



The 10th International Graduate Students Conference on Population and Public Health Sciences (IGSCPP)

July 25, 2019

Proceeding

The College of Public Health Sciences, Chulalongkorn University

Institute for Population and Social Research, Mahidol University

ASEAN Institute for Health Development, Mahidol University

The College of Public Health Sciences, Chulalongkorn University

International Conference Room and Room 1010, 1104

Institute Building 3, Phayathai Road, Bangkok.



Prof. Sathirakorn Pongpanich, Ph.D.
Chairperson, Executive Committee, 10th IGSCPP
Dean
The College of Public Health Sciences, Chulalongkorn University, Thailand
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Dear colleagues,

On behalf of the College of Public Health Sciences, Chulalongkorn University and Scientific Committees of the 10th International Graduate Students Conference on Population and Public Health Sciences, I would like to welcome all of you to the College of Public Health Sciences. There will be a number of student presentations reflecting the broad diversity of public health issues. We hope you will take the advantage of this opportunity to participate in interesting discussions as well as to meet with new colleagues.

I would like to thank the conference co-chair Assoc. Prof. Dr. Rossarin Gray, Director of Institute for Population and Social Research, Mahidol University and Asst. Prof. Dr. Phudit Tejativaddhana, MD, Director of ASEAN Institute of Health Development, Mahidol University as well as the members of the Organizing and Scientific Committees, colleagues and staff for their tireless efforts to organize this conference. I, as well, would also like to acknowledge significant support of Chulalongkorn University for this conference.

The success of the conference now rests upon your collective shoulders, in your presentations and participation. I encourage all of you to take in the experience as much as you can, to meet colleagues, to debate scientific perspectives, and of course, to take some time to enjoy the surroundings and Chulalongkorn University Campus.

Once again, welcome all of you to The 10th International Graduate Students Conference on Population and Public Health Sciences.





Assoc. Prof. Rossarin Gray, Ph.D.
Co- Chairperson, Executive Committee, 10th IGSCPP
Director
Institute for Population and Social Research, Mahidol University, Thailand
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Dear colleagues,

On behalf of Institute for Population and Social Research (IPSR), Mahidol University, I warmly welcome all of you to **"The 10th International Graduate Students Conference on Population and Public Health Sciences (IGSCPP)"**.

This conference has been conducted annually for almost a decade since 2010, to promote and strengthen the cooperative academic activities among three Institutes include the College of Public Health Sciences (CPHS), Chulalongkorn University, ASEAN Institute for Health Development (AIHD), and Institute for Population and Social Research (IPSR), Mahidol University.

Having with us today, the international participants attending the conference, I appreciate very much your interest in sharing and presenting research works in this conference, this would allow us and participants to enrich more knowledge and experiences from the discussions and presentations on various aspects such as population, social science, public health, health care, sexual and reproductive health, STIs/HIV/AIDS, and others. Besides, it is an opportunity for the graduate program students to have a platform to experience their presentations to the public. Certainty, the dissemination of research quality and findings would be beneficial for the further feedback and network establishment.

On this occasion, I would like to extend my sincere congratulations and gratitude to the College of Public Health Sciences (CPHS), Chulalongkorn University, ASEAN Institute for Health Development (AIHD), and Institute for Population and Social Research (IPSR), Mahidol University for supporting and organizing this conference.

Again, I would like to thank all of participants and organizing teams for the contributions to this conference, I wish you find this conference very fruitful and enjoyable.

Thank you.



Asst. Prof. Dr.Phudit Tejativaddhana
Co-Chair, Executive Committee, 10th IGSCPP
Director
ASEAN Institute for Health Development, Mahidol University, Thailand
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Dear colleagues,

On behalf of the ASEAN Institute for Health Development, Mahidol University and the organizing committee, I am delighted to welcome you to the 10th International Graduate Students Conference on Population and Public Health Sciences (IGSCPP) hosted by the College of Public Health Sciences, Chulalongkorn University in cooperation with the Institute for Social and Population Studies and the ASEAN Institute for Health Development of Mahidol University. The primary objectives of the 10th IGSCPP are to provide graduate students, faculties, and researchers with opportunities for developing and presenting academic paper and research at a national and international conference and to enhance the quality of research in Population and Public Health in order to reach international standards.

On this occasion, I would like to thank the respected speaker for sharing perspective and experience with participants. I would particularly like to extend my appreciation to students who contribute to disseminate graduate research among research communities to benefit the public at both national and international levels. I am particularly pleased to express my appreciation to CPHS for all the preparations that have been made in creating the optimal conditions for this respected event.

I sincerely hope that this conference will devote to showcasing population and public health sciences at national and international levels. Lastly, I would like to congratulate you for your commitment and active participation and wish you all the success.



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July 25, 2019
The College of Public Health Sciences, Chulalongkorn University
International Conference Room and Room 1010, 1104 Institute Building 3,
Phayathai Road, Bangkok.

Time	Program
8.00-8.45	**Registration**
8.45-9.00	**Conference Welcome Report** **Welcome keynote:** *Professor Sathirakorn Pongpanich, Ph.D.* *Dean, College of Public Health Sciences,* *Chulalongkorn University* *Asst. Prof. Phudit Tejativaddhana, Ph.D., MD* *Director, ASEAN Institute of Health Development,* *Mahidol University* *Associate Professor Rossarin Gray, Ph.D.* *Director, Institute for Population and Social Research, Mahidol University* *MC: Assoc. Prof. Chitlada Areesantichai, Ph.D.*
9.00-9.15	**Group Photo**
9.15-9.45	**Special Lecture:** Designing Health System to Meet Challenges in Aging Society *Somsak Chunharas, Ph.D., MD* *Executive Managing Director of National Health Foundation,* *Former Deputy Minister of Public Health* *Chairperson & Co-chairperson:* *Assoc. Prof. Wattasit Siriwong, Ph.D. / Montakarn Chuemchit, Ph.D.*
9.45-10.30	**Coffee Break / Poster Presentation**
10.30-12.00	**Oral Presentation**
Room inter. floor 2	**Track 4:** Reproductive, Sexual Health & Sexually, Communicable Diseases (CD) and Non-communicable Diseases (NCD) ***Chairperson & Co-Chairperson*** *Asst. Prof.Pojjana Hunchangsith, Ph.D. / Asst. Prof. Dr.Bang-On Thepthien* ***Outstanding awards committee:*** *Pramon Viwattanakulvanid, Ph.D.* ***Moderator:*** *Warapree Tangseefa / Kyi Kyi Hlyan Win / Langoya Justine John* 1) Antenatal Care-seeking Behavior among Women Having Children Under Five Years of Age in Rural Areas of Kachin State, Myanmar (#01) *by Nay Zar Win*

Time	Program
	2) Knowledge and Attitude of Nurses and the Screening for Gender-Based Violence Patient (#02) *by Aye Nyein Ei* 3) The Sociocultural Determinants of Anemia among Women of Reproductive Age in Eastern Indonesia: Analysis of Indonesia Family Life Survey East 2012 (#03) *by Mareta Linia* 4) Male Family Planning Practice among Husbands of Reproductive-age Married Women in Rural Areas of Kachin State, Myanmar (#04) *by Kaung Htet Soe*
Room 1010 floor 10	**Track 1:** Population, Demography, Aging and Migration **Track 3:** Primary Health Care, Global Health Care, Health Care Mgmt, Health Policy and Administration, Long-term Care System, Health Promotion, Health Behaviours **Track 6:** Health System Res, Sustainable Development Goal, District Health System, Health System Research, Zoonoses, Antimicrobial Resistance and One Health ***Chairperson & Co-Chairperson:*** *Asst.Prof. Aroonsri MongkolChati, Ph.D. / Dusita Phuengsamran, Ph.D.* ***Committee:*** *Asst.Prof. Nate Hongkrailert, Ph.D.* ***Moderator:*** *Phannathat Tanthanapanyakorn / Pallavi Koirala / Pema Yangchen* 1) Factors Associated with Quality of Life in Elderly over 50 Years Old in Thailand *by Pajaree Areerop* 2) Lived Experiences of Senior Citizens on Food Supplements *by Marianne P. Manego* 3) Human Resources for Health Gap and Factors Influencing Intention to Stay in Chin State Myanmar *by Peter Khai Deih Tung*
Room 1104 floor 11	**Track 2:** Public Health, Public Health Sc. & Health Social Sc., Healthcare 4.0 **Track 5:** Environmental and Occupational Health, Sustainable Development Goal, Global warming, Disaster, Resilience Health System Research, Zoonoses, Antimicrobial Resistance and One Health ***Chairperson & Co-Chairperson:*** *Asst. Prof. Nutta Taneepanichskul, Ph.D. / Onuma Zongram, Ph.D.* ***Committee:*** *Asst. Prof. Apa Puckpinyo, Ph.D.* ***Moderator:*** *Titaporn Luangwilai / Salila Cetthakrikul / Bhima Parajuli* 1) Factors Affecting Practice of Voluntary Blood Donation among University and College Students in Yangon, Myanmar *by Aye Chan Oo* 2) Designing Software to Calculate the Percentage of Materials Used in the Production of Compost According to the C:N Ratio *by Reihaneh Reyahi-Khoram* 3) Health Risk Assessment of Respirable Marble Dust Exposure Among Marble Stone Cutting Workers in Kyauk Sitt Tann Street of Mandalay City, Myanmar *by Cho Lwin Tun*

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	4) Factors Predicting Low Birth Weight Infants from Mothers with Previous Antenatal Care Service use at Huayploo Hospital, Nakhon Pathom *by Nuttawoot Photisan* 5) Factors Associating with Under-nutrition among Under- five Children in Myanmar *by Naw Kyi Pyar*
12.00-13.00	**Lunch**
13.00-13.30	**Poster Presentation** ***Poster committees:*** *Nanta Auamkul, M.D, M.P.H /Kriangkrai Lerdthusnee, Ph.D.* *Nipunporn Voramongkol, M.D. MPH. / Napaphan Viriyautsahakul, Ph.D.* *Asst. Prof. Orapin Laosee, Ph.D.*
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Note: The schedule of oral presentation will depend on the paper submission.

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FACTORS ASSOCIATED WITH QUALITY OF LIFE IN ELDERLY OVER 50 YEARS OLD IN THAILAND

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ABSTRACT

Introduction: Understanding quality of life among older people and middle age and associated factors is significant.
Objectives: This cross sectional survey research aimed to examine the association between selected factors and quality of life among older adults, aged over 50 years.
Methodology: Out of 3,720 participants who met the inclusion criteria were recruited. Selected factors in this study focused on four aspects: 1) personal factors including age, gender, marital status, education, religion, household income and occupation; 2) environment factors i.e. health service receiving, health care insurance, home safety and social support; 3) Health conditions such as suffering from Non Communicable Diseases and self-perception on health; and 4) Body function and health conditions including vision impairment, cognitive impairment and movement problems. For the quality of life aspect, this study used three types: 1) an 8 items subjective well-being score as the sum score of subjective well-being; 2) measurement of satisfaction and happiness in life as overall score of subjective well-being; and 3) self-rated quality of life. This study used the questionnaires created for the Study on Thai Global Aging and Adult Health (SAGE) project, and collected data through interviewing participants by research assistants. Frequency, percentage, mean, standard deviation, and binary logistic regression were used to analyze data.
Conclusion: The results revealed that majority, participants were female (63.0%), aged over 60 years 60.80)%), married (69.10%), household income greater 10000 Thai baht/month(79.30%), working (69.40%), and receiving at least primary school level (79.80%). Quality of life, including subjective well-being and self-rated quality of life, was poor according to the sum score and overall score of subjective well-being 51.30)% and62 % respectively); however, most people rated their quality of life as good 72.50)%) This study found that age, occupation, cognitive impairment and self-perception in health were associated with overall score of subjective well-being. Only self- perception on health was significantly associated with both subjective well-being and quality of life aspects. Health care profession should provide initiatives or campaigns to promote health which may improve the self – perception on health care system is needed and an intervention study to improve quality of life among an older adult is required for future research.
Keywords: Subjective well-being, Quality of life, Older adults, Association, elderly

INTRODUCTION

Quality of life among older people is significant because of three main reasons: a growth of ageing population, ageing process related changes and high impact of quality of life.

First, a growth of aging population is a major reason to increase the significance of awareness on quality of life in older adult . A growth of aging population in Asia as well as in Thailand [1, 2] reflects on increasing size of their needs or problems and requires more attention for studying quality of life among this group.

Second, ageing process related changes are important for older people because they may affect their health status, physical functions and quality of life [3] . Ageing process related changes usually shows a

decline trend to physical functions [4]. Therefore, it may relate to their psychological and social aspect among older people[4-7]. Some older people develop both chronic diseases and communicable diseases later because of their changes and poor health behaviors. Furthermore, previous studies [5] mentioned that suffering from health problems such as chronic problem especially depression, chronic or disable pain such as degenerative osteoarthritis, sensory or visual perception loss[8], learning difficulty or functional declines may lead to low quality of life in the future [9-11].

Third, high impact of quality of life should be concerned because it may lead to an increased social participation which can keep their active ageing. On the other hand, low quality of life may relate to depression and suicide which is a great loss for their families and society. Furthermore, older people with depression may be dependent, sedentary and require assistance from their caregivers on their own activity of daily living. These factors may develop non communicable diseases in the future and will increase cost of care such as medical care and informal care cost.

However, the high cost of care may not be positive for Thailand, one of the middle income countries with a limited budget. If most parts of budget will be put to treatment and medical care cost, it is not a good investment. Therefore, health promotion and disease prevention in particular increasing quality of life [12] and depression prevention should be more prioritized.

Furthermore, preventive and proactive activities should be involved comprehensive health prevention and care that is based on QOL and active aging. All factors require a healthy behaviors or satisfaction not only when reaching to old age group, but also do a good transition from the middle age period. Most older people' s quality of life studies usually focus on quality of life during the middle age as well because it may be a good predictor to indicate status of older people's quality of life. Furthermore, health promotion program to enhance older people's quality of life may need to start promoting from earlier age group. Therefore, studies on quality of life among middle age group are urgently needed.

There are various aspects of viewing quality of life among older people. The first aspect of quality of life is looking quality of life as a whole, health related quality of life (HRQOL) and subjective well-being.

This study focuses on quality of life in terms of subjective well- being because of less complexity, depending on one person's view or perspective and reflecting on the true emotional and satisfaction only. Therefore, this study aims to examine an association between personal factors, environmental factors, health condition, body function and health structure and quality of life in terms of subjective well-being among elderly who aged greater than 50 years old. Results from this study will provide more information about associative factors to quality of life and then may guide practice and policy to improve quality of life among older people in the future.

METHODOLOGY

Research design

A cross sectional descriptive survey

Population, sample and sampling

The target population for this study was adults aged 50 years and older who are Thai citizen and met the inclusion criteria: 1) All Thai citizens aged 50 years and older who was utilized out-patient department at selected community hospital ,2) Respondents who had the ability to communicate, and 3) Respondents who was willing to participate the study. However, the elderly who lived in study areas less than 6 mouths were excluded from the study.

Sample and sampling

Sampling method was the multi stage sampling techniques as shown in Figure 1.

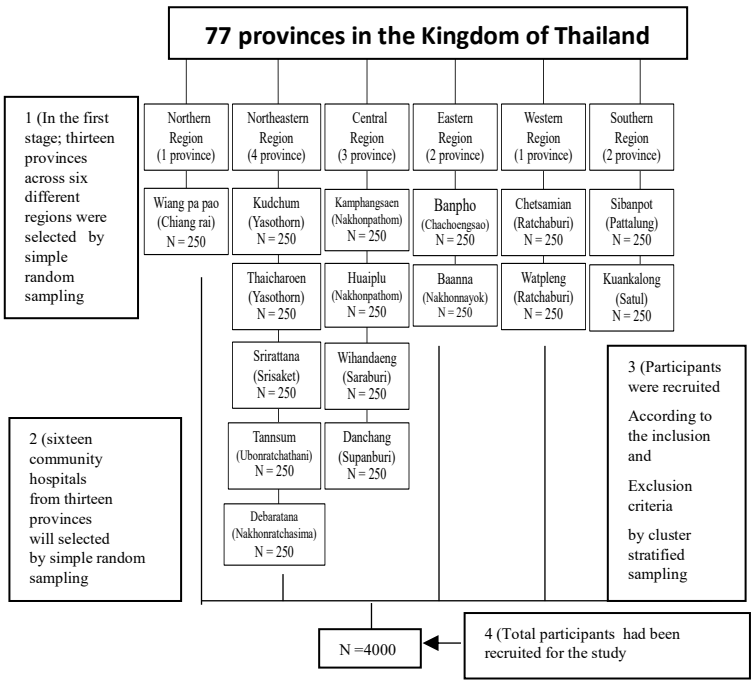


Figure 1 The three-stage sampling.

The calculation of the sample size had been described below.

$$n = \frac{Z^2 p(1-p)}{d^2}$$

$$n = \frac{1.96^2 (0.295)(1-0.295)}{0.015^2}$$

$$= 3550.919$$

Z = 95% confidence interval

E = 1.5% acceptance error

Z = 1.96 standard normal score at 95% confidence interval

E = 1.5 %acceptance error

P = 29.5% the percent of good quality of life in Thai eldery (Hongthong, Somrongthong, & Ward, 2015)

The sample size of SAGE in the Thailand hospitals is 3551 people who aged over 50 years .Furthermore, 10% additional participants were recruited to prevent missing data. Therefore, 3,906 participants who aged over 50 years in the selected district hospitals were interviewed, as they visit the out-patient department. This quality of life instrument we adapted from the Study on Global Ageing and Adult Health (SAGE) which supported by WHO. The total 4,000 participants were recruited to the study.

Firstly, purposive sampling technique had been used to select thirteen provinces across six different regions from the kingdom of Thailand .Secondly, sixteen community hospitals had been selected by purposive sampling technique from the thirteen provinces .Lastly, systemic sampling had been used to select the 250 participant aged 50 years and older from community .The participants had been selected according to inclusion and exclusion criteria.

In each of the 16 districts, 250 participants who aged 50 years and older had been recruited consecutively, as they are in the district.

The sample size of SAGE in the Thailand hospitals were 4000 people aged over 50 years .All people who met the recruitment criteria had been interviewed, as they visited the out-patient departments.

In each of the 16 district hospitals, 245 patients 50 years and older have been recruited consecutively, as they are in the district hospital.

However, after data edition, only 3,720 participants reported the completed most responses in this study.

Research instruments

Face-to-face individual questionnaires were performed to collect the data as a research instrument. In general, the questionnaires contained closed ended questions to generate quantitative data. Established questionnaires from the study on Global ageing) SAGE (had been modified according to variable in the study .The questionnaires consisted of six parts .The details were given below :

1) Personal factors including age, gender, marital status, education, religion, household income and occupation were used as the selected factors.

2) Environment factors including health service receiving, health care insurance, home safety and social support were used as the selected factors.

3) Health conditions including suffering from Non Communicable Diseases and self-perception on health were used as the selected factors.

4) Body function and health conditions including vision impairment,

cognitive impairment and movement problems.

5) For the quality of life aspect, this study used three types:

- An 8 items subjective well-being score as the sum score of subjective well-being; It is included four main aspects: 1) enough energy for daily life; 2) enough money to meet needs; 3) satisfaction with various aspects such as health, self, ability to perform daily activities, personal relationships and condition of living place and 4) overall quality of life. The questionnaire was the self-rated of 8 items and each item was categorized as five levels (score 1 equated to completely or very satisfied and score 5 equated to very dissatisfied). Then scores from each item were summed and transformed to percentage or 100 scores. Higher scores meant poorer quality of life, whereas lower scores meant better quality of life [13]. Furthermore, for the logistic regression analysis, scores were categorized as two groups using medians (45 score) as the cut point score: poor quality of life (greater than 45) and good quality of life (less than 45).

- Measurement of satisfaction and happiness in life as an overall score of subjective well-being Scores of each item ranged from 1-5 and higher scores meant poor well-being and lower score meant good well-being. For the logistic regression analyses, the researcher computed scores which were rated from two items and then divided scores into two groups: good wellbeing (less than four of tenth scores) and poor wellbeing (equate or greater than four of tenth scores).

- Self-rated quality of life ranged from 1-10 scores, 1 referred to the poorest quality of life and 10 referred to the highest quality of life. For the logistic regression analyses, the researcher computed scores which were rated from two items and then divided scores into two groups: good wellbeing (7-10 scores) and poor wellbeing (1-6 scores).

All factors data were divided into two groups to prepare data for the logistic regression analyses.

Validity and reliability of the instruments

This study used the questionnaires which created for the Study on Global AGEing and Adult Health (SAGE) project in various countries [14]. All questionnaires were well developed and tested for both validity and reliability. Validity were tested and reported by Cabellero and their colleagues [15]. Furthermore, reliability tests were reported from previous studies in Tanzania and south Africa [13,16].

For the Thai version, content validity was tested using three experts from AIHD Mahidol University to review the questionnaire .The researcher had revised and refined questionnaires based on these experts' comments and input After revised according to experts, the questionnaires were translated into "Thai "language .Before handling the research process, the Thai translation questionnaires were conducted to 30 adults aged over 50 years in a selected community hospital .The purpose of conduct in the pre-test was to detect any unclear statement, or misleading or highly sensitive questions in the research instrument, and to check the questions to ensure the validity and reliability of the questionnaire value 0.87.

Data Collection

Data had been collected by research assistants, after getting the permission from The Ethics Committee of Mahidol University . It was started in September 2015 to March of 2016, with the collection period lasting a maximum of 6 months. Face-to-face interview method and anthropometric measurement had been used to fill up the questionnaire .

Then, research assistants had been recruited from selected sixteen community hospitals .They had been trained to ensure the confident to fill the questionnaire and for the appropriate anthropometric measurements . One day training had been organized to introduce the questionnaire and ethical issues to them.

The interviewers explained the purpose of the research and make sure the respondents understand that the collected data were keep confidential and therefore the respondents had the right to decline to answer or withdraw from participation in the study if they feel that they did not want to continue for any reason .

A written informed consent form was given to the respondents to read; the forms were explained by research assistants before. The respondents were asked to make any decision as to whether to participate in the

study. Approximately 45 minutes to fill up the whole questionnaire.

Data Analyses

Frequency, percentage, mean, standard deviation, and binary logistic regression were used to analyze data. The SPSS statistic package was used and p-value <0.05 of the factors included in binary and multiple logistic regression.

RESULTS

Personal characteristics of participants

This study included socio demographic data such as age, religion denomination, gender, educational level, marital status, household income and occupation as personal factors to help understand background of participants and also include these variables as the independent variables towards quality of life among the elderly.

This part showed frequency, percentage, average and standard deviation of personal factors.

Most participants were female (63.00%), aged over 60 years old (60.80%), believed in Buddhism (92.30%), being married (69.10%), Household income greater than 10,000 Baht/Month (79.30%). Furthermore, most participants had still worked (69.40%), graduated higher than primary school level (79.80%) or had the median score of educational year about 4 years. Details of these personal factors as shown in Table 1.

Table 1 Frequency, Percentage, Average and Standard Deviation of Personal Factors among the elderly aged over 50 years (N=3,720)

Characteristics	frequency	Percent
Gender		
- Male	1,375	**37.00**
- Female	2,345	**63.00**
Age group (N= 3,712)		
<60 years	1,454	**39.20**
≥ 60 years	2,258	**60.80**
Mean= 63.80 yrs, Median = 62 yrs MIN-MAX =50-97		
Religion		
-Buddhism	3,433	**92.30**
- Other	287	**7.70**
Marital status		
- being married	2,570	**69.10**
- others	1,150	**30.90**
Household income (baht/month)		
- ≥ 10,000	2,949	**79.30**
- < 10,000	771	**20.70**
Occupation status		
- work	2,582	**69.40**

Characteristics	frequency	Percent
- none	1,138	**30.60**
Educational level (n=3,698)		
>primary school	2,950	79.80
≤primary school	748	20.20
Median of Educational years = 4.00		

It was found that age (Adjusted OR.=1.17, 95% CI=1.01-1.35,p=0.03), educational level (Adjusted OR.=1.28, 95% CI=1.07-1.53, p=0.01), occupation (Adjusted OR.=0.88, 95%CI=0.75-1.02, p value= 0.08), cognitive impairment (Adjusted OR.=1.14, 95% CI=1.00-1.31, p value= 0.06) , and self-perception in health (Adjusted OR.=1.36, 95% CI=1.18-1.56, p=0.00) were associated with overall score of subjective well-being as shown in table 2.

Table 2 Frequency, percentage, crude OR, Adjusted OR, 95% CI and P value of factors influenced to the overall score of Self-rated QOL score (N=3,270)

Factors	Overall self rated QOL score (%) good	poor	Crude OR	Adjusted	95% CI	P-value
Gender						
- Male	513(13.8%)	862(23.2%)	**0.96**	**0.93**	**0.80-1.07**	**0.30**
- Female	899(24.2%)	1446(38.9%)	**1**	**1**		
Age						
- <60 yrs	596(16.1%)	858(23.1%)	**1.23**	**1.17**	**1.01-1.35**	**0.03***
- ≥ 60 yrs	814(21.9%)	1444(38.9%)	1	**1**		
Religion						
- Buddhist	1294(34.8%)	2139(57.5%)	**0.87**	**0.91**	**0.71-1.18**	**0.49**
- Non Buddhist	118(3.2%)	169(4.5%)	1	**1**		
Education						
-≥Primary school	1158(31.3%)	1792(48.5%)	**1.36**	**1.28**	**1.07-1.53**	**0.01***
-< Primary school	241(6.5%)	507(13.7%)	1	**1**		
Marital status						
- Married	991(26.6%)	1579(42.4%)	**1.09**	**1.08**	**0.92-1.26**	**0.35**
- No Couple	421(11.3%)	729(19.6%)	1	**1**		
Occupation						
- Working	1005(27.0%)	1697(45.6%)	**0.89**	**0.85**	**0.73-0.99**	**0.04***
- No work	407(10.9%)	611(16.4%)	1	**1**		
Household income						

*Remark: p-value< 0.05

Only self- perception on health was significantly associated with both subjective well-being and quality of life aspects (p value less than 0.05) (Adjusted OR.=1.33, 95%CI=1.15-1.54, p<0.05; Adjusted OR.=1.32, 95%CI=1.14-1.54, p<0.05). The association with quality of life aspect was presented in Table 3and 4.

Table 3 Frequency, percentage, crude OR, Adjusted OR, 95% CI and P value of factors influenced to the sum score of Self-rated QOL score (N=3270)

Factors	Self-rated QOL score (%)		Crude OR	Adjusted	95% CI	P-value
	good	poor				
Gender						
- Male	683(18.4%)	692(18.6%)	**1.06**	**1.03**	**0.92-1.19**	**0.61**
- Female	1,130(30.4%)	1,215(32.7%)	**1**	**1**		
Age						
- <60 yrs	720(19.4%)	734 (19.8%)	**1.05**	**1.05**	**0.92-1.22**	**0.43**
- ≥ 60 yrs	1,090 (29.4%)	1,168(31.5%)	**1**	**1**		
Religion						
- Buddhist	1,672(44.9%)	1,761(47.3%)	**0.98**	**NA**	**NA**	**NA**
- Non Buddhist	141(3.8%)	146(3.9%)	**1**	**1**		
Education						
-≥Primary school	1,420(38.4%)	1,530(41.4%)	**0.91**	**0.92**	**0.77-1.08**	**0.31**
-< Primary school	377(10.2%)	371(10.0%)	**1**	**1**		
Marital status						
- Married	1,264(34.0%)	1,306(35.1%)	**1.06**	**1.05**	**0.89-1.22**	**0.53**
- No Couple	549(14.8%)	601(16.2%)	**1**	**1**		
Occupation						
- Working	1,293(34.3%)	1,409(37.9%)	**0.88**	**0.88**	**0.75-1.02**	**0.08**
- No work	520(14.0%)	498(13.4%)	**1**	**1**		
Household income						
- >10,000 Thai Baht	1,442(38.8%)	1,507(40.5%)	**1.03**	**1.05**	**0.89-1.05**	**0.59**
-≤ 10,000 Thai Baht	371(10.0%)	400(10.8%)	**1**	**1**		
Health service use						
- Used	224(6.0%)	245(6.6%)	**0.96**	**NA**	**NA**	**NA**
- Never used	1,582(42.7%)	1,656(44.7%)				
Health Insurance						
- Having insurance	1809(48.6%)	1901(51.1%)	**1.43**	**NA**	**NA**	**NA**
- No insurance	4(0.1%)	6(0.2%)				
Social support						
- Good	1245(33.5%)	1337(35.9%)	**0.93**	**0.94**	**0.82-1.09**	**0.42**
- Poor	568(15.3%)	570(15.3%)	**1**	**1**		
NCD						
- None	1556(42.1%)	1648(44.3%)	**1.00**	**NA**	**NA**	**NA**
- Having NCD	247(6.6%)	259(7.0%)	**1**	**1**		
Home safety						
- Being safe	1,540(41.6%)	1,658(44.8%)	**0.87**	**0.89**	**0.73-1.07**	**0.22**
- No safe	262(7.1%)	244(6.6%)	**1**	**1**		
Perception in Health						
- good	625(16.8%)	530(14.2%)	**1.37**	**1.33**	**1.15-1.54**	**0.00***
- poor	1,188(31.9%)	1,377(37.0%)	**1**	**1**		
Vision impairment						
- None	1482(40.5%)	1590(43.4%)	**0.91**	**0.93**	**0.78-1.12**	**0.46**
- yes	298(8.1%)	292(8.0%)	**1**	**1**		
Movement problem						
- No	90(2.4%)	69(1.9%)	**1.40**	**1.32**	**0.95-1.83**	**0.10**
- yes	1710(46.2%)	1832(49.5%)	**1**	**1**		
Cognitive impairment						
- No	977(26.3%)	949(25.5%)	**1.18**	**1.14**	**1.00-1.31**	**0.06**
- Yes	836(22.5%)	958(25.8%)	**1**	**1**		

*Remark: p-value< 0.05

Table 4 Frequency, percentage, crude OR, Adjusted OR, 95% CI and P value of factors influenced to the self-rated quality of life score (N=3270)

Factors	Self-rated QOL score (%)		Crude OR	Adjusted	95% CI	P-value
	good	poor				
Gender						
- Male	990(26.6%)	385(10.3%)	**0.96**	**0.90**	**0.77-1.05**	**0.18**
- Female	1707(45.9%)	638(17.2%)	**1**	**1**		
Age						
- <60 yrs	1060(28.6%)	394(10.6%)	**1.03**	**NA**	**NA**	**NA**
- ≥ 60 yrs	1631(43.9%)	627(16.9%)	**1**	**1**		
Religion						
- Buddhist	2488(66.9%)	945(25.4%)	**0.90**	**NA**	**NA**	**NA**
- Non Buddhist	209(5.6%)	78(2.1%)	**1**	**1**		
Education						
-≥Primary school	2133(57.7%)	817(22.1%)	**0.96**	**0.94**	**0.78-1.13**	**0.48**
-< Primary school	547(14.8%)	201(5.4%)	**1**	**1**		
Marital status						
- Married	1875(50.4%)	695(18.7%)	**1.08**	**1.11**	**0.94-1.31**	**0.22**
- No Couple	822(22.1%)	328(8.8%)	**1**	**1**		
Occupation						
- Working	1975(53.1%)	727(19.5%)	**1.11**	1.06	0.90-1.25	0.47
- No work	722(19.4%)	296(8.0%)	**1**	**1**		
Household income						
- >10,000 Thai Baht	2146(57.7%)	803(21.6%)	**1.07**	1.08	0.90-1.29	0.43
- ≤ 10,000 Thai Baht	551(14.8%)	220(5.9%)	**1**	**1**		
Health service use						
- Used	322(8.7%)	147(4.0%)	**0.80**	0.82	0.66-1.02	0.07*
- Never used	2369(63.9%)	869(23.4%)	**1**	**1**		
Health Insurance						
- Having insurance	2692(72.4%)	1018(27.4%)	**2.64**	2.43	0.69-8.54	0.17
- No insurance	5(0.1%)	5(0.1%)	**1**	**1**		
Social support						
- Good	1886(50.7%)	696(18.7%)	**1.09**	1.02	0.87-1.20	0.78
- Poor	811(21.8%)	327(8.8%)	**1**	**1**		
NCD						
- None	2339(62.9%)	875(23.5%)	**1.08**	1.13	0.91-1.39	0.27
- Having NCD	358(9.6%)	148(4.0%)	**1**	**1**		
Home safety						
- Being safe	2334(63.0%)	864(23.3%)	**1.17**	1.20	0.97-1.48	0.098
- No safe	353(9.5%)	153(4.1%)	**1**	**1**		
Perception in Health						
- good	924(24.8%)	231(6.2%)	**1.79**	1.69	1.41-2.01	0.00*
- poor	1773(47.7%)	792(21.3%)	**1**	**1**		
Vision impairment						
- None	2230(60.9%)	842(23.0%)	**0.99**	1.07	0.87-1.31	0.54
- yes	429(11.7%)	161(4.4%)	**1**	**1**		
Movement problem						
- No	112(3.0%)	47(1.3%)	**0.90**	0.85	0.59-1.22	0.37
- yes	2570(69.4%)	972(26.3%)	**1**	**1**		
Cognitive impairment						
- No	1473(39.6%)	453(12.2%)	**1.51**	1.40	1.20-1.63	0.00*
- Yes	1224(32.9%)	570(15.3%)	**1**	**1**		

*Remark: p-value< 0.05

DISCUSSION

The results revealed that age was significantly associated with the overall score of subjective well-being. It was congruent with previous studies [11,17-20]. In particular, age over 60 years may lead to a low quality of life.

Educational level was significantly associated with the overall score of subjective well-being (Crude OR.=1.36(. Then after adjustment, there was also be confirmed (Adjusted OR. =1.28, 95%CI=1.07-1.53, p=0.01). This results was congruent with Mwanyangala and his colleagues' s study[13] which explored the relationship between activities of daily living and quality of life among older people in rural Tanzania which was a part of TSAGE project as well. Furthermore, it is congruent with previous studies in rural areas of Thailand [17,21]. This phenomenon may be caused by educational level may increase an opportunity for older people in terms of seeking helps, information or ways to improve their quality of life. Furthermore, the characteristics of participants of these three studies such as living the rural area of Thailand may be the key as well.

Occupation was also significantly associated with the overall score of subjective well-being (Crude OR.=0.89). Then after adjustment, there was also be confirmed (Adjusted OR.=0.85, 95%CI=0.73-0.99, p=0.04). The result of this study was congruent with previous studies in Thailand, especially Hongthong's study [17], also found the significant associated with on occupation factor. However, the results showed the interesting result that adults who are working, tended to have lower quality of life than those who are not working. It may be caused two reasons: working may feel stressed and have low quality of life; Thai culture or belief that when people are getting old, they should have a resting time.

Cognitive impairment was related to the quality of life. This result was congruent with previous studies in Europe and Asia[4,6,22,23]. This phenomenon may cause by the older people perceived their limitation from their cognitive impairment. All these factors usually link to independence and self-care among older people which older people still want to maintain their own activities and function in particular for those with mild cognitive impairment group [23]. If they cannot work on or help themselves to do activities, it may diminish the quality of life or wellbeing of them in the future.

Only self- perception on health was significantly associated with both subjective well-being and quality of life aspects (p value less than 0.05) (Adjusted OR.=1.33, 95%CI=1.15-1.54, p<0.05; Adjusted OR.=1.32, 95%CI=1.14-1.54, p=0.00). This result showed similarly with previous study which mentioned that quality of life, which are mostly well-being concept[17], may link to the health status even it is occurs in the negative trends [6,10,11,24].

CONCLUSIONS

Only age, educational level, occupation, cognitive impairment and self perception on health were significantly associated with quality of life. Recommendations from this study were: 1) for practice, health care profession should provide initiatives or campaigns to promote health which may improve the self –perception on health; 2) for policy, retirement extension should be reviewed, and opportunity to learn both formal and informal systems should be increased; and 3) testing the effect of an intervention to improve subjective well-being and quality of life is required for future research. In addition, the further study should be done to confirm that the eldery who still work have more stress and reflect to their low quality of life before making a policy recommendation on this issue.

ACKNOWLEDGEMENTS

I would like to express my thankfulness to all participants in this research and research assistants. Also, Dr. Suriya Kuharat, the Chief of Ratchaburi Provincial health Officer and my colleagues at ASEAN Institute of Health Care Development, Mahidol University for their continual support and encouragement. Finally, my special thank goes to my family for their endless support during my master's degree journey.

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STRATEGIC ANALYSIS FOR ESTABLISH SERVICE PLAN OF CHRONIC KIDNEY DISEASE (CKD) IN PRIMARY CARE, BANGKOK BY MODIFIED DELPHI TECHNIQUE

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ABSTRACT

Introduction: Chronic Kidney Disease (CKD) is the global burden including Thailand. Based on the significant impact of CKD, the Kidney Disease Outcomes Quality Initiative (KDOQI) and Kidney Disease Improving Global Outcomes (KDIGO) recommend an early detection and appropriate treatment. The substantial underdiagnosis and inappropriate care lead to lost opportunities for prevention and contribute to disease progression to end-stage renal disease (ESRD) and increased cardiovascular risk. In Bangkok, there are primary cares such as Public Health Centers set up all over 50 districts. Diabetes Mellitus clinic personnel included physician, OPD nurse, community nurse, laboratory nurse, and pharmacist. Most doctors work as general practitioners (GP) and no Nephrologist for CKD evaluation and proper treatment. This may have resulted in care gaps for patients with CKD in primary care.
Objectives: To explore the administrators, supervisors, and practitioners perceptions and opinions about service plan for CKD development in PHCs, Health Department, Bangkok Metropolitan Administration, Thailand in the fiscal year 2019.
Methodology: A qualitative study using modified Delphi technique was done in 8 PHCs of Health Department, Bangkok Metropolitan Administration, between 1st November 2018 to 30th April 2019. A total of 50 participants included 40 healthcare providers in DM clinic, 8 directors of PHCs, and 2 executive directors of Health Department were included in this study. The 50 participants are grouped into 3 levels: policy, administrative, and operation level. The process consists of a series of rounds by using questionnaires and in-depth interview. The questionnaire composed of 15 questions and using the Likert scale 5-point ordinal scale by identified to 3 perception measurements including knowledge, awareness, and management categories.
Conclusion: Both rounds agreement on outcomes retained for all feedback groups were more than 90%. The highest and lowest mean score are knowledge perception and management perception respectively. The awareness perception was very different mean score between the policy level and the operational level in round 1. Fortunately, the awareness perception in policy level were increased in round 2. In this study, we found healthcare provider began to realize and saw the importance of preventing CKD by patients-centered care. A poor healthcare system such as the database, systematic referral, and consult system is a barrier to improve quality of care. However the Health Department may define a clear policy and support budget, tools, human resources and appropriate guideline that easy to follow.
Keywords: Primary care, Service plan, Chronic Kidney Disease, Public Health Center

INTRODUCTION

Chronic kidney disease (CKD) is the noncommunicable diseases (NCDs) and associated with an eight-to tenfold increase in cardiovascular mortality and is a risk multiplier in patients with diabetes [1]. The Global Burden of Disease (GBD) 2015 study also estimated that, in 2015, 1.2 million people died from kidney failure, an increase of 32%

since 2005 [2]. Overall, therefore, an estimated 5-10 million people die annually from kidney disease [3]. Type 2 diabetes mellitus is the leading cause of incidence and prevalence of chronic kidney disease (CKD), accounting for about 30% to 40% of CKD and up to 45% of end-stage renal disease (ESRD) [4, 5]. The incidence of chronic kidney disease was high in 2016 and discovered that kidney disease affects 2-9 million Thai people [6].The high burden of Chronic Kidney Disease (CKD) in Diabetes Mellitus (DM) and the associated adverse outcomes result in high health care budget [7]. Based on the significant impact of CKD, the Kidney Disease Outcomes Quality Initiative (KDOQI) and Kidney Disease Improving Global Outcomes (KDIGO) recommend a focus on early detection which may allow for treatment directed to prevent or slow progression and treatment of associated complications and comorbidities such as cardiovascular disease (CVD) [8]. Substantial underdiagnosis of CKD leads to lost opportunities for prevention, and inadequate or inappropriate care of patients with DM and CKD may contribute to disease progression to ESRD [9]. In Bangkok, there are primary care such as Public Health Centers (PHCs) set up all over 50 districts. The Health Department, Bangkok Metropolitan Administration has 68 PHCs which established DM clinic. DM clinic personnel included physician, OPD nurse, community nurse for home visit and home health care patients with complications or poor diabetes control, laboratory nurse acting to collect laboratory specimens and take care of patients with acute complications, and pharmacist. Most doctors work as general practitioners (GP) and no Nephrologist for CKD evaluation and proper treatment. No CKD guideline for primary care. Some primary care providers may not necessarily be targeted by CKD guideline for hospital, and not aware of care recommendations for patients with CKD. This may have resulted in care gaps for patients with CKD in primary care. The purpose of this study was to explore the strategy for service plan CKD development in PHCs, Health Department, Bangkok Metropolitan Administration, Thailand in the fiscal year 2019.

METHODOLOGY

This qualitative study was conducted between 1st November 2018 to 30th April 2019. An analytical research design was applied for this study and used the modified Delphi technique.

Study Population and Sample size

The study was carried out in 8 PHCs (the 5th, 9th, 14th, 16th, 22nd, 52nd, 66th, 67th PHC), Health Department, Bangkok Metropolitan Administration. The reason is the policy of Health Department for the service plan of CKD will be developed in 8 PHCs. A total of 50 participants included 40 healthcare providers (physicians, OPD nurses, community nurses, laboratory nurses and pharmacists), 8 directors of PHCs, and 2 executive directors of Health Department were included in the study. For exploration the strategy to develop the service plan for CKD. The modified Delphi technique by a paper-based questionnaire was conducted to gather data for analysis. The process consists of series of rounds.

Round 1 (December 2018) was conducted to survey and collect the opinions of healthcare providers, the directors and the executive directors in each individual contribute with information that he/she believes is pertinent about chronic kidney disease (CKD). The questionnaire composed of 15 questions and using the 5-point ordinal Likert (5= strongly agree, 4=agree, 3=undecided/ don't know, 2=disagree, and 1=strongly disagree). The 15 questions were categorized into 3 dimension of perception measurements including knowledge, awareness, and management (5 questions in each categories).

Round 2 (March 2019) was done after round 1 about 2 months. The same questionnaire with the mean score of round 1 was showed in each question then re-rate again.

Round 3 (April 2019) was done after round 2 about 2 weeks and involved the process of reaching an understanding of how the group views. The structured questionnaire consisted of 5 questions about the strategy to establish DM clinic for slowly CKD progression in Public Health Centers has been delivered to all participants. For validity and reliability of research tools, the 3 experts from ASEAN Institute for Health Development Mahidol

University had examined the questionnaire. The researcher had revised and improved the weakness questions regarding the expert comments and inputs. Data analysis was done using Microsoft Excel 2010.

Ethical Consideration

Ethical approval was granted from Mahidol University, Committee for Research Ethics (Social Sciences), Faculty of Social Sciences and Humanities, Mahidol University. Certificate of MUSSIRB approval No. 2018/269.2011.

RESULTS

A total of 50 participants involved in the study 40 healthcare providers (8 physicians, 8 OPD nurses, 8 community nurses, 8 laboratory nurses, and 8 pharmacists), 8 directors of Public Health Centers, and 2 executive directors of Health Department. The 50 participants were classified into 3 groups: policy level, administrative level, and operational level. The 15 questions were identified to 3 perception measurements including knowledge, awareness, and management are showed in Table 1. For knowledge perception, someone did not know that CKD is the leading cause of End-Stage Renal Disease and the risk of cardiovascular disease. For awareness perception, someone did not aware that poor diabetes control or inappropriate treatment may contribute to CKD progression. For management perception, someone not know how to early detection of CKD because no CKD guideline. The frequency in each question on round 1 and 2 are showed in Table 2. The result of round 1, agreement on outcomes retained for all feedback groups was high 93.10% (strongly agree: 65.30% and agree: 27.80%), undecided/ don't know: 3.99%, disagree: 1.73%, and strongly disagree: 0.93%. Question 15 (Q15) had 18% disagree and 3.57 score was the lowest mean score. The participants explained that some part-time doctors who are retired doctor not updated treatment and not followed guidelines. Other questions that someone disagrees were Q1, 2, 3, 8, and 14. The participants who did not agree with each question were the same person and believed that diabetes not affect the kidney function. The result of round 2, agreement on outcomes retained for all feedback groups was high 93.23% (strongly agree: 60.38% and agree: 32.86%), undecided/ don't know: 5.32%, disagree: 1.06%, and strongly disagree: 0.13%. Q15 had 10% disagree and 3.88 score was the lowest mean score as same as the result from round 1. The questions that someone disagree were Q2 and 3. When comparing round 1 and 2 showed that most of all agree and when seeing the score of round 2, the multidisciplinary team were ready to perform in the same way. When considering the perception in each category and group into 3 levels, we found that the mean score in round 1 and round 2 were 4.61 and 4.63 in knowledge perception, 4.56 and 4.59 in awareness perception, 4.40 and 4.42 in management perception respectively. When considering each group of participants, all 3 groups had similar mean score of knowledge perception. But the awareness perception was found that very different scores between the personnel in PHCs (4.78 in administration and 4.65 in operational level) and the policy level (3.90) in Health Department. The reason was that personnel in PHCs were patient care team and saw the progression of disease and various complications when the patient had visited . Fortunately, the awareness perception in policy level were increased in round 2. For the management perception, the operational level had the lowest mean score (4.37 in round 1 and 4.39 in round 2) and it could be explained that they did not see a clear policy regarding the quality of care and the PHC was supported by a relatively small budget. All data was showed in radar chart 1 and 2. In radar chart 3, we explore the perception in round 1 and found that the executive director of Health Department had the lowest mean score of awareness: 3.90. For management perception, the executive director of Health Department, community nurse, and laboratory nurse had a low mean score: 4.30, 4.25, and 4.25 respectively. The reason was an unclear policy about proactive screening in the community or Home Health Care of CKD patients and did not know the clear budget of laboratory cost. For the knowledge perception, each group had a similar high mean score, which equals to 4.60. For round 2 in radar chart 4, most of all mean score in each perception was slightly higher than round 1. The mean score of awareness perception of the executive director

of Health Department was markedly increased (from 3.90 of round 1 to be 4.70 of round 2). For the mean score of the management perception of laboratory nurse was decreased from 4.25 to 4.08 because of unclear budget and worried about increased workload in the future. In the round 3 in-depth interview by using questionnaire with 5-structured questions (Table 3), the response of participants were summarized in Table 4. For Q5 the researcher concluded the answers to "4M" management resources.

Man

1.Organize training to educate medical personnel to increase awareness to screening for early detection and proper treatment.
2.Personnel (multidisciplinary team) should increase learning and skills development for patients with CKD.
3.Find a health network (primary, secondary, and tertiary level), health volunteer, and health leader help the healthcare providers in patient care.
4.Medical personnel should be large enough and have a proper proportion to the number of patients that need care.
5.Provide Nephrologist or the specialist in counseling for primary care doctors.
6.PHCs should have the laboratory staff for collect samples for evaluation CKD.
7.PHCs should have the nutritionist for determining the appropriate food for each patient.
8.Both primary care doctor and part time doctor should treatment by follow same Clinical Practice Guidelines.
9.Create a kidney care team in Public Health Center.
10.Personnel (Physician, OPD nurse, community nurse, laboratory nurse, and pharmacist) in the team should have the same purpose and performance of patient care.

Money

1. Budget for laboratory equipment, tools, media and personnel.
2. Budget for pilot project and routine to research (R2R).

Material

1. Clinical Practice Guideline for primary care (clearly and easily to understand and practice) and reviewed by expert committee.
2. Protocol step by step for physician, OPD nurse, community nurse, laboratory nurse, and pharmacist and academic detailing
3. Lab equipment for screening and monitoring.
4. Education media.
5. Technology equipment (Computer and related CKD program) for monitoring and evaluation may develop computer decision-making support program.
6. Patient's book.

Method/ Management

1.Determine as a policy by the executive director of the Health Department and aim at improving the quality of primary care.
2.Establishment of the CKD Committee in Health Department and Public Health Center level.
3.Promoting and Public Relation about prevention and slow progression of CKD policy and proactive define risk group in communities.
4.Define 3P (Purpose Process and Performance) clearly and easily to practice in PHC. Evaluate the performance every 3 months.
5.Create measures to define high risk group and slow progression of CKD.
6.Define Clinical Practice Guideline for primary care.
7.Empower diabetic patients avoid risk factor and strictly to control and reach to target.
8.Establish Self Help Group or club to behavioral change.
9.Create a database system for data collection, linking in (Incidence, Prevalence, Key Performance Indicator (KPI), and Patient registration).
10.Develop seamless and effective referral system and counseling system.
11.Implement a pilot project to establish DM clinic for slowly CKD progression in PHC.
12.Create morale for the healthcare providers by rewarding and share best practices.

Table 1 showed mean score in each question on round 1 and 2. (N=50)

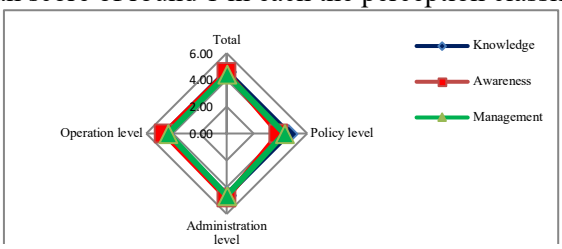
Question	Perception	Mean score	
		R1	R2
Q1: Diabetes Mellitus (DM) is one of the most severe noncommunicable diseases (NCDs) which have emerged as a leading global health problem.	Awareness	4.59	4.80
Q2: The goal of DM treatment is to ensure that the blood sugar level is kept at normal or near-normal levels (HbA1c < 7%).	Knowledge	4.68	4.59
Q3: DM patients who receive care, approximately 30-44% suffer from kidney disease.	Awareness	4.14	4.04
Q4: The risk factor of chronic kidney disease (CKD) in DM are the long duration of DM, nonoptimal glycemia, high blood pressure, hyperlipidemia, obesity, and cigarette smoking.	Knowledge	4.68	4.75
Q5: Controlling the risk factor of CKD help prevent the progression of kidney disease.	Knowledge	4.70	4.80
Q6: Inadequate or inappropriate care of patients with DM may contribute to CKD progression.	Awareness	4.32	4.70
Q7: Substantial underdiagnosis of CKD leads to lost opportunities for prevention of CKD progression.	Awareness	4.73	4.73
Q8: CKD in DM is also the leading cause of End-Stage Renal Disease.	Knowledge	4.41	4.46
Q9: RRT include Dialysis (Hemodialysis, Peritoneal dialysis), and Kidney transplant constitute a heavy financial burden as well as in Thailand and global.	Awareness	4.71	4.70
Q10: CKD increased the risk of cardiovascular disease.	Knowledge	4.59	4.52
Q11: Poorly controlled diabetes accelerates kidney disease at every stage, contributing to increasing health care costs, including expensive procedures such as regular dialysis.	Management	4.77	4.61
Q12: Secondary prevention measures mainly consist of measures for early detection of CKD, allowing prompt interventions to prevent or delay CKD progression.	Management	4.38	4.36
Q13: The level of awareness among clinicians and patients should, therefore, be improved to prevent CKD, as well as its progression and its consequences (e.g. cardiovascular and cerebrovascular disease).	Management	4.61	4.61
Q14: Patients with moderate to severe stages might be referred to a nephrologist in order to receive an optimized disease management, according to disease severity, patient characteristics, and underlying causes.	Management	4.66	4.64
Q15: Most physicians in primary care, followed by the clinical practice guidelines.	Management	3.57	3.88

DM=Diabetes Mellitus, CKD=Chronic Kidney Disease, RRT=Renal Replacement Therapy, CVD=Cardiovascular disease

Table 2 showed frequency in each question on round 1 and 2. (N=50)

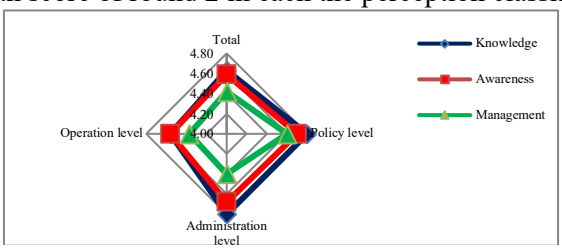
	Round 1 (N, %)					**Round 2** (N, %)				
	5	4	3	2	1	5	4	3	2	1
Q1A	40, 80%	7, 14%	2, 4%	1, 2%	0, 0%	41, 82%	7, 14%	2, 4%	0, 0%	0, 0%
Q2K	34, 68%	15, 30%	0, 0%	1, 2%	0, 0%	34, 68%	11, 22%	3, 6%	2, 4%	0, 0%
Q3A	21, 42%	23, 46%	5, 10%	1, 2%	0, 0%	12, 24%	31, 62%	5, 10%	1, 2%	1, 2%
Q4K	35, 70%	15, 30%	0, 0%	0, 0%	0, 0%	37, 74%	12, 24%	1, 2%	0, 0%	0, 0%
Q5K	36, 72%	14, 28%	0, 0%	0, 0%	0, 0%	40, 80%	9, 18%	1, 2%	0, 0%	0, 0%
Q6A	34, 68%	16, 32%	0, 0%	0, 0%	0, 0%	35, 70%	13, 26%	2, 4%	0, 0%	0, 0%
Q7A	36, 72%	13, 26%	1, 2%	0, 0%	0, 0%	36, 72%	13, 26%	1, 2%	0, 0%	0, 0%
Q8K	27, 54%	18, 36%	3, 6%	2, 4%	0, 0%	26, 52%	21, 42%	3, 6%	0, 0%	0, 0%
Q9A	41, 82%	8, 16%	1, 2%	0, 0%	0, 0%	37, 74%	12, 24%	1, 2%	0, 0%	0, 0%
Q10K	32, 64%	16, 32%	2, 4%	0, 0%	0, 0%	27, 54%	22, 44%	1, 2%	0, 0%	0, 0%
Q11M	41, 82%	8, 16%	1, 2%	0, 0%	0, 0%	31, 62%	19, 38%	0, 0%	0, 0%	0, 0%
Q12M	31, 62%	13, 26%	2, 4%	1, 2%	3, 6%	22, 44%	23, 46%	5, 10%	0, 0%	0, 0%
Q13M	34, 68%	16, 32%	0, 0%	0, 0%	0, 0%	29, 58%	20, 40%	1, 2%	0, 0%	0, 0%
Q14M	36, 72%	12, 24%	0, 0%	1, 2%	1, 2%	36, 72%	11, 22%	3, 6%	0, 0%	0, 0%
Q15M	13, 26%	15, 30%	13, 26%	6, 12%	3, 6%	11, 22%	23, 46%	11, 22%	5, 10%	0, 0%

Radar chart 1 showed mean score of round 1 in each the perception classified to 3 levels.



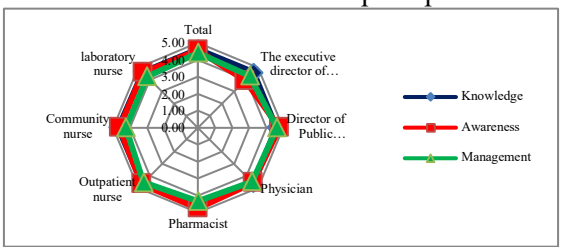
Perception	Knowledge	Awareness	Management
Total	4.61	4.56	4.40
Policy level	4.60	3.90	4.30
Administration level	4.60	4.78	4.63
Operation level	4.62	4.65	4.37

Radar chart 2 showed mean score of round 2 in each the perception classified to 3 levels.



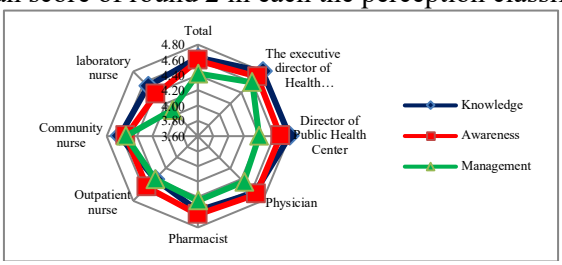
Perception	Knowledge	Awareness	Management
Total	4.63	4.59	4.42
Policy level	4.80	4.70	4.60
Administration level	4.80	4.68	4.40
Operation level	4.56	4.56	4.39

Radar chart 3 showed mean score of round 1 in each the perception classified to individual groups.



Perception	Knowledge	Awareness	Management
Total N=50	4.61	4.56	4.40
The executive director of Health Department	4.60	3.90	4.30
Director of Public Health Center	4.60	4.78	4.63
Physician	4.60	4.58	4.48
Pharmacist	4.50	4.75	4.33
Outpatient nurse	4.65	4.70	4.55
Community nurse	4.70	4.63	4.25
laboratory nurse	4.63	4.58	4.25

Radar chart 4 showed mean score of round 2 in each the perception classified to individual groups.



Perception	Knowledge	Awareness	Management
Total N=50	4.63	4.59	4.42
The executive director of Health Department	4.80	4.70	4.60
Director of Public Health Center	4.80	4.68	4.40
Physician	4.65	4.68	4.45
Pharmacist	4.58	4.63	4.45
Outpatient nurse	4.40	4.55	4.40
Community nurse	4.63	4.55	4.55
laboratory nurse	4.53	4.38	4.08

Table 3 showed the questionnaire with 5-structured questions

Q1	CKD diagnosis and management remains silent or asymptomatic, especially in early stages. As consequence, many CKD patients are identified only after reaching the most severe stage, i.e. end stage renal disease (ESRD), which usually requires dialysis or renal transplantation. This group of severely ill patients is basically comparable to the classical "tip of the iceberg".

Q2	The general practitioners (GP) may be able to opportunistically check the renal biomarker (in particular eGFR and albuminuria) for patients at high risk of CKD. Identified CKD patients may receive treatments for underlying causes e.g. hypertension, diabetes, should undergo regular controls of their kidney function (e.g. annual eGFR and ACR measurements), and should receive advice concerning lifestyle amelioration and possible outcomes in case of disease progression (i.e. RRT).
Q3	Some study suggests that the low percentage of awareness, even among patients with a great number of clinical markers, may reflect poor recognition of CKD by primary care clinicians [10].
Q4	In a study comparing the diagnostic accuracy for CKD patients, the authors reported that primary care physicians and nephrologists correctly recognized the presence of CKD for 56% and 96% of the patients, respectively [11].
Q5	How is the service plan for chronic kidney disease (CKD) designed to reduce CKD progression among diabetes patients (T2DM) in Public Health Centers, Health Department, BMA?

Table 4 showed the response of participants

Descriptions
Q1: Agreement 100%
Public health centers (PHCs) must send blood and urine to evaluate kidney function at central lab faraway and sometime neglected to send laboratory tests. No repetition for laboratory if anything observed. High cost of laboratory examination. The examination takes a long time and the physician or patient will know in the next visit (minimum 1 month to 3 months), sometimes CKD has already progressed.
Screening kidney function is the most important to early detection of CKD. But the plan for CKD treatment by the multidisciplinary team, there was no systematic operation.
The effectiveness of patient care was related to the number of patients. Doctors treated a large number of patients, make them exhausted and not prudent for treatment.
The kidney function decreases in the early stages, rarely symptoms not see with the naked eye, causing both doctors and patients to not awareness and reaching the doctor when he or she is severe stage.
The process of preventing and treating CKD must be a multidisciplinary linkage system. The physicians, nurses, and pharmacists should have care plan and treatment and give education on food, medicine, exercise, and reducing salt.
The initial care standard and alert to the consequences of CKD progression that will greatly improve the quality of life for patients and reduce budgets should be deployed, for example, to give education to risky CKD patient.
Healthcare provider should pay attention to guidelines and strictly follow, including the care of patients as one of their relatives. Detect early stage in order to early treatment to prevent ESRD.
If possible, the National Health Security Office (NHSO) had determined the examination plan and paid the budgets to the primary care. Primary care such as PHC should be aware of the importance of CKD. In order to prevent and reduce the cost burden of the country.
Q2: Agreement 100%
The GP doctor should have updated practices for treating chronic diseases and follow guideline.
Grouping of patients with poor glycemic control into behavior modification programs will be able to slow CKD progression. The multidisciplinary training process of behavior modification should be defined as a standard for patient care.
In primary care and GP doctor can do, there is no need to be a specialized physician, only have diabetes and hypertension guideline to follow. In this role, primary care systems can provide care, follow-up and change treatment follow to guidelines. But current guidelines for the practice of diabetes, hypertension and kidney disease are also separated and provide advice on secondary or tertiary care.
In chronic disease still lacking surveillance systems. No need to wait for the doctor to order blood or urine test but primary care should have the system to proceed.

There are standard medical procedures, but should be added and paid to health care providers for additional diagnosis.

In addition to medical facilities, patients should self-care and improve behavior by recognizing the disease. Be careful about drug use and provide knowledge about kidney disease.

In primary care have care givers who provided basic advice for CKD.

Q3: Agreement 98%

Providing health knowledge will help raise awareness of primary care clinicians and healthcare providers should advise about prevention of the disease.
The role model who successful in glycemic control and self-management in primary care may help another patient become more aware.

Primary care should develop a model and clear health service system and group patients according to risk.

GP doctors and health care providers should monitor laboratory of CKD and follow patients to visit to the appointment. They should be aware that blood or urine collection is not routine but to find early detection of CKD.
Because there are many doctors who are concerned with the changing lab values of patients until having to send patients to the hospital, unfortunately the specialist at hospital may not do anything. Therefore, guidelines for referring patients to the hospital should be clear and planned together.
Some patients who physicians recommend to visit a specialist at the hospital but the patient refused. The reasons are inconvenient or no abnormal symptoms. Should establish a CKD clinic in primary care together with noncommunicable disease (NCD) clinic to provide knowledge and management.
Most patients lack knowledge of CKD. Consumption behaviors as well as drugs are available from many sources such as private clinic, hospital and pharmacy.
The important thing is to make the patient aware of self-care and change behavior. Some patient who does not cooperate in the treatment caused by the ignorance of the patient and family. They did not aware of eating foods related to kidney disease and not know how to behave.
Should encourage and train the GP doctors in primary care be aware of the treatment follow guidelines
Opportunities to access patient services are also involved. Reflecting the lack of awareness of doctors and medical personnel in caring for patients and preventing potential complications if everyone helps to realize, it can greatly improve the quality of life of patients and can also reduce costs and increase the capacity of the primary care.

Q4: Agreement 98%

From the message, it can be said that the delayed diagnosis of CKD may be a disadvantage to patients.

This is possible because the doctor in primary care did not realize. The development of healthcare provider knowledge in diagnosis is essential. Health department should develop medical learning through training and guidelines for accurate diagnosis and patient care in primary care.

All public health centers have retired doctor work as part time, someone not followed to update guideline and lack awareness. So the training courses are important to correct diagnosis.

In primary care should have guideline appropriately. For example, there are clear guidelines for kidney disease in the primary context and a referral system that will be able to refer patient to see nephrologist.

The healthcare policy should increase awareness of surveillance and prevention of CKD in primary care. The frequency of screening and reimbursement should be increased.

DISCUSSION

The prevalence of CKD in the global rising every year. Despite this increasing prevalence, awareness of CKD among the population has been relatively low [12]. CKD and its complications are still largely under-diagnosed and undertreated [13]. The implementation of the evidence-based KDOQI guidelines, which were developed for the delay of progression of CKD, is increasing importance in primary care. Early recognition, proper management, and early referral have the greatest effect on slowing the progression of CKD [14]. For strategic analysis for service plan CKD development in primary care, we found the weakness of PHC was unclear health policy, lack of awareness and management perception about CKD, no guideline for primary care. Blood and urine examination

done annually. Because they had not laboratory equipment so the samples will be sent to the central laboratory at far away. Both physician and patient will know the results in next follow up which may delay diagnosis of CKD. In addition, because of the overlap between diabetes, hypertension, cardiovascular disease, and CKD, most physicians prioritize treatment only for diabetes or hypertension without realizing the underlying pathophysiologic link between these diseases and lack of early detection, management, and control of risk factor of CKD. Lack of financial support from the National Health Security Office (NHSO). The budgets of CKD screening programs are opportunistic and are faced with challenges. Furthermore, inadequate training and few human resources that were poorly distributed affect the effectiveness of screening and management in PHCs. Persistent stress related to challenging working environments with patients often leads to burnout and poor the quality of care. A poor healthcare system such as the database system, systematic referral system, and consult system was a barrier to improve quality of care. The big challenges are increasing patient's health literacy through OPD or the community health education for self-care management may prevent or slow CKD progression.

CONCLUSIONS

Although from the study, we found that many things have to be adjusted for service plan CKD development but we found the strength of the PHC is a holistic approach and linkage of OPD to the community. If the service plan for CKD is established, PHCs will cover education, identify risk group, screening, early detection, early treatment for CKD, refer patient with the severe stage to hospital, home health care and palliative care for the patient with ESRD. In this study, we found healthcare provider began to realize and saw the importance of preventing CKD by patients-centered care. But the Health Department may define a clear policy and support budget, tools, enough personnel, guidelines for the PHCs that easy to follow.

RECCOMMENDATIONS

Based upon the findings of this study suggested recommendations for the implementation for service plan CKD development are follow as

Policy level

Firstly, Health department should report the situation of CKD in primary care to the National Health Security Office (NHSO) for financial support. The most important is the budgets for screening CKD in communities and primary care for early detection. Secondly, Bangkok Metropolitan Administration and Health Department should have clear policy for slow CKD progression. Finally, Health Department should establish the committee for implementation service plan for CKD, proper guideline for primary care, data system, referral system link with the hospital and train healthcare provider for effective patient care and establish proper model. Furthermore, afford the budgets training and human resources.

Administration level

PHC should establish the committee for service plan CKD, provide laboratory equipment for immediately detect and diagnosis complication of CKD and report the prevalence of CKD.

Operational level

The mutidisciplinary team should increase awareness for identify risk group, CKD detection, evaluation diabetes control and surveillance eGFR decline. To develop the follow up system which may contribute to early diagnosis of CKD when get the results of exam, achieve proper management, control of risk factor of CKD such as NSAIDs and increase patient's health literacy through OPD or the community health education or self-care management for slow CKD progression.

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FACTORS ASSOCIATED WITH PERCEPTION OF ENROLLMENT ON NATIONAL HEALTH INSURANCE PROGRAM AMONG HOUSEHOLD HEAD IN NEPAL

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ABSTRACT

Introduction: Social Health Security Development Committee (SHSDC) was formulated as a legal framework to implement on National Health Insurance Program (NHIP) in 2017. The coverage of health insurance has been only15 percent of the residing population.
Objectives: This study aims to find out the factors associated with the perception of national health insurance program of Makawanpur district in Nepal.
Methodology: A cross-sectional comparative study was conducted in 346 randomly selected households in Nepal. Descriptive analysis, chi-square test and logistic regression were used to establish the association between enrollment status and selected variables. The p-value at a 95% confidence interval was used.
Results: The association for socio-demographic factor with an enrollment of family size less than or equal to 5 and more than 5 was found statistically significant ($\chi2=3.8$; $p=0.05$). Occupation as agriculture was also significantly associated with the enrollment of Social Health Insurance Scheme ($\chi2=46.187$; $p<0.001$). The significant association of knowledge was found with the enrollment status in all variables ($p<0.0001$).
Conclusion: This study revealed equity gaps in enrollment status between rich-poor households and privileged-under privileged ethnic groups. Willingness to pay was high, but majority household heads are not ready to pay their premium in every year.
Keywords: Perception, Willingness to pay, Social health insurance program, Nepal

INTRODUCTION

The World Health Organization has identified universal health coverage (UHC) as a key approach in reducing equity gaps in a country, and the social health insurance Program has been recommended as an important strategy towards it [1]. World Health Assembly in 2005 passed resolution for countries to introduce prepayment mechanisms in the health sector for sharing risk as well as to avoid catastrophic health-care expenditure of individuals as a result of seeking care [2]. World health report 2010 advocated health insurance as one of the promising means of subsidizing the entire population and achieving universal health care coverage [1].

Global estimated 13 billion people lack of access to effective and affordable health care, and annually additional 150 million people in 44 million households face financial catastrophe as a result of paying directly for health care. Also, about 100 million people are pushed into poverty due to the need to pay for health services [4]. Many low- income countries health sector financing from out of pocket of household and development assistances funds trends to financial help with government spending services [3]. This proportion has been estimated to be the highest (40.8 percent) in the WHO South East Asia Region [1]. In Nepal, household out-of-pocket expenditure alone contributes to 56.3 percent of current total health expenditure [6]. Out-of-pocket expenditure is the most important source of

health care financing [2,14,7]. Now a day, many low- and middle-income countries have found it increasingly difficult to sustain sufficient financing for health care. Moving away from out of pocket health care payments to prepayment mechanisms has widely been conducted as an important step towards reducing risks from financial hardship [5].

While the studies conducted in Ghana and Burkina Faso showed that household headed by males were more likely to join the health insurance programs as compared to female households [8]. Studies showed Ghana, Mali, and Senegal has female headed household were more likely to enroll in community-based health insurance schemes. There are also other evidences where sex of household head was found to have no association with enrollment in health insurance programs [15]. A study shows that educational levels also identified in their household heads, when household head with get the secondary level of education are five times more likely to enroll in national health insurance scheme in comparison to those never attending school [1]. Another study shows from Tanzania; the large household family were more likely to join insurance scheme as compared to small family size [8]. One study about NHIS in Ghana found that fully insured households had higher illness per capita in the past six months prior to the survey [9]. Similarly, the presence of illness was a significant determinant of purchasing a health card in Thailand [10].

Nepal is a low-income country has the total gross domestic product per capita is only US$732.39 in the year 2015.44.2% of the people of Nepal are living below the poverty line [11,12]. Health system of Nepal is mixed public- private provider approach. The various pre-paid schemes experimented in Nepal were often fragmented and limited in achieving universal health coverage [13]. Nepal began to start free health policy to achieve UHC from 2006AD which was revised in the year 2014. In this context, Government of Nepal again implement national social health insurance policy 2014 as a key policy guide with a vision to insure universal health coverage as a basic approach for integration of all existing pre-paid schemes. Nepal considers this scheme as a cornerstone for making a progress towards universal coverage and aims to expand by 2020 to all the districts throughout the country.

The objective of this study was to explore the existing knowledge gap by examining the factors associated with perception and willing to pay in enrollment of household in the National Health Insurance program of Nepal. Beside this a policy perspective, timely generation of such evidences can inform policy makers on how to design effective strategies to increase household enrollment and ensure the sustainability of the program. Moreover, the findings can be generalized to countries in which lunch the national health insurance program.

METHODOLOGY

Data source

The study was a community- based cross-sectional comparative study among the enrollment and non-enrollment household head on Social health insurance program of Thaha and Makawanpur Gadi Municipality in Nepal. This study area is a multi-cultural and diverse geographical area and is situated in the semi-urban and rural part of the district. While health insurance coverage is still very low.eg. Thaha municipality enrollment status is 10.32% and Makawanpur Gadi enrollment status is 17.30% (SHSDC,2018).

Study population and Sample size

The inclusion criteria were household head or most senior member aged 20-70 years who lived in permanently in Thaha and Makawanpur Gadi municipality. The exclusion criteria were being residence of temporary household head within six months and who have severe mental illness. Simple random sampling was used to selected one rural municipality and one municipality. The selection of study participant was done by ensuring a balance of number of both enrolled and none enrolled population by using stratified sampling method. The sample size was calculated by using a formula for estimating population, and assumed a 5% margin of error(d) and 95% confidence interval (CI). With total estimated household head (N), the required sample size was 346.The sample size was increased to 380 to account for 10% probable non-response.

A structured questionnaire was developed by review of related studies with

strongly reliability results and modified to suit the Nepalese context. The data was collected by means of interview. The research instrument was first developed in English and then translated Nepalese version. A pilot study of the instruments was conducted among a group of people of 10% of the sample size in the nearest and similar characteristics of health insurance enrollment status. Three research assistance who had previous experience of data collection were trained in the meaning of obtaining informed consent, keeping confidentiality, Quality control and the protection of the respondents under the various legal and ethical rights. After completion of each data collection was checked by interviewer themselves and re-checked by the principal investigator daily for completeness and accuracy

Instruments

The structured questionnaire comprised about 53 and divided into six Parts comprising information about Socio-demographic and economic variable related 17 questions to the general description of sex and education of household head, household size, family type, occupation of household head, ethnicity, presence of under five children and elderly over 60 years and socio-economic status. Knowledge factors consists of eight questions related to Knowledge about annual premium amount and benefit ceiling, and period of membership renewal, what service facility are cover and process of enrollment. Perception comprised ten statements covering the perceived benefits and perceived barriers related questions related to perceived benefit of SHIP, perception on price and benefit package, perceived quality of care and perceived adequacy of service delivery. The five- point Likert scales will be used for scoring. Morbidity and risk characteristics focused mainly five questions about family experience of illness in past three months and perceived health status of family.

Quality of health service delivery related ten statement covering the quality of service, availability of service, and enrollment status. The five- point Likert scales will be used for scoring. Willingness to pay for NHIP consists 11 questions related to willing to pay and none willing to pay among none enrolled for availability of service and provided quality of services under the available scheme package.

Statistical analysis

Descriptive analysis includes frequency tables with percentages. For inferential analysis, Chi square test was used to examine a significant association between insurance enrolment status and selected explanatory variables. Multiple logistic regression was used to examine predictors of enrolment status.

Ethical considerations

The study proposal was revised and approved by the office of the committee for Research Ethics, Faculty of Social Science and Humanities, Institutional Review Board, Mahidol University (COA.No.2019/084.0904). Written consent, after explanation about the study, was obtained from the study participants to ensure that participation was strictly voluntary. Study participants have full right to withdraw from the study at any time.

RESULTS

The study was conducted a descriptive cross-sectional study. Variables are described on frequency table and percentage distribution. The association between independent variables and factors association with perception of enrolment in National health insurance program among household head was calculated chi-square test. The strength of association and significant predictors were measured multiple logistic regression. A total of 346 participants were participated in this study (response rate of 100%)

Table 1 Socio- demographic characteristics and economic factors of household

Variables	Frequency	Percentage
Sex of household head		
Male	228	65.9
Female	118	34.1
Education of household head		
Informal	145	41.9
Primary (1-5)	85	24.6
>Primary (6-10)	45	13.0
SEE passed (10+)	49	14.2
Higher secondary (+2)	17	4.9
University level	5	1.4
Family type		
Nuclear	170	49.1
Joint Family	176	50.9
Household size		
Equals to and less than 5 members	186	53.75
More than 5 members	160	46.42
Income		
Government Job	15	4.3
Private Job	8	2.3
Agriculture	283	81.8
Business/Trade	39	11.3
Presence of children under 5 years		
No children<5	200	57.8
At least 1 and more than<5	146	32.2
Presence of elderly above 60 years		
No elderly>60 years	209	60.4
At least 1 and more than	137	39.6
Ethnicity		
Mountain Dalits	15	4.3
Janajati	168	48.6
Terai Dalits	1	0.3
Muslim	1	0.3
Brahmin/Chettri	157	45.4
Others	4	1.2
Presence of children under 5 years		
No children<5	200	57.8
At least 1 and more than<5	146	32.2
Presence of elderly above 60 years		
No elderly>60 years	209	60.4
At least 1 and more than	137	39.6
Ethnicity		
Mountain Dalits	15	4.3
Janajati	168	48.6
Terai Dalits	1	0.3
Muslim	1	0.3
Brahmin/Chettri	157	45.4
Others	4	1.2
Family experience of illness		
Illness History		
Yes	207	59.8

Variables	Frequency	Percentage
No	139	40.2
Times of illness		
Equals to and less than 5	309	89.31
Above 5	37	10.69
Health service utilization		
Visit in SHIP listed Hospital		
0-3 visit	281	81.21
4-6 visit	44	12.71
7-9	21	6.06
Information about membership and renewable process		
Low	267	77.2
High	79	22.8
Low	159	46.0
High	187	54.9

Table 1 represents the socio demographic characteristics of participants. More than half of the respondents (65.9) were male. More than half (74.9) of the household head gender were male. According to the education of household head, about half (41.9%) were informally educated. On the contrast, only few (1.4%) of them were in university level. And similarly, regarding the family type of respondents, half of the participants (50.9) were living in joint family. Also, it was found that more than half of the family contains less than 6 members in their family (53.75). The table has also concluded that more than half of the household does not have any family member less than 5 years (57.8%). Also, nearly half of the respondents were Janajati (48.6%). Similarly, the majority of the respondents (81.6%) have been involved in agriculture. reveals about the morbidity pattern and risk characteristics of the respondents and their families. Half of the respondents and their families (59.8%) had experienced illness. Majority of the respondents and their families (89.31%) reported that the times of illness were equals to and less than five times. It was found that majority of the respondents (81.21%) were 0-3 times visited in SHIP listed hospitals. Also, majority of the respondents (84.4%) had not presence of chronic illness suffered with non-communicable disease.

Knowledge about National Health Insurance Program

Table 2 reveals the Knowledge about National Health Insurance Program (NHIP). Most of the respondents (79.5%) had correct information about annual premium amount. Only few numbers of respondents (30.6%) had heard that Annual premium for more than five members. More than half of the respondents (72%) had knowledge regarding the Annual benefit ceiling less than five. Similarly, it was reported that only few respondents (17.9%) had knowledge about annual benefit ceiling more than five. Regarding the Renewable process, nearly half (54.9%) of the respondents had the correct information. Only few respondents (32.4%) had the correct information about renewal period. Half of the respondents (57.2%) reported that source of information was F.M./Radio

Table 2 Knowledge about National Health Insurance Program (NHIP)

Variables	Frequency	Percentage
Annual Premium Amount		
Low	71	20.5
High	275	79.5
Annual Premium for > 5 members		
Low	240	69.4
High	106	30.6
Annual Benefit Package		
Benefit ceiling < 5		
Low	97	28
High	249	72
Benefit selling >5		
Low	284	82.1
High	62	17.9
Maximum Benefit ceiling		
low	267	77.2
High	79	22.8
Period renewal period		
Low	234	67.6
High	112	32.4
Source of Information		
F.M./ Radio	198	57.2
Print Material	9	2.6
Health Facility	32	9.2
Health Insurance Staff	58	16.8
FCHV	16	4.6
Friend/Neighbor	33	9.5

Association of knowledge factors with SHSP enrolment status

Table 3 represents the association of knowledge with enrolment status. The chi-square test was applied to observe the difference in the mean score of knowledge with enrolment status. The mean score of the knowledge was significantly different with annual premium for up to five members (<0.0001), Annual premium for more than five members (<0.001), benefit ceiling for up to five members (<0.001), benefit ceiling for more than five members (<0.001), maximum benefit ceiling (0.001), renewal process (<0.001) and period of renewal (<0.001).

Table 3 Association of socio-demographic factors with enrollment status in NHIP

Variables	Enrolled n (%)	Non-Enrolled n (%)	Chi-square Statistic	P-value
Gender of HH Head				
Male	132 (51.0)	127 (49.0)	0.348	0.536
Female	41 (47.1)	46 (52.9)		
Education of HH Head				
No education or informal education	75 (51.7)	70 (48.3)	0.791	0.673
Below Secondary	61 (46.9)	69 (53.1)		
Secondary and above	37 (52.1)	34 (47.9)		
Family size				
Less than or equal to 5	84 (45.2)	102 (54.8)	3.767	0.052
More than 5	89 (55.6)	71 (44.4)		
Ethnicity				
Disadvantaged	87 (47.0)	98 (53.0)	1.406	0.236
Advantaged	86 (53.4)	75 (46.6)		

Variables	Enrolled n (%)	Non-Enrolled n (%)	Chi-square Statistic	P-value
Presence of children under five				
At least one and more than one	59 (40.4)	87 (59.6)	9.290	0.002
None	114 (57.0)	86 (43.0)		
Presence of elderly				
At least one and more than one	76 (55.5)	61 (44.5)	2.719	0.099
None	97 (46.4)	112 (53.6)		
Occupation				
Agriculture	141 (49.8)	142 (50.2)	0.019	0.889
Non-agriculture	32 (50.8)	31 (49.2)		

Table 4 represents the association of knowledge with enrollment status. The chi-square test was applied to observe the difference in the mean score of knowledge with enrollment status. The mean score of the knowledge was significantly different with Annual premium for up to five members (<0.0001), Annual premium for more than five members (<0.001), benefit ceiling for up to five members (<0.001), benefit ceiling for more than five members (<0.001), maximum benefit ceiling (0.001), renewal process (<0.001) and period of renewal (<0.001).

Table 4 Association of Factors with enrollment status

Variables	Enrolled n (%)	Non-Enrolled n (%)	Chi-square value	P-value
Annual Premium for up to 5 members				
Incorrect	8 (11.3)	63 (88.7)	53.606	<0.0001
Correct	165 (60.0)	110 (40.0)		
Annual Premium for>5 members				
Incorrect	91 (37.9)	149 (62.1)	45/753	<0.001
Correct	82 (77.4)	24 (22.6)		
Benefit ceiling for up to 5 members				
Incorrect	17 (17.5)	80 (82.5)	56.857	<0.001
Correct	156 (62.7)	93 (37.3)		
Benefit ceiling for >5 members				
Incorrect	126 (44.4)	158 (55.6)	2-.122	<0.001
Correct	47 (75.8)	15 (24.2)		
Maximum benefit ceiling				
Incorrect	121 (45.3)	146 (54.7)	10.252	0.001

Variables	Enrolled n (%)	Non-Enrolled n (%)	Chi-square value	P-value
Correct	52 (65.8)	27 (34.2)		
Renewal process				
Incorrect	48 (30.2)	62 (33.2)	46.187	<0.001
Correct	125 (66.8)	173 (50.0)		
Period of renewal				
Incorrect	100 (42.7)	134 (57.3)	15.262	<0.001
Correct	73 (65.2)	39 (34.8)		

DISCUSSION

This study was conducted to assess the factors associated with perception of enrollment of households in Social Health Security Program of Makawanpur district in Nepal. The factors associated with household enrollment in the Social Health Insurance Program as identified in this study include household size, ethnicity, socio-economic status, experience of illness in the family, presence of chronic illness, knowledge of annual premium amount and benefit package covered by SHIP. This study confirmed an association between ethnicity and household enrollment in the SHIP i.e. households from privileged ethnic groups were 1.5 times more likely to enroll in SHIP compared to those from underprivileged ethnic groups. This might be because underprivileged ethnic groups are more likely to be financially unstable. A national data also indicates that hill Janajati and hill Dalits represent higher segments of the poor [32].

Evidence from studies in various low- and middle-income countries are shown to have a positive association between socioeconomic status and health insurance uptake[16,22,24,25,26,33]. In multivariate analysis, richer households were four times more likely to enroll in SHIP as compared to those in poorest category. This suggests that socio-economic status is a very crucial factor influencing the uptake of health insurance program. Bivariate and multivariate analyses in this study showed a positive association between household illness experience and enrollment in the SHIP. The presence of chronic illness member in the household also showed significant association with SHIP enrollment. Similar findings have been reported by the studies from several low- and middle- income countries [18,21,24,26,7,34].

Studies conducted in India, Ghana and Zimbabwe have shown a negative association of household size with enrollment in health insurance schemes [18,20,24,25,35]. Interestingly, household size in this study showed a positive effect on enrollment; households with more than five members were two times more likely to enroll in SHIP. The observed association in this study could probably be explained by the fact that SHIP is a family- based scheme where entire members in a household are enrolled as a unit [15]. As all the families up to five members need to pay equal premium amount irrespective of their size [19].

This study found that the knowledge of annual premium required for enrolling in the SHIP and knowledge of the annual benefit amount covered by the program was strongly associated with enrollment of households in the SHIP. Although factor such as education of household head was significantly

associated in bivariate analysis., However, the role of education of household head cannot be ruled out. Studies from Bangladesh, Ghana and Burkina Faso have shown positive associations between health insurance uptake and higher education of household head [16,22,24,35,]. Considering the patriarchal nature of Nepalese society, men are considered responsible for major financial decisions within the households. In contrast to this presumption, sex of household head in this study showed no association with enrollment of households in SHIP. The available evidence however is mixed regarding association between sex of household head and enrollment in health insurance scheme. While some studies suggested that female headed households are more likely to purchase health insurance [18,20,21]. Others have shown that male headed households are more likely to enroll in health insurance program [22,31]. Some other studies reported no significant association in enrollment in health insurance schemes between male and female headed households [16,19,27].

An association between poor perceived health status and increased NHIS policy uptake was reported in two Ghanaian studies [18,23]. However, such association was not evident in this study. Also, in the current study, none of the perception factors were significantly associated with SHIP enrollment, although other studies have established an association [20,23,30]. To the best of our knowledge, this is one of the first few studies attempting to identify the factors associated with perception of household enrollment in the newly implemented health insurance program of Nepal. In this study, there could be some chances of recall bias since self-reported method was used and the recall period for some information was for the past one year. Although the findings of this study were consistent with large body of literatures from various low- and middle-income countries, we couldn't relate these findings to our national context owing to the limited number of literatures available for Nepal. Despite these limitations, the results of the study will add to the knowledge base on the SHIP and generally be useful to policy makers, decision makers at SHSDC and those in academician.

CONCLUSIONS

Having more than five members, belonging to the privileged ethnic group and higher socio-economic status, having an experience of illness in the past, presence of chronic illness member in the family and having correct knowledge about the annual premium and benefit ceiling of the scheme are the potential factors associated with enrolment of households in Social Health Insurance Program. Our study revealed equity gaps in enrolment between rich-poor households and privileged-underprivileged ethnic groups. Addressing these disparities in enrolment across socio-economic and ethnic groups is necessary to accelerate the pace towards achieving universal health coverage. Our results also provide an indication of adverse selection being present in the scheme as illness is one of the driving factors influencing enrolment in NHIP.

RECOMMENDATIONS

The findings of this study have implications for moving towards Universal Health Coverage by ensuring increased population coverage and adequate financial risk protection across the socio-demographic spectrum. The effective implementation of provisions to subsidize the targeted households through means such as immediate distribution of poverty identification cards might contribute to reduce equity gaps across socio-economic and ethnic groups and increase the enrollment of poor and marginalized households in the SHIP. Studies are necessary to substantiate whether the indication of adverse selection shown in this study could threaten the financial viability of the scheme.

ACKNOWLEDGEMENT

The authors would like to thanks their full support and appreciation to all the household heads and other most senior member of Thaha municipality and Makawanpur Gadi Rural municipality of Makawanpur District in Nepal for supporting the data collection for this study

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KNOWLEDGE, PERCEPTION, SELF-MOTIVATION, AND TRUST AMONG WOMEN TOWARD DELIVERY BY SKILLED BIRTH ATTENDANTS IN GONDOKORO ISLAND, SOUTH SUDAN

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ABSTRACT

Introduction: The rate of childbirth assisted by Skilled Birth Attendants (SBAs) in South Sudan is 41.5% in 2017 while in Gondokoro Island, Jubek State was 26% in 2018. The maternal mortality rate in South Sudan is estimated to be 789 per 100,000 live births. This worrying factor thought to be due to the limited number of skilled attendants. This study sought to determine health beliefs among women of reproductive age in Gondokoro Island, Jubek state, South Sudan.
Objectives: To assess the health belief factors (perception, knowledge, self-motivations, and trusts) and socio-demographic characteristic association with the SBA utilization at delivery among women of reproductive age in Gondokoro Island.
Methodology: A community based cross-sectional study design was implemented using face to face interviews by a questionnaire that contains questions on knowledge, perceptions, self-motivations, and trust. Data collected from 338 eligible women recruited by systematic random sampling of households in Gondokoro Island. The descriptive statistical frequency and percentage were used to describe the baseline characteristics of participants. The association between health belief and SBA utilization was determined with the bivariate analysis. The multiple logistic regression analysis was established to identify the significant factors of health belief after adjusting the confounders.
Results: The study shows a low rate of delivery with skilled attendants (43.2%) among women in Gondokoro Island. However, 85.2% of respondents had adequate knowledge of health risk, 68% had a positive perception, 56.8% self-motived, and 85% had trusted SBA. The multiple logistic regression analysis shows husband occupation (AOR=5.386, 95% CI =2.925-9.918), type of family (AOR=3.839, 95% CI =2.126-6.932), (p-value =<0.001), and low knowledge of health risk (AOR =0.242, 95% CI =0.098-0.599), (p-value =<0.05) had association with SBA utilization. Women positive perception (AOR =3.648, 95% CI =1.979-6.727), family support (AOR=0.334, 95% CI =0.187-0.598), and trust (AOR=0.224, 95% CI =0.107-0.468), (p<0.001) strongly predicts SBA utilization at delivery.
Conclusion: These study findings highlight women's perception, the trust of SBA, and family support strongly influence women's likelihood of delivery by SBA. There is a need for health intervention to strengthen health education for pregnant women and their families for the necessary support to expecting mothers.
Keywords: Knowledge, Perception, Trust, Self-motivation, Skilled Birth Attendant, South Sudan

INTRODUCTION

The maternal mortality ratio in low-income countries (LIC's) in 2015, estimated at 239 per 100 000 live births compared to developed countries, which was at 12 per 100 000 live births. In 2016, the start of the Sustainable Development Goals (SDGs) era, pregnancy-related preventable morbidity, and mortality globally increasingly high. Approximately 303 000 women globally died each year due to complications related to

pregnancy and childbirth. About 99% of these deaths occur in LIC's, and most are preventable with the assistance of the Skilled Birth Attendant (SBA) [1-2]. Skilled attendant at deliveries is the only best option for reducing such death, World Health Organization (WHO) strongly advocates for 'skilled care at birth. According to WHO definition; SBAs are the educated, trained and certified medical professionals such as doctors, nurses, and midwives who can manage uncomplicated childbirth [3].

The estimates of skilled attendance coverage in developed countries are 99.5% and developing regions, the proportion of deliveries attended by SBA ranges between 55 % in 1990 to 65 % in 2010. Sub-Saharan Africa accounts for the lowest coverage (45%), and despite concerted effort to increase SBA, still millions of births happened without the assistance of a midwife, a doctor or a trained nurse in LIC's, [4]. Previous studies explained that; despite progress in improving access to a skilled attendant at delivery in LIC's. There are still many barriers hindering pregnant women to the full utilization of skilled attendants. Obstacles such as culture, socio-demographic characteristics, healthcare facilities setting, and environmental factors remain the constraint [5-8].

South Sudan, the Africa youngest nation which gained her independence in 2011 after a decade of civil war with Sudan, again conflicted in 2013; the health system is much distorted. At the end of MDG (2015), South Sudan rang the fifth country in Africa with high maternal mortality rate, 789 per 100,000 live birth after Nigeria, Chad, Central Africa Republic, and Sierra –Leone [9].

South Sudan national healthcare indicator (2015) indicated that 41% of pregnant mothers attend to ANC services, and 19% delivery assisted by SBA. According to the WHO and the South Sudan Ministry of Health (SSMoH) in 2013, there are a total of 189 physicians and over 461 nurses and midwives in South Sudan, an estimate of one doctor for every 39,088 persons [10].

From 2012, the SSMoH, and the support of the humanitarian organization in the country. Training program for SBAs across the country was launched, about 300 SBA trained, and around 600 SBA deployed across both urban and rural health facilities in 2016[10, 11]. Despite the effort to improve accessibility to SBA across both urban and rural healthcare facilities, little improvement realized on delivery attended by SBAs and high Maternal Mortality Rate of 789 per 100,000 live birth estimate persist in South Sudan [12, 13].

In South Sudan, public health services, are delivered along with a four-tier system. Starting with the Primary Health Care Unit (PHCU) at the village level, Primary Health Care Centre (PHCC) at Payam (sub-county) level, and Hospital at the County level as secondary level and State hospital as tertiary at the State or regional level. Maternal healthcare services start at the level of PHCC to the hospital level. The South Sudan national health policy; a guideline for the package for Antenatal Care (ANC) and delivery care. Every pregnant woman is to have four visits of ANC at least. Childbirth should be by a skilled attendant at the health facility; however, in an emergency, a woman can be help for delivery by SBA at the household. Traditional Birth Attendants (TBAs) are not considered SBA trained or not trained. They are only allowed to monitor the pregnancy, delivery-related situation, reporting, and helping women in their communities with information and guidance [14].

Gondokoro is an Island located along the Nile River in South Sudan. It has two PHCC and has a growing population of over 10,000, influenced by the recent ongoing arm conflict in the country; many people fled to the area for safety security. According to facility mapping survey4 (2018). Gondokoro reported low utilization of SBAs, 26%(113) deliveries attended by SBA out of 435 pregnant mothers who attended ANC services [15].

However, there is no existing justification data on why women prefer attending ANC services than delivery services offered by SBA in Gondokoro. Thereby contributing to the achievement of progress towards reducing MMR in south Soudan and reaching the target of less than 70 maternal deaths per 100,000 live births by 2030 SDG-3 [16]. This study's objective is to explore the association of the socio-demographic characteristics and health beliefs factors (knowledge, perception, self-motivation, and trust) and the utilization of SBA at the delivery. The anticipated finding in this study will be useful for improving maternal healthcare services in Gondokoro County. South Sudan health system reform to increase access and utilization of SBA among women of reproductive age.

METHODOLOGY

The study was a one-stage systematic cross-sectional, conducted with a total of 338 eligible respondents drown from selected households by systematic random sampling procedures. Targeted were women of reproductive age and the preferred group women with under 1-year children and residents of Gondokoro Island. The study was between April to May 2019.

The sample size calculated by the finite proportional of 50% and the margin of error-p =5%. It was because the researcher could not find updated information about the population statistic of the study area. Data used was obtained from South Sudan Household Health Survey II (SSHHS II), 2010.

Formula: $\boldsymbol{n = \frac{N(Z)^2 Pq}{d^2\,(N-1) + ((Z^2 Pq)}}$, **Z** = Standard normal division set as 1.96 corresponding 95% confidence interval (CI), **Q**=1-P,
margin of error = d **(p-P),**
P =finite population proportion (1,457 households)
d= 0.05 **(**precision/margin of error), **P** = 0.5 **(**finite proportion of population)
The 10% adjustment (non-response cases or incomplete questionnaires),
Calculated by $\frac{\mathbf{n}}{(\mathbf{1-r})}$; where **r** is 10% adjustment proportion. n = 304 ± 10% = 338 sample

The total sample size of 338 obtained and face to face interview with a questionnaire which contains two parts; questions on socio-demographic characteristics and health belief factors (knowledge on health risk, perception, self-motivation, and trust of SBA for childbirth). The data obtained with 100% respond from 338 respondents.

Measurement

Knowledge questions; consist of 12 items, 3 scales and maximum score =1. Perception questions; Consist of 10 questions, 5 scale, and maximum rating = 5. The median score was cut point to determine knowledge level and perception. Score above-median is high knowledge and positive perception. Score below-median is low knowledge of health risk and negative perception. Reliability check by pre-test study of 30 participants, Cronbach's Alpha used on results of 30 participants; knowledge = 0.729 and Perception = 0.724. Other variable self-motivation classified as family support, planned pregnancy, SBA services, and distance; Trust; classified as yes and no from perception questions. The socio-demographic characteristics that includes mothers age; categorized in two group by median, age ≤29 years categorized as young mother and age >29 adult mothers; religion classified as Christian and Muslims; education classified as housewife, famer and other, education classified as low and high; marital status classified as married and others; type of family classified as monogamous and polygamous; type of family classified as extended and nuclear family.

The descriptive statistical frequency and percentage were used to describe the baseline characteristics of participants. A binary logistic regression was performed using statistical package to determine the associations. The multiple logistic regression analysis was used to identify the significant factors of health belief after adjusting the confounders.

The ethical committee from the Institute for Population and Social Research (IPSR) Mahidol University approved this study (Cord No. 2019/03-095. Date 28 March 2019), and consent obtained from participants with an assurance of confidentiality.

RESULTS

A total of 338 women recruited and completed data collected; every respondent later used to analyze the findings. Table 4.1 shows the respondent's knowledge of health risk, 55.6% has adequate knowledge, while 44.4% has inadequate knowledge about health risks related to pregnancy and childbirth. The perception toward SBAs and hospital delivery, 68% with a positive perception, while 32% has a negative attitude. Self-motivation, 56.8% influenced by family support, while 43.2% motivated with a planned pregnancy, distance to the health facility, and healthcare services. Lastly, among respondents, 76.9% trust SBA services, while 23.1% do not trust SBAs and services they offer.

Table 1 Distribution by Health belief factors.

n= 338	Number (%)
Knowledge of health risk	
High knowledge (≥ 6 scores)	288 (85.2)
Low knowledge (< 6 scores)	50 (14.8)
Perception on SBA/hospital delivery	
Negative perception	108 (32)
Positive perception	230 (68)
Self-motivation	
Family support	192(56.8)
Others(planned pregnant, health services, and distance)	146 (43.2)
Trust on SBAs	
Yes	260(76.9)
No	78 (23.1)

Socio-demographic characteristics

The socio-demographic characteristics of the women interviewed, 60.6% were age ≤29 years old, while 39.4% were age >29 years old. The median age among respondents was 29 years old (18 to 42 years old) with quartile deviation(QR) ± 4.5 years. Christians were 93.8%, while 6.2%% were Muslims. Among respondents, 48.2% were housewives, 33.4% farmers, and 18.3% were business, civil servants, and students, respectively. Women with no or primary level of education were 82%, and secondary or college level 18%. Married women were 93.2%, while single mothers, widow, separated 6.8% respectively. Among the married women (n =327), 87% in monogamous marriage and 9.8% in polygamous marriage. Regarding the husband's education level (n=327), 60.1% of women's husbands had no education or primary level, while 39.9% secondary or college level. Furthermore, among the married women (n =327), 56.5% husband's occupation was farming, while 43.5% were civil servant, business, and student respectively. Lastly, about half of respondents 50.3% were from an extended type of family while 49.7% were from a nuclear family (Table 2)

Table 2 Distribution by socio-demographic characteristics.

N=338	Number (%)
Women Age	
≤ 29 years	204 (60.6)
>29 years	134 (39.4)
Median (QR) =29(4.5), Min =18, Max=42	
Religion	
Christian	317 (93.8)
Muslim	21 (6.2)
Woman Occupation	
Housewife	163 (48.2)
Farmer	113 (33.4)
Others	62 (18.3)
Women Education	
Low education	277 (82)
High education	61 (18)
Marital Status	

N=338	Number (%)
Married	315 (93.2)
Others	23 (6.8)
Type of marriage (n=327)	
Monogamous	294 (87)
Polygamous	33 (13)
Husband education (n=327)	
Low education	203 (60.1)
High education	124 (39.9)
Husband occupation (n=327)	
Farmer	191 (56.5)
Others	136 (43.5)
Type of family	
Extended family	170 (50.3)
Nuclear family	168 (49.7)

In the bivariate logistic regression analysis of health belief. The three variables; perception, self-motivation, and trust, had strong associations unlike knowledge of women on health risk. As shown in Table 3, women with a positive perception of SBA and hospital delivery were two times, and women with inadequate knowledge of health risks were (1-0.2 =0.7*100 =80%)80%. Women with no family support were (1-0.4 =0.6*100 =60%)60%, and women without the trust of SBA were (1-0.3 =0.7*100 =70%)70% less likely to delivery with SBA respectively.

Table 3 Association between utilization of SBA and Health belief factors

Variables	Total Sample	Health believes Delivery by SBA No n(%)	Yes n(%)	Crude OR (95% CI)	p-value
Perception of SBAs/ hospital delivery	**338**				
Negative perception	108	75(69.4)	33(30.6)	1	
Positive perception	230	117(50.9)	113(49.1)	2.186 (1.409-3.391)	**<0.001**
Knowledge of health risk	**338**				
High	288	152(52.8)	136(47.2)	1	
Low	50	40(80)	10(20)	0.279 (0.135-0.580)	**0.001**
Self-motivation for ANC	**338**				
Family support	192	90(46.9)	102(53.1)	1	
Others	146	102(69.9)	44(30.1	0.381 (0.242-0.599)	**<0.001**
Trust on SBAs	**338**				
With trust	260	133(51.2)	127(48.8)	1	
No trust	78	59(75.6)	19(24.4)	0.337 (0.190-0.597)	**<0.001**

p-value based on t-test as appropriate; *p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001

In the socio-demographic characteristics, three variables, including- husband education and occupation as well as the type of family, has a significant association with the utilization of SBA among respondents. Woman with a husband of secondary or college education were 2-times more likely to utilized SBA. Women with a husband businessman or employed 4-times more likely to utilized SBA compared to those women with a husband a farmer who depends on annual income. On the other hand, the nuclear family was 4-times more likely to utilized SBA compared to an extended type of family, Table 4.

Table 4 Association between sociodemographic characteristics and SBA utilization

Characteristics	Socio-demographic characteristics Delivery by SBA			Crude OR (95% CI)	p-value
	Total Sample	No n(%)	Yes n (%)		
Husband education level	**327**				
Low education	203	38(18.7)	165(81.3)	1	
High education	124	14(11.3)	110(88.7)	1.621 (1.032-2.546)	**0.036**
Husband occupation	**327**				
Farmer	191	135 (70.7)	56(29.3)	1	
Others(business/ employment)	136	50(36.8)	86(63.2)	4.146 (2.598-6.618)	**<0.001**
Type of family	**338**				
Extended family	170	116 (68.2)	54(31.8)	1	
Nuclear family	168	78(45.2)	92(54.8)	2.600 (1.669-4.051)	**<0.001**

p-value based on t-test as appropriate; *p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001

Table 5 summarized the significant predictors of the SBA utilization at delivery after adjusting the confounding factors. The strong significant predictors of SBA utilization in this study outcome were husband occupation, type of family, perception, self-motivation, and trust. Knowledge of health risk was as well a predictor but less reliable. Respondents with a husband businessman or working were 5-times (AOR =5.386, 95% CI =2.925-9.918). Respondents from nuclear family were 4-times (AOR =3.839, 95% CI =2.126-6.932) more likely to utilize SBA. A positive perception of SBA and hospital delivery is 4-times (AOR =3.648, 95% CI =1.979-6.727) more likely to utilize SBA. Women with support other than family one were (1-0.3 =0.7*100 =70%)70% (AOR =0.334, 95% CI =0.187-0.598) lees expected to delivery by SBA. Women who do not trust SBA services were (1-0.2 =0.8 *100 =80%)80% (AOR =0.224, 95% CI =0.107-0.468), p-value = <0.001 less expected to delivery with SBA compared to women with a trust of SBA services.

Lastly, also, women's knowledge of health risk was a significant predictor. Women with little knowledge on health risk were (1-0.2 =0.8*100 =80%)80% (AOR =0.242, 95% CI =0.098- 0.599), p-value =0.002 less likely to delivery by SBA than those women with adequate knowledge on health risks.

Table 5 Significant predictors of SBA utilization among women after adjusted confounders.

Independent Variable	Adjusted OR (95% CI)	p-value
Husband education		
Low education	1	
High education	1.723 (0.934-3.178)	0.082
Husband occupation		
Farmer	1	
Others(business/working)	5.386 (2.925-9.918)	**<0.001*****
Type of family		
Extended family	1	
Nuclear family	3.839 (2.126-6.932)	**<0.001*****
Perception of SBAs/hospital delivery		
Negative perception	1	

Independent Variable	Adjusted OR (95% CI)	p-value
Positive perception	3.648 (1.979-6.727)	**<0.001*** **
Knowledge of health risk		
High	1	
Low	0.242 (0.098-0.599)	**0.002****
Self-motivation		
Family support	1	
Others	0.334 (0.187-0.598)	**<0.001*** **
Trust on SBAs		
With trust	1	
No trust	0.224 (0.107-0.468)	**<0.001*** **

p-value based on logistic regression analysis; *p-value < 0.05, ** p-value < 0.01, *** p-value < 0.001

This study presents results on factors associated with SBA utilization. Husband's occupation, type of family among socio-demographic characteristics; women's knowledge, perception, self-motivation, and trust among health belief factors have an association with the utilization of SBA services. This study found that SBA assisted 43.2% of childbirth, while 56.8% not attended by SBA in Gondokoro County, South Sudan. Skilled Attendants are essential during pregnancy, at birth, as well as during the postnatal period. These results highlight a low rat of SBA utilization at delivery. According to finding the reasons could be women are not well informed of the health benefit, lack support, or wrong perceived beliefs of SBA.

In the multivariable logistic regression results of this study. Husband's occupation and type of family influence SBA utilization. A previous study in Ghana agrees with this finding; a household with a woman or husband employed or doing business has increased chances of delivery with SBA [17-18]. Nuclear family women get adequate support from their husbands and less stress. Which often increases their chances of utilizing SBA at delivery at study in Nigeria, South Sudan, and Israel [19-22]. Women with a husband businessman or employed and those in the nuclear family had a higher likelihood of delivery with SBA. The reasons could be because they get the financial and necessary support from their husbands, which is essential to influence the utilization of SBA.

A study in South Sudan (Rumbek East, and Kapoeta East) finding shows a low percentage of deliveries attended by SBAS [23-24]. Women give a reason such as lack of family support in a situation of sudden onset of labor, do not trust SBA experience, delivery in hospital end up with C-section, and considering delivery complications as a normal situation.

These finding highlight negative perceptions, little knowledge of health risk, inadequate family support, and the low trust of SBA services did not likely deliver with SBA. Mother's understanding of health risk is a significant predictor of overall attitude toward the utilization of SBAs; mothers with inadequate knowledge likely perceive SBAs with a negative attitude [25]. The reason is insufficient understanding influences women to think primitively towards modern healthcare and less benefit SBA services compared to informal(traditional) healthcare. In Tanzania among two communities (Maasai and Watermi) was low delivery by SBA. Because, mothers did no realized benefits and aware that delivery complications a manageable with help of SBA, home deliveries were much preferred because mothers not informed [26]. Raising women's awareness of the benefits of SBA delivery is essential, and offering satisfactory healthcare services would improve women's trust in SBA. Women with no trust of SBA services are those rooted in traditional healthcare. They view traditional birth attendants as older women and being more experts compared to SBAs [27]. So, making women aware of both the importance of delivery in hospital and being assisted by SBA is necessary.

In India and Uganda; women get motivated when attended by female SBA compared to males. The incentive for transport, a delivery kit for baby at the facility during ANC visits and gift to a new mother who delivers in a hospital by SBA as well motivate mothers [28-

29]. The finding of this study highlight, family support mainly from husband and family members, they feel motivated whenever reminded by their husband and family members for healthcare services. Husband and elders are usually considered family head and adviser for women; women expect full support from their husbands and family members, both financial and in kind.

As a result of this study is presented, recalled bias was a limitation; however, managed in the inclusion criteria. Women with under 1-year children were the eligible respondents recruited into the study. Furthermore, this study presents its strength of a study area is an Island that bears unique characteristics, and its residents could present different health needs.

CONCLUSION

According to the finding of this study, there is low utilization of SBA at delivery, which is influenced by a husband occupation, type of family, perception, self-motivation, and trust. Also, the mother's knowledge of health risk had a significant association with the usage of SBA; health belief factors strongly associated with the SBA utilization in Gondokoro county.

Based on this finding and considering reducing MMR. We suggest that there is a need for intervention in the health sector, such as health education and behavior change communication need for pregnant mothers and their families.

Women and the community need health literacy education, and further training of more SBA on counseling skills could be helpful to improve communication among SBA and mother. It is also necessary that home visit intervention by SBA as follow up would improve relationships and trust, positive perception of mothers towards SBAs and hospital delivery. Community health education program for pregnant women, husband and senior mothers in the house is necessary.

Further qualitative research with focus group discussion is needed to understand the insight of why women in Gondokoro prefer delivery without assistance of SBA.

ACKNOWLEDGMENT

The investigator would like to thanks the women of Gondokoro County who accepted to volunteer in the study and provided valid information that represents the entire population. Also, thanks to the state ministry of health staff, County health department staffs, and community health workers who participated in coordinating for the successful collection of data.

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THE DETERMINANTS OF SUBJECTIVE WELL-BEING AMONG THE ELDERLY IN INDONESIA

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ABSTRACT

Introduction: Subjective well-being (SWB) is the cognitive and affective evaluations of a person's life. SWB is synonymous with Happiness as reflects society's quality of life. Older people with high SWB are more likely to have better health, decreased disabilities, increased longevity, and reduced mortality.
Objectives: This study aims to explore individual, household, and district factors predicting the subjective well-being among older people in Indonesia.
Methodology: This study uses the latest wave of population survey data of Indonesian Family Life Survey (IFLS5) in 2014 conducted by RAND Corporation and Survey Meter which include questions about life satisfaction, positive affect, and negative affect constituting the domains of SWB. A total of 2,777 respondents aged 60 years old and over in Indonesia were sampled in this study. The scores of life satisfaction, positive affect, and negative affect were converted into a single score of SWB using Principal Component Analysis (PCA). SWB and its predictor variables were analyzed by the multilevel linear regression model.
Result: The multilevel linear regression analysis result found that SWB is associated with marital status (β=-0.106, p=0.033), education level (β=0.358, p=0.001), religiosity (β=0.272, p<0.001), health condition (β=0.605, p<0.001), extraversion personality (β=0.109, p=0.008), agreeableness personality (β=0.109, p=0.016), conscientiousness personality (β=0.203, p<0.001), neuroticism personality (β=-0.215, p<0.001), openness personality (β=0.099, p=0.028), and household wealth index (β=0.611, p<0.001).
Conclusion: The results can be a call for policymakers in Indonesia to make the strategic policies in promoting active and happy aging for the Indonesian citizen such as providing social and financial support for widow or separated elderly, providing long life and accessible education services, creating more programs in supporting religious activities in the society, providing more accessible health facility for elderly in the community, and providing welfare programs in the community to reduce poverty among household in Indonesia.
Keywords: Subjective Well-being, Elderly, Indonesia

INTRODUCTION

Interest in subjective well-being (SWB) for policy purpose is increasing. Many countries around the world now seriously consider measuring SWB for appraising and informing public policy [1]. Measuring subjective well-being also become one of an important recommendation of the Commission on the measurement of economic performance and social progress [2]. Since subjective well-being provides key information about people's quality of life, statistical offices should incorporate questions to capture people's quality of life evaluation, hedonic experiences, and priorities in their own surveys. Quantitative measurement of these subjective aspects holds the promise of delivering not just a good measurement of the quality of life, but also a better understanding of its determinants, reaching beyond people's income and material conditions [2].

Subjective well-being is defined as 'a person's cognitive and affective evaluations of

his or her life. The evaluations contain both emotional reactions and cognitive judgment [3]. People with a high level of SWB may feel many pleasant and few unpleasant emotions. Engaged with interesting activities, experience many pleasures and few pains, and satisfied with their lives leads people to have a high level of SWB. The term of "subjective well-being" has the colloquial term with "happiness" [4].

Subjective well-being has four main components [5]. These components consist of positive affect (experiencing many pleasant emotions and moods); low levels of negative affect (experiencing few unpleasant emotions and moods); life satisfaction (a global judgment of one's life); and satisfaction with specific domains (e.g., health satisfaction, work satisfaction, etc.). Those components are all conceptually related to each other. Each component provides unique information about the subjective quality of one's life and becomes an important part of constructing general subjective well-being [5].

The composition of the old population rapidly increases in both developed and developing countries because of decreasing fertility (birth) and mortality (death) rates while life expectancy is increasing. Globally, the elderly population is predicted to continuously increase. Asia and Indonesia since 2015, have entered the era of ageing population because of the total population aged 60 years old and over (elderly population) exceeds 7 percent [6]. The last Indonesia census in 2015 reveals that the percentage of an ageing population in Indonesia reached 8.47%. The number of Elderly's population in this country in 2015 was 21,609,717 out of 255,182,144 and is predicted to increase year by year [7]. According to the Government Regulation of the Republic of Indonesia Number 43 in 2004, the definition of elderly is someone who has reached the age of 60 years old and over [6].

The previous studies on well-being in Indonesia were using the single-item scales to measure happiness and life satisfaction as a domain of SWB that may lead less reliable over time than multi-item scales, and they also focused on the general population. This study addresses this weakness from the previous studies because this study uses the SWB measurement created from three elements of subjective well-being that consists of life satisfaction, positive affect, and negative affect. Furthermore, this study focuses on the ageing population where many researchers in Indonesia did not pay much attention to this population.

The objective of this study is to explore the individual, household, and district factors predicting the subjective well-being among ageing people in Indonesia. By conduct this research, this study can provide the beneficial understanding of SWB and can be a consideration for the policymakers in constructing the fit policies to prepare in facing the ageing population challenge and to meet the goal of increasing the longevity and promote active and happy ageing in Indonesia.

METHODOLOGY

Indonesian Family Life Survey

This study is a cross-sectional study using secondary data from the latest wave of the Indonesian Family Life Survey (IFLS5) fielded from October 2014 to April 2015. This survey was conducted by RAND Corporation and Survey Meter in which this wave only questions about life satisfaction, positive affect, and negative affect as the domains of SWB were asked. IFLS is the only ongoing large-scale longitudinal survey in Indonesia which is designed to provide data for studying behaviors and outcomes[8]. IFLS1, the first wave of IFLS survey was conducted in 1993–1994. The survey sample represented about 83% of the Indonesian population living in 13 out of a total of 26 provinces in Indonesia in that year. However, during 21 years since the first wave to the last wave of IFLS, Indonesia experienced provincial expansion from 26 to 34 provinces. This led to the increasing number of provinces involved in IFLS5.

The sample population in this study is respondents aged 60 years and over in the data set who completed on answering the questionnaire of life satisfaction, positive affect, and negative effect. The total sample gained from the data set after filtered from missing data of all the variables found 2,777 samples. The individual respondents in IFLS wave 5 for all age groups were initially 58,325 individuals nested in 15,749 households.

The dependent variable in this study is the subjective well-being, while the

independent variables in this study divided into individual factors, household factor, and district factor. The individual factors in this study consist of age, sex, marital status, education level, employment status, type of residence, religiosity, health condition, and personality. While the household factor in this study is the household wealth index, and the district factor is the Gross Regional Domestic Product (GRDP).

Subjective Well-being

Subjective well-being constructed from the variables of life satisfaction, positive affect, and negative effect. In the survey, life satisfaction was measured by a question: *"Please think about your life as a whole. How satisfied are you with it?* 1=*'completely satisfied'*, 2=*'very satisfied'*, 3=*'somewhat satisfied'*, 4=*'not very satisfied', and* 5=*'not all satisfied'"*. This question has been validated and widely used by previous studies [9-11]. On the other hand, both positive affect and negative affect were measured by a question: "*Now please take a few quiet seconds to recall your activities and experiences yesterday. Good, now I have questions about your experiences yesterday. Yesterday, did you feel…."*. The given answer from the respondents varies from 1=*'not at all'*, 2=*'a little'*, 3=*'somewhat'*, 4=*'quite a bit', and* 5=*'very'*. The questions of positive affect and negative affect were taken from the Health and Retirement Study (HRS) [8]. Originally, there were 12 words in a question represent both positive affect and negative affect consist of *'frustrated', 'sad', 'enthusiastic', 'lonely', 'content', 'worried', 'bored', 'happy', 'angry', 'tired', 'stressed', and 'pain'*. From the 12 words then separated into two variables of positive affect and negative affect. 3 words of 'enthusiastic', 'content', and 'happy' generated into variables of positive affect, while 9 words of *'frustrated', 'sad', 'lonely', 'worried', 'bored',' angry', 'tired', 'stressed', and 'pain'* generated into variables of negative affect. The quality of SWB measurement has been checked and Internal consistency of the items is good (Cronbach's alpha=0.7037).

The Determinants of Subjective Well-being

Age of this study divided into three groups of age: 0=60-69 years old (young elderly); 1=70-79 years old (middle elderly); and 2=80 years old and older (the eldest). Sex categorized as 0=Male and 1= Female. Marital status categorized as 0=Married; 1=Unmarried; and 2=Widow/Separated. Education level categorized as 0=Uneducated; 1=Elementary School; 2=Junior High school; 3=Senior high school; and 4=University. Employment status categorized as 0=Unemployed and 1=Employed. Type of residence categorized as 0=Urban and 1=Rural. Religiosity was measured by the question *"How religious are you: 'Very religious', 'Religious', 'Somewhat religious', or 'Not religious'?"*. The answer of 'very religious' and 'religious' then combined into 'Religious', while the answer of 'somewhat religious' and 'Not religious combined into 'Not religious. This variable categorized as 0=Not religious and 1=Religious. Health condition was measured by the question *"In general, would you say that you are 'Very healthy', 'Somewhat healthy', 'Somewhat unhealthy', or 'Unhealthy'?* The answer of 'very healthy' and 'somewhat healthy' then combined into 'good health condition', while the answer of 'somewhat unhealthy' and 'unhealthy' combined into 'poor health condition'. This variable categorized as 0=Poor health condition; and 1=Good health condition.

The questionnaire about personality asked a set of 15 adjectives representing all the big five personality types where 3 characteristics represent each of the 5 types of personality. This scale was used in many population surveys, such as the German socioeconomic panel (GSOEP) [8]. A five-point ordinal scale was used to reflect how well the respondent believed that characteristics represented them (1=Disagree strongly; 2=Disagree a little; 3=Neither agree nor disagree; 4=Agree a little; and 5=Agree Strongly). The types of personality then generated by the total scores from each characteristic represent each of them. It turns out 5 variables of personality with continuous data (scores minimum=3 and maximum=15) of each the personality types of Extroversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. Each of the personality types then divided into categorical variables with mean as the cut point. Extroversion personality categorized as

0=Introversion and 1=Extraversion; Agreeableness personality categorized as 0=Antagonism and 1=Agreeableness; Conscientiousness personality categorized as 0=Lack of Direction and 1=Conscientiousness; Neuroticism personality categorized as 0=Emotional stability and 1=Neuroticism; and Openness personality categorized as 0=Closedness to experience and 1=Openness.

Household wealth index gained from the household assets questionnaire. Household Assets refers to the assets belong to the household such as: house and land, other house/building, land, poultry, livestock or fishpond, hard stem plant, vehicles (cars, boats, bicycles, motorbikes), household appliances (radio, tape recorder, tv, fridge, sewing or washing machine, VCD player, cellphone, etc.), savings/certificate of deposit/stocks, receivables, jewelry, household furniture and utensils, and other assets. The respondents were asked on: "Do you or does any other member of the household own this kind of assets?". The respondents answer with "Yes" or "No". The answer then recoded into 1=have the assets and 2= don't have the assets. From the scored gained, the Principal Component Analysis (PCA) used to generate the wealth index variable from that divided into five categories coded as 0=The poorest; 1=Second range; 2=Middle range; 3= Fourth range; and 4=The richest. Gross Regional Domestic Product (GRDP) in this study refers to per capita GRDP at current market price by regency/municipality in every district where the respondents reside in 2015. This variable then divided into four categories coded as 0=Low GRDP; 1=Low-Middle GRDP; 2=Upper-Middle GRDP; and 3=High GRDP.

Multilevel Linear Regression

The data used in this study were analyzed by the multilevel linear regression model using STATA version 15 software. Before analyzing by multilevel linear regression, Principal Component Analysis (PCA) has used to construct the dependent variable (subjective well-being). The scores of three different variables (life satisfaction, positive affect, and negative affect) converted into a single score of subjective well-being using this analysis. PCA is a technique for creating a new variable from the uncorrelated variables by reducing the dimensionality of such datasets, maximizing the variance, but at the same time minimizing the information loss [12]. PCA has been used in the past study to construct subjective well-being from more than two different measurements [13].

Multilevel linear regression is used to account for individual, household, and district characteristics on subjective well-being. This model is more suitable than using the regular linear regression which concentrates on data at the individual level and ignores the nested data. Ignoring the recognize hierarchical structure lead to underestimate the standard errors and overestimate the statistical significance. Multilevel linear regression analysis or some study called it a hierarchical linear model is a type of regression to analyze the multilevel data where the dependent variable is at the lowest level [14].

Ethics consideration

The IFLS Wave 5 surveys and all their procedures were properly reviewed and approved by IRBs (Institutional Review Boards) in the United States at RAND and in Indonesia at the University of Gadjah Mada (UGM) [8]. This study has been reviewed and received an approval letter from the IRB committee at the Institute for Population and Social Research (IPSR) Mahidol University.

RESULTS

Before analyzed by PCA, the multicollinearity within the dependent variable need to be checked. Based on the matrix, there was no indication of a violation of multicollinearity assumption because of no high correlation between variables. It means that no variable needs to be excluded. Matrix correlations within the dependent variable present in Table 1.

Table 1

Variables	Life Satisfaction	Positive Affect	Negative Affect
Life Satisfaction	**1**		
Positive Affect	**0.2745** <0.0001	**1**	
Negative Affect	**-01365** <0.0001	**-0.1171** <0.0001	**1**

These variables also should be recoded in the same direction before analyzed by PCA. After the multicollinearity has been checked and all the variables within the dependent variable have been in the same direction, PCA was used to convert the total scores gained from life satisfaction, positive affect, and negative affect into a single score of SWB. SWB is the standardized factor score based on the unrotated first principal component. The first principal component accounted for 45.63% of the variance in items. The result of PCA found that SWB is normally distributed with the mean 0.002 and the standard deviation is 1.166 (min=-4.464, max= 2.974).

Majority of the respondents in this study were young elderly (65.97%), female (51.53%), married (64.67%), attended elementary school (54.66%), employed (59.20%), live in urban area (54.12%), religious (91.90%), in the good health condition (62.95%), with extraversion personality (59.49%), with Agreeableness personality (70.18%), with Conscientiousness personality (60.06%), with Neuroticism personality (54.92%), with Openness personality (70.51%), and in the middle range of the household wealth index (28.41%), and in living in the high GRDP (25.50%). The results also reveal that the respondents in this study lived in 198 districts (14 respondents per district on average) and 2,311 households (1.2 respondents per household on average). Detail of the descriptive statistics of the respondents and mean distribution of SWB for each independent variable are presented in Table.2.

Table 2 The descriptive statistics of the respondents and mean distribution of SWB for each independent variable.

Independent variables	Frequency	Percentage	Mean of SWB	S.D
Age				
Young elderly (60-69 years old)	1,832	65.97	0.033	0.028
Middle elderly (70-79 years old)	807	29.06	-0.067	0.040
The eldest (80-49 years old and older)	138	4.97	-0.003	0.090
Total	2,777	100.00		
Sex				
Male	1,346	48.47	0.030	0.032
Female	1,431	51.53	-0.024	0.031
Total	2,777	100.00		
Marital Status				
Married	1,796	64.67	0.042	0.027
Unmarried	17	0.61	-0.127	0.279
Widow/Separated	964	34.71	-0.069	0.039
Total	2,777	100.00		
Education Level				
Uneducated	547	19.70	-0.071	0.051
Elementary School	1,518	54.66	-0.101	0.030
Junior High School	269	9.69	0.084	0.068
Senior High School	285	10.26	0.295	0.062
University	158	5.69	0.583	0.079
Total	2,777	100.00		

Independent variables	Frequency	Percentage	Mean of SWB	S.D
Employment Status				
Unemployed	1,133	40.80	0.017	0.035
Employed	1,644	59.20	-0.008	0.028
Total	2,777	100.00		
Type of Residence				
Urban	1,503	54.12	0.068	0.030
Rural	1,274	45.88	-0.075	0.032
Total	2,777	100.00		
Religiosity				
Not Religious	225	8.10	-0.334	0.074
Religious	2,552	91.90	0.032	0.023
Total	2,777	100.00		
Health Condition				
Poor Health	1,029	37.05	-0.438	0.037
Good Health	1,748	62.95	0.262	0.025
Total	2,777	100.00		
Extraversion Personality				
Introversion	1,125	40.51	-0.092	0.035
Extraversion	1,652	59.49	0.066	0.028
Total	2,777	100.00		
Agreeableness Personality				
Antagonism	828	29.82	-0.164	0.041
Agreeableness	1,949	70.18	0.073	0.026
Total	2,777	100.00		
Conscientiousness Personality				
Lack of Direction	1,109	39.94	-0.208	0.036
Conscientiousness	1,668	60.06	0.143	0.028
Total	2,777	100.00		
Neuroticism Personality				
Emotional stability	1,252	45.08	0.205	0.031
Neuroticism	1,525	54.92	-0.164	0.031
Total	2,777	100.00		
Openness Personality				
Closedness to experience	819	29.49	-0.148	0.039
Openness	1,958	70.51	0.065	0.027
Total	2,777	100.00		
Household's Wealth Index				
The poorest	287	10.33	-0.380	0.074
Second range	502	18.08	-0.209	0.053
Middle range	789	28.41	-0.107	0.041
Fourth range	638	22.97	0.103	0.045
The richest	561	20.20	0.426	0.042
Total	2,777	100.00		
Gross Regional Domestic Product (GRDP)				
Low GRDP	679	24.45	-0.078	0.045
Low-middle GRDP	695	25.03	0.073	0.044
Upper-middle GRDP	695	25.03	-0.090	0.044
High GRDP	708	25.50	0.101	0.043
Total	2,777	100.00		

In the multilevel linear regression analysis, we constructed three models. Model 1 consists of variables in the individual level only; model 2 consist of individual-level variables and household-level variable; and model 3 consist of individual-level variables, household-level variable, and district-level variable. The comparison between the result of the multilevel linear regression analysis is shown in Table 3.

Table 3 the multilevel linear regression analysis.

Independent variables	Model 1 (Individual level only)		Model 2 (Individual + household)		Model 3 (Individual + household + district)	
	β –coef.	p-value	β –coef.	p-value	β –coef.	p-value
Age						
(Ref.young elderly)						
Middle eldery	-0.047	0.323	-0.019	0.686	-0.018	0.698
The eldest	0.057	0.562	0.102	0.293	0.102	0.297
Sex						
(Ref. Male)						
Female	0.076	0.101	0.063	0.169	0.063	0.173
Marital status						
(Ref. Married)						
Unmarried	-0.093	0.721	-0.030	0.908	-0.037	0.886
Widow/seperated	-0.106	0.033	-0.093	0.059	-0.094	0.056
Education level						
(Ref. Uneducated)						
Elementary school	-0.016	0.786	-0.067	0.252	-0.067	0.251
Junior high school	0.071	0.422	-0.022	0.797	-0.026	0.769
Senior high school	0.201	0.025	0.064	0.476	0.058	0.516
University	0.358	0.001	0.145	0.186	0.140	0.201
Employment status						
(Ref. Unemployed)						
Employed	-0.064	0.159	-0.050	0.267	-0.49	0.275
Type of residence						
(Ref. Urban)						
Rural	-0.023	0.680	-0.016	0.762	-0.002	0.966
Religiousity						
(Ref. Not religious)						
Religious	0.273	<0.001	0.271	<0.001	0.272	<0.001
Health condition						
(Ref. Poor health)						
Good health	0.611	<0.001	0.605	<0.001	0.605	<0.001
Extraversion personality						
(Ref. Introversion)						
Extraversion	0.112	0.007	0.109	0.008	0.109	0.008
Agreeableness personality						
(Ref.Antaginism)						
Agreeableness	0.125	0.006	0.108	0.017	0.109	0.016
Conscientiousness personality						
(Ref. Lack of direction)						
Conscientiousness	0.224	<0.001	0.202	<0.001	0.203	<0.001
Neuroticism personality						
(Ref. Emotional stability)						
Neuroticism	-0.216	<0.001	-0.216	<0.001	-0.215	<0.001
Openness personality						
(Ref. Closedness to experience)						
Openness	0.119	0.009	0.101	0.025	0.099	0.028
Household's wealth index						
(Ref. The poorest)						
Second range			0.120	0.142	0.121	0.140
Middle range			0.220	0.004	0.221	0.004
Fourth range			0.368	<0.001	0.368	<0.001
The richest			0.609	<0.001	0.611	<0.001
Gross regional domestic product (GRDP)						
(Ref. Low GRDP)						
Low-middle GRDP					0.045	0.594
Upper-middle GRDP					-0.023	0.778
High GRDP					0.077	0.365

Number of Observation = 2,777, significant at *p*-value < 0.05

Table 3 presents the result of multilevel linear regression analysis. The result reveals that in model 1, 9 variables were strongly predicted SWB. Marital status, education level, religiosity, health condition, extraversion personality, agreeableness personality, conscientiousness personality, neuroticism personality, and openness personality predicted SWB.

In model 2, by adding 1 variable from household level, 8 variables showed strongly predicted SWB. In this model, marital status and education level lost their significant power. They were not any longer the predictor of SWB in this level. In this model, the *p*-value of marital status increase from 0.033 to 0.059. On the other hand, the *p*-value of education level for both senior high school and university increased dramatically from 0.025 to 0.476 for senior high school and from 0.001 to 0.186 for university. The changes of the *p*-value for marital status and education level in model 3 were slightly different from the result in model 2 and those variables remain not significant in model 3.

Religiosity became one of the very strong predictors of SWB on every level. Compared to not religious respondents, religious respondents consistently showed higher on SWB ($p<0.001$). Another variable that strongly and consistently predicts the SWB was the health condition. Respondents who perceived that they were in a good health condition consistently higher on SWB compared to those who feel that they were in a poor health condition ($p<0.001$).

All of The Big-five personality types predicted the SWB. The changes of *p*-value in each model showed in the extraversion personality, agreeableness personality, and openness personality. On the other hand, conscientiousness personality and neuroticism personality consistently predict SWB in every model ($p<0.001$). The difference between those personalities only in the direction of the association. Conscientiousness personality positively predicts SWB, while neuroticism personality negatively predicts SWB.

The household's wealth index as a household-level factor strongly and consistently predicts SWB. The richer the household elderly reside, the higher SWB. Nothing changes in the *p*-value for model 2 and model 3. Added in model 3, Gross Regional Domestic Product in district level evidently not a predictor of SWB. This study found interesting results. The marital status (widow/separated) and education level (senior high school and university) were not a predictor of SWB when holding household factor and district factor together.

DISCUSSION

In this study, we explore individual, household, and district level factors predicting good SWB among ageing people in Indonesia. The main results suggest that SWB or happiness of the elderly in Indonesia is significantly associated not only with the individual factors, but also the household factor. Marital status, education level, religiosity, health condition, big five personalities, and household's wealth index are significantly associated with SWB. The previous studies found that marital status [15], education level [16], religiosity [17,18], health condition [19], and personality [20-22], and household wealth index [23], are the predictors of SWB.

Confirming the previous study, marital status is a predictor of SWB. Married people have both emotional and material support from their spouse [15]. Being married benefits individual well-being [24]. People with formal marriage tent to be happier than those who are not married [25]. The possible reason is that a married couple can share their experiences on every pleasant and unpleasant moments and feelings in their lives with their spouse, rather than those who are single. The spouses give emotional and social support to their life partner. Elderly who are accompanied by a spouse may not feel lonely facing the fact that their children might leave them and they can take care of each other living in old age. In addition, formal marriages provide legal and social protection more than informal marriage [25]. On the other hand, the widow or separated elderly will be done and finished pleasant and unpleasant moments and feelings by himself solely. It might happen because they no longer get the emotional, material, and social support from the spouse.

Confirming the previous study, the education level is a predictor of SWB. The higher educated people, the higher SWB [26,27]. It should be noted that most of the

respondents (54.66%) finished elementary school and only 5.56% of respondents finished the University level. It can be understood because Indonesia declared the Independent day just 74 years ago (in 1945) when the education facility is not sufficient at that time. Educational opportunities for people who were born at least 60 years ago in Indonesia were limited. Education is related to income and occupation status. Thus, people with a higher level of education tend to feel happier and satisfied with their life [27].

As expected, religious people tend to score higher on SWB compared to those who were not religious [17,18] and the association is very strong ($p<0.001$). Religiosity plays an important role in Indonesia's society. Religion values and activities become a way of life in this country. 91.9% of respondents confirmed that they are a religious person. Religious people tend to have a less negative affect and higher on life satisfaction [28] this leads to high on SWB. This study proves that 90.32% elderly who perceive that they are a religious person that they were not feel stressed at all and mostly they were somewhat satisfied (41.73%) and very satisfied (37.07%) in their whole life. Elderly will be better prepared for facing the problems in their life, such as in preparing or facing death. Some elderly have prepared through deepening religious activities so that the elderly feel calm, thus this calmness can make them happy. Furthermore, the elderly are more resigned and surrendered to God in facing their own death [29].

This study found that the perception of better health condition is associated with SWB. This result confirming the earlier finding that health condition is a strong determinant of 'happiness' [30]. People in good health condition is more likely higher on SWB [19,25,31] and people who feel unhealthy are less satisfied and less happy in their life [11,24]. Having a medical problem in people's life affects the quality of life. On the other hand, the good status of health-enhancing their quality of life. Elderly who perceive that they are in good health are likely independent in their daily activity without much help from others.

This study found that all of the Big-five personality significantly predict SWB. This result confirmed the prior study which found that extrovert, conscientiousness, openness, and agreeableness people tend to be more satisfied with their life while neuroticism has a negative relationship with happiness and life satisfaction [24]. An individual with extraversion personality tends to experience more positive effect while the individual with neuroticism personality tends to experience negative affect [21].

Household wealth index was strongly associated with SWB. This result confirms the previous study which found that lower household wealth status significantly has a negative association with SWB [23]. People with higher values of an asset are more likely to be happy than those with a lower value of an asset. It might happen because people with sufficient asset might feel more secure than people who have insufficient one. An asset can be used as an investment as well as prevention [25].

LIMITATIONS AND STRENGTHS

This study has the limitations which need to be addressed. This study uses the secondary data from IFLS5 dataset where the community level variable is not appropriate for analysis because the number of respondents of the community level is few. Another limitation is since this is a cross-sectional study, the causal relationship cannot be inferred.

The future researcher who interests in this study area may add more dataset to be included in the study to explore the determinant of subjective well-being among the elderly at a various level so the finding will be richer; and they may conduct the longitudinal studies that could support more valid inferences about the relative importance of the various determinants of subjective wellbeing among elderly.

Despite the limitations, this study has several strengths. Firstly, 2,777 samples from ageing population considered as a big sample. Secondly, this study uses the appropriate statistical method with multilevel linear regression analysis which takes account of the level nested data. Thirdly, this study does something different which instead of using only the single measurement to measure SWB, this study constructing a new SWB measurement by combining the three different measurements consist of life satisfaction,

positive affect, and negative affect with appropriate analysis method using Principal Component Analysis (PCA).

POLICY RECOMMENDATIONS

The results can be a call for policymakers in Indonesia to make the strategic policies in promoting active and happy aging for the Indonesian citizen such as providing programs giving social and emotional support for widowed or separated elderlies, providing long life and accessible education services, creating more programs in supporting religious activities in the society, providing more accessible health facility for elderly in the community, and providing welfare programs in the community to reduce poverty among household in Indonesia. There are no direct policy recommendations for the big-five personalities on SWB because they are not easily amenable. Personality is an individual issue and it fairly stable across the lifetime unless the individual really wants to change it with or without professional's help.

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FORMATIVE RESEARCH TO DEVELOP A DIABETES PREVENTION EDUCATION PROGRAM FOR BASIC HEALTH STAFF IN SEMI-URBAN AREA OF YANGON REGION, MYANMAR

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ABSTRACT

Background: Diabetes prevalence in Myanmar (10.5 (%is higer than the average diabetes prevalence in South East Asia Region (8.6 .(%A number of intervention trials have demonstrated the risk of developing diabetes can be reduced up to 63 %by lifestyle intervention.
Objective: Th e objective of this study was to explore the challenges and supports to develop a diabetes prevention education program for basic health staff in semi-urban area of Yangon Region, Myanmar .
Subject and Methods: This qualitative study was conducted in Mingaladon Township of Yangon Region, Myanmar .Total 8-days observation at 4 health centres, in-depth interviews with basic health staff) n-10(, in-depth interviews) n=10 (and focus group discussions) n=4, 28 participants (with community members who are at-risk of developing diabetes were conducted using semi-structured interview guides. The transcripts of audiotaped interview and focus group were coded and codes were analysed by hand .
Results: Participants identified the lack of training programs and health information supports regarding diabetes and diabetes prevention .Both basic health staff and community participants had low level of knowledge about diabetes and lifestyle intervention for diabetes prevention. Basic health staff were interested to learn about diabetes and its prevention. They identified the opportunities to integrate diabetes prevention education program into their routine works.
Conclusion: As there is no information supports and resources, most participants have low level of knowledge about diabetes and its prevention. This study shows the needs to establish a diabetes prevention education program for basic health staff to combat the rising trend of diabetes in Myanmar. The program should cover knowledge about diabetes, prediabetes, diabetes prevention and lifestyle intervention including diet and physical activity
Key words :Myanmar, Diabetes prevention program, Basic health staff, At-risk community members

INTRODUCTION

Diabetes becomes a global concern and one of the four priority non-communicable diseases)NCDs (targeted by world leaders to take series of actions [1]. According to International Diabetes Federation)IDF(, it is estimated that 425 million people worldwide, or 8.8 %of adults)20-79 years (have diabetes in 2017 .If these trends continue, some 629 million of adults)20-79 years (will have diabetes by 2045 [2]. Over the past 3 decades, the prevalence of diabetes is growing most rapidly in low and middle income countries [1]. About 79 %of people with diabetes are estimated to be living in low and middle income countries [2].

A number of very well-conducted intervention trials have demonstrated the risk of developing diabetes can be reduced up to 63 %in lifestyle intervention groups compared with control groups [3]. Early interventions to delay the progression from prediabetes to diabetes have massive benefits for the patients in terms of increasing life expectancy and

quality of life, and potentially in economic terms for society [4].

Although there are a number of successful intervention trials concerning prevention of diabetes and its complications in developed countries, there are still limitations in translation of these programs to developing and low and middle income countries, where resources are limited to address the problems [3]. IDF recommended that all activities in lifestyle modification for diabetes prevention are tailored to the specific local situation[4].

Myanmar, as other developing countries, is facing the double burden of communicable and non-communicable diseases due to the demographic and socio-economic transition that occurred in recent decades [5]. According to data from National Survey on Diabetes and Risk Factors for NCDs in Myanmar (2014), the prevalence of diabetes among adult population)aged 25-64 years (in Myanmar is 10.5 %which is higer than the average prevalence of diabetes in South East Asia Region- 8.6 %[6] [1]. A study conducted in 2014 showed that the aged standardized prevalence of diabetes in Yangon Region was 12.1% in urban and 7.1% in rural areas [7].

The Myanmar Diabetes Care Model has been developed to lessen the health and socioeconomic burden of diabetes in Myanmar [8]. One of the features of the model is empowering basic health staff (BHS) in diabetes care [8]. In Myanmar, around 70% of total population resides in rural areas [9]. In rural areas and semi-urban areas, BHS such as health assistants (HAs), lady health visitors (LHVs), midwives and public health supervisors are major health care providers [10]. They are usually the first contact points and initial points of referral for sick people to secondary and tertiary hospitals [11]. Primary health care professionals are said to be integral to the communities in which they work and it is likely that health-related massages coming from them are heard, accepted and implemented by the community members [12].

From literature review, highly trained staff such as physicians, nurses, registered dieticians, nutritionists are employed to deliver a lifestyle intervention to participants in the previous successful diabetes prevention programs [13]. In Myanmar, there are only a few number of diabetes educators, dieticians and nutritionists as there is no government institute that offers degrees or diplomas in those fields. In addition, the number of medical doctors per capita in Myanmar is lower than many countries in the region. There were only 6.1 doctors per 10,000 people in Myanmar in 2015 according WHO data. This number is fewer compared with 11.9 per 10,000 in Vietnam, 19.5 in Singapore, and 12 in Malaysia [14].

With the limited numer of medical doctors and their busy schedules, and relatively small number of diabetes educators, nutritionists and dieticians in Myanmar,it is unlikely that adults who are at-risk of developing diabetes or general population will have chances to get either lifestyle education for diabetes or diabetes prevention. This reflects that nutrition and lifestyle education for prevention and care of diabetes is urgently needed in Myanmar to reduce the social and health burden of diabetes. In this regard, we speculate that BHS are the most promising primary health care workers to deliver lifestyle education for diabetes and diabetes prevention to the population. Thus the objective of this study is to explore the challenges and supports for implementing diabetes prevention education program for BHS in semi-urban area of Yangon Region, Myanmar.

METHODOLOGY

Compliance with Ethical Standards

The permission to conduct this study was granted by Mahidol University-Central Institutional Review Board)MU-CIRB(, Nakhon Pathom province, Thailand and Department of Medical Research, Ministry of Health and Sports, Yangon, Myanmar. The written consents to participate in the study were obtained from the participants.

Study Setting

The study was conducted in Mingaladon Township, Northern District of Yangon Region, Myanmar .We purposely selected the Yangon region among 14states and regions in Myanmar as the estimated prevalence of diabetes is high in Yangon region :17.2 %in urban area and 9.2% in rural area[15]. Mingaladon Township was purposely chosen because of the total population size and percentage of urban

population to represent semi-urban area. Mingaladon Township, located approximately 15 km north of central Yangon, is the home for Yangon International Airport [16]. There are 27 wards, 5 village tracts and 20 villages in Mingaladon Township .The total population size of the township is 331,586 and percentage of urban population is 59.8 %[17]. There are 4 health centres and 19 sub health centres in Mingaladon Township [18]. Many community members in Mingaladon Township work at factories and companies [19].

Study Design

This qualitative research includes)1 (Total 8 days observation at 4 health centres;)2 (in-depth interviews (IDIs) with BHS;)3 (IDIs and focus group discussions (FGDs) with community members who are at risk of developing diabetes.

Sample Selection

Sample selection for BHS participants

BHS who meet the eligible criteria were selected purposively to ensure to select the holders of knowledge in the selected areas . Inclusion criteria for BHS are**:** BHS)HA,LHV, midwife (currently working at one of the government health care centres in Mingaladon Township, who has at least one year work experience in selected community, and who is willing to participate in the study.

Sample selection /Identifying individuals at risk of diabetes

As there is no data related to diabetes screening or the community members who are at risk of diabetes, we adapted the diabetes risk score for Thais to identify at risk community members .The diabetes risk score for Thais includes 5 risk factors such as age, sex, body mass index)BMI(, waist circumference, hypertension, and family history of diabetes . The cut off point for this risk scoring is 6 .If the score is ≥ 6, it indicates high risk of developing diabetes within 5 year [20]. At risk community members are chosen from the communities where four health centres are located. Inclusion criteria for at-risk community members include: (i) adult > 18 year old living in the selected communities , (ii) who hasdiabetes risk scoring ≥ 6,) iii(who is clinically stable, (iv) who can speak Burmese fluently) v (who is not previously diagnosed as diabetes.

Research Instruments

The semi-structured interview guides for IDI with BHS and IDI and FGD with at-risk community members were research instruments in this study. The interview guides were adapted from similar study in Thailand [21]. The interview guides were open-ended, simple, and contained no threatening questions. Some changes were made in the interview guides after field observation and after piloting the interview guides.

The interview guides for IDIs were pre-tested both for BHS and individuals at risk of diabetes .During preparation phase, the researcher and assistants had meetings and discussions to assure that all the interviewers have the same understanding of the interview questions and are able to probe to get the answers .The researchers and assistants also discussed how to probe participants to obtain additional information on interesting topics that emerge and to clarify ambiguous comments.

Data collection

The data were collected from observation, IDIs and FGDs at four health centres in Mingaladon Township .Before starting each IDI or FGD, written consents were obtained from the participants. The demographic data of the participants were collected during IDIs and FGDs .All IDIs and FGDs were conducted based on the interview guides. IDIs and FGDs were audio-taped with the permission of the participants.

Total 8 days observation was conducted at 4 health centres from 9:00AM to 4:00PM)i.e .two days observation was conducted in each health centre .(The observation was unstructured observation. The focus of the observation were roles and responsibilities of BHS, their workloads and daily activities including disease prevention, health promotion and home visiting .Field notes were taken during observation .

IDIs with 10 BHS were conducted at four health centres. Duration of each IDI was 30-45 minutes .IDIs were conducted to investigate the BHS's experiences in health promotion, disease prevention including diabetes prevention, previous training

regarding diabetes and diabetes prevention; and their attitudes and awareness towards diabetes prevention and related factors in the community.

Ten IDIs with at-risk community members from four selected communities ,where health centres are located, were conducted. The duration of each IDI was 20-45 minutes .Total 4 FGDs with at-risk community members were also conducted . There were 7 participants in each FGD. Each FGD was led by a moderator according to the interview guide. The duration of each FGD was 60-90 minutes .Both IDIs and FGDs with at-risk community members were conducted to explore their beliefs, knowledge and attitudes towards diabetes and diabetes prevention .

Data analysis

The audiotapes of IDIs and FGDs were transcribed and translated from Myanmar to English .One IDI with BHS, 1 IDI with at-risk community members and 1 FGD of translations were randomly selected and checked independently for validation and accuracy .Both the transcripts and field notes are organized by hand. The transcripts were coded and codes were sorted using Microsoft excel work sheets .The codes were categorized and themes were generated. The codes and themes were checked and confirmed by supervisors of the researcher.

RESULTS

General information of participants

Three males and 7 females BHS participated in IDIs with BHS .The mean age of BHS was 47 years and 70 %of them had a bachelor degree .In this study, 3 health assistants, 2 lady health visitors and 5 midwives participated and 80 %of them have more than 10 years of work experience in public health **.**The total number of at-risk community members participated in the study is 38 .Ten at-risk community members participated in IDIs and 28 at-risk community members)n =4 groups (participated in FGDs . The average age of at-risk community members was 49 years and the mean diabetes scoring was 8**)** Table 1**.(**

The findings from IDIs and FGDs of both BHS and at-risk community members were interrelated in the hurricane diagram (Figure 1). Figure 2 show the concept map of challenges and supports for diabetes prevention education program for BHS in semi-urban areas of Yangon *Region.* Figure 1 and Figure 2 were adapted from the previous similar study in Thailand [21].

Table 1 General information of participants, N=48

	Basic Health Staff (n=10)	At-risk community members (n=38)
Age, years (Mean ± SD)	47.4±11.1	49.8±9.4
Sex (n, %)		
• Male	3(30)	9(24)
• Female	7(70)	29(76)
Education (n, %)**((**		
• Bachelor	7(70)	
• Less than Bachelor	3(30)	
• ≥ grade 4		10(26)
• Middle school		15(40)
• High school		13(34)
Occupation)n, **((%)**		
• Health Assistant	3(30)	
• Lady Health Visitor	2(20)	
• Midwife	5(50)	
• Own business		11(29)

	Basic Health Staff (n=10)	At-risk community members (n=38)
• Labourer		3(8)
• Housewife		17(45)
• Farmer		4(10)
• Government staff (retired)		3(8)
Work Experience		
• Less than 10 years	2(20)	
• More than 10 years	8(80)	
BMI(n,%)		
• Overweight)≥ 23 but < 27.5(		30(79)
• Obesity)≥ 27.5(		8(21)
Waist Circumference (n,%)		
• M ≥90 cm		5(13)
• F ≥80 cm		25(66)
Hypertension(n, %)		15(39)
Family History of diabetes (n,%)		7(18)
Diabetes Scoring (n,%)		
• Median (min, max)		9(6,13)
• Mean ± SD		8.4±1.7

*WHO expert consultation)2004 .(Appropriate body-mass index for Asian population and its implication for policy and intervention strategies .The Lancet, 157-163.

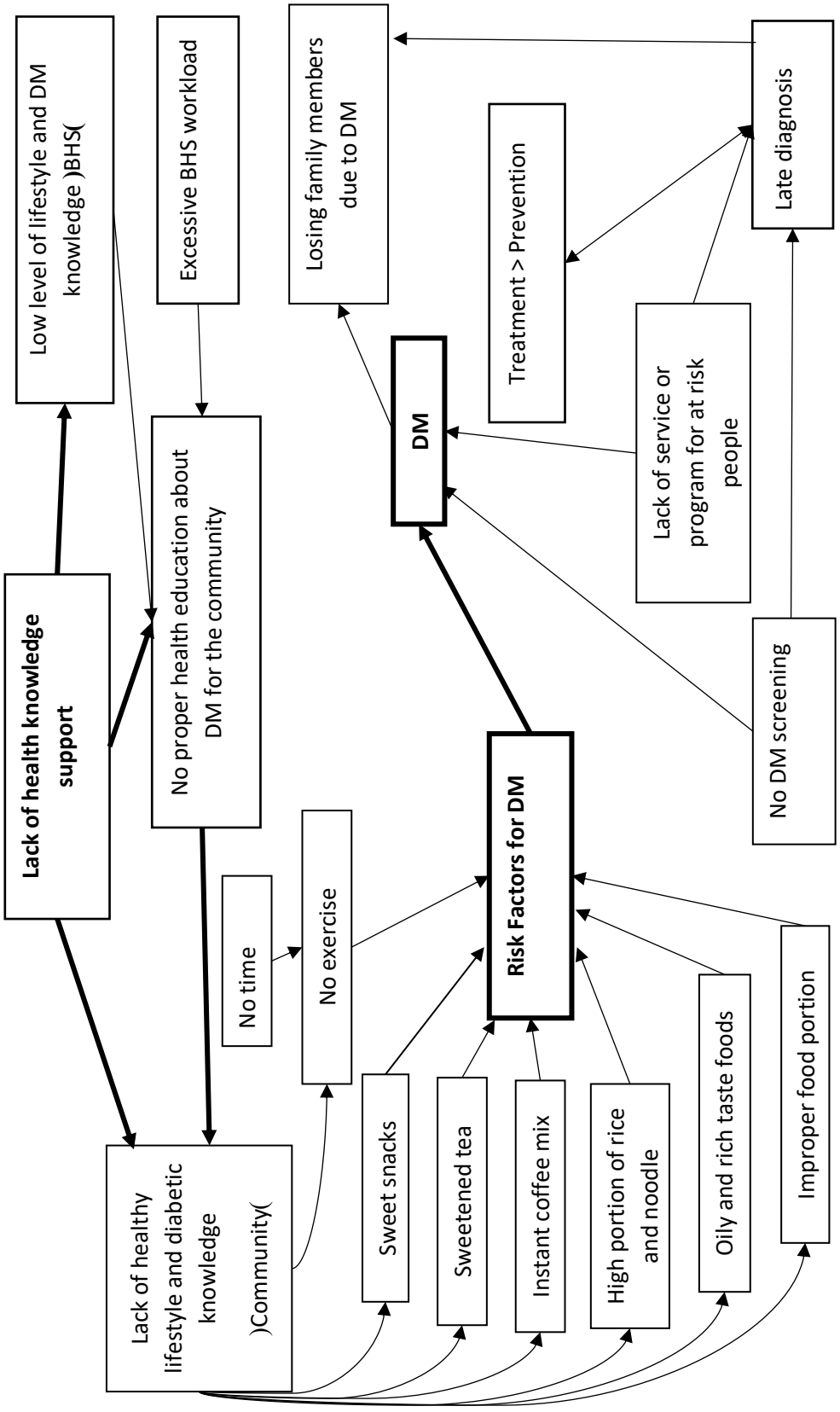


Figure 1 Hurricane diagram generated from input from BHS and at-risk community members

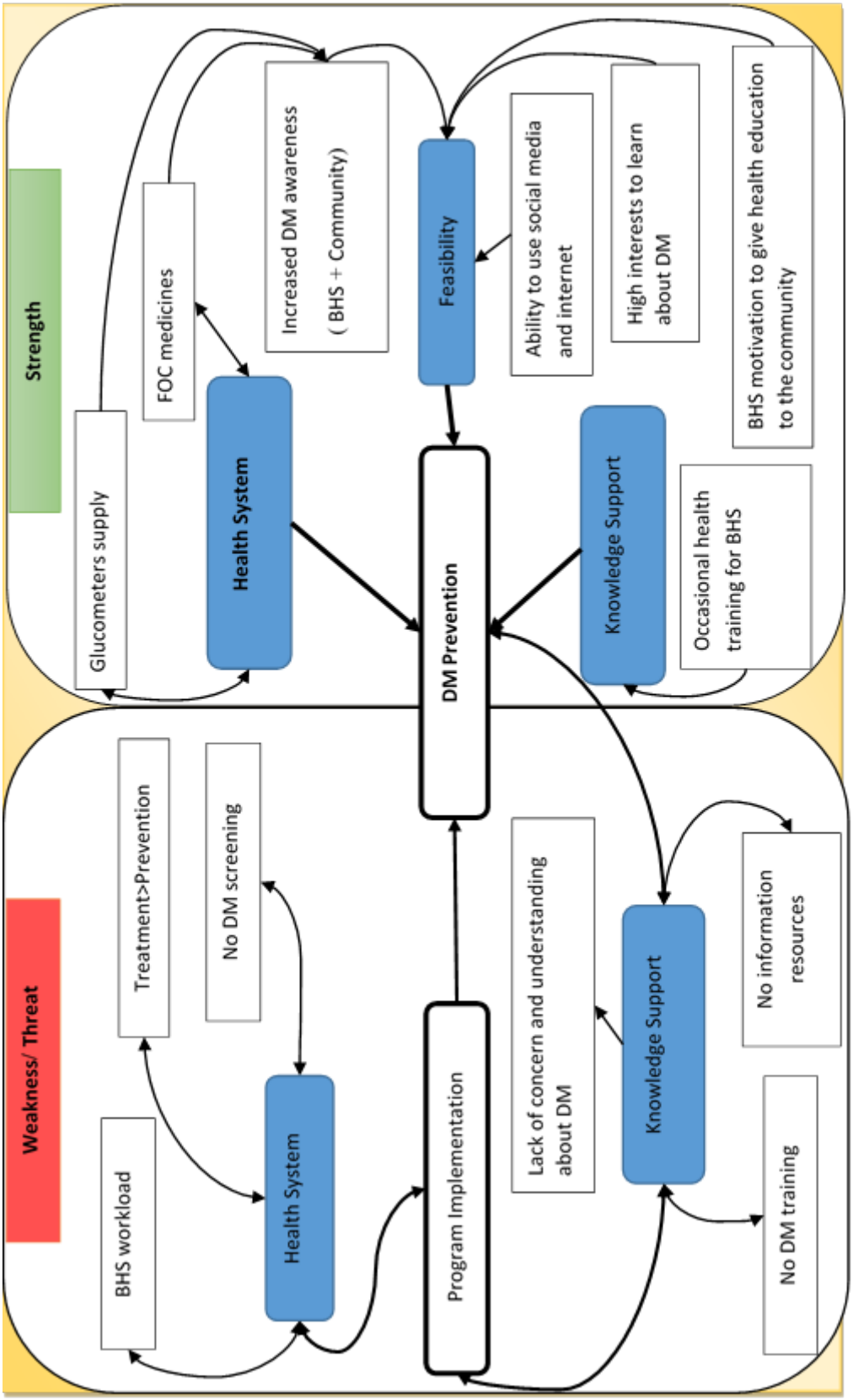


Figure 2 a concept map of challenges and supports for diabetes prevention education program for BHS in semi-urban area of Yangon Region, Myanmar

The following sections are the narrative of the findings from thematic analysis.

Responsibilities and workload of BHS

BHS are responsible for immunization, disease prevention and control, maternal and child health, and nutrition such as deworming and vitamin-A supplement . BHS perform disease prevention and control such as larva control for dengue haemorrhagic fever, tuberculosis and multi drug resistant tuberculosis)MDR-TB (and prevention of mother to child transmission of HIV infection)PMTCT.(

BHS have many works to accomplish each month .A senior health assistant described "*The human power and the workloads are imbalance .It will be quite good if all the posts as in the organization charts are fulfilled*".[*BHS-1*[Being the major health promotion workforce, BHS usually give health education related to antenatal care, dengue haemorrhagic fever, nutrition, immunization and other seasonal diseases.

Practice of diet and physical activity in the community

Most community members consume high amount of rice and noodles daily with small portion of vegetables and meats. The community members prefer to eat oily and rich taste foods. Most snacks available in the community are made from rice flour, sticky rice flour, wheat flour, sugar and jaggery. Drinking sweetened tea, instant3 in 1 coffee mix(coffee powder, milk powder and sugar) 1 to 3times per day is common among the community members.

Most community members mentioned that they do not do exercise for health .Some of them believed that they do not need to do physical exercise as they already have enough physical activity by doing their daily works. Some community members mentioned that they do not have time to do physical activity.

Diabetes situation in the community

Majority of participants noticed that the number of people with diabetes in the community is increasing .Some believed that there may be many cases of undiagnosed diabetes in the community as there is no screening for diabetes.

Community awareness and knowledge about diabetes

All BHS agreed that the community members have awareness about diabetes compare to the past .Increasing number of diabetes in the community and seeing how the diabetes patients suffer appeared to raise the awareness of community members regarding diabetes. Despite the increased awareness of diabetes, majority of the community members appeared to have low level of knowledge about diabetes and diabetes prevention" *.As I do not have experience about diabetes among my family members or my neighbourhood, I do not know much about diabetes*."]*Community participant -3* [

Most community participants believed that they will not have chances to develop diabetes in the future" *.I do not think I will get diabetes in the future*as *I usually take care of my diets .I do not drink tea, I do not eat tea leaves .I do not drink coffee at all .I only eat rice .I eat rice most of the time*."]*Community participant -1*[

Most community members appeared to check their blood glucose only when they have prominent symptoms or complications of diabetes" *.I have never checked my blood sugar .But as I used to hear that if we have diabetes, the wound will not heal within a short period of time .For me, I usually get injuries and wounds but they usually get heal quickly .So, I do not think that I have diabetes and that is why I do not go and check my blood sugar*."]*Focus group3-participant4* [Some community participants stated that they loss their family members because of diabetes . They said they knew that their family members had diabetes when it was late.

Current practice about diabetes

Regarding diabetes, BHS test the blood sugar level of all pregnant women in the community .All BHS participants agreed that there is no screening for the risk factors of diabetes at the moment .BHS said that they are not familiar with prediabetes and methods to identify the community members who are at risk of diabetes and prediabetes, and there is no service or program that focuses on the

community members who are at-risk of diabetes. BHS mentioned that there have been some improvement in the health system regarding diabetes care compare to the past . They recieve glucometers and medicines)metformin (from the government .A LHV stated "*Now it is not the same as before .We can give medicines for diabetes when we give health education and we can do blood glucose test without any charge*."]*BHS-10*[

Regarding health education for diabetes, all BHS stated that there is no separate health education session for diabetes . "*Frankly, we are not familiar with diabetes and we are not skilful to talk about diabetes to community members .We don't have any teaching materials for diabetes .We don't have papers or pamphlets related to diabetes .We don't have anything related to diabetes*."]*BHS-4*[

Health information supports and resources regarding diabetes

There is no available health information resources related to diabetes for BHS in the health centre .A BHS described : "*We do not have pamphlets nor vinyl about diabetes .We don't have posters too*".[*BHS-2* [All the BHS agreed that they have never get training about diabetes prevention in Mingaladon Township .Some BHS participants appeared to have some knowledge about diabetes .Some BHS and most of community participants mentioned that they learned the symptoms of diabetes from the experience of diabetic patientsand other community members. Some of the information are unlikely to be accurate and reliable.

Diabetes prevention education program for BHS

As there has not been training about diabetes and diabetes prevention for BHS in Mingaladon Township, most of BHS appeared to be interested to participate in the diabetes prevention education program .Most of them believed that the program will be useful for themselves and for the community .Most of BHS participants are interested to learn the details about diets and physical activities related to diabetes prevention .BHS desire to participate in the training in which they can actively participate and do practically .

Most BHS believed that it will be possible to implement diabetes prevention program for BHS if we inform the township public health officers about the program in advance and set the date and time when most of the BHS will be availableto ensure that most BHS are available to participate in the program.

DISCUSSION

BHS have many responsibilities and most of them agreed that the current human power and their workloads are imbalance. Most participants aware that the number of people with diabetes in the community is increasing. Despite the awareness of diabetes in the community, BHS and community participants have low level of knowledge about diabetes. Both BHS and community participants appeared to be unfamiliar with lifestyle intervention including diets and physical activities for diabetes prevention. Most community participants do not practice healthy diet and physical exercise for their health.

All BHS stated that there is no health information supports or training program for diabetes prevention. BHS do not give health education to the community members particularly for diabetes and diabetes prevention. Some BHS mentioned that they do not have confident to share knowledge about diabetes and its prevention among community members. This study included the community members who are at risk of diabetes and most of them believed that they will not have chances to develop diabetes in the future. Most community members are likely to check their blood sugar only when they have prominent symptoms or complications of diabetes. Some community member participants mentioned that they loss their family members because of diabetes.

BHS receive glucometers and essential medicines supply for diabetes from the government. There is no screening for diabetes and prediabetes. Some participants believed that there will be many undiagnosed diabetes cases in the community as there is no screening for diabetes.

BHS appeared to be interested to learn about diabetes and diabetes prevention. Excessive workloads of BHS is likely to be the

major obstacle to implement the program. In order to overcome this obstacle, BHS advised to negotiate with township public health officers and to set the date and time for the program when most BHS are available to participate in the program.

Many well-conducted diabetes prevention programs such as Diabetes Prevention Program (DPP) and the Finnish Diabetes Prevention Study, Da Qing Study and Indian Diabetes Prevention Program demonstrated that development of diabetes can be delayed or prevented through lifestyle interventions [22-25]. Diabetes prevention by lifestyle modification is also likely to yield other health benefits such as lowering the risk of hypertension, hyperlipidemia, heart disease and certain cancers [26].

Education and support are considered gold standards for prevention and care of diabetes as diabetes is a disease that require behavioural change and self-management [27]. Some studies also showed that community-based interventions for diabetes prevention is one of the effective approaches for prevention and control of diabetes in low -and middle-income countries [28].

This study shows the needs to develop and implement diabetes prevention education program for BHS to reduce the increasing burden of diabetes on health and socioeconomic status. In Myanmar, BHS are the first contact points and major health care providers for majority of community members. Empowering BHS in diabetes care and prevention by giving training and providing health information supports related to diabetes and diabetes prevention is recommended. This will facilitate dissemination of reliable and concise knowledge about diabetes and its prevention among community members. Health massages about diabetes and lifestyle for prevention of diabetes coming from BHS are likely to be heard, accepted and practiced by community members.

The limitation of this study is that we were not able to include the health policy makers and the leaders from NCDs Department in the in-depth interviews.

CONCLUSION

Despite increasing number of people with diabetes in the community heightened awareness and interests of BHS and community members regarding diabetes ,both BHS and community members have low level of knowledge about diabetes prevention and healthy lifestyle .It is absolutely imperative to develop and implement diabetes prevention education program for BHS and community members to combat the rising trend of diabetes in Myanmar.

Conflict of interest: The authors declare that they have no conflict of interests.

Funding: This research was supported by the Mahidol-Norway Capacity Building Initiative for ASEAN

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FACTORS EFFECTING PRACTICE OF VOLUNTARY BLOOD DONATION AMONG UNIVERSITY AND COLLEGE STUDENTS IN YANGON, MYANMAR

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ABSTRACT

Introduction: Blood is a vital part of human which is used to save millions of lives worldwide in different clinical settings. World Health Organization (WHO) stated the young voluntary blood donors are the most potential sources of donors for the safest supply of blood. In developing countries including Myanmar, the sustainability, sufficient and timely blood supply is a major challenge and requires strategies to recruit more voluntary young blood donors.
Objectives: This study aimed to determine the association of socio-demographic factors, knowledge and attitude towards practice of voluntary blood donation among university and college students in Yangon
Methodology: The cross-sectional study (April to May 2019) with self-administered questionnaires covering socio-demographic, knowledge, attitude and practice part was conducted among full time students with age ≥18 years old in Yangon Technological University (YTU) and National Management Degree College (NMDC) in Yangon, Myanmar. The questionnaires validity was tested with Item-Objective Congruence (IOC) and having back-translated method. Before data collection, reliability test with Cronbach's Alpha for attitude section and KR 20 for knowledge section were done and results were 0.63 and 0.71 respectively.
Results: Total 341 students (136 males and 205 females) participated in the study with mean age of 19.1 years (SD ± 1.1). Approximately 32% of total students practiced blood donation before and all of them were voluntary blood donors. Minority of the participants had high knowledge level, 74 (21.7%) and high attitude level, 61 (17.9%) towards blood donation. However, most of the participants 286 (83.9%) were willing to donate blood in the future. The predictors of being voluntary blood donor were male gender AOR (95%CI): 3.03 (1.70, 5.43) p<0.001, having blood related disorder AOR (95%CI): 0.25 (0.09, 0.71) p= 0.010, high knowledge level of blood donation AOR (95%CI): 8.24 (3.06, 22.20) p<0.001 and high attitude level of blood donation AOR (95%CI): 7.01 (1.97, 24.90) p = 0.003.
Conclusion: Proportion of voluntary blood donor among university and college students was relatively low. Male students with higher knowledge and attitude levels were more likely to donate blood voluntarily. Small proportion of the participants had high knowledge and attitude towards blood donation. Female students should be encouraged more to involve in blood donation and more regular blood donation campaigns and awareness raising in the university students society are required to increase the voluntary blood donations in the country.
Keywords: Voluntary blood donation, University students, Yangon, Myanmar

INTRODUCTION

Blood is an essential and vital part of human body as well as an important irreplaceable resource being used in various clinical settings of both routine and emergency conditions. Although the uses of blood may differ between developed and developing countries, the need of blood and blood products is increasing with advanced medical

and surgical procedures, as well as increasing population [1].

Blood donation is philanthropic deed when the blood of a healthy person is collected for purpose of transfusion for patient in need [2]. Blood donors can be categorized into three as voluntary/ non-remunerated donors, family/replacement donors and paid donors. Adequate and reliable supply of safe blood is mainly achieved by donations of regular, voluntary, non-remunerated blood donors since they tend to avoid risky behavior and maintain healthy status [3]. According to the Melbourne Declaration, voluntary unpaid blood donation has been universally declared to be the cornerstone of safe blood and World Health Organization recommends that all the national blood transfusion services should base on the supply of voluntary non-remunerated blood donors [4].

Young blood donors become target of blood transfusion services as they can provide sustainable and stable base of voluntary non-remunerated donors. If effectively recruited, young blood donors can be the main pool of regular and long term blood supply. In 2010 World Blood Donor Day, WHO stated that young and enthusiastic voluntary blood donors should be main focus of all the blood transfusion services to recruit and key population are university and college students [5]. Therefore, with voluntary nature of blood donation, university student's society can provide more safe and sustainable supply of blood in long run which will help to get timely and adequate blood supply in routine and emergency clinical conditions.

The previous studies done in Nepal, Tanzania, Nigeria, Mumbai, Dhaka, North India, Iraq and Ethiopia showed several factors associated with blood donation practice which were being male gender, low socioeconomic status, knowing blood donors, knowledge regarding blood donation, attitude towards blood donation and willingness to donate blood [6-13].

According to WHO report, there was increase in voluntary donors among low and middle income countries recent years. However, some countries in developing world still get more than 75% of blood donations from family/ replacement donors and paid donors [4, 14]. In 2016, Myanmar National Blood Center recorded 397,278 blood donations with voluntary blood donation rate of 79% [15]. Myanmar blood transfusion service have challenges such as raising demand of blood and blood products from different clinical setting. This urged the blood transfusion service to develop more effective strategies to get sustainable and timely blood supply throughout the country and to meet WHO goal of 100% voluntary blood donation by year 2020 [16, 17]. In Myanmar, there was no previous study on blood donation of the key population which is university and college students and to fill the information required for blood transfusion service to recruit more young voluntary blood donors, this study aimed to determine factors effecting the practice of voluntary blood donation among university and college students in Yangon.

METHODOLOGY

Study Population and Sample size

Cross-sectional study was conducted in full time students with blood donor eligibility age of ≥18 years old in Yangon Technological University (YTU) and National Management Degree College (NMDC) in Yangon, Myanmar in May 2019. Total sample size of 341 was calculated by Finite Population Proportion Formula method [18] including 10% missing rate. Quota and convenience sampling method was used to recruit participants.

Measurement Tool

Measurement tool was self-administered structured questionnaires covering socio-demographic characteristics, knowledge related to blood donation, attitude towards blood donation and practice of voluntary blood donation. The questionnaires were prepared and modified according to various sources of literature review and National Blood Center to fit in country context [6, 7, 9, 11, 19-22] . The knowledge section was binary response and covered 6 topics; blood types, donor eligibility criteria, transfusion transmitted infections (TTIs), blood donation procedures, effects of blood donation on donors and voluntary blood donation. The attitude section was in Likert Scale of 5 level and contained positive and negative statements covering 4 topics; opinion on blood donation, choice of blood donation,

expectation of benefits and opinions on blood banks. Knowledge score was categorized into low, moderate, high according to Bloom's cut off point and attitude score was categorized into negative, neutral and positive from mean and standard deviation. The questionnaires validity was tested with Item-Objective Congruence (IOC), and then having translation into local language with back-translated method and reliability was tested before data collection with Cronbach's Alpha for Attitude questions and KR 20 for Knowledge questions with results of 0.63 and 0.71 respectively. Ethical approval was obtained from Ethics Review Committee of Chulalongkorn University, Thailand.

Data collection and analysis

Data collection was done in students of YTU and NMDC by distributing information sheet and informed consent form followed by self-administered questionnaires to be filled in 30 mins. The knowledge questions were answered and explained to participants after the data collection.

Data entry and analysis was done by SPSS version 22. Descriptive data with frequency, percentage, mean and standard deviation were generated. In order to find out the factors predicting the practice of voluntary blood donation, purposeful selection of covariates was done by 2 steps; Step 1)Bivariate analysis of Chi-square test and selection of independent variables with p-value 0.2 in order to not miss out the potential covariates , Step 2) multivariable analysis of logistic regression of selected variables form step 1 to find out the final adjusted predictors with significant level of p value 0.05. The results were reported with adjusted odds ratio (AOR) and 95% confident interval.

RESULTS

Table 1. shows the socio-demographic characteristics of the respondents. The age of students range between 18-22 years old with mean age of 19.1. More than half of the participants (60%) were females

Table 1 Demographic Characteristics of participants (N=341)

Characteristics	**Frequency**	**(%)**
Age (years)		
Mean ± SD	19.1 ± 1.1	
Range	18-22	
Age Category (years)		
18-20	308	90.3
>20	33	9.7
Sex		
Male	136	39.9
Female	205	60.1
Religion		
Buddhism	320	93.8
Islam	11	3.2
Christian	9	2.6
Hindu	1	0.3
Household Income/month (kyats)*		
Mean ± SD	1,005,337.2 ± 888,223.1	
Range	100,000 – 5,000,000	
<500,000 kyats	66	19.4
≥ 500,000 kyats	275	80.6

Characteristics	Frequency	(%)
History of blood disorder		
No	289	84.8
Yes	52	15.2

* 1 USD = ~ 1,500 Myanmar kyats

Table 2. shows the practice of blood donation among the participants. Out of total 341 participants, 110 (32.3%) of the participants practiced blood donation before and all of them were voluntary blood donors. Most of them were first time donors (82.7%) and donated in school blood donation campaign (89%). Majority of both blood donors (91.8%) and non-donor (80.1%) participants showed willingness to donate blood in the future.

Table 3. shows the level of knowledge and attitude towards blood donation among participants. Minority of the participants had high knowledge level, 74 (21.7%) and high attitude level, 61 (17.9%) towards blood donation.

Table 2 Frequencies and distribution of Practice of voluntary blood donation

Statement	Frequency	Percentage (%)
Donated Blood Before	N=341	
Yes	110	32.3
No	231	67.7
Type of blood donation	n= 110	
Voluntary	110	100
Not voluntary	0	0
Frequency of donation	n=110	
Once	91	82.7
Twice	9	8.2
>2 times	10	9.1
Place of last donation	n=110	
School blood donation campaign	98	89.1
National Blood Center	8	7.3
Hospital	4	3.6
Satisfaction of blood donation	n=110	
Yes	104	94.5
No	2	1.8
Not Sure	4	3.6
Willing to donate regularly	n=110	
Yes	101	91.8
No	9	8.2
Willing to donate blood in the future (non-donors)	n= 231	
Yes	185	80.1
No	46	19.9

Table 3 Level of knowledge and attitude towards blood donation
Total N=341, Non-donor (ND) n= 231, Voluntary Donor (VD) n=110

Variable	Number (%)		
	ND	VD	Total
Level of Knowledge			
Low (Score 0-17)	37 (16)	11(10)	48(14.1)
Moderate (Score 18-24)	179 (77.5)	40 (36.4)	219 (64.2)
High (Score 25-30)	15 (6.5)	59 (53.6)	74 (21.7)
Level of Attitude			
Negative (Score 12-39)	31 (13.4)	5 (4.5)	36 (10.6)
Neutral (Score 40-48)	179 (77.5)	65 (59.1)	244 (71.6)
Positive (Score 49-60)	21 (9.1)	40 (36.4)	61 (17.9)

Table 4 showed the bivariate analysis with Chi-square test for association of socio-demographic characteristics, knowledge and attitude level of blood donation towards practice of voluntary blood donation in participants. Using purposively selection of covariates, at significant level of p value < 0.2, five variables were found to be significantly associated with practice of voluntary blood donation, which are sex, Buddhism religion, history of blood disorder, knowledge and attitude towards blood donation.

Table 5 showed the multivariate analysis of significant variables from Chi square test in logistic regression with significant level of p value 0.05. The final predictors of being voluntary blood donor were male gender AOR (95%CI): 3.03 (1.70, 5.43) p<0.001, having blood related disorder AOR (95%CI): 0.25 (0.09, 0.71) p= 0.010, high knowledge level of blood donation AOR (95%CI): 8.24 (3.06, 22.20) p<0.001 and high attitude level of blood donation A OR (95%CI): 7.01 (1.97, 24.90) p = 0.003

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Table 4 Association of socio-demographic characteristics, knowledge and attitude levels towards voluntary blood donation practice (N=341)

Variable	Donated blood voluntarily		Crude OR	95% CI		p value [a.]
				Lower	Upper	
	No n(%)	Yes n(%)				
Socio-demography						
Age (years)						0.300
18-20	206 (89.2)	102 (92.7)	1			
>20	25 (10.8)	8 (7.3)	0.646	0.282	1.483	
Sex						**<0.001***
Male	71 (30.7)	65 (59.1)	3.255	2.031	5.217	
Female	160 (69.3)	45 (40.9)	1			
Buddhism Religion						**0.181***
Yes	214 (92.6)	106 (96.4)	2.105	0.691	6.412	

Variable	Donated blood voluntarily		Crude OR	95% CI		p value [a.]
	No n(%)	Yes n(%)		Lower	Upper	
No	17 (7.4)	4 (3.6)	1			
Household Income/month						0.411
< 500,000 kyats	115 (49.8)	60 (54.5)	0.826	0.524	1.303	
≥ 500,000 kyats	116 (50.2)	50 (45.5)	1			
History of blood disorder						**0.012***
Yes	43 (18.6)	9 (8.2)	0.390	0.183	0.831	
No	188 (81.4)	101 (91.8)	1			
Knowledge regarding blood donation						**<0.001***
High	15 (6.5)	59 (53.6)	13.230	5.488	31.894	
Moderate	179 (77.5)	40 (36.4)	0.752	0.353	1.600	
Low	37 (16)	11 (10)	1			
Attitude towards blood donation						**<0.001***
High	21 (9.1)	40 (36.4)	11.810	4.002	34.852	
Moderate	179 (77.5)	65 (59.1)	2.251	0.840	6.037	
Low	31 (13.4)	5 (4.5)	1			

a. Bivariate Analysis (Chi square test), variables with p value < 0.2 are included

Table 5 Factors predicting practice of voluntary blood donation among participants (N=341)

Variable	Donated blood voluntarily					
	B	SE	p value[b.]	AOR[b.]	95% CI	
					Lower	Upper
Socio-demography						
Sex						
Male	1.110	.297	<0.001*	3.034	1.696	5.428
Female				1		
Buddhism Religion						
Yes	.658	.699	0.346	1.932	.491	7.598

Variable	Donated blood voluntarily					
	B	SE	p value[b.]	AOR[b.]	95% CI	
					Lower	Upper
No				1		
History of blood disorder						
Yes	-1.398	.540	0.010*	0.247	.086	.712
No				1		
Knowledge regarding blood donation						
High	2.109	.506	<0.001*	8.240	3.058	22.199
Moderate	-.585	.419	0.162	0.557	.245	1.266
Low				1		
Attitude towards blood donation						
Positive	1.947	.647	0.003*	7.005	1.971	24.898
Neutral	.702	.546	0.198	2.019	.692	5.887
Negative				1		

[b.]AOR (adjusted odds ratio) and p value from multiple logistic regression including significant variables from bivariate analysis. * Significant p value <0.05

DISCUSSION

Within the total 341 participants, only one third (32.3%) had donated blood previously and most of them were first time donors. This finding is similar to other studies done in Tanzania and Bangladesh [6, 23], higher than studies in Nepal and Nigeria [7, 11]. The latter may reflect the different perception of the practice of blood donation in different context. Although this proportion is a bit low, it is convincing that most of the donors and non-donors had willingness to donate in the future. All of the blood donors practiced blood donation voluntarily which showed higher voluntary donation compared to other studies in Tanzania and Nigeria [6, 7]. Most of the blood donors donated blood in school blood donation campaigns which showed that most of the donors were motivated to donate blood due to the blood donation campaign of university/college and it might also create an opportunity to donate blood voluntarily among the students.

Only minority of the participants had high knowledge (21.7%) and positive attitude level towards blood donation. This may express the misconception and misinformation among the students. However, blood donors showed higher knowledge than non-donors which is supported by several studies [8, 24-26]. This means that blood donors are better informed than non-donors.

This study showed that male students are 3 times more likely to practice blood donation than female students which is consistent with previous studies done in Mumbai, Nigeria, Tanzania, Dhaka and North India [6-10]. This significant male propensity may be due to outgoing nature and more sense of social responsibility in males. At the same time, there can be factors that hinders females from donating blood such as temporary deferral conditions of anemia, periodic menstrual cycles and fear to donate blood.

Another factor that predict negatively for practice of blood donation was history of blood related disorder. Those who had history of blood disorder have 75% less likely to practice blood donation previously. Although some blood disorder such as thalassemia, G6PD deficiency etc. cause the permanent deferral for blood donation, some temporary conditions such as anemia can be follow up again for next donation. Thus, awareness about deferral conditions and clear explanation for follow up appointment in case of deferral should be reinforced in blood donation sites.

Students with high knowledge levels are 8 times more likely to practice blood

donation. This is in agreement with other studies done in Nepal, Nigeria, Iraq and Ethiopia [7, 11-13]. This finding reinforce the idea that more blood donation awareness programs and campaigns are needed to effectively increase the voluntary blood donors.

Positive attitude level is also significantly associated with practice of blood donation and it showed that students with positive attitude were 7 times more likely to donate blood than those with negative attitude. Since it is generally assumed that attitude come from the experience, information and learning, it is important that these students get the correct information about the blood donation [27].

This study had some limitation as the study was done only in Yangon region and data may not be generalized for whole country. Being a cross sectional study, the associations observed cannot be determined as cause and effects, and convenience sampling method might lead to selection bias.

CONCLUSIONS

Proportion of voluntary blood donors among studied university and college students was relatively low. However, most of participants have willingness to donate blood in the future. Male students with higher knowledge and attitude levels were more likely to donate blood voluntarily. Only minority had high knowledge and attitude towards blood donation.

There is need of reinforcement in awareness raising activities in student society and community to give correct information and effective recruitment of voluntary donors. Female oriented education messages should also be developed to encourage more female students to involve in blood donation. In addition to that, blood transfusion services should collaborate more with academic and community organizations to hold more frequent blood donation campaigns to create opportunity to donate blood.

To implement these recommendations, both political and financial commitments form government and policy makers are crucial. National Blood Transfusion Service should establish more regional blood centers and frequent outdoor and indoor blood donations campaigns in University society and community at large, budget allocations for technical and facilities improvements in blood donation settings and effective awareness raising programs such as social media involvements in order to increase young voluntary blood donors in the country to supply adequate blood to every patient in need.

This study was expected to benefit National blood transfusion Services by providing information to generate strategies and enlighten challenges in recruiting more voluntary blood donors in young university students who are key source of safe and sustainable blood supply.

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CALCULATE THE PERCENTAGE OF MATERIALS USED IN THE PRODUCTION OF COMPOST ACCORDING TO THE C:N RATIO BY MEANS OF DESIGNED SOFTWARE

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ABSTRACT

Introduction: Solid waste management can be considered as a public health issue and that needs public investment and encouragement. Compost is produced by damaged organic matter that is used to fertilize soil and ability to hold water. Composting process is a biological degradation of organic matter and affected by several factors. C:N ratio is one of the important Nutritional factors that affect composting process and compost maturity. Generally, it is recommended that the C:N ratio at the start of the composting process should be kept in the range of 25:1 to 30:1. Since generally various solid waste are used in the process of composting, and also because each of these compounds and solid waste has different amounts of nitrogen and carbon, so the C:N ratio in the mentioned compounds and solid waste will also be different.
Objectives: having a computer software to determine the C:N ratio is very important in the field of public health and environmental management. Therefore, the aim of this research is to design the best software for user and manager of composting plants.
Methodology: The study was accomplished during 2018- 2019 in Hamedan province, situated in the north-west of Iran. Data input process was done professionally according to the questions and answers between the software and the user. This program is a windows application which is developed using visual basic 6.0. This exe file is a program to calculate the C/N ratio of compost using the given data of its raw materials and give instructions to optimize the compost in case it is needed.
Conclusion: Based on the methods, this software was built, tested and actually used without any problems. Composting process can be an alternative and sustainable solution to reduce the harmful effects of municipal solid waste.
Keywords: Compost, Environment, Public Health, Software, Iran

INTRODUCTION

Population growth along with urban development as well as changing patterns of consumption and improving quality of life, have increased the production of Municipal Solid Waste (MSW) in all population centers of the world. MSW management is a basic service for protecting public health and the environment [1].

In Iran, the average generation rate of MSW is about 0.64 kg per person per day. According to the population census, the population of Iran in the year 2016 was equivalent to 80 million, of this population; approximately 59 million are living in municipal regions. In this situation, the amount of MSW generated in all of the municipal regions of Iran is about 13782400 tons per year. From this amount, only 10% is treated for compost production, about 6% is recycled, and 84% is sent to sanitary landfills [2].

In some parts of the word, in order to improve the public health and reduce the environmental problems, it is targeted that by 2020, a significant part of MSW would be collected and recycled into compost or biofuel [3]. Compost is produced by damaged organic matter that is used to fertilize soil and improve its quality and ability to hold water. Means, compost can be used to increase various soil quality parameters such as water holding capacity, soil porosity, structural stability amount of available nutrients, nutrient-sorption capacity, and it also can improve soil fertility and microbial growth [4].

Composting process is mediated by aerobic bacteria that decompose organic matters and transform them into humus and inert compounds and other by products such as CO2 and H2O. Humus and inert compounds are free of pathogens and infectious agents that do not attract disease carrier insects or vectors, and can be handled and stored without bad taste, but is used to grow plants [5].

Composting process is a biological degradation of organic matter and affected by several factors such as pH, aeration, temperature and moisture and Nutritional factors [6].

C:N ratio is one of the important Nutritional factors that affect composting process and compost maturity. In fact, it is recommended to maintain the C:N ratio between 20-40 in order to achieve a good process development and stabilized compost [7].

Generally, it is recommended that the C:N ratio at the start of the composting process should be kept in the range of 25:1 to 30:1. It should be noted that, the rate of decomposition is generally fall; when C:N ratio rice. Meantime, C:N ratios lower than that would elevate the loss of nitrogen due to variation of residue nitrogen into ammonia. In the other word, a significant reduction in carbon during composting process shows mineralization of organic matter [8].

Since generally various solid waste are used in the process of composting, and also because each of these compounds and solid waste has different amounts of nitrogen and carbon, so the C:N ratio in the mentioned compounds and solid waste will also be different.

For example, it was reported that, the C/N ratio of crop residues depends on crop genotype, soil fertility, plant species, length of the growing season, and environmental conditions [19]. In addition, C:N ratio at the start of the composting process is determined by both trial and error method (or empirical method) and mathematical methods. Determining the C:N ratio at the beginning of the process, is more of a problem and is difficult, time-consuming and error-prone. Many researchers calculate C:N ratio using trial and error method [19,20].

But, having a computer software to determine the C:N ratio is very important in the field of public health and environmental management. Therefore, the aim of this research is to design the best software for user and manager of composting plants.

METHODOLOGY

The task was accomplished during 2018- 2019 in Hamedan province, situated in the north-west of Iran. Hamedan is a cold city and calculation of C/N ratio of the solid waste requires more precision in cold climates. First of all, it was necessary to assume that both carbon and nitrogen source in the MSW compounds are relatively degradable. The second point is that all solid waste data such as nitrogen and carbon percentage of the materials that needs to be introduced to the software must be thoroughly dry condition.

This program is a windows application which is developed using visual basic 6.0. This exe file is a program to calculate the C/N of compost using the given data of its raw materials and give instructions to optimize the compost in case it is needed. Program takes its first argument as n which is the number of raw materials used in the compound. Then it uses a loop to take arguments of C/N, Nitrogen percentage, name, and weight for each of the raw materials used. After the program exits the loop, it calculates the total C/N of the compound using the formula for calculating a weighted average. If the total C/N is lower than 25 in order to optimize the compost, we use a certain amount of sawdust with the C/N rate of 511 and Nitrogen percentage of 0.11. The program solves equation (1) to find the weight of the sawdust needed.

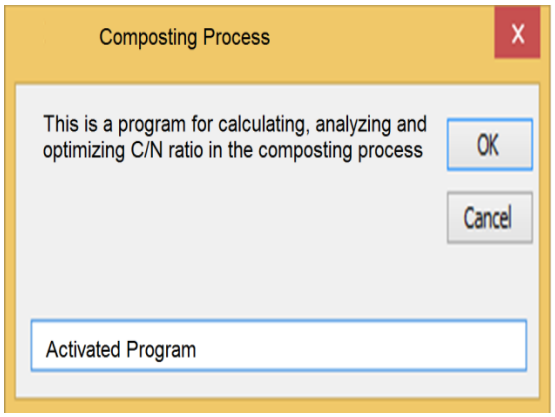


Figure 1 Dialog window to set up program.

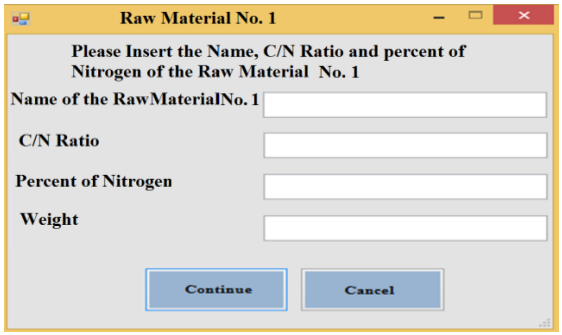


Figure 2 window for input Data.

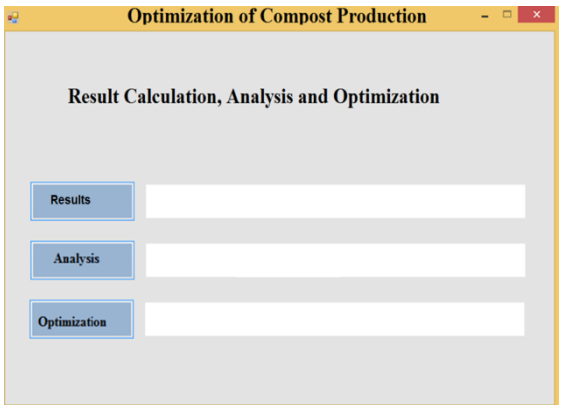


Figure 3 window with output of results.

Two windows of the software are presented in figure 1 and 2. Data input process was done based on questions and answers between the software and the user. In this research, it is planned that the output of the software should be saved and filed as a separate document. The basic formula used for calculations in the software was based on linear programming (LP) method and are presented in equation (1) [9].

$$\frac{C}{N} = \frac{(R_1.A_1.W_1) + (R_2.A_2.W_2) + (R_3.A_3.W_3) + \cdots}{(A_1.W_1) + (A_2.W_2) + (A_3.W_3) + \cdots} \quad (1)$$

In which:

$\frac{C}{N}$: carbon to nitrogen ratio at the start of the composting process
R_1: carbon to nitrogen ratio of material 1
A_1: percentage of nitrogen in material 1 (%)
W_1: mass of material 1 (kg)
R_2: carbon to nitrogen ratio of material 2
A_2: percentage of nitrogen in material 2 (%)
W_2: mass of material 2 (kg)

This software can be widely applied in many different fields including agriculture, food industry, environmental science, health care and even biological sciences.

This program is created and performed in the Visual Basic environment. Based on the literature review and the content of the recommendation, C:N Ratio at the start of the composting process was defined as 30 for the software.

RESULTS

Input data

As was mentioned above, Data entry was accomplished through questions and answers between the software and user as below:

1- Please insert the number of dry materials that are used for the formation of compost.
2- Please insert the name of the first material
3- Please insert the C:N ratio of the first material
4- Please insert the percent of nitrogen of the first material
5- Please insert the name of the second material
6- Please insert the C:N ratio of the second material
7- Please insert the percent of nitrogen of the second material

If the number of materials used in the composting process was more than two, the characteristics of each material would be entered in the same format.

Output Information

Based on the input values those are entered entirely in software, output information includes the value of C:N ratio at

the start of the composting process and whether the obtained ratio complies with the permitted ratio. If the obtained ratio of C:N is exactly equal to the critical value of 30, then the result would be true and vice versa.

If the ratio of C:N is less than 30, The software will propose automatically to the user to add a certain amount of Sawdust to raw materials for composting. Because Sawdust has the most ratio of C:N (Table 1), adding it to other materials can help to adjust the ratio of C:N at the start of the composting process.

Also, if the ratio of C:N is greater than 30, The software will propose automatically to the user to add a certain amount of fish and meat processing or blood wastes to raw materials for composting. Because fish and meat processing or blood wastes has the lowest of C:N ratio (Table 1), adding it to other materials can help to reduce the ratio of C:N at the start of the composting process. Based on the methods, this software was built, tested and actually used without any disturbance.

Example of output

After running the software, data of two materials are loaded to the software as shown in figure 4 and 5.

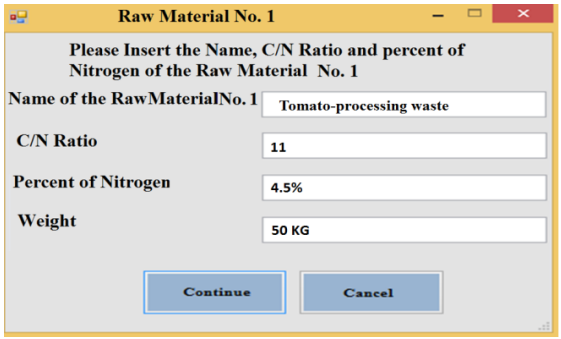


Figure 4 loaded data of row material No. 1 in a window of software

After that, the software automatically run, calculate analysis and optimize the results as shown in figure 6.

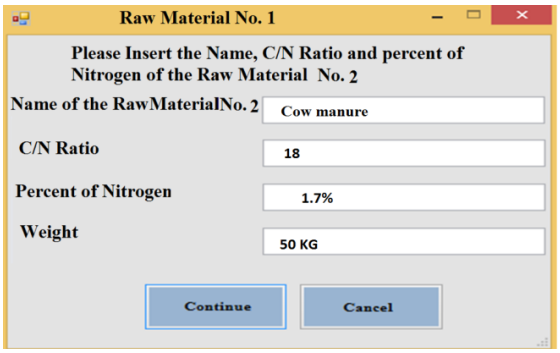


Figure 5 loaded data of row material No. 1 in a window of software

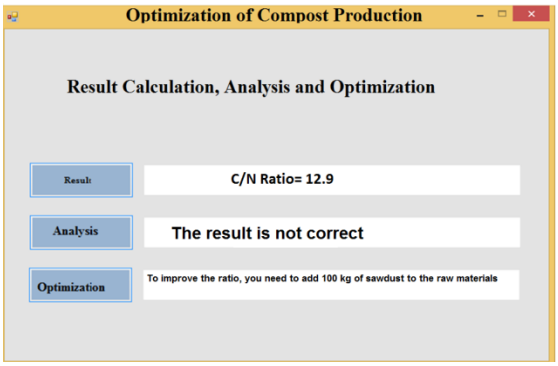


Figure 6 results of the data that loaded to a window of software

Based on the results, the ultimate C/N ratio of the two mentioned materials was equal to 12.9. In the analysis section (Figure 6), the software interprets the result and shown that the results is not correct because it not equal to 30. In optimization section (figure 6), the software can propose an assignment to improve the results. In this example, the sent comment stated that in order to achieve the best possible results (C:N ratio=30), it is necessary to add 100 kg of sawdust to the raw materials.

Software Assessment

Software Assessment and software reliability assessment is important in guaranteeing the precision, function and quality of software. In order to evaluate and verify the software, two examples were applied and were manually solved and the results were compared with the software solution. The results showed that there was no significant difference between the software solutions and manual solutions.

DISCUSSION

Using computerized programs can improve environmental sustainability, health quality and health security and also reduce the cost and time spent for maintaining that relationship with the service provider. Many researchers have been attention on the C:N ratio of compost production in developing countries [10, 11, 12, 13, 14, 15, 16, 17, 18].

Table 1: C:N ratio and Nitrogen content of various raw materials and wastes

material	Nitrogen (%)	C:N Ratio
Activated sludge	5	6
Blood	10-14	3
Cow manure	1.7	18
Grass clippings	3-6	12-15
Horse manure	2.3	25
Mixed grasses	214	19
Night soil	5.5-6.5	6-10
Non-legume vegetable wastes	2.5-4	11-12
Potato tops	1.5	25
Poultry manure	6.3	15
Raw sewage sludge	4-7	11
Sawdust	0.1	200-500
Straw, oats	11	48
Straw, wheat	0.3-0.5	128-150
Tomato-processing waste	4.5	11
Fish and meat processing, Blood wastes (slaughterhouse waste and dried blood)	13.5	3-3.5

References: [6, 9]

However, according to some of the studies such as research conducted by Arbab and Mubarak (2016) which investigated the effects of different levels of C:N ratio on some properties of final compost [4]. Based on the mentioned results, Increase in C:N ratio of materials has firmly been an increase in pH. Also, quality of final compost commonly depends on initial C:N ratio of the materials used. In another study, it was accepted that initial C:N ratios of 25–30 are considered while some studies have shown that composting can be done at lower initial C:N. but it should be noted that composting at lower initial C:N ratios can also increase the amount of manure treated [8, 11].

Singh et al (2013) reported that the change in C:N ratios is the results of organic matter stabilization and decomposition within composting process [5]. Decomposition of organic matter is mediated by living organisms, which use nitrogen for making cellular structures and the carbon as energy source. The C:N ratio reduced from initial situation after a few days of composting process. In a study that was conducted in Poland, Neugebauer et al (2017) reported that the C:N ratio is very effective in increased the inside temperature of the bioreactor and composting rate [13]. In this research, considering the importance of C:N ratio, it was preferred to use the software to optimize the amounts of materials used in composting process.

CONCLUSIONS

This study has demonstrated that: (1) Computer engineering includes software and hardware is an emerging industry in many professional planning areas including urban sustainability planning, public health planning, environmental planning and natural resource planning; (2) Composting process can be an alternative and sustainable solution to reduce the harmful effects of municipal solid waste Especially in agricultural areas, forest areas and rangelands.

ACKNOWLEDGMENTS

The authors gratefully acknowledge from the Center of Agriculture Research and Education and Natural Resources in Hamedan province in Iran for providing support to carry out this research work. This research did not receive any specific grant from funding agencies in the public sectors or commercial sectors.

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HEALTH RISK ASSESSMENT OF RESPIRABLE MARBLE DUST EXPOSURE AMONG MARBLE STONE CUTTING WORKERS IN KYAUK SITT TANN STREET OF MANDALAY CITY, MYANMAR

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ABSTRACT

Introduction: Workers in marble workshop experience occupational risks such as marble dust, utilization of sharp instruments, extreme noise and electrical accidents. The dust particles which sizes are less than 10 μm can go deeper into the respiratory tract and can cause respiratory diseases. Therefore, it is important to assess personal air sampling in dust-producing marble workshops.
Objectives: This study aimed to assess the health risk of respirable marble dust exposure in Mandalay City of Myanmar.
Methodology: This study was conducted by a cross-sectional survey and personal air sampling in Kyauk Sitt Tann Street of Mandalay City in Myanmar in April 2019. The Cross-sectional survey was done by interviewing 80 marble stone cutting workers. Eight respirable marble dust samples had been collected for 8 hours by using the SKC air sampling pump (AirCheck 3000) with 25 mm Polyvinylchloride filter in plastic Institute of Occupational Medicine (IOM) sampler and cassette which is placed in the breathing zone of the workers and then analyzed by gravimetric method.
Results: The means concentration of respirable marble dust was 6 mg/m^3 which was greater than both of Permissible Exposure Limit of Occupational Safety and Health Administration (5mg/m^3) and Threshold Limit Value of American Conference of Governmental Industrial Hygienists (3mg/m^3). According to the results of the cross-sectional survey, marble stone cutting workers had low level of knowledge (55%), negative attitude (55%) and low level of practice (57.5%). Factors statistically associated with the practice of preventive behavior were age, working experience and personal protect equipment provision in workshops. Elderly workers and workers who work in PPE provision workshops were more likely to have high practice level (AOR = 2.85, 95% CI = 1.08-7.50, P-value <0.05 and AOR = 8.22, 95% CI = 1.58-42.81, P-value <0.05).
Conclusion: This study concluded that health education and practice-based training program should be given to marble stone cutting workers mainly younger workers in order to prevent the respirable marble dust exposure and promote KAP. At the same time, the provision of Personal Protection Equipment (PPE) and PPE wearing practice in the workshop should be strengthened by laws and regulations. Additionally, risk reduction designs should be implemented by authorities, occupational and environmental health experts, workshop's owners and workers to reduce dust emission and other occupational risk,
Keywords: Marble/Mandalay/Health Risk Assessment

INTRODUCTION

In Asia and Pacific, more than 1.1 million people die due to occupational related injuries and diseases [1]. Workers in marble workshops experience occupational risks such as marble dust, utilization of sharp instruments, extreme noise and electrical accidents [2]. Process in marble sector are quarrying, cutting and manufacture of art works. Among this process, workers are highly exposed to marble dust in the cutting process. If the size of the dust is smaller and smaller, the more and more health effects can be occurred. It is because these particles can go into the small parts of the respiratory system like alveolus [3]. Therefore, marble workers complain the respiratory symptoms like coughing, phlegm, shortness of breath, chest pain and chest tightness. Moreover, marble dust containing silica can also causes silicosis, chronic obstructive pulmonary diseases, asthma, increased risk of tuberculosis and lung cancer [4]. Because of health effects of dust, personal air sampling is required in dust producing industries and workshops. According to size-selective sampling criteria, there are three fractions of dust; naming inhalable fraction, thoracic fraction and respirable fraction. International organizations agreed that respirable fractions should be used to describe exposure limits of dust [5]. Thus, Permissible Exposure Limit (PEL) of OSHA for respirable marble dust concentration is 5 mg/m^3 and Threshold Limit Value(TLV) of ACGIH for respirable marble dust concentration is 3 mg/m^3 [6].

"Kyauk Sitt Tann Street" of Mandalay City is a market place of marble statue. This place is also tourist attraction point of Mandalay City to look the art of craving stone. The most prominent feature related to health is that dust exposed marble workers in Myanmar doesn't use any PPE [7]. This study aimed to assess respirable marble dust concentration in Kyauk Sitt Tann Street of Mandalay City and to describe the socio-demographic factors, knowledge, attitude and practice of marble stone cutting workers. In addition, it also targeted to find the association between studied factors and practice of preventive behavior.

METHODOLOGY

This study was investigated by personal air sampling and cross-sectional survey in Kyauk Sitt Tann Street of Mandalay City in Myanmar. The target population was marble stone cutting workers whose age was more than 18 years. Ethical aspect of the study was proved by Ethical Review Committee of Faculty of Social Sciences & Humanities, Mahidol University, as well as Defense Service Medical Research Center in Myanmar.

Personal Air Sampling

Sample size determination for personal air sampling can be seen in figure one. According to figure one, eight personal air samples were collected in in this study. The Process of personal air sampling was assisted by occupational hygienists from Occupational and environmental health department, Myanmar. Desiccation and weighing of filters and cassette were done before and after measurement. Personal respirable dust samples were collected by using the SKC air sampling pump (AirCheck3000) with the 25 mm PVC membrane filter (0.5µm pore size) fitted in the IOM sampler and cassette which was placed in the breathing zone of the workers. The cassette was connected to the pump and operated with the flow rate of 2.2 L/min. The flow rate was calibrated before and after the measurement. Samples obtained when calibration levels fell outside 2200 ml/min ± 5% (2095- 2310 ml/min) has been removed from the dataset. Additionally, 2mg dust loading filter was discarded according to NIOSH analytical method 0600. Dust Samples were analyzed by gravimetric technique (filter weight). Respirable dust concentration was calculated according to following equation.

$$C = \frac{(W_2 - W_1) - (B_2 - B_1) \times 10^3 \ mg/m^3}{V} \quad \text{.....[8]}$$

C= concentration of the dust

W_1= tare weight of filter before sampling(mg)

W_2=post-sampling weight of sample-containing filter (mg)

B_1= mean tare weight of blank filters(mg)

B_2= mean post-sampling weight of blank filters(mg)

V= volume as sampled at the nominal flow rate (L)

$$TLV - TWA = \frac{C_1T_1 + C_2T_2 + \cdots + C_nT_n}{8} \quad \text{.....[9]}$$

TWA=Time Weighted Average

C_1 = concentration of the dust detected in time period 1 (mass/volume)
T_1 = Exposure time of chemical in time period 1 (hr)

Cross-sectional Survey

As per preliminary interview with ward leaders, there are around 80 marble workshops along the Kyauk Sitt Tann Street of Mandalay City. Eighty marble stone cutting workers were selected according to figure 2.

The research instrument used in cross-sectional survey was questionnaire which consists of 32 questions and divided into 4 parts. The first part contained questions related with socio-demographic factors like age, sex, educational level, marital status, working years, working hours, working days, dust control measures and PPE provision in workshops.

The second part of questionnaire comprised with 13 questions which assessed the workers' knowledge about occupational hazards in marble workshops, personal protective equipment use and health effect of hazards. The questions were Semi structured close-ended questionnaire with correct, incorrect and don't know answer. One point was scored for correct answer and no point was scored for incorrect and don't know answer. Then, the scores were summed up and classified into two knowledge level; low knowledge level (equal to and less than the mean) and high knowledge level (more than the mean).

The third part of questionnaire consists of 9 questions measuring worker' attitude about preventive behavior of occupational risk. The marble stone cutting workers were asked attitude questions with Likert's method. Score for positive statement were 5 points for "Strongly Agree", 4 points for "Agree", 3 points for "Not Sure", 2 points for "Disagree", 1 point for "Strongly Disagree". But the scores were inverted for negative statements. After summing up the scores, the attitude was categorized into 2 level (negative attitude and positive attitude) by using mean.

The fourth part of questionnaire contains 11 questions which determined worker's practice towards preventive behavior of work-related risk. Practice questions were constructed with five levels of answers. Scoring was giving 5 points for "always", 4 points for "very often", 3 points for "sometimes", 2 points for "rarely" and 1 point for "never". After that, the total score was considered into two categories; low practice which was equal to and less than the mean and high practice which was more than the mean.

The questionnaire was pre-tested for 23 marble stone cutting workers with Cronbach's alpha reliability test. Cronbach's coefficient alpha of knowledge questionnaire was 0.70. Cronbach's coefficient alpha of attitude questionnaire was 0.73.

Data collection process was done in April 2019. After giving information to Occupational and environmental health department, township health officer, local authorities and workshop owners, Consent was taken from marble stone cutting workers and asked questions.

Data were analyzed by using SPSS software version 16. Studied factors were described with number and percentage and then determine the association between studied factors and practice of preventive behavior by Chi-square. Finally, multiple logistic regression was run to find the predictors of practice.

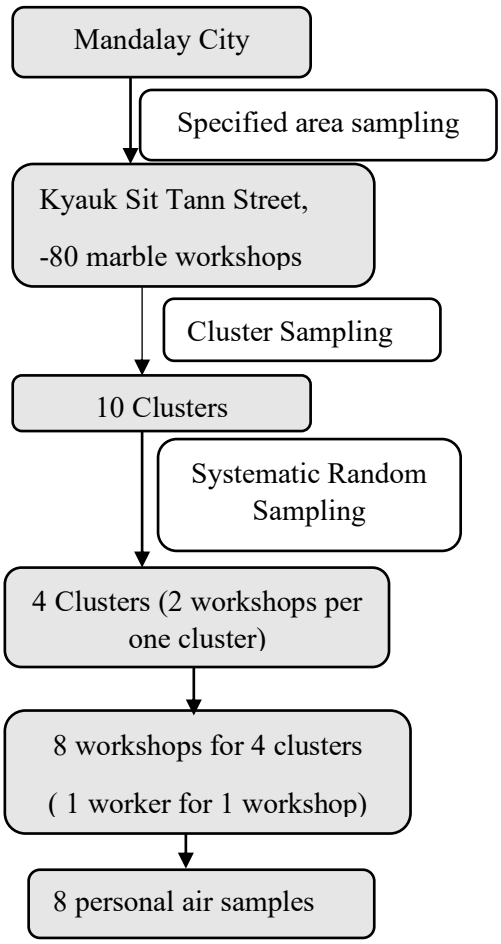


Figure 1 – Sample size selection for personal air sampling

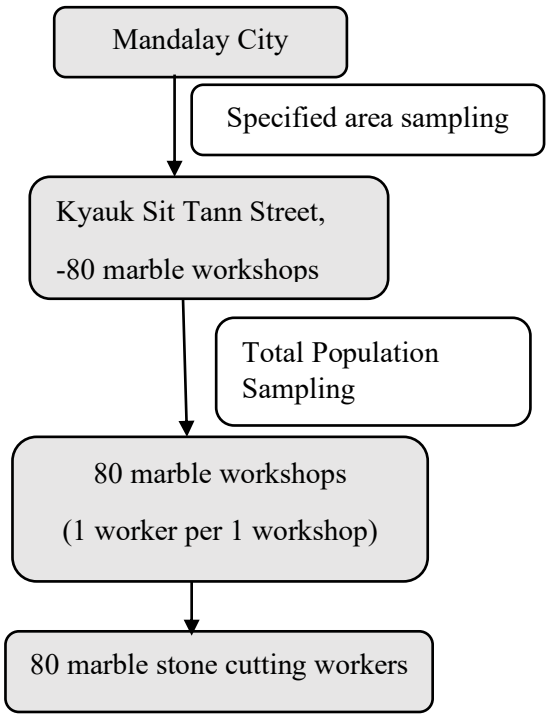


Figure 2 – Sample size selection for cross-sectional survey

RESULTS

Results of Respirable dust concentration from personal air samples

Personal air sampling is the sampling of air within the breathing zone of workers. Table one showed that how much respirable dust the workers exposed. Results from personal air sampling showed that mean concentration of respirable dust in Kyauk Sitt Tann Street was 6 mg/m^3. The detail results were presented in Table 1.

Results of cross-sectional survey

Table 2 showed that the median age of marble stone cutting workers was 26.5 years. The eldest and youngest age were 18 and 60 years respectively. Gender of all the workers in this study were male. The majority of workers are married showing 58.8%. Most workers attained middle school level representing 53.8% and only 16.3% of workers reached high school and higher.

Table 2 also describe that the percentage of workers who had less than 10 years of work experience was 61.3% which was the highest percentage among three different range of work experience. When looking at to working hours, most workers (58.8%) worked 8 hours per day. 35.0 % of workers worked less than 8 hours, whereas only 6.3% of workers worked overtime. The highest percentage of workers, amounting to 55.0 %, had to work 7 days per week. However, 45.0 % of workers worked 6 days per week.

Most workshops used natural ventilation, showing 71.3%. The workshops which used wet method was the lowest percentage showing 6.3 %. The percentage of

workshops which provided PPE is only 13.8%, in comparison with workshops which didn't provide PPE showed higher percentage (86.3%).

When looking up to knowledge, attitude and practice of marble workers, Table 3 described that the total score of knowledge was divided into two groups (low knowledge and high knowledge) by mean score. The mean point of knowledge was 8±2.7, minimum point was zero and the maximum point was 13. As the results, the percentage of low knowledge level of workers was higher than that of the high knowledge level of workers, with 55.0% as opposed to 45.0%. Table 4 showed that the percentage of negative attitude outnumbered percentage of positive attitude with 55.0% as against 45.0%. The mean score of attitudes was 33.35±3.2and the minimum and maximum score of attitudes were 26 and 45. Table 5 described the practice level which was divided by mean point (15.56) as the practice score are normally distributed. The minimum point and maximum point were 0 and 37. The majority of workers had low practice level which contributed to 77.8%. Reversely, only 22.2 % of workers had high practice level.

In Table 6, Chi-square test and binary logistic regression analysis was performed to determine percentage of practice level, the significance and strength of association between studied factors and practice level. The studied factors that were analyzed were socio-demographic characteristics, knowledge level and attitude level. Table six showed that practice level has a statistically significant association between age of workers, working years and provision of PPE in workshops because P values were less than 0.05.

As Table 7 was the final model of multiple logistic regression, age of workers, working years and provision of PPE were be run with forward LR method. The variables in equation only showed that 2 variables, adjusted odd ratio of age (AOR) = 2.85, 95% CI = 1.08-7.50, P value <0.05 and AOR of PPE provision = 8.22, 95% CI = 1.58-42.81, P value <0.05.

Table 1 Respirable Dust Concentration for personal air samples

Sites	Cluster	Sample Label	Respirable Dust Concentration (mg/m^3) 8-hour TWA
	KST 1	R 1	3.9*
	KST 1	R 2	8.1**
	KST 2	R 3	4.3*
Kyauk Sitt Tann	KST 2	R 4	5.9**
(KST)	KST 3	R 5	5.9**
	KST 3	R 6	7.7**
	KST 4	R 7	7.6**
	KST 4	R 8	4.6*
Mean=6, Median=5.9, SD=1.4, Min=3.9, Max=8.1			

KST1,2,3,4=Kyauk Sitt Tann's Cluster 1,2,3,4 R1,2,3,4,……,8=Personal air samples 1,2,3,4,…,8
*= more than Threshold Limit Value of ACGIH (3 mg/m^3)
**= more than Permissible Exposure Limit of OSHA (5 mg/m^3)

Table 2 Socio-demographic characteristic of marble stone cutting workers (n=80)

Socio-demographic characteristics	Number (n = 80)	Percent
Age		
≤27	42	52.5
>27	38	47.5
Median=26.5, QD=6, Min = 18, Max = 60		
Sex		
Male	80	100
Marital status		
Unmarried	33	41.3
Married	47	58.8
Educational status		
No education & Primary School	24	30.0
Middle School	42	53.8
High School and higher	13	16.3
Work experience (years)		
1-10	49	61.3
11-20	20	25.0
> 21	11	13.8
Median=8, QD=6.5, Min =1, Max = 35		
Working hours per day		
< 8 hours	28	35.0
8 hours	47	58.8
> 8 hours	5	6.3
Median=8, QD=0.5, Min =5, Max = 10		
Working days per week		
6 days	36	45.0
7 days	44	55.0
Dust control measure		
No Method	11	13.8
Wet Method	5	6.3
Natural Ventilation	57	71.3
Wet Method & Natural Ventilation	7	8.8
Provision of PPE in workshops		
Yes	11	13.8
No	69	86.3

Table 3 Number and percentage of marble stone cutting workers classified by knowledge level on work related health risk and preventive behavior (n = 80)

Knowledge Level	**Number**	**Percent**
Low Knowledge (≤ 8 points)	44	55.0
High Knowledge (9-13 points)	36	45.0
Mean=7.65, SD=2.738, Min = 0, Max= 13		

Table 4 Number and percentage of marble stone cutting workers classified by attitude towards preventive behavior of marble stone cutting (n = 80)

Attitude Level	**Number**	**Percent**
Negative Attitude (≤ 33 points)	44	55.0
Positive Attitude (> 33 points)	36	45.0
Mean=33.35, SD = 3.292, Min = 26, Max = 45		

Table 5 Number and percentage of marble stone cutting workers classified by Practice towards preventive behavior of marble stone cutting (n = 80)

Practice Level	**Number**	**Percent**
Low Practice (≤ 14 points)	46	57.5
High Practice (> 14 points)	34	42.5
Mean=14.33, SD=4.230, Min = 0, Max = 30		

Table 6 Association between studied factors and practice levels of preventive behavior

Variables	n	Low Practice %	High Practice %	Crude OR	P value
Age					
≤27	42	69	31	1	
>27	38	44.7	55.3	2.76(1.10-6.88)	0.030*
Marital Status					
Not Married	33	69.7	30.3	1	
Married	47	48.9	51.1	2.40(0.94-6.13)	0.067
Educational Level					
Lower Middle School	24	66.7	33.3	1	
Middle School & Higher	56	53.6	46.4	1.73(0.64-4.70)	0.28
Work Experience					
≤ 8yrs	41	68.3	31.7	1	
> 8yrs	39	46.2	53.8	2.51(1.01-6.25)	0.047*

Variables	n	Low Practice %	High Practice %	Crude OR	P value
Working Hours					
≤ 8 hours	75	56	44	3.14(0.34-29.47)	0.316
>8 hours	5	80	20	1	
Working days					
6 days	36	50	50	1.75(0.71-4.29)	0.221
7 days	44	63.6	36.4	1	
Provision of PPE					
Yes	11	18.2	81.8	7.92(1.59-39.58)	0.012*
No	69	63.8	36.2	1	
Knowledge					
Low (<=8points)	44	47.7	52.3	2.49(0.99-6.27)	0.053
High (9-13)	36	69.4	30.6	1	
Attitude					
Neg (<=33)	44	63.6	36.4	1	
Positive (>33)	36	50	50	1.75(0.71-4.29)	0.22

*= P value<0.

Table 7 Final model of multiple logistic regression

Variables	Adj OR	95% CI		P value
		Lower	Upper	
Age				
≤27	1			
>27	2.85	1.08	7.50	0.034
PPE Provision				
Yes	8.22	1.58	42.813	0.012
No	1			

DISCUSSION

Respirable dust concentrations of five samples were higher than PEL of OSHA(5mg/m^3). But, respirable dust concentrations of all 8samples were more than the TLV of ACGIH(3mg/m^3). Moreover, means concentration of respirable dust in this study (6 mg/m^3) were higher than both PEL of OSHA and TLV of ACGIH. The respirable dust concentration of this study was similar to the study done in marble workshops of Egypt which showed that means concentration of respirable dust (6.10mg/m^3, 6.92mg/m^3 and 7.15mg/m^3) were higher than PEL of OSHA [10]. Respirable dust concentration can be risen because most of the process are cutting and polishing of marble stone to form statue with sharp machine and poor dust control measures. The results of this study pointed out that effective dust control measures and PPE uses are needed in this area.

This study showed that marble workers had low knowledge (55.0%), negative attitude (55.0%) and low practice (57.5%). One study done in gold leaf workers in Mandalay showed that low knowledge (45.7%), negative attitude (52%), low practice

(60%) [11]. In addition, The study in 501 printing workers of Hong Kong also showed that low knowledge (20.4%), appropriate attitude (38.4%) and safe practice (22%) [12]. Low education level and lack of training resulted in low knowledge and negative attitude. Addition of poor PPE provision with low knowledge and negative attitude can be reasons for low practice of PPE use.

This study also defined that age was the predictor for practice of preventive behavior, showing AOR = 2.849, 95% CI = 1.082-7.504, P-value <0.05. The study in Guinea found that age was associated with the safety behavior, representing P-value <0.01 [13]. Another predictor was PPE provision. The practice of workers who got PPE was more likely to be 8.23 times higher than that of workers who didn't get PPE. Furthermore, this study also supported the study in Mexican immigrant farm worker. It was proved that PPE provision causes increased use of PPE, with showing p value <0.001[14].

There are some limitations in the study because air measurement was not easy process and it need technical support, financial support and human resources support. Therefore, this study can do only 8 personal air sampling. During air measurement, there was one-hour raining which can reduce the real amount of dust exposure.

RECOMMENDATION

Strategies for using of dust control measures should be instigated to prevent occupational health risk. Dust reduction program and design should be implemented together with local authorities, workshops owners and workers. Policy for PPE provision and checking of PPE use in marble workshops should be strengthened by laws and regulations to prevent occupational health risk. Regular monitoring of dust should be promoted in this area.

For further study, more dust samples should be taken to investigate seasonal and annual variations for working environment. The dust samples should be collected for the whole year in order to get the real average dust concentration. Lung functions test should be contained in further study to compare with the respiratory symptoms.

ACKNOWLEDGEMENT

Special Thanks to Master of Primary Health Care Program of ASEAN Institute for Health Development, Mahidol University, Thailand for partial scholarship and the Occupational and Environmental Health Department, Nay Pyi Taw, Myanmar for helping to do dust measurement.

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FACTORS PREDICTING LOW BIRTH WEIGHT INFANTS FROM MOTHERS WITH PREVIOUS ANTENATAL CARE SERVICE USE AT HUAYPLOO HOSPITAL, NAKHON PATHOM

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ABSTRACT

Introduction: Several factors, such as preterm birth, had been reported to strongly predict low birth weight (LBW). However, studies conducted in Thai district hospital setting using clinical data from real routine antenatal care were still limited.
Objectives: To identify factors predicting LBW from mothers with previous antenatal care service use at Huayploo Hospital, Nakhon Pathom.
Methodology: This was a retrospective cohort study using electronic medical records of 299 pregnancies among Thai women who utilized antenatal care service and delivered singleton baby at Huayploo Hospital, Nakhon Pathom between October 1, 2014 and April 30, 2016. Outcome data of birth weight and related exposure factors including maternal age, gestational age, hematocrit level, birth order, completeness of antenatal care visits, VDRL test, and oral health status were extracted from a hospital database. The weight less than 2,500 grams at birth was considered LBW. Generalized linear model with a log link and binomial distribution was applied to identify predictive factors of LBW by stepwise selection method. The risk ratio with 95% confidence interval and statistical significance at p-value <0.05 were reported.
Results: The overall cumulative incidence of LBW was 7.4%. LBW frequently found in pregnant women delivered before 37 gestational weeks and in mothers giving birth four times or more. Multivariable regression analysis showed that VDRL seropositive had the largest influence on the occurrence of LBW (Adjusted RR = 6.17, 95% CI = 1.16-32.87), followed by preterm delivery (Adjusted RR = 3.27, 95% CI=1.20-8.97) and giving birth four times or more before (Adjusted RR = 3.01, 95% CI = 1.15-7.89).
Conclusion: VDRL seropositive, preterm delivery, and giving birth four times or more before were three predictive factors of LBW in this setting. This finding might serve as preliminary information for health care providers to identify the women at risk for LBW and giving treats appropriately.
Keywords: Low birth weight, Pregnancy outcome, Predictors, Risk, Epidemiology

INTRODUCTION

The World Health Organization (WHO) has defined low birth weight (LBW) as the weight less than 2,500 grams at birth regardless of the gestational period [1]. It is estimated that more than 20 million infants born worldwide annually are of LBW and developing countries have the biggest burden 95.6% [1]. Birth weight is one of the important indicators of adverse perinatal, neonatal, and adulthood outcomes. Based on epidemiological evidence, LBW infants are approximately 20 times more likely to die than

those with optimal weight in the first year of life [2]. LBW also increases risk of birth complications such as birth asphyxia [3] and this results in reduced or impaired cognitive function [4] and delay in growth and developmental [5, 6], or lead to non-communicable diseases in adulthood such as coronary heart disease [7], type 2 diabetes mellitus [8], and hypertension [9].

In Thailand, the percentage of LBW was estimated at 8.2% in 1996 and 9.4% in 2016 [10, 11, 12, 13]. The figures are still higher than the service goal of not more than 7% targeted by the Ministry of Public Health [10]. Multiple Indicators Cluster Survey in Thailand during 2015-2016 shows variation in LBW by place of residence [13]. The percentages of LBW are relatively higher in rural areas (10.1%) than those of urban areas (8.5%), and vary across regions: 11.3% in the South, 10.2% in the North, 9.9% in the Northeastern, and 8.6% in the Central. Survival rates of LBW in Thailand are 81% in the group of birth weight <1,500 grams and 52% in the group of birth weight <1,000 grams and the major cause of death of these babies was respiratory distress syndrome (RDS) [14]. In addition, LBW is the main cause of increased disability-adjusted life-years (DALYs), years of life lost (YLLs), and years lived with disability (YLDs) in children [15].

There are several factors influencing occurrence of LBW including maternal age, infection during pregnancy (e.g., syphilis), attendance to antenatal care service, birth order, preterm delivery, anemia, etc [16]. Apart from the obstetric factors, dental caries was also investigated for its predictive role of LBW [17]. Estimated effects of these factors vary greatly across different studies. However, studies regarding this issue conducted in public service in Thailand is still limited.

Hence, this study was carried out to identify factors predicting LBW from Thai mothers with previous antenatal care service use at Huayploo Hospital. The study indicates that health data from real routine antenatal care can be useful for assessing and monitoring the incidence of LBW, also design appropriate intervention strategies to improve wellbeing of mothers and children in Nakhon Chai Si, Nakhon Pathom.

METHODOLOGY

Study Setting and Population

This was a retrospective cohort study using electronic medical records from Huayploo Hospital, one of the district hospitals located in Nakhon Chai Si, Nakhon Pathom, Thailand. This hospital is a governmental health facility that provides prenatal and postnatal care services for Thai women and for foreign female residing in nearby areas. The study population includes all Thai pregnant women who utilized antenatal care service and delivered a singleton live born at the hospital from October 1, 2014 to April 30, 2016. Pregnant women who had non-communicable disease, baby with congenital anomaly, and missing information on infant's birth weight were excluded.

Data Collection Approach

Outcome data of birth weight and related exposure factors were extracted from the hospital database. The study included the following exposure factors; maternal age was recoded at the time of delivery and divided into three groups: teenage mother (less than 20 years), optimal maternal age (20 to 34 years), and advanced maternal age (35 years old or above). Gestational age at delivery calculated from the expected delivery date recorded at the booking visit (that was derived from last menstrual period, and clinical examination, as well as in some cases from ultrasounds examination) and the baby's actual date of birth. Mothers who delivered before 37 gestational weeks were defined as preterm delivery. Venereal Disease Research Laboratory (VDRL) serological test for syphilis infection was divided into two categories: positive and negative. Anemia was defined by hematocrit level less than 33%. Utilization of antenatal care service was defined as: completeness and incompleteness. Mothers was recorded as having dental caries if presence of at least one tooth with caries during pregnancy. A total number of caries presented in the mouth was assessed and divided into three groups: without caries, 1-3 teeth, and 4 teeth or more. In addition, the results of dental caries examination were classified into three groups: caries free, caries without extraction need, and caries with extraction need. The outcome variable is LBW. Based on the definition of WHO1,

babies were classified into 2 groups: Low birth weight (LBW; birth weight <2,500 grams) and Normal birth weight (birth weight ≥2,500 grams).

Statistical Analysis

The characteristics of study population were summarized using descriptive statistics. Exact probability test was used to assess the differences in categorical variables while independent sample t-test was applied to analyze continuous variables with normal distribution, and a two-sample Wilcoxon rank-sum test for non-normal continuous variables. Generalized linear model with a log link and binomial distribution was applied to identify the predictive factors of LBW by forward stepwise selection method. The risk ratio with 95% confidence interval and statistical significance at p-value <0.05 were reported.

Ethical Considerations

Prior to the beginning of the study, the protocol was reviewed and approved according to the Standard Operating Procedures of Ethical Review Committee for Public Health, Mahidol University with ethic code number 78/2561. This study was conducted based on hospital record and permission was obtained from the medical director included the respective department heads of Huaysloo Hospital.

RESULTS

Information on the characteristics of the 299 pregnancies is presented in table 1. The majority of mothers were 20-34 years old (62.2%), giving birth to the first child (52.1%), having inadequate antenatal attendance (64.2%), and delivered babies at term or 37-42 weeks of gestation (95.3%). Only 4.7% were preterm deliveries. An average birth weight of babies was 3,064.5 grams. Overall cumulative incidence of LBW was 7.4%. There was a significant difference in the proportion of LBW by categories of gestational age at delivery. Mothers who delivered before 37 gestational weeks had a greater proportion of LBW (28.6%) than those delivered at 37 weeks and after (6.4%). Results from univariate analysis were presented in Table 2. The greatest crude RR was observed for the relationship between preterm delivery and LBW.

Multivariate analysis showed that the mothers who had VDRL-seropositive had the largest risk of LBW babies (Adjusted RR = 6.17, 95% CI = 1.16-32.87), followed by preterm delivery (Adjusted RR = 3.27, 95% CI = 1.20-8.97), and giving the fourth- or fifth-born child (Adjusted RR = 3.01, 95% CI = 1.15-7.89).

DISCUSSION

This study aimed to describe the incidence of LBW and identify its key predictive factors in Thai district hospital setting using clinical data from real routine antenatal care between 2014 and 2016. The incidence of LBW in this study is 7.4%, is similar to the 7% prevalence reported in Cambodia [18]. However, the incidence of LBW in this study is lower than the national figure of 9.4% in Thailand's Multiple Indicators Cluster Survey in 2015-2016 [13]; and other local studies in Songkhla (9.8%) [19], Chiang Mai (9.2%) [20], and Chanthaburi (9.1%) [21]. The disparity in these incidences might be due to the difference in study populations and levels of hospitals.

The present study showed that gestational age, and the fourth or fifth born child, and syphilis infection could significantly predict LBW. Babies born before gestational age of 37 weeks was 3.27 times more likely to have LBW compared to those born at gestational age of 37 weeks or later. Several studies showed a strong link between low gestational age and LBW which was logically expected since the preterm babies would have less time in utero to grow [21, 22, 23]. Risk of LBW in this study also significantly increased with the fourth or fifth birth order compared to the earlier order, which was similar to several previous studies showing that birth weight tended to decrease when the birth order increased [24, 25, 26]. In this study, mothers with VDRL-seropositive had 6.17 times the risk of LBW when compared with VDRL-seronegative mothers. Syphilis is an infectious

Table 1 Characteristics of the study population by birth weight groups

Characteristics	Total	LBW n (%)	Normal n (%)	*p*-value
	299			
Maternal age (years)				
Overall Mean±SD		24.7±6.6		
Mean±SD		24.3±7.4	24.8±6.5	0.727[2]
Min-Max		16-43	14-44	
< 20	83 (27.7)	8 (9.7)	75 (90.3)	
20-34	186 (62.2)	12 (6.5)	174 (93.5)	
≥ 35	30 (10.1)	2 (6.7)	28 (93.3)	
Rh blood groups (n = 118)				
Rh positive	117 (99.1)	9 (7.7)	108 (92.3)	
Rh negative	1 (0.9)	0 (0.0)	1 (100.0)	
Hematocrit level (%) (n = 296)				
Overall Mean±SD		34.8±3.4		
Mean±SD		34.4±3.7	34.8±3.4	0.528[2]
Min-Max		27-40	24-44	
< 33	77 (26.1)	8 (10.4)	69 (89.6)	0.311[1]
≥ 33	219 (73.9)	14 (6.4)	205 (93.6)	
HIV screening (n = 298)				
Negative	296 (99.3)	22 (7.5)	274 (92.5)	1.000[1]
Positive	2 (0.7)	0 (0.0)	2 (100.0)	
VDRL screening (n = 298)				
Negative	295 (98.9)	21 (7.2)	274 (92.8)	0.206[1]
Positive	3 (1.1)	1 (33.3)	2 (66.7)	
Hepatitis B screening (n = 298)				
Negative	296 (99.3)	22 (7.5)	274 (92.5)	1.000[1]
Positive	2 (0.7)	0 (0.0)	2 (100.0)	
Birth order				
Overall Median (IQR)		1 (1)		
Median (IQR)		1.5 (2)	1 (1)	0.458[3]
Min-Max		1-5	1-5	
1st child	156 (52.1)	11 (7.1)	145 (92.9)	0.067[1]
2nd child	86 (28.7)	5 (5.9)	81 (94.1)	
3rd child	35 (11.7)	1 (2.9)	34 (97.1)	
4th child	18 (6.1)	4 (22.3)	14 (77.7)	
5th child	4 (1.4)	1 (25.0)	3 (75.0)	
Gestational age (weeks)				
Overall Mean±SD		38.8±1.4		
Mean±SD		37.5±2.1	38.9±1.3	< 0.001[2*]
Min-Max		31-40	34-42	
< 37	14 (4.7)	4 (28.6)	10 (71.4)	0.014[1*]
≥ 37	285 (95.3)	18 (6.4)	267 (93.6)	
ANC completed				
No	192 (64.2)	14 (7.3)	178 (92.7)	1.000[1]
Yes	107 (35.8)	8 (7.5)	99 (92.5)	
Dental caries (teeth) (n = 167)				
Overall Median (IQR)		0 (2)		
Median (IQR)		1.5 (2)	0 (2)	0.191[3]
Min-Max		0-5	0-11	
0	84 (50.3)	3 (3.6)	81 (96.4)	0.243[1]
1-3	67 (40.1)	5 (7.5)	62 (92.5)	
≥ 4	16 (9.6)	2 (12.5)	14 (87.5)	
Extraction need (n = 167)				
No	127 (76.0)	8 (6.3)	119 (93.7)	1.000[1]
Yes	40 (24.0)	2 (5.0)	38 (95.0)	
Caries status (n = 167)				

Characteristics	Total	LBW n (%)	Normal n (%)	*p*-value
Caries free	84 (50.3)	3 (3.6)	81 (96.4)	0.215[1]
Caries without extraction need	43 (25.7)	5 (11.7)	38 (88.3)	
Caries with extraction need	40 (24.0)	2 (5.0)	38 (95.0)	

LBW, low birth weight; Rh, Rhesus; HIV, Human immunodeficiency virus; VDRL, Venereal Disease Research Laboratory test; ANC, Antenatal care; SD, Standard deviation; Min, minimum; Max, maximum; IQR, Interquartile range.
[1]Exact probability test.
[2]Independent sample *t*-test.
[3]Two-sample Wilcoxon rank-sum test.
*Statistically significant (*p*-value <0.05).

Table 2 Univariate and multivariate analyses of factors predicting LBW

Factors	Total	LBW n (%)	Univariate analysis RR[1]	95% CI	*p*-value	Multivariate analysis RR[2]	95% CI	*p*-value
	299	70						
Maternal age (years)								
20-34	83 (27.7)	12 (6.5)	1.00	Reference				
< 20	186 (62.2)	8 (9.7)	1.49	0.63, 3.52	0.358			
≥ 35	30 (10.1)	2 (6.7)	1.03	0.24, 4.39	0.965			
Anemia (n = 296)								
No	77 (26.1)	77 (26.1)	1.00	Reference				
Yes	219 (73.9)	219 (73.9)	1.63	0.71, 3.72	0.251			
VDRL screening (n = 298)								
Negative	295 (98.9)	21 (7.2)	1.00	Reference		1.00	Reference	
Positive	3 (1.1)	1 (33.3)	4.68	0.90, 24.44	0.067	6.17	1.16, 32.87	0.033*
Birth order								
1-3	277 (92.6)	17 (6.1)	1.00	Reference		1.00	Reference	
≥ 4	22 (7.4)	5 (22.7)	3.70	1.51, 9.09	0.004*	3.01	1.15, 7.89	0.025*
Preterm delivery								
No	14 (4.7)	4 (28.6)	1.00	Reference		1.00	Reference	
Yes	285 (95.3)	18 (6.4)	4.52	1.76, 11.60	0.002*	3.27	1.20, 8.97	0.021*
ANC completed								
Yes	192 (64.2)	14 (7.3)	1.00	Reference				
No	107 (35.8)	8 (7.5)	0.98	0.42, 2.25	0.953			
Dental caries (n = 167)								
0	84 (50.3)	3 (3.6)	1.00	Reference				
1-3	67 (40.1)	5 (7.5)	2.09	0.52, 8.43	0.300			
≥ 4	16 (9.6)	2 (12.5)	3.50	0.63, 19.30	0.150			
Extraction need (n = 167)								
No	127 (76.0)	127 (76.0)	1.00	Reference				
Yes	40 (24.0)	40 (24.0)	0.79	0.18, 3.59	0.764			
Caries status (n = 167)								
Caries free	84 (50.3)	3 (3.6)	1.00	Reference				
Caries without extraction	43 (25.7)	5 (11.7)	3.26	0.82, 12.99	0.094			
Caries with extraction	40 (24.0)	2 (5.0)	1.40	0.24, 8.05	0.706			

RR, risk ratio; CI, confidence interval; VDRL, Venereal Disease Research Laboratory test; ANC, Antenatal care.
[1]Crude RR estimated by generalized linear model.
[2]Adjusted RR estimated by generalized linear model.
*Statistically significant (*p*-value <0.05).

disease that can be transmitted across the placenta and cause infection in the fetuses [27]. Pregnant women infected with syphilis had a 4.6 times greater risk of HIV coinfection and might receive inadequate treatment that may also lead to intrauterine growth

restriction/ retardation (IUGR) of the fetuses [27, 28, 29]. However, a study conducted in Southern Thailand did not show an association between the VDRL-positive and LBW [30]. Although VDRL-seropositive was found to be the largest risk associated with LBW in this study, the result should be interpreted with caution, as the proportion of mothers who had VDRL-seropositive in this study were very small. Random error concerning the estimation of the parameter was likely to occur and might affect this finding. Further study with a larger sample size is needed to confirm this finding and can additionally focus on mothers with multiple pregnancies and stillbirth, which were not included in the study. Study in other potential predictors that may affect LBW is also recommended such as marital status, education, gestational hypertension, genitourinary tract infection, prior abortion, height, pregnancy weight, gravidity, parity, sex of the baby, smoking, alcohol, first antenatal care visit, number of antenatal care visits, and quality of antenatal care, etc [16].

CONCLUSIONS

The incidence of LBW observed in this study was 7.4%. Mothers who had blood VDRL positive, preterm delivery, and gave birth four or five times before increased the risk of delivery LBW babies. This result will help to do risk classification of mothers and to explore those at risk for LBW. Subsequently, these women can be referred during early pregnancy to an institution which is equipped with facilities for disposition of high-risk women and LBW babies.

ACKNOWLEDGEMENTS

The authors would like to acknowledge support of Huaysloo Hospital for allowing use of the routine service data for this study.

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FACTORS ASSOCIATED WITH UNDER-NUTRITION AMONG UNDER-FIVE CHILDREN IN MYANMAR

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ABSTRACT

Introduction: Under-nutrition among young children is an ongoing problem in Myanmar. It is a serious public health problem because it attributes most of child morbidity and mortality. Myanmar is still far behind reaching the WHO global nutrition targets. Recent literature suggests that under-nutrition is complex, and various forms of under-nutrition including stunting (low height for age), wasting (low weight for height) and underweight (low weight for age) should be considered.
Objective: This study aimed to identify factors associated with stunting and underweight among children of 0-59 months (under-five children) in Myanmar.
Methodology: The analysis was drawn on data of 4,230 under-five children whose complete records of heights and weights were available in Myanmar Demographic and Health Survey (MDHS) 2015-16. Associations between stunting and underweight and child, parental, household factors were examined following UNICEF's latest framework on under-nutrition.
Results: The finding illustrated that 28.97% of children were stunted and 19.22 % were underweight. The mother's BMI, mother's decision on their children's well-being, and father's education were significantly associated with child's stunting and underweight. However, mother's occupation was associated with stunting only. Among control variables, child's age and sex, child's size at birth, and the number of under-five children in the household were associated with stunting and underweight. Household's wealth status was significantly indicated child's stunting only.
Conclusion: The study suggested that the factors that predispose to child under-nutrition are multidimensional and varied between different under-nutrition indicators. Multi-sectoral and comprehensive policies are necessary to combat under-nutrition in Myanmar. These policies should focus on empowering low socio-economic status women and should encompass the promotion of compulsory secondary education for both men and women, gender-sensitive family planning programs, as well as poverty elimination programs such as social safety net and cash transfer programs targeting low socio-economic status women.
Keywords: Under-nutrition, under-five children, stunting, underweight, Myanmar

INTRODUCTION

Under-nutrition is a serious public health problem and the most vulnerable population are young children. Under-nutrition is an outcome of insufficient nutrition intakes and recurrent infections which includes stunting (low height for their age), underweight (low weight for their age), wasting (low weight for their height) and other vitamin and mineral deficiency [1]. Globally, nearly 165 million of under-five children are suffering from stunting and wasting, the prevalence is particularly high in developing countries [2]. Under-nutrition can lead both acute and chronic impacts on child's physical health and adverse effects on children's mental and cognitive development and their school performances [3,4]. More importantly, under-nutrition may lead mortality and morbidity among under-five children [5,6]. About half of under-five child mortality was associated with under-nutrition especially in low- and middle-income countries [7]. Reduction of under-nutrition is the vital for economic and human development of countries, not just for children's health.

Investments in early nutrition interventions are estimated to yield from 4 to 35 times returns on the investment [8].

Countless efforts made for reducing under-nutrition resulted in a global decrease of under-nutrition over the past decades [9]. Yet, the prevalence remains high in Africa and South Asia due to social disparities in their sub populations [7]. Women's status in household and societies influence their nutrition status, which are one of the key factors leading children's under-nutrition [10]. Although these are some moves to tackle these direct and indirect determinant [11], they need to be scaled up for those who need the most.

Myanmar is a low middle-income country and faces these nutrition-related issues for a long time. Despite a moderate decline of under-nutrition since 2000, the prevalence of stunting, underweight and wasting remains high [12] and is still far behind reaching the global nutrition targets set by World Health Assembly [13].[1] Moreover, nutrition status of mothers is an issue as a half of women had anemia and 16% of women of reproductive age were undernourished according to the recent DHS report [12]. About one-third of neonatal death in Myanmar is predominantly caused by premature birth of baby or low birth weight.[17] Despite economic growth and poverty reduction over the past decade, in Myanmar, socio-economic disparities persists in some populations and regions [8] and they continue to influence maternal and child health, their education, their employment and their access to healthcare services.

Determinants of under-nutrition are complex and multidimensional. The UNICEF's latest framework on under-nutrition recognizes various distal factors such as inadequate health services, education level, employment status or family income, women decision making powers, and sociocultural, economic and political conditions of societies [15]. It has been recognized that antenatal care (ANC) utilization, education level, poor household and nutrition status of mother are key determinants of child under-nutrition [11, 16, 17]. Yet, there are few studies in Myanmar examining the relationships between the child nutrition status and these distal factors based on a large sample. A recent study focused on examining relationships between on stunting and feeding practices only [20], but it did not explore impacts of more distal factors such as characteristics of parents and households. In order to develop socially and culturally appropriate interventions to under-nutrition, it is necessary to consider impacts of such factors. Therefore, the objective of this study was to identify the potential factors which are associated with child under-nutrition among under-five children in Myanmar.

METHODOLOGY

Data source

This study conducted secondary data analysis of the Myanmar Demographic Health Survey (MDHS) 2015-16, which is comprised of a nationally representative sample from 14 States and Regions including Nay Pyi Taw [12]. The survey employed two-stage stratified sampling method. Trained researchers collected the anthropometric data and anemia test not only 0 and 59 months old child but also 15-49 years old women from 13,260 households. To obtain children's data, the researchers asked parents or care givers of children for the consent to measure height, weight and anemia test.

Study Population and Sample

This study used the Kids record file (KR file) from MDHS data, which is comprised of 4,230 children of 0–59 months with complete anthropometric data. In all analyses, sampling weights were applied for correcting standard error and p-value estimation to make representative data of the entire population.

Dependent variables

The dependent variables of the study were widely used indicators of assessing nutrition status of child nutrition: stunting and underweight. Each of these indicators were displayed as the number of standard deviation (SD) unit (Z-score) from the median of the 2006 WHO child growth standards.[32] Stunting reflects the failure of receiving adequate nutrition over a long time period and considered as aggregate effect of chronic under-nutrition. Children whose height-for-age Z-score is below minus two standard deviations (-2 SD) from the median of the reference population are considered short for their age (stunting). Underweight is a composite index of stunting and wasting, an overall indicator of children nutrition status. Children whose weight-for-age

Z-score is below minus two standard deviations (-2 SD) from the median of the reference population are classified underweight [19]. The dependent variables of study were categorized as dummy stunting (stunting v normal) and underweight (underweight v normal). Missing values and biologically implausible values were excluded for stunting less than (-6 SD) and greater than(+6 SD) and for underweight less than (-6SD) and greater than (+6SD) [20].

Main independent variables

The main variables of the study were parental factors including mother's BMI, mother's decision making related to well-being of their child, education of both mother and father, mother's antenatal care (ANC) visits during their pregnancy, occupation of mother and father.

Covariates

Following existing literature, age, sex of child, diarrheal episode in last two weeks, child size at birth time perceived by his or her mothers, household's wealth status, place of residence and the number of under-five child in the household were added in this study.

Analysis

The study assessed the association of parental characteristics and three nutrition indicators applying binary logistic regression adjusting covariates. Multicollinearity was assessed between independent variables and covariates to exclude the correlation and effect to regression results. The analysis was performed with three models of logistic regression: model 1 assessed the relation between maternal characteristics and two under-nutrition indicators; model 2 added father's characteristics; model 3 added a set of control variables (child and household characteristics). All analysis were conducted with STATA (v 14.0) and the results were presented using adjusted odds ratios (AOR) with 95% CI with the significant level (<0.05).

RESULTS

Among 4,230 children of 0-59 months old, the prevalence of stunting and underweight were 28.97%, and 19.22% (see Table 1).

Table 1. Prevalence of stunting and underweight

Outcome variables	N	Weighted %
Stunting (HAZ)		
-2 SD and above (Normal)	2,635	71.03
below -2 SD	1,075	28.97
Underweight (WAZ)		
-2 SD and above (Normal)	3,006	80.78
below -2 SD	715	19.22

Descriptive statistics of children are shown in Table 2 and 3. Nearly 60% of mothers made decisions on their children's well-being by themselves. About 60% of the mothers visited ANC at least 4 times. Mothers who were underweight was 12% and 17% did not complete formal education. One-third of children' mothers were housewives.

Associated factors of stunting

This study included three models to investigate the net effect of maternal, paternal, household and child characteristics and observe the change of the odds ratio and p-value of each variable. The paper discusses results of model 3 to highlight the strongest relationship between parental characteristics and outcome variables after controlling other variables. After controlling child and household factors, mothers' BMI was significantly associated with their children's under-nutrition. The children whose mothers were underweight were more likely to be stunted compared to overweight mothers (AOR=1.50, 95% CI: 1.05 -2.14). If the decision related with their children well-being was jointly made by both mother and father, their children were 21% less likely to be stunted compared to if the decision was made by mother only. The children whose mothers worked as sale, marketing or service were 1.53 times and the children whose mothers were manual workers were 1.33 times more likely to be stunted compared to children whose mothers were housewives. The child whose fathers completed secondary education or higher were 32% less likely to be stunted than those fathers did not complete formal education.

The child of 12-23 months old were 2.60 times, that of 24-59 months old were 5.53 times more likely to be stunted compared to those under one year old. Female children were

23% less likely to be stunted than males. The mothers who perceived that their child was smaller than the average were 2.18 times more likely to be stunted compared to those who perceived that their child was larger than the average. Children from poorest family were more likely to be stunted than those from richest family (AOR=2.09, 95% CI: 1.31 - 3.33). The increase of one under-five child in the household increased 1.23 times more probability of child stunting. Mother's ANC visits, mother's education and father's occupation were not statistically associated with stunting in multivariate analysis though they were significantly associated with stunting in bivariate analysis.

Associated factors of underweight

After controlling the confounding factors in model 3, mother's decision on well-being of their child was associated with child's under-nutrition status. The child was more likely to be underweight if the decision on child's well-being was made by their father only compared to decision made by mother only (AOR=1.76, 95% CI: 1.05 -2.95). Similar to stunting, the children whose mothers were underweight were 2.47 times more likely to be underweight than children whose mothers were overweight. The children whose fathers completed secondary or higher education were 38% less likely to be underweight children than those fathers did not complete formal education.

Similar to stunting, the older children showed higher risk of underweight compared to younger children. Children of 12-23 months old were 1.61 times and those of 24-59 months old were 2.96 times more likely to be underweight compared to children younger than one year old. Female children were 21% less likely to be underweight than males. The mothers perceived that their children were smaller than the average were 23.65 times more likely to be underweight compared to those who perceived that their children were larger than average. The increase of one under-five child in the household increased 1.28 times more likely to be underweight. Similar to stunting, mother's ANC visits, mother's education and father's occupation were not statistically significant in multivariate analysis despite showing significant results in bivariate analysis.

DISCUSSION

The under-nutrition among under-five children is an ongoing issue in Myanmar as the prevalence of stunting is high and that of underweight is medium according to the WHO's cut-off [11]. The maternal and paternal characteristics were imperative factors influencing their children's nutrition status. As well as social status of mothers and their nutrition status fathers' education were a strong predictor of child under-nutrition as shown in existing studies on other developing countries [21]. The current study showed that BMI of mothers was strongly associated with their children's under-nutrition status (both stunting and underweight). Under-nourished mothers were more likely to have under-nourished children. The finding was consistent with other DHS studies [22]. This can be explained by the fact that poor nutrition status or BMI of mothers before and during pregnancy affects babies' nutrition status and increase risk of low birth weight and intrauterine growth retardation (IUGR) in their later lives [23,24].

Mother's status in the household affects health and well-being of young children. The result highlighted that mother's autonomy over decisions related to their children health and well-being was associated with their children's under-nutrition status. The finding was consistent with systematic review at South Asia study that a lack of women autonomy regarding their child health and well-being less than 5 years old was positively associated with being underweight. Myanmar DHS reported that 35% of women in Myanmar particularly women who did not complete formal education and those who were from the poorest households did not participate in decision making in their households [12]. In addition, the children whose mothers who were not engaged with paid employment were less likely to participate in the decision on their children's well-being than those who engaged with paid employment.[18] Unequal access to resources such as education and financial resources may influence mother's participation in decision making. The more women participating on household's decisions, the better nutritional status of their children will be.

Mothers' occupation can be a predictor of child's under-nutrition but the results varied between stunting and underweight. The study

showed that children of working mothers were more likely to be stunted compared to those whose mothers were housewives. The result was consistent with some studies in Myanmar and Nigeria that children of working mothers were more likely to be stunted [12,25]. However, other studies showed that children whose mothers were housewives were more like to be stunted and underweight compared to children of mothers worked as officers.[15] A plausible explanation in context of Myanmar is that most of working women in Myanmar engage with most of housework including cooking and taking care of children and the elderly, and they may not be able to pay attention to all young children at household. This may influence the quality of their child feeding practices and this may result in negative health outcomes of their children [27].

Fathers' education was another important factor of child under-nutrition [28]. The current study presented that the likelihood of child's stunting and underweight reduced by levels of father's education. This result was also identified in other studies that parent's education was positively correlated with their child nutrition [21,29]. The result highlighted that educated fathers have potential to contribute to increase household incomes as well as enhance knowledge on maternal and child health and feeding practices within the households.

CONCLUSIONS

The study demonstrated that the determinants of child under-nutrition were complex, and varied between different nutrition indicators. The socio-economic conditions of children's mothers and fathers were founded to be key indicators of childhood under-nutrition. Mother's BMI, mother's decision on their children well-being, and father's education are associated with stunting and underweight. Mother's occupation was associated with stunting only. In addition, among control variables, the age and sex of child, the size of child at birth, and the number of under-five children in the household were associated with stunting and underweight. Household wealth was associated with stunting only. The study results suggested that the comprehensive and multi-sectoral policies are necessary to enhance nutrition status of children. The policy makers should pay more attention to empower and promote the status of women. The policy should encompass the promotion of compulsory secondary education to men and women, gender-sensitive family planning programs, and poverty elimination programs including social safety net and cash transfer programs especially for low socio-economic status women.

Table 2. Distribution of parental characteristics among under-five children

Parental characteristics	Frequency	Weighted %	Parental characteristics	Frequency	Weighted %
Mother's decision on well-being of their children			**Mother's occupation**		
Mother only	2,103	59.25	Housewife	1,407	38.06
Mother and father	1,179	33.23	Managing/professional level	133	3.6
Father only	189	5.32	Sale/marketing /service	590	15.96
Relatives	78	2.2	Agriculture	523	14.15
Mother's antenatal care visits			Manual worker	1,044	28.24
None	378	11.94	**Father's education**		
1 to 3times	884	27.95	No education	603	16.26
4 times or more	1,881	59.48	Primary	1,526	41.16
Don't know	20	0.63	Secondary or higher	1,520	41.01

Parental characteristics	Frequency	Weighted %	Parental characteristics	Frequency	Weighted %
Mother's BMI			Don't know	58	1.56
Underweight	442	11.93	**Father's occupation**		
Normal	2,340	63.18	Managing/professional level	217	5.92
Overweight	921	24.87	Sale/marketing/ service	310	8.47
Mother's education			agriculture	992	27.1
No education	614	16.55	manual worker	2,142	58.51
Primary	1,748	47.12			
Secondary or higher	1,348	36.33			

Table 3. Distribution of household and child characteristics among under-five children

Household's characteristics	Frequency	Weighted %	Child characteristics	Frequency	Weighted %
Household wealth			**Age of child**		
Poorest	1,095	29.52	0-11 months	704	18.98
Poor	841	22.67	12-23 months	776	20.91
Moderate	643	17.32	24-59 months	2,230	60.11
Richer	620	16.72	**Sex of child**		
Richest	510	13.76	Male	1,914	51.6
Place of residence			Female	1,796	48.4
Urban	814	21.93	**Diarrheal episode in last 2 weeks**		
Rural	2,896	78.07	No	3,315	89.35
Number of under 5 children in a household	Mean =1.56; SD = 0.74; Min = 0, Max = 5		Yes	395	10.65
			Child size at birth time (perceived by his/her mother)		
			Larger than the average	890	23.98
			Average	2,211	59.62
			Smaller than the average	461	12.43
			Don't know	147	3.96

Table 4. Binary logistic regression model of all explanatory variables on stunting (N=2,922)

Variables	Model 1		Model 2		Model 3	
	Adjusted OR	95% CI	Adjusted OR	95% CI	Adjusted OR	95% CI
Maternal characteristics						
Mother's decision on well-being of their children						
Mother only (Ref)						
Mother and father	0.79*	0.64-0.98	0.79*	0.64-0.98	0.79*	0.64-1.00
Father only	1.20	0.76-1.89	1.23	0.78-1.92	1.05	0.65-1.69
Relatives/others	0.35*	0.16-0.78	0.41*	0.19-0.90	0.48	0.20-1.11
Mother's visit to antenatal care						
None (Ref)						
1 to 3times	0.92	0.67-1.26	0.93	0.67-1.28	1.01	0.74-1.40
4 or more	0.72	0.52-0.98	0.75	0.54-1.04	0.87	0.63-1.21
Mother's BMI						
Overweight (Ref)						
Normal	1.23	0.96-1.58	1.20	0.93-1.54	1.26	0.96-1.65
Underweight	1.57	1.12-2.21	1.52*	1.07-2.17	1.50*	1.05-2.14
Mother's education						
No education (Ref)						
Primary	0.83	0.62-1.10	0.90	0.66-1.21	0.91	0.66-1.27
Secondary/ higher	0.57**	0.41-0.78	0.67*	0.47-0.95	0.81	0.55-1.20
Mother's occupation						
Housewife (Ref)						
Manager/ professional level	1.73*	1.06-2.81	1.76*	1.06-2.92	1.47	0.84-2.55
Sale/ marketing and service	1.54**	1.12-2.11	1.57**	1.13-2.17	1.53*	1.09-2.13
Agriculture	1.59**	1.17-2.15	1.60**	1.15-2.22	1.27	0.89-1.81
Manual worker	1.68***	1.32-2.15	1.60***	1.25-2.04	1.33*	1.02-1.73
Father's characteristics						
Father's education						
No education (Ref)						
Primary			0.75*	0.57-0.99	0.71*	0.53-0.96
Secondary/ higher			0.62**	0.45-0.86	0.68*	0.49-0.96
Father's occupation						
Manager /professional level (Ref)						
Sale/ marketing /service			1.03	0.61-1.75	1.06	0.59-1.92
Agriculture			1.03	0.63-1.71	0.87	0.50-1.47
Manual worker			1.09	0.69-1.74	0.94	0.57-1.55
Child Characteristics						
Age of child						
0-11 months (Ref)						

Variables	Model 1		Model 2		Model 3	
	Adjusted OR	95% CI	Adjusted OR	95% CI	Adjusted OR	95% CI
12-23 months					2.60***	1.78-3.80
24-59 months					5.53***	3.84-7.96
Sex of child						
Male (Ref)						
Female					0.77**	0.64-0.93
Diarrheal episode in last 2 weeks						
No (Ref)						
Yes					1.19	0.86-1.64
Child size at birth (perceived by his/her mother)						
Larger than average (Ref)						
Average					1.14	0.89-1.47
Smaller than average					2.18***	1.61-2.95
Don't know					1.49*	0.97-2.27
Household characteristics						
Number of under-five child in the household					1.23*	1.01-1.49
Household wealth						
Richest (Ref)						
Richer					1.20	0.78-1.83
Moderate					1.79*	1.16-2.76
Poor					1.81*	1.16-2.82
Poorest					2.09**	1.31-3.33
Residence						
Urban (Ref)						
Rural					1.18	0.88-1.59

Table 5. Binary logistic regression model of all explanatory variables on underweight (N=2,932)

Variables	Model 1		Model 2		Model 3	
	Adjusted OR	95% CI	Adjusted OR	95% CI	Adjusted OR	95% CI
Maternal characteristics						
Mother's decision on well-being of their children						
Mother only (Ref)						
Mother and father	1.07	0.85 -1.35	1.07	0.84-1.36	1.09	0.85-1.39
Father only	1.95**	1.20 -3.15	1.98*	1.20-3.26	1.76*	1.05-2.95
Relatives	0.35*	0.13 -0.93	0.32*	0.11-0.94	0.34	0.12-1.01
Mother's visit to antenatal care						
None (Ref)						

Variables	Model 1		Model 2		Model 3	
	Adjusted OR	95% CI	Adjusted OR	95% CI	Adjusted OR	95% CI
1 to 3times	0.91	0.63-1.31	0.95	0.66-1.36	1.07	0.74-1.55
4 or more	0.76	0.50-1.12	0.82	0.55-1.19	0.97	0.64-1.49
Mother's BMI						
Overweight (Ref)						
Normal	1.62**	1.15 -1.97	1.57**	1.19-2.06	1.60**	1.21-2.11
Underweight	2.62***	1.63 -3.42	2.53***	1.73-3.69	2.47***	1.71-3.56
Mother's education						
No education (Ref)						
Primary	0.78	0.57-1.07	0.86	0.62-1.21	0.96	0.67-1.38
Secondary & higher	0.70*	0.49-0.99	0.83	0.56-1.23	0.98	0.64-1.49
Mother's occupation						
Housewife (Ref)						
Manager/ professional level	0.76	0.46-1.26	0.77	0.43-1.38	0.67	0.35-1.27
Sale/ marketing/ service	0.84	0.58-1.22	0.86	0.59-1.27	0.83	0.56-1.23
Agriculture	0.88	0.63-1.22	0.87	0.60-1.26	0.75	0.52-1.09
Manual worker	1.06	0.80-1.39	1.06	0.81-1.38	0.95	0.72-1.27
Father's characteristics						
Father's education						
No education (Ref)						
Primary			0.68*	0.48-0.97	0.66*	0.47-0.92
Secondary/ higher			0.60**	0.42-0.85	0.62**	0.44-0.88
Father's occupation						
Manager/ professional level (Ref)						
Sale/ marketing/ service			1.19	0.63-2.24	1.29	0.56-2.54
Agriculture			1.13	0.64-1,99	1.06	0.57-1.98
Manual worker			1.08	0.62-1.89	1.02	0.55-1.88
Child Characteristics						
Age of child						
0-11 months (Ref)						
12-23 months					1.61*	1.08-2.41
24-59 months					2.96***	1.98-4.41
Sex of child						
Male (Ref)						
Female					0.79*	0.63-0.99
Diarrheal episode in last 2 weeks						
No (Ref)						
Yes					1.25	0.89-1.76
Child size at birth (perceived by his/her mother)						
Larger than average (Ref)						
Average					1.66**	1.25-2.21

Variables	Model 1 Adjusted OR	95% CI	Model 2 Adjusted OR	95% CI	Model 3 Adjusted OR	95% CI
Smaller than average					3.65***	2.58-5.18
Don't know					2.35**	1.39-3.97
Household characteristics						
Number of under-five children in the household					1.28*	1.05-1.57
Household wealth						
Richest (Ref)						
Richer					1.19	0.74-1.89
Moderate					1.14	0.71-1.84
Poor					1.24	0.76-2.03
Poorest					1.53	0.96-2.45
Residence						
Urban (Ref)						
Rural					0.99	0.71-1.40

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Association between Application of Herbicides and Herbicide Acute Symptoms Among Rice Farmers in Song Phi Nong Subdistrict, Song Phi Nong District, Suphan Buri Province,

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ABSTRACT

Introduction: Agriculture is a primary contributor to the Thailand economy. Rice farmers commonly and widely use pesticides and herbicides on their crops such as glyphosate, paraquat, and 2-4 D.
Objectives: To explore the association among demographic characteristics, farming characteristics herbicide exposure amount of use with acute symptoms of herbicide exposure.
Methodology: A cross-sectional study investigated in Song Phi Nong subdistrict, Song Phi Nong district, Suphan Buri province, Thailand during May 2019. Demographic characteristics, farming characteristics, application of herbicides and acute symptoms were collected by face to face questionnaires.
Conclusion: A total of 133 rice farmers were surveyed in both male and female with average age 45.8 ± 10.1 years old and 55.6% participants are female. The most frequent acute symptom was found on eye symptoms had 88 participants. Besides, education level, farmland size, work time, personal protective equipment, handle herbicides frequency showed statistically significant with acute symptoms. This Study suggested that demographic characteristic, farming characteristics, and herbicide exposure amount of use had statistically significant in association with acute symptoms. Findings also indicated that farmers' BMI, smoking, and drinking behaviors were not significantly in relating to acute symptoms. For reducing the risk of herbicide exposure, it is suggested that the automatic spreading of herbicide can be applied to the rice farming.
Keywords: Herbicides, Acute symptoms, Rice farmers, Thailand

INTRODUCTION

Agriculture is a primary contributor to the Thai economy and relate to Thailand sustainable develop, furthermore, more than 11 million Thai people (38%) work in agriculture [1], almost half of all Thailand's labor workers are employed in the farming industry [2,3]. According to Bureau of Epidemiology, Ministry of Public Health Thailand, the morbidity rate of pesticide poisoning was 7.92 per 100,000 populations in 2017. Herbicide use is almost the first step before insecticide, fungicide and other pesticides [4-6], especially among rice farmers, meanwhile, herbicides volume of import is the top one in Thailand from 2013 to 2017 [4,]. Overuse of herbicide by farmers which leads to increasing pesticide risked for farmers, consumers, and the environment [5].

There was plenty previous study of herbicide exposure acute symptoms [6-8], however, this study aimed at figuring out associations among demographic characteristics, farming characteristics, application of herbicides and acute symptoms in Song Phi Nong Subdistrict, Song Phi Nong District, Suphan Buri Province, Thailand. Suphan Buri province is one of primary producer of rice in Thailand. From precious study, demographic characteristics included self-behavior, BMI. Farming characteristics included years of farmer experience in agriculture, work hours per day, farmland size. Application of herbicides included personal protective equipment, handle equipment and handle frequency [8,9]. Herbicides exposure

acute symptoms chose significant symptoms from previous study [9-11]. This study investigated acute symptoms after applying three type of herbicides glyphosate [9] paraquat [12], 2,4-D [13-15]. The acute symptoms of herbicide in exposed people within seven days include skin irritation, nausea, vomiting, headache, dizziness, coughing and so on [7,12-18].

METHODOLOGY

This research was a cross-sectional study from Oct 2018 to June 2019 in Song Phi Nong Subdistrict, Song Phi Nong District, Suphan buri Province, Thailand. Song Phi Nong subdistrict was randomly selected by researcher. There are 199 households in Song Phi Nong subdistrict. The researcher randomly selected 133 households of rice farmers and choose one main rice farmer of each household. This study included rice farmers age between 18-60 years old, both male and female who worked or lived at this area. Exclude criteria were rice farmers who never used one of three herbicides, glyphosate, paraquat and 2,4-D.

also farmers who had skin disease, diabetes, hypertension, thyroid, and cardiovascular disease [14, 16-17].

Data was collected by face to face questionnaire and the pre-tested questionnaire for reliability and validity was prior completed with 30 rice farmers in Ban Mo district, Sara Buri province, Bangkok. The statistical analysis was used descriptive statistics, chi square to find the association among demographic characteristics, farming characteristics, herbicide exposure amount of use and acute symptoms of herbicide exposure.

RESULTS

Demographic characteristics of the study population

The total participants were 133 people. Participants in this study composed of both 59 men and 74 women, most of participants were 51 to 60 years old while average age (±SD) was 45.8 ± 10.1, most of them had low education, lower than primary school (48.9%), participants who finished primary school had 12 persons, majority of farmers did not have much high education level. However, they had good behavior, 82% participants did not smoke, what is more, 75.9% participants did not drink alcohol. More than half of participants at Song Phi Nong subdistrict had normal weight (57.9%), average BMI was 24.4± 4.5 (Table 1).

Farming Characteristics

Rice farmers with 10 – 25 years was the majority participants (36.8%), only 5 people had farming experience more than 40 years; 78.2% farmers work time usually chose morning 12pm - 12am and worked around 10 – 25 hours per week, while average work hours were 27.6 ± 17.8, most of farmers had 10 – 25 rais farmland, 24.2 rais were average farmland size of all participants (Table 2).

Table 1 Demographic characteristics of study population

Characteristics	Number (n=133)	Percentage (%)
Age (year)		
18-30	15	11.3
31-40	23	17.3
41-50	45	33.8
51-60	50	37.6
Mean ± SD = 45.8 ± 10.1; Median 48		
Gender		
Female	74	55.6

Characteristics	Number (n=133)	Percentage (%)
Male	59	44.4
Education		
lower than primary school	65	48.9
primary school	12	9
senior high school	30	22.6
higher than senior high college	26	19.5
Smoke		
yes	24	18
no	109	82
Drink Alcohol		
yes	32	24.1
no	101	75.9
BMI		
<18	4	3
18-24.9	77	57.9
25-29.9	40	30.1
30	12	9
Mean ± SD = 24.4 ± 4.5; Median 23.7		

Table 2 Farming characteristics

Characteristics	Number (n=133)	Percentage (%)
Farmer Experience (year)		
<10	35	26.3
10-25	49	36.8
25-40	44	33.1
>40	5	3.8
Mean ± SD = 21.59 ± 12.0; Median 20		
Work Time		
12pm-12am	104	78.2
12am-5pm	3	2.3
5pm-12pm	2	1.5
Working Hours per Week		

Characteristics	Number (n=133)	Percentage (%)
<10	28	21.1
10-25	41	30.8
25-40	29	21.8
>40	35	26.3
Mean ± SD = 27.6 ± 17.8; Median 24.0		
Farmland (rai)		
<10	40	30.1
10-25	48	36.1
25-40	19	14.3
>40	26	19.5
Mean ± SD = 24.2 ± 18.5; Median 20.0		
Knowledge Level		
low level	51	38.3
moderate level	38	28.6
high level	44	33.1
Attitude Level		
not concern attitude	15	11.3
neutral attitude	66	49.6
concern attitude	52	39.1
Practice Level		
poor practice	3	2.3
fair practice	11	8.3
good practice	119	89.5

Application of herbicides use

All participants wore long sleeves to apply herbicides, 97.8% farmers wore long pants to work, 74.4% participants applied hat and gloves. Most of farmers wore cloth to cover their mouths and noses, even though they did not use standard respirator. Less people used boots (44.4%), while very less people wore goggles (21.8%) and apron (19.5%). Most of participants handle frequency were1 day per month (59.4%), sometimes 2-3 days per month (26.3%), very few people handled herbicides 1 day more than 1 month (others 2.3%), almost all participants use backpacker sprayer (92.5%), farmers sowed by hands had 4 people, and others (4.5%) used car sprayer.

Table 3 Herbicide exposure

Characteristics	Number (n=133)	Percentage (%)
PPE USE		
hat	99	74.4
respirator	64	48.1
long sleeves	133	100
long pants	130	97.8
gloves	99	74.4
boots	59	44.4
goggles	29	21.8
apron	26	19.5
Handling Frequency		
1day/month	79	59.4
2-3days/month	35	26.3
4-7days/month	16	12
others	3	2.3
Handle Equipment		
backpacker sprayer	123	92.5
battery powered backpack sprayer	0	0
manual sow	4	3
others	6	4.5

Association between demographic characteristics and acute symptoms

Association between demographic characteristics and acute symptoms arising after applying herbicides analyzed as Table 4, results showed age, gender and education were associated with acute symptoms. Education was significant with skin bleeding (p = 0.005), gender was associated with skin rash (p = 0.035), drowsiness (p = 0.014) and sweating (p = 0.014).

Association between Farming Characteristics and Acute Symptoms

This result analyzed association between farming characteristics and acute symptoms arising after applying herbicides within 7 days, working hours per day had association with headache/dizziness (p = 0.015), farmland was significant with skin rash (p = 0.001), muscular twitching and cramps (p = 0.043) and hypersalivation (p =0.017). In terms of knowledge attitude and practice of herbicides, attitude was not significant with any acute symptom, while knowledge was significant with eye symptoms, while lacrimation and eye irritation p value were 0.016 and 0.003 respectively, what is more, it was also significant with central nervous system (irritability) and respiratory system (shortness of breath) p value were 0.043 and 0.021respectively. Farmers practice level was only significant with sweating (p = 0.041).

Additionally, work time was significant with headache (p = 0.015) as showed in Table 5.

Association between Personal Protective Equipment (PPE) and Acute Symptoms

These results illustrated association between PPE use and acute symptoms arising after applying herbicides within 7 days, wearing hat had significant association with gastrointestinal system anorexia (p = 0.038), because of incorrect data, total interviewed participants of using respiratory, goggles and apron are 120 people. The results showed respiratory was significant with skin bleeding (0.03), anorexia (0.038) and sweating (0.033). association on goggles showed more statistically significant with acute symptoms,

such as skin numbness (0.015), skin bleeding (0.007), drowsiness (0.029), also in respiratory system and gastrointestinal system, p value is 0.039 and 0.015 respectively. Finding showed there are strong significant between apron and sweating, p value = 0.01, meanwhile, vomiting appeared statistically significant with using apron as well. the statistical analysis was found long sleeve and pants were not significant with any acute symptoms. Gloves had association with two acute symptoms, it was significant with dyspnea (p = 0.038) and sweating (p = 0.034), while boots were significant with skin rash (p = 0.034) and sweating (p =0.021).

Table 4 Association between demographic characteristics and acute symptoms

Characteristics	Age		Gender		Education		Smoke		Drink		BMI	
	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value
Skin Symptoms												
Skin rash/ itching/burning	4.324	0.228	5.795	0.035*	2.613	0.458	0.582	0.454	3.923	0.067	5.782	0.071
Numbness/tingling of hands	4.039	0.198	3.644	0.170	1.059	0.647	0.069	1.000	1.636	0.302	2.387	0.444
Muscular twitching and cramps	0.843	0.771	3.328	0.228	2.209	0.508	0.002	1.000	0.306	0.555	7.163	0.093
Bleeding	7.270	0.04*	5.173	0.067	12.577	0.005**	0.908	1.000	0.002	1.000	2.999	0.469
Eye Symptoms												
Blurred vision	3.362	0.358	2.444	0.309	5.005	0.222	0.246	0.741	0.157	0.768	1.43	0.647
Lacrimation	5.631	0.143	0.844	0.580	4.469	0.280	0.257	0.565	0.063	1.000	4.725	0.241
Irritation/itching/inflammation	7.929	0.047*	2.642	0.293	3.922	0.269	0.513	0.487	3.964	0.057	6.421	0.083
Central Nervous System												
Headache/dizziness	4.584	0.207	2.081	0.334	4.438	0.221	0.14	0.822	0.032	1.000	2.268	0.517
Drowsiness	1.062	0.723	8.169	0.014*	3.233	0.266	0.52	0.737	0.306	0.555	2.89	0.588
Irritability	2.572	0.527	4.379	0.140	2.885	0.281	0.314	1.000	0.454	0.449	1.324	1.000
Respiratory System												
Wheezing	1.599	0.605	1.733	0.386	1.462	0.585	0.52	0.737	1.346	0.241	2.678	0.608
Dyspnea	0.450	0.904	3.199	0.240	0.209	0.983	0.238	0.765	1.174	0.404	2.366	0.677
Shortness of Breath	1.390	0.641	0.232	0.836	5.234	0.200	0.847	0.524	0.11	1.000	1.351	0.896
Gastrointestinal System												
Vomiting/Nausea	6.051	0.123	4.864	0.077	1.844	0.607	1.101	0.405	0.063	1.000	4.308	0.171
Anorexia	0.515	0.900	1.775	0.319	2.222	0.426	3.172	0.124	0.594	0.733	7.081	0.100
Abdominal cramps	1.762	0.585	4.427	0.122	4.539	0.197	0.006	1.000	0.515	0.535	5.232	0.066
Glands												
Hypersalivation	1.648	0.649	5.253	0.066	2.375	0.456	0.847	0.524	0.11	1.000	3.181	0.299
Sweating	3.225	0.361	7.779	0.014*	2.146	0.543	2.153	0.214	2.597	0.122	7.823	0.097

Table 5 Association between farming characteristics and acute symptoms

Characteristics	Experience (years)		Work Hours		Farmland		Knowledge		Attitude		Practice		Work Time	
	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value
Skin Symptoms														
Skin rash/ itching/burning	2.329	0.462	2.380	0.573	10.724	0.001**	2.332	0.331	1.554	0.492	0.604	0.581	2.380	0.573
Numbness/tingling of hands	1.796	0.726	2.434	0.670	1.408	0.740	0.366	0.816	1.573	0.537	6.367	0.051	2.434	0.670
Muscular twitching and cramps	1.422	0.859	4.614	0.247	7.075	0.043*	3.543	0.189	2.242	0.344	2.796	0.174	4.614	0.247
Bleeding	3.152	0.359	1.150	1.000	1.823	0.612	3.560	0.249	0.898	0.581	0.485	1.000	1.150	1.000
Eye Symptoms														
Blurred vision	4.194	0.320	8.125	0.176	5.674	0.123	4.934	0.081	2.648	0.284	0.713	1.000	8.125	0.176
Lacrimation	2.254	0.625	7.047	0.178	1.836	0.679	8.082	0.016*	1.492	0.463	1.068	0.444	7.047	0.178
Irritation/itching/inflammation	1.565	0.728	3.036	0.601	6.028	0.111	11.363	0.003**	1.882	0.393	1.678	0.698	3.036	0.601
Central Nervous System														
Headache/dizziness	6.524	0.084	10.341	0.015*	1.277	0.745	2.147	0.358	0.627	0.727	0.906	0.647	10.341	0.015*
Drowsiness	1.422	0.880	3.332	0.435	4.013	0.301	3.613	0.178	0.119	0.935	2.293	0.575	3.332	0.435
Irritability	4.197	0.211	2.692	0.637	6.720	0.042	6.112	0.043*	1.159	0.420	0.312	0.645	2.692	0.637
Respiratory System														
Wheezing	2.699	0.538	2.753	0.368	0.901	0.826	2.272	0.312	2.242	0.344	2.622	0.332	2.753	0.368
Dyspnea	4.876	0.255	1.692	0.842	4.294	0.288	1.341	0.527	1.191	0.623	0.613	1.000	1.692	0.842
Shortness of Breath	1.540	0.775	1.724	0.807	1.654	0.647	7.565	0.021*	0.085	0.938	5.153	0.103	1.724	0.807
Gastrointestinal System														
Vomiting/Nausea	0.264	0.984	1.373	0.704	1.956	0.593	1.100	0.587	0.713	0.685	1.795	0.607	1.373	0.704
Anorexia	2.166	0.638	0.944	1.000	5.582	0.099	5.660	0.062	0.832	0.652	1.695	0.708	0.944	1.000
Abdominal cramps	5.459	0.210	3.155	0.322	3.558	0.296	5.261	0.058	0.251	0.931	0.537	1.000	3.155	0.322
Glands														
Hypersalivation	2.528	0.574	2.214	0.728	8.994	0.017*	2.805	0.251	0.651	0.783	2.608	0.490	2.214	0.728
Sweating	2.137	0.530	5.454	0.202	1.367	0.717	1.520	0.476	2.562	0.292	6.492	0.041*	5.454	0.202

*significant at 0.05 probability level
*Experience, Work time, Farmland, Knowledge, Attitude, Practice, Work time were divided into groups followed table 4.2

Table 6 Association between Personal Protective Equipment (PPE) and acute symptoms

Characteristics	Hat		Respiratory		Long Sleeve		Long Pants		Gloves		Boots		Glasses		Apron	
	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value	χ^2	P-value
Skin Symptoms																
Skin rash/ itching/burning	2.053	0.184	0.429	0.561	2.715	0.271	2.787	0.402	2.715	0.404	5.820	0.034*	0.296	0.639	0.000	1.000
Numbness/tingling of hands	0.047	1.000	0.022	1.000	0.109	1.000	0.447	1.000	0.300	0.765	0.000	1.000	2.345	0.156	0.159	1.000
Muscular twitching and cramps	3.968	0.070	2.148	0.195	6.875	0.128	7.280	0.166	7.150	0.106	0.203	0.773	0.662	0.528	0.751	0.524
Bleeding	1.416	0.572	4.446	0.051	0.031	1.000	0.128	1.000	1.308	0.295	0.581	0.602	6.845	0.032*	1.002	1.000
Eye Symptoms																
Blurred vision	0.054	0.778	0.461	0.614	0.158	1.000	0.646	1.000	2.049	0.346	1.569	0.322	0.002	1.000	2.592	0.197
Lacrimation	0.976	0.434	3.256	0.107	0.211	1.000	0.862	1.000	0.531	0.672	0.268	0.620	0.299	0.782	0.082	1.000
Irritation/itching/inflammation	1.572	0.222	0.749	0.468	0.551	1.000	0.558	1.000	3.179	0.169	3.071	0.106	0.109	0.827	0.295	0.653
Central Nervous System																
Headache/dizziness	1.13	0.322	0.002	1.000	1.226	0.451	1.824	0.402	1.455	0.545	0.616	0.469	0.773	0.407	1.438	0.276
Drowsiness	1.95	0.236	0.181	0.796	0.148	1.000	0.604	1.000	1.082	0.456	0.047*	0.862	4.290	0.056	0.045	1.000
Irritability	3.315	0.111	0.052	1.000	0.073	1.000	0.299	1.000	1.849	0.287	0.057	1.000	0.753	0.409	0.437	1.000
Respiratory System																
Wheezing	0.642	0.558	0.894	0.438	0.148	1.000	1.300	0.425	1.082	0.456	0.476	0.731	2.080	0.205	0.045	1.000
Dyspnea	0.556	0.590	0.277	0.641	0.189	1.000	0.773	1.000	6.469	0.038*	1.652	0.296	0.670	0.400	0.439	0.765
Shortness of Breath	1.793	0.155	0.321	0.627	0.168	1.000	1.067	0.464	0.172	1.000	0.107	0.813	0.007	1.000	0.032	1.000
Gastrointestinal System																
Vomiting/Nausea	0.294	0.624	0.183	0.830	3.956	0.203	4.692	0.288	4.661	0.159	0.046*	1.000	0.003	1.000	8.232	0.005**
Anorexia	4.948	0.038*	2.572	0.146	0.109	1.000	0.447	1.000	0.164	1.000	0.180	0.829	2.345	0.156	3.501	0.071
Abdominal cramps	0.003	1.000	0.026	1.000	7.368	0.120	7.742	0.154	7.851	0.090	1.722	0.244	0.109	0.750	4.420	0.041*
Glands																
Hypersalivation	1.113	0.399	0.181	0.805	6.045	0.143	6.512	0.189	6.647	0.095	0.081	0.807	2.940	0.129	1.147	0.365
Sweating	.179	0.828	4.833	0.036*	2.429	0.293	3.656	0.180	5.820	0.034*	5.835	0.021*	0.054	0.825	4.932	0.030*

*significant at 0.05 probability level

Association between Herbicides Handling and Acute Symptoms

For respiratory system, this study found dyspnea had p value = 0.056 and shortness of breath were 0.034. Handle equipment did not show significant with acute symptoms. However, handle frequency was significant with acute symptoms, headache of central nervous system p value = 0.007, and glands were found significance as well, hypersalivation and sweating p value was 0.017 and 0.024 respectively.

Table 7 Association between herbicides handling and acute symptoms

Characteristics	Handle Equipment		Handle Frequency	
	χ^2	P- value	χ^2	P- value
Skin Symptoms				
Skin rash/ itching/burning	0.047	1.000	1.081	0.298
Numbness/tingling of hands	0.001	1.000	0.578	0.447
Muscular twitching and cramps	1.585	0.360	0.228	0.633
Bleeding	0.335	1.000	2.819	0.146
Eye Symptoms				
Blurred vision	0.386	0.625	0.025	0.874
Lacrimation	0.055	0.683	0.390	0.532
Irritation/itching/inflammation	1.017	0.323	1.297	0.255
Central Nervous System				
Headache/dizziness	0.968	0.346	7.348	0.007*
Drowsiness	0.075	1.000	1.012	0.314
Irritability	0.785	1.000	3.481	0.083
Respiratory System				
Wheezing	0.075	1.000	0.337	0.562
Dyspnea	0.273	1.000	0.509	0.475
Shortness of Breath	1.802	0.356	0.748	0.387
Gastrointestinal System				
Vomiting/Nausea	0.709	0.686	0.000	0.987
Anorexia	1.171	0.597	3.799	0.051
Abdominal cramps	0.042	1.000	1.836	0.175
Glands				

Characteristics	Handle Equipment		Handle Frequency	
	χ^2	P- value	χ^2	P- value
Hypersalivation	0.162	1.000	5.659	0.017*
Sweating	1.948	0.280	5.121	0.024*

*significant at 0.05 probability level

DISCUSSION

There were many articles showed statistically significant effects of demographic characteristics and herbicides exposure acute symptoms [19-23], somewhat surprisingly, in this study, there were no significant among, BMI, smoke, drink and acute symptoms. The majority population of rice farmers in Song Phi Nong subdistrict, Song Phi Nong district, Suphan Buri Province female was more than male, more than half of participants were showed rice farmers BMI most were normal range 18 - 24.9, additionally, through investigation, researcher found Song Phi Nong subdistrict was famous with marathon race, there are marathon races every year. People were active to participant marathon race. Hence, whether Participants' good BMI related with running habit or not was considerable. Meanwhile, most of participants never drink (75.9%) or smoke (82%) and also showed none significance with acute symptoms.

Overall, this study suggested that demographic characteristic, farming characteristics, and herbicide exposure amount of use had statistically significant in association with acute symptoms. Findings also indicated that BMI, smoking, drinking behaviors. For reducing the risk of herbicide exposure, it is suggested that the automatic spreading of herbicide can be applied to the rice farming. Since this investigation was conducted on a small group of rice farmers within a short period of time, further in-depth investigation is needed to verify the acute symptom caused by application of herbicide for a long-term practice and under doctor diagnosis evaluation. As to increase the reliability of the human toxicity due to herbicide application, biomarker can be involved in conducting such evaluation.

CONCLUSIONS

In Thailand, the common herbicide handling equipment for rice farmers were female. The average age of farmers in this study was 45.8 years old, ranging from 18 - 60 years old. Additionally, age showed association with acute symptoms, median age was 48 years old, such as skin bleeding and eye irritation, during interview, most of participant did not wear goggles, few of them wore sunglasses, it cannot protect eyes properly, which was similar to other studies conducted in Thailand.

Most of rice farmers did not finish primary school (48.9%), lower education had more possibility to have acute symptoms. The study backpacker sprayers and battery powered backpack sprayers. This study found that around 5% of the farmer had used sprayer car for herbicide spreading. As to prevent farmer from the risk of herbicides exposure, the necessarily of mechanical spreading in herbicide application can be considerable. Nevertheless, properly wearing personal protective equipment is needed to reduce the risk of herbicides exposure. Since this investigation was conducted on a small group of rice farmers within a short period of time, further in-depth investigation is needed to verify the acute symptom caused by application of herbicide for a long-term practice and under doctor diagnosis evaluation. As to increase the reliability of the human toxicity due to herbicide application, biomarker can be involved in conducting such evaluation

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WORK STRESS AND FACTORY SIZE AMONG WOMEN GARMENTS WORKERS IN DHAKA, BANGLADESH

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ABSTRACT

Introduction: A cross-sectional descriptive study was conducted to assess the work stress related health among women garments workers in three different size of garments factories located in Dhaka district of Bangladesh. Previous study determines that women garments workers have experienced work stress but there was no such evidence which shows that working environment or the factory condition has any relation with work stress. Among the total Therefore, it is important to assess the relation between factory size and work stress. The study may notify authorities to emphasize the policy for improving work environment for garment workers.

Objectives: This study aimed to investigate the relations between factory size and work stress among women garments workers.

Methodology: This cross-sectional study was conducted for around four weeks where primary data has been collected through structured interview of 310 women garments workers aged between 18 to 32 from three different types and size of garments in Dhaka district of Bangladesh. Multiple logistic regression test was conducted to analyze the relationship between factory size (small, medium, and large) and work stress level (high and low). For perceived- work stress score by factory size, we compare mean rank of the score by Kruskal–Wallis test. Work stress score was estimated by ERIs (Effort-Reward Imbalance) questionnaire which composed of seven items with four Likert scale. Self-reported health problems and socio-economic information were obtained using a semi-structured questionnaire by face to face interview.

Results: The research revealed that there is significant difference between factory size and level of work stress among the garments workers. That is women worker who work in small size factory they were almost 7 times (specific odd ratio=6.22, C.I.= 2.5 -15.32) high stress comparatively of women working in large size factory. Overall, it has been observed from the research that prevalence of high stress among the total number of garments workers interviewed was 63.87% which signals that factory size has a significant effect on work stress. A Kruskal-Wallis H test showed that there are statistically significant differences in seven items of work stress scores by factory size with the highest work stress scores from small factory size.

Conclusion: Work stress among women garments workers is a common phenomenon while self - reported health problems has a close relation between socio-economic and working condition among women garments workers in Bangladesh. The results indicated that a conducive working environment and job security can play crucial role to eliminate work stress among women garments workers. Additionally, a friendly employer-employee relation can contribute to create a stress-free work environment in this most promising economic sector in Bangladesh. In order to improve quality of life related work among women garments workers in Bangladesh, the government and all concern agencies need to incorporate a national health plan which would ensure healthy work environment especially in small size factories.

Keywords: Work stress, Self-reported health problem, Factory size, Ready made garment workers.

INTRODUCTION

Bangladesh has made a very significant progress in socio-economic sector since independence in 1971. Rapid transformation in economy is largely attributed to the emergence and tremendous growth of the export-oriented readymade garments (RMG) sector in Bangladesh. RMG sector accounts for more than 40% of the manufacturing base, and about 80% of the total export of the country [1]. Despite a remarkable economic growth, Bangladesh is yet to ensure a sufficient entry for the mass people in the public health facilities nationally. A number of issues like, huge population, impoverishment rate, weak rule of law, rampant corruption in public sectors and poor environment situation have appeared as a major setback for this country of 166 million people.

Started in 1976, Bangladesh has reached to a number of 4,825 garments factories throughout the country. Almost 33% of FDI (Foreign Direct Investment) in Bangladesh from EU (European Union) comes to the country which is provided by garments sector [2]. Young women are the key factor of development in this giant sector. According to survey 86% of women labor are aged between 18-32 [2]. Unfortunately, the women labors faced discrimination and inequality which make them vulnerable in economic and social context. Primarily, it is the culture and tradition that determines the participation of women in both the public and private sectors of the country [3]. It is the patriarchal social values which is the key factor of women's engagement in the socio-economic and cultural field in all over Bangladesh specially in the rural areas. This socio-cultural trend is primarily responsible to cause discrimination and marginalization of women (4).These are the factors which ultimately separate women from decision making process in the field of education, healthcare and other socio-economic fields in Bangladesh [4]. Lack of education among rural women population makes them prone to be further discriminated in attaining health care facilities. Research shows that approximately 4.0million of workers, of whom almost 85% are women working in the garments industry has brought a significant change in the social, political and economic spheres of Bangladesh which is unprecedented [5]. Timely identification and well managed stress can contribute to produce a skilled and productive work force in industrial sector like garments factories where gender and work experience of the workers has an important relation with level of stress [6].

This paper would analyze the association between factory size and work stress among women garments workers in Bangladesh. After that this paper will discuss the methods adapted to conduct the field research and finally, the paper would conclude with findings and recommendation.

METHODOLOGY

Study design and areas

In this paper, a descriptive cross-sectional study has been conducted to identify the association between work stress and factory size among women garments workers in Dhaka, Bangladesh. This would further describe the socio-economic characteristics of respondents including the overall condition of the factory.

Study Population

The study population was the female garments workers who were permanent staff in the different garment's factories in Dhaka district of Bangladesh. The age of the respondents is between 18-32 years.

Exclusion Criteria: The female garments workers who did not meet the following requirements were excluded as prospective respondents for my study:

a. Not a permanent employee.
b. Less than one-month experience in these garments.
c. Unwilling to participate in the study.
d. The person does not experience any physical complicacy.

Inclusion criteria:

a. Age not over 32 and not below 18.
b. Factory having not less than 50 workers.
c. Factories which are within Dhaka metropolitan area.

The research has collected three different types of samples from three different size of factories considering that maximum number of workers working in large size factory and the proportion number of sample size is also considerable quantity.

Sample Size and Sampling Technique

Those respondents who met the criteria were selected randomly as eligible interviewee for the proposed research study. Based on the formula of determining sample size for the estimation of population proportion

n = N / (1 + Ne^2)

n= corrected sample size

N = population size

e = Margin of error (MoE) (e = 0.06 based on the research condition)

The population is 10,66666 At 6% MoE., the sample size was: 10,66666 / (1 + 10,66666 (0.06^2) = 10,66666 / 26 = ~ 278 and 10% ~310. Hence, 310 women garments worker was selected purposively as eligible participant in the study.

Sampling technique:

Selection site: Purposive selection sampling was used for Factory selection.

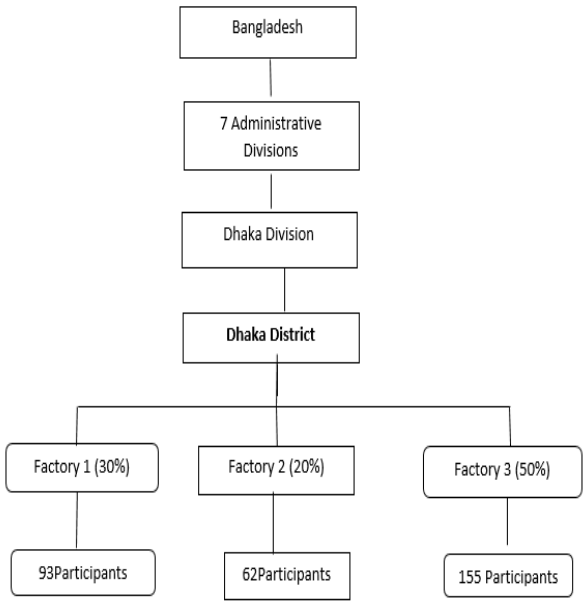


Figure 1 Selection of Research Area

Figure 1 above shows that for the purpose of the research, three factories of the set criterions has been selected from Dhaka district. This fall under Dhaka Division which is one of the seven Administrative Divisions in Bangladesh. Dhaka division and Dhaka District has been chosen by purposive selection sampling method. The reason behind choosing Dhaka district as my research area is the number of garments factories are more in proportion to other areas within Dhaka District, Dhaka district is chosen because it is in the communication hub and capital city of Bangladesh. Moreover, garments related institutions like BGMEA (Bangladesh Garment Manufacturers and Exporters Association) and BKMEA (Bangladesh Knitwear Manufacturers and Exporters Association) are also located in this city. This research has considered the size of the factory according to the total number of workers working in that factory.

Research instrument for data collection

The study was conducted by using primary data which was collected by structured interview with women garments workers in few garments factories at Dhaka district in Bangladesh. The participants' official record at garments factories was used to confirm their identification as an eligible interviewee. The structured questionnaire was also translated from English to Bangla (native language of the respondent) so that, researcher can explain the question and the respondents can ask for clarification regarding both the question and answer of the interview topic. The questionnaire consisted of three parts. The first part contained participants' background data about the age, family income, religion, marital status, number of children, education level, family resources/ economic activity, family member, earning family member, per day overtime as a means to assess their socioeconomic status [7-10] .The second part will answer about the overall condition of the factory and its size. In the final part, the questionnaire will answer a few issues like work stress [11-13]. This study used work stress scale called ERIs (Effort-Reward Imbalance) [12] from siegrist model. Siegrist model of ERI has maximum sixteen items. Some studies use only five items for measuring ERI [14]. However, this research has taken seven items which are composed of: Do you think your job is physically demanding / Stressful? **(Physical demand),** Are you

working under constant time pressure due to a heavy workload? **(Time pressure)**, Do you receive enough support in times of

crisis? **(factory support),** Are you satisfied with your salary in consideration to your remuneration? (**salary satisfaction),** Do you receive your recognition that your job demand? (**Recognition**), How is the prospect of your job position? (**Promotion**), Are you satisfied your job security? (**Job security).** Data was collected

from participants using four point Likert scales and total score was 28. Out of seven questions two questions had to recode to bring the consistency in result. After adding the score, work stress was classified as high work stress and low work stress using cut point at median (Median=13). Above 13 was considered high work stress, 13 and below 13 was considered low work stress.
questionnaire was pre-tested for reliability.

Quality assurance
Validity and reliability test
The instrument was revised by 3 experts, pre-tested and reviewed for the final version. Before the real data collection, the Table 1 is showing the research instrument tools and their scale and scoring range used in this research.

Table1 Research instrument tools

Variables	Scale	Items	Scores range
Predisposing factors	Continuous, Nominal Interval	11	Frequency percentage
Work stress Item	Ordinal	7	7-28

Pilot study. Based on the result of the pilot study, the researcher has adjusted her question pattern or methodology. This part has facilitated the data collection procedure. In the pre-test, for the work stress item, the Cronbach Alpha was 0.675. For the purpose of the pilot study this research has taken 33 respondents from a factory which was different factory from the main research sample although other criteria about the respondents and factories were maintained exactly same like the main research.

Identified research assistant
Research assistants were selected based on their previous experience in data collection. In this regard University students were the first priority to choose as a research assistant. Where University students were not available in that case college students were taken as research assistant. All the selected research assistants were given one-day training by researcher.

Data management
Data was managed using SPSS and quality of the data was ensured by descriptive statistics in cross tabulation form of frequency and percentage. Association test was done by establishing chi square test and P. value of 0.05 was indicated as significant association. Kruskal-Wallis H Test was used to compare mean rank and finally used Multiple logistic regression.

Ethical Issues
Informed consent were taken from the respondents before conducting interviews. The participants had come to know what the research project is about, and its purpose by filling up the Informed Consent Form. The interviewer has also explained the objective of the interview, how long it will take and address terms of confidentiality and anonymity that are necessary to ensure that any personally identifying information provided will not be disclosed. The personal information of the respondents such as name, addresses, email address and other relevant information, will be kept safe and separate. After collecting the data (recording and document notes), it is necessary to ensure that all the information would be kept safe, to protect the participants, the researcher and the University. The files will be protected with a password, which only allows the researcher to have access in case of loss or theft.

RESULTS

Table 2 Number and percentage distribution of the respondents classified by Socio-Economic-Demography of Women Garments Workers (n = 310`)

Socio-Economic-Demography Characteristics	Frequency	Percentage(%)
Age		
18-22	170	54.8
23-27	53	17.1
28-32	87	28.1
Religion		
Muslim	300	96.8
Hindu and others	10	3.2
Level of Education		
No education	53	17.1
Under elementary school	128	41.3
Middle and High school and above	129	41.6
Marital Status		
Married	222	71.6
Single and others (who doesn't have husband)	88	28.4
Monthly Income of the respondent's(BDT)		
<5000	3	1
5,100-15,000	303	97.7
15,100-30,000	4	1.3
Number of Children		
None and single women worker	137	44.2
1to 2	140	45.2
3to >4	33	10.6
Total Family Member		
1 to 4	202	65.2
5 to 6	84	27.1
>6	24	7.7
Total Earning Family Member		
1	21	6.8
2	230	74.2
3 to >3	59	19
Total Household Income(BDT)		
<5000 to 15000	84	27.1
15100 to 30000	202	65.2
>30,000	24	7.7
Per day Overtime (Hour)		
No and <1 - 3	276	89

Socio-Economic-Demography Characteristics	Frequency	Percentage(%)
>3	34	11
Job Experience		
<1 year	124	40
1 to 3 year	134	43.2
>3 year	52	16.8
Factory Size		
Large size	155	50
Medium size	93	30
Small size	62	20
Work stress		
Low	112	36.1
High	198	63.9

Table 2 demonstrates that the youngest age of women garments worker was 18 years and the oldest age was 32 years. Among 310 women garments worker, majority (54.8%) were 18-22 years, 17.1% belonged to the age group 23-27 years and 28.1% were 28-32 years. The majority (96.8%) of respondents were Muslim and only minimum (3.2%) were Hindu and other religions. Regarding the education levels, the large group of respondents came from middle and high school and above (41.6%), second large group were under elementary school (41.3%), and small portion (17.1%) were from No education group.

According to marital status most of the workers were married (71.6%) and only (28.4%) were single and other who doesn't have husband. The monthly income of the respondents was calculated in Taka (BDT) earned in a month. The minimum (1%) were<5,000 group, maximum (97.7%) were 5,100- 15,000 group, and (1.3%) were 15,100-30,000 group. The number of children of the respondent's maximum (45.2%) were 1 to 2 and minimum (10.6%) were 3 to 4, others were no children and unmarried respondents. Total family member of the respondents was maximum (65.2%) in 1 to 4-person group, and (27.1%) were in 5 to 7-person group and minimum (7.7%) were >6 people's group. Regarding the total earning family member maximum (74.2%) were 2 people's group, minimum (6.8%) were 1person group and (19%) were 3 and >3 people's group. The total household income calculated in taka (BDT) earned in a month. The maximum (65.2%) were in 15,100-30,000 group, (27.1%) were <5,000 to 15,000 group and the minimum (7.7%) were >30,000 group. Concerning the occupation of respondent's total per day overtime(hour) the maximum (89%) were No and <1 to 3 hour working group and minimum (11%) were >3 hour working group. Concerning the job experience, the maximum (43.2%) were 1to 3 years experienced and <1 year was (40%) and minimum (16.8%) were >3 years.

In the same table the factory size which has a close link with work stress and other issues, we find large size factories are dominating by (50%) women workers, while medium size is (30%) and small size are lowest with (20%) women workers.

This study used work stress scale called ERIs (Effort-Reward Imbalance) [12] from siegrist model. Siegrist model of ERI has maximum sixteen items. Some studies use only five items for measuring ERI ([14]. However, this research has taken seven items which are composed of: **(Physical demand), (Time pressure)**, **(factory support),** (**salary satisfaction),** (**Recognition**), (**Promotion**), (**Job security).** Data was collected from participants using four point Likert scales and total score was 28. Out of seven questions two questions had to recode to bring the consistency in result. After adding the score, work stress was classified as high work stress and low work stress using cut point at median

(Median=13). Above 13 was considered high work stress, 13 and below 13 was considered low work stress. The results from table 1 showed that, majority of the respondents (63.9%) had to get high work stress and lesser (36.1%) of respondents have got low work stress.

Table 3 Association between Factory size and Work stress among women garments worker(n=310) by Chi-square analysis.

Factory Size	**Work stress**				**P-value**
	Low		**High**		
	n	**%**	**n**	**%**	
Large size	62	40.00%	93	60.00%	0.00
Medium size	44	47.30%	49	52.70%	
Small size	6	9.70%	56	90.30%	

From the Table 3 above it is found that the relationship between work stress and factory size using Chi-square test. The results showed that there is significant difference between high stress and different sizes of factory. It was found that 90.30% of women working in the small size factory have high work stress whereas, only 60% of women in large size factory have high work stress. It is noted that we define the size of factory based on their number of employees. As context of the Bangladesh, a factory which has an employee between 100 and <1000 called small size,1000-3000 employee called medium size, and >3000 employee is called large size factory.

Table 4 Adjusted Odd Ratios from the full model of multiple Logistic Regression

Predictors	**Adjusted OR**	**95% CI for OR**		**P-Value**
		Lower	**Upper**	
Age				0.431
18-22	**1**			
23-27	1.53	0.78	2.99	0.216
28-32	0.98	0.58	1.68	0.965
Religion				
Muslim	**1**			
Hindu and others	0.844	0.233	3.056	0.796
Level of Education				0.333
No education	**1**			
Under elementary school	1.62	0.843	3.141	0.147
Middle and High school and above	1.29	0.675	2.478	0.437
Marital Status				
Married	**1**			
Single and others (who doesn't have husband)	0.86	0.517	1.433	0.563

Predictors	Adjusted OR	95% CI for OR Lower	Upper	P-Value
Monthly Income of the respondent's(BDT)			0.909	
<5000	**1**			
5,100-15,000	291	0	0	0.999
15,100-30,000	484	0	0	0.999
Number of Children				0.416
None and single women	**1**			
1to 2	1.37	0.83	2.24	0.207
3to >4	1.001	0.46	2.17	0.998
Total Family Member				0.987
1 to 4	**1**			
5 to 6	1.01	0.599	1.73	0.946
>6	0.94	0.393	2.26	0.896
Total Earning Family Member				0.382
1	**1**			
2	1.25	0.508	3.103	0.622
3 to >3	1.85	0.66	5.199	0.241
Total Household Income(BDT)				0.451
<5000 to 15000	**1**			
15100 to 30000	0.71	0.414	1.226	0.221
>30,000	0.89	0.341	2.357	0.825
Per day Overtime (Hour)				
No and <1 - 3	6.034	2.7	13.47	**0.00**
>3	**1**			
Job Experience				**0.001**
<1 year	3.62	1.838	7.149	0.00
1 to 3 year	2.05	1.072	3.926	0.03
>3 year	**1**			
Factory Size				**0.00**
Large size	1			
Medium size	0.742	0.442	1.247	0.26
Small size	6.22	2.52	15.32	0.00

Table 4 describes association between significant Independent variables and work stress. The significant variables are Monthly Income of Respondent's Husband in Bangladeshi Taka (BDT) Per day Overtime (Hour), Job Experience, and Factory Size. The women garments worker who have no and <1-3 hour per day overtime they have 6.5 times less likely to suffer from work stress than worker who work >3 hours per-day overtime. The women garments worker who have job experience <1 year and 1-3 year they have respectively 4 times and 2.5 times higher work stress than worker who have > 3years job

experiences. The women workers who work in small size factory, were almost 7 times (specific odd ratio=6.22, C.I.=2.5-15.32) more likely to have higher work stress in comparison to the women working in large size factory. Additional, Kruskal-Wallis H test showed that there are statistically significant differences in seven items of work stress scores by factory size with the highest work stress scores from small factory size**.**

Table 5 Mean rank of perceived work stress by factory size from Kruskal-Wallis test

Individual work stress item	**Factory Size (Mean Rank)**			**P-Value**
	Small (N=62)	Medium (N=93)	Large (N=155)	
Do you think your job is physically demanding/ stressful? (**Physical demand**)	125.89	157.64	166.06	**0.004**
Are you working under constant time pressure due to a heavy workload? (**Time pressure**)	113.83	175.57	160.13	**0.000**
Do you receive enough support in times of crisis? (**factory support**)	204.53	153.22	137.25	**0.000**
Are you satisfied with your salary in consideration to your remuneration?(**salary satisfaction)**	193.85	143.28	147.49	**0.000**
Do you receive your recognition that your job demand?(**Recognition**)	200.22	137.4	148.47	**0.000**
How is the prospect of your job position? (**Promotion**)	191.71	142.84	148.61	**0.001**
Are you satisfied your job security? (**Job security)**	192.49	137.21	151.68	**0.000**

Table 5 showed the results from Kruskal-Wallis H Test. It is noted that seven items having rating scale ranged from 1=agree to 4=disagree, the results found that out of all seven items only two items that are negative questions-; physical demand and time pressure indicate low mean rank in the small size factory in comparison to medium and large size factories. Regarding the other items which are positive questions, all are highest mean rank for small size factory. This indicates that small size factory workers have got high work stress than large and medium size factories for all seven items.

DISCUSSION

The study reveals that there is a strong association between work stress and size of the factory. While measuring the work stress there were number of factors which apparently seemed to be a prime cause of work stress but after analyzing the result it appeared a very negligible factor. For example, the environment inside the factory premises, CBA/ Trade Union facilities, worker's recreation facilities, food and hygiene facilities and medical facilities etc. In addition, during field visit the researcher observed few things like unhealthy working condition, Improper ventilation, and salary structure which were the prime cause of determining the level of work stress among garments worker. Due to the researcher limitation in regards to obtain permission from the factory owners these crucial factors could not be considered while assessing the women garments workers work stress level. It also seemed to the researcher that the workers are not providing true statement about their Prolong working hours and insufficient medical facilities provided by factories which has a direct impact on the stress level.

This study didn't show any association between age, education level, marital status, number of children, monthly income of respondents, household income. But a separate study identified wages structure of the workers and irregular wages payment cause job dissatisfaction among women garments worker [15] .

There was different research on depression among workers in a shoe factory in Vietnam which shows that factors associated with depression at work were high psychological demand, low social support, inadequate work protection materials, and work absenteeism [16]. A relatively high proportion of workers belongs to the high-strain group based on Karasek's model. The prevalence of work-related depression among workers was relatively high.

Study on garments workers to assess the relation between work environment and health problems among garments worker identified congested work area, unergonomic work place, inadequate lighting and ventilation, noise, dust, and not using of personal protective equipment as the main factors that causes major health problems among garments worker [17].

In India, a research study on garments workers identified occupational hazards which includes long working hours, absence of leave facilities, unhealthy work place and safety condition as few of the many factors which are prevalent among garments workers [18].In this research also revealed the women garments worker who have work >3 hours per-day overtime they have high work stress almost 6.5times than worker who have no and <1-3 hour per day overtime.

Study carried out in Africa, on occupational health and safety condition and work environment in small scale enterprise identified in total 36 garments employing 100 people found that unsafe and poor occupational health and safety condition put the workers in the work related injuries and diseases [19].

A study based on descriptive and inferential research of the compliance procedure in different size of garments factories out of 5000 RMG industries in Bangladesh identified that in regards to compliance issues the large size factory is doing better than medium and small ones. The same research determined that different factors like health, safety and security, social issues, labour employee's relations and overall environment of the work place are pivotal for sustainable development in RMG sector [20].

A survey conducted in 869 factories in two sub-districts of Dhaka found that there are number of factors such as prolong working hours, lesser leisure time, inadequate support from the office, job insecurity and excess of workload are the prime reasons of work stress among the garments employees [21].

Limitation of the study

Area/Space Limitation: Due to the gigantic nature of the area of research, it is not possible to conduct the study in the whole country. So, the proposed research has been restricted within the Dhaka district keeping in mind the concentration of larger numbers of garments industries in this area.

Time Limitation: Since the constraint of time is the prime consideration to keep into account, therefore the research is limited by time and to overcome this problem the data was collected by pre-structured interview questionnaires. Moreover, the researcher has carried out a piloting phase before the main data collection.

Resource Limitation: At this level of conducting research it seems obvious that the limitation of the available fund had an impact to conduct the research. Besides, this research entailed recruiting 5 to 7 students from Universities as a temporary basis to interview respondents and collect data. To address these issues, the researcher managed her fund and provided 1-day basic training to the said research assistants.

Conflict of Interest. It is envisaged that while data collection, the factory owners might doubt the intention and objective of the research whether it would prejudice their organization's reputation or not. This attitude would also affect research work. Therefore, the researcher has ensured while setting up questions so that no question creates a conflict of interest between workers and employers. The researcher has also assured the factory owners regarding the aim and objective of the research by describing its positive impact on society.

CONCLUSIONS

Work stress among women garments workers is a common phenomenon while self -

reported health problems has a close relation between socio-economic and working condition among women garments workers in Bangladesh. The results indicated that a conducive working environment and job security can play crucial role to eliminate work stress among women garments workers. Additionally, a friendly employer-employee relation can contribute to create a stress-free work condition in this most promising economic sector in Bangladesh. In order to improve the quality of life of women garments workers in Bangladesh, the government and all concern agencies need to incorporate a national health plan which would ensure healthy work condition in garments factories.

RECOMMENDATION

1. Introducing national health policy keeping in mind the women garments worker and their health issues.
2. Reforming particular sections of labor law which are age-old and incompatible with present situation of garments sector.
3. A national action plan to be introduced in order to provide special health care facilities for women garments worker.
4. Employer-employee relationship should be strengthened by providing job security for the garments worker and ensuring other job related benefit for them. This will ultimately build a friendly Employer-employee relationship which can contribute to create a stress-free work environment in this most promising economic sector in Bangladesh.

ACKNOWLEDGEMENTS

The authors would like to acknowledge and thank all the women garments workers who participated in the data collection of the study. I am very grateful to the ASEAN Institute for Health Development for the all support of my study.

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DISASTER RISK REDUCTION KNOWLEDGE AMONG SECONDARY SCHOOL CHILDREN IN KATHMANDU, NEPAL

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ABSTRACT

Introduction: Nepal considered as the 20th most disaster prone countries in the world while its capital Kathmandu is more prone to earthquake as it locates at seismic site. During disaster children are considered as vulnerable group because of their age, physical ability and psychological behavior. For instance, 2015 earthquake in Nepal has destroyed lives of 8,700 people out of which 55 percent were women and children. Considering their vulnerability, the study investigates the disaster risk reduction knowledge among secondary school children in Kathmandu, Nepal. In the study preparedness and response on disasters like earthquake and fire were included in disaster risk reduction knowledge.
Objectives: The study aims to identify the disaster risk reduction knowledge among secondary school children of Kathmandu
Methodology: The school based cross-sectional study has used questionnaire and observational checklist to collect data from students of 5 public and 5 private secondary level school of Kathmandu applying simple random sampling technique. Students from grade 7-10 were enrolled in the study. Descriptive statistics and chi square test were employed to identify the key findings.
Conclusion: Most of the student have less knowledge on disaster risk reduction along with this less school have given focus on practical skill. Based on result, disaster risk reduction curriculum with development of skill for student using enough disaster risk reduction learning materials could be beneficial in improving knowledge and practice.
Keywords: disaster, disaster risk reduction, knowledge, student, Nepal

INTRODUCTION

Children are considered as most vulnerable group in disaster because of their age, physical ability and psychological behavior [1]. For instance, the Gorkha 2015 earthquake in Nepal has destroyed over 500,000 homes and lives of 8,700 people, out of which 55 percent were women and children [2]. Their vulnerability increase more during disasters as they depend on adults for food, hygiene, shelter, care and protection [3]. For instance, a study conducted in Bangladesh has shown that children losing their parents and separated from family may suffer from malnutrition, artificial feeding, poor diet results them to suffer from diarrhea, pneumonia, fever and skin diseases [4].Carolkyn Kousky says physiology of children makes them more prone to have health impacts of disaster in compare to adults [5]. Disasters may result children to undergo with homeless, migration, grief of losing loved ones, interruption in school, becoming victims of violence, exploitation and abuse leading emotional trauma to them [1,6]. Children exposed to disaster can show problem of panic disorder, nightmares, incontinence, anxiety disorder, separation anxiety, sleep disorders, social withdrawal, aggressive behavior, irritability, learning difficulties and substance abuse [1,4].

According to Akhter Syeda R et al, in spite of vulnerability of children, they have ability to anticipate, manage with and get recover from hazard effects and their resilience can be increased with the increase in knowledge about risks in the surrounding

environment and awareness about disaster preparedness and development of management skills [4]. Study has concluded that knowledge and education supports to develop culture of prevention, safety and resilience at community level [7,8]. This is why to reduce disaster impacts children need to get knowledge, access to resources and also need to be supported so that they can share that information with the adults and in the community [7]. For children school is the best platform to receive formal knowledge and education. Jennifer Tatebe, has considered school as crucial sites that help in disaster preparedness, mitigation and adaptation [9]. UN Secretary- General for Disaster Risk Reduction, embraces "One of the easiest disaster risk reduction measures we can take is to empower children and youth and ensure they are actively involved in disaster risk reduction and contribute to making their cities and communities resilient to disasters" [6]. A critical review by A Amri et al, conclude that most of Disaster risk reduction (DRR) education and child participation studies shows a positive impact for children in addition these studies increase the awareness level, knowledge and skills, develop confidence among students [10].

The Hyogo framework for Action (HFA) 2005-2015 has highlighted use of knowledge, innovation and education to build a culture of safety and resilience can reduce the global burden of disaster risks [11]. Furthermore, under the HFA which has been replaced by the Sendai Framework for Disaster Risk Reduction 2015-2030 has given emphasis to promote the incorporation of DRR knowledge, disaster prevention, mitigation, preparedness, response, recovery and rehabilitation in education curricula [12].

The Government of Nepal has made great effort on disaster risk management, they have developed various strategies, policies, plan and implement it but there is no any significant change achieved yet [9]. Nepal Government's commitment is increasing toward integrating disaster related content in school curricula however, Upadhyay's review a national DRR consultant, in 2012 conclude that Nepali curriculum and textbook has not enough content regarding disasters [13]. Gangalal Tuladhar interviewed 124 students of 17 district of Nepal (2014) to assess their disaster related information, knowledge, readiness, awareness, adaptation and disaster risk perception which confirmed that most of the students have less knowledge on disaster and its mitigation method [14]. Hence, there is limited study conducted in Nepal assessing the DRR education, the study investigates the disaster risk reduction knowledge among secondary school children in Kathmandu, Nepal where preparedness and response on disasters like earthquake and fire were included on disaster risk reduction knowledge.

METHODOLOGY

Study design and area

The study was a school based cross-sectional descriptive study in order to identify the disaster risk reduction knowledge among secondary school children of Kathmandu. Kathmandu is the capital city of Nepal and considered as a central hub for many schools where students can study. Kathmandu city is at highest risk for earthquake and has highest risk in terms of impact on people [14-16]. It has 10 municipalities/ nagarpalikas and 1 metropolitan city. Out of 11 municipalities of Kathmandu 5 municipalities were enrolled in study using simple random sampling technique. Among selected municipalities one public and one private secondary school were selected purposively. Students from each private and public secondary schools were selected for study.

Sample size and sampling technique

The sample size was calculated by using formula for estimating a sample for proportion, with 95% of confidence interval (CI), and acceptable error (E) of 1%. Prevalence of importance on disaster knowledge in students of Nepal (2014) in the past (p) was set as 14% in reference to previous study [14]. With total number of schools (N), the required sample size was 572. From around 287 schools (private and public) in 5 municipalities of Kathmandu around 572 students were selected randomly. Students studying at class 7-10 in sampled schools were considered as inclusion criteria for the study population.

Measurements

The instrument was a structured questionnaire which was developed. The questionnaires have 4 parts comprising of socio-demographic information, multi-hazard risk assessments, safe school facilities, disaster risk reduction education. The multi hazard risk assessments included student experience of disaster, worry level of the students. While safe school facilities cover school readiness for the disaster, their involvement in DRR plan, emergency holiday, perception to involve student in DRR, interest to make school prepare for disaster. The DRR education present knowledge level of student, interest to learn more about disaster, disaster related curriculum, drill practice and use of DRR educational resources.

Table 1 Criteria for classifying student's knowledge level

SN	Type	Number of correct answers			Total questions
		Low	Medium	High	
1	Earthquake preparedness and response	0-1	2-3	4-5	5
2	Fire preparedness and response	0-1	2-4	5-6	6

The assessment of knowledge level was classified as low, medium and high taking reference from A Amri et al(17).The criteria for classifying the knowledge level is presented in the Table 1. The research instrument was first developed in English and then translated into Nepali. A pre-test of the instrument was conducted among students equal to 10% of the sample size in one public and private school each from Kathmandu

RESULTS

A total of 572 students were recruited in the study (response rate of 100%) among them, half of (50%) were boys. More than half (69.1%) of the participants aged 10-14 years with mean age of 13.9 years and standard deviation of 1.17. Table 2 shows the demographic information of the respondents. Surprisingly, 73.8% had experienced disaster at their school in their life time, among which 62.8% had faced earthquake. While comparing two schools most of the students from private had experienced more disaster (82.9%) in compare to students of public (64.6%). Participants (70%) have gone through emergency holiday due to disaster at their school (Table 2).

Table 2 Distribution of students by socio-demographic variables and student experiencing disaster

Variables	Total	
	n	%
Gender		
Male	286	50
Female	286	50
Age (years)		
10-14	395	69.1
15-19	177	30.9
(Mean= 13.91, Median= 14, SD= 1.172, Min= 10, Max=19)		
School type		
Private	287	50.2%
Public	285	49.8%

Variables	Total	
	n	%
Experience of disaster		
No	150	26.2
Yes	422	73.8
Type of experienced disaster	422	
Earthquake	359	62.8
Landslide	8	1.4
Fire	13	2.3
Strom	14	2.4
Earthquake and storm	28	4.9
Experience of disaster by school type	422	
Private	238	82.9
Public	184	64.6
Experience emergency holiday		
No	172	30.1
Yes	400	69.9

Table 3 presents the information on disaster risk reduction education. Over three quarters (77%) of students identified learning disaster related topic formally in the class while only 44.6% attended drills. Just 4.2 % has used disaster risk reduction educational materials in the class. Most of them (94.6%) have never been involved in disaster risk reduction plan of school although they are willing to involve in disaster preparedness plan.

Out of all respondents, 58.7% of students strongly perceived themselves had an important role in disaster preparedness while nearly half of the respondents (45.6% and 43.7%) strongly agreed on students should be involved in disaster simulations and response exercise and also in developing disaster preparedness plan at school. All most 80% of students felt worry about disaster and most of them (92.3%) have interest to prepare their school for disaster. More than three quarters (75.2%) would like to know more about disaster. Almost all respondents (97.7%) think their school was prepared more than 50% for disaster (Table 3)

Regarding knowledge on earthquake preparedness and response, only 34.5% had high level of knowledge. Majority of them had medium level of knowledge (53.0%) while only 11.5% had low level of knowledge. Likewise, only 13.5% of participants had low level of knowledge on fire preparedness and response. Whereas nearly half (45.3%) had medium level and 41.3% had high level of knowledge on fire. (Table 4) The distribution of correct answer given by the student are described at Table 5.

Table 3 Distribution of disaster risk reduction education and perception of students

Variables	Total	
	n	%
Disaster risk reduction education		
Curriculum		
No	83	14.5
Informal	49	8.6
Yes	440	76.9
Attended drills		
No	317	55.4
Yes	255	44.6
Used education materials		
No	471	82.3

Variables	Total	
	n	%
Sometimes	77	13.5
Yes	24	4.2
Involvement in Disaster risk reduction plan		
No	542	94.8
Yes	30	5.2
Perception of students		
Important role in disaster preparedness		
Strongly Agree	336	58.7
Agree	196	34.3
Neither Agree Nor Disagree	16	2.8
Disagree	10	1.7
Strongly Disagree	14	2.4
Involvement in disaster simulations and response exercise		
Strongly Agree	261	45.6
Agree	198	34.6
Neither Agree Nor Disagree	60	10.5
Disagree	33	5.8
Strongly Disagree	20	3.5
Involvement in developing disaster preparedness plan at school		
Strongly Agree	250	43.7
Agree	226	39.5
Neither Agree Nor Disagree	55	9.6
Disagree	22	3.8
Strongly Disagree	19	3.3
Worry about disaster		
No	96	16.8
Yes	456	79.7
I am not sure	20	3.5
Interest to prepare their school for disaster		
No	44	7.7
Yes	528	92.3
Like to know more about disaster		
No	142	24.8
Yes	430	75.2
School prepare for disaster		
<50	13	2.3
>50	559	97.7
(Mean=1.977, Median= 2, SD= 0.14, Min= 1, Max=2)		

Table 4 Distribution of Knowledge level on Earthquake and Fire preparedness and response

Variables	Total	
	n	%
Knowledge on Earthquake		
Low	66	11.5
Medium	303	53.0
High	203	34.5
Knowledge on Fire		
Low	77	13.5
Medium	259	45.3
High	236	41.3

Table 5 Percentage of correct answer by the students

SN	Items	% of Correct answer (n= 572)
Knowledge on Earthquake		
1	If you hear the words "Drop, Cover and Hold on", what would you do?	63.5
2	Why do you "Drop, Cover and Hold On" during an earthquake?	76.0
3	What do you think has caused the most injuries during earthquakes?	30.1
4	What is the most important part of your body to protect from injury during an earthquake?	93.2
5	What will you do if you are now in safe place during earthquake?	35.0
Knowledge on Fire		
1	Do you know fire can happen anytime and anywhere?	92.0
2	What you do if you hear danger sign?	67.0
3	What you will do if fire breaks out in class at school?	57.3
4	How you put on fire from a burning stove?	81.1
5	Do you know the emergency telephone number of fire service or police station?	71.3
6	Do you know how to use fire extinguisher ?	35.0

Those in private schools (56.4%) reported having high knowledge level as well as disaster related topics were more taught in private schools (54.8%) in compare to public as presented in Table 6. Chi-square test revealed that knowledge is associated with attending drills (p=0.001), incorporation of Disaster related topic in curriculum (p=0.001) and school type (p=0.005), as shown in Table 7.

Table 6 Frequency and percentage of relationship between knowledge level with type of schools

Level of knowledge	Type of school			
	Private		Public	
	n	%	n	%
Low	27	35.1	50	64.9
Medium	127	49.0	132	51.0
High	133	56.4	103	43.6

Table 7 The association between each independent variable and knowledge level of students

Independent Variables	Level of knowledge			p-value
	Low	Medium	High	
	n (%)	n (%)	n (%)	
Attend drills				
No	57 (74.0)	157 (60.6)	103 (43.6)	0.001
Yes	20 (26.0)	102 (39.4)	133 (56.4)	
Incorporation in Curriculum				
No	27 (32.5)	41 (49.4)	15 (18.1)	0.001
Informal	13 (26.5)	19 (38.8)	17 (34.7)	
Yes	37 (8.4)	199 (45.2)	204 (46.4)	
School type				
Private	27 (35.1)	127 (49.0)	133 (56.4)	0.005
Public	50 (64.9)	132 (51.0)	103 (43.6)	

DISCUSSION

The current study investigated the disaster risk reduction knowledge among students of secondary schools of Kathmandu and found only 34.5 % and 41.3% have high level of knowledge on earthquake and fire preparedness and response respectively. This result is supported by the study from Nepal 2014 which has concluded that most of the students do not have a correct knowledge of disasters and their mitigation methods [14]. Similarly, a study from Indonesia which found only 15 % of student have high level of knowledge on fire prevention and safety [17]. In support to the findings, a study in Lao PDR only a small proportion of students (ranged from 7.2%-35.0%) were respond correctly about fire prevention [18].

In this study, more than three quarter had experienced disaster (73.8%) among which earthquake was the most common disaster faced by the students (62.8%) followed by earthquake and storm, (4.9), storm (2.4%), fire (2.3%) and landslide (1.4%). Likewise, 94% of the questioned respondents of G. Tuladhar et al have experienced a disaster in their life whereas 43% and 42% has experienced earthquake and fire respectively [14]. In support to the findings among 8 schools 5 have experienced fire by the school in Lao PDR, 2018 [18].

Almost 80% of the students have mention about disaster related topic included in their curriculum. Similarly, most of the primary schools in Hue City of Vietnam have integrated disasters components in some of their subjects [19]. Likewise, out of 8 schools of Lao PDR 6 schools have disaster risk reduction lessons and curriculum [18].

Even though disaster related topic were included in curriculum the study had shown there is still lack of skill development for the students. More than half (55.4%) have never attended drills at their schools which can be supported by the study in Lao PDR where out of 8 schools only 2 of them have conducted disaster risk reduction simulation exercise [18].

Similarly, almost all students (98.4%) mentioned that they have never been involve in disaster risk reduction plan of the school even though most of the participants (92.3%) have great interest to prepare their school for disaster. This percentage is near to the research from Indonesia, which found 83% of students would like to be involved in making their school to be prepared for disasters. Likewise, in the same study 94% of the students wants to know more about how to stay safe from the disaster which is similar to the findings of the current study reveling 75.2% of population wants to know more about disaster [17]. Based on Table 4 all most all students perceive that their school if more than 50 % prepare for the disaster which is related with study done by Amri et al, Indonesia where majority of children (69%) think that their school is well prepared [17].

Additionally, despite of having positive thought on their great role for disaster preparedness, their involvement in disaster simulation and response exercise and participation in developing disaster preparedness plan at school level but in real scenario students have been involved least.
On an observation most of schools used lecture methods for education materials as 82.3% of them has not used any educational materials. Most of them have used Books and posters as teaching and learning materials. In similar to this finding a research in Ghana had concluded majority of teachers (64.0%) most widely used lecture technique while experimental technique and action oriented technique was mentioned by 18.0% each [8].

Although the current study shows student had some knowledge on disaster such as earthquake, fire most of them (80%) still feel worry about disaster. Similar to this findings, a research in Nepal has also presented most of the students were found to be feel insecure from the disasters [14].

According to the findings, students of private schools have more knowledge level (56.4%) in compare to public school (43.6%) as the students from private school had experienced disaster more (82.9%) than of public school's students (64.6%). This finding is oppose with the outcomes of the study done in Nepal which suggest that various types of pre-exposed disasters could not effect on the disaster risk reduction issues such as disaster knowledge, readiness behavior, awareness, adaptation and disaster risk perception [14].

As per table 7, there is significant relationship of knowledge level of students between their participation on drills (p=0.001), incorporation of disaster related topics in the curriculum (p=0.001) and type of school (0.005). This had concluded there should be more simulation exercise, strong curriculum in order to increase the knowledge of the students on disasters. The current findings could encourage the line agencies for modification in their programs in disaster education system in Nepal as this type of independent research clearly shows the general status of disaster risk reduction knowledge among school students of Nepal.

CONCLUSIONS

Although Nepal government has initiated disaster risk reduction education in the formal curriculum of schools but its implication seems inadequate to improve the knowledge and skills of students for disasters. Most of the student have less knowledge on disaster risk reduction along with this less school have given focus on practical skills and most of the school are giving more focus on lecture method to deliver the information on disasters. Based on result, disaster risk reduction curriculum with development of skill for student using enough disaster risk reduction learning materials and diverse method of teaching could be beneficial in improving knowledge and practice among students of secondary level schools.

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DOUBLE BURDEN OF MALNUTRITION A PUBLIC HEALTH CHALLENGE AMONG NEPALEASE WOMEN AND CHILDREN

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ABSTRACT

Introduction: Double burden to malnutrition is now being concern of developing countries due to the nutrition transition and poor eating habit of people. The term "double burden of malnutrition "at household level is indicated as high prevalence of 'stunted child growth and overweight or obese mother" (SCOWT). In Asian region 87 million under 5 children and 9 million women eighteen year or more were obese in Asia by 2016. Nepal demographic health survey indicates since 2006 to 2016 proportion of overweight or obese women has increased more than double from 9.0 % (2000) to 22.1 % (2016), similarly 36.0% of under 5 children were suffered from stunting by 2016. The dual consequences raised from the double burden of malnutrition as undernutrition related various deficiency diseases and non- communicable diseases due to overweight has raised the major public health concern. According to literature review very few studies has been conducted to identify the prevalence of SCOWT, and no study has been conducted in Nepal.
Objectives: Study aimed to identify the prevalence of malnutrition in the form of stunted child growth and overweight or obesity in mother and factor associated with SCOWT.
Methodology: The cross sectional study was conducted via face to face interview with anthropometric measurement of height and weight of mother and child in the Tilottama Municipality of Nepal during the April and May 2019. Municipality was selected as purposive sampling and all 17 wards of municipality was selected as study area. Ethical approval was obtained from University's Ethical Committee before conducting the study.
Conclusion: Overall 385 mothers aged 18 – 49 years and child aged 6-59 months were enrolled in the study. The study has estimated the prevalence of SCOWT is 8.6%. Similarly, prevalence of stunting among children was 19.2% and overweight /obesity among the mother was 60.3%, via using Asian BMI cutoff points. Furthermore, prevalence of underweight among children was 13.2% and 5.2% wasting. Chi-square test was significant with maternal BMI and stunting (p = .002) baby of mothers with higher BMI are less likely to be stunted. In addition, children with higher order i.e more than two birth order are more likely to be stunted ((p =.042). Likewise, children with higher household income are less likely to be stunted (p = .017). More over children with low birth weight are more likely to stunted (p= 0.024) and underweight (p< 0001).
The study indicates that municipality is suffering from double burden of malnutrition and overweight/obesity is at alarming situation among the mothers. High prevalence of SCOWT would increase the burden of disease and unproductive population which ultimately hampered in development of community and country. The result suggests to Tilottama Municipality to conduct program simultaneously to minimize over and undernutrition and policy makers to design and amend the policy to address all form of malnutrition
Keywords: Double burden of malnutrition, stunting, overweight, obesity

INTRODUCTION

Double burden to malnutrition is now being concern of developing countries due to the nutrition transition and poor eating habit of people [1]. The term "double burden of malnutrition "at household level is indicated as

high prevalence of 'stunted child growth and overweight or obese mother"[2]. Global Health report indicates that 155 million under 5 children suffered from childhood stunting and 982 million women of reproductive age suffered from overweight in 2016 in the world, similarly 87 million under five year children suffered from stunting and 9 million women 18 years or more were obese in Asia region in 2016. This epidemiological transition indicates the double burden of malnutrition in world [3,4]. Despite of lowest prevalence rate of overweight and obesity in Asian Counties, but now they are suffering from frightening rates of increase in recent years. Prevalence of obesity among Asian Women has been increased from 3.6 to 6.1 percent since 2005 to 2016 [4,5].

According Nepal Demographic Survey 2016, 22.1 % of 15-49 age women were overweight or obese, among them 5.0% were obese and 17.0 % were overweight. Since 2006 to 2016 proportion of overweight or obese women has increased more than double from 9.0 % (2000) to 22.1 % (2016), similarly 36.0% of under 5 children were suffered from stunting by 2016. Which clearly indicates that Nepal is suffering from double burden of Malnutrition. Likewise, 39.0 % under five years' children's were stunted and 15.2 % women of reproductive age were overweight and 3.2 % were obese in the province no.5 and Tilottama is city that comes under this province [6]. No study has been published in Nepal to identify the stunted child and overweight or obese mother (SCOWT) as a pair but the Study conducted in poor resource setting of Guatemala published in 2016 indicates that about 17% child and mother pair were suffered from the dual burden of malnutrition (SCOWT) [7]. Likewise study on urban setting of Indonesia defines that prevalence of child stunting was 36.4% and 70.2% mothers were overweight or obese. Among them 24.7% mother and child pair was SCOWT (2). Another study from Indonesia in urban setting mention the prevalence of SCOWT was 21.2% with 37.7% of maternal overweight or obese and 15.3% Stunted child (1). Similarly, Prevalence of SCOWT was found 21.2% in poor urban setting of Malaysia, where 37.7% mother were overweight and 15.3 % were stunted that area [8].

Stunting has several long term harmful effects on child growth and development. Stunting delays, the cognitive growth through permanent damage of brain, as a result child has poor school performance and low learning capabilities. Stunted children are in risk of chronic non communicable disease like diabetes, hypertension and obesity in their adulthood/ elderly age similarly, those children who are stunted now they have low productivity or low earning at future it can reduce country Gross Development Productivity(GDP) by12.0% [9] . Another the most important matter is that about 45% of child death among all death in under five years' children are due to undernutrition [2]. In other hand Obesity and overweight increases the risk of disease like type 2 diabetes mellitus, ischemic stroke as well as coronary heart disease. While increasing in the body mass index, person develops the risk of breast, colon, kidney, gall bladder cancer [10].

Therefore, study was conducted to identify the prevalence of malnutrition in the form of stunted child growth and overweight or obesity (SCOWT) in mother and factor associated with SCOWT. This study will help political leaders, local authorities, community and families to know the nutritional status their Municipality and help them to develop the plan to control and prevent the risk of double burden of malnutrition. As this study will support the local government of Tilottama Municipality and District Public Health of Rupandehi District to plan the municipality based interventions to prevent and control the double burden of malnutrition with in household level with regards to consequences of childhood stunting and maternal overweight and obesity.

METHODOLOGY

Study design and participants

The cross sectional study was conducted via face to face interview with 6-59 months' children and 18-49 aged mother as a pair within same household of Tilottama Municipality of Nepal during the April and May 2019. Sample size (n=385 mother and child pair) was calculated through applying the formula for estimating the proportion with 5% allowable error with 95% confidence interval and proportion of 39% stunted children in

province no.5 in 2016 (6). Municipality was selected as purposive sampling and all 17 wards of municipality were selected as study area. As per data provided by Government of Nepal as a target population of 2018 – 2019 to each ward, proportion formula was used to have appropriate sample size according to population density of 6 -59 months' children's. Furthermore, percentage were converted to number(11).

The height and weight of children aged 6-59 months and mother aged 18 -49 years were measured to identify the nutritional status (Stunting, Wasting Underweight and Obesity). Eventually mothers were asked questionnaire about sociodemographic factors, child health. Validation of the questionnaire were done according to instruction from advisory committee team. Likewise, categorical questions were adapted from the NDHS 2016 questionnaire, Suaahara Annual Survey 2017. Regarding the validation of measurement tools wooden height board supplied by USAID in Nepal was used for both mother and children and electronic seca scale supplied by USAID funded multisector nutrition program SUAAHARA were used to measure the height and weight of mothers. Before initiating the data collection in real field, questionnaires were translated in Nepali language and 30 pretesting were conducted in Butwal Sub – Metro politician city other than the study area to determine the quality of questionnaires and after that some changes some made were in questionnaire. Before collecting the data calibration of seca scale and height board was done. Ethical approval was obtained from Mahidol University's Ethical Committee before conducting the study dated on 2/4/2019 with certificate of approval no 2019/075.0204.

Two experienced research assistants with public health background were hired. Before collecting about the data, orientation about research objectives, data collection procedure, measurement tools and its application was provided to research assistants. Mothers were asked questionnaire about socio economic and demographic characteristics and child characteristics which includes mother about her age, occupation, education, income, date of birth of children, age, sex, fever, birth weight, breastfeeding, complementary feeding and diarrhea, fever within month before the survey etc. and was coded by about date of birth of children, age, sex, fever and diarrhea, fever within month.

Regarding the measurement process wooden height board was placed vertically on hard stable surface and request them remove the shoes, head covering, outer wear, jewelry and empty their pockets to obtain the accurate height. Similarly, child or mother were placed on the middle of height board standing on upright position with his or her back against the board. Research assistant ensured the respondents head, shoulders, buttocks, knees and heels are in touch with height board. Regarding the children below two years or less than 85 cm height measuring board was placed horizontally on a flat smooth surface. Then after children were place in the face middle of the board through lying down with face up. Children's shoes, head covers, outer wear will remove before measuring. while measuring assistant supported to hold the two sides of child head until touching the head board. Likewise soles of the feet were placed flat on the foot piece and toes should were pointing up at right angles.

To obtain the weight of children and mothers. Children and mothers were requested to take off the shoes, jewelry empty the pockets and wear the light clothes and stand in the middle of electronic scale surface through evenly distributing body weight between the two feet. Before weighing assistants checked seca scale adjust the weight reading to zero scale. In case of those children who cannot stand up weight was taken through using mother and child electronic scale. To obtain the weight of children weight of mother alone was taken subtracting baby weight with mother. Hence the weight of mother and baby was recorded to nearest 0.1 kg using the recommended scale.

Before entering the data in to the computer, were rechecked in daily basis to minimize the error like missing data, data entry error etc. Eventually Epi data and SPSS version 21 software were used to data entry and analysis. To calculate the BMI of mother and weight for age, height for age and height for weight of children WHO Anthroplus software was used. Asian BMI cutoff point recommended by WHO expert was used to calculate BMI of mothers. All collected data were kept on password protected computer

and analysis of variables were done according to objectives of study.

RESULTS

Overall 385 mothers aged 18 – 49 years and child aged 6-59 months were enrolled in the study. The study has estimated the prevalence of SCOWT was 8.6%. Similarly, prevalence of stunting among children was 19.2% and overweight /obesity among the mother was 60.3%, via using Asian BMI cutoff points. Furthermore, prevalence of underweight among children was 13.2% and 5.2%wasting. Chi-square test was significant with maternal BMI and stunting (p = .002) baby of mothers with higher BMI are less likely to be stunted. In addition, children with higher order i.e more than two birth order are more likely to be stunted ((p =.042). Likewise, children with higher household income are less likely to be stunted (p = .017). More over children with low birth weight are more likely to stunted (p= 0.024) and underweight (p< 0.001)

Table 1 Nutritional Status of Children mothers aged 18 -49 years and children age 5 -59 months

Characteristics	n	%
Co-existence of SCOWT		
Yes	33	8.6
No	352	91
Nutritional Status of Children aged 6-59 months		
Stunted	74	19.2
Underweight	51	13.2
Wasted	20	5.2
Nutritional Status of 18 -49 years' mothers		
Underweight	27	7
Overweight	140	36.4
Obesity	96	24.9

Table 2 Factors associated with height for age of children

	Height for age of children			
	Normal n (%)	Stunted n (%)	Chi Square	p-value
Birth Order of Children			4.142	0.02
1-2	288 (82.1)	63 (17.9)		
>2	23 (67.6)	11 (32.4)		
Birth Weight of 6-59 months Children			5.07	0.024
≤2500 g	27 (67.5)	13 (32.5)		
>2500 g	284 (82.3)	61 (17.7)		
Household income			5.674	0.017
≤50000	255 (78.7)	69 (21.3)		
>51000	56 (91.8)	5 (8.2)		
Maternal Body Mass Index			12.135	0.02
Underweight	17 (63)	10(37)		
Normal	93 (75)	31 (25)		
Overweight or Obese	201 (85.9)	74 (14.1)		

Table 3 Association between birth weight of children and weight for age of children aged 6-59 months

	Weight for age children			
	Low birth weight	Normal weight		
	n (%)	n (%)	Chi Square Value	p- value
Weight for age of 6-59 months children			12.421	0.0001
Normal	25 (7.5)	309 (92.5)		
Underweight	15(29.4)	36 (70.6)		

DISCUSSION

Study estimated prevalence of stunted child and overweight or obese mother (SCOWT) is 8.6 % among the 6-59 months' children's and 18 -49 years' mothers pair. The estimated global prevalence by cross sectional study of 54 middle income countries was 3.3% where the range of prevalence was varied from 0.5% to 16 % (12). Likewise, cross sectional study on Bazil in 2016 presented 2.2% of stunted children and overweight or obese mother as a pair (13). Similarly, study conducted in 18 lower and middle income countries estimated the prevalence of stunted children and overweight or obese mother as a pair showed lowest 1% from (Bangladesh) to 23% (Guatemala) (14). Furthermore, cross sectional study conducted in Indonesia 2015 at Surbaya urban city estimated the prevalence of SCOWT was 24.7% (2), Similarly study on Bangladesh estimated the prevalence of child stunting and maternal overweight was 4% (15). Thus the various study on different middle income countries showed that prevalence of stunted child and overweight or obese mother is high is Tillotama Municipality. These situation indicates that Nepal is suffering from double burden of malnutrition and coexistence of over and under nutrition at same household to mother and child is threating the society as double a burden of malnutrition with various poor health conditions from over and under nutrition.

Nepal Demographic Health Survey (NDHS) 2016 estimated the prevalence of stunting in province no.5 as 39% which consist of 12 districts with huge different geography, where the one urban city of this province consists 19.2 % prevalence of stunting(6). Similarly, the prevalence overweight and obesity in 18-49 years was 60.3 % it was calculated via using the Asian specific BMI cutoff points recommended by WHO expert consultation according to disease pattern and risk factors within Asian Populations ((16)). Cross-sectional study conducted at with under 5 children and mother as a pair at household level in urban city of Indonesia estimated the prevalence of overweight or obesity was 70.2% (2). Although the prevalence is lower than Indonesia urban city but it should be realized that increasing rate of overweight or obese mother is alarming in urban cities of Nepal. According to NDHS 2016 province no.5 data only 15.2% and 3.2% of women of reproductive age were overweight or obese respectively (6).

The study results indicate that there is association between height for age and body mass index of mother (p =0.02). Recent case control study conducted in Ethiopia 2019 found that mother with low BMI (<18kg/m^2) was risk for the child stunting(17, 18). Likewise, study indicates the children with higher than birth order is more likely to be stunted as well as children with low birth weight were more likely to be stunted and this result is also supported by the study on "Trends and predictors of inequality in childhood stunting" conducted in Nepal from 1996 to 2016 where higher birth order were

more likely to stunted (p= <0.0001) in 1996 (p = 0.007) in 2016 and children with low birth weight have higher chances to be stunted (p <0.001) in 1996 and (p= 0.003) in 2016(18). Likewise, this study found the association between stunting and household income, household with higher income children are less likely be stunted.

CONCLUSIONS

The objective of study is to identify the prevalence of double burden of malnutrition in the form of stunted child growth and overweight or obese mother among the 6-59 months' children and 18-49 years' mothers residing in Tilottama Municipality of Nepal. As per the objectives study estimated the prevalence of SCOWT as 8.6%, where the 19.2 % were stunted child and 60.3% were overweight or obese mother. Study found the significant association between mother's BMI and height for age of children, birth order, low birth weight and height for age, income and height for age. Likewise, study showed the there is no association between dietary diversity and body mass index of mother.

The result of this study identified the higher prevalence of double burden of malnutrition in the form of stunted child and overweight or obese mother (SCOWT) pairs. Study identified alarming result of overweight or obese mother in Tilottama municipality. Therefore, necessary actions should be taken by municipality, policy makers to minimize the all form of malnutrition.

Study evidence shows that Nepal had higher prevalence of double burden of malnutrition. Therefore, Government should update the policies and priorities to address the double burden of malnutrition. As per previous policies, strategies interventions were focused in undernutrition therefore as per the study result it is recommended to focus on over nutrition to address all form of malnutrition. Health promotional and awareness program on consequences double burden of malnutrition should be conducted in public private partnership.

Physical activities friendly infrastructure and community should be created.

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ANTENATAL CARE SEEKING BEHAVIOUR AMONG WOMEN HAVING CHILDREN UNDER FIVE YEARS OF AGE IN RURAL AREAS OF KACHIN STATE, MYANMAR

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ABSTRACT

Introduction: Myanmar has alarmingly high maternal mortality along with low care-seeking behavior during pregnancy. It is essential to classify the facilitating factors and barriers for the women, when deciding to seek antenatal care (ANC) services.
Objectives: This study aimed to identify factors affecting ANC-seeking behavior during pregnancy among women having a child or children under five years of age in rural areas of Kachin State, Myanmar.
Methodology: A community-based cross-sectional study using quantitative data collection methods was conducted in 24 villages in two Townships in Kachin State. The sample consisted of 410 women age 15-49 years' old who had a child or children under age five years. Face-to-face interview was led by using a structured questionnaire during April 4 – May 3, 2019. Simple and multiple logistic regression were used to examine factors associated with and predictive of ANC-seeking behavior.
Results: The study found that 42.7% of respondents had high ANC-seeking behavior and more than half had low ANC-seeking behavior. Only 16.1% reported receiving complete ANC services, i.e., at least four ANC check-ups, with the first check-up within 12 weeks and provided by a skilled birth attendant. By using multiple logistic regression, women from families who had high socio-economic status (SES) were two times more likely to have ANC-seeking behavior (AOR=1.99, 95%CI=1.12-3.54) than those from families with low SES. Participants who could read and understand health education posters were nearly twice as likely to have ANC-seeking behavior (AOR=1.69, 95%CI=1.01-2.83) than those who could not. Women who had moderate and high level of knowledge were two and three times more likely to have ANC-seeking behavior (AOR= 2.10, 95% CI= 1.22-3.60) (AOR= 3.58, 95%CI= 2.09-6.14) than the women who had low knowledge level, respectively. Women without convenient access to ANC services were nearly two times (AOR=1.94, 95%CI= 1.23-3.06) less likely to have ANC-seeking behavior compared to those with better access.
Conclusion: The results show that ANC-seeking behavior was poor in these rural areas of Kachin State. In addition, lower SES, less knowledge of ANC, and inconvenient access to services were the main constraints related to ANC-seeking behavior. Interventions, such as community-based health promotion, education and service provision programs about ANC should target women from lower socio-economic backgrounds.
Keywords: ANC/ Seeking behavior/ Rural areas/ Myanmar

INTRODUCTION

Maternal health is still a global concern because, every day, it is estimated that 830 reproductive-age women (15-49) die from preventable causes related to pregnancy and childbirth, and 99.0% of all maternal deaths occur in developing countries [1]. Myanmar is a lower-income country, and its maternal mortality ratio (MMR) was 227 deaths per 100,000 live births in 2015. That level of maternal mortality is significantly higher than many other countries of Southeast Asia, and Myanmar still has a long way to go to achieve the MMR target of the Sustainable Development Goals [2, 3]. In Myanmar, 29.1% of maternal deaths in 2014 were attributed to complications of pregnancy [4]. To improve the health of reproductive-age women, ante-natal care (ANC) is an important determinant of safe delivery, including the provision of health information and other related services [5]. The aims of ANC are decreasing maternal mortality and morbidity rates, and improving the mental and physical health of women and infants [6]. According to WHO clinical guidelines, pregnant women need to have their first ANC visit at 8-12 weeks of pregnancy, the second visit at 24-26 weeks, the third at 32 weeks, and the fourth at 36-38 weeks [7]. In Myanmar, 59.0% of pregnant women received at least four ANC check-ups, and 40.0% received their first ANC exam in the first trimester [2].

Nevertheless, ANC-seeking behavior of pregnant women in lower-income countries is still poor, and increasing ANC is one of the greatest challenges to reduce MMR in those countries, including Myanmar. Many pregnant women avoid seeking ANC until they deliver [8]. Numerous factors influence seeking health care in rural areas such as availability and accessibility of services, the social group norms, distance to health service, cost of services, as well as socio-economic status (SES) [8-11]. Knowledge of pregnancy danger signs and complications, health care behavior, and transportation options are also related with ANC-seeking behavior [4, 12, 13]. Poor quality of the health system, including access to health information and access to care, is contributing to persistently poor maternal outcomes [14-17]. Nearly half of reproductive-age women in Myanmar reported that they had serious problems in seeking care during pregnancy and delivery [2].

According to a 2018 WHO report, poor women in remote areas are least likely to receive maternal health care due to hard-to-reach ANC, poverty, inadequate services, lack of relevant information, and cultural practices [18]. In 2014, the MMR in Myanmar was 310 deaths per 100,000 live births in rural areas compared to 193 in urban areas [4]. There are large differences in MMR by rural and urban, state and region, and income [2]. Kachin people from conflict areas in northern Myanmar have been forced to flee their homes due to insecurity and lack of access to basic needs. Moreover, most Kachin people live in remote, conflict-affected areas which are less accessible in terms of cultural, social, geographical and/or financial factors. This study aimed to identify factors affecting ANC-seeking behavior during pregnancy among women having a child or children under five years of age in rural areas of Kachin State, Myanmar.

METHODOLOGY

Study Area

The study was conducted in 24 selected villages of Waingmaw and Ingangyang Townships, in Kachin State located in the northern part of Myanmar. Kachin State is composed of four districts and 29 townships, and has a total population 1,689,441, and 364,566 women age 15-49 years [19].

Study Design

This research was a community-based cross-sectional study. The sample size of 410 women was determined by using a formula based on a background prevalence of 59.0% with at least four ANC visits according to Myanmar Demographic and Health Survey. The resulting, prescribed sample size was increased by 10% for information loss due to incomplete data and withdrawal of participants. The following sampling techniques were used:

- Firstly, Kachin State out of 14 states and regions in Myanmar was selected by using purposive sampling.

- Secondly, simple random sampling was used to select one district, Myitkyina, out of four districts and two townships, Waingmaw and Ingjangyang, out of six townships in the district.
- Thirdly, systematic sampling was used to select the 24 out of 174 villages in the two townships. The adjusted sample size of 410 was drawn from 372 households in 18 villages (90.9% of sample size) in Waingmaw and 38 households in six villages (9.2% of sample size) in Injangyang based on the proportion of total households in each township.

Finally, the face-to-face interviews were conducted using a structured questionnaire with the woman of reproductive age in the sampled household. If there was more than one eligible woman in a household, only one was interviewed who met the inclusion criteria of age between 15-49 years who had a child or children under five years of age, and had lived in the study area during the last pregnancy.

The research questionnaires were developed based on the study objectives, conceptual frame of the social-ecological model and operational definitions. The questionnaire was composed of (i) Questions on socio-demographic characteristics like age, marital status, education, occupation, family income, birth order, number of family members, ethnicity, religion, etc.; (ii) Questions on intrapersonal factors such as language and communication, knowledge, perception and health-seeking behavior during pregnancy including ANC visits at a health facility, timing of first check-up, and type of birth attendant; (iii) Questions on interpersonal factors such as family support, cultural and traditional beliefs, social support towards maternal care, and source of information from the family and community level; and (iv) Questions on interpersonal factors like availability, affordability and accessibility of ANC services by type and level of service outlet.

To promote validity of the data, the questionnaire was developed to be consistent with operational definitions of the variables, and some of the variables were revised based on previous studies' questionnaires. The questionnaire was finalized after consultation with advisors and experts who assessed its content and wording. The English questionnaire was translated into Myanmar language and re-checked with back translation. A pre-test was conducted with 30 respondents in Kayin State who had similar characteristics with targeted women in the study area to assess content, structure and understanding of the question. The reliability of the questionnaires was calculated by using Cronbach's Alpha coefficient showing around 0.8.

Data collection and analysis

The study protocol and data collection instruments were approval by the Ethical Committee of Mahidol University. The interviews were conducted by trained Myanmar and Kachin research assistants from Kachin State. Data were computerized by using Epi Info (version 4) and edited, coded and analyzed using SPSS (version 21). The Survey was set a standard normal deviation score (95% confidence interval) and an error of allowance at 0.05. Descriptive statistics, such as mean, frequency, standard deviation, percentage, minimum and maximum, were used to describe ANC-seeking behavior by type of respondent. Simple logistic regression was used to identify the factors associated with ANC-seeking behavior, and multiple logistic regression was used to explore the predictors of ANC-seeking behavior among the sample.

RESULTS

One-fourth of the sample were less than 20 years or more than 35 years of age. These ages are higher-risk ages to carry a pregnancy to term. Approximately, one-third were not working, and nearly half were working in farming. Average income was <= 50,000 Myanmar kyat (US$32) per month. Two out of five (41.2%) were from low socio-economic backgrounds and only one-fifth had high SES. More than 90% of the sample respondents were ethnic Kachin and Christian. Most of the women always communicate using the Kachin language in their community, and one-third cannot read or understand health education posters. Approximately two-fifths of the sample had poor knowledge level, and nearly half had a low level of perceptions. More than half the sample had poor social support from their husband, family, relatives

and neighbors. The majority of the sample (62.4%) can access transportation, 43.2% can afford the transportation fee, one-fourth (25.4%) can afford the fee for medical services, and three-fifths (61.2%) could access health information.

Table 1 shows that 42.7% of the respondents had good ANC-seeking behavior during pregnancy. About half had their first ANC check-up for the last pregnancy in the first trimester, while two-fifths had at least four ANC check-ups. However, over half the ANC practitioners were not formally trained. Thus, in sum, only 16.1% reported receiving complete ANC services, for example., at least four ANC check-ups, with the first check-up within 12 weeks and provided by a skilled birth attendant at a health facility. About one in five (19.0%) never used formal ANC services during the last pregnancy.

Table 2 identifies the factors which are significantly, positively associated with ANC-seeking behaviour. These include SES (p-value=0.003, 95%CI=1.32-3.84) and the religion of respondent (p-value=0.022, 95%CI=1.13-4.79). Moreover, being able to read or understand health education posters (p-value= 0.002, 95%CI=1.30-3.37), moderate or high knowledge level (p-value= 0.003, 95%CI= 1.30-3.70) (p-value= <0.001, 95%CI=2.36-6.62) and respondent's perception (p-value=0.042, 95%CI=1.01-2.23) were positively associated with ANC-seeking behaviour. Concerning interpersonal factors, social support (p-value=0.004, 95%CI=1.21-2.68), accessing transportation (p-value=0.001, 95%CI=1.63-3.82), affordability of medical service fees/transportation (p-value=0.001, 95%CI=1.33-2.95) and available information (p-value=0.001, 95%CI=1.30-2.99) were also positively associated with ANC-seeking behaviour.

Table 3 shows the results of multiple logistic regression analysis to identify predictors of ANC-seeking behavior. The data show that that women from families who had low SES were two times less likely to have ANC-seeking behavior (AOR=1.99, 95%CI=1.12-3.54) than those from families with high SES. Participants who could read and understand health education posters were nearly twice as likely to have ANC-seeking behavior (AOR=1.69, 95%CI=1.01-2.83) than those who could not. Women who had a moderate or high level of knowledge were two and three times more likely to have ANC-seeking behavior (AOR= 2.10, 95% CI= 1.22-3.60) (AOR= 3.58, 95%CI= 2.09-6.14) than those who had low knowledge level, respectively. Women without convenient access to ANC services were nearly two times (AOR=1.94, 95%CI= 1.23-3.06) less likely to have ANC-seeking behavior compared to those with better access.

Table 1 Analysis on ANC-seeking behaviour

ANC-seeking behavior	Number	Percentage
Place of ANC visit		
At home/ other	134	32.7
Health facility	276	67.3
ANC provider		
Not skilled birth attendant	221	53.9
Skilled birth attendant	189	46.1
First ANC visit		
>3 months/ No visit	213	52.0
≤3 months	197	48.0
Number of ANC visits		
<4 times/ No visit	228	55.6
≥4 times	182	44.4
Total score on ANC		
Poor (0-2)	235	57.3
Good (3-4)	175	42.7
(Mean=2.06, SD=1.35, Minimum=0, Maximum=4)		

Table 2 Association between independent variables and ANC-seeking behaviour

Variables	Low		High		95% CI	P value
	N	%	N	%		
SES						
Low	105	62.1	64	37.9		
Moderate	95	60.1	63	39.9	(0.69-1.69)	0.710
High	35	42.2	48	57.8	(1.32-3.84)	0.003**
Religion						
Christianity	222	59.0	154	41.0		
Other	13	38.2	21	61.8	(1.13-4.79)	0.022*
Can read health posters						
Yes	162	52.9	144	47.1	(1.30-3.37)	0.002**
No	73	70.2	31	29.8		
Knowledge						
Low	96	74.4	33	25.6		
Moderate	78	56.9	59	43.1	(1.30-3.70)	0.003**
High	61	42.4	83	57.6	(2.36-6.62)	<0.001**
Perception						
Negative	126	62.4	76	37.6		
Positive	109	52.4	99	47.6	(1.01-2.23)	0.042*
Social support						
Low	127	64.8	69	35.2		
High	108	50.5	106	49.5	(1.21-2.68)	0.004**
Access to transportation						
No	109	70.8	45	29.2		
Yes	126	49.2	130	50.8	(1.63-3.82)	0.001**
Affordability						
Poor	147	64.8	80	35.2		
Good	88	48.1	95	51.9	(1.33-2.95)	0.001**
Available information						
No	107	67.3	52	32.7		
Yes	128	51.0	123	49.0	(1.30-2.99)	0.001**

***p-value<0.05, **p-value<0.01, SES=Socio economic status**

Table 3 Final model of multiple logistic regression for predictors of ANC-seeking behaviour

Variables	Adj OR	CI 95%	
		Lower	Upper
SES			
Low	1		
Moderate	0.91	0.56	1.46
High	1.99	1.12	3.54
Read and understand health education poster			
Yes	1.69	1.01	2.83
No	1		
Knowledge			
Low	1		
Moderate	2.10	1.22	3.60
High	3.58	2.09	6.14
Accessibility			
No	1		
Yes	1.94	1.23	3.06

Remark: Method – Forward LR, Odds ratio were significant at the p-value <0.05

DISCUSSION

In this study, complete (i.e., optimal) ANC-seeking behavior was defined as having at least four ANC check-ups, with the first check-up in the first trimester of pregnancy, and services provided by a skilled birth attendant at a health facility. The proportion of the sample having at least four ANC check-ups (44.4%) and being served by a skilled birth attendant (46.1%) were lower in this study compared to countrywide data (59.0% and 78.4%, respectively) as found in the Myanmar Demographic and Health Survey (4,42). The proportion having their first ANC check-up within 12 weeks (48.0%) was higher than the overall Myanmar population data (40.0%) [2]. There were no data available to compare ANC visit to health facilities in both studies. In sum, the present study found that more than half of respondents (57.3%) had low ANC-seeking behavior, and that finding is similar with the national data (49.0%). What is more, a significant proportion of reproductive-age women in Myanmar reported that they have serious problems in seeking care for pregnancy and delivery [2].

SES was highly associated with and a significant predictor of ANC-seeking behavior in this study. This finding is supported by previous studies from Southeast Nigeria and Bangladesh which found a significant relationship between SES of the respondents and the number of ANC visits in the last pregnancy and maternal health care seeking behavior [8, 20]. The religion of the respondent was also associated with ANC-seeking behavior, and that finding is supported by previous studies in eastern Ethiopia and Bangladesh which found that religion is associated with maternal health care service seeking behavior of women [1, 21].

The ability to read and understand health education posters was a positive, associated factor and also a predictor of ANC-seeking behavior. A previous study in Guatemala found a relationship between maternal care and language ability. Similarly, a study in Malawi found that promotion of ANC by using posters was a contributing factor of ANC attendance in Malawi [22, 23]. Perception of the respondent was also associated with ANC-seeking behavior in this study. The findings on knowledge and perception are consistent with previous findings in Bangladesh and Pakistan. Knowledge and perception about pregnancy are a determinant of using skilled maternal health services [21]. The review of literature from developing countries showed that knowledge of pregnancy complications partly explains the effect of receiving ANC [24].

Social support, as measured in this study, was associated with ANC-seeking behavior, and that finding is consistent with previous qualitative studies from Pakistan and Ghana. The family and neighbors played an important role in assisting women during pregnancy and delivery [25]. Social factors play an important role in determining whether women in rural northern Ghana seek care in a health facility or not [26]. In addition, accessible transportation was highly associated with ANC-seeking behavior and also an important predictor of ANC-seeking behavior in this study, which is also consistent with the studies in Bangladesh and Ethiopia. Distance to the ANC facility and transportation options also affected ANC-seeking behavior [27]. Accessibility was difficult for some communities, and this was characterized by remote location and large catchment area served by a single health facility [28]. Affordable fees for transportation and medical service, and available information contributed to ANC-seeking behavior. This result is consistent with the studies in Nigeria and Anambra State (Nigeria). The cost of transport is an additional cost to care seeking. The cost of services greatly influenced the choice of provider and facility. Cost also influenced the ability of women to follow through with referrals [13, 29[. Health care facilities are closed at night due to human resource constraints and this limitation forces some women to be delivered by traditional providers, as found in the Nigerian study [13]. A major constraint to ANC-seeking behavior was the language barrier and the fact that some households had to relocate because of the conflict situation in study areas of Myanmar.

RECOMMENDATIONS

This study found that ANC-seeking behaviour was poor in these rural areas of

Kachin State of northern Myanmar. In addition, lower SES, less knowledge of ANC, and inconvenient access to services were the main constraints related to ANC-seeking behaviour for these women. Interventions, such as community-based health promotion, education and service provision programs about ANC should target women from lower SES backgrounds. To be more effective, the health promotion and education activities need to use posters in the local language (i.e., Kachin). Assistance with transportation fees or vehicle support need to be added in the implementation program to improve access to ANC services. This study was focused on the service receiver side as a community-based, service utilization and health system policy. Future studies should examine the services provision side for its influence on ANC-seeking behaviour.

ACKNOWLEDGMENTS

The authors express their gratitude to the ASEAN Institute for Health Development, Mahidol University for technical assistance, and Community Partners International for providing financial support for this research. We are also thankful to the research assistants and respondents who actively participated in data collection. The authors are solely accountable for the contents of this study, and the interpretations and recommendations do not necessarily reflect the views of the supporting organizations or institutions.

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Knowledge and Attitude of Nurses and the Screening for Gender-Based Violence Patients

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ABSTRACT

Introduction: Gender-based violence is a public health issue that can distract physical, mental and social well-being of the victim. If the health care staff are aware of and can screen for the supposed gender-based violence (GBV) cases, the victims can turn their lives into survivors. **Objectives**: This study was conducted to explore the knowledge and attitude of the nurses and screening the injured patients for suspected GBV in Yangon Region, Myanmar.
Methodology: A cross-sectional study was conducted among 322 nurses from various hospitals in Yangon, Myanmar during May, 2019. The self-administered questionnaire was used as a measurement tool. The ethical approval was obtained from Chulalongkorn University and the permission to conduct in the selected hospitals was given from Yangon Regional Health Department and from each hospital administrates. The chi-square test and binary logistic regression analysis was run to find the association between the dependent and the independent variables.
Results: This study enrolled 322 nurses (mean age=35.29±8.21). More than 90% haven't completed the trainings on GBV response and multidisciplinary teamwork. About 30% and 17.4% have attended STIs management and communication skills training respectively. Three-fourth of respondents answered that there is moderate amount of supplies such as the HIV diagnostic test kit and contact list for psychosocial support in their workplace.
About 80% of the participants have moderate knowledge and attitude level. Only 27% screened for GBV patient. Age, sex, education level, job position, the completeness of STIs management training, the completeness of multidisciplinary teamwork training and level of knowledge are found to affect the outcome behaviour.
The older nurses (age 36-57) are more aware of screening GBV cases (OR 1.99; CI=1.2-3.3) than the younger nurses (age 20-35). The junior nurses tend to be less aware of suspecting GBV than the head nurses (OR 5.22; CI=1.71-15.90). The nurses who have completed multidisciplinary teamwork training are more aware of GBV (OR 1.06, CI=1.11-7.56).
Conclusion: The results indicated that the nurses in this study have very limited knowledge and attitude towards GBV and the screening practice is low. So, the service-provider level training on GBV response for nurses should be implemented and a specific GBV guideline should be developed for health sector response.
Keywords: Gender-based Violence, Nurse, Screening, Knowledge and Attitude

INTRODUCTION

Gender- based violence (GBV) against women has been defined as "any act that results in, or is likely to result in physical, sexual, or psychological harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or private life"[1].

The GBV has many negative impact on health, both physical and mental as well as the economic problems. Physical illness includes musculoskeletal injuries, soft tissue injuries, genital trauma, unwanted pregnancy and unsafe abortion, which can cause the maternal or foetal mortality [2]. Women who has experienced GBV have twice more likelihood to get depression and alcohol/ substance abuse, 16% more chance to get a low birth weight baby and 1.5 times more easy to be infected with HIV and other sexually transmitted infections [2].

The patients can seek care at the emergency departments, out-patient departments, obstetric and gynecological departments, mental health care, family planning or STI clinics, orthopaedic clinics at hospitals and the primary care [3].

Clients who experienced GBV would present at the health care facilities with various symptoms such as eating or sleeping disorders, headache, auditory problems, unexplained chronic pain, trauma with unexplainable cause, unexplained gastrointestinal symptoms, reproductive health problems such as pelvic pain, STIs, sleep problems, substance abuse, depression, probability of self-harm, adverse pregnancy outcomes and so on [3, 4].

However, an early screening and detection can reduce or eliminate those negative impacts[5, 6]. Early identification of GBV cases is a secondary prevention procedure [7]. A qualitative study conducted in India among 300 women in 2014-2015 revealed that 72% of participants preferred to be asked about GBV by the health care providers especially the nurses [8]. As nurses are working in various settings, and can they can help explore and refer GBV victims to relevant services [9].

In order to provide services to GBV survivors, the health care providers should have knowledge on GBV, magnitude of the problem, the negative impacts on health, what health care services are needed to be provided, and ensuring the patient's safety. The nurses can take duties and responsibilities in practicing all steps of GBV response including screening GBV and providing treatment [10]. The knowledge and attitude play an important role in determining the practice [11, 12].

However, little knowledge on the nurses' ability to assess the suspected GBV in Myanmar is known. So, a study was conducted to assess the behavior of the nurses in Yangon, Myanmar on screening GBV cases together with the association with their socio-demographic factors, training background, knowledge and attitude towards GBV cases. The results are aimed to benefit the health system managers to develop appropriate training modules.

METHODOLOGY

This is a cross-sectional study to assess the current situation of the nurses' behavior on screening gender-based violence (GBV) cases. This study was conducted in 48 public hospitals among 83 public hospitals [13] in Yangon Region, Myanmar during April and May 2019.

The total sample size needed was 314 respondents including 10% refusal rate calculated using Taro Yamane's Table. This study used a multi-stage sampling. First, 15 out of 45 townships in Yangon Region was selected by stratification to cover all levels of hospitals. Among 15 townships selected, four townships have regional level hospitals and another 11 townships have one township hospital each and 3-5 station hospitals. Among them, all township hospitals were included and 3 station hospitals were selected by randomization. Finally, the participants were selected by convenience sampling. The total participants were all available nurses from the emergency and out-patient department and the total number is 322.

The data was collected using a self-administered questionnaire with four sections, socio-demographic characteristics, knowledge on GBV, attitude towards GVB cases and the supportive environmental factors followed by the question on the practice of screening for GBV cases.

The socio-demographic characteristics section contained 10 questions including the training background related with GBV response.

The knowledge section had 9 questions regarding forms of GBV, adverse

effects of GBV on health, health care procedures and diseases prevention in caring a rape survivor, history taking and physical examination on a GBV survivor, forensic specimen collection, psychological support, purpose of follow-up appointments and the available organizations for social and legal support in Myanmar. There was a statement matching with five options which the participants have to choose the right and wrong answers. It was 1 point for each correct answer and the score ranges from 1-45 points. Then, each participant's knowledge level was separated using Bloom's cut-off point.

The attitude questions were 8 statements with three likert scale (Agree/ Not Sure/ Disagree). The statements include,

1. Health providers have the responsibility to interview the clients with musculoskeletal injuries about the violence.
2. Domestic violence is a private matter. No third party should not interfere.
3. The client might feel offended if you ask them directly about the domestic violence.
4. A sex-worker cannot be a victim of sexual violence.
5. A client complaining insomnia can be a GBV victim.
6. A rape case is a serious case and need urgent care.
7. The gender-based violence can be experienced by all males, females and LGBTs. (lesbians, gays, bisexuals, trans-genders)
8. The survivor has to follow all treatment procedures as the service provider is doing for his/her own benefit.

The supportive environmental factors were about the infrastructure and the readiness of the health care sector such as medication and other supplies (guidelines/protocol private room for counselling, forms for documentation, financial risk protection, HIV test kit. emergency contraception, contact list for referral). The answerable options included "No/ Not Sure/ Yes", and the scoring ranged from 0-7 points. Then the question on if the participants have ever questioned injured patients for suspected GBV within two years (for example, is this injury was caused from beating by your husband or someone?) was asked separately.

The questionnaire was developed by referring to various articles [12, 14-17] and the content and construct validity was checked by three experts by using the Item Objective Congruence Index. The IOC score for the whole questionnaire package was 0.91. A pilot study was also conducted among 30 nurses from various region except Yangon using google forms before the final study. Then the Cronbach Alpha test was run. The Cronbach's alpha results 0.783 for the 9 knowledge questions, 0.814 for 8 attitude questions, 0.741 for 7 items on supportive environmental factors. The questions were adjusted according to the results.

The ethical approval for conducting the study was received from Research Ethics Review Committee, Chulalongkorn University and the permission to conduct the study was obtained from Yangon Regional Health Department and each administration team of the hospitals.

RESULTS

In this study, 322 participants (mean age=35.29±8.210); 79 junior nurses, 226 senior nurses and 17 nurses took part. There was 5.6% of male nurses involved. Among them, 56.8% have completed the Diploma in Nursing and Midwifery and 41% were Bachelor in Nursing Science (B.N.Sc) degree holders. Only 2.2% of the respondents finished the post-graduate level. The distribution of the participants in three levels of hospitals; station, township and regional is almost equal (about 33% of each). The working experience of the nurses ranged from 1-34 years and the average was 10 years.

This study explored four trainings background related to GBV screening. The vast majority have never attended the GBV response training (96.3%) and multidisciplinary teamwork training (94.4%). For other training, 29.2% of the respondents have completed STIs management training and 17.4% finished communication skills training. These data are shown in table 1.

Table 1- Socio-demographic Characteristics of Participants (n=322)

Socio-demographic Background	Frequency	Percent
Age		
Mean (±Std. Deviation)	35.29 (±8.210)	
Range	20-57	
Sex		
Male	18	5.6
Female	304	94.4
Education		
Diploma in Midwifery and Nursing	183	56.8
Bachelor in Nursing Science	132	41.0
Master in Nursing Science	7	2.2
Workplace		
Station (16-25 bedded)	106	32.9
Township (25-100 bedded)	105	32.6
Regional (200-500 bedded)	111	34.5
Position		
Junior Nurse (Fresh graduate, Working experience 1-3 years)	79	24.5
Senior Nurse (Working experience 3-7 years)	226	70.2
Head Nurse (Working experience >7 years)	17	5.3
Working Experience		
Mean (±Std. Deviation)	10.484 (±6.631)	
Range	1-34	
Ever attended GBV response training		
No	310	96.3
Yes	12	3.7
Ever attended STI management training		
No	228	70.8
Yes	94	29.2
Ever attended multidisciplinary teamwork		
No	304	94.4
Yes	18	5.6
Ever attended communication skills training		
No	266	82.6
Yes	56	17.4

Table 2 shows the level of knowledge of the participants. The knowledge part included the statements such as the forms of GBV, negative impact of GBV on health, and health care services to be provided to a GBV patient. The level of the knowledge was categorized into three groupings. The number of participants according to the level of knowledge was low (14.3%), moderate (78%) and high (7.7%). Most participants answered economic dependency as a form of GBV although it is a contributing factor. Another obvious fact is the participants' misunderstanding of cervical cancer screening as a health care procedure for post-rape care and providing extra contraceptives as a follow-up care. Most of them knew the organizations to be contacted to get social support for a GBV survivor.

Table 2- Participants by Level of Knowledge (n=322)

Level of Knowledge	Frequency	Percent
Low	46	14.3
Moderate	251	78.0
High	25	7.8

The attitude was also classified into three groups; positive, neutral and negative by mean cut-off point. The majority of the respondents had neutral attitude (82.9%) and only 10.2% had negative attitude. Only 6.8% had the positive attitude and 85.7% of the respondents answered that the GBV patient should follow every procedure the health care provider is providing as if they might be forgetting about the patient's right to autonomy. The participants by level of attitude is shown in table 3.

Table 3- Participants by Level of Attitude

Level of Attitude	Frequency	Percent
Negative	33	10.2
Neutral	267	82.9
Positive	22	6.8

Table 4 presents the level of supportive environmental factors. For the supportive environmental factors, 42.9% of the nurses answered there is a GBV response guideline/ protocol in their workplace and 40.4% answered that they have special record form for post-rape survivors. For the infrastructure, only 10.6% of the participants answered there is no private room for history taking, counselling and physical examination in their workplace.

Table 4- Level of Supportive Environmental Factors

Level of Supportive Environmental Factors	Frequency	Percent
Low	33	10.2
Moderate	267	82.9
High	22	6.8

Concerning the medical supplies, HIV rapid test kit was available in 91.9% and emergency contraceptive pills was in handy in 59.9% of participants' workplace. The health care services for a rape survivor was free of charge and the cost could be claimed from the relevant health administrator in 41.6% of the participants' hospitals.

Among 322 participants, only 27% of them have ever asked an injured patient for suspected GBV within previous two years referring to table 5.

Table 5 –Respondents by Screening GBV Cases

Ever screened for GBV cases last two years	Frequency	Percent
No	235	73
Yes	87	27

Table 6- Association between Socio-demographic Characteristics, Level of Knowledge, Level of Attitude, Level of Supportive Environmental Factors and Screening for GBV Cases

Independent Variables	Ever asked an injured patient for suspected GBV		P-value
	Yes n(%)	No n(%)	
Socio-Demographic Characteristics			
Age			
20-35	34 (10.6)	132 (41)	0.008*
36-57	53 (16.5)	103 (32)	
Sex			
Male	8 (2.5)	10 (3.1)	#0.102
Female	79 (24.5)	225 (69.9)	
Education			
Diploma	41 (12.7)	142 (44.1)	0.011*
Bachelor	46 (14.3)	86 (26.7)	
Master	0 (0)	7 (2.2)	
Workplace			
Station	34 (10.6)	72 (22.4)	0.231
Township	29 (9)	76 (23.6)	
Regional	24 (7.5)	87 (27)	
Position			
Junior Nurse	14 (4.3)	65 (20.2)	0.009*
Senior Nurse	64 (19.9)	162 (50.3)	
Head Nurse	9 (2.8)	8 (2.5)	
Working Experience			
1-10 years	40 (12.4)	128 (39.8)	0.209
11-34 years	47 (14.6)	107 (33.2)	
Ever attend GBV response training			
Yes	3 (0.9)	9 (2.8)	#1
No	84 (21.6)	226 (70.2)	
Ever attended STI management training			
Yes	33 (10.2)	61 (18.9)	0.039*
No	54 (16.8)	174 (54)	
Ever attended multidisciplinary teamwork training			#0.031*
Yes	9 (2.8)	9 (2.8)	
No	78 (24.2)	226 (70.2)	
Ever attended communication skills training			
Yes	17 (5.3)	39 (12.1)	0.620
No	70 (21.7)	196 (60.9)	
Level of Knowledge			
Low	8 (2.5)	38 (11.8)	
Moderate	74 (23)	177 (55)	0.175
High	5 (1.6)	20 (6.2)	
Level of Attitude			
Negative	11 (3.4)	22 (6.8)	0.387
Neutral	68 (21.1)	199 (61.8)	
Positive	8 (2.5)	14 (4.3)	
Level of Supportive Environmental Factors			
Low	8 (2.5)	40 (12.4)	0.220
Moderate	69 (21.4)	172 (53.4)	

Independent Variables	Ever asked an injured patient for suspected GBV		P-value
	Yes n(%)	No n(%)	
High	10 (3.1)	23 (7.1)	

*p-value<0.05
#Fisher's Exact Test

Table 6 shows the association between the dependent and independent variables. After running the bivariate analysis, the association factors with the screening for suspected GBV cases are age (p-value=0.008), education (p-value=0.011), job position (p-value=0.009), ever attended STI training (p-value=0.039) and ever attended multidisciplinary teamwork training (p-value=0.031).

All variables with p-value less than 0.2 were included in the multivariate analysis. Table 7 shows the results from the binary logistic regression analysis.

Table 7- Binary Logistic Regression Analysis

Variables	Screening for GBV Cases		P-Value
	OR	95% CI	
Age			
20-35	Ref		>0.001*
36-57	1.998	1.209-3.3	0.007*
Sex			
Male	Ref		0.010*
Female	0.439	0.167-1.151	0.094
Education			
Diploma	Ref		0.053
Bachelor	1.853	1.125-3.051	0.015
Master	0.000	0.000	0.999
Job Position			
Junior Nurse	Ref		0.012*
Senior Nurse	1.834	0.961-3.499	0.066
Head Nurse	5.223	1.715-15.909	0.004*
Ever Attended STI Management Training			
No	Ref		0.410
Yes	1.743	1.034-2.938	0.037*
Ever Attended Multidisciplinary Teamwork Training			
No	Ref		0.030*
Yes	2.897	1.110-7.561	0.030*
Level of Knowledge			
Low	Ref		0.176
Moderate	1.986	0.884-4.461	0.097
High	1.187	0.343-4.110	0.786

From the binary logistic regression analysis, age is significantly associated with the screening practice. Older nurses (36-57 years old) have 1.998 times likelihood to screen for GBV cases than the younger nurses (20-35 years old). Like that, the nurses with a bachelor degree tend to 1.853 times screen more than those with a diploma. Another factor that is found to be associated with the screening behaviour is the job position. Head nurses tend to screen GBV cases 5.223 times more than the junior nurses. The nurses who have attended the STIs management training also have the 1.743 times likelihood to screen more. Next, nurses who have completed the multidisciplinary teamwork training have the trend to screen GBV cases 2.897 times more than who have not.

DISCUSSION

This cross-sectional study was conducted to explore the nurses' behavior on screening the injured patients for suspected GBV cases. A total 322 nurses participated in this study. Among them, only 27% have ever screened injured patients for suspected GBV cases and the rest 73% haven't. This number is a lot lower than the study conducted in Brazil where 51 nurses and 170 physicians participated. In that study, only 13% of nurses and 10% of physicians have never asked for the suspected GBV [18]. Another studies found the rate of health care personnel who haven't queried for GBV cases was 23% to 32%[16, 19, 20]. So, the rate of screening GBV cases among the nurses in Yangon Region was a lot lower comparing with the similar studies. The result indicates that the nurses should be more trained for the GBV screening and response as the GBV victims can show up at the health facilities with different signs and symptoms without revealing about the violation.

Among the respondents, 63.4% agreed that it is the health care provider's responsibility for screening the possible violence cases. Similarly, in the study among 685 health care workers in Oxfordshire revealed that 69% of them agreed health care providers should be more involved in identifying the domestic violence cases [16].

This study found out that the age was related to the screening practice. Next, the head nurses have a better screening of GBV cases than the junior nurses. So, the junior nurses should be trained to include the GBV as one of the patient's background. It will be better if GBV response management was included in the nursing curriculum at the undergraduate level as many studies found out this can raise both knowledge and perception towards GBV [21, 22].

The health care personnel who have attended the STIs and multidisciplinary teamwork training seems to screen the potential GBV cases than who haven't. The similar studies which show the association between such trainings and the screening practices was not found.

This is the first study that evaluate the knowledge and attitude of the nurses on GBV, assess the readiness of the health care facilities for GBV response and explore the GBV screening practice among nurses in Myanmar.

However, this study has many limitations as this is a cross-sectional study on whether the nurses are screening GBV cases or not using a questionnaire. The study should also include assessing the health care practices for GBV survivors by mixed method, both observation and questionnaires. Some recall bias might also present in this study in answering the questions on training background.

CONCLUSIONS

In conclusion, the nurses in Yangon Region had weakness in practicing screening GBV cases. The women in rural area are supposed to have less GBV response services accessibility than in urban [23]. It is recommended that the nurses in all levels of hospitals including the station level which are locating in rural areas should be included in the GBV response trainings. In addition, the policy makers should develop a specific GBV guideline/ protocol and consider to include the GBV response management in the under-graduate level curriculum and to develop specific GBV response protocol. Further studies focusing more health care practices for GBV response other than the screening practice alone should also be conducted.

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THE SOCIOCULTURAL DETERMINANTS OF ANEMIA AMONG WOMEN IN REPRODUCTIVE AGE IN EASTERN INDONESIA: ANALYSIS OF INDONESIA FAMILY LIFE SURVEY EAST (IFLS EAST) 2012

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ABSTRACT

Introduction: Anemia is a critical public health problem related to women's reproductive health. In 2018, the Basic Health Survey (RISKESDAS) of Indonesia revealed a high proportion of anemia in pregnant women which was 48.9%. Maternal mortality rate in Eastern region where the sociocultural diversity in term of ethnicity, religion, and specific cultural practices exist, was the highest in Indonesia compared to other regions. Anemia presents one of many risks contributing to up to 20% of maternal mortality.

Objectives: Based on the social determinants of health theory, this current study utilizes the Indonesia Family Life Survey East (IFLS EAST) 2012 to examine the socio-cultural determinants of anemia among women in reproductive ages in Eastern Indonesia.

Methodology: Based on the social determinants of health theory, this current study utilizes the Indonesia Family Life Survey East (IFLS EAST) 2012 to examine the socio-cultural determinants of anemia among women in reproductive ages in Eastern Indonesia.

Conclusion: The prevalence of anemia among the respondents is 43.82%. The total ethnic groups of the respondents are 303 and 36.35% of total respondents have the internal migration experience. The multivariate analysis shows that age, BMI, pregnant status, level of education, migration experience, ethnicity, and religion were significantly associated with anemia. By contrast, dietary (intake of meat and fish), marital status, income level, involvement in community activity, religious feeling, involvement in decision making in selection of food type, and place of residence were not significantly associated with anemia. The constitutional factors, the general socioeconomic, culture, environmental, living, and working conditions are the predictors of anemia. The community health center needs to prioritize the supplementation of anemia for women in reproductive age particularly pregnant and underweight women in Eastern compared with Western. Therefore, public health policy makers need to address the socio-cultural issues including women's education, internal migration, religion, and ethnicity with the appropriate methods and effective communication in accordance with the local culture.

Keywords: anemia, sociocultural, women in reproductive age, Eastern Indonesia

INTRODUCTION

Anemia is defined as an insufficient condition of red blood cells or the capacity to carry oxygen to fulfill the physiologic need that differs by sex, age, altitude, smoking and pregnancy status [1]. Anemia is one health concern for women in low income countries. The effects of anemia not only contribute to the mother's health status, but also to her infant's health. Anemia is an indicator of both poor health and poor nutrition [2]. In low and middle income countries where the problem is more complex, anemia is a worldwide public health challenge disproportionally affecting childbearing age and other complications during pregnancy [3,4]. Anemia also increases maternal deaths up to 20% but for every 10 g/L increase in hemoglobin will decrease that risk [2,5,6]. Globally, pregnant women and children are the most vulnerable group regarding anemia [7].

Globally (excluding China), the WHO [8] reported 288.4 million women 15-49 years were anemic (35% of nonpregnant and 51% of pregnant women). Nonpregnant women aged 15-49 years with anemia were 41.5% whereas globally totaled 29.0% and pregnant women were 48.7% whereas globally were 38.2% [9]. Additionally, all women of reproductive age 15-49 years in South-East Asia totaled 41.9% with anemia compared with 29.4% globally.

Regarding RISKESDAS national health survey of Indonesia in 2018, the proportion of anemia among pregnant women was 48.9%, which increased from 37.1% in 2013 [10]. The estimate used in the Indonesia Family Life Survey (IFLS) shows the prevalence of anemia was 36.0%, for nonpregnant women ≥15 years in 1997, increasing in 2000 to 38.8% and in 2008 to 26.6% [11]. The proportion of anemia in rural areas is higher than urban, for example, 22.8% of people in rural areas had anemia [12]. Maternal deaths in Eastern Indonesia are the highest according to data from the Ministry of Health. Strong cultural beliefs and practices in eastern Indonesia might constitute risk factors regarding maternal health, as shown in this study measured by anemia. Cultural and religious beliefs and practices include food restrictions that comprise inescapable causes of anemia [13]. Beliefs to avoid other kinds of protein sources from animals have been identified as stemming from cultural and religious beliefs [14].

In Indonesia, poverty is most severe in the remote eastern islands [14]. One report from Ministry of National Development Planning in Sonny [15] described that poverty level was still high in most provinces in Eastern Indonesia. The percentage of poor populations was highest in Maluku-Papua and Nusa Tenggara Island [16]. Many cases of lowered quality of health related to women of reproductive age have existed in Eastern Indonesia. Access to community health care also taken a part to the worsens conditions in Eastern [17]. This study is the first study examined the determinants of anemia focusing on sociocultural factors in particular part of Indonesia which was in Eastern with its several diversities in term of ethnicity, religion, language, and culture. This study aimed to identify the sociocultural determinants of anemia among women of reproductive age in Eastern Indonesia.

METHODOLOGY

Data source

This current study employed a cross sectional quantitative research design and used secondary data, IFLS EAST 2012. IFLS East 2012 was conducted in seven provinces: East Nusa Tenggara, East Kalimantan, South-East Sulawesi, Maluku, North Maluku, West Papua, and Papua.

Study Population and Sample size

This study administrated to around 10,000 individuals in 2,500 households living in 99 communities (enumeration areas) [18]. Unit analysis of this study was woman in reproductive age 15-49 years. The respondents were selected by stratified multistage sampling. Totally 2,330 women was involved in the survey. Inclusion criteria of the sample comprised women in reproductive aged 15 to 49 years and tested for hemoglobin level at the survey time.

STATA (StataCorp. Released 2017. Stata Statistical Software, Version 15. College Station, TX: StataCorp LLC) was used to analyze data. Therefore, the study employed univariate, bivariate and multivariate statistical analysis. The univariate analysis was done to describe the frequency and percentage of each independent variable. The bivariate analysis (Chi-Square test) was used to assess the association between independent variables and anemia status. Then multivariate (binary logistic regression) analysis was used to examine the correlation between socio-cultural and anemia status after controlling other factors.

This study conceptualized the variables based on socio determinants of health (SDH). SDH consists of 5 big domains including: age, sex, and constitutional factors; individual lifestyle factors; social and community networks; living and working networks; and general socio-economic, culture, and environmental conditions [19]. This study used model K, IIIA, IIIB, and US to gain the information. Health measurements result including hemoglobin level, weight and height was tested during the survey time. BMI (Body Mass Index) was calculated by dividing

weight in kilograms (kg) by squared height in meters. WHO has standard to classify BMI level, there are underweight (BMI<18.5 kg/m^2), normal (BMI 18.5-24.9 kg/m^2), and overweight/obese (BMI ≥25 kg/m^2) [20].

Outcome of this study is anemia status. It was categorized by hemoglobin level that has been tested to all respondents aged more than 1 year including women of reproductive age in the survey time. Anemia status was defined into anemia if hemoglobin level <12 g/ld for nonpregnant woman and <11 g/ld for pregnant woman. Meanwhile, for those who has hemoglobin level above the mentioned cut off was defined into not have anemia.

RESULTS

Totally, of 2,330 women aged 15-49 years participated in the IFLS East 2012 [21]. The general characteristics of respondent are presented by Table.1. According to age, sex, and constitutional factors, each age group had almost the same proportion within the population. Regarding body mass index, majority of women had the normal. Only 2.06% of women were pregnant and surprisingly the average number of children was 0.06. In the individual lifestyle factors, more than three fourth of respondents did not intake meat twice or more last week of the survey, and more than a half of respondents did not intake fish last week of survey. Majority of women in this study were married at that time of survey. Predictably, because of the poverty, most respondent have earned salary in last 12 months less than 10 million. One third of respondents only graduated from elementary school. In social and community networks, 89.40% out of respondent did not involve in community activity (*arisan*). In living and working conditions, more than a half respondent had internal migration experience. The proportion of women lived in each province was almost eventually distributed. Regarding the ethnicity, more than a half of women were from ethnic groups in Sulawesi and Maluku Island. The smallest proportion was showed by ethnic group from Sumatera, Chinese, and Arabic. In this study Islam was presented as the majority group, followed by protestant, Catholic and other (Hindu, Buddhist, and other). By 1,846 of 2,330 respondents claimed themselves had somewhat religious. Most of women did not involve to select food type and 68% of them lived in rural area.

The Chi-square analysis revealed that BMI, pregnancy status, level of education, ethnicity, place of residence, and internal migration experience were found significantly associated with anemia (the table is not presented). However other independent variables showed without any association with anemia.

Table 1 Descriptive characteristics of the study population (n = 2,330)

Variables	Frequency	Percentage
Age, sex and constitutional factors		
Age		
Early reproductive age (15-24 years)	690	29.61
Mid reproductive age (25-34 years)	734	31.50
Late reproductive age (35-49 years)	906	38.88
BMI (Body Mass Index)		
Underweight	817	35.06
Normal	1,096	47.04
Overweight/Obese	417	17.90
Currently pregnant		
Yes	48	2.06
No	2,282	97.94
Individual Lifestyle Factors		
Frequency of meat intake in last week		
Twice or more	332	14.25
Less than twice	1,998	85.75
Frequency of fish intake in last week		
Twice or more	1,100	47.21

Variables	Frequency	Percentage
Less than twice	1,230	52.79
Marital status		
Single	500	21.46
Married	1,698	72.88
Widow, separated, divorced	132	5.67
Income level in last 12 months		
Low (<Rp.10,000,000)	2,028	87.04
Middle (Rp. 10,000,000 – Rp. 35,000,000)	208	8.93
High (> Rp. 35,000,000)	94	4.03
Level of education		
Uneducated	145	6.22
Elementary	789	33.86
Junior High School	422	18.11
Senior High School	689	29.57
University	285	12.23
Social and Community Networks		
Women's involvement in community activity in last 12 months		
Routine	247	10.60
Not routine	2,083	89.40
Living and Working Conditions		
Internal migration experience		
Never migrate	1,483	63.65
Ever migrate	847	36.35
Province of residence		
East Kalimantan	267	11.46
South-east Sulawesi	387	16.61
Maluku	358	15.36
North Maluku	357	15.32
West Papua	304	13.05
Papua	276	11.85
East Nusa Tenggara	381	16.35
General Socio-Economic, Culture, and Environmental Conditions		
Ethnicity		
Ethnic groups from Java Island		
Ethnic groups from Kalimantan Island	278	11.93
Ethnic groups from Bali/Nusa Tenggara Island	100	4.29
Ethnic groups from Sulawesi Island	428	18.37
Ethnic groups from Maluku Island	597	25.62
Ethnic groups from Papua Island	588	25.24
Ethnic groups from Sumatera Island, Chinese and Arabic	318	13.65
Religion	21	0.90
Islam		
Catholic	1,323	56.78
Protestant	205	8.80
Others (Hindu, Buddhist, others)	757	32.49
Religious feelings	45	1.93
Not religious		
Somewhat religious	25	1.07
Religious	1,846	79.23
Very religious	171	7.34
Women's involvement to decide type of food	288	12.36
Involve		
Not involve	588	25.24
Place of residence	1,742	74.76
Urban		
Rural	743	31,89
	1,587	68,11

Binary logistic regression is one of multivariate statistic where the dependent variable is a dichotomous variable [22]. In this study the dependent variable was anemia, with 2 categories: yes or no. The independent variables included in this study were 15 variables from 5 domains explained above. According to rule of thumb mentioned about the number of events per variable in the logistic regression, all the variable might be included into multivariate analysis [23]. However, the multicollinearity test revealed that intake of fish had the high correlation with province of residence. Therefore, variable of province of residence was dropped out [24].

After adjusted to all variables, 7 out of 15 variables were significantly associated with anemia. In the age, sex and constitutional factors, women were in aged 25-34 years or mid reproductive age tend to have more risk of anemia compared to early reproductive age. BMI was associated with anemia, compared with normal women, underweight women were more likely to be anemic (AOR=3.1, 95% CI 2.54-3.78). Another variable that significantly associated with anemia was pregnant status. Pregnant women were 7.6 times more likely to be anemic compared with unpregnant women. In the individual lifestyle factor, level of education had association with anemia. Compared to women graduated from university, uneducated women had 54% reduce the risk of anemia. The dietary in last week (intake of meat and fish), marital status, and income level did not show the association with anemia. Women involvement in community activity also did not have association with anemia. However, the internal migration experience revealed the weak significant association with anemia after adjusted with other variables. Compared with women who have not migrated, women who have ever migrated were 1.3 times more likely to be anemic (AOR=1.348, 95% CI 1.073-1.693).

In the general socioeconomic, culture, and environmental factors, ethnicity were found weak association with anemia. After controlled with other variables, compared with ethnic women from Java Island, ethnic women from Maluku and Kalimantan were less likely to be anemic (AOR=0.674, 95% CI 0.477-0.952, AOR=0.575, 95% CI 0.341-0.969). Regarding the religion, Christian women were 1.4 time more likely to be anemic compared with Islam women (AOR=1.416, 95%CI 1.107-1.811). Other independent variables including religious feeling, women's involvement to decide type of food, and place of residence were found without any association with anemia.

Table 2 Binary Logistic Regression Analysis of Anemia

Factors		Anemia		
		Adjusted Odd Ratio	95% CI Lower	Upper
Age, sex and constitutional factors				
Age	Early reproductive age (15-24) (ref)			
	Mid reproductive age (25-34)	1.331* (0.033)	1.023	1.731
	Late reproductive age (35-49)	1.212 (0.164)	0.925	1.588
Body Mass Index (BMI)	Normal (ref)			
	Overweight/obese	0.804 (0.093)	0.619	1.032
	Underweight	3.097***(0.000)	2.538	3.779
Currently pregnant	No (ref)			
	Yes	7.637***(0.000)	3.718	15.684
Individual Lifestyle Factors				
Frequency of meat in last week	Twice or more (ref)			
	Less than twice	1.150 (0.306)	0.880	1.502
Frequency of fish in last week	Twice or more (ref)			
	Less than twice	0.864 (0.255)	0.671	1.111
Marital status	Single (ref)			
	Married	0.841 (0.214)	0.641	1.104
	Widow, separated, divorced	0.742 (0.203)	0.469	1.174

Factors		Anemia		
		Adjusted Odd Ratio	95% CI Lower	Upper
Income level in last 12 months	Middle (ref)			
	High	1.017 (0.951)	0.592	1.748
	Low	1.363 (0.067)	0.979	1.899
Level of education	University (ref)			
	Senior High School	0.849 (0.307)	0.622	1.161
	Junior High School	0.999 (0.994)	0.706	1.411
	Elementary	0.972 (0.867)	0.695	1.359
	Uneducated	0.458**(0.002)	0.281	0.746
Social and Community Networks				
Women's involvement in community activity	Routine (ref)			
	Not routine	1.137 (0.010)	0.849	1.551
Living and Working Conditions				
Internal Migration experience	Never migrate (ref)			
	Ever Migrate	1.348* (0.010)	1.073	1.691
General Socio-Economic, Culture, and Environmental Conditions				
Ethnicity	Ethnic groups from Java Island (ref)	0.571* (0.035)	0.339	0.962
	Ethnic groups from Kalimantan Island	0.890 (0.541)	0.614 0.603	1.291 1.144
	Ethnic groups from Bali/NT Island	0.831 (0.257)	0.470	0.938
	Ethnic groups from Sulawesi Island	0.664 (0.020)	0.799	1.860
	Ethnic groups from Maluku Island	1.219 (0.357)	0.448	2.988
	Ethnic groups from Papua Island	1.157 (0.763)		
	Ethnic groups from Sumatera Island, Chinese and Arabic			
Religion	Islam (ref)			
	Catholic	0.922 (0.669)	0.637	1.336
	Christian	1.419** (0.005)	1.109	1.814
	Hindu, Buddhist, and other	1.450 (0.265)	0.755	2.785
Religious feeling	Not religious (ref)			
	Somewhat religious	1.527 (0.347)	0.632	3.689
	Religious	1.935 (0.163)	0.765	4.896
	Very religious	1.393 (0.475)	0.561	3.454
Women's involvement to decide type of food	Involve (ref)			
	Not involve	0.827 (0.123)	0.660	1.072
Place of residence	Urban (ref)			
	Rural	0.946 (0.611)	0.762	1.173

N = 2,330
LR chi-square = 255.16*** (0.000)
Pseudo R square = 0.0799
Degree of freedom = 31
Note: *p < 0.05 **p <0.01 *** p <0.001

DISCUSSION

Prevalence of anemia in Eastern in 2012 was 43.82% which was getting higher to be 48.9% in 2018 national survey [12]. Regarding age, sex, and constitutional factors, found that age, BMI and pregnant status were significantly associated with anemia whereas number of children were not. BMI and pregnancy status had the strong significant level to anemia. Predictably, underweight women are more likely to have anemia. Similar with studies in Myanmar, China, Azerbaijani, and India that revealed underweight women are more likely to have anemia [24-27]. BMI is one health assessment to determine nutrition status by calculate weight and height [28]. Underweight woman tends to be anemic because her nutrition was insufficient to support the metabolic process

including low intake of iron and Vitamin B12 which useful to produce red blood cells. Pregnant woman were more likely to have anemia as well as the result of studies in other countries [24,29,30]. Medical point of view stated that pregnant women have to supply iron not only for themselves but also their fetus [31]. That means pregnant woman needs more iron to cover the red blood cells production. Regarding age group, the result in this study was consistent with the prior studies in Sudan and Indonesia that revealed age is the main predictors to anemia [32,33]. Age group of 25-34 years old is the first marriage age and the most reproductive to be pregnant. Related to bleeding of menstruation, younger women were more likely to have anemia while related to marrow bone capability, older women were more likely to have anemia [34]. Those conflicting statements might be the reason why this study found the association of age and anemia is in the mid reproductive age. Women who had more experiences of pregnant and delivery also had bleeding experiences [27]. Bleeding may decrease the number of red blood cells including hemoglobin. Pregnant history also related to number of children, study in Ethiopia and Myanmar found women who had more children (high pregnant history) were higher risk to be anemic [35,36]

Individual lifestyle factors in this study consists of meat intake, fish intake, marital status, income level, and education level. Only education level which significantly associated with anemia. This finding was also found by study in Bali, Indonesia and Ethiopia [37,38]. Education may influence to health knowledge, socio-economic, and at the end it will affect the ability to purchase a nutritious food [37]. Surprisingly, Uneducated had less risk to have anemia. One example of education description in Eastern Indonesia was found in Sorong, Papua Province. Student graduated from high school do not always reflect the ability to read and write properly [39]. Regarding the low-income level, uneducated women could not purchase the haeme-sources so they might grow the veggies and rose the hens. Additionally, this study found that educated women do not always describe the high-income level and good knowledge. Intake of meat and fish (the main sources of haeme-iron) were not significantly associated with anemia. The possible reason is because of malabsorption of iron. Although the intake has been sufficient, but if the inhibitor food was consumed together with haeme-iron, it will disturb the absorption of iron [34]. Those inhibitors such as tea, coffee, chocolate, and some kind of drugs. Regarding marital status, the result was different with the study in Nigeria that revealed unmarried women tend to have high dependency in term of economic to buy a food [40]. Differently, women lived in Eastern Indonesia has the survival ability to adapt to the nature thus lead them to be independent. Surprisingly, income level in past 12 months had lack associated with anemia. It might be due to the survival ability and the availability of natural resources.

Women's involvement in community activity (arisan) was not associated with anemia. There is a lack of literature discuss how community activity affects health. One study discussed community activity may increase the knowledge of health and as an organization to ease the distribution of vitamin and iron pills [41,42]. Unfortunately, it is still rare to held the arisan in Eastern Indonesia because they did not have the stable income to saved. Arisan is the saved method with frequently within some peoples and each member will get the total saving during one period.

In term of living and working conditions, internal migration experience has significantly associated with anemia. For those who have ever moved across the village and stayed more than 6 months tend to have higher risk of anemia. The possible reason is because migrant need to adapt to find the food and improve their economic status when involved in new community ([43]. Migration may affect health in term of different culture and interaction behavior between origin and destination place [44]. According to ethnicity, ethnic group of Maluku and Kalimantan were less likely to be anemic compared with Javanese. In term of geographical conditions, this finding was supported by study in Myanmar that found geographical zone was one the risk factors of anemia, for example risk to have natural disaster and food insecurity [36]. Maluku is an archipelago that has the big fishing industry while Kalimantan Island has many rivers. Maluku is one of the largest contributor of national fish

consumption and fishery which the highest contributor for province's GDP (Gross Domestic Product) [45]. The availability of large quantities of fish may indicate high consumption of fish. Fish is the source of haeme-iron to support red blood cells production. This study found Christian women tend to be anemic compared with Islam. The possible reason is the Church recommends a total 180-200 days of fasting per year and prohibits consumption of meat, dairy products, olive oil, and occasionally fish on fasting day [46]. This indicate that women will not eat iron sources more than a half of whole year. However, study in India did not find the significant association between religion and anemia [27]. The strong correlation between religion and ethnic group was found in this study. Religious feeling had no association with anemia. In the patriarchy system, women's involvement to decide the type of food did not associate with anemia. Even though woman involved to decide the food, but she was not the only one decision maker. Sometimes woman's mother in-law also the most influencer in the household. Place of residence was not significantly associated with anemia. It may be assumed that rural area in Eastern Indonesia still have the rich natural resources. Argue the previous study that stated rural area only have unvaried food, people in Eastern still practice hunting animals in the forest [47]. Therefore, intake of varied food including iron sources are still sufficient.

CONCLUSIONS

The sociocultural determinants also take a part to be predictors of anemia. The factors associated with anemia are age, BMI, pregnancy status, education level, migration experience, ethnicity and religion. This study provides relevant knowledge and a greater understanding about the general determinants, particularly socio-cultural determinants of anemia among women aged 15-49 years old. Participation is needed from all stakeholders to manage the negative effects of socio-cultural factors which may influence anemia. Equitable distribution of government programs (iron pills program) should be spread throughout the Indonesian territory including education, health, economic, and agriculture. The community health center needs to prioritize the supplementation of anemia for women in reproductive age particularly pregnant and underweight women in Eastern compared with Western. Therefore, public health policy makers need to address the socio-cultural issues including women's education, migration, religion, and ethnicity with the appropriate methods and effective communication in accordance with the local culture. The health, education, and infrastructure systems in Eastern Indonesia should be improved to encourage the development. The further research should combine the qualitative approach to elaborate the social and culture factors deeply which might be conducted by ethnographic research.

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MALE FAMILY PLANNING PRACTICE AMONG HUSBANDS OF REPRODUCTIVE-AGE MARRIED WOMEN IN RURAL AREAS OF KACHIN STATE, MYANMAR

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ABSTRACT

Introduction: At present, it is widely recognized that men are key agents where a wide range of sexual and reproductive health (SRH) practices is concerned. The most important factor that appears to promote male participation in family planning practice is having a better relationship between men and women, such that both view the practice of family planning as a joint and equal responsibility. Another important factor is the knowledge that condom use by men can markedly reduce the risk of HIV/STD transmission to their partner.
Objectives: The objectives of this study were to determine the prevalence of male contraceptive use among husbands of reproductive age women, factors associated with condom use, and predictors of condom use by men.
Methodology: This study applied a socio-ecological model. A community-based cross-sectional study was conducted during April 4 to May 3, 2019. A total of 419 husbands of reproductive-age women were enrolled in this study through multi-stage sampling. The data were collected by face-to-face interviews using a structured questionnaire. For statistical analysis, descriptive statistics and logistic regression were applied.
Results: Over half (52.2%) of the male respondents were over 34 years of age, mean (Standard Deviation) age was 35.1 (7.85) years and most of the respondents were Christian (90.7%). Overall contraceptive prevalence among the couples in this study was 77.3%, however the prevalence of use of a male method of contraception (i.e., condom, vasectomy, withdrawal) was only 29.8%. Results indicate that age group of 25-34 years was significantly associated with male family planning practice. The majority of respondents were low socio-economic status, but high socio-economic status was significantly associated with male family planning practice (p-value=0.044). Moreover, receiving information about family planning was significantly associated with male family planning practice. After using multiple logistic regression, predictors of male contraceptive use include monthly income more than 150,000 kyats (~US$100) (AOR=3.349; 95% CI=1.362-8.239), source of information from posters/pamphlets/flyers (AOR=1.785; 95%CI=1.014-3.142), and types of information from media (AOR=3.001; 95%CI=1.156-7.792).
Conclusion: Family planning services and information should be tailored to the context of rural Myanmar. Local government and authorities should implement comprehensive health programs which focus not only on women but also on their husbands. There should be couple counseling and participation of both women and men in campaigns to promote family planning.
Keywords: Male family planning practice, rural, Kachin State, Myanmar.

INTRODUCTION

Myanmar has the second highest maternal mortality ratio (MMR) among ASEAN countries at 282 deaths per 100,000 live births, whereas the comparable figures are 161 in Cambodia and 20 in Thailand. Approximately 2,800 women die every day during pregnancy and child birth, and the under-five mortality rate is 72 deaths per 1,000 live births, compared to 29 in Cambodia and 12 in Thailand [1]. Myanmar updated and

renewed the commitments regarding with family planning situation at the Family Planning Summit in London, UK on July 11, 2017. The government of Myanmar views family planning as critical to saving lives, protecting mothers and children from death, ill health, disability, and under development. Myanmar planned the targets: to increase CPR from 41 percent to 50 percent by 2015 and above 60 percent by 2020 [2]. Male participation in family planning is very important in order to improve reproductive health and birth spacing programs and also to reduce the maternal mortality and transmission of HIV/AIDS [3]. Reproductive health includes both women and men, however the range of family planning methods for men (condoms, vasectomy and withdrawal) are fewer than for women. Thus, family planning programs have focused more on women according to FP2020 [4]. In 1994, at the International Conference on Population and Development, it was stated that organizations that are providing family planning services should focus not only on women but also on men in order to achieve optimal results [5].

Globally, the contraception prevalence rate (CPR) has increased from 54.0% in 1990 to 57.4% in 2015. In Asia, the CPR has slightly increased from 60.9% to 61.8%, and in Latin America and the Caribbean it has remained the same at 66.7% [6]. In Myanmar, half of women (49.9%) do not use modern contraceptive methods, and 16.0% cannot access any contraceptive methods. According to a UNFPA report, the CPR in Myanmar was 51.3% and unmet need for family planning was 16% in 2017 [7]. Men are key decision makers, and this authority is to related family planning decisions. Male participation is a way of supporting their own and their spouse's reproductive health needs. In addition, a man's attitude and knowledge level of family planning may influence seeking maternal and newborn health care services [8].

Promoting family planning is one of the effective strategies to reduce unmet need for contraception among married women. Governmental and non-governmental organizations (NGOs) provide the most support for family planning in most countries in South-East Asia [9]. Many studies found that the condom was the most common family planning method ever used among men, and availability of information on contraceptive methods influenced the use of male contraception [10,11]. Another important health benefit is that condom usage can markedly reduce HIV/STD transmission between sex partners.

In Myanmar, the use of male contraception is lower than female contraception because it is a cultural norm that contraception is primarily the women's duty. In addition, some religious teachings consider family planning to be a women-only issue. Therefore, this study aimed to study the prevalence of male contraceptive use among husbands of reproductive-age women, and identify the associated factors and predictors of male family planning practice.

METHODOLOGY

Data source

The study was conducted in rural areas of Kachin State, Myanmar. Kachin State is composed of four districts and 29 townships covering 89,041.8 square kilometers. The total population of Kachin State is 1,689,441. Of these, the rural population was 1,050,473 (62% of total population), and the male to female sex ratio was 113.2 in 2014 according to Myanmar Population and Housing Census 2014. The number of married males and females in rural areas was 326,599 and 317,020, respectively [12].

This study was a community-based, cross-sectional study using structured questionnaires to determine the male method CPR. This study aimed at determining the association between socio-demographic factors, intrapersonal factors, and interpersonal factors, and identifying predictors of male family planning practice among husbands of reproductive-age women.

Study Population and Sample size

The target population was husbands of reproductive-age women (between 15-49 years of age) who were age 18 years or older, and currently living together with their wife for not less than six months prior to the interview. The data were collected from April 4 – May 3, 2019.

Sampling Technique

The desired sample size was calculated using a 95% confidence interval (CI), assuming a 5% margin of error (d) and CPR of married males of 38.2% (based on a previous study) [13]. The prescribed sample size was at least 400. Multistage cluster sampling (Figure 1) was used to select individual respondents. In first step, one district out of 4 districts were selected by using simple random sampling method. Then, among selected district, two townships were randomly selected. Afterwards, among two townships, 17 villages from one township and 5 villages from another township according to number of villages proportionately were also randomly selected. Therefore, the study site included 22 villages from selected two townships. For this study, the face-to-face interview with the structured questionnaires were conducted to the selected respondents from each village recruited by systematic random sampling. To get the required sample size (419 husbands of reproductive age married women) from selected 22 villages, it was calculated depend on the number of household lists of each village and used systematic random sampling with 3 household interval. A total of 419 husbands were recruited into this study.

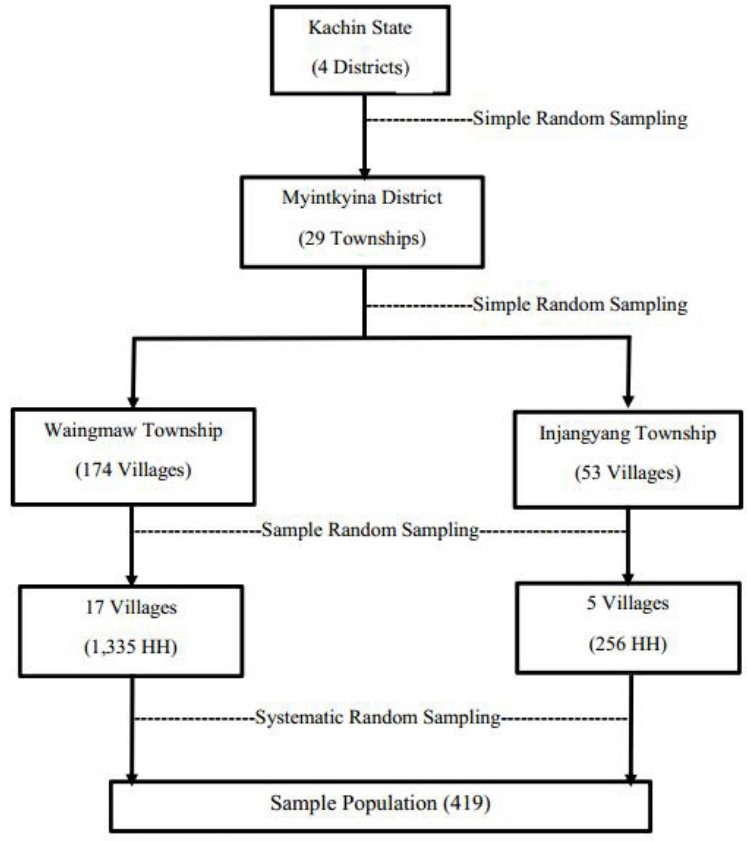


Figure 1 Multi-stage Cluster Sampling

Research Instruments

A self-administered questionnaire was developed as the research instrument based on the objectives, conceptual framework and operational definitions. For validity and reliability, a pilot test was conducted among individuals with the same general characteristics as the target population. The questionnaire consists of three parts as follows:

Part 1: Socio-demographic characteristics: age, educational level, religion, occupation, monthly income, current number

of children, desired number of children, socio-economic status.

Part 2: Intrapersonal factors: knowledge of and attitude toward family planning. For knowledge of family planning, there were 14 items. In the pilot test, the reliability coefficient (Cronbach's Alpha) of knowledge was 0.723. Participants received a score of 1 for a correct answer and 0 for an incorrect answer. Thus, when summed, the range of knowledge scores was 0 to 14. The scores were classified into three levels using Bloom's criteria [14]. If the score was >80% of the total, it was classified as 'good' knowledge; 60%-80% correct was 'fair' knowledge; and <60% correct was 'poor' knowledge. Attitude towards family planning was assessed based on opinion toward various statements. Response options were 'Agree,' 'Uncertain' and 'Disagree' using a Likert scale [15]. Response was scored 3, 2, or 1 for the agree, uncertain and disagree, respectively, for positive attitudes, and 1, 2, or 3 for agree, uncertain and disagree for the negative attitudes, respectively. Thus, potential scores ranged from 14-42 for the 14 attitude questions. The summed score was classified into two groups by using median and quartile deviation, and Cronbach's Alpha was 0.718.

Part 3: Interpersonal factors: availability and accessibility of family planning and source of information about family planning. Eight questions assessed availability of family planning methods, location, distance, transportation, satisfaction with access, convenience and cost for services. Source of information covered four items including type of information such as different types of methods, advantages and disadvantages of each method, dosage and usage and service places, media and motivational effect of media.

Data analysis

The data were coded and analyzed by using SPSS software version 21.0. Descriptive statistics (percentage) were used to describe the independent variables. Simple logistic regression was used to determine the association between the dependent variable (i.e., male use of any method of contraception) and each independent variable. Multiple logistic regression was done by forward (LR) method to examine the predictors of male use of any method of contraception.

Ethical considerations

The study protocol was approved by the Ethics Committee for Research Ethics (Social Science), Faculty of Social Science and Humanities, Mahidol University Institutional Review Board (MUSS-IRB). The certificate of approval number is 2019/064.2603.

RESULTS

Overall CPR among couples in this study was 77.3%. However, the CPR of male contraceptive methods was only 29.8%, and use of contraception by both husband and wife was 30.3% (Figure 1). About one in five respondents (22.7%) reported never using contraception.

Figure 2 Contraceptive Prevalence among Couples

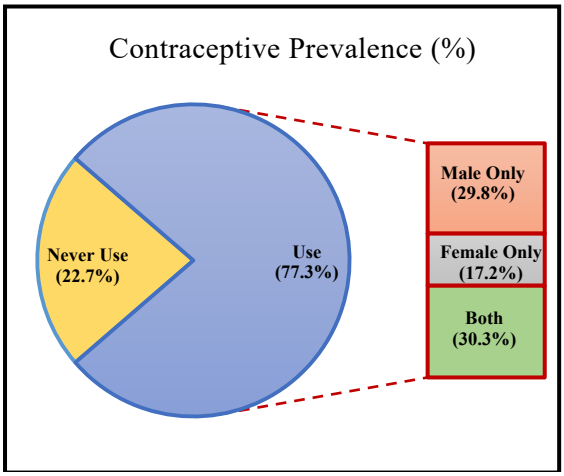


Table 1 shows the association between each independent variable and proportion of males using any method of contraception. Age 25-34 years old was significantly associated with use of a male method of family planning (p-value 0.010). Two-thirds of respondents had middle level of completed education. High education was significantly associated with male family planning practice (P-value=0.023). Husbands who wanted less than five children tended to use a male family planning method more than those who want more than five children. High socio-economic status was significantly associated with male

family planning practice. More than half of the respondents had fair knowledge of family planning, but 54.4% had negative attitudes towards family planning. Nearly half of the respondents stated that family planning services were available every day, and two-thirds stated that it was convenient to go to those places. Having obtained information about family planning from posters/ pamphlets/ flyers was significantly associated with male family planning practice.

Table 1 Association between each dependent variable and male use of any family planning method

Variables	Total		Male Family Planning Practice : Any Method Yes		No		95% CI	P-value*
	n	%	n	%	n	%		
Socio-demographic factors								
Age group								
<25 years	35	8.4	15	42.9	20	57.1	1	
25-34 years	165	39.4	110	66.7	55	33.3	(1.268-5.609)	**0.010***
>34 years	219	52.2	127	58.0	92	42.0	(0.895-3.786)	0.97
Highest education level								
Low Education	128	30.5	66	51.6	62	48.4	1	
Middle Education	268	64.0	168	62.7	100	37.3	(1.031-2.416)	**0.036***
High Education	23	5.5	18	78.3	5	21.7	(1.184-9.661)	**0.023***
Religion								
Christian	380	90.7	225	59.2	155	40.8	1	
Buddhist/Muslim/Hindu	39	9.3	27	69.2	12	30.8	(0.762-3.153)	0.226
Monthly income (kyats)								
< =50,000	170	40.6	89	52.4	81	47.6	1	
50,001 – 150,000	184	43.9	117	63.6	67	36.4	(1.039-2.431)	**0.033***
> 150,001 (~100 USD)	65	15.5	46	70.8	19	29.2	(1.193-4.069)	**0.012***
Current number of children								
≤ 3 children	270	64.4	170	63.0	100	37.0	(0.925-2.086)	0.113
>3 children	149	35.6	82	55.0	67	45.0	1	
Desired number of children								
< 5 children	245	58.6	157	64.1	88	35.9	(0.985-2.179)	0.060
≥ 5 children	173	41.4	95	54.9	78	45.1	1	

Variables	Total		Male Family Planning Practice : Any Method Yes		No		95% CI	P-value*
	n	%	n	%	n	%		
Socio Economic Status (SES)								
Low SES	244	58.2	133	54.5	111	45.5	1	
Medium SES	147	35.1	98	66.7	49	33.3	(1.091-2.555)	**0.018***
High SES	28	6.7	21	75.0	7	25.0	(1.026-6.108)	**0.044***
Intrapersonal factors								
Knowledge of family planning								
Poor	103	24.6	62	60.2	41	39.8	(0.688-2.522)	0.406
Fair	258	61.6	159	61.6	99	38.4	(0.788-2.483)	0.252
Good	58	13.8	31	53.4	27	46.6	1	
Attitude towards family planning								
Negative	228	54.4	135	59.2	93	40.8	1	
Positive	191	45.6	117	61.3	74	38.7	(0.735-1.614)	0.670
Interpersonal factors								
Family planning services available every day								
No	197	47.0	116	58.9	81	41.1	1	
Yes	222	53.0	136	61.3	86	38.7	(0.746-1.634)	0.620
Convenient to go for family planning services								
No	267	63.7	150	56.2	117	43.8	1	
Yes	152	36.3	102	67.1	50	32.9	(1.050-2.412)	**0.029***
Get FP information from posters/ pamphlets/ flyers								
No	126	52.7	68	54.0	58	46.0	1	
Yes	113	47.3	81	71.7	32	28.3	(1.260-3.700)	**0.005****
Get FP information from media								
No	203	84.9	119	58.6	84	41.4	1	
Yes	36	15.1	30	83.3	6	16.7	(1.407-8.856)	**0.007****

***p-value <0.05, **p-value<0.01**

Table 2 describes the predictors of use of any male method of family planning by using multiple logistic regression with the Forward (LR) method. The results show that husbands who earned >150,001 kyats per month were three times more likely to use a male family planning method than those who earned ≤ 50,000 kyats (AOR=3.349, 95% CI=1.362-8.239). Husbands who obtained family planning information from

poster/pamphlets/flyers were nearly twice more likely to use male family planning methods than those who did not get information from those media (AOR=1.785, 95% CI=1.014-3.142). Moreover, husbands who got family planning information about service places were three times more likely to use male family planning methods than those who did not (AOR=3.001, 95% CI=1.156-7.792)

Table 2 Multiple logistic regression for predictors of male use of any family planning method

Variables	AOR	95% CI		P-value*
		Lower	Upper	
Monthly income (kyats) (ref = ≤ 50,000)				
50,001 – 150,000	1.610	0.893	2.901	0.113
> 150,001 (~100 USD)	3.349	1.362	8.239	**0.008****
Got FP information from pamphlets (ref = no)	1.785	1.014	3.142	**0.045***
Get FP information from media (ref = no)	3.001	1.156	7.792	**0.024***

***p-value<0.05, **p-value<0.01**

DISCUSSION

This study found that 29.8% of the respondents practiced male family planning including condoms, vasectomy or withdrawal. The results of this study are different from a study in Ethiopia where 70.0% of respondents were users of family planning methods [16]. However, another Ethiopian study found hardly any male contraceptive use [17]. The results of the current study are somewhat in line with a study in Kyrgyzstan [18].

In this study, the results show that being age 25-34 years was significantly associated with male family planning practice. This result is not different from a previous study in Nigeria where age 18-29 years was significantly associated with previous use of at least one contraceptive method among married men [19]. By contrast, another study in Ethiopia found no association between age and use of family planning services [2]. In line with other studies, high education was significantly associated with male family planning practice [11,20]. Most of the respondents in this study were Christian, but religion did not influence family planning practice. One study found that having three living children was significantly associated with use of modern contraception among married men in Kyrgyzstan, and that result is inconsistent with the results from this study [18]. This study found that high socio-economic status was significantly associated with male family planning practice, and that finding is consistent with a study in Nigeria [21].

In line with previous studies, the results revealed that knowledge of family planning did not influence family planning practice in this sample of men [17]. However, most of the respondents had negative attitudes toward family planning, yet that had no effect on use. This result is consistent with another study done in Myanmar [13] which found that good knowledge of family planning was also associated with many misconceptions.

Monthly income, information from posters/pamphlets and get information about service places were significant predictors of male use of family planning. A previous study found that high level of perceived income among men was significantly associated with use of family planning [20,22]. The findings of this study are inconsistent with the study in Bahir City, Ethiopia [16]. Another study found that male Muslims received information about family planning through radio, TV and posters [21], and also found that mass media played a very important role in family planning practice [24,25]. However, that result is inconsistent with the findings of a study in Bangladesh [26].

CONCLUSIONS

The majority of the respondents were Christian. Prevalence of male contraception was 29.8%. Although the husbands in this study had enough knowledge about family planning, they don't have enough positive attitude. Therefore, health education programs should target married men at that area in order to attain positive and practice of family planning methods. Moreover, accessibility of information was very important because they cannot easily access service places and don't know how and where to get services. So, local authority and government should ensure the accessibility and availability of services in order to strengthen the service provision.

RECOMMENDATIONS

This study provides evidence-based information for the Myanmar National Maternal and Reproductive Health Program and stakeholders in order to promote family planning programs. Based on the findings, male contraceptive prevalence is relatively low and family planning services cannot be accessed every day by about half. Thus, domestic and international NGOs should intensify implementation to improve access. Implementing organizations and local government should use mass media in order to improve family planning knowledge and practice in the community. Further studies are needed which collect qualitative data from in-depth interviews and focus group discussions in order to probe reasons why men do or do not use male methods of contraception.

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THE INFLUENCE OF EARLY SEXUAL DEBUT AND OTHER SELECTED FACTORS ON ADOLESCENT CHILDBEARING IN INDONESIA

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ABSTRACT

Introduction: Maternal and child health remains a major reproductive health concern in developing countries. A number of research has suggested that early childbearing has contributed to the problem, and that adolescent childbearing imposes a major risk for maternal and infant mortality. Indonesia is one of many developing countries where maternal and infant mortality rates are higher than the WHO's recommendations. Moreover, the occurrence of adolescent childbearing could pose a risk of child malnutrition, vulnerable marriage, and intergenerational economics problems. Declining of age at sexual debut was predicted as the direct causes of early childbearing.
Objectives: This study modifies and applies Andersen's health behavioral model to examine the influence of the practice of early sexual debut, other selected predisposing characteristics, as well as enabling factors and need factor on adolescent childbearing in Indonesia.
Methodology: Data for this study is drawn from a cross-sectional survey of 2017 Indonesian Demographic and Health Survey. Totally, 7,936 female adolescent aged 15 – 19 years old were selected to be samples for the study. The dependent variable in this study is adolescent childbearing. The independent variables include female adolescent's current age, educational level, marital relation, age at sexual debut, fertility preference, wealth index, residential place, provincial childbearing index, and contraceptive use. Binary logistic regression analysis is used to examine the association between the dependent variable and the independent variables.
Result: The study found that the prevalence of adolescent childbearing in Indonesia is 7%. In binary logistic regression analysis's results, female adolescent experiencing early sexual debut (≤ 15 years old) (OR: 1.17), older age (OR: 1.54), married or ever had married (OR: 4.74), the lowest economic status (OR: 2.61), exposed of digital media (OR: 0.85), family planning information from health professionals (OR: 1.58) and using contraceptive (OR: 3.35) were significantly influence adolescent childbearing in Indonesia.
Conclusion: Early sexual debut, other predisposing factors as well as enabling factors and need factor associated with adolescent childbearing in Indonesia. Minimum age of women marriage on the Law marriage of Indonesia should be immediately ratified. Hence, the Indonesian government including policy makers and health professionals need to utilize digital technology properly to help adolescent girls and boys to get access to sexual reproductive health information.
Keywords: early sexual debut, Andersen's health behavioral, adolescent childbearing

INTRODUCTION

Maternal and child health remains a major reproductive health concern in developing countries. It showed by the number of maternal and child mortality in Eastern Asia, Northern Africa and Southern Asia is 14 times higher than in the developed countries [1]. The phases of pregnancy, giving birth and early child caring among adolescent younger than 19 years old, as known as adolescent childbearing is one cause of maternal and child mortality. Adolescent pregnancies experience higher risk of complications and death rather than older women such as early neonatal death among infants, eclampsia, puerperal endo-

metritis, systemic infections, low birth weight, preterm delivery, and severe neonatal conditions, because adolescent have not completed their body growth yet [2-4]. In Indonesia, adolescent childbearing was contributing to the second most common cause of neonatal, infant, and toddler deaths [5]. In addition, poor intergenerational economic problems, repetition of experiences of adolescent childbearing, disruption of adolescent mental development and cessation of girls' chance to pursuing better opportunities are other social consequences of adolescent childbearing [6].

Related studies have found varied factors determine adolescent childbearing. Among US and Europe countries adolescent, living in a disordered environment or family, lower socio-economic status, low educational level, experiencing a divorce in family history, experiencing sexual abuse, relationship disclosure with parents, socio-economic problems, family disruption, lower education, early sexual debut, having multiple partners, contraceptives non-use and lack of parental supervision were associated with adolescent childbearing [7]. However, in low income countries such as Bangladesh, India and Nepal, demographic characteristics were identified as adolescent childbearing factors [7].

Andersen (1995), developed the first behavioral model consisting of three major components, namely predisposing characteristics, enabling resources and need factors. The model has been adopted and modified by various health researchers to investigate the predictors associated with health outcomes. Despite of the magnitude consequences of the problem, study about early sexual debut and media exposure factors influencing adolescent childbearing in Indonesia are limited and not well studied. Considering the related studies about linkage to factors influencing adolescent childbearing, Andersen's behavioral model helps explain how early sexual debut and other selected factors has contributed to the occurrence of adolescent childbearing in Indonesia.

This study aimed to examine whether early sexual debut and other selected factors refer to Andersen's model were associated with adolescent childbearing in Indonesia including becoming pregnant during adolescence and becoming a teenage mother.

METHODOLOGY

Data source

This study uses secondary data analyses from the quantitative research also a cross-sectional survey of the 2017 Indonesia Demographic and Health Survey [8].

Study Population and Sample size

This present study population focused on female adolescent (15 to 19 years old) in Indonesia and was derived from the 2017 IDHS woman's questionnaire. Overall, from 49,627 of women were recruited in IDHS 2017 only 7,936 subjects are included in this current study.

Variables and Measurement

The dependent variable used in this study was adolescent childbearing. Adolescent childbearing is a condition of adolescent age 15 to 19 with condition becoming pregnant or adolescent mother.

The selected independent variables according to Andersen's health behavioural model, literature review and available data in the 2017 IDHS related to factors influencing on adolescent childbearing. Based on its model and review, there are three groups factors of adolescent childbearing including predisposing characteristics (age, education level, marital status, age at sexual debut and fertility preference), enabling resource (economic status, media exposure, residence and provincial childbearing index) and need (contraceptive use).

Especially for media exposure and provincial childbearing index will explained more because these variables measured degree of factors by using factor analysis before included in multivariate analyses. Media exposure refers to 4 variables includes exposure to digital media, exposure to local media, family planning information from mass media and family planning information from health professionals. Exposure to digital media and local media are a factor as a result of varimax rotation to capture degree of the media exposure of respondent from five relevant questions about media. Family planning information from mass media and

health professional are a factor as a result of varimax rotation to capture degree of family planning information resources of respondent from five relevant questions about it. Residence refers to the type of respondents' residence as in urban and rural area. Provincial childbearing index refers to the relative ranking of childbearing in each province. This variable was calculated from the proportion of adolescent pregnancy of each province, due to imbalance size population of adolescent in each province. The ratio of childbearing among females in each province were then ranked in three levels (low, medium and high level). Economic status in this study was categorized as lowest, lower, middle, higher and highest. Last, contraceptive use refers to currently using one modern or traditional contraceptive method.

Data Analysis

Multivariate analysis using binary logistic regression was used to examine the influence of early sexual debut and other selected factors on adolescent childbearing in Indonesia. SPSS version 22 was used for statistical analyses.

RESULTS

The unit of analysis in this study is adolescent women aged 15 to 19 years. 7% of 7,936 total subjects were experienced adolescent childbearing. Table 1 shows descriptive statistics of subjects according to the categorized factors by Andersen's health behavioural model. Regarding the predisposing characteristics, the proportion of women aged 15 to 19 years did not differ much, the mean age of respondent was 16.88 years. Percentage of adolescent childbearing was highest at age 19 years (17.5 Mostly, all respondents (83.5%) had completed secondary education level; while adolescent childbearing at the highest percentage was found in the group having primary education level (31.1%). 90.3% of respondents were unmarried; 74.8% of married or had ever been married adolescent women had experienced childbearing. 89.6% of respondents reported no experience of sexual intercourse. Furthermore, 822 of the total respondents were sexually active. The mean age at sexual debut is 16 years. Adolescent who initiated early sexual debut was 66% experiencing childbearing; while did not initiate early sexual debut was 65.29% experiencing childbearing. In addition, the percentage of adolescent childbearing between respondents who prefer one until five or more children were did not differ much, around 7%.

Table 1 Descriptive statistics of Indonesian female adolescent

	All	**Adolescent Childbearing N = 7,936 (%)**	
	N = 7,936	**Yes**	**No**
		N = 557 (7%)	**N= 7,379 (93%)**
Predisposing Characteristics			
Current age (Years)			
15	1,681 (21.20)	14 (0.8)	1,667 (99.2)
16	1,690 (21.30)	39 (2.3)	1,651 (99.7)
17	1,798 (22.67)	94 (5.2)	1,704 (94.8)
18	1,415 (17.83)	173 (12.2)	1,242 (87.8)
19	1,352 (17)	237 (17.5)	1,115 (82.5)
Education level			
No education	26 (0.33)	5 (19.2)	21 (80.8)
Primary	441 (5.56)	137 (31.1)	304 (68.9)
Secondary	6,625 (83.48)	408 (6.2)	6,217 (93.8)
Senior high school/Higher	844 (10.63)	7 (0.8)	837 (99.2)

On the enabling factors, the proportion of respondents' economic status did not differ much, but adolescent childbearing was more likely to occur among adolescent with the lowest economic status (12.4%). Almost one half of respondents were not exposed to

newspapers/magazines and radio media. Moreover, the majority of respondents were exposed to television, mobile phone and the Internet (96.7%, 85.3% and 82.5% respectively). A few numbers of respondents who had ever been received family planning information from radio, newspaper, visited by field workers and visiting health facilities. Almost half of them who ever watch family planning information on television (46.7%). The proportion of adolescent residing in urban and rural areas did not differ much. The percentage of experienced adolescent childbearing were 4.9% and 9.6% respectively. From 34 provinces in Indonesia, 5 of them have the highest index of childbearing (more than 12 from Mean 7.02; Min 2.11; Max 13.30) that are North Maluku, West Papua, Central Kalimantan, Bangka Belitung, Bengkulu and Jambi. Meanwhile, the lowest index is Riau Island, Jakarta and Bali.

Regarding contraceptive use as need factor, 89.6% did not use contraceptives because they never had sex. However, among those who were sexually active, 6.5% currently did not use contraceptives and 3.8% were currently using contraceptive.

Table 1 Descriptive statistics of Indonesian female adolescent (Cont.)

	All N = 7,936	**Adolescent Childbearing** N = 7,936 (%)	
		Yes N = 557 (7%)	**No** N= 7,379 (93%)
Predisposing Factors			
Marital status			
Never married	7,250 (91.36)	44 (0.6)	7,206 (99.4)
Married or had ever been married	686 (8.64)	513 (74.8)	173 (25.2)
Sexual Debut			
Never had sex	7,114 (89.64)	0 (0)	7,114 (100)
Early sexual debut (10-15 years)	269 (3.79)	193 (71.75)	76 (29.25)
Not early sexual debut (16-19 years)	521 (6.66)	344 (66)	177 (34)
Fertility Preference			
0	34 (0.43)	0 (0)	34 (100)
(1-2 children)	5,377 (67.75)	376 (7)	5,001 (93)
(3-4 children)	1,705 (21.48)	135 (7.91)	1,570 (82.09)
(5 or more children)	147 (1.85)	10 (6.8)	137 (93.2)
Enabling Resources			
Personal/Family			
Economic status			
Lowest	1,866 (23.51)	231 (12.4)	1,635 (87.6)
Lower	1,592 (20.06)	133 (8.4)	1,459 (91.6)
Middle	1,479 (18.64)	90 (6.1)	1,389 (93.9)
Higher	1,433 (18.06)	75 (5.2)	1,358 (94.8)
Highest	1,566 (19.73)	28 (1.8)	1,538 (98.2)
Enabling Factors			
Exposure to General Media:			
Reading newspaper or magazine			
No	3,469 (43.71)	343 (9.89)	3,126 (90.11)
Yes	4,467 (56.29)	214 (4.79)	4,253 (95.21)
Listening to radio			
No	4,033 (50.82)	333 (8.26)	3700 (91.74)
Yes	3,903 (49.18)	224 (5.74)	3,679 (94.26)
Watching television			
No	262 (3.3)	35 (13.26)	227 (86.64)
Yes	7,671(97.67)	521 (6.79)	7,150 (93.21)

	All N = 7,936	Adolescent Childbearing N = 7,936 (%)	
		Yes N = 557 (7%)	No N= 7,379 (93%)
Owns Mobile telephone			
No	1,163 (14.68)	150 (12.90)	1,013 (87.10)
Yes	6,771 (85.32)	407 (6.01)	6,364 (93.98)
Use of Internet			
No	1,390 (17.82)	247 (17.78)	1,143 (82.32)
Yes	6,544 (82.18)	309 (4.72)	6,235 (95.28)
Family Planning Information:			
Heard in radio			
No	7,389 (93.16)	508 (6.9)	6,881 (93.1)
Yes	543 (6.84)	49 (9)	494 (91)
Watch in television			
No	4,157 (52.38)	298 (7.2)	3,859 (92.8)
Yes	3,778 (47.62)	259 (6.9)	3,519 (93.1)
Reading newspaper/magazine			
No	7,152 (90.21)	514 (7.2)	6,638 (92.8)
Yes	777 (9.79)	43 (5.5)	734 (94.5)
Visited by fieldworker			
No	7,868 (99.14)	534 (6.8)	7,334 (93.2)
Yes	68 (0.86)	23 (33.8)	45(66.2)
Visiting health facility			
No	5,867 (73.93)	186 (3.2)	5,581 (96.8)
Yes	2,067 (26.07)	371 (17.9)	1,696 (82.1)
Residence			
Urban	4,352 (54.84)	213 (4.9)	4,139 (95.1)
Rural	3,584 (45.16)	344 (9.6)	3,240 (90.4)
Provincial Childbearing			
Aceh*	384 (4.8)	12 (13.1)	372 (96.9)
North Sumatera**	408 (5.1)	23 (5.6)	385 (94.4)
West Sumatera*	209 (2.6)	11 (5.3)	198 (2.7)
Riau**	168 (2.1)	10 (6)	158 (94)
Jambi***	99 (1.2)	10 (10.1)	89 (89.9)
South Sumatera***	161 (2.0)	16 (9.9)	145 (90.1)
Bengkulu***	116 (1.5)	14 (12.1)	102 (87.9)
Lampung**	184 (2.3)	14 (7.6)	170 (92.4)
Bangka Belitung***	138 (1.7)	17 (12.3)	121 (87.7)
Riau Islands*	142 (1.8)	3 (2.1)	139 (97.9)
Jakarta*	294 (3.7)	7 (2.4)	287 (97.6)
West Java***	817 (10.3)	63 (7.7)	754 (92.3)
Central Java*	477 (6.0)	20 (4.2)	457 (95.8)
Yogyakarta*	104 (1.3)	3 (2.9)	101 (97.1)
East Java**	490 (6.2)	37 (7.6)	453 (92.4)
Banten*	256 (3.2)	10 (3.9)	246 (96.1)
Bali*	108 (1.4)	3 (2.8)	105 (97.2)
West Nusa Tenggara**	213 (2.7)	16 (97.5)	197 (92.5)
East Nusa Tenggara**	401 (5.1)	28 (7)	373 (93)
West Kalimantan***	178 (2.2)	17 (9.6)	161 (90.4)
Central Kalimantan***	69 (0.9)	9 (13)	60 (87)
South Kalimantan	120 (1.5)	12 (10)	108 (90)

	All N = 7,936	Adolescent Childbearing N = 7,936 (%)	
		Yes N = 557 (7%)	No N= 7,379 (93%)
East Kalimantan**	172 (2.2)	13 (7.6)	159 (92.4)
North Kalimantan**	141 (1.8)	8 (5.7)	133 (94.3)
North Sulawesi***	90 (1.1)	8 (8.9)	82 (91.1)
Central Sulawesi***	215 (2.7)	20 (9.3)	195 (90.7)
South Sulawesi***	336 (4.2)	27 (8)	309 (92)
Southeast Sulawesi*	264 (3.3)	14 (5.3)	250 (94.7)
Gorontalo*	107 (1.3)	4 (3.7)	103 (96.3)
West Sulawesi***	310 (3.9)	26 (8.4)	284 (91.6)
Maluku***	371 (4.7)	35 (9.4)	336 (90.6)
North Maluku***	188 (2.4)	25 (13.3)	163 (86.7)
West Papua***	91 (1.1)	12 (13.2)	79 (86.8)
Papua***	115 (1.4)	10 (8.7)	105 (79)
Need			
Current Contraceptive Use			
Never had married	7,114 (89.64)	0	7,114
Currently not use contraceptive	518 (6.53)	296 (57.1)	222 (42.9)
Currently use contraceptive	304 (3.83)	261 (85.9)	43 (14.1)

*= Lowest index of childbearing; **= Middle index of childbearing; ***= Highest index of childbearing

Table 2 Multivariate binary logistic regression models on adolescent childbearing (n = 7,236)

Independent variables	Coefficient (SE)	OR (95% CI)
Current age	0.43(0.09)***	1.54 (1.28-1.84)
Education level (ref Senior high school/Higher)		
No education	0.80 (1.37)	2.23 (0.15-32.82)
Primary school	0.76 (0.67)	2.14 (0.57-8.01)
Secondary school	0.92 (0.65)	2.50 (0.70-8.91)
Marital status (ref unmarried)		
Married or had ever been married	1.56 (0.26) ***	4.74 (2.87-7.84)
Age at sexual debut (ref not early sexual debut)		
Early sexual debut	0.65 (0.23)*	1.91 (1.21-3.02)
Fertility Preference	- 0.07 (0.09)	0.94 (0.79-1.12)
Economic status (ref highest)		
Lowest	0.96 (0.43)*	2.61 (1.12-6.07)
Lower	0.61 (0.42)	1.84 (0.80-4.22)
Middle	0.23 (0.43)	1.26 (0.54-2.94)
Higher	0.69 (0.45)	2.01 (0.82-4.86)
Exposure to digital media	-0.17 (0.08)*	0.85 (0.73-0.99)
Exposure to local media	-0.11 (0.10)	0.91 (0.74-1.11)
FP information from mass media	-0.01 (0.11)	1.01 (0.81-1.25)
FP information from health professional	0.46 (0.11)***	1.58 (1.26-1.97)
Residence (ref urban)		
Rural	0.39 (0.22)	1.47 (0.97-2.24)
Provincial childbearing index	0.15 (0.12)	1.16 (0.92-1.47)
Contraceptive use (ref not use contraceptive)		
Use contraceptive	1.21(0.21)***	3.35 (2.22-5.12)
Never have sex	-19.55(475)	0.00 (0.00)
LR chi-square = 745.224	n = 7,236	Pseudo R square = 0.835

Note: *p<.05; **p<.01; ***p<.001 Degree of freedom = 13

Table 2 shows the results of binary logistic regression regarding adolescent childbearing. According to the predisposing factors, age, marital status, sexual debut of adolescent highly contributed to childbearing (p<0.05). Every increasing age of adolescents indicated increasing probability to experience childbearing. Adolescent women who had married or had ever been married were 4 times more likely to experience childbearing than unmarried adolescent times (OR=4.74, 95%CI= 2.87-7.84). Early sexual debut revealed an increasing probability to experience childbearing. Adolescents who initiated early sexual debut at ages 10 to 15 years were highest risk to experience childbearing compared with adolescents who did not initiated early sexual debut. Despite, education level and fertility preference were not significantly correlated with adolescent childbearing.

Regarding enabling factors, economic status, digital media exposure and family planning information from health professionals were significantly associated with adolescent childbearing (p<0.05). In contrast, local media, family planning information from mass media, residence and provincial childbearing index were not significantly associated with adolescent childbearing. In terms of economic status, adolescents with the lowest economic status were twice more likely to experience childbearing compared with those with the highest economic status (p<0.05). Furthermore, adolescents exposed to digital media were less likely experience childbearing (p<0.05). However, adolescents receiving family planning information from fieldworkers or health professionals in a health facility were 1.5 times (OR=1.58, 95%CI= 1.26-1.97) more likely to experience childbearing (p<0.000). Furthermore, adolescent women who used contraceptives were twice more likely to experience childbearing.

DISCUSSION

This study revealed that early sexual debut, predisposing factors (current age, marital status), enabling factors (economic status, exposure to digital media and exposure to family planning information from health professionals) and need factor (contraceptive use) were significantly associated with adolescent childbearing. Early sexual debut correlated with exhibiting risky sexual behavior such as non-use of contraception, involving transactional sex, having multiple partners and lingering time being sexually active [11-14]. These behaviors increased the probability of adolescent childbearing. Moreover, sexual debut at very young age indicates that adolescents have less power to negotiate contraceptive use or willingness to having children with their partner. It might cause adolescents who initiated early sexual debut to be more likely to experience childbearing.

Early sexual debut in Indonesia also correlated with early marriages. The social construction of Indonesian society only allows childbearing within marriage and the government allows female adolescents to marry at age 16 years [6]. It proved concerning this study findings, that adolescent women who had or ever had married were four times more likely to experience childbearing. Moreover, among married women, the decision to have children is often influenced by social norms such as the spouse or family decisions [15]. It as well as has a linkage with a fertility preference. In spite of adolescent women majority willing to have one or two children in their live, if they are less power to decide of their pregnancy intention when they had married. Although the majority prefer to have one or two children during their lifetime, it can change depending on their strength and ability to defend their rights. On the contrary, it doesn't matter how much they desire to have children, when they have the power to delay childbearing, they tend to be remain young mothers [16].

This study found that increasing age in line with increasing probability to get childbearing. Increasing age is a natural human development process that is followed by maturation of their physical, psychological and sexual behaviour [17].

Several studies proving that education is an essential component to protect adolescents from early childbearing [18,19]. By obtaining increased education levels adolescents will

then expected to be better able to have more sophisticated knowledge of sexual reproductive health [3,20]. However, this study findings education was not associated with adolescent childbearing. This might have occurred because the experience of adolescent childbearing has happened long before this study was conducted. Education levels in this present study reflected most current and high education attainment by respondents. The women who experienced childbearing might take a break from a school when they give birth but after that, they continue attending school or follow government programs of junior/high school equivalency programs [16].

This study revealed economic status was strongly associated with adolescent childbearing. This result was similar to those related studies reporting that poor economic condition were associated with higher probability of adolescents childbearing [14,21]. This variable indicated enabling factors contribute to the occurrence of early childbearing. Adolescents who experienced childbearing are still financial dependent on their parents or the parents of her partner [21]. Several qualitative study in West Java, Central Java, Nusa Tenggara Barat and Central Kalimantan Provinces found that economic allay constitutes one reason for adolescent women to enter adolescent marriage and experience adolescent childbearing in Indonesia [6,22,23]

In this study, local media exposure was not associated with adolescent childbearing. In contrast, exposure to digital media was positively associated with preventing adolescent childbearing. Digital media exposure helps adolescents to obtain sexual reproductive health knowledge such the importance of contraceptive use to delay pregnancy. Sex education content through the Internet has several benefits to disseminate SRH knowledge compared with traditional methods (SRHR education in school or in primary health services) [24,25]. sexual education is sensitive issues for adolescents. While information from the internet as well as social media is more private and easier to access, but the validity of that information should be controlled by the related government institution.

Family planning information from health professionals was positively associated with adolescent childbearing, whereas information from newspaper, television and radio were not. Currently, the mass media's trend among adolescent has changed from previous decade. The 2017 IDHS reported the significant decline of television, newspaper and radio use as a source of health information. They are more likely to use the Internet which is more accessible. This study showed that family planning information from fieldworkers and health facilities influenced adolescent childbearing. This study employed a cross-sectional design, with the high probability of childbearing occurring before the respondent received this information. According to the reproductive health policy in Indonesia on the Law Number 52/2009, the government did not provide SRH care services for unmarried adolescent [26]). Despite government programs providing SRH information and education goals at schools and health facilities, the implementation and evaluation systems of the program were not realized properly [27].

Residence and provincial childbearing index were not significantly associated with adolescent childbearing, similar to previous studies revealed that traditional norms among adolescents changed as time went by. Adolescents living in urban, rural or different regions may have equal opportunities to encourage early childbearing [14]. Equality and accelerated policies in infrastructure development and internet network coverage in rural and remote areas in Indonesia can increase information disclosure [26–28]. These improvements might help increase access to knowledge about sexual reproductive health equally among adolescents compared with the level decades ago.

Regarding contraceptive use, the prevalence of childbearing was significant higher among adolescent who using contraceptive. This finding was contrary to previous studies reporting that contraceptive use proved to alleviate the risk of adolescence childbearing [29,30. It may be because during the survey employed, subjects have been pregnant or having children, so they using contraceptive to delayed next pregnancies. It could occur because when the survey was conducted, subjects had been pregnant or had children, so they were already using contraception to delay further pregnancies. Similarly, several studies

found that married women tended to use contraception to delay a further pregnancy rather than to delay the first pregnancy [6,14].

According to the findings of this study, adolescent childbearing mostly occurred due to matrimony. However, it remains unclear whether early marriage caused by sacred marriage or non-voluntary marriage due to responsibility resulting of premarital childbearing. Emerging this situation, the government should immediately ratify the marriage law in terms of a minimum age of marriage for women. No less important, the government should strongly enforce the law comprehensively into the region level. In addition, adolescent childbearing can be preventing by utilize digital media such as television, mobile phone and the internet. Comprehensive and appropriate information from trust-worthy media could be a solution. This was expected to help upgrade knowledge, as well as change the attitude and sexual behaviour among Indonesian adolescents and also their parents.

CONCLUSIONS

Andersen's health behavioral model could answer influencing factors adolescent childbearing in Indonesia. Early sexual debut, predisposing factors (age and marital status), enabling factors (economic status and media exposure) and need factor (contraceptive use) were significantly associated with adolescent childbearing in Indonesia. The policy-makers and health professionals should utilize digital technology properly to disseminate comprehensive and communicative to respond to sexual reproductive health information need among adolescent. The government should immediately ratify of the marriage law about minimum age of marriage women and monitor its implementation to the lowest level regions.

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IN VITRO α-GLUCOSIDASE AND DIPEPTIDYL-PEPTIDASE-IV INHIBITORY ACTIVITIES OF COFFEE BREWED WITH MUNG BEAN COAT AS THE ADJUNCT

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ABSTRACT

Introduction: Diabetes is a major non-communicable disease, whose prevalence has been increasing globally. Mung bean coat (MBC), an industrial by-product, was reported for its in vitro α-glucosidase inhibitory activity and consumption of MBC could improve control of blood glucose level in diabetic mice. In this study, MBC was used as an adjunct to coffee powder to develop a functional coffee with the inhibitory activities. Coffee was chosen because it is often consumed with high amount of sugar added or with desserts.
Objectives: To develop a coffee with α-glucosidase and dipeptidyl peptidase-IV inhibitory activities by using mung bean coat as the adjunct.
Methodology: Different coffee beans were tested for their α-glucosidase and dipeptidyl peptidase-IV (DPP-IV) inhibitory activities. Then, coffee was brewed with a commercial espresso machine at different ratios of roasted MBC to the selected coffee bean (0:100, 25:75, 50:50, and 75:25). Extraction yield, total dissolved solids, color, and α-glucosidase and DPP-IV inhibitory activities of the obtained coffee were determined. Preference of the products was tested by 50 untrained panelists using a 9-point hedonic scale. The panelists were recruited from their preference toward sweet diets. All results were expressed as mean ± SD. One-way ANOVA and Tukey's multiple comparison tests were performed to assess the significant differences in inhibitory activities. The sensory acceptance of coffee were compared by Kruskal-Wallis and Duncan's multiple range tests. This study was approved by Mahidol University Center Intuitional Review Board (COA No. MU-CIRB 2018/160.1508).
Conclusion: MBC can be used as an adjunct without compromising sensory qualities of the brewed coffee. This usage as a coffee adjunct not only creates value-added to MBC but also develops a functional coffee. However, it warrants clinical investigations into blood glucose control.
Keywords: α-glucosidase; dipeptidyl peptidase-IV; inhibitory activity, mung bean coat, coffee

INTRODUCTION

Diabetes is a major type of non-communicable diseases (NCDs) [1]. International Diabetes Federation (IDF) reported that there were 425 million cases of diabetes in 2017 globally and the number of people with diabetes may rise to 629 million in 2045. There were over 4.2 million cases of adults with diabetes in Thailand in 2017, and around 90% of all cases of diabetes are type 2 diabetes mellitus (T2DM) [2]. Major intervention to control or prevent T2DM is the lifestyle modification, which consists of physical activity and a healthy diet.[3] Postprandial glucose or blood glucose level after the meal is a key contributor to overall glucose and a predictor of diabetic complication [4]. An important mechanism to reduce postprandial glucose is delaying carbohydrate digestion and absorption by inhibiting of α-glucosidase and α-amylase activities [5]. A class of anti-diabetes agent, dipeptidyl peptidase-IV (DPP-IV) inhibitor, is known to increase insulin secretion and reduce postprandial blood glucose level rise [6]. Studies recently showed that some natural sources act as against α-glucosidase inhibitory

activities such as mung bean[7, 8], especially its coat [9], and coffee [10] and navy bean [11], and cherry juice[12] against DPP-IV inhibitory activities.

Mung bean (Vigna radiata) is a traditional food in many countries such as India, China, Bangladesh, Thailand, and western countries [13]. Mung bean coat (MBC), an industrial by-product, contains abundant polyphenols. Some studies demonstrated that MBC contributed to great antioxidant activity, phenolic and flavonoid compounds [14]. MBC was reported also for in vitro α-glucosidase inhibitory activity [9]. Moreover, the anti-diabetic activity of MBC in diabetic mice was reported [15, 9]. However, there is no report on the anti-diabetes activities of MBC in human.

Coffee is one of the most popular beverages and consumption of coffee may help to prevent or to improve several chronic diseases, including the incidence of diabetes, liver, Parkinson's disease [16, 17]. The health beneficial properties of coffee are derived from its bioactive chemicals such as caffeine, chlorogenic acids, and diterpenes [16, 17]. However, coffee is often consumed with high amount of sugar added or with desserts. Consequently, it may cause high blood glucose level. Although brewed coffee was reported for anti-diabetic properties such as anti-α-glucosidase and anti-glycation activities [18], there is no report on its DPP-IV inhibitory activity. The objective of this study was to determine α-glucosidase and DPP-IV inhibitory activities of coffee and MBC and to explore the potential of MBC as a coffee adjunct for a functional coffee with anti-diabetic properties. explore the potential of MBC as a coffee adjunct for a functional coffee with anti-diabetic properties.

METHODOLOGY

Chemicals

The chemicals including *p*-nitrophenyl-α-D-glucopyranoside (*p*NPG) and Gly-Pro *p*-nitroanilide and the enzymes, Saccharomyces cerevisiae α-glucosidase (Type 1, ≥ 10 units/mg) and the protein, Dipeptidyl Peptidase IV human (DPP-IV, ≥ 10 units/mg protein) were purchased from Sigma-Aldrich (St. Louis, MO, USA).

Raw materials

Mung bean (Vigna radiata) coat was received as a courtesy from Tangyingwattana (1958) Co., Ltd, Samutprakarn, Thailand. It was kept in vacuum aluminum foil bags at -20°C until use. Four coffee bean sorts from different origins (Brazil, Colombia, Kenya, and Ethiopia) were purchased from Lin Lin Coffee Equipment, Bangkok, Thailand. White sugar, Mit Phol (1946) Co., Ltd, Singburi, Thailand, was used.

Sample preparation

Roasted coffee beans were ground by a coffee grinder (Severin 100W, Germany) into fine powder [19]. MBCs tested were raw, baked, and roasted samples. Baked MBC was cooked by a hot air oven (Memmert, Germany) at 120°C for 30 minutes. Roasted MBC was medium heated in a pan for 9 minutes.

Product formulation

The aim of this study to vary the ratio of MBC to coffee powder. Different ground coffee beans and the blends of roasted MBC-coffee bean (at the ratio of 25:75, 50:50, and 75:25) were brewed with a commercial espresso machine (Starbucks 900 –1,199 W, 15 bar). The coffee was brewed to meet the standard guideline for coffee preparation [19]. For instance, the extraction yield (EY), the total dissolved solids (TDS), and the ratio of coffee powder to water (w/w) should be 18-22%, 1.20 – 1.35%, and 1:17, respectively. The extraction yield and TDS were measured by a refractometer (Milwaukee Inc., USA) with an automatic temperature compensation set at 25°C. The results from refractometer were presented as Brix (%) and calculated with the following equation:

$$\text{TSD (\%)} = \text{Brix (\%)} \times 0.85$$

$$\text{EY (\%)} = \frac{\text{TDS} \times \text{Brewed coffee (g)}}{\text{Grounded coffee (g)}}$$

The color of samples was analyzed by a HunterLab ColorFlex EZ spectrophotometer (Reston, Virginia, USA) using C.I.E. LAB system. The results were shown as color value of L* (+ lightness, - darkness), a* (+ redness, - greenness), and b* (+ yellowness, - blueness).

Determination of α-glucosidase inhibitory activity

Inhibition of α-glucosidase activity was measured according to the method of You et al., 2011 [20]. The colorimetric assay was assessed by the reaction of α-glucosidase (0.2 mg/mL), *p*NPG (10 mM) and the brewed sample (21.87 mg/mL of final concentration) was added into 50 mM potassium phosphate buffer (KPB, pH 7.0). Absorbance (Abs) was measured at a wavelength of 405 nm using a microplate reader (Molecular Devices, LLC., USA) and Softmax Pro 6.5.1 software. The results were presented as a percentage of inhibition and calculated according to the following equation:

$$\text{Inhibition (\%)} = 1 - \left[\frac{\text{Abs Control} - \text{Abs Sample}}{\text{Abs Control}}\right] 100$$

Determination of DPP-IV inhibitory activity

DPP-IV inhibitory activity was determined according to Lacroix and Li-Chan, 2013 [21]. The brewed coffee samples were reconstituted in 100 mM Tris-HCl buffer, pH 8.0. The brewed samples (14.58 mg/mL of final concentration) were mixed with substrate Gly-Pro *p*-nitroanilide (12 mM), and DPP-IV (0.02 U/mL) in a 96-well microplate and incubated at 37°C for an hour. The reaction assessment and calculation of the inhibitory activity were conducted as described in the method for the determination of α- glucosidase inhibitory activity.

Sensory acceptance

Fifty untrained panelists tested the preference of the products using a 9-point hedonic scale (9 = like extremely, and 1 = dislike extremely). Thai aged 18 - 50 years old were recruited. They were faculty members and students of Mahidol University, Salaya campus. The healthy panelists were recruited from their preference toward sweet diets such as high-sugar beverage and dessert [22]. The samples tested were brewed coffee with different ratios of roasted MBC to coffee powder (0:100, 25:75, and 50:50). Twelve gram of white sugar was added to 240 mL of brewed coffee samples. The test was conducted following the standard recommendations in laboratory environment such as individual booths, control temperature white light and air purifier [23]. The standard sensory testing facilities are well equipped at the Institute of Nutrition. Each panelist received three samples (30 mL per sample) in plastic cups with codes. Moreover, their comments were collected. The sensory acceptance of products by 47 panelists was analyzed.

Statistical analysis

All results were expressed as mean ± SD. One-way ANOVA and Tukey's multiple comparison tests were performed to assess the significant differences in inhibitory activities. The sensory acceptance of coffee was compared by Kruskal-Wallis and Duncan's multiple range tests. This study was approved by Mahidol University Center Intuitional Review Board (COA No. MU-CIRB 2018/160.1508).

RESULTS

α-glucosidase and dipeptidyl peptidase-IV inhibitory activities of mung bean coats, coffee beans, and coffees from the blend of roasted mung bean coat and coffee powder

From Figure 1, different coffee bean sorts showed the α-glucosidase inhibitory activity within the range of 14-27%. The Brazil coffee bean exhibited the highest α-glucosidase inhibitory activity, while the Ethiopia coffee bean exhibited the lowest. For DPP-IV different coffee bean sorts showed the inhibitory activity ranging from 29 to 33 %. Columbia coffee bean (33.4±2.1 %) showed the highest DPP-IV inhibitory activity, followed closely by coffee beans from Brazil (32.5 ±1.0 %), Ethiopia (31.0±2.2%), and Kenya (29.3±1.6%), respectively.

Roasted MBC (52.4±1.9 %) showed the highest α-glucosidase inhibitory activity, while raw MBC (40.1±0.9%) and baked MBC had the similar activities (38.2±0.5 %). Raw MBC showed the lowest anti-DPP-IV activity (15.0±1.5 %), followed by baked MBC (26.0±2.1 %) and roasted MBC (31.5±2.6 %)

As roasted mung bean coat and Brazil coffee bean showed the highest α -glucosidase and DPP-IV inhibitory activities, they were selected for testing the inhibitory activities of the blends of them. The roasted MBC to coffee powder ratios including 0:100, 25:75, 50:50, and 75:25. The α-glucosidase and DPP-IV inhibitory activities of these blends were in the

range of 38-68% and 14-27%, respectively (Figure 1). The coffee brewed with the mixing ratio of 75:25 exhibited the highest α-glucosidase and DPP-IV inhibitory activities, while the mixing ratio of 0:100 exhibited the lowest activities.

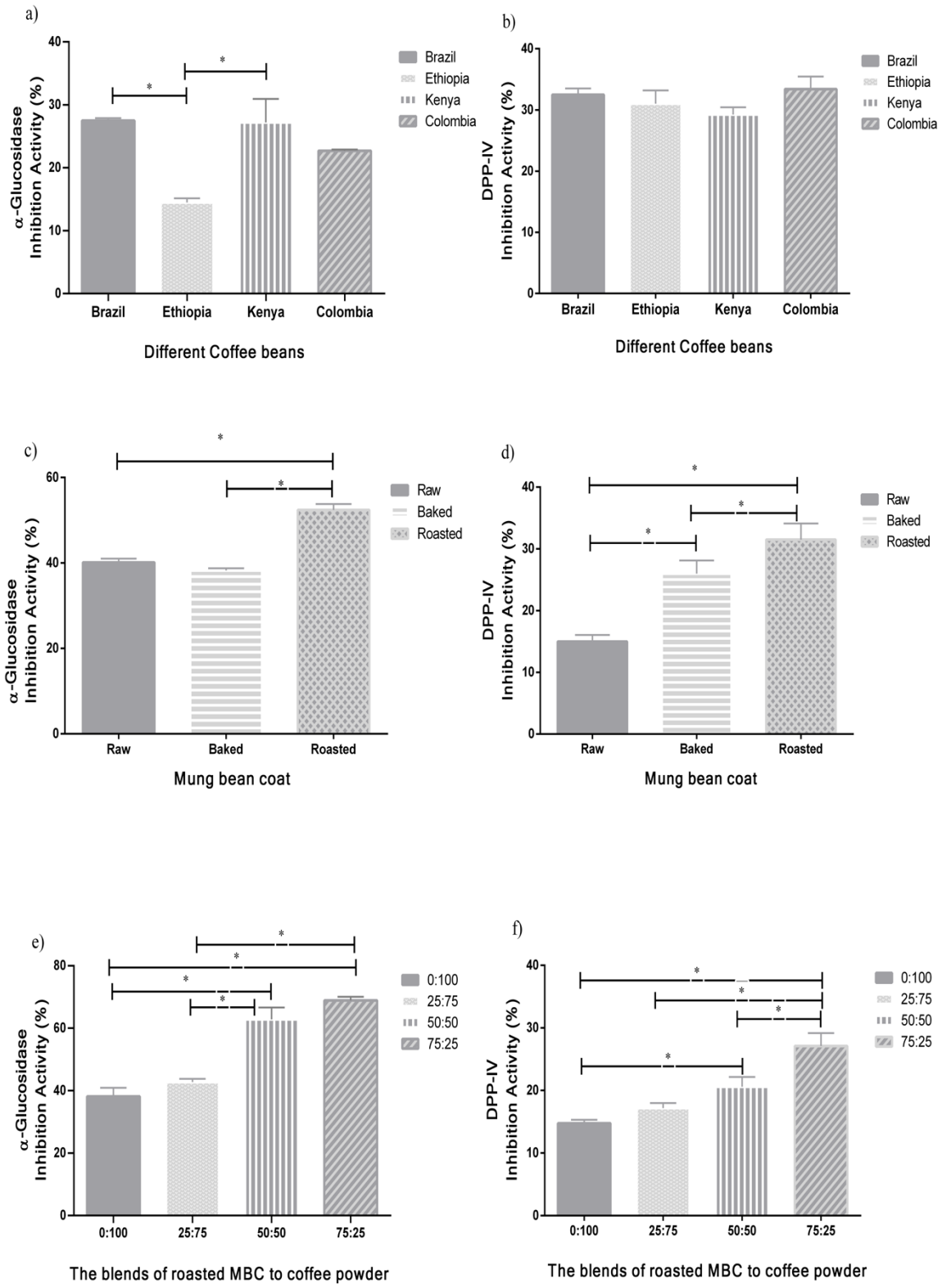
Development of functional coffee

Extraction yield, total dissolved solids, and color of the coffee

All brewed coffee prepared from the blends with different ratio of roasted to coffee powder (0:100, 25:75, 50:50 and 75:25) were analyzed. The extraction yield values were 19.91 ± 0.84, 18.91 ± 0.00, 16.03 ± 1.46, and 15.06 ± 0.84 % and TDS were 1.16 ± 0.05, 1.11 ± 0.00, 0.94 ± 0.09, and 15.06 ± 0.84 %, respectively (Table 1). The color of brewed coffees in term of lightness, redness, and yellowness were in the range of 3.35-12.95, 1.15-4.32 and 2.82-7.16, respectively.

Sensory acceptance of the coffee

Brewed coffees from all blends were tested for sensory acceptance using a 9-point hedonic scale (9 = extremely like, 1= extremely dislike). The results showed that the brewed coffees obtained the preference scores before drinking in term of appearance, color, and odor in the range of 6.3-6.7, 6.0-6.6, and 6.2-6.6, respectively (Table 2). In addition, the preference scores after drinking including flavor, texture, and overall acceptance were in the range of 5.7-6.1, 6.4-6.6, and 6.0-6.4, respectively. From the results, the brewed coffee ratio of 0:100 (only coffee powder) had the highest acceptance for appearance, color and odor scores. For consistency or texture, the coffee brewed with the 50:50 blend obtained the highest score, while the coffee brewed with 25:75 blend showed the highest score regarding taste and overall acceptance, followed by 50:50 and 0:100 blend. However, the acceptance of all coffee samples in all sensory aspects was not significant.



Figue 1 Percentage of α-glucosidase and dipeptidyl peptidase-IV inhibitory activities of difference coffee beans (a-b), raw and cooked MBC (c-d), and the blends of roasted MBC to coffee powder (e-f). Results were expressed as mean ± standard deviation. The sign "*" expressed as a significant difference($p<0.05$)

Table 1 The extraction yield, total dissolved solids and color of different ratios of roasted mung bean coat to coffee powder including 0:100, 25:75, 50:50, and 75:100

Roasted MBC: Coffee powder	Extraction yield (%)	TDS (%)	Color value		
			L*	a*	b*
0:100	19.91 ± 0.84	1.16 ± 0.05	3.35 ± 0.13	1.15 ± 0.04	2.82 ± 0.01
25:75	18.94 ± 0.00	1.11 ± 0.00	4.82 ± 0.37	2.53 ± 0.02	3.96 ± 0.08
50:50	16.03 ± 1.46	0.94 ± 0.09	9.94 ± 0.25	4.32 ± 0.19	7.16 ± 0.25
75:25	15.06 ± 0.84	0.88 ± 0.05	12.95 ± 0.12	2.99 ± 0.07	6.78 ± 0.18

Results were expressed as mean ± standard deviation.
The ratio of coffee powder (1g): brewed sample (17g).

Table 2 The sensory acceptance scores of brewed coffee from mixing between roasted MBC and coffee powder by 47 untrained panelists using a 9-point hedonic scale

Sensory attribute	Roasted mung bean coat: Coffee powder			P-value
	0:100	25:75	50:50	
Appearance	6.7 ± 1.4	6.3 ± 1.2	6.3 ± 1.3	0.284
Color	6.6 ± 1.7	6.5 ± 1.4	6.0 ± 1.4	0.085
Oder	6.6 ± 1.8	6.2 ± 1.5	6.3 ± 1.6	0.355
Taste	5.7 ± 2.0	6.1 ± 2.1	6.0 ± 2.2	0.446
Texture	6.4 ± 1.6	6.4 ± 1.6	6.6 ± 1.6	0.813
Overall acceptance	6.0 ± 1.9	6.4 ± 1.9	6.3 ± 2.0	0.442

Results were mean ± SD (n=47)
No significant was different from the sensory acceptance of coffees at $p < 0.05$ by Kruskal-Wallis test.

DISCUSSION

α-glucosidase and dipeptidyl peptidase-IV inhibitory activities of mung bean coats, coffee beans, and coffees from the blend of roasted mung bean coat and coffee powder

Among MBC, roasted MBC showed the highest α-glucosidase and DPP- IV inhibitory activities. Baking did not increase the α-glucosidase activities of MBC but it did for DPP-IV inhibitory activities, while roasting improves both inhibitory activities. The increase in the inhibitory activities maybe because of the Maillard reaction during roasting [24]. Heat processing such as roasting and baking can increase the content of total phenolic, total flavonoid, and antioxidant activities in legumes [25, 26]. Moreover, a study reported that a higher level of total antioxidant, phenolic compounds, and flavonoids were found in MBC compared with those in its whole or cotyledon [14, 27]. Two major flavonoids in MBC are vitexin (apigenin-8-C glucoside) and isovitexin (apigenin-6-C glucoside) [27, 28], which have potential anti-diabetic properties [29].

Numerous studies reported that the reaction of α-glucosidase activity was inhibited by vitexin and isovitexin [30, 31]. Other Flavonoids such as apigenin, luteolin, and stilbenes such as resveratrol and trans-stilbene were found also in MBC [32]. Apigenin acts as a natural compound with DPP-IV inhibitory activity [32,33].

Different coffee beans exhibited different α-glucosidase and DPP-IV inhibitory activities due to their chemical composition, which depends on various factors such as planting site, degree of roasting and coffee brewing method [34]. In this study, Brazil coffee bean exhibited the highest α-glucosidase inhibitory activity. It was previously reported that coffee bean from Cerrado was an important source of phenolic compounds8. The major phenolic compounds in brewed coffee including chlorogenic acid and caffeic acid [28, 18]. The inhibition of α-glucosidase and DPP-IV activities in a dose manner were reported for chlorogenic and caffeic acid [12, 18]. Caffeic acid showed an anti-diabetic potential by retarding hepatic glucose secretion and elevation of adipocyte glucose absorption and insulin secretion in diabetic mice [35]. Additionally, consumption of chlorogenic-rich extract showed significantly improved postprandial glucose level in healthy animal and human volunteers [36].

As these results, the brewed coffee preparation from the blend of roasted MBC and coffee powder (75:25) showed the highest α-glucosidase and DPP-IV inhibitory activity. MBC contributes to abundant bioactive compounds, which their content increased after heat treatment [25, 26]. In contrast, the antioxidant activity of roasted coffee beans decreases due to the degradation of the polyphenols [37].

Development of functional coffee

Coffees from all blending ratios had the extraction yield and total dissolved solids in the range of 15.06 - 19.91 % and 0.88 - 1.16 %. The yield and dissolved solid depended on the amount of coffee powder. The ideal extraction yield is 18 - 22%, ideal total dissolves solids varies among different standard recommendations such as 1.15 -1.35 % by A Specialty Coffee Association (ACAA) and 1.25 -1.45% by the Speciality Coffee Association of Europe (SCAE) [19]. For the sensory acceptance, brewed coffee prepared with the MBC adjunct had slightly lower consumer acceptance regarding appearance, color, and odor, compared with that prepared from pure coffee powder. However, the difference was not significant and coffees from all blending ratios were well accepted by the consumer. Various factors affect sensory preferences of coffee, for example, coffee type, degree of roasting, method of preparation and consumption [38, 39]. These factors can be optimized to improve consumer acceptance of the coffee.

CONCLUSIONS

MBC can be used as an adjunct without compromising sensory qualities of the brewed coffee. This usage as a coffee adjunct not only creates value-added to MBC but also develops a functional coffee. However, it warrants clinical investigations into blood glucose control.

ACKNOWLEDGMENTS

I would like thank thesis grant master degree students in 2019, the National Research Council of Thailand (NRCT) for the grant provided to conduct. In addition, I would also like to thank Tangyingwattana (1958) Co., Ltd, Samutprakarn, Thailand which was courtesy supported MBC sample for this research.

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CORRELATES OF HIV KNOWLEDGE AND RISK BEHAVIOR AMONG REPRODUCTIVE AGE WOMEN IN CAMBODIA

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ABSTRACT

Introduction: Knowledge of HIV is essential for preventing and controlling the acquired immune deficiency syndrome (AID) disease. Lacking comprehensive knowledge and risk behavior lead women to be vulnerable to HIV infection. Currently, there is not enough information about HIV related knowledge and behavior in Cambodia.
Objectives: This study identified the level of knowledge and risk behavior, and investigated factors associated with knowledge and risk behavior of reproductive age women in Cambodia.
Methodology: Secondary data was used for analysis from the Cambodia Demographic and Health Survey 2014 (CDHS 2014). Total of 12,074 women at reproductive age who had experienced in sexual intercourse last 12 months and both married and unmarried women were selected to be studied. Descriptive statistic, bivariate analysis, and General Structured Equation Modeling were used to investigate the characteristic of the sample and correlation.
Result: Among 12,074 reproductive-age women, 97.7 percent reported did not use a condom. The majority of participants (97.2 percent) had a sufficient level of HIV awareness. More than half (77.6 percent) of participants had sufficient knowledge of HIV prevention, and only 22.8 percent of the respondent had sufficient knowledge of HIV transmission. The result indicated factors associated with condom use included the age of respondent, education level, and socioeconomic factor. Moreover, HIV awareness was statistically associated with the age of respondent, education level, place of residence, socioeconomic factor, and source of information. Likewise, the knowledge of HIV prevention was correlated with education level, marital status, socioeconomic factor, and source of information. Besides, factors associated with knowledge of HIV transmission were the age of respondent, education level, socioeconomic factor, and source of information.
Conclusion: The strengthening and increasing HIV policies are suggested for consideration in improving comprehensive knowledge of HIV and safe practice for all reproductive-age women needed. Particularly, women with low education, rural women, and poor women need more knowledge on HIV. Access to information sources is crucial because it was found a high correlation with HIV knowledge. However, knowledge appears to have no effect on condom use, fulfill the weakness needed (access to the condom, empower women, knowledge of men).
Keywords: HIV, AIDS, Knowledge, and Reproductive age women

INTRODUCTION

Acquired Immune Deficiency (AIDS) is a chronical disease affected by the Human Immunodeficiency Virus (HIV), since 1981. Total 36.1 million people living with HIV (PLHIV) was estimated and 20.8 million have already died in the world, around 95% in developing countries [1]. The new incident rate of HIV demonstrate are the burden of illness in all countries, 2.5 million people are newly incident of HIV every year [2]. In Southeast Asia, estimated that 5.8 million of adult and children live with HIV, especially among sexual contact (heterosexual) and injection drug user [1].

Around the world, AIDS has infected women since early of 1980, from this year many public facilities were ignored that women were also a vulnerable risk to HIV

transmission [3]. Women in the world are around 20 million living with HIV [4]. Adult women live in Southeast Asia is about 35 percent of the total of 5.8 million living with HIV [1].

A few studies showed that age of respondent, place of residence, education level, socio-economic status, information source were statistically significantly correlated to HIV knowledge and behavior of women. For instance, young women were at high risk to HIV transmission and lack of comprehensive knowledge than men, and unsafe sex was high-risk behavior of HIV transmission [5]. Based on the studies in South Sudan and China and Cambodia stated that women were high knowledge of HIV related to those women who lived in the city area [6-8]. While women who lived in an urban area are 1.6 times likely to use the condom during sexual intercourse than those who live in the rural area [6]. Furthermore, a study in South Sudan found that women whose high education was also a high knowledge of HIV, and respondents who had high education (secondary school) are 4.4 times likely to use a condom than those respondents who had no education [6]. Besides, the study in Metropolitan Tehran and Uganda showed that married women were significantly associated with better knowledge of Sexual and reproductive health, especially good knowledge on HIV and sexual behavior [9,10]. According to Mach et.al.(2010) found the former married women were significantly associated with safe practice than those who were single [6]. Moreover, the study in South Sudan and Rwanda found that women who had high income were likely to have good knowledge and safe practice about HIV transmission and prevention than women who have less income [6,11]. Additionally, media was the most influenced factor of high knowledge of HIV transmission among women in the rural and urban area [7,21]. Therefore, the lack of comprehensive knowledge on HIV encouraged women to seek information about the concerning of HIV through the internet and television.

Cambodia is one of rapid HIV epidemic in Asia. HIV incidence was found in the first case about three decades ago since 1991. After that, HIV prevalence was a rapid increase, especially HIV transmission through sexual contact among heterosexual [20]. HIV prevalence among the general population in Cambodia had been declined from 1.2% to 0.7% over a decade because of the intervention of government [20]. Yet, HIV prevalence among women in reproductive age is the remaining issue; as a result, reported 123,100 of adult living with HIV (46.7 percent women) [13].

According to the Cambodia Demographic and Health Survey in 2014, more women in reproductive age had low comprehensive knowledge on HIV and reported premarital sex than men [19]. In term of gender and literacy, described women inability to read and write that influencing access to information of HIV/AIDs that concerning risk to HIV transmission, women illiterates were a high-risk group than men in Cambodia [14]. According to Wingood and Diclemente (2000) showed the positive HIV women is the main cause of HIV infection to the infant [15].

Lack of HIV knowledge and risk behavior make women vulnerable to HIV infection. In general, HIV related to risk behavior including condom use during sexual intercourse, multiple sexual partners, frequency of sexual intercourse, first sexual intercourse at a very young age, and using the drug during sexual intercourse, etc.[19]. This study obtained only condom use take into account due to the lack of data regarding other aspects of risk behavior. HIV-related Knowledge includes women's awareness of HIV and their knowledge of how HIV can be prevented and transmitted.

Understanding HIV knowledge and behavior among women in reproductive age is important not only to improve their knowledge, but it is also important to identify those women who are at most risk of involving risk practice by unsafe sexual behavior. This research area are provided information to government and non-government organization that help to design a more effective policy to improve women's HIV knowledge and reduce risky behavior. Currently, there have not enough information about HIV related to knowledge and behavior in Cambodia. Therefore, this study aimed to explore the level of HIV knowledge and risk behavior; furthermore, investigated factors associated

with HIV knowledge and risk behavior of women.

METHODOLOGY

Data source

Secondary data used for analysis based on data from Cambodia Demography and Health Survey 2014 (CDHS 2014), conducted by the Ministry of Planning and Ministry of Health. This study was a cross-sectional survey. Site of the study randomly selected 19 provinces out of a total of 25 provinces and stratified into the urban and rural area. CDHS was the national representative survey which was the latest Survey in Cambodia.

Study Population and Sample Size

The study criteria focused on all women aged 15 to 49 both married and never married. Additionally, this study selected only women who had experienced with sexual intercourse in the last 12 months. Moreover, after dropped all women who had not experienced sexual intercourse, this study was also dropped the missing values because had not questionnaires for checking. Therefore, the total sample size is 12,074 women in reproductive age selected for analyze [18].

Data analysis

The data collection was inputted into a spreadsheet and then used STATA application, version 14.0 for analysis consisted of descriptive and correlation statistical analysis. Descriptive statistics (frequency and percentage, and Mean were used to analyze sample characteristic). The correlation of HIV knowledge and risk behavior with socio-demographic, socioeconomic, and social media assessed through the General Structured Equation Modeling (GSEM). GSEM used to examine the probability that occurred among HIV knowledge and behavior of women when focusing on explanatory factors. The 95% confident interval will use with a significant level of 0.05.

Dependent variables

HIV-related behavior was measured in terms of condom use; two questions were used to construct this dependent variable likely the condom use in the last sexual intercourse and condom use in the last 12 months. Condom use was coded 0=”Use a condom” if participants answered both questions with Yes, while not use condom code 1= “Not use a condom” if they could not answer both questions correctly. Furthermore, knowledge of HIV assigned as dependent variables which divided into three variables such as awareness, knowledge of prevention, and knowledge of transmission.

Independent variables

The independent variables included socio-demographic, socioeconomic, and social media. Socio-demographic characteristic was the age of respondent, education level, place of residence, and marital status. For socioeconomic was also influenced knowledge and behavior of women. Furthermore, social media was a source of information that could deliver HIV information to women likey newspaper/magazine, radio, and television.

Ethical consideration

The dataset received after register and offer from the Demographic and Health Survey (DHS website). For ensure confidentiality and security of dataset, this study has not shared the dataset to other researchers or used the data in other purposes besides study objectives. Furthermore, the Institute for Population and Social Research’s Institutional Review Board (IRB) has reviewed and approved (COE No. 2019/06-205) this study.

RESULTS

Table 3 shows the level knowledge and behavior of women such as percentage of awareness, knowledge of prevention, knowledge of transmission, and risk behavior. The result found that among 12,074 reproductive-age women, aged 15 to 49 years old. The mean age of participants was 33.28 years old (SD=8.68). The majority of participants came from the rural area. Most of the respondents had sufficient awareness and HIV prevention, while little women had sufficient knowledge of HIV transmission. Additionally, most of the respondents did not use a condom during sexual intercourse last 12 months.

Table 1 Univariate statistic of sample characteristic (N=12,074)

Variables	Fr	%
Place of residence		
Urban	3,559	29.5
Rural	8,515	70.5
Awareness		
Sufficient	342	2.8
Insufficient	11,732	97.2
Prevention knowledge		
Sufficient	2,701	22.4
Insufficient	9,373	77.6
Transmission knowledge		
Sufficient	9,327	77.2
Insufficient	2,747	22.8
Behavior		
Safe practice	270	2.2
Risk practice	11,804	97.8
Age		
Range	15-49	
Mean	33.3	
Standard deviation	8.7	

Factors associated with risk behavior were age of respondent, education level, and socioeconomic factor (Table 2). For example, women being older more likely to do risky practice. Participants attended higher education were less likely to do risky practice compare to those had no education. Besides, women who live in the relative rich family were less likely to do risky practice compared to those who lived in the poorest family.

Table 2 Factor associated with risk behavior (0=safe behavior; 1=risk behavior)

Variable	OR	P-value
Awareness	0.85	0.789
Prevention knowledge	0.71	0.065
Transmission knowledge	1.15	0.349
Age of respondent	1.02	**0.011**
Education		
No education (Ref.)	1.00	
Primary	0.83	0.448
Secondary	0.83	0.469
Higher	0.46	**0.015**
Place of residence		
Urban (Ref.)	1.00	
Rural	1.33	0.83
Marital status		
No live with a partner or husband (Ref.)	1.00	
Live with partner or husband	0.77	0.252
Socioeconomic status		
Poorest (Ref.)	1.00	
Poorer	0.41	**0.003**
Middle	0.49	**0.025**
Richer	0.50	**0.023**
Richest	0.21	**0.000**
Constant	123.14	**0.000**

Note: N=12.074; OR=Odd ratio; Ref.=Reference

Factors associated with HIV awareness of women included the age of respondent, education level, place of residence, socioeconomic factor, and source of information (Table 3). For instance, when age increased one year, then the probability of women to have sufficient awareness was also increased. Participants who attended secondary education were more likely to have sufficient awareness than those who had no education; nevertheless, women who had higher education were not significant because this category might be had a small sample size. Moreover, participants live in a rural area were less likely to have sufficient awareness than women who lived in an urban area. Participants live in the middle family were more likely to have sufficient awareness compare to those who lived in the poorest family. Besides, women who accessed to the information source likely newspaper/magazine, radio, and television were high HIV awareness than others who never access to information.

Table 3 Factor associated with HIV awareness (0=Insufficient; 1=Sufficient)

Variable	OR	P-value
Age of respondent	1.02	**0.004**
Education		
No education (Ref.)	1.00	
Primary	3.80	**<0.001**
Secondary	7.79	**<0.001**
Higher	3417358	0.989
Place of residence		
Urban (Ref.)	1.00	

Variable	OR	P-value
Rural	0.55	**0.013**
Marital status		
No live with partner or husband (Ref.)	1.00	
Live with partner or husband	0.18	0.817
Socioeconomic status		
Poorest (Ref.)	1.00	
Poorer	0.90	0.377
Middle	1.55	**0.049**
Richer	1.49	0.152
Richest	0.99	0.842
Newspaper/magazine		
Not at all (Ref.)	1.00	
Less than 1 a week	8.38	**0.003**
More than 1 a week	2.44	0.202
Radio		
Not at all (Ref.)		
Less than 1 a week	1.00	**<0.001**
More than 1 a week	2.21	**0.002**
Television	1.58	
Not at all (Ref.)		
Less than 1 a week	1.00	**<0.001**
More than 1 a week	5.18	**<0.001**
Constant	3.37	**0.003**
	4.07	

Note: N=12.074; OR=Odd ratio; Ref.=Reference

Factors associated with knowledge of HIV prevention among women were education level, socioeconomic factor, and source of information (Table 4). For example, participants attended higher education were more likely to have sufficient knowledge of prevention than those who had no education. Participants live in the relative rich family were more likely to have sufficient knowledge of prevention compared to those who lived in the poorest family. Also, women who accessed to a source of information such as newspaper/magazine, radio, and television had a higher knowledge of HIV prevention.

Table 4 Factor associated with prevention knowledge (0=Insufficient; 1=Sufficient)

Variable	OR	P-value
Age of respondent	1.00	0.572
Education		
No education (Ref.)	1.00	
Primary	1.67	**<0.001**
Secondary	2.40	**<0.001**
Higher	3.44	**<0.001**
Place of residence		
Urban (Ref.)	1.00	
Rural	0.94	0.819
Marital status		
No live with a partner or husband (Ref.)	1.00	
Live with partner or husband	1.15	0.137
Socioeconomic status		
Poorest (Ref.)	1.00	
Poorer	1.06	0.422
Middle	1.03	0.622
Richer	1.16	**0.037**
Richest	1.55	**<0.001**
Newspaper/magazine		
Not at all (Ref.)	1.00	
Less than 1 a week	1.30	**<0.001**
More than 1 a week	1.38	**0.021**
Radio		
Not at all (Ref.)	1.00	
Less than 1 a week	1.45	**<0.001**
More than 1 a week	1.31	**<0.001**
Television		
Not at all (Ref.)	1.00	
Less than 1 a week	1.29	**<0.001**
More than 1 a week	1.32	**<0.001**
Constant	1.12	0.389

Note: N=12.074; OR=Odd ratio; Ref.=Reference

Factors associated with knowledge of HIV transmission were an age of respondent, education level, socioeconomic factor, and source of information (Table 5). When the age of women increased one year, then the probability of women to have sufficient knowledge of HIV transmission was decreased. Participants who attended higher education were more likely to have sufficient knowledge of transmission than those who had no education. Besides, participants who live in the relative rich family were more likely to have sufficient knowledge of transmission than women who lived in the poorest family. Additionally, women who accessed to a source of information likely newspaper/magazine, radio, and television had a higher knowledge

of HIV transmission than women who never accessed to a source of information.

Table 5 Factor associated with transmission knowledge (0=Insufficient; 1=Sufficient)

Variable	OR	P-value
Age of respondent	0.99	**0.007**
Education		
No education (Ref.)	1.00	
Primary	1.44	**<0.001**
Secondary	1.92	**<0.001**
Higher	2.56	**<0.001**
Place of residence		
Urban (Ref.)	1.00	
Rural	1.04	0.554
Marital status		
No live with a partner or husband (Ref.)	1.00	
Live with partner or husband	1.05	0.487
Socioeconomic status		
Poorest (Ref.)	1.00	
Poorer	1.10	0.254
Middle	1.16	0.081
Richer	1.44	**<0.001**
Richest	1.58	**<0.001**
Newspaper/magazine		
Not at all (Ref.)	1.00	
Less than 1 a week	1.07	0.238
More than 1 a week	1.30	**0.003**
Radio		
Not at all (Ref.)	1.00	
Less than 1 a week	1.26	**<0.001**
More than 1 a week	1.09	0.119
Television		
Not at all (Ref.)	1.00	
Less than 1 a week	1.08	0.332
More than 1 a week	1.20	**0.001**
Constant	0.13	**<0.001**

Note: N=12.074; OR=Odd ratio; Ref.=Reference

DISCUSSION

The study explored the proportion rate of HIV awareness, knowledge of prevention, and knowledge of transmission among reproductive-age women in Cambodia. The result found that the proportion of women who had ever heard about AID were 97.2 percent; similarly, the study of Prybylski and Alto (1999) found 97.4 percent of women had ever heard about AIDs [16]. Seventy-eight percent of women had sufficient knowledge of prevention; a little increase compared to Cambodia Demographic and Health Survey 2010 that was only 75 percent. Women who had sufficient knowledge of HIV transmission were very low 23 percent; similarly, the finding in CDHS 2010. It is because of social inequality between women lived in the rural and urban area because in urban area women were easy to access to HIV information than rural women. Another reason, it might be because of proportion rate of illiteracy women is still high, that the rate of drop out school is high among women. Although the policy implementation of HIV is not expanding to all women in Cambodia.

Surprisingly, only 2 percent of respondents used the condom during sexual intercourse last 12 months. It might be the result of married women that they had only one sexual partner, so they trust each other. Further, young women who lived in the rural area were strongly influenced by the culture than urban women. Thus, they cannot talk about sexual intercourse with others; especially, discuss with family members.

The main purpose of this study has explored the correlation between socio-demographic factor, socio-economic, and access to information with HIV-related to knowledge and risk behavior of women. As a result of this study found that education level, marital status, and socioeconomic status were statistically significantly correlated with HIV-related to risk behavior (Table 2). The finding showed that women who had higher education and lived in the richest family were likely to use the condom during sexual intercourse compared to those women who had no education and lived in the poorest family. Similarly, the study of Patrao and McIntyre was also found women who attended grade 9 and higher education, and young women who had not in the union were a higher rate of using a condom [17]. Because they had a better knowledge of HIV and they need to use a condom with not regularly partners.

Additionally, the finding of this study showed that age of the respondent, education level, place of residence, socioeconomic factor, and information source (newspaper/magazine, radio, and television) were significantly associated with HIV

awareness (Table 3). For instance, women who were older age, attended secondary school, lived in an urban area, and lived in middle family, and accessed to information source were more likely to have high HIV awareness. Similarly, women who had higher education, lived in the richest family, and accessed to information source of HIV were more likely to have high knowledge of HIV prevention. Further, the finding showed that women who had higher education, lived in the richest family, and accessed to information source were likely to have high knowledge of HIV transmission. It is probably the result of the government's intervention for input HIV/AIDs lesson in the education system. Another reason, women who live in an urban area is easily access to HIV information through newspaper/magazine, radio, and television.

CONCLUSIONS

This study describes that the knowledge level of HIV among women was still low and misunderstanding about HIV prevention and transmission route methods. Importantly, most of the women had not used a condom during sexual intercourse in the last 12 months. The finding described that factors associated with behavior included education level, marital status, and socio-economic factor. Moreover, factors correlated with HIV awareness of women included the age of respondent, education level, place of residence, socio-economic factor, and source of information. Further, determinant factors significantly associated with HIV prevention were education level, socio-economic factor, and source of information. Additionally, knowledge of HIV transmission was associated with the age of respondent, education level, socio-economic factor, and source of information.

This study may be suggested to inform the Ministry of Health, and the relevant organization to act immediately to prevent and control the vulnerable risk of HIV infection among women in Cambodia. Therefore, the strengthening and increasing HIV policies should suggest for consideration in improving comprehensive knowledge of HIV and safe practice for all reproductive-age women are needed. For instance, the future policy of the Ministry of Health should provide detail explanations of how HIV can be prevented and transmitted. Besides, the intervention program of the Ministry of Health should encourage those women to use a condom during sexual intercourse because it can help for preventing the diseases and also control for unwanted pregnancy. Especially, the intervention program should cover younger women, low educated women, women live in low socioeconomic status and women who never access to information source of HIV.

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PREVALENCE OF AND FACTORS ASSOCIATED WITH PAYING FOR SEX AMONG INDONESIAN MEN: AN ANALYSIS OF INDONESIAN DEMOGRAPHIC HEALTH SURVEY 2017

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ABSTRACT

Introduction: HIV new infection per year of Indonesia was estimated to be the fourth largest in the world 73,000 people infected per year. The country is in a concentrated epidemic where HIV prevalence is low in general population but higher than 7% in key populations. However, the national surveillance survey found that some groups of general men are having slightly higher HIV prevalence than general population. Therefore, identifying the factors that make men become a bridge population for HIV transmission is the way to prevent HIV transmission.

Objectives: To estimate the prevalence and to examine the factors associated with paying for sex among Indonesian male populations in 2017.

Methodology: This analysis used the Indonesia Demographic Health Survey (IDHS) 2017. The prevalence of paying for sex behavior is estimated from the total sample of male respondents (N=10,009) and then those who reported ever had paying sexual partners in their lifetime were selected to explore factors associated with paying for sex. The weighted sample size was 366. Logistic regression was used to predict the odds of paying for sex in the past 12 months based on the values of the independent variables.

Conclusion: The prevalence of paying for sex are more likely to happen among younger age, staying away from their wives, having moderate knowledge of HIV, and have negative gender role attitude. The results clearly indicate the importance of HIV prevention and sex education for the young people, as well as promoting safe sex practice among married couples.

Keywords: Paying for sex, Indonesia, Demographic Health Survey, HIV

INTRODUCTION

Indonesia is in a concentrated epidemic of HIV, i.e., where prevalence is low in the general population but higher than 7% in key populations. The prevalence among adult aged 15-49 year old is below 1%, while among key population range from over 2% to almost 30% [1]. The annual number of new HIV infections in Indonesia is estimated to be the fourth largest in the world (73,000) after China, India and Russia [2]. The primary route of HIV transmission had become sexual transmission, especially among MSM, transgendered (Waria), though the highest prevalence was of people who inject drugs (PWID) [3]. The prevalence among sex workers has been about 5% for lower risk and 8% for higher risk sex workers. And, the clients of sex workers have been reported as important bridge population, i.e. persons who have HIV-risk contact with both high- and low-risk groups [4].

A study in Tijuana found that, among 134 persons who had a spouse or steady partner, 70 (52.2%) had ever had unsafe sex with a female sex worker (FSW) and their wife, thus providing a "bridge" for HIV transmission from the higher-risk population of sex workers to the, otherwise no-risk, wife. The prevalence of any STI or HIV among the bridge group was 16.5 %, while it was only 2.3% among the non-bridgers [5].

A study conducted in China classified men who paid for sex and did not use condoms consistently and who did not practice safe sex

with their spouse as a potential bridge population for HIV transmission. According to that study, men who paid for sex were more likely to report having had premarital or extramarital sex and having had short-term sexual partners. What is more, men who paid for sex were ten times more likely to have an STI (either self-reported or tested) compared to those who did not pay for sex and used condoms inconsistently with their regular partner [6].

Men also engage in other HIV risk behaviors such as sharing needles to inject drugs, and are less likely to prioritize their sexual health and safety [7]. The Indonesia Integrated Biological and Behavioral Surveillance (IBBS) classifies men who pay for sex as a high-risk group for HIV. The median age of these high-risk men was 34 years, and most lived with a spouse. High-risk men in Indonesia also had a high frequency of purchasing sex during the previous year. Unfortunately, that group is also least likely to have had an HIV test even though they are at elevated risk for HIV [8].

Pregnant woman in Indonesia who tested positive for syphilis increased in 2017 to 8,092 from only 1,169 in 2016 [9]. The implication is that these women were infected by their husband who had sex with a high-risk partner.

Paying for sex can increase risk of contracting STI and HIV. One study found that nearly two-thirds of FSW in India had a viral and/or bacterial STI [10], indicating that condom use is low. In this situation, HIV can spread rapidly among the population of both FSW and male clients. Meanwhile, another study found that many of the men who pay for sex are married. An empirical study of 1,600 male clients of sex workers in three cities in Indonesia found that clients of FSW are more likely to be married than single [11].

There is an urgent need to stem the increasing number of HIV cases in Indonesia. Based on the UNAIDS report in 2017, the percentage of new cases of HIV among clients of sex workers and sexual partners of other high-risk persons was 35%. This group of heterosexual males is the highest risk group compared to other key population groups in Asia and the Pacific (such as sex worker, people who inject drugs, gay men, and transgender women). For new HIV infections among countries in the Asia-Pacific region in 2017, Indonesia ranked third, with 18% [12].

Because of the risk these men pose to their wives or regular partners, this study was interested in identifying the factors that lead men to become a bridge population for HIV transmission. That information can help in the design of interventions to reduce risk for both the men and their higher- and lower-risk sex partners. Therefore, this study is aimed for estimating the prevalence and examining factors associated with paying for sex among Indonesian male.

METHODOLOGY

Data Source

This is a cross sectional and descriptive study using the latest national-representative sampling IDHS data to estimate the prevalence for paying for sex among Indonesia male and examine the association between paying for sex among Indonesian male and social demographic factors, knowledge about HIV, gender role attitude and sexual norm. This study has been approved by IRB on 27 June 2019. The question from IDHS questionnaire to estimate the prevalence for paying for sex refer to question have you ever paid anyone in exchange for having sexual intercourse and used question in IDHS 2017, did you pay anyone in exchange for having sexual intercourse to examine the factors associated with paying for sex in the last 12 months.

Study Population and Sample size

This analysis used secondary data from the Indonesia Demographic Health Survey (IDHS) 2017. The IDHS 2017 used stratified, two-stage sampling. Data collection was conducted from July 24 to September 30, 2017 (13). The prevalence of paying for sex behavior is estimated from the total sample of male respondents (N=10,009) and then those who reported ever had paying sexual partners in their lifetime (N=532) were selected to explore factors associated with paying for sex. Because this study employed national survey data, sample weights and influence clustering effects. After doing sampling weights to avoid disproportionate sampling, the sample become

366. So, the result will represent the country actual population. The inclusion criteria in this study is men age 15 – 54 year old.

Statistical Analysis

The prevalence of paying for sex among male Indonesian would be calculated from the denominator of total respondents. The percentage would be presented and disaggregated by key characteristics. Descriptive analysis would be done to examine factors that associated with paying for sex. Bivariate analysis was used to measure the association between recent history of paying for sex among Indonesian men with independent variable using chi-square. Logistic regression was used to predict the odds of paying for sex in the past 12 months based on the values of the independent variables.

RESULTS

Prevalence of paying for sex

The 2017 IDHS found that about 5% of respondents representing the Indonesian male population reported ever had to pay partners in their lifetime (N=532) and about 23.1% reported having paying partners in the past 12 months, or recently visiting sex worker. To fix the disproportionate sampling might have occurred, the weighted sample of men who ever paying for sex in their lifetime was 366. Majority of them (21.2%) aged 30 – 34 years old, finished secondary school and higher (over 68%). Male paying for sex were living with their wife (90.8%), having children (95.6%) and more than half were from rural area (53%) and 46.3% was from urban area. However, this was not indicating that the paying for sex occurred in rural or urban area, but that paying for sex happened in marriage.

Among them only about 25% (92/366) reported that the paying for sex occurred during the past 12 months. In the next step, this study would explore factors associated with this recent paying for sex behavior among Indonesian males.

Factors associated with paying for sex in the last 12 month

Bivariate analysis (Table 1) found that occupation, current residing, level of knowledge and sexual norm are significantly associated with paying for sex in the last 12 months ($p < 0.001$ and $p < 0.05$). The variable of sexual norms in men based on response to two questions. The male respondents were asked how they would feel if their wife asked them to use a condom if the husband has an STI, and if the wife is justified in refusing to have sex. But for age, type of residence, level of education, wealth index, are they have children or not, marital status, and gender role attitude is not significantly associated with paying for sex in the last 12 months.

Table 1 Distribution of factors associated with paying for sex in the last 12 month

Variables	Ever paid for sex		P Value
	Never paying for sex in the last 12 month N (%)	Paying for sex in the last 12 month N (%)	
Age			
≤29	26 (65.0)	14 (35.0)	
30 – 34	56 (72.7)	21 (27.3)	
35 – 39	50 (71.4)	20 (28.6)	0.264
40 – 44	43 (74.1)	15 (25.9)	
45 – 49	48 (78.7)	13 (21.3)	
50 – 54	51 (85.0)	9 (15.0)	
Type of Residence			
Urban	127(74.7)	43 (25.3)	1.000
Rural	147(74.6)	50 (25.4)	
Education			
≤ Primary school	78 (67.2)	38 (32.8)	0.089
Secondary school	167(78.0)	47 (22.0)	
Higher than secondary school	28 (77.8)	8 (22.2)	

Variables	Ever paid for sex		P Value
	Never paying for sex in the last 12 month N (%)	Paying for sex in the last 12 month N (%)	
Wealth Index			
Poorest	54 (72.0)	21 (28.0)	
Poorer	57 (71.3)	23 (28.7)	0.833
Middle	55 (76.4)	17 (23.6)	
Rich	57 (78.1)	16 (21.9)	
Richests	49 (76.6)	15 (23.4)	
Occupation			
Work for family	10 (47.6)	11 (52.4)	0.012
Employed for someone else	143(75.3)	47 (24.7)	
Self-employed	118(77.6)	34 (22.4)	
Have Children			
Do not have children	12 (70.6)	5 (29.4)	0.913
Have children	262 (74.9)	88 (25.1)	
Marital Status			
Married	271 (74.9)	91 (25.1)	0.604
Living with partner	3 (60.0)	2 (40.0)	
Current Residing			
Living together	258 (77.7)	74 (22.3)	0.000
Living apart	16 (47.1)	18 (52.9)	
Knowledge of HIV			
No knowledge	17 (48.6)	18 (51.4)	
Poor	32 (72.7)	12 (27.3)	0.000
Moderate	113 (84.3)	21 (15.7)	
Good Knowdlege	111 (72.5)	42 (27.5)	
Gender role attitude			
Negative attitude	62 (77.5)	18 (22.5)	0.202
Moderate	66 (68.0)	31 (32.0)	
Positive attitude	145 (77.1)	43 (22.9)	
Sexual norm			
Negative sexual norm	15 (53.6)	13 (46.4)	0.020
Neutral	64 (73.6)	23 (26.4)	
Positive sexual norm	194 (77.6)	56 (22.4)	

The logistic regression analysis found that males not current residing with their partners are 4 times more likely to have paying partner during the past 12 months (OR 4.452, $p < 0.001$), comparing to those staying with their partners. Comparing with the younger, males 50 - 54 years old are significantly less likely to have paying partners (OR 0.288, $p < 0.05$). Those who have level of knowledge moderate less likely to paying for sex compare to those who have good knowledge (OR 0.493, $p < 0.001$). The variable gender role attitude in men based on response to five questions as follows: A husband is justified in hitting or beating his wife in the following situation: (1) If she goes out of the house without telling him; (2) If she neglects the children; (3) If she argues with him; (4) If she refuses to have sex with him; and (5) If she burns the food. Men were also asked if they were willing to share their income with their wife. The result from this study found that they who have negative attitude 2 times more likely to paying for sex during the past 12 months (OR 2.169, $p < 0.05$), compare to they who have positive attitude. The logistic regression result are shown in Table 2.

Table 2 Multivariate analysis socio-demographic, knowledge of HIV, gender role attitude, and sexual norm with paying for sex in the last 12 month**.**

Variables	OR	S.E	95% CI	
			Lower	Upper

Variables	OR	S.E	95% CI	
			Lower	Upper
Age				
30 – 34	0.694	0.471	0.275	1.748
35 – 39	0.791	0.478	0.310	2.018
40 – 44	0.586	0.505	0.218	1.578
45 – 49	0.408	0.514	0.149	1.116
50 – 54	0.288*	0.573	0.094	0.884
Type of Residence (Ref. Urban)				
Rural	0.912	0.290	0.517	1.610
Education (Ref. ≤ Primary school)				
Secondary school	0.696	0.321	0.372	1.305
Higher than secondary school	0.632	0.572	0.206	1.939
Wealth Index				
Poorer	1.569	0.432	0.672	3.661
Middle	1.288	0.464	0.519	3.199
Rich	1.289	0.469	0.514	3.232
Richest	1.437	0.531	0.507	4.070
Occupation (Ref. Work for family)				
Employed for someone else	0.519	0.550	0.176	1.524
Self-employed	0.525	0.559	0.175	1.571
Have Children (Ref. Do not have children)				
Have Children	0.705	0.606	0.215	2.309
Marital Status (Ref. Married)				
Living with partner	1.373	1.104	0.158	11.947
Current Residing (Ref. Living together)				
Living apart	4.452***	0.412	1.987	9.979
Knowledge of HIV (Ref. Good knowledge)				
No knowledge	2.174	0.492	0.829	5.702
Poor knowledge	0.856	0.447	0.356	2.056
Moderate	0.493*	0.326	0.261	0.933
Gender role attitude (Ref. Positive attitude)				
Negative attitude				
Moderate	2.169*	0.394	1.002	4.696
	1.367	0.364	0.670	2.788
Sexual norm (Ref. Positive sexual norm)				
Negative sexual norm	2.344	0.482	0.912	6.028
Neutral	1.297	0.326	0.685	2.456

*significant at p<0.05, **significant at p<0.01, ***significant at p<0.001

DISCUSSION

The HIV prevalence in Malaysia was 9.2 %. This percentage is higher than previous study that also conducted in Malaysia among men, whether they have sex with casual partner or male sex worker [14]. The increased prevalence of HIV may be caused by men who paying for sex. Because one pattern of the spread of HIV is through sexual activity.

A study conduct in Singapore, which is comparing the prevalence men who paying for sex in the past 12 months in entertainment establishments (EEs) in Asia with men who paying for sex in the past 12 months in brothels in Singapore. This study found that the prevalence men who paying for sex in brothel group (91.9%) compared to the EEs group (37.1%). They focused study is men who paying for sex because, this population could act as a bridging population for HIV and STI transmission through unprotected sex with female sex worker to their spouse or their regular partner [15].

This study revealed that age is significantly associated with paying for having sex. Those who age 50 - 54 years old are less likely to pay for sex compare with young age in the last 12 months. In other words, the young are more likely to pay for sex, which was similar to what found in a study in Cambodia stating that age 18 years old and above is significantly associated with paid for sex in the last 12 months [16]. In contrast, a study in Spain state that the likelihood of paying for sex in the last 12 months increased with older age (OR=2.6; 95%CI 1.6 to 4.1 for men aged 40-49 years old as compared to they those who aged 18-24 years old) [17], and a study in the United State found that older men significantly more frequent participation in paying for having sex than younger men ($r=0.24$; $p<0.01$; $N=208$) [18]. In this study found that 28.6% those who age 35 – 39 years old reported ever paying for sex in their lifetime still paying for sex.

This study found that males who living apart with their partner 4 times more likely paying for sex in the last 12 months, comparing to those living together with their wives. Work can be one of the causes of men who living apart from their wives to paying for sex. For example long-haul truck drivers, they have sex with many regular and commercial partners on the road [19].

In this study found that males those who have moderate level of knowledge less likely to paying for sex comparing to males with good knowledge. In other words, the better knowledge, the less likely to pay for sex. This strongly indicated that increased knowledge on HIV could keep people in safe sex behavior.

The result from this study found that they who have negative attitude 2 times more likely to paying for sex during the past 12 months. Social norms about gender can affect sexual behavior. Because they can arrange the behavior of men. Social norms can be related to religious levels. Usually, those who are more religious have fewer sex partners [20].

CONCLUSIONS

The overall prevalence of Indonesian male paying for sex was about 5% in 2017. The recent paying for sex among those male ever paying for sex was 25.3%. The findings that paying for sex did occurred at young age, in marriage and when husbands were away from their wives and that attitude of gender roles and social norms were significantly associated with such behaviors indicated that Indonesian female were very much at risk of sexually transmission infection and HIV. If this situation is not well monitored and changed, the HIV epidemic of Indonesian could become generalized as general population are affected by these bridge population, i.e. client of sex workers. Therefore, it is important to promote HIV prevention and sex education for the young people, as well as safe sex practice among married couples.

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FACTORS RELATED TO DOMESTIC VIOLENCE AGAINST WOMEN IN MYANMAR

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ABSTRACT

Introduction: Domestic violence occurred everywhere and women are predominantly exposed to this violence in their daily life. Husband and intimate partners have played as the important abuser of domestic violence against women, which included physical, emotional and sexual violence. Despite frequent occurrence, domestic violence is still largely a hidden problem and under-reported in Myanmar.
Objectives: To examine the factors related to domestic violence against women to fulfill the knowledge gap needed for social and policy planning to eradicate domestic violence in Myanmar.
Methodology: The study is a cross-sectional study using secondary data based on Myanmar Demographic and Health Survey (MDHS 2015-16). Domestic violence questions conducted in a subsample of half of the interviewed households and the total number of 3,417 married women aged (15-49) was interviewed. Only ever-married were selected in this analysis. Descriptive statistic and binary logistic regression analysis were used to examine related factors.
Conclusion: The findings of this study can benefit the policymakers and implement protective programs to decrease the risk factors for domestic violence against women in Myanmar. The intervention program suggested for consideration by improving the knowledge of domestic violence for all women.
Keywords: Domestic Violence, Spousal Violence, Women Rights, Gender-Based Discrimination

INTRODUCTION

Domestic violence has been a common phenomenon worldwide. Women are predominantly exposed to domestic violence in their daily lives. According to the World Health Organization (1), more than 30% of women faced both physical and sexual violence from their spouses or non-spouses worldwide. For domestic violence against women, husband and intimate partners have played important predators. One survey of over 50 population-based groups in 35 countries conducted by the WHO has revealed that 10 to 52% of women worldwide have experienced physical abuse from their husbands or intimate partners. Moreover, 10 to 30% have been victims of sexual violence (2). Domestic violence takes place in all countries, regardless the social, economic, religious or cultural group. Globally, women's organizations have long drawn consideration to violence against women and to intimate partner violence specifically. Therefore, violence against women has now become an issue of international alarm (3).

Violence against women is viewed as a main violation of human rights. Moreover, Human rights and domestic violence against women share their common issues concerning the unequal distribution of power in certain communities. Human rights are defined as a group of ethical values having a lawful measurement, rising out of the requirement of each singular individual to appreciate the situations crucial for a decent life (4). Most communities view that domestic violence is a violation of women's rights and differ from human rights (5).

The origins of violence against women include gender discrimination that gives men power over women and generally men's use of violence to exert that power. Likewise, one study showed that men were the major committers of all kinds of violence against women, and in particular, domestic violence and sexual violence against women (6). With the concern of human rights, upholding

women's rights should cast women comprising all their different ways of thinking, feeling and acting as leading actors in this process of change. Their historical and day-to-day experiences should be taken into account in this substantive reformulation of human rights because the definition and application of these rights must not be separated from people's daily lives (4).

Therefore, researchers have proved that women's rights are one of the human rights issues. Moreover, domestic violence can affect not only the physical injuries to the victims but also psychological consequences. Many women exposed to violence in the family are victims of physical, emotional or sexual violence. Being victims of violence also affects the physical, mental and reproductive health of women. Women exposed to violence have an increased risk of premature mortality because of the direct effects of injury and increased risk of suicide. Moreover, sexual violence is also related to complications such as sexually transmitted infections, poor perinatal outcomes and increased risk of HIV infection. In addition, mental health problems are also associated with exposure of domestic violence such as depression, posttraumatic stress disorder and suicidal behaviors (7).

Domestic violence has adverse effects on family relationships. The study of Holt et al. (2008) found that the complex associations of children raised with inter-parental violence develop attitudes to both of their parents and proposing those children's attitudes toward their offensive fathers in two different ways as the "good, loved father" and as the "bad, offensive father. Children and young people define paternal experiences that are polluted with unhappiness, fear, misunderstanding, dissatisfaction and uncertain attitudes towards both their parents, with fear and empathy towards their father, and kindness coupled with a sense of responsibility to protect their mother. In addition, children and young people are considerably affected by living with domestic violence, and the impact can cause negative consequences even after measures have been taken to protect their security (8).

Myanmar is one of the Buddhist countries in the Southeast Asia Region where the economic growth is slow. Many differences can be observed between rural and urban areas concerning education, cultural and economic status. Because of the culture, domestic violence is one of the hidden problems in every state and region, especially in the rural areas. Most people in the rural areas assume that domestic violence is a normal phenomenon and the husband is allowed the chance to beat his wife when he wants. Moreover, most of the community also accepted that domestic violence is a family issue not a concern for others (9).

METHODOLOGY

Data Source

This study used secondary data from the MDHS 2015-2016, implemented by the Ministry of Health and Sports of the Republic of Union of Myanmar. This study was a cross-sectional survey that collected data from 15 regions and states including Nay Pyi Taw Territory. The variables in this study were taken from the questionnaire for women aged 15 and 49. The MDHS survey was conducted using a stratified two-stage cluster sample design. At the first stage, the selection of sample points (clusters) consisting of enumeration Area or ward/village tracts were performed and 442 clusters from the master sample (123 urban and 319 rural areas) were selected. In the second stage, 13,238 households were selected and 12,500 households were successfully interviewed. From those 12,500 households, 15- 49- year-old women and men 12,885 and 4,737, respectively, were interviewed (10).

Study Population and Sample size

Out of 12,885 respondent women, 4,563 were randomly selected from each household where the male respondent was interviewed. According to the MDHS 2015-2016, male questions were conducted in a subsample of one-half of the interviewed households. In addition, domestic violence questions were asked in same households that male questions were asked because according to the World Health Organization, the domestic violence module in the DHS, need to interview only eligible couples. Moreover, domestic violence in this study emphasized only women who had married. Therefore, among those 4,563 female respondents, 3,425 were women who married. Thus, single women were excluded and the sample size became 3,425. After cleaning the data, 3,417 currently married women were included in this study.

Statistical Analysis

Descriptive statistics implemented to describe frequencies and percentage distribution of variables. In order to find out the association between the dependent variable and independent variables, bivariate analysis was done in the form of cross tables together with chi-square tests using p-value to determine for significance level. Multivariate analysis used to explore the related factors that vulnerable to domestic violence against women. The binary logistic regression analysis was done for this study because the dependent variables were dichotomous. The results were shown as an adjusted odds ratio (OR), 95% CI and p-value to consider for significance level.

RESULTS

Prevalence of Domestic Violence

Table 1 shows an analytical sample consisting of 3,417 ever-married women who aged 15 to 49, interviewed for domestic violence module, and analyzed. In this study, the respondent's age was categorized in groups. The minimum age of women was 15 while the maximum age was 49 years. Among them, women aged 30 to 39 held the highest percentage (40%) and young aged women comprised only 2.5%. Moreover, the number of women aged over 40 years was about 30%. Importantly, women aged between 15 and 39 years were the highest proportion (nearly 70%) and those aged 40 to 49 totaled about 30%.

Education level refers to no education, primary, secondary and higher. In Myanmar, preschool to fourth standard means primary, 5th to 10th standard refers to secondary and after passing 10th standard and graduating means higher education. In this study, educational level was categorized in four groups. Women who had no education comprised 15.5%, secondary education was 48.1% and higher education was 7.1%. Likewise, husbands who had no education comprised 16.4%, primary education was 41.2% and higher education was 5.6%. Moreover, women who witnessed domestic violence in their family comprised 19.8% and those without experience comprised about 75.6%.

Concerning the marital status of women, regardless of official marriage registration, the study observed that more than 90% of women were currently married and the women who were divorced and widowed totaled 4.4 and 4.2%, respectively. Occupation status indicated the main occupation of women. It was categorized according to economic activity in the place. Nearly 30% of the women in this study were not working whereas 25.2% were unskilled manual laborers. Moreover, women who worked as sales and agricultural-self-employed totaled 17.7 and 10.7%, respectively.

In this study, the analysis of domestic violence against women only focused on spousal violence that included physical, emotional and sexual violence. The total number of 3,417 married women was analyzed in this study. Among them, about 23.7% experienced domestic violence. Definitely, 16.8% were victims of physical violence, 15.9% were victims of emotional violence and only 3.8% experienced sexual violence. Physical violence was the most reported incidence, followed by emotional violence and sexual violence by their husband.

Table 1 Frequency and distribution of ever-married women in Myanmar

Variables	Number	Percent
Demographic Variables		
Family history of domestic violence		
Yes	675	19.8
Don't know	158	4.6
No	2,584	75.6

Variables	Number	Percent
Respondent's age		
15-19	84	2.5
20-24	339	9.9
25-29	564	16.5
30-34	684	20.0
35-39	693	20.3
40-44	562	16.4
45-49	491	14.4
(Mean +SD) 34.7 +8.12		Min=15 , Max=49
Demographic Variables		
Respondent's women education		
No education	530	15.5
Primary	1,645	48.1
Secondary	1,000	29.3
Higher	242	7.1
Husband education		
No education	563	16.5
Primary	1,407	41.2
Secondary	1,254	36.7
Higher	193	5.6
Current marital status of respondent women		
Widow	142	4.2
Divorced	152	4.4
Married	3,123	91.4
Husband alcohol consumption		
Yes	1,706	49.9
No	1,711	50.1
Gender and Social Roles		
Age at first cohabitation		
15-19	84	2.5
20-24	339	9.9
25-29	564	16.5
30-34	684	20.0
35-39	693	20.3
40-44	562	16.4
45-49	491	14.4
(Mean +SD) 20.84 + 4.8		Min=10 , Max=44

Binary logistic regression (Table 2) was done to examine the correlation between domestic violence and related factors. The results showed that gender and social roles, the dominance of men over women, socio-demographic and economic factors statistically influence domestic violence. However, the study found that some of the hypothesized factors such as respondent's age, education, place of residence and husband's education are not statistically significant.

The study hypothesized that women residing in low family wealth were more likely to suffer from domestic violence than those residing in higher family wealth. Moreover, the study hypothesized that family conditions could influence women's decisions to trap themselves under violence. Furthermore, cohabitation with

husband at a young age and having a large number of children put women under subordinated status and increased women has to be at risk of domestic violence.

Table 2 Odds ratios (OR) from binary logistic regression to assess the association between domestic violence and other background characteristics (N=3,417)

Variables	OR	95% C.I.		P-value
		Lower	Upper	
Demographic Factors				
Respondent's women age	0.992	0.979	1.006	0.279
Family history of domestic violence *				
No [a)]				
Yes	2.380	1.949	2.906	0.001
Don't know	1.816	1.238	2.664	0.002
Current marital status of respondents				
Married [a)]				
Widowed	1.155	0.769	1.735	0.487
Divorced***	5.853	4.053	8.454	0.001
Husband alcohol consumption* **				
No [a)]				
Yes	2.978	2.487	3.565	0.001
Gender and social roles				
Age at First Cohabitation of respondents				
Age at first cohabitation	0.963	0.941	0.985	0.001
Respondent's Occupation				
Not working [a)]				
Professional/ technical/managerial	1.432	0.891	2.300	0.138
Clerical	2.006	0.785	5.126	0.146
Sales	1.447	1.111	1.885	0.006
Agricultural-self employed	0.864	0.627	1.190	0.370
Agricultural- employee	1.736	1.156	2.607	0.008
Household and domestic	1.751	0.310	9.900	0.526
Services	1.309	0.444	3.858	0.626
Skilled manual	1.119	0.726	1.724	0.610
Un-skilled manual	1.393	1.102	1.761	0.006
Psychological Perspective				
Dominance of men over women				
Beating justified without care children **				
No [a)]				
Yes	1.256	1.030	1.530	0.024
Don't know	1.246	0.631	2.463	0.526
Number of Children * **				
Living children + current pregnancy	1.162	1.090	1.239	0.000

Variables	OR	95% C.I.		P-value
		Lower	Upper	
Economic Factors				
Household Wealth Index *				
Richest [a)]				
Poorest	1.621	1.129	2.327	0.009
Poorer	1.409	0.987	2.012	0.059
Middle	1.147	0.801	1.642	0.454
Richer	1.050	0.741	1.488	0.783
Constant				0.19
Number of observation				3,417
Log likelihood				0.19
Nagelkerke R Square				3,282.187

*significant at p<0.05, **significant at p<0.01, ***significant at p<0.001, (a = Reference)

DISCUSSION

Family history was one of the influencing factors that increased the risk of domestic violence. According to the results of this study, women who witnessed domestic violence from their parents were more likely to be abused and experience domestic violence than those without such family history. This finding was consistent with empirical studies. Ebenezer who studied about domestic violence in Ghana and found that those women who had experienced their father thrashing their mother were at a higher risk of domestic violence because they accepted the violence and chose to remain silenced (11), has supported this view.

Regarding the economic status of the family wealth index in this study, women residing under low economic conditions were more likely to experience domestic violence than those residing under high economic conditions. This result agreed with related studies. Men were more likely to commit domestic violence depending on some factors such as family wealth index (12). In Myanmar, women serve as housewives and their responsibilities include cooking, child caring and mostly staying at home.

The result in the current study showed that women with husband who consumed alcohol were more likely to experience domestic violence compared with those living with husband's not consuming alcohol. This argument was consistent with empirical studies. Alcohol consumption by the husband was a common factor of increased 'risk of domestic violence (13).

According to this result, the respondents who neglected their children are more suffered from domestic violence compared with the women who went out without telling their husband. One study showed that men were the major committers of all kinds of violence against women, and in particular, intimate partner violence and sexual violence against women (6).

The study showed that when the family increased by one child, the probability of experiencing domestic violence increased 1.2 times. Moreover, economic dependency can also be a predisposing factor by the presence of children, access to different housing and access to economic resources beyond income (14).

In this study, women's occupations were significantly related to domestic violence especially among women who worked as sales representatives, agricultural-employees and unskilled manual laborers. When women worked as sales representatives, she has to relate to many people and expose herself to a broader sector of society. This includes talking to other men, which induces jealous feelings of the husband. On the other hand, women who worked as unskilled manual laborers inherit a subordinated class in their jobs with low income. They tend to experience increased risk

of domestic violence. Previous studies found that the women working in low-income occupations were considerably less likely than other women to restrict offensive relationships (15, 16).

CONCLUSIONS

The study showed some of the risk factors for domestic violence against women in Myanmar. Based on the result of this study, the researcher recommended that the government and policymakers should implement effective interventions in decreasing domestic violence against women by reducing the risk factors. For logistic regression analysis in this study, those three types of violence were combined as domestic violence. According to the analysis, women's occupation, marital status, the number of children in the family, family wealth index, family history of violence, age at cohabitation, husband's alcohol consumption and men's dominance over women significantly correlated with domestic violence. However, respondent's age, women's education, husband's education and rural/urban residence were not significantly related to domestic violence. The current findings in this study were an important contribution to reducing domestic violence in Myanmar. These results are based on the national representatives and could provide useful information to policy makers to reduce domestic violence.

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SHIFT WORK DISORDER AND FATIGUES AMONG NURSES AT A PRIVATE HOSPITAL IN BANGKOK

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ABSTRACT

Introduction: Shift work disorder (SWD) is a kind of circadian rhythms sleep disorder related to sleep problem and shift work schedule. SWD is classified by excessive daytime sleepiness and/or insomnia equal or more than 1 month which is related to shift work schedule. Nurse considers as a health profession who work as a shift schedule.
Objectives: To estimate the prevalence of shift work disorder among nurses at a private hospital in Bangkok and its associations with physical and mental fatigue.
Methodology: A questionnaire-based cross-sectional study was conducted among 207 registered nurse in a private hospital in Bangkok, Thailand. A questionnaire comprised of standardized questions on SWD, fatigue and socio-demographic backgrounds of participants were administered. The descriptive data were presented by mean and percentage. The prevalence of shift work disorder was calculated. The association between fatigue to SWD were analyzed by Chi-square and crude odd ratio.
Results: In this study, mean age of registered nurse were 32.46(± 7.27) years. Most of them were female (94.1 %) and single (71.7%). The prevalence of SWD among private hospital nurses is 23.9%. 43.9% of nurses reported physical fatigue and 66.8% reported mental fatigue. In multivariate analyses, those who have physical fatigue is 3.842 times more like to develop SWD (AOR = 3.842; 95%CI 1.635, 9.027). However, mental fatigue was not associated with SWD.
Conclusion: One quarter number of nurses in this study reported of SWD. Physical fatigue was associated with SWD among these private nurse. Workload management policy should consider to improve physical fatigue for reducing SWD in this hospital
Keywords: Shift work disorder; Fatigue; Private hospital; Nurses.

INTRODUCTION

Shift work is a fundamental component of working patterns and is an integral part of the lifestyle healthcare workforce. It posed a serious health risk by disruption of circadian rhythm, namely biological clock or life cycle. National sleep foundation of America Foundation defined shift-work as a job that takes place on a schedule outside the traditional 9 am – 5 pm day and involves evening or night shifts, early morning shifts, and rotating shifts [1]. Shift work disorder (SWD); or shift-work sleep disorder, is a kind of circadian rhythms sleep disorder related to sleep problem and shift work schedule. American Academy of Sleep Medicine [2] classifies SWD by excessive daytime sleepiness and/or insomnia equal or more than 1 month which is related to shift work schedule [3]. SWD is caused by night shifts, rotating shifts, or even an early morning shift. Study from Drake reported that around 10% of night and rotating shift workers aged 18 – 65 years have been estimated to have a diagnosable "shift-work sleep disorder" [1]. A study in Japan reported that around 24.4% among nurses were diagnosed as SWD [4].

Shift work disorder have been related with negative physical and psychological impact. Previously research shown the affect of shift work and night shift can caused of increasing risk factor of cardiovascular disease including myocardial infarction, ischemic stroke, and any coronary event [5], breast cancer [6], cancer of endometrium[7], colon-rectal [8] and non-Hodgkin lymphoma[9]. In addition, working in non normal time was linked to gastrointestinal disorder including peptic ulcer, gastritis, constipation, gastro-esophageal reflux disease, flatulence, colitis and the cause may be from changing of eating habitual induced gastric acid releasing [10].

Fatigue both of physical and mental were a common negative health problem to worker who engaged in shift work The symptoms showed inform of lack energy and sleepiness. Fatigue related to the risk of errors in working and accident including quality of work as well.

Nurse is a profession of which are important for providing health care to the services. Patient care requires multiple skills such as experience, expertise, responsiveness and empathy are an important component for the safety and mental support of patients and excellence service quality[11]. Nurses were divided their work as a shift schedule included night shift work because patient care needed to provide all 24 hours a day. Several epidemiological studies reported sleep-disorder among nurse. In Hong Kong, a prevalence of nurses experienced of sleep problem was more than 70% [12]. The study in Intensive Care Unit also reported a large prevalence 81.9% of poor sleep quality among Thai nurses and approximately 30.4% of them had insomnia [13].

Given an increased understanding of SWD among nurses, it is crucial to gain a better understanding between SWD and fatigue. Therefore, this study aims to investigate SWD and fatigue among a private hospital nurses in Thailand. This study finding would be benefit for providing a suggestion for shift work management in hospital to prevent SWD among nurses.

METHODOLOGY

Procedure and participants

A questionnaire-based cross-sectional study was conducted during December 2018 – January 2019 among registered nurses in a private hospital in Bangkok, Thailand. The private hospitals have found that nurses are under high pressure from patients' expectations. Including a lack number of nurse. This hospital is located in the central of Bangkok with facility of outpatient ward, intensive care and inpatient care with 154 beds. All 302 registered nurses were invited to participate in this study. Part-time nurses, nurses with psychiatric problem and obstructive sleep apnea were excluded from the study. 279 self-administrative questionnaires were distributed registered nurses whom met inclusion. In total, 205 questionnaires were returned. The response rate was 73.48%.

Instruments

Shift work disorder questionnaire

SWD was developed from American Academy of Sleep Medicine: ICSD-2. The questions comprised of 3 question for diagnose SWD including (1) Do you experience difficulties with sleeping or excessive sleepiness? (yes/no), (2) Is the sleep or sleepiness problem related to a work schedule where you have to work when you would normally sleep? (yes/no), (3) Has this sleep or sleepiness problem related to your work schedule persisted for at least one month? (yes/no) .The respondents answers “Yes” to all of three questions were fulfilled the criteria for SWD [2].

Fatigue Questionnaire

The Chalder Fatigue questionnaire (CFQ 11) referred to both of physical and mental fatigue. The questionnaire was used to measure the severity of tiredness. The 11 items were asked about sensations and functionality, each of the 11 items were ranged on 4 scale from asymptomatic to severe symptomatic. Item 1-7 were used for measurement physical fatigue and item 8-11 were used for measurement of mental fatigue. The extreme left received a score of 0, increasing to 1, 2 or 3 as they became more symptomatic [14]. A group of physical fatigue could define by the sum of the total number of points item 1-7 if the score more than 14 classified to physical fatigue.

Socio-demographic Questionnaire

Socio-demographic of participants were included age (< 30 years/ ≥ 30 years), gender (male/ female), marital status (married/ single), education level (Bachelor' s degree/ Master's degree), monthly income (< 40,000 Baht/ ≥

40,000 Baht), underlying disease including respiratory disease, hypertension and diabetes (yes/no) and body mass index (< 23 kg/m^2 / ≥23 kg/m^2).

Statistical Analyses

SPSS version 22 (Chulalongkorn University license) was used for the statistical analyses. Descriptive analysis was reported. For categorical data, frequency and percentage were reported. Bivariate analysis was performed by chi-square test. If assumption of chi-square did not meet, fisher's exact test would be performed. The associations of chi-square with p-value < 0.2 was selected to the next step of analysis. Binary logistic regression was analyzed against SWD (yes/no) and crude odd ratio (OR) was reported. After that, all independent variables with p-value < 0.2 (or p-value < 0.05) was included into the last model. Adjusted odd ratio (AOR) and 95% confidence interval (95%CI) was reported. Where the 95%CI did not included 1, those odd ratios was considered as statistical significant.

Ethical statement

Ethical approval was taken from the Research Ethical Review Committee for Research Involving Human Research Participants, Chulalongkorn University (COA No.056/2562).

RESULTS

Table 1 presents an association between socio-demographic characteristics of nurses and SWD. The study found that 69.4% of SWD were a group of participants aged less than 30 years. Age was associated with SWD in nurses (p = 0.001). Most of SWD (85.7%) had money income less than 40,000 baht per month. However, income was not associated with SWD. The participants were reported underlying disease had SWD less than those who never had underlying disease. Other characteristics of participants were not associated with SWD.

Table 1 an association between socio-demographic characteristics of nurses and SWD.

Socio-Demographic	No Shift Work Disorder n = 156 (76.1%)	Shift Work Disorder n = 49 (23.9%)	Chi-square	P-value
Age(Years)				
< 30 years	67(42.9%)	34(69.4%)	10.428	0.001**
≥ 30 years	89(57.1%)	15(30.6%)		
Gender				
Male	8 (5.1%)	4 (8.2%)	0.623	0.486
Female	148 (94.9%)	45 (91.8%)		
Marital status				
Single	116 (74.4%)	35 (71.4%)	0.165	0.685
Marital	40(25.6%)	14(28.6%)		
Education level				
Bachelor' s	141 (90.4%)	48(98.0%)	2.973	0.125
Master's	15 (9.6%)	1 (2.0%)		
Money income				
< 40,000 Baht	130(83.3%)	42(85.7%)	0.157	0.692
> 40,000 Baht	26 (16.7%)	7 (14.3%)		
Underlying disease				
No	136 (87.2%)	42 (85.7%)	0.07	0.791
Yes	20 (12.8%)	7 (14.3%)		

Socio-Demographic	No Shift Work Disorder n = 156 (76.1%)	Shift Work Disorder n = 49 (23.9%)	Chi-square	P-value
Body Mass Index (BMI)				
<23 kg/m^2	115 (73.7%)	36 (73.5%)	0.001	0.973
≥23 kg/m^2	41 (26.3%)	13 (26.5%)		
Work Experience				
<10 years	94 (60.3%)	42 (85.7%)	10.823	0.001
≥11 years	62 (39.7%)	7 (14.3%)		

Table 2 showed the association between SWD and fatigue. Around 75% of SWD have physical and mental fatigue. SWD was significantly associated with physical fatigue (p<0.001) but not for mental fatigue.

Table 2 Association between Shift Work Disorder and fatigue.

	No Shift Work Disorder n = 156 (76.1%)	Shift Work Disorder n = 49 (23.9%)	Chi-square	P-value
Fatigue Questionnaire				
Physical fatigue				
No	103 (66.0%)	12 (24.5%)	26.12	<0.001**
Yes	53 (34.0%)	37 (75.5%)		
Mental fatigue				
No	56 (35.9%)	12 (24.5%)	2.189	0.139
Yes	100 (64.1%)	37 (75.5%)		

*p-value<0.05; **p-value < 0.01

Table 3 shows the final model of association between factor related shift work disorder (SWD). We found that physical fatigue increased 3.842 fold-odds of having SWD (AOR = 3.842; 95%CI 1.635, 9.027).

Table 3 Binary logistic regression analysis of associated factors of shift work disorder

	OR	95%CI		AOR*	95%CI	
Physical Fatigue						
No	1			1		
Yes	5.992	2.886	12.441	**3.842**	**1.635**	**9.027**

*Adjusted for age, sleep medication use. Noise exposure at night, Insomnia and depression
OR=Odd ratio; AOR=Adjusted odd ratio; CI=Confidence interval

DISCUSSION

In this study, we found prevalence of SWD among nurses in a private hospital is 23.9 %. SWD was associated with socio-demographic, personal behavior, work characteristic, and factors related to sleep quality. After multiple logistic regression analysis, physical fatigue were the predictors of SWD in this study.

The prevalence of SWD in our study was similar to Japanese nurses working with rapid-rotation schedules which reported SWD for 24.4% [4]. Similarly, study from Waage studied with oil rig workers and found that 23.3% of workers were reported of SWD and low quality of sleep [15]. Comparing with Egyptian and Nigerian nurses, we found that Thai nurses had reported lower percent of SWD than Egyptian nurses and found SWD around 43.07%. Correspondingly, Fadeyi found 43.2% of the shift nurses in Nigerian fulfilled the criteria for SWD [16].

In this study, age is associated significantly factor with SWD condition. We found that 69% of nurses aged less than 30 years reported SWD which was higher than those age higher than 30 years. Our study was opposite with study by Harma. The study was conducted among 2 groups whose age 19-29 years and 53-59 years. The results suggested that the group of age between 19-29 years were able to tolerate and adapt to sleep deprivation less than the older who age between 53-59 years old. The younger group could be adjust sleep deprivation better than older after passed 3 night shift [17]. Considering on age and sleep quality among shift-worker, a large epidemiological study of 2,767 workers suggested no association between age of worker, shiftwork and work characteristics [18].

Our result suggested that nurses with experience of working less than 10 years had more SWD than the one who had longer work experience. The association between work experience and SWD was statistically detected. The possible reason is that work experience may associate with work experience adjustment. However, working hours was not associated with SWD among nurses in our study because the hospital's policy required nurses to work longer than 16 hours per day should to take a break at least 1 day and during long working hour they could take a nap 1 hours per day. The result was inconsistency with a cohort study which suggest that the longer hours of work was associated with sleep disturbance. Mental and physical fatigue could result from long working hours which may link to sleep disturbance and sleep problem [19].

Several limitations of this study should be noted. First, this study is not be able to generalize to other nurses in either private or public hospital because the pattern of working hours was not the same. Regarding to this point, the characteristic of hospitals also need to be considered in the further study. Second, a cross-sectional study is limited to a causal relationship between physical fatigue and SWD. Lastly, self-reported questionnaire is prone to information bias.

CONCLUSIONS

The prevalence of shift work disorder showed 23.9 % of total participants. Finding from the final model of this study suggested the predictors of SWD was physical fatigue. Workload management policy should consider to improve physical fatigue for reducing SWD in this hospital.

ACKNOWLEDGEMENT

The study was supported by Chulalongkorn Academic Advancement into Its 2nd Century Project (CUAA Project).

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JOB STRESS, SOCIAL SUPPORT AND INSOMNIA AMONG PUBLIC HEALTH WORKERS IN THAILAND

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ABSTRACT

Introduction: Insomnia, defined by difficulty of sleep which presence of an individual's report, is the most common sleep disorder. The Asian Sleep Research (ASRS) reported that prevalence of insomnia among Thai population is 52%. Insomnia affects on immune system interruption, mental disorder and dysfunction of metabolism resulting in depression, hypertension, and coronary heart diseases. Several epidemiological studies had been reported an association between high demands, low job control, low social support and sleep disturbances including insomnia. Public health workers refer to doctors, nurse, public health officer under ministry of public health, Thailand. Their responsibility base on epidermiology working such as surveillance and investigation to find the prevalence and control disease in their area. Their work has been challenged with overload job demand leading mental health risk factors. However, limited studies focused on job stress and insomnia among public health workers. Given an increased understanding risk of insomnia especially among Public health workers, it is better to identify effect job stress, social support and insomnia.
Objectives: To examine associations between job stress, social support and insomnia among Public health workers in Thailand.
Methodology: An analytical cross-sectional study was conducted during April-May, 2019. 325 Public health workers, Thailand were invited to participate in this study. The quota sampling technique was utilized to select participants. A self-reported questionnaire was sent out via mail. Chi-square was performed to find the associations.
Results: Majority of respondents were female (80%). Average age was 35 years old and 67.69% graduated Bachelor's degree. 64% of them were public health workforce. Average reported working time per week was 46 hours/week. 40% of them reported having enough monthly income without saving. More than half (52.6%) of respondents reported clinical insomnia. The results among clinical insomnia showed that 27.49 % had high level of job stress, 43.27% reported low level of social support.We found that job demand and supervisor support were associated with clinical insomnia statistic significantly ($p<0.05$).
Conclusion: We found that half of public health workers in Thailand reported clinical insomnia. Their job demand and supervisor support affected on insomnia status. The results of the study suggest to enhance job demand and supervisor support among public health workers for improving sleep quality and reducing insomnia.
Keywords: Insomnia, Job stress, Job control, Job demand, Social support, Supervisor support, Co-worker support, Public health worker.

INTRODUCTION

Insomnia is well known as a pertinent public health problem, with a complex etiology [1, 2]. Insomnia defined as a difficulty of sleep which presence of an individual's report [3]. Insomnia person often wakes up early than normally or does not feel fresh when they wake up from sleep. In 2000, the Asian Sleep Research Society [ASRS] reported that 3 Asian

countries that had an overall high prevalence of insomnia (52%) were Thailand, Taiwan and Philippines [4]. Stress, anxiety, depression, substance abuse, medical illness, or other sleep disorders were related to insomnia [5, 6]. Person with insomnia affects on immune system and metabolism [7], depression [8] hypertension [9], and coronary heart diseases [10]. Insomnia had in 2011, The studied in Korea [11]) found prevalence of insomnia among workers (32.9%). Worker'sleep disturbances have significant effect on organizations'performances due to impairments in concentration, communication skills, decision-making, and flexible thinking. Sleep disturbances may be reduced job motivation and poor leadership qualities [12, 13].

Public health workers are the person who enchances health in term of distribution and determinants of health-related, and prevention or control people from illness. In Thailand public health workers can be doctor, nurse, public health officer etc., who work on measurement, supervisory, disease control, follow-up, and evaluate of the system [14]. Previous studied knew association between job stress level as low job control and high job demand and social support level with insomnia [4, 7, 11, 15, 16]. Limited studied were conducted among Public health worker who had high workload. Therefore, this study aimed to accesses the prevalence and to find an association between job stress, social support and insomnia among Public Health workers in Thailand.

METHODOLOGY

Subject

A cross-sectional study was conducted among public health workers under ministry of public health, Thailand. Which spread into 14 offices around Thailand (N=1,853 workers). After calculated sample size, we got 350 samples then using quota sampling technique to distributed Self-reported questionnaire to participants in 14 offices. Amount 325 questionnaires were returned (response rate: 92.85%).This study conducted during April – June 2019. And this study was approved by the ethics committee of Chulalongkorn University Research Ethics Committee, COA No.065/62.

Questionnaires

Questionnaires were divided into 4 parts. The first part consisted of 2 components; socio-demographic variables (gender, age, education, marital status, have children, hobby, work experience, income, and sufficiency of income) and work characteristic variables (work place, hours of work per day, position, and traveling period). Job stress was assessed by the Thai Job Content Questionnaires (TJCQ) [17], which translated from Job Content Questionnaires (JCQ) [18]. The questionnaire is included job control and job demand. There were 22 questions question number 1 to 9 for job control and question number 10 to 22 for job demand. A rating scale was used for this questionnaire (very agree, agree, disagree, very disagree). The Control of the work were calculated by 2 multiplied with the sum of Q1 to Q9 (Following this formula: 2(Q1+Q2+Q3 +Q4+Q5+Q6+Q7+Q8+Q9), then high and low level of job control were difined by the average score of participants. In the part of the Demand of the work were calculated by 0.9 multiplied with the sum of Q10 to Q19 and then plus with 3 multiplied with the sum of Q20 to Q22 (Following this formula: {0.9[Q10+Q11+Q12 +Q13+Q14+Q15+Q16+Q17+Q18+Q19]} + {[3(Q20+Q21+Q22]} and the result also difined high and low level of job demand by the average score of participants. (High level of job stress: High demand of the work + Low control of the work.) Social support questionnaire was accessed by TJCQ [17], which consist with 2 components were supervisor and co-worker support. There were 4 positive questions for supervisor support and also 4 positive questions for co-worker support. A rating scale was used for this questionnaire (very satisfied, satisfied, dissatisfied, very dissatisfied). The social supports were calculated by combine supervisor support and co-worker support is 2.25 multiplied with the sum of Q1 to Q8 (Following this formula: 2.25(Q.1+Q.2+Q.3+ Q.4+Q.5+Q.6+Q.7+Q.8). Then high and low level of social support were defined by the average score of participants. If total score equal or higher than average, it refers to high level social support group. If not, it refers to low level of social support group. Insomnia was assessed by Insomnia Severity Index [19, 20]. Insomnia was classified into clinical insomnia (score: 8 -24 score) and non-clinical insomnia (score: 0-7).

The reliability of this study was tested via a pilot test. The Cronbach's alpha for each part is showed as follows; General and working information questionnaire (Cronbach's alpha = 0.86), Job stress questionnaire (Cronbach's alpha = 0.83), Social Support questionnaire (Cronbach's alpha = 0.89), and Insomnia Severity Index (Cronbach's alpha = 0.86).

Statistical Analyses

Data was analysed by SPSS program version 22 (Chulalongkorn university license). Categorical data reported as number and percentage.And the continuous data described by mean and standard deviation (normal distributed data), but if data was skewed, median and interquartile rank (IQR) had been reported. Insomnia as dependent variable was treated as categorical data (Clinical and Non-clinical insomnia). For independent, all variables treated as categorical data which used median to classified it (equal or lower than median, and higher than median), because researcher yearn to know the different between low and high among them. Chi-square was performed to access the associations.

RESULTS

Majority of participants were female (80.00%) with average age 35 years old (±9.5; Range 23 to 60 years) . Predominantly of them were single (64.00 %) and mostly have no children (89.80%). More than half were graduated Bachelor's degree (67.69%). Around 40% of them reported having enough income without saving, median of income was 20,000 baht per month (IQR = 18,000 to 32,300 baht). Majority of participants 64.00 % were public servant and among them 70.40 % had experience equal or lower than median (median =7 years ,IQR = 4 to15 years). Their average reported working time was 46 hours per week (± 10.27; Range 35 to 80 hours). In part of travelling period, the average time was 50.93 minutes (median =30, IQR = 15 to 60 minutes per day) (Table 1).

Job stress and Social support measurement found, just 24.30% of participants had high level of job stress. Which the whole 59.10 % of participants had low level of job control and 46.20 % had high level of job demand .In part of social support level, quite a lot of participants had low level of social support (41.50%).Which 39.40% had low level of supervisor support and 29.20% low level of co-worker support (Table 2).

More than half of participants's respondents reported clinical insomnia (52.6%). The highest prevalence of insomnia by self-report in this study was observed for female group, age group lower than mean, single, no have children, had hobby, higher work experience, equale or lower income, and enough sufficeinccy income but no saving. However, the association between socio-demographic factors, there were 2 variables had association with insomnia in socio-demographic factors: education level (P-value=0.03) and sufficiency of income (P-value<0.01). The propotion of education lower or equal to Bachelor's degree and Master's degree or higher among clinical level of insomnia was 60.82% and 39.18% respectively .For in the proportion of sufficiency of income among insomnia group, 42.11% had enough and have saving, 39.77% had enough but no saving, and 18.12% had not enough money. For the work characteristics, the traveling pepiod just only one factor that association with Insomnia (P-value<0.01). The propotion of traveling time higher than median and equal or lower than median among clinical level of insomnia was 56.73% and 43.27% by step.

The part of job stress and social support found that, the highest prevalence of insomnia by self-report in this study was on lower job control, higher job demand, high supervisor support, and high co-worker support. Nevertheless, there were 2 factors which associated with Insomnia at P-value=0.05, job demand and supervisor support (P-value<0.01 and 0.04 by step). The propotion of job demand was 53.80% had high level, and 46.20% had low level of job demand among clinical level of insomnia. While the supervisor support's propotion was 69.59% had high level, and 30.41% had low level of supervisor support among clinical level of insomnia (Table 3).

Table 1 Number of Sociodemographic factors and work characteristics in participants among public health workers in Thailand.

Sociodemographic Variables (N = 325)	n	%
Gender		
Male	65	20.00
Female	260	80.00
Age		
Equal or lower than mean	203	62.50
Higher than mean	122	37.50
Mean=35years old, SD=9.50, Rage=23-60 years		
Education level		
Lower than Bachelor's degree	22	6.80
Bachelor's or equivalent level	220	67.70
Master's or equivalent level	81	24.90
Doctoral or equivalent level	2	0.62
Marital status		
Single	208	64.00
Maried	92	28.30
Separate/Divord/Widowed	25	7.70
Have childrens		
No	292	89.80
Yes	33	10.20
Work experience		
Equal or lower than median	232	71.40
Higher than median	93	28.60
Median=7 years, IQR=4-15 years		
Income		
Equal or lower than median	167	51.40
Higher than median	158	48.60
Median=20,000 Baht/month , IQR=18,000-32,300 Baht/month		
Sufficiency of income		
Not enough	85	26.20
Enough but no saving	130	40.00
Enough with saving	110	33.80
Hours of work		
35 – 40 hours	180	55.40
Higher than 40 hours	145	44.60
Mean = 46.13 Hours/ week ,SD = 10.27, Rang = 35-80 Hours/ week		
Position		
Public servants	208	64.00
Government employee	117	34.00
Traveling pepiod		
Equal or lower than median	173	53.20
Period higher than median	152	46.80
Median=30 minutes, IQR=1 – 60 minutes		

Table 2 Number of Job stress, Social supportin participants among public health workers in Thailand.

Variables (N = 325)	n	%
Job Stress Level		
Low	246	75.70
High	79	24.30
Job Control		
Low	192	59.10
High	133	40.90
Job Demand		
Low	175	53.80
High	150	46.20
Social support Level		
Low	135	41.50
High	189	58.20
Supervisor support		
Low	128	39.40
High	197	60.60
Co-worker support		
Low	95	29.20
High	229	70.50

Table 3 Association between Indeoendent variables and Insomnia in participants among public health workers in Thailand.

Variables	Non-Clinical (n=154)	Clinical (n=171)	Chi-Square	P-value
Sociodemographics	**n (%)**	**n (%)**		
Gender				
Male	31(20.13)	34(19.88)	0.003	0.96
Female	123(79.37)	137(80.12)		
Age (mean = 35 years)				
Equal or lower than mean	99(64.28)	104(60.82)	0.42	0.52
Higher than mean	55(35.72)	67(39.18)		
Education level				
Equal or lower than Bachelor	123(79.87)	119(69.59)	4.50	0.03*
Master's degree or higher	31(20.13)	52(31.41)		
Marital status				
Single	99(64.28)	109(63.74)	0.64	0.73
Maried	45(29.22)	47(27.48)		
Separate/Divord/Widowed	10(6.50)	15(8.78)		
Have children				
no	142(92.20)	150(87.72)	1.79	0.18
yes	12 (7.80)	21(12.28)		
Hobby				
None	56(36.36)	60(35.09)	0.06	0.81
Yes	98(63.64)	111(64.91)		
Work experience (median=7 years)				
Equal or lower than median	87(56.49)	82(47.95)	2.37	0.22
Higher than median	67(43.51)	89(52.05)		
Income (median = 20,000 baht/month)				
Equal or lower than median	80(51.95)	87(50.88)	0.37	0.85
Higher than median	74(48.05)	84(49.12)		
Sufficiency of income				
Not enough	54(35.06)	31(18.12)	16.17	<0.01*
Enough but no saving	62(40.26)	68(39.77)		
Enough and have saving	38(24.68)	72(42.11)		
Working characteristics				
Hours of work/week				
35 – 40 hours per week	86(55.84)	94(54.97)	0.03	0.87
Higher than 40 hours per week	74(44.16)	84(45.03)		
Position**				
Public servant	96(62.34)	112(65.50)	0.35	0.55
Government employee	58(37.66)	59(34.50)		
Traveling period (median = 30 minutes)				
Equal or lower than median	97(62.99)	74(43.27)	12.63	<0.01*
Period higher than median	57(37.01)	97(56.73)		

Variables	Non-Clinical (n=154)	Clinical (n=171)	Chi-Square	P-value
Sociodemographics	**n (%)**	**n (%)**		
Job Stress Level				
Low	122(79.22)	124(72.51)	1.98	0.16
High	32(20.78)	47(27.49)		
Job Control				
Low	85(55.19)	107(62.57)	1.83	0.18
High	69(44.81)	64(37.43)		
Job Demand				
Low	96(62.34)	79(46.20)	8.49	<0.01*
High	58(37.66)	92(53.80)		
Social support Level				
Low	61(39.61)	74(43.27)	0.36	0.53
High	92(60.39)	97(56.73)		
Supervisor support Level				
Low	52(33.77)	76(44.44)	3.87	0.04*
High	95(66.23)	102(55.56)		
Co-worker support Level				
Low	43(27.92)	52(30.41)	0.21	0.65
High	110(72.08)	119(69.59)		

*P-value < 0.05
**Position : Public servant will have more security in their careers than Government employee.

DISCUSSION

The aimed of this study was to access prevalence of insomnia, and to access an associations between job stress, social support and insomnia among public health workers in Thailand. Based on Job Demand - Control Model [21] which job stress combind with job control and psychological job demand and social support combind with supervisor and co-worker support. Job stress and Social support Questionnaires were added in Job Content Questionnaire (JCQ) which Pichaya Pakthongsuk [17] translated in Thai Language.The result found that , psychological job demand(P-value<0.01) and supervisor support (P-value=0.04 by step) had significant association with Insomnia at P-value=0.05. This results are convicing because they are similar to the previous outcome such as in 2011 Hwan-Cheol Kim's studied [11] "job stress is possible risk factor for insomnia and and inadequate social support have more strong relation to insomnia" (high job demand: OR: 1.30, 95% CI: 1.14-1.47) .And And the studied of Nakata, Akinori [22] found that lower social support at work was significantly associated with a greater risk of insomnia than the higher social support (adjusted OR 2.5).

Limitation & Reccomendation

This study had several limitations. First, this study was a cross-sectional study which cannot refer to causal relationship between independent factors and insomnia. Second, this study did not include a physical examination or underlying disease and personality habit of participants that may affect insomnia (e.g., coffee and alcohol consumption).

However, this study also had several advantages, such as the design of this study was able to determine the prevalence of insomnia among public health worker in Thailand and also examined factors related to insomnia. Moreover, this study can be the model for the next study. For further study, researcher can choose cohort study to conduct and confirm the relationship between job stress, social support and insomnia. And include socio-demographics factor that can influence insomnia or sleep disorder ,such as drink coffee,alcohol before

bed, home place have noise in bedtime ,chonic disease etc.

CONCLUSIONS

We found that half of public health workers in Thailand reported clinical insomnia. Their education, had children in family, travelling period, pyschological job demand in job stress and supervisor support in social support affected on insomnia status. The results of the study suggest to enhance job demand and social support among public health workforce for improving sleep quality and reducing insomnia.

ACKNOWLEDGEMENTS

A Grant for this study was supported by Chulalongkorn University Graduate School Thesis Grant.

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BLOOD PRESSURE CHANGES AMONG HYPERTENSIVE PATIENTS UNDER NCD CLINIC PLUS PROGRAM IN KONGRA HOSPITAL, PATTHALUNG PROVINCE, THAILAND

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ABSTRACT

Introduction: NCD Clinic Plus Program has been implemented in 2014 hospitals in Thailand since 2014. In 2015, Kongra Hospital, located in Patthalung province, is the best of small hospital or first-level hospital in Thailand and receives NCD Clinic Plus Award, The success of NCD Clinic Plus program was evaluated only the function of medical personnel. However, the patients' outcomes have not been yet evaluated after program implementation since 2014.
Objectives:To compare blood pressure among NCD Clinic Plus Program patients from 2015-2017. To assess change of blood pressure from 2015-2017 among patients in NCD Clinic Plus. To assess percentage of control and uncontrol blood pressure of patients during 2015-2017 and to find associated factors of control and uncontrol blood pressure of patients.
Methodology: A secondary data analysis between 2015 – 2017 from NCD Clinic Plus Program in Kongra Hospital, Phatthalung province and the southern provinces in Thailand. This research export data from HOSxP program in the Kongra hospital. Hypertensive patients total 176 cases.
Conclusion: NCD Clinic Plus program successful control blood pressure of hypertensive patients after intervention from 2015-2017 in Kongra Hospital. Hypertensive patients total 176 cases. This result, presented of the number of patients control BP in 2015 to 2017. The hypertensive patient of control BP at 132 persons in 2015, 2016 control BP at 142 persons and in 2017 control BP at 164 persons. So, the total of patients could be control blood pressure in 2015 to 2017 increase total 32 persons (72.72%) and factors associated of control and uncontrol blood pressure in 2015 showed tobacco (p-value=0.009) and alcohol (p-value=0.002) significant difference of whose p-value ≤ 0.05. Promoting intervention NCD Clinic Plus Program essential element of health care service that encourage high-quality chronic disease (hypertension) service care system. It also requires further development and improvement for Hypertensive patients can control blood pressure.
Keywords: NCD Clinic plus program, Hypertensive patients, Blood pressure change, Longitudinal study

INTRODUCTION

NCD Clinic plus developed from Wagner's chronic care model, there is an organizational approach to caring for people with chronic disease in the primary care setting or the hospital. NCD Clinic Plus Program including two parts. Part one is the process of evaluation 6 components. There are concise health policy, Information systems, Health Service system. Decision support, Self-management and the community collaboration. Part two is an evaluation of service outcome indicators total 15 indicators. The Quality Assessment Criteria to help Public Health Service of Center Hospital General Hospital and Community Hospital use as a guide. The quality of NCD Clinic Plus in 2017 was evaluated. This has a full rating 100 points are divided into two parts. The hospitals that pass the NCD Clinic Plus Program assessment must to score more than 70 points. [1, 2, 3, 4].

NCD Clinic Plus Program has been implemented in 2014 hospitals in Thailand since 2014. In this recent year, Kongra Hospital, located in Patthalung province, is the best of small hospital or first-level hospital in Thailand and receives NCD Clinic Plus Award,

the scoring of the program, this hospital received a score of 92 out of 100 points which was classified into the excellent level (ThaiNCD, 2017b). The success of NCD Clinic Plus program was evaluated only the function of medical personnel. However, the patients' outcomes have not been yet evaluated after program implementation since 2014. Therefore, current study will be analyzed of NCD Clinic Plus program's patients in Kongra Hospital, Patthalung Province from 2015–2017. The results of this study would be benefit for MOPH of Thailand in order to fulfill some issues for NCD prevention program among Thai people.

METHODOLOGY

Data source

This study design using secondary data analysis between 2015 – 2017 from NCD Clinic Plus Program in Kongra Hospital (F3 level-30 beds), Phatthalung province, the southern provinces in Thailand. This research export data from HOSxP program Hypertensive patients total 176 cases.

RESULTS

Age of the first diagnosis and Period of the hypertension disease. The mean age of the first age of diagnosis in this study was 59.51, with 88 years as the highest and 26 years as the lowest age among all the participants. The mean period of HT of the participants in this study was 7.08.

Age of the first diagnosis and period of the hypertension disease. Most of patient were the first age of diagnosis more than 60 around 89 person (50.57%) and less than 60 around 60%. In this study, the most period of the hypertension disease less than 5 years. There are 63 (35.8%), 5 to 9 around 59 (33.5%) and period of the hypertension disease less than 10 or equal around 54 (30.7%). (Table 1)

Table 1

Variables (N=176)	Frequency	Percentage
First age of diagnosis (year)		
< 30	3	1.70
30 - 39	10	5.68
40 - 49	25	14.20
50 - 59	49	27.84
≥ 60	89	50.57
Mean = 59.51, **SD.** = 12.72, **Min.** = 26, **Max.** = 88		
Period of HT (year)		
< 5	63	35.8
5-9	59	33.5
≥ 10	54	30.7
Mean = 7.08, **SD.** = 3.57, **Min.** = 2, **Max.** = 17		

The characteristic of uncontrolled blood pressure's hypertensive patient on 2015. Age of the first diagnosis more than 60 years, 20 person or 45.45% and less than 30, 2 persons or 2.27%. Period HT (year) less than 5 years,14 persons or 31.82%, in period 5 to 9 years, 20 persons or 50% and period HT more than 10 years, 8 persons or 18.18%. The patient uncontrolled blood pressure on 2015 were smoker 4 persons or 9.09% and non-smoker 40 person 90.91%. All of them, drinker 6 persons or 13.64 % and non-drinker 38 persons or 86.36%. Body Mass Index of uncontrolled patients, who was BMI less than 25, 29 persons or 65.91% and BMI more than or equal 25, 15 persons or 34.09%, (Table 2)

Table 2

Variables (N=176)	Frequency	Percentage
First age of diagnosis (year)		
< 30	1	2.27
30 - 39	4	9.09
40 - 49	8	18.18
50 - 59	11	25.00
≥ 60	20	45.45
Period of HT (year)		
< 5	14	31.82
5-9	22	50.00
≥ 10	8	18.18
Tobacco		
Smoker	14	31.82
Non-smoker	22	50.00
Alcohol		
Drinker	14	31.82
Non-drinker	22	50.00
BMI		
< 25	14	31.82
≥ 25	22	50.00

Analyze hypertensive patients total 176 persons. This study, Success or control in BP control was defined as systolic BP <140 mm Hg and diastolic BP <90 mm Hg.

Factors associated with control and uncontrol of hypertension on 2015. Control and uncontrol blood pressure analysis for categories variables use Chi-Square Test and Fisher's Exact Test associated between and categories variables contains 3 variables such as tobacco, alcohol and BMI on 2015.

Analysis of tobacco are smoker could be control 0.76% and uncontrol 9.09%, non-smoker could be control 99.24%, uncontrol 90.91% (P=0.009).In this study showed tobacco significant difference of whose p-value ≤ 0.05.

Alcohol are drinker could control 1.52% and uncontrol 13.64%, non-smoker could control 98.48%, uncontrol 86.36% (P=0.002), In this study showed alcohol significant difference of whose p-value ≤ 0.05.

Analysis BMI less than 25 could control 63.64% and uncontrol 65.91%, BMI more than 25 or equal 25 could control 36.36%, uncontrol 34.09% (P=0.785), In this study showed BMI no significant difference of whose p-value ≤ 0.05. (Table 3)

Table 3

Variables	Control (n=132)		Uncontrol (n=44)		P-value
Tobacco					
Smoker	1	(0.76%)	4	(9.09%)	0.009[b]
Non-smoker	131	(99.24%)	40	(90.91%)	
Alcohol					
Drinker	2	(1.52%)	6	(13.64%)	0.002[b]
Non-drinker	130	(98.48%)	38	(86.36%)	
BMI					
< 25	84	(63.64%)	29	(65.91%)	0.785[a]
≥ 25	48	(36.36%)	15	(34.09%)	

Factors associated with control and uncontrol of hypertension on 2016. Control and uncontrol blood pressure analysis for categories variables use Chi-Square Test and Fisher's Exact Test associated between and categories variables contains 3 variables such as tobacco, alcohol and BMI on 2016.

Analysis of tobacco are smoker could control 2.11% and uncontrol 5.88%, non-smoker could control 97.89%, uncontrol 94.12% (P=0.278), In this study showed tobacco significant difference of whose p-value ≤ 0.05.

Alcohol are drinker could control 2.11% and uncontrol 5.88%, non-smoker could control 97.89%, uncontrol 94.12% (P=0.278), In this study showed alcohol no significant difference of whose p-value ≤ 0.05.

Analysis BMI less than 25 could control 64.79% and uncontrol 67.65%, BMI more than 25 or equal 25 could control 35.21%, uncontrol 32.35% (P=0.753), In this study showed BMI no significant difference of whose p-value ≤ 0.05. (Table 4)

Table 4

Variables	Control (n=142)		Uncontrol (n=34)		P-value
Tobacco					
Smoker	3	(2.11%)	2	(5.88%)	0.278[b]
Non-smoker	139	(97.89%)	32	(94.12%)	
Alcohol					
Drinker	3	(2.11%)	2	(5.88%)	0.278[b]
Non-drinker	139	(97.89%)	32	(94.12%)	
BMI					
< 25	92	(64.79%)	23	(67.65%)	0.783[a]
≥ 25	50	(35.21%)	11	(32.35%)	

Factors associated with control and uncontrol of hypertension on 2017. Control and uncontrol blood pressure analysis for categories variables use Chi-Square Test and Fisher's Exact Test associated between and categories variables contains 3 variables such as tobacco, alcohol and BMI on 2016.

Analysis of tobacco are smoker could control 1.12% and uncontrol 0.00%, non-smoker could control 98.78%, uncontrol 100% (P=0.594). In this study showed tobacco no significant difference of whose p-value ≤ 0.05.

Alcohol are drinker could control 2.44% and uncontrol 0.00%, non-smoker could control 97.56%, uncontrol 100% (P=0.045). In this study showed alcohol no significant difference of whose p-value ≤ 0.05.

Analysis BMI less than 25 could control 68.90% and uncontrol 41.67%, BMI more than 25 or equal 25 could control 31.10%, uncontrol 33.17% (P=0.062), In this study showed BMI no significant difference of whose p-value ≤ 0.05. (Table 5)

Table 5

Variables	Control (n=164)		Uncontrol (n=12)		P-value
Tobacco					
Smoker	2	(1.12%)	0	(0.00%)	0.594[b]
Non-smoker	162	(98.78%)	12	(100%)	
Alcohol					
Drinker	4	(2.44%)	0	(0.00%)	0.045[b]
Non-drinker	160	(97.56%)	12	(100%)	
BMI					
< 25	113	(68.90%)	5	(41.67%)	0.062[a]
≥ 25	51	(31.10%)	7	(33.17%)	

The number of control and uncontrol blood pressure on 2015 – 2017. 2016, the number of control BP increase 10 persons from 2015 and 2017, increase 22 persons from 2016. So, 2015-2017 the number of control BP increase total 32 persons. In 2016 the number of uncontrol blood pressure decrease 10 persons from 2015. In 2017 uncontrol decrease 22 persons. So, 2015-2017 the number of uncontrol BP decrease total 32 persons. In 2015, the hypertensive patient control 132 person (75%) and uncontrol 44 person (25%). 2016, hypertensive patient control 142 person (80.68%) and uncontrol 34 person (19.32). 2017, hypertensive patient control 164person (93.18%) and uncontrol 12 person (6.82%). (Figure 1)



Figure 1

Systolic blood pressure of hypertension patients from 2015-2017. The over all of hypertension patients from 2015 to 2017 was followed up every 6 months. Blood pressure monitoring results, overall systolic blood pressure (SBP) among hypertension patient decreased from 127 mmHg in 2015 (2nd) to 124 mmHg in 2016 (1st) and increased to 128 mmHg in 2017 (2nd). Considering in 2015, trend of SBP was not different. However, the SBP was decreased at the first time of measurement in 2016. After that, it increased to 127.69 mmHg. After 2016, overall SBP was increased in the first and second time visit in 2017. (Figure 2)

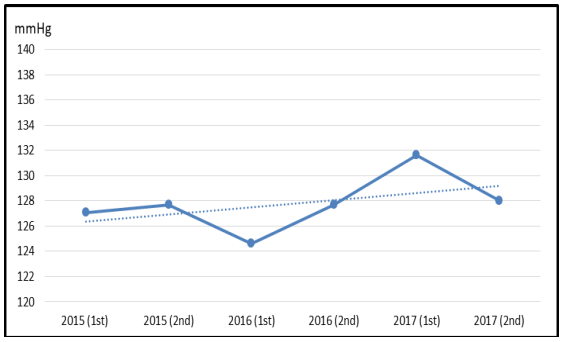


Figure 2

SBP between 2015 (1st) and 2017 (1st) was increase (P = 0.004). SBP between 2015 (2nd) and 2017 (1st) was increase (P = 0.021). SBP between 2016 (1st) and 2017 (1st) was increase (P = 0.000). SBP between 2016 (2nd) and 2017 (1st) was increase (P = 0.036). SBP between 2017 (1st) and 2017 (2nd) was increase (P = 0.018). There are statistically significant differences P- value < 0.05. (Table 6)

Table 6

Systolic Blood Pressure measurement		Mean Difference	Sig	95% Confidence Interval	
				Lower Bound	Upper Bound
2015 (1st)	2015 (2nd)	-0.608	1.000	-3.27	2.05
	2016 (1st)	2.460	0.506	-0.96	5.88
	2016 (2nd)	-0.602	1.000	-3.91	2.71
	2017 (1st)	**-4.551***	0.004	-8.17	-0.93
	2017 (2nd)	-0.955	1.000	-4.96	3.05
2015 (2nd)	2016 (1st)	3.068	0.144	-0.42	6.55
	2016 (2nd)	0.006	1.000	-3.59	3.60
	2017 (1st)	**-3.943***	0.021	-7.55	-0.33
	2017 (2nd)	-0.347	1.000	-4.33	3.64
2016 (1st)	2016 (2nd)	-3.063	0.058	-6.18	0.05
	2017 (1st)	**-7.011***	0.000	-10.47	-3.55
	2017 (2nd)	-3.415	0.116	-7.19	0.36
2016 (2nd)	**2017 (1st)**	**-3.949***	0.036	-7.76	-0.14
	2017 (2nd)	-0.352	1.000	-4.35	3.65
2017 (1st)	**2017 (2nd)**	**3.597***	0.018	0.35	6.84

Diastolic blood pressure of hypertension patients from 2015-2017. The over all of hypertension patients from 2015 to 2017 was followed up every 6 months. Blood pressure monitoring results, overall diastolic blood pressure increase (DBP) among hypertension patient decreased from 79 mmHg in 2016 (2nd) to 74 mmHg in 2017 (1st) and increased to 75 mmHg in 2017 (2nd). Considering in 2015, trend of DBP was not different. However, the DBP was increased at the first time of measurement in 2016. After that, it increased to 79 mmHg. After 2016, overall DBP was increased in the first and second time visit in 2017. **(**Figure 2**)**

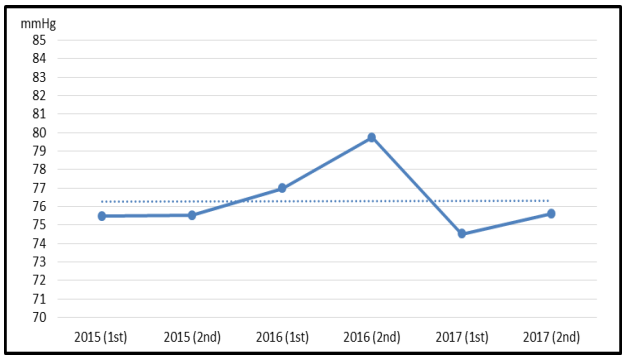


Figure 2

DBP between 2015 (1st) to 2015 (2nd) was increase (P = 1.000). DBP between 2015 (1st) to 2016 (1st)) was increase (P = 1.000). DBP between 2015 (1st) to 2016 (2nd) was increase (P =1.000). DBP between 2015 (1st) to 2017 (2nd) was increase (P = 1.000). DBP between 2015 (2nd) to 2016 (1st) was increase (P = 1.000). DBP between 2015 (2nd) to 2016 (2nd) was increase (P = 1.000). DBP between 2015 (2nd) to 2017 (2nd) was increase (P = 1.000). DBP between 2016 (1st) to 2016 (2nd) was increase (P = 1.000). DBP between 2017 (1st) to 2017 (2nd) was increase (P = 1.000). There are not statistically significant differences P- value < 0.05. (Table 7)

Table 7

Systolic Blood Pressure measurement		Mean Difference	Sig	95% Confidence Interval	
				Lower Bound	Upper Bound
2015 (1st)	2015 (2nd)	-0.045	1.00	-1.71	1.62
	2016 (1st)	-1.517	1.00	-4.13	1.10
	2016 (2nd)	-4.261	1.00	-16.66	8.14
	2017 (1st)	0.955	1.00	-1.88	3.78
	2017 (2nd)	-0.131	1.00	-2.93	2.67
2015 (2nd)	2016 (1st)	-1.472	1.00	-4.36	1.41
	2016 (2nd)	-4.216	1.00	-16.56	8.13
	2017 (1st)	1	1.00	-1.72	3.72
	2017 (2nd)	-0.085	1.00	-2.79	2.62

Systolic Blood Pressure measurement		Mean Difference	Sig	95% Confidence Interval	
				Lower Bound	Upper Bound
2016 (1st)	2016 (2nd)	-2.744	1.00	-14.99	9.50
	2017 (1st)	2.472	0.26	-0.59	-5.54
	2017 (2nd)	1.386	1.00	-1.54	4.31
2016 (2nd)	2017 (1st)	5.216	1.00	-7.12	17.55
	2017 (2nd)	4.131	1.00	-8.19	16.45
2017 (1st)	2017 (2nd)	-1.085	1.00	-3.40	1.23

DISCUSSION

NCD Clinic Plus program analyze blood pressure change after intervention of from 2015-2017 in Kongra Hospital. The hypertensive patients less than 50% can't control their blood pressure. In this study, Systolic Blood Pressure Change are decrease 68 patients (38.64%), no change or increase 108 patients (61.36%) and Diastolic Blood Pressure Change are decrease 68 patients (38.64%), no change or increase 108 patients (61.36%). In this study showed increasing of diastolic blood pressure (Mean 127.09 - 128.04 mmHg) and systolic blood pressure (Mean 75.47 - 75.6 mmHg) from 2015-2017. The reduction in Systolic Blood Pressure 5 mmHg would reduce the mortality from stroke 14%, reduce the mortality from coronary heart disease 9%.

Blood pressure is a problem with the image that is very common in Thailand. Found approximately in Five of those aged 15 years and above, high blood pressure, are silent, often do not show symptoms of the disease, causing people Do not know that he has a silent disease or deaths from non-communicable diseases such as heart disease and stroke, congestive heart failure, stroke, kidney disease, etc. At various levels of blood pressure, can classify the severity of hypertension according to the criteria, but for the blood pressure, SBP 120-139 mmHg and / or DBP 80-89 mmHg or prehypertension group Is a group that has risk factors that develop into illness soon, but can be change the way of life in order to reduce blood pressure to normal levels without using life modification drugs. Preventing sickness with blood diseases will lead to a reduction in the number of other non-communicable diseases Is a risk group that is important in preventing disease. Therefore, advice should be given to those who have hypertension. To be able to control blood pressure levels. Instruction for patient / High-Risk Group to consist of body weight control to normal. With a body mass index (BMI) of less than 23 kg /m2, waist circumference less than 90 cm in men and 80 cm in women With diet control and regular exercise, consuming dietary pressure or dietary diets (Dietary approaches to stop hypertension – DASH diet) by focusing on eating vegetables and fruits with fiber Dairy products that are low in fat, whole grains, nuts, reduced consumption of large meats, flour, sugar, sweets, saturated fats and cholesterol and reduce the consumption of salty or sodium foods, reduce the amount of sodium salt consumed not more than 2.4 grams per day (equivalent to 6 grams of salt or about 1 teaspoon), reduce alcohol drinking which men can drink up to 2 drinks per day (drink) which is equivalent to 90 ml whiskey, 300ml wine or 720 ml beer. women drink no more than 1 drink, no smoking, regular aerobic exercise such as brisk walking, jogging, cycling, swimming 30-45 minutes at a time, 3-5 times a week and maintain good mental health, not stress, understand and accept life. Including regularly practicing stress relaxation and mental health management. [6].

Alcoholic affects the cardiovascular system causes of cardiovascular disease and high blood pressure and may be acute death. High blood pressure is a risk factor for heart disease. And stroke. People who drink more than 8 units of alcohol per time are more likely to cardiovascular disease than those who are

twice as likely to have high blood pressure. for a long time, the body will be destroyed. Hypertension is the cause of the signs of various diseases that will follow. Cardiovascular system when drinking a lot of alcohol will make the heart beat abnormal. At the same time, if drinking too much alcohol, vitamin B1 deficiency. It will make the heart muscle does not work well. These factors cause big heart. Not working normally. The symptoms are not normal. Vascular system Alcohol causes the blood vessels to expand and cause high blood fat to clog the arteries cause of stroke. [5, 6].

CONCLUSIONS

NCD Clinic Plus program successful control blood pressure of hypertensive patients after intervention from 2015-2017 in Kongra Hospital. Hypertensive patients total 176 cases. This result, presented of the number of patients control BP in 2015 to 2017. The hypertensive patient of control BP at 132 persons in 2015, 2016 control BP at 142 persons and in 2017 control BP at 164 persons. So, the total of patients could be control blood pressure in 2015 to 2017 increase total 32 persons (72.72%) and factors associated of control and uncontrol blood pressure in 2015 showed tobacco (p-value=0.009) and alcohol (p-value=0.002) significant difference of whose p-value ≤ 0.05.

The NCD Clinic Plus is operational to enhancing NCD service efficiency but it can't increase self-management of hypertensive patients. Analysis of hypertension patient data is essential to planning for self- management to control blood pressure. This study found that the intervention of NCD Clinic Plus program should develop in hypertension patient health services and follow up patients to monitor behavioral modifications such as weight control is normal. lose weight, exercise regularly, choose low salt foods, reduce the alcohol, non-smoking and Stress management.

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ASPECTS AND FACTORS ON MR (MEASLES RUBELLA) VACCINE HESITANCY PHENOMENA AMONG CHILDREN IN MAKASSAR CITY, INDONESIA

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ABSTRACT

Introduction: Vaccine hesitancy has become phenomena that occurred more and more in the last decade. These phenomena are happening all over the world, and the causes are different between each region. From the lack of awareness about VPD (Vaccine-preventable Diseases) that can cause the misinformation about the vaccine to the problems caused by health workers itself. This term is so important because it can lead to completely receiving the vaccine into completely reject from one to all kinds of the vaccine. These individuals ranged so wide that still need more observation. Health workers are the first line that has an essential role in order to help parents and caregiver so that they can appreciate the benefits of vaccine; because health worker (especially doctors) has been proven to be the most important predictor for parent's decision to accept the vaccination. This research is particularly on MR Vaccine only.

Objectives: To explain the aspects and factors related to MR Vaccine hesitancy among caregiver of children aged 1-9 years old in Makassar City, Indonesia.

Methodology: A descriptive cross-sectional study conducted in April 2019. The study uses a self-administered questionnaire based on WHO SAGE (Strategic Advisory Group of Experts) Vaccine Hesitancy Matrix and also additional questions from PAVC (Parent Attitudes about Childhood Vaccine) Survey. The questionnaire distributed via an online questionnaire and, the respondents are Parents/Caregiver that has children aged 1-9 years old and living in Makassar City. There were 283 respondents filled the questionnaire. Descriptive analysis performed. Numbers and percentages were reported in this study.

Result: From the variable related to the vaccine hesitancy itself, 65 or 23% respondents said that they refused the vaccine because it included the porcine or non-halal ingredient. The other is 51 (18%) participants said that leaders (religious, political, teachers, health care workers) in their community did not support MR Vaccination program. There are 61 or (21.6%) respondents said them against/delay in getting MR vaccination to their children after they went informed themselves. There are also 33 (11.6 %) of respondents agree that it will raise hesitancy on vaccine if celebrity advocates against MR vaccine. On their knowledge of MR Vaccine, 75 (26.5 %) said that their health care professional did not provide them with all the information needed regarding MR Vaccination. From the design of vaccination program, 101 (35 %) respondents said that they refrain their children for having MR Vaccination on the immunization campaign.

Conclusion: Based on the respondent's answer on the questionnaire, although the number is not high, we can see that some of the respondents doubt Measles-Rubella (MR) vaccination. This then causes them to refuse or delay the vaccine. Many factors can contribute to hesitancy, from the information that they get before vaccination to the leaders or celebrity that against it.

Keywords: vaccine hesitancy, MR Vaccine, measles, rubella, Indonesia, children

INTRODUCTION

When speaking about the vaccine, the goal is to create immunity on the community level to prevent and eliminate diseases. The highest rate of vaccination, the better. However, even in a country that has high vaccination uptake, there is always some gap created by people questioning the benefit of vaccination itself. Which these kinds of a group, in the end, can contribute to lowering coverage of vaccination. This is something that we need to look after. The numbers of people who hesitant doing vaccination are increasing each year. Although it has been said that vaccination has been one of the most successful and cost-effective inventions in order to improve health outcome [1].

WHO SAGE (Strategic Advisory Group of Experts) in the vaccine has come out on definition this term that: ***Vaccine hesitancy refers to delay in acceptance or refusal of vaccines despite availability of vaccine services. Vaccine hesitancy is complex and context-specific, varying across time, place, and vaccines. It is influenced by factors such as complacency, convenience, and confidence*** [2].

Immunizations program has become one of the hugest achievements in the field of public health for the last 100 years. However, for the last 20 years or so, the few groups of people have emerged and begun to question the "true" benefit of vaccine, how it can be a benefit of the children's health in the future, long after they got the vaccine [1].

The other factors that make this Vaccine Hesitancy are something that we have to look very carefully are because the range is so broad. From entirely except it but not sure to altogether refuse to one typical vaccine or all the vaccine [3-5].

Because of this vaccine, hesitancy is so wide, and it needs many bits of knowledge about the specific problems that are causing it. One of the most important is to identify the fundamental cause of this vaccine hesitancy. Also, because the cause of this phenomena is different for each region, it needs close monitoring since it has so many determinants [6].

Indonesia, as the fourth largest population in the world, also facing the vaccine hesitancy problems. Especially on the MR Vaccine, one of the factors that people concern is that the ingredients of the vaccine itself that people consider it is not halal. This is quite similar to the study regarding Outbreak of vaccine-preventable diseases (PVD) in Muslim majority countries. This study was conducted in 2018, and there were three countries got involved in this study: Afghanistan, Malaysia, Pakistan. These three countries also have the same problem, where parents concern regarding the halal issue. This halal issue must be the main concern for the government, and this issue must be communicated well and encourage the general public to do MR vaccination so the coverage can be increased [7].

Through surveillance, it is reported that more than 11,000 cases of suspected measles are happening in Indonesia, and after laboratory test, it was said that 12-39 % of those cases are measles, and 16-43 % is rubella. The number of these cases are still not the real number that currently happens in the field. Many of these cases are not reported to the local authorities. Especially those who went and got treatment at the private health center. Another challenge why these cases are not reported is that especially when the cases are happening in a small and remote place. Where laboratory tests are limited, or even there is no laboratory testing, and also, there are no adequate surveillance tools available [8]. This study conducted in Makassar city because its located in the middle of Indonesia and has much diversity concerning ethnical and religion/culture background. Makassar city right now is the 5th of the most populated city in Indonesia. This study aimed to explain the aspects and factors related to MR Vaccine hesitancy among caregivers of children aged 1-9 years old in Makassar City. It is because in Indonesia, Measles-Rubella (MR) immunization program for the children aged 1-9 years old.

METHODOLOGY

Data source

This research study is a descriptive cross-sectional, which conducted in Makassar City, and data collection was held from March to May 2019. An online questionnaire was distributed via online social media platforms. Snowball sampling technique was performed to

select the participants. The questionnaire was modified from Vaccine Hesitancy Survey Questions related to SAGE Vaccine Hesitancy Matrix. The first link of the questionnaire is put on the authors' Facebook wall, with the caption about the main criteria of the respondents which were parents who lived in Makassar city for the last ten years and parent/caregiver who has a child aged 1-9 years old. From that, people who were qualified with the study can then copied the link and pasted it on their social media/group chat platforms (Facebook, WhatsApp, Line).

Study Population and Sample Size

Sample size calculation using Cochran Formula [9]. Using Statulator [10], with assuming a factor of interest was 89 % in 2017 [11], and the expected response rate was 50%, this study requires 301 sample size for estimating expected proportion 5% and 95% confidence.

Data collection has been approved by Chulalongkorn University Research Ethics Committee. COA No. 141/2019.

There were 283 respondents participated in this study. Data are analyzed by SPSS program version 22 (Chulalongkorn university license) by a descriptive statistic. Frequency and percentage were reported.

RESULTS

Table 1 presents the general characteristic of respondents in this study. Most of the respondents were the child's mother (78.1%). From the marital status, most of them were married (96.5%); also, most of their educational background was more than four years degree college degree (88.3%). From the ethnical background, most of them are Buginese (59.7 %).

Table1 General Characteristic of respondents

Characteristic	N (%)
Relationship with the child (n=283)	
Mother	221 (78.1)
Father	54 (19.1)
Other	8 (2.8)
Age respondents (n = 283)	
Less than 30	42 (14.8)
≥ 30	241 (85.2)
Marital Status (n = 283)	
Single	4 (1.4)
Widowed	4 (1.4)
Divorce	2 (.7)
Married	273 (96.5)
Educational level (n = 283)	
8th Grade or less	0 (0)
Some high school but not graduate	2 (.7)
High school graduate	16 (5.7.)
Some college or 2-to-4 years of college degree	15 (5.3)
More than 4 years college degree	250 (88.3)
Household income (n = 279)	
Rp. 3.000.000 or less	23 (8.1)
Rp. 3.000.001 - Rp. 5.000.000	84 (29.7)
Rp. 5.000.001 - Rp. 7.500.000	64 (22.6)
Rp. 7.500.001 or more	108 (38.2)
How many children aged 1-9 years old in your household right now? (n = 283)	
One	129 (45.6)

Characteristic	N (%)
Two	126 (44.5)
Three	27 (9.5)
Four or more	1 (.4)
Ethnical background (n = 283)	
Makassar	54 (19.1)
Bugis	169 (59.7)
Toraja	23 (8.1)
Mandar	8 (2.8)
Other	29 (10.2)

From table 2, there were 65 (23 %) of the respondents that said that they refused to give their child MR vaccination because they think that it is not halal, and the other 215 (76 %) prefer to give their child MR Vaccine. Leaders (political, religious, teachers, health care workers) also have a significant role in order to increase the level of acceptance of the vaccine. From our result, mostly, 81.3 % of those respondents said that their leaders support MR vaccination, and 18 % of them do not support MR Vaccination. One of exciting thing that we found on this research is that, there were 61 or 21.6 % of respondents went to search regarding MR vaccination before taking their child to get the vaccination, and after they get the information, they decided not to give their child MR vaccine. The fourth is that 101 (35.7%) of these parents/caregivers refrain their children in the time of the immunization program. The last one is that 76 (26.9 %) of these respondents were not sure if celebrity advocate against MR Vaccination, although 170 (60 %) of them are disagreeing with this celebrity, still 33 (11.6 %) of them agree with this celebrity. The reason why some of the respondents who answer the question less than 283 was because at the beginning of the questionnaire, before answering those 82 questions, they were informed that they were given freedom to skip the question if they felt the question was sensitive for them or they don't want to answer it and also, they were able to leave the questionnaire anytime they want.

Table 2 Description Vaccine Hesitancy in Makassar

Vaccine Hesitancy	N (%)
Have you ever refused a vaccine as you considered it to include porcine or other animal derived ingredients (non-halal)? (n = 280)	
Yes	65 (23%)
No	215 (76 %)
Do leaders (religious, political, teachers, health care workers) in your community support MR vaccines for infants and children? (n = 281)	
Yes	230 (81.3 %)
No	51 (18 %)
Did you ever inform yourself on MR vaccine and then decide against it/delay receiving it? (n = 277)	

Vaccine Hesitancy	N (%)
Yes	61 (21.6 %)
No	216 (76,3 %)
Did you ever refrain from having your child MR vaccinated during a mass immunization campaign? (n = 271)	
Yes	101 (35.7 %)
No	170 (60.1 %)
Would it trigger doubts to have your child vaccinated, if a celebrity advocates against MR vaccine? (n = 277)	
Strongly agree	8 (2.8 %)
Agree	25 (8.8 %)
Not sure	76 (26.9 %)
Disagree	132 (46.6 %)
Strongly disagree	38 (13.4 %)

DISCUSSION

From the result of this study, it was found that 65 or 23% of the respondents refuse the Measles-Rubella (MR) vaccination because they had considered it not halal. From the leader role of MR vaccination, our study found that 230 (81.3%) respondents said that their leader support Measles-Rubella (MR) Vaccination. However, 51 or (18%) respondents said that their leader did not support Measles-Rubella (MR) Vaccination. This study also has quite a similarity with the result that we got when we asked them about the role of their leaders. This is quite similar to the study about the rejection of vaccination in Nigeria, Pakistan, and Afghanistan. They found out that Religion and beliefs had a long history as one factor regarding either vaccine hesitancy or anti-vaccine movements itself. Some of these religious groups will use a form of doctrines to others regarding their choice to do vaccination. Some of these group did not approve only to some vaccine because of how those vaccine productions violate their beliefs. Those group of people who oppose rejection comes from selected Muslim communities in Nigeria, Pakistan, and Afghanistan during poliovirus immunization program. Their primary consideration regarding this problem is that the suspicion of this immunization program can spread HIV or any problem, such as political power, inadequate health services. In the end, the Nigerian government sent religious representatives to South Africa, Indonesia, and India to observe the vaccine quality control from its manufacturers directly. However, not just some of Muslim group that questioning this vaccine. These groups include the Roman Catholic, which opposed the rubella 27/3-strain vaccine because the origins are derived from the aborted fetus [12]. Another essential aspect when we discuss vaccine hesitancy is that how the religious leader had an impact on society. There was a study that measured the level of vaccine confidence in 67 countries, it is said, in European countries, Roman Catholics leaders tend to support vaccination [13]. Many parents also still think that breastfeeding to a specific time of period can prevent diseases. This is included diseases that can be prevented by vaccination. Also, they think that those diseases are not severe and believed that if another child is already vaccinated, then their child will be safe from those illnesses. Another non-medical

explanation to this is that religious believed or personal believe [14].

Another question that we asked is that 61 (21.6 %) respondents said that they delay/against MR Vaccination after they individually went to search for information about it. This is quite similar in one study regarding Measles, Mumps, Rubella (MMR) vaccine hesitancy, parents/caregiver who does now want to give their children vaccination is the one who is the qualified ones. This also included parents with higher educational level. One of their main reason to delay/against it because they feel that their children do not need additional immunity shot [15]. From the question on Did you ever refrain from having your child MR vaccinated during a mass immunization campaign? From 271 respondents who answered this question, there were 101 (35.7 %) respondents said yes. This is quite similar with another study that conducted in finding one of the reasons why they feel hesitant about vaccination is that these parents/caregivers could not match their schedule with vaccination time that's already been set by the government [16]. These two types of research make strong points onto those parents who hesitant about it. It is because of the inclusion criteria, not the same when it comes to attitudes and perception. This why what makes vaccine hesitancy so complicated because of a different place, different causes [17, 18]. We also asked them, would it trigger doubts to have your child vaccinated if a celebrity advocate against Measles-Rubella (MR) vaccine? From 277 respondents who answer this question, there were 8 (2.8 %), and 25 (8.8 %) respondents answer strongly agree and agree, respectively. This is quite similar to the study on vaccine Rejection and Hesitancy: A Review and Call to Action in 2017. They also said that when speaking on vaccine hesitancy, some hesitant parents can refer to celebrity and websites who have the same hesitancy regarding vaccination [19].

CONCLUSIONS

Some factors are influence parents' decision on Measles-Rubella (MR) Vaccination. Some of them were religious/culture, the role of leaders (religious, political, teachers, health care workers), celebrity, looking for information without consulting with competent health workers, and also vaccination schedule. Vaccine hesitancy phenomena are also happening in Indonesia with a different cause with other countries. This is the pilot project regarding vaccine hesitancy in Indonesia, and Makassar city is the first city to do Measles-Rubella (MR) Vaccination.

ACKNOWLEDGMENT

This research was supported by CU Graduate School Thesis Grant.

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EFFECTS OF GESTATIONAL DIABETES MELLITUS ON MRNA EXPRESSION OF MAJOR IRON TRANSPORT MACHINERIES IN THE PLACENTA OF TERM PREGNANT WOMEN: A PRELIMINARY STUDY

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ABSTRACT

Introduction: Iron is one of essential trace elements for several biological reactions. However, excessive amount of iron can lead to free radical generation and oxidative stress. Therefore, body iron level is tightly controlled at both systemic and cellular levels through various mechanisms. Pregnancy is associated with increased iron demand in order to support fetal growth and development particularly during the third trimester. Several conditions such as inflammation have been shown to affect the expression of iron transporters and iron status. Gestational diabetes (GDM) is one of common obstetric complications that can result in some degree of systemic inflammation. Therefore, the present study aims to determine whether GDM affect placental iron transporter expression.
Objectives: To compare the mRNA expression of major iron transporters in the placenta of term pregnant women with and without GDM
Methodology: Placental tissues from term pregnant women (GDM = 10, normal = 10) were collected at delivery and stored in RNA*later* solution. RNA was extracted and complimentary DNA was synthesized. The mRNA expression of major iron transport machineries was determined by RT-qPCR and presented as a fold change compared to control group. The relative mRNA expression was analyzed by unpaired student *t*-test. A *P*-value less than 0.05 is considered statistically significant.
Conclusion: This preliminary study revealed that GDM was associated with downregulation of several iron transporters in the placenta. Further studies are required to delineate the mechanisms of such findings and to determine whether iron status of pregnant women and fetus is affected by this condition.
Keywords: Iron transporter, Gestational Diabetes Mellitus, Placenta, Iron

INTRODUCTION

Iron is one of essential trace elements for humans as it is required for several physiological functions, however, excessive amount of iron can result in oxidative stress. As a result, the amount of iron in the body needs to be tightly regulated. Body iron homeostasis can be achieved at both cellular and systemic levels. At the cellular level, iron homeostasis involves the balance between cellular iron uptake by transferrin receptor 1 (TfR1) and iron storage in the form of ferritin. Systemic iron homeostasis is maintained by the liver-secreted iron-regulatory peptide, hepcidin, which has been shown to induce downregulation of iron exporter, ferroportin [1]. The expression of hepcidin is regulated by several factors including inflammation. Notably, inflammation has been shown to induce hepcidin expression leading to hypoferremia [2].

Iron deficiency is commonly found during pregnancy. In Thailand, the prevalence of iron deficiency and iron deficiency anemia in

pregnant women was 34.4% and 37.8%, respectively [3]. In other countries, iron deficiency and iron deficiency anemia were found in roughly 42-48% and 3.2-23% of pregnant women, respectively (4-7). Notably, iron deficiency has been well recognized to adversely affect pregnancy outcomes. Iron deficiency anemia was reported to associate with low birth weight, preterm birth as well as delayed mental and physical development in the children [4,8]. During pregnancy, the placenta is responsible for the transport of iron from the mother to the fetus [9, 10]. The transport of iron across the placental involves several iron transport machineries including TfR1, ferroportin as well as divalent metal transporter 1 (DMT1) [11, 12]. Gestational diabetes mellitus (GDM) is one of the common obstetric complications. Interestingly, GDM has been reported to be associated with increased serum levels of inflammatory markers [13]. Therefore, the expression of iron transporters can be altered as a result of inflammation *per se*, or through inflammation-induced hepcidin regulation.

Notably, previous study revealed that serum hepcidin levels as well as the expression of iron transporters in the placenta differed between normal pregnancy and GDM [14]. However, the expression of iron transporters in the aforementioned study was determined by semi-quantitative approach. It is noteworthy that a limited number of studies regarding the effects of GDM on the expression of iron homeostasis have been conducted and yielded inconclusive data. Furthermore, those studies did not cover all major iron transport machineries. Therefore, this study aims to compare the mRNA expression of placental iron transport machineries between women with normal pregnancy and GDM in order to determine whether placental iron transport is affected by this pregnancy complication.

METHODOLOGY

Prenatal intervention and assessments

Ten term pregnant women (from 37 to ≤42 weeks gastational age) with known diagnosis of GDM who attended the delivery room at Siriraj Hospital were enrolled according to inclusion and exclusion criteria. Ten term pregnant women with normal pregnancy were included as control group. The exclusion criteria include: Meternal age <18 years old ; Hematocrit <33% ; BMI >27 kg/m^2 ; Pregnant women with medical complications or other obstetric complications ; Pregnant women using progesterone or steroids during pregnancy ; Abnormal fetus as detected by high frequency sound waves or prenatal diagnosis.

The diagnosis of GDM involved two-step approach. Initially, 1-hour 50-gram glucose challenge test (1-hr GCT) was performed at the first antenatal care visit and at the gestational age of 24-48 weeks. GDM was diagnosed in subjects with one-hour glucose levels of 200 mg/dL or above. Pregnant women with one-hour glucose levels between 140 and <200 mg/dL would undergo a 100-gram oral glucose tolerance test (OGTT), after which, GDM was diagnosed according to Carpenter-Coustan criteria.

The protocol of the study has been approved by the Faculty of Medical Siriraj Hospital Ethical Committee. Written informed consent was obtained from all participants. The study was conducted

Specimen Collection

Placental tissue samples were obtained immediately after delivery. The placental tissues were washed and cut into small pieces (0.5x0.5mm.). The samples were fixed in RNA*later* solution (Qiagen, Netherlands.) and stored at -20ºC.

Quantitative Real-Time PCR

Tissue RNA extraction

Total RNA was extracted from placental tissue samples by homogenizing 50-100 mg of tissue in TRIzol reagent (Life Technologies, USA) using a Dounce homogenizer. RNA extraction was subsequently performed as per manufacturer's protocol. In brief, chloroform was added into the tissue homogenates followed by centrifugation. The resultant aqueous phase was transferred to new tubes. Isopropanol was added to precipitate RNA. After centrifugation, RNA pellet was washed with 75% Ethanol and resuspended with UltraPure DEPC treated water (Invitrogen, USA). The resultant RNA samples were stored at -80ºC.

RNA integrity assessment

The yielded RNA were spectro-photometrically determined using Nanodrop spectrophotometer (Implen GmbH, Germany).

The quantity and purity of RNA samples was assessed by A260/230 and A260/280absorbance ratio, respectively. In this study, RNA samples were utilized only when A260/A280 is between 1.8-2.2 and A260/A230 is more than 1.7.

Synthesis of complementary DNA (cDNA)

One microgram of RNA from each sample was reverse-transcribed into cDNA using a Tetro cDNA synthesis kit (Bioline, USA) according to the manufacture's instructions. The resultant cDNA samples were stored at -20^{o}C until further analysis.

Primer design

The NCBI primer-BLAST program (National Library of Medicine, USA) was used to design primers and check for their pecificity to targeted genes. The targeted genes include genes encoding ferritin-H, ferritin-L, TfR1, ferroportin and DMT1 (*FTH1*, *FTL*, *TFRC*, *SLC40A1* and *SLC11A2*, respectively) The sequences of gene-specific PCR primers are shown in table 1.

Determination of placental iron transporters expression

The mRNA expression of the targeted genes in the placenta was determined using quantitative real-time PCR (qPCR) technique by CFX384 Thermal Cycler (Bio-Rad, USA).

PCR was performed in a final volume of 10 µL, containing 3 µL of DEPC-treated water, 0.5 µL of 10 µM forward primer, 0.5 µL of 10 µM reverse primer, 5 µL of SYBR and 1µL of cDNA. Each PCR reaction were performed in triplicate and *GAPDH* was used as housekeeping gene. The mRNA expression was normalized to *GAPDH*. The data was presented as fold change compared to control groups obtained by $2^{-\Delta\Delta CT}$ method.

Statistical analysis

The results were presented as means ± SEM. The normal distribution was determined by Kolmogorov Smirnov test. In case of normal distribution, the comparison between the two groups was performed by unpaired Student *t*-test.

Nonparametric test was applied for the comparison of results with non-normal distribution. A *P*-value less than 0.05 is considered statistically significant.

Table 1 Gene-specific primer sequences

Genes		Primers Sequence (5' → 3')
FTH1	(NM_002032.2)	F :AGGTGCGCCAGAACTACCA R :TCGCGGTCAAAGTAGTAAGACATGG
FTL	(NM_000146.3)	F : TAAAACCCCAGACGCCATGAA R : ATGGATGCAGCGGGTACG
TFRC	(NM_003234.3)	F : TCATATGTCCCTCGTGAGGCT R : ACCGAGTTTTGAGCGCTGTC
SLC40A1	(NM_014585)	F : CACCGTCAGTATTCCCAAGGT R : CATGTCTGACCGATGATAGC
SLC11A2	(NM_001174125.1)	F :AGCTCCACACTGTGAACTAAAATC R :TGGCAGACTCCCCATGATCT
GAPDH	(NM_002046.6)	F :TTGGTATCGTGGAAGGACTCA R :TGTCATCATATTTGGCAGGTTT

RESULTS

The clinical characteristics of the population are shown in Table 2. The age of GDM group was significantly higher than control group. Other maternal and fetal parameters including maternal BMI, maternal hematocrit, placental weight and birth weight did not significantly differ between the two groups as shown in figure 1, real-time PCR demonstrated that GDM was associated with transcriptional downregulation of placental iron uptake machinery (TfR1) and both isoforms of iron storage protein (Ferritin-H, Ferritin-L). Furthermore, a trend toward ferroportin mRNA suppression was also noted. In contrast, the mRNA levels of DMT1, another iron uptake machinery, was not altered between control and GDM.

DISCUSSION

Our preliminary study found that iron homeostasis might be altered in Gestational Diabetes Mellitus (GDM).

The relationship between iron and GDM has previously been reported. Increased ferritin levels in maternal serum have been shown to associate with increased incidence of GDM (10). Interestingly, it was reported that the elevated serum ferritin in pregnant women with GDM was independent of maternal or fetal iron status. However, Yang *et al* demonstrated that the levels of hemoglobin and ferritin in maternal blood were not significantly different between women with normal pregnancy and GDM[8]. The discrepant finding in serum ferritin levels in these previous studies might be due to different maternal age and gestational age at the time of sample collection. Further study should be performed to compare serum ferritin levels in the current population which might provide more conclusive evidence on the relationship between this body iron status parameter and GDM.

Table 2 Clinical characteristic of the population

Group	Control (n=10)	GDM (n=10)	*P* value
Age (years)	27.6 ± 1.8	33.5 ± 1.2	0.01
Maternal hematocrit (%)	38.00 ± 0.92	36.01 ± 0.65	0.10
Maternal BMI (kg/m^2)	22.67 ± 1.25	26.76 ± 3.52	0.30
Placental weight (grams)	584 ± 19.90	626.25 ± 31.51	0.28
Birth weight (grams)	3104.90 ± 97.44	3202.50 ± 188.22	0.65

Our present study reveals that GDM was associated with transcriptional downregulation of several iron transporters involved in the uptake and storage of iron in the placenta including ferritin and TfR1. In contrast, previous study showed that ferroportin protein levels were increased in the placenta of GDM subject while TfR1 protein levels were unaltered [8]. It is noteworthy that there was a significant difference in BMI between GDM and Non-GDM in the previous report. The difference in BMI between the two groups might be a confounding factor and contributes to the discrepancy between the previous report and our present study. Furthermore, the previous study conducted a semiquantitative approach to compare the expression at protein level whereas our study quantitatively compares mRNA expression by real-time PCR.

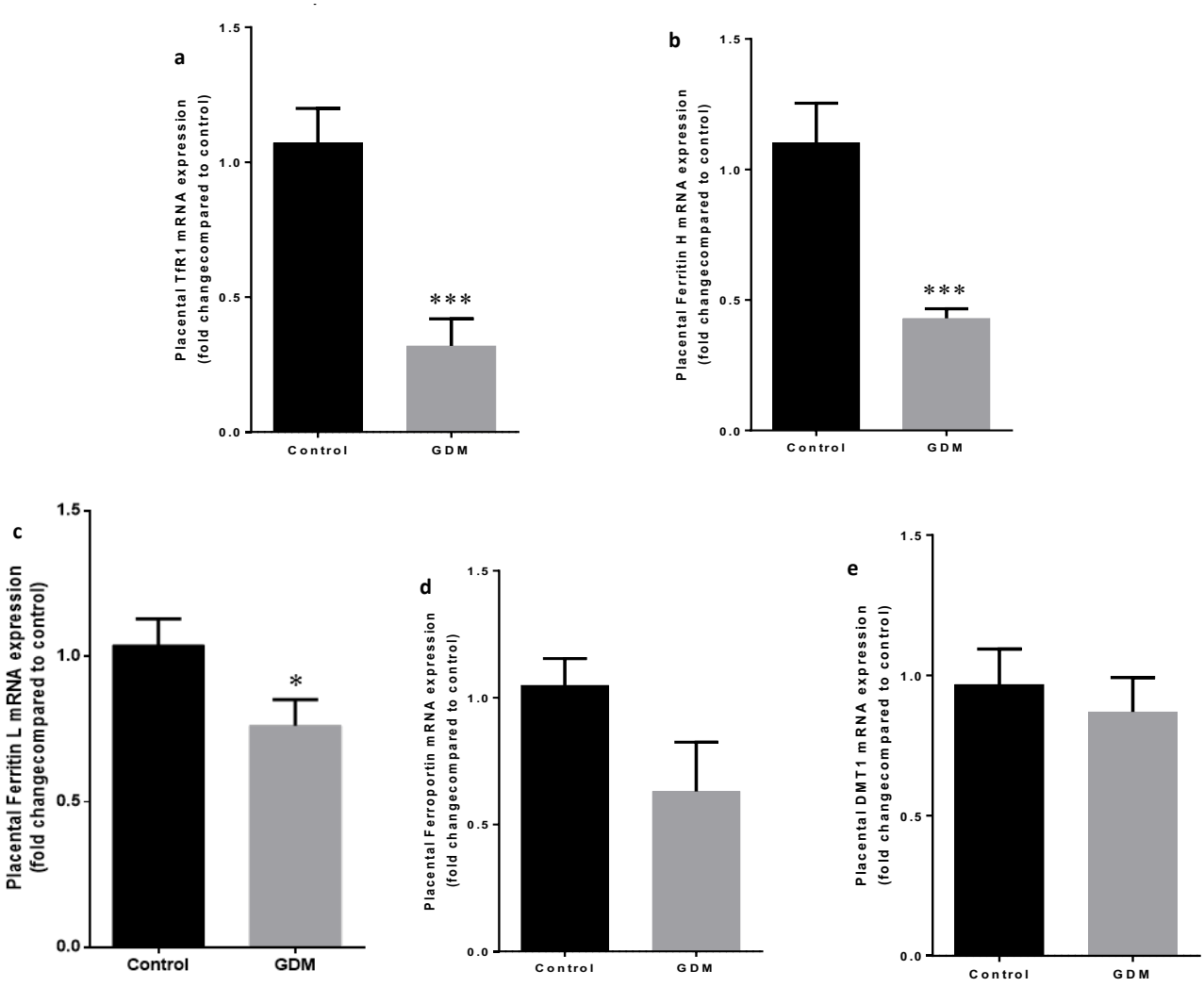


Figure 1. The mRNA expression of (a) *TFRC*, (b) *FTH1*, (c) *FTL*, (d) *SLC40A1* and (e) *SLC11A2* in the placenta of term GDM and normal pregnant woman (n=10 per group). Data are presented as mean ± SEM of the fold change in mRNA expression compared to control group. Statistical analysis was performed using unpaired student *t*-test. *$P<0.05$, *** $P<0.001$

Notably, GDM is an inflammatory condition which is associated with imbalanced production of inflammatory cytokines. It is possible that the reductions in placental TfR1 and ferritin mRNA expression might be inflammatory responses or direct effects of GDM *per se*. As iron can both donate and accept electron, excessive accumulation of this trace element can therefore generate reactive oxygen species (ROS) leading to cellular injury and tissue damage [15]. Interestingly, oxidant levels were increased in GDM subjects compared to normal pregnant subjects [16]. The decreased TfR1 and ferritin mRNA expression might result in reduced placental iron uptake and thus limit the amount of iron in the placenta and fetus to prevent oxidative stress.

It has previously been reported that iron is accumulated in fetus particularly during late pregnancy, which associates with increased maternal iron requirement [17]. According to our results, maternal-to-fetal iron transfer might be decreased in GDM subjects. The current study underscores the effects of GDM on placental iron transport which might potentially alter iron status of the offspring as well as affect pregnancy outcomes and childhood development. Further studies in a large population size are required to delineate the mechanisms of the transcriptional changes and

to determine whether maternal and fetal iron status is affected by this pregnancy complication.

ACKNOWLEDGMENTS

This research was supported by the Siriraj Research Fund. Siriraj Graduate Scholarship, Faculty of Medicine Siriraj Hospital, Mahidol University.

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ASSOCIATION BETWEEN SOCIAL SUPPORT AND DEPRESSION ON BOARDING SCHOOL STUDENTS IN MYANMAR

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ABSTRACT

Introduction: Boarding school is a stressful environment because they are very strict and their target is to achieve higher academic performance. While living at boarding school, adolescents face many problems like strict rules and regulations, living far away from parents and relatives, and communicating with strange environment. During that time, social support from parents and peers is an important factor for them to live and study well.
Objectives: The purpose of study was to describe and explore association between socio-demographic factors, social support and depression of Taze boarding school adolescents.
Methodology: Study design was a cross-sectional study among 346 adolescents (14-15 years old) living at boarding schools in Taze. Participants were chosen by systematic random sampling technique and data collection method was self-administered method. Questionnaire for social support and depression was modified form of MOS social support and from DASS-21. Ethical consideration was from Chulalongkorn University.
Result: According to result, Female participants were at 51.7%. There was equal distribution of age. Buddhism were at 98%. Low social support from parents and peers was at 67.3%. The prevalence of depression was at 56.4%. In bivariate analysis, age and social support were significantly associated with depression. In multivariate analysis, age (aOR=0.012, 95%CI=0.004-0.033, p value=0.000) and social support (aOR=18.530, 95%CI=6.396-53.687, p value=0.000) maintained significance.
Conclusion: The results pointed out that social support was the main indicator for having depression among adolescents who were living at boarding school. In stressful environment, social support is one of the relieving factor to pass through getting depression. This research can be useful for government and non-government organization for promoting and improving of adolescent health. Further researches are needed to study about other variables that can disrupt health and life quality of adolescents.
Keywords: Boarding school, Adolescent, Social support, Depression, Myanmar

INTRODUCTION

Adolescent period is one of the most important periods of life because it is a transitional phase. During that period, various physical, emotional and behavioral changes are happening. Moreover, they are so sensitive and immature enough to face stressful conditions and can lead to depression. Especially in this period, social support is very important factor for them to pass negative events and achieve academic success and good life quality [1, 2].

Boarding school is a stressful environment because their rules are very strict and their target is to achieve higher academic performance. In that stressful environment, adolescents face many problems like strict rules and regulations, living far away from parents and relatives, and communicating with strange environment. Another thing is that parental support would be strictly limited for those adolescents, as the boarding school is far away from their home. Therefore, this can make adolescents mental health burden and can lead to depression [3]. In contradiction of students attending public school, they have an adequate social support, leading to good emotional well-being, in a better physical health, and have a

good immunity to prevent from getting depression [3]. The rules and regulations of boarding school is very severe and kick out from the school if the students did the things such as drinking alcohol, smoking, betel chewing, mobile phone use and making relationship. There is not adequate relaxation time and their time schedule is fulled with studying [4]. Hence, adolescents need to rely on teachers or peers at boarding school [5, 6]. Anyway, living at boarding school is linked with separation from parents, friends and familiar surrounding environments.

The prevalence of mental health problems in adolescents is about 20% globally according to the World Health Organization (WHO) reports [7]. For this disease, the cost is over US$42 billion every years [8]. Furthermore, Depression cause other emotional and physical problems and lower their skills and performances in their environment [9, 10]. The sever side effect is suicide. The prevalence of suicide is 5% of total number and about 10-20% are in chronic case [9, 10]. This side effect can impact on life quality in adolescent life but also throughout life-long [11]. It also can cause high damage on economy and big financial loss [12].

There are many reasons about social support is one of the key factor in mental health problems. Social support helps the lives of adolescents and produce results in various fields such as, social functioning and academic achievement. There is proof that social support is very vital in predicting the well-being for anyone from childhood through older adults (Cohen & Willis, 1985). General support or specific supportive behaviors have a broad meaning and consists of emotional, instrumental, informational, and appraisal support [13]. Academic achievement is indirectly effect of social support through motivational and affective mechanisms [14-17]. Among many different kinds of social support, family support is the most important element for adolescent. As part of their growth experience, adolescents usually imagine loads of things from their parents. But sometimes in real situation, they do not get and it will lead to get depression [18]. Beside family support, peer support is also essential thing for adolescents. They also expect a lot from their peers and friends. If they do not get enough support from their parents, they want to get that support from their friends. In reality, young people could easily withdraw from their peers when they get depressed. Then they start to live far away and neglect social support from anyone [18]. Having social support is very crucial for adolescents to have successful lives not only at school but also in their future environment. For example, there was a history of low social support from friends, family, teachers and significant others. Another thing is that depressed people have a social problem and it makes more leading to become loneliness [19]. Adequate social support can reduce for getting depression in adolescent [20, 21]. Among many researches, there is a positive relationship between social support and psychological condition of adolescent [22, 23]. But also there is some researches about negative relationship between depression and social support [24]. In some research studies [22, 23], social support may help to solve adolescents from depression. From one cross-cultural study of 4433 students in Germany, 3774 students in Russia and 4982 students in China, students suffered depression from inadequate social support [25]. In Myanmar, it is so rarely about association between social support and depression. The objective of the study is to measure prevalence of depression and correlation with socio-demographic characteristics and social support among boarding school students.

METHODOLOGY

Data source

Study design is cross-sectional study. Data was taken from four boarding schools in Taze, Myanmar and systematic random sampling technique was used based on age of students from 14 and 15 years old.

Study Population and Sample size

The target population was 346 students who were 14 and 15 years old from boarding school in Taze. The inclusion criteria was 14 and 15 years old students of both male and female, living at least 9 months at boarding school. The exclusion criteria was adolescents not wanted to join as respondents. Data collecting was self-administered method. The researcher went to collect pretesting on 10% of total students.

RESULTS

Among 346 total students, 51.7% of total respondents were female adolescents (n=179). There were equal proportion of total participants in age variable with 14 and 15 years old. With regard to religion, only 2% of total boarding school adolescents were Christian (n=7) while others were Buddhism. About 32.7% of respondents indicated that they had high social support (n=113) whereas 67.3% reported that they had low social support (n=233). The prevalence rate of depression was 56.4% of total respondents.

In bivariate analysis by using simple logistic regression, age and social support variables were significantly associated with depression (p value<0.05). When age, sex, religion and social support were put into multiple logistic regression model, only age and social support were still significantly associated with depression (p-value<0.05).

Table 1 Frequency and percentage of socio-demographic characteristics, social support and depression

socio-demographic characteristics	N=346	%
Age		
14	173	50.0
15	173	50.0
Gender		
Male	167	48.3
Female	179	51.7
Religion		
Buddhism	339	98.0
Christian	7	2.0
Social support		
High	113	32.7
Low	233	67.3
Depression		
With depression	195	43.6
Without depression	151	56.4

Table 2 Association between socio-demographic characteristics, social support and depression

socio-demographic characteristics	Total	With depression	Without depression
Total	346	195(56.4%)	151(43.6%)
Age			
14	173	153 88.4%)	20 (11.6%)
15	173	42 (24.3%)	131(75.7%)
Gender			
Male	167	101(60.5%)	66 (39.5%)
Female	179	94 (52.5%)	85 (47.5%)
Religion			
Buddhism	339	189(55.8%)	150(44.2%)
Christian	7	6 (85.7%)	1 (14.3%)
Social support			
High	113	43 (38.1%)	70 (61.9%)
Low	233	152(65.2%)	81 (34.8%)

Table 3 Simple logistic regression analysis of association between depression and socio-demographic characteristics, social support

	Crude OR	95% CI	P
Age			
15	Ref.	0.023-0.075	**0.000****
14	0.042		
Sex			
Male	Ref.	0.903-2.121	0.136
Female	1.384		
Religion			
Buddhism	Ref.	0.567-39.984	0.151
Christian	4.762		
Social support			
High	Ref.	1.917-4.867	**0.000****
Low	3.055		

*OR=odd ratio, CI=confidence interval, Ref=reference, **=p value<0.05*

Table 4 Multiple logistic regression analysis of association between depression and socio-demographic characteristics, social support

	Adjusted OR	95% CI	P
Age			
15	Ref.	0.004-0.033	**0.000****
14	0.012		
Sex			
Male	Ref.	0.810-2.706	0.202
Female	1.480		
Religion			
Buddhism	Ref.	0.074-7.456	0.800
Christian	0.743		
Social support			
High	Ref.	6.396-53.687	**0.000****
Low	18.530		

*OR=odd ratio, CI=confidence interval, Ref=reference, **=p value<0.05*

DISCUSSION

The prevalence of depression was 56.4%. When compared to recent studies such as one cross-sectional study among 1245 students [27, 28], the prevalence of depression was 74%. A study about 772 students, the prevalence of depression, anxiety and stress were 50% [29]. Another study from 1723 students, depressive people was at 38.2%, [30]. In the cross-sectional study from Saudi students, 38.2% depressive people were found out [2]. Another cross-sectional study from Saudi adolescents, there was 41.5% of students in depressive mood [31].

In relation to age, 14 years old students were 0.01 times less likely to get depression when compared to 15 years old. The result is opposite from one study in which age had not significant effect with depression [29]. This study was consistent with cross-sectional study among 506 students in Malaysia [32]. The older

the age group, the higher depression. This may be due to increasing workload.

In relation to social support, students having low social support were 18 times more likely to get depression than those having high social support. This study was supported by one of the study [33] indicating that social support was an important role in depression. In one study [34], mental health of student can reduce if they have adequate social support. This result was opposite to some recent studies such as [35, 36] in which social support prediction on depression was not significant. It may be due to different measurement used, different culture and different geography. Other fact is that adolescents were living far away from their parents and relatives. Therefore they had not enough social support from parents but for peers, they were seem like competitor for each other in education. Therefore, it leaded to poor social support from peers.

CONCLUSIONS

Parents and teachers should support their children especially adolescent time because at that time, the prevalence of mental health problems has risen steeply. Social support is one of the most important to reduce the chance to get depression. During living at stressful environment, students struggle their daily life and communicate with strange environment, lessons and other things. At that time, they need support not only from parents but also peers and teachers and environment. Mental health intervention program is not so awareness in poor developing countries. Many counselling services and treatment program is still needed especially for adolescent period.

ACKNOWLEDGMENTS

This thesis is supported by Graduate School Thesis Grant, Chulalongkorn University.

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THE TREND IN PREVALENCE OF NEONATAL MICROCEPHALY IN THAILAND, DOES ZIKA OUTBREAKS CHANGE THE TREND?

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ABSTRACT

Introduction: The concern of neonatal microcephaly became high after Zika outbreaks occurred worldwide. Thailand was one of the affected countries. The estimation of neonatal microcephaly prevalence was crucial for public health preparedness and response. The epidemiological characteristics of microcephaly specifically to Thailand were vital to developing clinical management and guideline.
Objectives: The objectives of this study were to estimate the prevalence and describe the epidemiological characteristic of neonatal microcephaly in Thailand during 2014-2018.
Methodology: This study was a cross-sectional study using data from the Health Data Center (HDC), Ministry of Public Health, Thailand (MoPH), 69% of live-births in Thailand was included in this database. Neonatal microcephaly is a newborn who has head circumference (HC) less than the 3rd percentile of standard HC by gestational age (GA) and sex. The results of the descriptive study were shown in percentage, 95% confidence limit, ratio, mean and SD, and median and min and max. Chi-square was used for comparison prevalence before and after Zika outbreaks.
Conclusion: The prevalence of neonatal microcephaly in Thailand was higher than expected. The high prevalence may come from the standard reference. Using international standard reference may induce a high prevalence. The study to establish a local standard reference is needed.
Keywords: Prevalence, Neonatal, Microcephaly, Thailand

INTRODUCTION

Neonatal microcephaly is a birth defect where a newborn's head is smaller than expected when compared with the standard references by age and sex. Newborn with microcephaly may die at birth or develop other abnormalities as they grow older. The cause of microcephaly remains unclear. Currently, there is no specific treatment for this condition [1, 2]. According to the World Health Organization (WHO) report, microcephaly is a rare condition. The prevalence of microcephaly is 1 case per several thousand live-births [2]. In 2014 Thailand reported that there were 4.36 microcephaly cases per 100,000 live-births [3].

The concern of microcephaly became high after Zika outbreaks occurred worldwide because the major complications of Zika virus infection were microcephaly and other neurological disorders [4]. Moreover, the relationship between microcephaly and other central nervous systems (CNS) and Zika virus infection from 17 countries were reported. Consequently, WHO declared that the cluster of microcephaly cases and other neurological disorders was a Public Health Emergency of International Concern (PHEIC) [5]. In 2016, Thailand was one of the Zika affected countries. Bureau of Epidemiology (BoE), Department of Disease Control, Ministry of Public Health, Thailand reported more than 1000 cases of Zika virus infection from many parts of Thailand. Among these, two confirmed Zika-related microcephaly was reported [6].

For the public health preparedness and response in this situation. The Magnitude of microcephaly in Thailand before and after Zika virus outbreak in Thailand is needed. The characteristics of microcephaly specifically to Thailand is vital for clinical management and develop a clinical practice guideline. However, there was no evidence about the prevalence of microcephaly in Thailand after the epidemic of

Zika virus infection and the characteristics of microcephaly specifically to Thailand had no report. Therefore, the objectives of this study were to estimate the prevalence and describe the epidemiological characteristic of neonatal microcephaly in Thailand during 2014-2018.

METHODOLOGY

Data source

This study was a cross-sectional study using the data (43 files report) from HDC, Thai MoPH. This database was established by Thai MoPH in 2012 and data was completed since 2014. The aim of this database was collecting health information among client who received a medical service in a public hospital under Thai MoPH for health strategic management and health policy planning [7]. Nowadays, 1454 hospitals were involved by HDC [8]. During 2014-2018, this database cover live-births around 69% of total live birth in Thailand [9].

Study Population

The inclusion criteria of this study was a term newborn (GA ≥ 37 week) who received a medical service in a public hospital under Thai MoPH or other hospitals who interest to send the data to MoPH during 1 Jan 14 to 31 Dec 18. The exclusion criteria were a newborn who had no head circumference data or cannot evaluate gestational age.

Interested Variables

The newborn data (HC, sex, GA, birth weight, and length) and maternal data (age, pre-pregnancy weight, height, and gravida) were extracted from HDC.

Data Management and Analysis

The definition of microcephaly and macrocephaly are a newborn who had HC less than the 3rd percentile and more than 97th percentile of standard HC by GA and sex. According to the Thai royal college of pediatricians[10], the standard references for a term newborn who has GA 37-41 weeks is INTERGROWTH 21st standard head circumference charts,[11] and a term newborn who has GA > 41 weeks is WHO standard head circumference charts [12]. The prevalence of microcephaly was showed in proportion with 95% confidence limit. Chi-square was used for comparing the prevalence before and after Zika outbreaks.

The neonatal and maternal characteristics were categorized into the group. Birth weight was divided by risk into small for gestational age (SGA), appropriate for gestational age (AGA), and large for gestational age (LGA). SGA is a newborn who has a birth weight that below the 10th percentile of expected weight for their age and gender, AGA is a newborn who has a birth weight between the 10th – 90th percentile, and LGA refers to a newborn who is larger than 90th percentile [13]. The birth length was divided into short and normal lengths. The short newborn is a newborn length that less than the 3rd percentile of the standard length. According to the complication during pregnancy of advanced maternal age[14, 15], the maternal age was divided into < 35 years and ≥35 years. Maternal weight and height will be calculated to body mass index (BMI, <18.5 kg/m^2 = underweight; 18.5–23 kg/m^2 = normal range; ≥ 23–24.9 kg/m^2 = overweight; ≥ 25-29.9 kg/m^2 = obesity). The gravida of the mother was divided into first gravida and multigravida. The results of the descriptive study were shown in percentage, 95% confidence limit, ratio, mean and SD, or median and min and max.

Ethical Consideration

This study was approved by the research ethics review committee for research involving human research participants, health science group, Chulalongkorn University, Thailand. The information did not include the name of patients (keep anonymous). All information was kept confidentially and use for study purpose only.

RESULTS

During January 2014 – December 2018, a total of 2,335,320 newborns in Thailand were recorded in the database of HDC, Thai MoPH. In this number, only 121,448 newborns (5.2%) had HC variable and can evaluate GA. Among this, the number of term newborn is 111,692 newborns. The characteristic of newborns and their mother in this study were shown in table 1. There was boy 51.3% and girl 48.7%, boy:girl ratio was 1.1:1. Around 80% of the newborn had weight in AGA group. The

mean ± SD of birth weight was 3082.3 ± 404.2 grams. Most of the newborn had length ≥ 3rd percentile of standard reference by age and sex. The mean ± SD of birth length was 51.0 ± 2.6 centimeters. Ninety-seven point nine percent of the mother in this study had age less than 35 years old. The median for maternal age was 32 years old. The minimum and maximum age of the mother were 14 and 47 years old, respectively. The major groups of maternal BMI were a normal range (36.5%) and obesity (34.4%). The mean ± SD of maternal BMI was 23.5 ± 4.9 Kg/m^2. The median of gravida was 2. Minimum and maximum gravida were 1 and 9, respectively.

The prevalence of neonatal microcephaly, normal head size, and macrocephaly were shown in table 2. There were 12,769 newborns (11.4%) had head circumference less than 3rd percentile of standard reference (microcephaly). The trend of microcephaly was slightly increased since 2014 and hit to the peak (12.7%) in 2015 then the trend gradually decreased to 8.6% in 2018. The prevalence of neonatal microcephaly before (2014-2015) and after (2016-2018) Zika virus outbreak were 12.5% and 10.9% (x^2=64.5, P-value < 0.001). For macrocephaly, the trend was decreasing from 8.0% in 2014 to 5.1% in 2018.

The characteristics of a newborn who was microcephaly case and a newborn who had normal head size were shown in table 3. More than half of microcephaly case was female (56.0%). Around 40% of microcephaly case was SGA newborn. The main birth length of both groups was the same. There were newborn who had length ≥ 3rd percentile 91.7% and 98.8% in microcephaly and normal head size groups, respectively. For the maternal factors, most of the mother had age less than 35 years old, accounting for 98.1% and 97.8% in microcephaly and normal head size, respectively. BMI was divided into 4

groups according to BMI for Asian populations. The main groups of BMI were normal BMI range and obesity in both groups. We found that mother with underweight in microcephaly group (18.1%) was more than a normal head size group (17.3%). The proportion of the first gravida among microcephaly (48.9%) was higher than a normal head size group (42.4%).

Table 1 The characteristic of newborns and their mother in this study, Thailand, 2014-2018

Variables	n	%	Total
Neonatal factors			
Sex			
Male	57,337	51.3	111,692
Female	54,355	48.7	
Weight			
SGA	12,425	11.1	111,645
AGA	91,920	82.3	
LGA	7,300	6.6	
Mean ± SD 3082.3 ± 404.2 grams			
Length (by Age and Sex)			
< 3rd percentile	2,331	2.1	111,692
≥ 3rd percentile	109,361	97.9	
Mean ± SD 51.0 ± 2.6 centimeters			
Maternal factors			
Age (year)			
≥ 35	318		15,150
< 35	14,832		
Median 32 Min-Max 14 – 47 years			
BMI (Kg/m^2)			
Underweight	14,087	17.6	79,994
Normal	29,210	36.5	

Variables	n	%	Total
Overweight	9,224	11.5	
Obesity	27,473	34.4	
Mean ± SD 23.5 ± 4.9 Kg/m^2			
Gravida			
1	35,182	43.0	81,746
>1	46,564	57.0	
Median 2 Min-Max 1 - 9			

Table 2 Prevalence of neonatal microcephaly, normal head size, and macrocephaly, Thailand, 2014-2018

	2014		2015		2016		2017		2018		Total	
Microcephaly	2,078		2,802		4,071		1,629		2,189		12,769	
Normal head size	13,678		17,666		26,923		11,920		21,840		92,027	
Macrocephaly	1,368		1,530		1,882		836		1,280		6,896	
Total	17,124		21,998		32,876		14,385		25,309		111,692	
Prevalence of microcephaly (%)	12.1		12.7		12.4		11.3		8.6		11.4	
95% Confidence limits	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**
	11.7	12.6	12.3	13.2	12.0	12.7	10.8	11.9	8.3	9.0	11.3	11.6
	Before Zika outbreaks				**After Zika outbreaks**						**X^2**	**P-value**
Prevalence of microcephaly (%)	12.5				10.9						64.5	<0.001
95% Confidence limits	**Lower**		**Upper**		**Lower**		**Upper**					
	12.2		12.8		10.7		11.1					
Prevalence of macrocephaly (%)	8.0		7.0		5.7		5.8		5.1		6.2	
95% Confidence limits	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**	**Lower**	**Upper**
	7.6	8.4	6.6	7.3	5.5	6.0	5.4	6.2	4.8	5.3	6.0	6.3
	Before Zika outbreaks				**After Zika outbreaks**						**X^2**	**P-value**
Prevalence of microcephaly (%)	7.4				5.5						158.1	<0.001
95% Confidence limits	**Lower**		**Upper**		**Lower**		**Upper**					
	7.2		7.7		5.3		5.7					

Table 3 The epidemiological characteristic of neonatal microcephaly and newborn with normal head size, Thailand 2014-2018

	Microcephaly		Normal Head size	
	n	**%**	**n**	**%**
Neonatal factors				
Sex				
Male	5,613	44.0	48,118	51.9
Female	7,156	56.0	44,542	48.1
Weight				
SGA	5,225	40.9	6,881	7.4
AGA	7,485	58.7	80,124	86.5
LGA	52	0.4	5,635	6.1
Length (by Age and Sex)				
< 3rd percentile	1,056	8.3	1,125	1.2
≥ 3rd percentile	11,713	91.7	91,535	98.8
Maternal factors				
Age (year)				
≥ 35	32	1.9	273	2.2
< 35	1,621	98.1	12,210	97.8
BMI (Kg/m2)				
Underweight	1,745	18.1	11,379	17.3
Normal	3,445	35.7	24,352	37.1
Overweight	1,117	11.6	7,587	11.6
Obesity	3,331	34.6	22,300	34.0
Gravida				
1	4,455	48.9	28,904	42.4
>1	4,662	51.1	39,208	57.6

DISCUSSION

During 2014-2018, the prevalence of neonatal microcephaly in this study is 11.4% which higher than expectation and a previous study (4.36 cases per 100,000 live-births)[3]. In this study, the definition of neonatal microcephaly is a newborn who had head circumference less than the 3rd percentile of the standard head circumference by age and sex [1, 2]. It means that the expected prevalence of neonatal microcephaly is around 3%.

The higher prevalence, when compared with the previous study, may come from the different methodology. In this study, we used HC compared with standard reference to identify microcephaly case directly but in the previous study, they used diagnosis code (ICD-10-CM = Q02, a congenital or acquired developmental disorder in which the circumference of the head is smaller than normal for the person's age and sex)[16] to identify the microcephaly case. The data from microcephaly reporting system evaluation which conducted by Thai BoE reported that the sensitivity of 43 files report for microcephaly was 0.14%. It means that if microcephaly occurs 100,000 cases, only 140 cases will be reported Q02 in the system[17]. This is a reason why the prevalence of neonatal microcephaly in this study is higher than the previous study.

Another reason for high prevalence may come from using international standard reference. The number of studies in South East Asia countries[18-21] mentions about international standard growth curve may not

proper with their newborn because the international standard reference did not include the neonatal data from their countries, Thailand did not include also. They made the standard of head circumference from their newborn data and compared with the international standard reference, they found that local standard head circumference in each country are smaller than international standard head circumference. Therefore, using the international standard head circumference may induce a high prevalence of microcephaly. According to the national guideline,[10] the newborn with microcephaly is one of the criteria for congenital Zika syndrome investigation which have expensive cost. If using international standard head circumference, the newborn may receive unnecessary investigation and loss of expenditure wastefully. Therefore, the local standard head circumference specifically to Thai newborn is needed.

The trend of microcephaly after the outbreak of Zika virus was decreasing. It may be explained by the decreasing of SGA and low birth weight newborn. There are a number of studies show the relationship between birth weight and microcephaly. Many studies suggest that the rate of microcephaly is inversely related to birth weight. The prevalence of microcephaly is highest in a newborn who had weight < 1,500 grams, and the trend of microcephaly decreased to lowest in the newborn who had more weight, respectively.[21-23] We tried to divide the birth weight of the newborn in this study by year. We found that the proportion of SGA and low birth weight newborn in this study was decreased since 2014 and lowest in 2018. This may be the reason why the trend of microcephaly was decreased.

The strength of this study is the database. This study used the data from HDC, Thai which 1,454 hospitals were involved. Regarding the population of this study, 69% of live birth in Thailand were included in this database. However, only 5.2% of the newborn in 43 files report can evaluate the head size. The low completeness of HC data may come from non-compulsory data. The HC in this database is a non-compulsory variable, the service provider may send or not send up to the willingness. This reason can explain why almost 95% of the newborn has no HC data. As same as the HC, some interesting variable such as gestational weight gain, nutrition during pregnancy, socioeconomic status, environmental, and lifestyle (stress, smoking and alcohol use) are noncompulsory variable. So, these variables cannot be evaluated in this study.

CONCLUSIONS

A total of 111,692 term newborns who born at a public hospital under Thai MoPH and other hospitals who interest to send the data to MoPH in 2014-1018 were included in this study. There were 12,769 newborns (11.4%) had head circumference less than 3rd percentile of standard reference (microcephaly). The high prevalence of neonatal microcephaly in this study may come from the standard reference. Using international standard reference may induce a high prevalence. The study to establish a local standard reference is needed.

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THE EFFECT OF AFP-SIRNA COMBINATION WITH ANGIOGENESIS INHIBITOR DRUG IN HEPATOCELLULAR CARCINOMA

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ABSTRACT

Introduction: Alpha-fetoprotein (AFP) can accelerate the growth of hepatocellular carcinoma (HCC) cells by plays a key role in the carcinogenesis of HCC counteracting apoptosis and promoting cell proliferation through angiogenesis pathway. Recently, angiogenesis inhibitor such as sorafenib, sunitinib, and bevacizumab have been explored as important pharmacological agents for cancers therapy, including hepatocellular carcinoma. However, the limitations of these therapeutic agents should be concerned such as high toxicity, and side effects including drug resistance. Suggests that silencing of AFP mRNA by using small interfering RNA specific for alpha-fetoprotein (AFP-siRNA) may increase the efficacy of angiogenesis inhibitor drug strategies for reducing toxicity.
Objectives: To investigate the effect of AFP-siRNA in combination with angiogenesis inhibitor drugs on HCC cell proliferation.
Methodology: In this study, we selected the AFP producing HCC cell which is HepG2. HepG2 cancer cells were treated with different concentrations of sorafenib, sunitinib, and AFP-siRNA. After that, anti-proliferative dose response of individual inhibitor on HepG2 cell was measured fby cell viability assay. Moreover, we investigated the combination effect of AFP-siRNA and angiogenesis inhibitor drug by performing AFP-siRNA transfection on HepG2 cell before treating them with each angiogenesis inhibitor drug. Finally, the proliferative activity of HepG2 cells was detected by cell viability assay.
Conclusion: The result revealed that the treatment of either AFP-siRNA or an angiogenesis inhibitor drug itself decreased the proliferation rate and percentage of cell viability. Moreover, the combination of AFP-siRNA and an angiogenesis inhibitor showed a significant inhibitory effect on cell proliferation when compared to individual inhibitor treatment. The resulting combination index (CI) offers a quantitative definition for a synergistic effect. The combination treatment showed great inhibitory effect on hepG2 cell viability even though we used sorafenib and sunitinib in a low dose which is indicated the promising possibility candidate for HCC treatment. Therefore, further investigation on the other mechanism affected by this combination treatment is important to the potential for translation into clinical therapies.
Keywords: hepatocellular carcinoma, alpha-fetoprotein, small interfering RNA, angiogenesis inhibitor

INTRODUCTION

An annual scientific paper published in the American Cancer Society journal (Cancer Facts & Figures2018) reports that 1.7 million new cancer cases are expected to be diagnosed in 2018. Interestingly, Asia region presents high incidence rates of hepatocellular carcinoma (HCC) which is causing to economic burden on healthcare and significantly accelerate causes of death. In Thailand, HCC incidences have been found in many areas such as Khonkaen, Lampang, Chiang Mai, Bangkok, Chonburi, and Songkhla [1-5]. Currently, the potential treatments which can extend the life expectancy of HCC patients are surgical resection and liver transplantation. Unfortunately, only 15-20 % of HCC patients

are suitable for surgical resection and liver transplantation after the initial diagnosis, therefore the development of appropriate treatments for HCC patients is needed [6,7]. Alpha-fetoprotein (AFP) is a tumor marker of liver cancer, which accelerates the growth of HCC cells by interacting with AFP receptor (AFPR) to activate phosphatidylinositol 3-kinase PI3K/AKT signal pathway and promoting cell proliferation through angiogenesis pathway. It plays a key role in the carcinogenesis and counteracting apoptosis of HCC [8-12]. To date, anti-angiogenesis drugs such as sorafenib, sunitinib, and bevacizumab have been explored as important pharmacological agents for cancer therapy, including hepatocellular carcinoma. However, the limitations of these therapeutic agents should be concerned such as high toxicity, and side effects including drug resistance [12-14]. Meng, *et al*. showed the abundant apoptotic cells when silencing of AFP mRNA by using siRNA (AFP-siRNA) [15]. Therefore, AFP-siRNA plays a crucial role in HCC cytotoxicity. Suggests that silencing of AFP mRNA by using small interfering RNA specific for alpha-fetoprotein (AFP-siRNA) may increase the efficacy of angiogenesis inhibitor drug strategies for reducing dose-dependent manner of the drug. Hence, investigating the effect of small interfering RNA specific for alpha-fetoprotein (AFP-siRNA) in combination with angiogenesis inhibitor drug which is sunitinib and sorafenib on cell survival and cell proliferation of HCC cell line.

METHODOLOGY

Cell culture and cytotoxicity study

HepG2 cancer cell was cultured in Dulbecco's modified Eagle's medium (DMEM) with high glucose supplemented with 10% (v/v) fetal bovine serum (FBS) and all cells were incubated at 37 °C in 5% CO2.

Study the cytotoxicity of AFP-siRNA

HepG2 cell was seeded in 96-well plates at the concentration of 10,000 cells/well and cultured for 24 hours after that the chemical synthesized AFP-siRNA were transfected into HepG2 cells in concentration of 0-25 nM by using the Lipofectamine 2000 transfection Agent (Invitrogen, Carlsbad, CA, USA) according to the manufacturer's protocol and further incubated for 48 hours and *In vitro* cytotoxicity of each condition was examined by using CellTiter-Blue® Cell Viability Assay following the protocol (Promega, Madison, WI).

Study the cytotoxicity of angiogenesis inhibitor drug

HepG2 cell was seeded in 96-well plates at the concentration of 10,000 cells/well and cultured for 24 hours after that sorafenib and sunitinib were treated into HepG2 cells in concentration of 0-20 uM and further incubated for 24 hours and *In vitro* cytotoxicity of each condition was examined by using CellTiter-Blue® Cell Viability Assay following the protocol (Promega, Madison, WI).

Determination of the combination effect

HepG2 cell was seeded in 96-well plates at the concentration of 10,000 cells/well and cultured for 24 hours. Chemical synthesized AFP-siRNA were transfected into HepG2 cells for 48 hours using the Lipofectamine 2000 transfection Agent (Invitrogen, Carlsbad, CA, USA) according to the manufacturer's protocol before continuously treated with angiogenesis inhibitor drug which is sorafenib and sunitinib for 24 hours. Next, *In vitro* cytotoxicity of each condition was examined by using CellTiter-Blue® Cell Viability Assay following the protocol (Promega, Madison, WI). Finally, the combination effect of two drugs was quantified by the combination index (CI) theorem of Chou-Talalay method using the following equation (1):

$$\text{Combination index (CI)} = \frac{(D1)}{(Dx)1} + \frac{(D2)}{(Dx)2} \quad (1)$$

where (Dx)1 and (Dx)2 is doses of the chemicals that when applied singly also have the same effect and (D)1 and (D)2 is doses of chemicals 1 and 2 that in combination produce some specified effect. The CI index value as described in the level of synergism, additive, antagonism followed by Hernandez JL, *et al.* as shown in Table 1 (16).

Table 1 Combination index (CI) value description

Value range	Description
< 0.1	Very strong synergism
0.1-0.3	Strong synergism
0.3-0.7	Synergism
0.7-0.85	Moderate synergism
0.85-0.9	Slight synergism
0.90-1.10	Nearly additive
1.20-1.45	Slight antagonism
1.45-3.3	Antagonism
3.3-10	Strong antagonism
>10	Very strong antagonism

Statistical analysis

Data are presented as mean ± S.D. of three independent experiments. One-way ANOVA statistical analysis with post-hoc comparisons test was performed by Jamovi software. $p < 0.05$ was selected as the significance level. The data were indicated with (*,**,***) for $p < 0.05$, 0.01, 0.001 respectively, and (n.s.) for no statistically significant difference ($p \geq 0.05$).

RESULT

Cytotoxicity of AFP-siRNA

The anti-proliferative potential and the percentage of HepG2 cell viability of AFP-siRNA was tested in a concentration of 0.195, 0.390, 0.781, 1.563, 3.125, 6.25, 12.5, and 25 nM. at 48 hours incubation time was revealed about 89.39%, 87.73%, 76.83%, 74.20%, 69.65%, 62.12%, 45.78%, and 38.90% respectively. The half maximal inhibitory concentration (IC_{50}) of AFP-siRNA is approximately 10.75 nM (Figure 1).

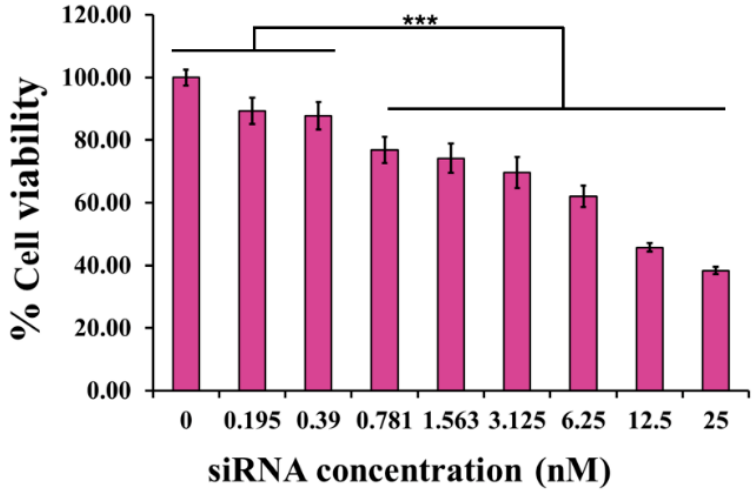


Figure 1. Dose-response of AFP-siRNA with hepatocellular carcinoma cell line.

The effects of AFP-siRNA on cell viability of HepG2 after treated with different concentrations (0-25 nM) of AFP-siRNA for 48 hours.

Cytotoxicity of Sorafenib and Sunitinib

HepG2 cancer cell were separately treated with sorafenib and sunitinib for 24 hours. The percentage of cell viability was showed inhibited in a dose-dependent manner. IC_{50} of sorafenib and sunitinib is approximately 6.125 and 6.250 uM, respectively (Figure 2).

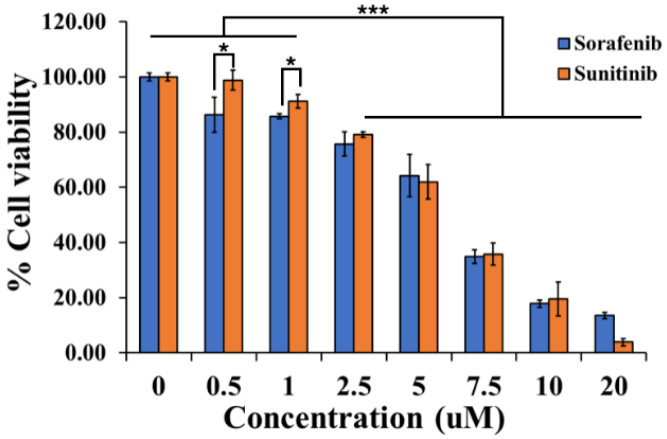


Figure 2. Dose-response of angiogenesis inhibitor drug with hepatocellular carcinoma cell line.

The effects of angiogenesis inhibitor drug on cell viability of HepG2 after treated with different concentrations (0-20 μM) of Sorafenib and Sunitinib for 24 hours.

Combination effects of anti-angiogenesis drug and AFP-siRNA

To determine the synergistic effect of AFP-siRNA and anti-angiogenesis drug which are sorafenib and sunitinib, the HepG2 cancer cell was treated by AFP-siRNA for 48 hours before treating with the anti-angiogenesis drug for 24 hours. The HepG2 cell viability showed significantly inhibitory effect in present with some combination treatment (Figure 3). However, the level of synergism was predicted by the drug combination index (CI) which was calculated from the dose-response (Table 2).

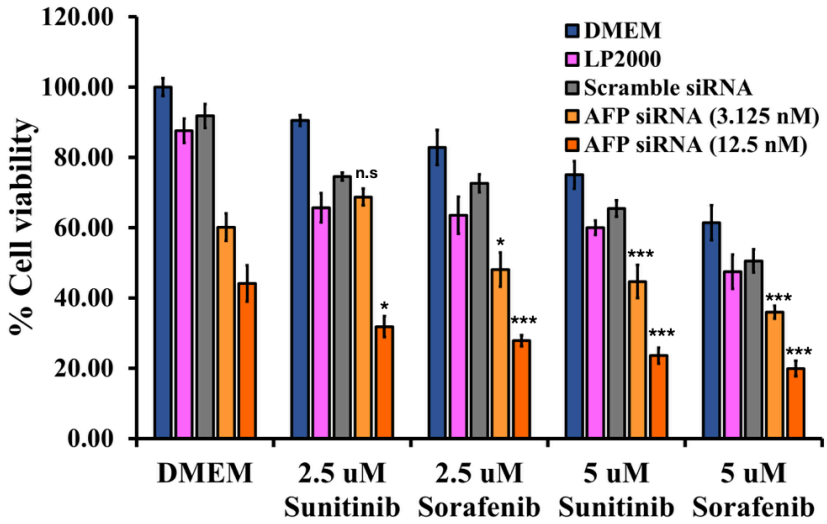


Figure 3. The combination effects of anti-angiogenesis drug combined with AFP-siRNA.

HepG2 cell was treated with AFP-siRNA for 48 hours before treating with the anti-angiogenesis drug for 24 hours. Data are presented as the mean ± SD (n=3).

Table 2 The prediction of drug combination effect of anti-angiogenesis drug and AFP-siRNA

Condition	CI	Interpretation
3.125 nM siAFP + 2.5 uM Sunitinib	1.13	Slight antagonism
3.125 nM siAFP + 2.5 uM Sorafenib	0.67	Synergism
3.125 nM siAFP + 5.0 uM Sunitinib	1.08	Nearly additive
3.125 nM siAFP + 5.0 uM Sorafenib	0.89	Slight synergism
12.5 nM siAFP + 2.5 uM Sunitinib	0.81	Moderate synergism
12.5 nM siAFP + 2.5 uM Sorafenib	0.80	Moderate synergism
12.5 nM siAFP + 5.0 uM Sunitinib	1.00	Nearly additive
12.5 nM siAFP + 5.0 uM Sorafenib	1.00	Nearly additive

DISCUSSION

Silencing AFP mRNA by using AFP-siRNA can inhibit the viability of HepG2 cancer cell.

Silencing AFP expression by using AFP-siRNA was able to reduce HepG2 (AFP-producer) cell viability although we used only a small amount of AFP-siRNA (0.781 nM) (figure 1). These results indicated the expression of AFP played an important role in HCC cell survival and proliferation. Like the previous study of Meng, *et al*., they demonstrated that the abundant of apoptotic cells when silencing of AFP mRNA by using AFP-siRNA [15].

The effect of sorafenib and sunitinib on the viability of HepG2 cell.

Not only AFP-siRNA that can reduce the viability of HepG2, but sunitinib and Sorafenib can also reduce as well. The result showed that both of anti-angiogenesis drugs showed a great inhibitory effects to reduce HCC cell viability at 24 hours (Figure 2) which is the same way as the previous study of HK Ho, *et al.,* they demonstrated that the anti-proliferative effects of sunitinib (IC_{50}=3.5 uM) and sorafenib (IC_{50}=5.0 uM) on HCC cell lines at 72 hours, they found that sunitinib treatment can reduce HepG2 and Huh 7 proliferation better than sorafenib by 2 time at concentration of 5 uM [14]. Therefore, sunitinib is one of the anti-angiogenesis inhibitor drugs that we interest, but in this study, the IC50 value of both anti-angiogenesis inhibitor drug is non significantly difference (6.125 and 6.250 uM) for sorafenib and sunitinib, respectively) and it higher than previously reported, probably due to drug exposure time under our experimental conditions.

The combination effect of AFP-siRNA and angiogenesis inhibitor drug on the viability of HepG2.

The performance to inhibit the viability of HepG2 of both angiogenesis inhibitor drug was revealed a significantly increased when combined with AFP-siRNA (Figure 3). The prediction of drug combination effect was indicated by the combination index (CI) value and revealed the interpretation for synergistic effect and additive effect (Table 2). Interestingly, AFP-siRNA combination enables enhanced therapeutic in term of decreased HCC cell survival and play a role in cell proliferation mechanism, correlated with the study of Zhu, *et al.,* they showed the effect of paclitaxel on

suppressing proliferation in HLE cells (non AFP-producer) was significantly higher than in Bel 7402 cells (AFP-producer), they transfected HLE cell with pcDNA3.1-afp (AFP-expressed vectors), the sensitivity of HLE cells to paclitaxel was significantly decreased and sensitivity of Bel 7402 cells was significantly enhanced after transfection with AFP-siRNA [17]. However, in the condition of 3.125 nM AFP-siRNA combined with 2.5 uM sunitinib displayed a slight antagonism of the combination index value This implies that the combination treatment needs to be cautious. This appears that sunitinib might mediate activation of HepG2 proliferation or resistance to AFP-siRNA. We hypothesized that it may be caused by the autocrine loop activating the Akt and ERK pathway leading to enhance of tumor aggressive might directly promote VEGF stimulation as the similar mechanism which has been described in many studies and reports [12, 18, 19].

CONCLUSION

In this study, we found that the combination AFP-siRNA and angiogenesis inhibitor have a synergistic effect to inhibited the proliferation of HCC cell even though we used sorafenib and sunitinib in a low dose which are implied to decrease side effect and toxicity in a healthy cell. This finding indicated that, the benefits of this combination treatment are leading to increase the effective treatment of both anti-angiogenesis inhibitor drug which are promising possibility candidate of HCC treatment resulting in alleviating the toxicity and therapeutic dose contributed to increase the cost-effectiveness of cancer treatment and extend the life expectancy of patients.

Unfortunately, siRNA unable to penetrate into any cell directly, therefore, developing a delivery system of siRNA in order to offer the potential for translation into clinical therapies is important including further investigation on the other mechanism affected by this combination treatment is important.

ACKNOWLEDGEMENT

This work is supported by Siriraj Graduate Scholarship from Faculty of Medicine Siriraj Hospital, Mahidol University.

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THE EFFECT OF SMALL INTERFERING RNA IN REDUCING MELANOGENESIS FOR HYPERPIGMENTATION DISORDER

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ABSTRACT

Introduction: Hyperpigmentation is a skin pigmentation disorder caused by high production of melanin or melanogenesis in skin melanocytes. The accumulation of excess melanin leads to dermatological problems such as solar lentigines, freckles, and melasma. These hyperpigmentary skin disorders can significantly impact an individual's appearance, emotional and psychological distress, and reduce quality of life. Topical depigmenting agents, such as hydroquinone, azelaic acid, kojic acid, licorice extract, and retinoids are generally used for hyperpigmentation management, however unsightly depigmentation, irritant dermatitis, ochronosis or other long-term safety side effects are major problems for clinical treatment. Thus, a new approach is required to identify new drug target that potent and safe. The control of melanogenesis pass key enzyme such as tyrosinase enzyme (TYR) which is a rate-limiting step of the process using dicer-substrate small interfering RNA (DsiRNA) to downregulate TYR expression might be a great strategy to develop novel therapeutic agents for controlling abnormal melanin synthesis to manage skin hyperpigmentation.
Objectives: To investigate the development of dicer substrate small interfering RNA (DsiRNA) specific against to human tyrosinase (TYR) that downregulate mRNA expression of human TYR.
Methodology: The DsiRNA sequence against to human TYR gene and scrambled as control were designed and developed. The normal human primary epidermal melanocytes and human melanoma cell line were cultured in complete media at 37°C in a humidified atmosphere of 5% CO_2 for 24 h before transfection. The DsiRNA against TYR gene and scrambled were transfected into the cell using the lipofection method. The relative mRNA expression of TYR was determined by quantitative real-time reverse transcription (qRT-PCR) and analysed according to the $2^{-\triangle\triangle C}$T method.
Results: The DsiRNA against to human TYR was successfully developed by *in vitro* transcription using T7 Promotor/ RNA polymerase method. The transfection of DsiTYR showed a lower TYR mRNA expression in both normal human primary epidermal melanocytes and human melanoma cell line when compared with scrambled control.
Conclusion: The DsiRNA has a great potential as an alternative therapeutic regime which can downregulate mRNA expression of TYR both the normal human primary epidermal melanocytes and human melanoma cell line. Further study such as dosage optimization is needed in order to develop a complete TYR-DsiRNA as an alternative treatment for hyperpigmentation disorder.
Keywords: Dicer substrate Small interfering RNA (DsiRNA), Melanogenesis, Tyrosinase, Hyperpigmentation

INTRODUCTION

Hyperpigmentation is a skin pigmentation disorders that caused by abnormally high production of melanin or melanogenesis in skin melanocytes. The excessive accumulation of melanin leads to dermatological problems such as solar lentigines, freckles and melasma. These hyperpigmentary skin disorders can significantly impact an individual's appearance, and may cause emotional and

psychological distress and reduced quality of life [1].

Topical depigmenting agents, such as hydroquinone, azelaic acid, kojic acid, licorice extract, and retinoids are generally used for hyperpigmentation management, however unsightly depigmentation, irritant dermatitis, ochronosis or other long-term safety side effects is a major problem for clinical treatment [2-4]. Thus, the therapeutic approaches that potent and safe are required for inhibition of melanogenesis process to manage skin hyperpigmentation.

The melanogenesis process is controlled by the key enzyme such as tyrosinase enzyme (TYR) which is a rate-limiting step of the process as a therapeutic target. The modulation of TYR expression, maturation, degradation, and direct inhibition of catalytic activity was reported to control melanogenesis targeting the key tyrosinase [5]. Only a few of effective targeting tyrosinase inhibitors are found and possibly induce the similar characteristics in clinical trials [5,6].

The small interfering ribonucleic acid (siRNA) is a double-stranded RNA (dsRNA) with 21–25 nucleotides that functions as a post-transcriptional regulator and specific knockdown of mRNA target. The siRNA has been reported in several skin applications and successfully used in the melogenic cell such as siRNA-mediated specific down-regulation of TYR inhibits melanin synthesis in fish embryos [7]. Moreover, the previous study indicated that using dicer-substrate dsRNAs which is a RNA duplexes in the 25-30 base length range to trigger RNAi can prolong the duration of RNAi at a lower concentration than conventional siRNA [8]. Thus, using dicer-substrate siRNA (DsiRNA) to treat skin disorder is very interesting, and the modulation of TYR expression may act as a therapeutic target for hyperpigmentation disorder.

This study aims to design and synthesis dicer-substrate small interfering RNA (DsiRNA) against to human TYR that downregulate mRNA expression of human TYR in melanogenesis.

METHODOLOGY

Design and synthesis of DsiRNAs

The Human Tyrosinase mRNA sequence (Refseq id NM_000372.4) and mouse tyrosinase mRNA sequence (Refseq id NM_011661.5 and NM_001317397.1) were obtained from NCBI nucleotide data set and process multiple sequence alignment using Clustal Omega tool online to select the best conserve sequence tyrosinase-targeted DsiRNAs (only a nucleotide mismatch between human and mouse mRNA sequence were selected).

The DsiRNA sequences against to human TYR gene (DsiTYR) with scrambled (siScr) were designed according to the siRNA sequence and Dicer substrate guideline [9,10]. The Basic Local Alignment Search Tool (BLAST) was performed to ensure the targeting gene of this study. The sense strand and anti-sense stand template of DsiRNA and T7 oligonucleotides were ordered from company for synthesis unmodified DsiTYR construct 1 (DsiTYR-d1), DsiTYR construct 2 (DsiTYR-d2) and scrambled (siScr) by *in vitro* transcription siRNA synthesis using T7 Promotor/ RNA polymerase was performed as previously described [11].

Briefly, each template and T7 oligonucleotides were annealed with T7 RNA promotor oligo in TE buffer by heating at 95^{O}C for 2 min and cool down slowly to obtain double stand DNA at room temperature for 5 min. Next, *in vitro* transcription reaction were performed using T7 RNA polymerase according to the manufacturer's instruction (Lucigen, USA). The annealing template was used in T7 reaction mix and incubate at 37 ^{O}C for 6 h, after that RNase free-DNase (Promega, USA) was added and continued to incubate at 37 ^{O}C for 30 min to digest the template. Sense and antisense strand of siRNA was generated in separate reaction and were annealed by mixing both transcription reaction and heat at 95^{O}C for 2 min and cool down slowly at room temperature for 20 min.

The reaction was purified using a QIAquick Nucleotide Removal Kit (Qiagen, Germany) according to the manufacturer's

instruction. The quality and quantity of DsiRNA was determined by polyacrylamide gel electrophoresis (PAGE) and Nano photometer (IMPLEN, Munich, Germany).

DsiRNA transfection

The normal human primary epidermal melanocytes (HEMa) cell from the American Type Culture Collection (ATCC, Rockville, Md, USA) and human melanoma cell line (G-361) were cultured in complete media at 37°C in a humidified atmosphere of 5% CO_2 for 24 hr before transfection. DsiTYR and siScr were transfected into the cell using Lipofectamine™ 2000 Agent (Invitrogen) according to the manufacturer's protocol.

Transfection efficiency assay

The transfection efficiency was performed using BLOCK-iT ™ Alexa Flour Fluorescent (Invitrogen, Carlsbad, CA, USA) compare with untreated cell use as a control and evaluated under an inverted fluorescence microscope and The BD FACSCalibur™ flow cytometer (Becton Dickinson, San Jose, CA).

RNA extraction and cDNA synthesis

Total RNA was extracted using RNeasy Mini kit extraction (Qiagen, Germany) according to the manufacturer's instruction. The quality and quantity of RNA was determined by nanophotometer and Agilent 2100 bioanalyzer (Agilent, Palo Alto, CA, USA). Reverse transcription was performed using The SuperScript® III First-Strand Synthesis System (Invitrogen) for RT-PCR under the condition described in the kit manual.

Quantitative Real-time reverse transcription (qRT-PCR)

The Gene-specifc primers was synthesized by company to amplify human tyrosinase (TYR) and the housekeeping gene glyceraldehyde 3-phosphate dehydrogenase (GAPDH). Real-time quantitative PCR reaction was performed on the Stratagene Mx3005P real-time thermal cyclers using KAPA SYBR FAST qPCR Kits. The PCR reaction and cycling condition were performed base on the kit instruction. The relative mRNA expression was analysed according to the $2^{-\triangle\triangle C}$T method.

Statistical analysis

The data was presented as the mean ± standard deviation. Statistic significant among triplicate and between groups were determined using one way ANOVA and independent t-test. *P*-value ($p < 0.05$) was considered as significant difference.

RESULTS

The DsiRNA with the nucleotide sequences against to a coding region of a human tyrosinase gene transcript (NCBI GenBank accession number, NM_000372.4) was used in this study as show in the Fig. 1A. The blast search shown that the dsiTYR specified to human tyrosinase. The characterization of DsiRNA by gel electrophoresis shown the constructs of new DsiTYR were successfully developed and synthesis by *in vitro* transcription using T7 Promotor/ RNA polymerase method (Fig.1B).

The normal human primary epidermal melanocytes (HEMa) cell and human melanoma cell line or (G-361) transfected with *in vitro* transcription synthesis DsiTYR-d1 and DsiTYR-d2 compare with siScr. The result indicated lower level of TYR mRNA expression than siScr with 33 nM for 24 hr of transfection both HEMa cell and G-361 cell (Fig. 2A and 2B). The expression levels of TYR were normalized based on the GAPDH levels. Data are presented as relative expression to siScr.

The Cellular distribution and transfection efficiency of DsiRNA in HEMA and G-361 cell were performed using 33 nM concentrations of BLOCK-iT Fluorescent Oligo and 0.25 µl of Lipofectamine 2000. At 24 hr after transfection, the cells were observed under an inverted fluorescence microscope and quantified by flow cytometry. The cells were assayed in three independent experiments. The result show both HEMA and G-361 cell present transfection efficiency more than 50% and 70%, respectively. (Fig. 3A and 3B).

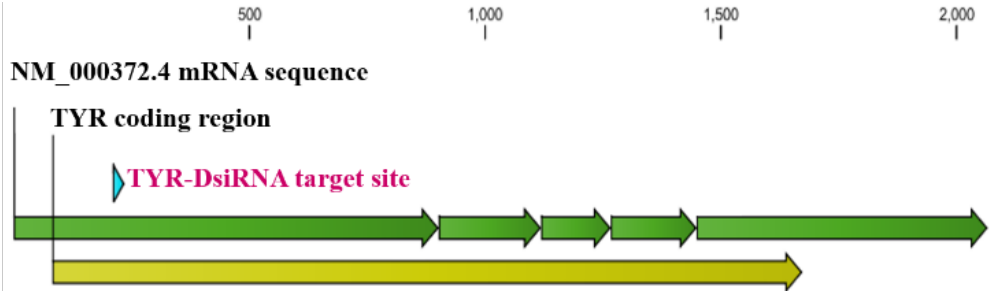


Figure 1A The DsiRNA with the nucleotide sequences against to a coding region of a human tyrosinase gene transcript (NCBI GenBank accession number, NM_000372.4)

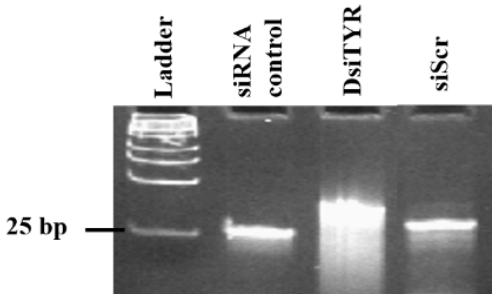


Figure 1B The characterization of unmodified DsiRNA *In vitro* transcription siRNA synthesis by gel electrophoresis.

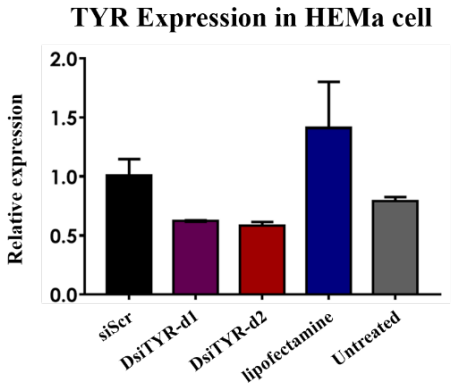


Figure 2A Effect of DsiTYR on the expression of TYR at the mRNA levels in HEMa cell with 33 nM for 24 hr

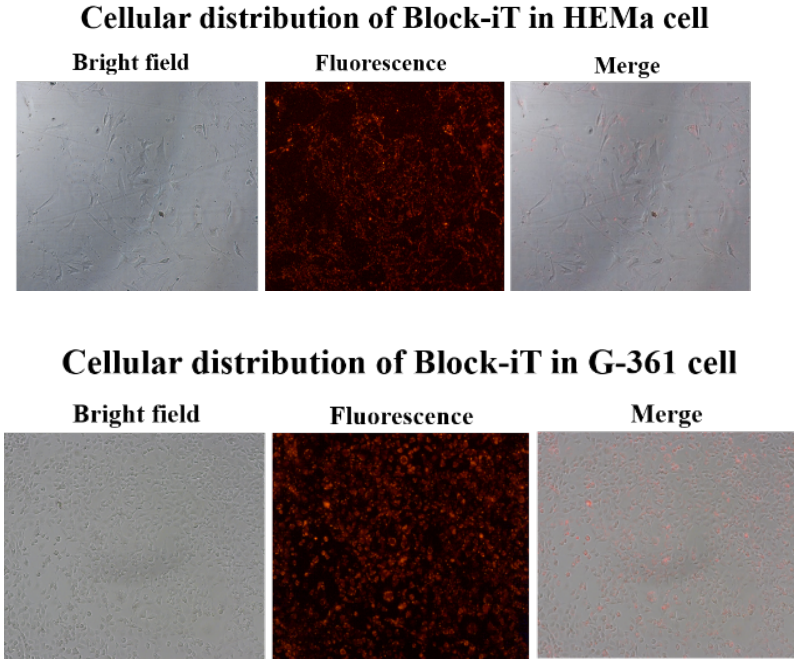


Fig.3A Cellular distribution of DsiRNA in HEMA cell and G-361 cell using inverted fluorescence microscope.

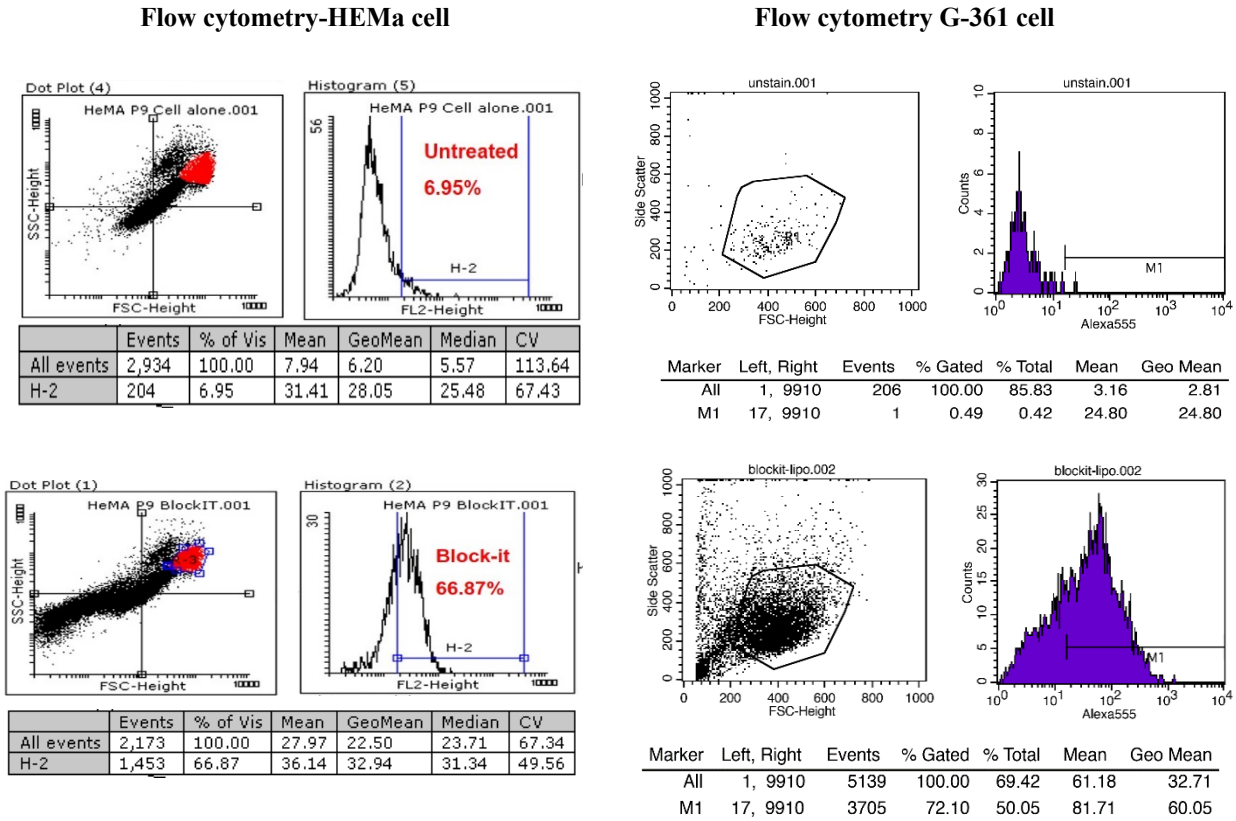


Fig.3B Transfection efficiency of DsiRNA in HEMA cell and G-361 cell using flow cytometry.

DISCUSSION

This study demonstrates the success *in vitro* transcription synthesis DsiTYR against to human TYR as shown in Fig 1. This DsiTYR can downregulate TYR mRNA expression in the normal human primary epidermal melanocytes (HEMa) and human melanoma cell (G-361) as shown in Fig.2. The transfection system of DsiRNA were successfully performed with transfection efficiency more than 60% occurred both HEMa and G-361 cell when the siRNA concentration was 33 nM at 24 hr post transfection as shown in Fig.3.

The previous study reported that the decrease in level of tyrosinase mRNA using traditional medicinal plants act as antimelanogenic agents resulting to reduction of tyrosinase activity and melanin content in G-361 melanoma cell (12, 13). Thus, the DsiTYR in this study may provide a strategy for the controlling abnormal melanin synthesis in hyperpigmentation disorder. So, the reduction of tyrosinase activity enzyme or melanin content should be perform to evaluate effect of DsiTYR in this study to melanogenesis in the future.

According to our study, the DsiRNA was designed bases on conserved sequence of TYR mRNA both human and mouse (only one nucleotide mismatch sequence). Therefore, the construct of DsiTYR in this study may apply for *in vivo* study for the validation of downregulation of mRNA expression.

ACKNOWLEDGMENTS

This study is supported by the NANOTEC-Mahidol University Research Network of NANOTEC (RNN) under Siriraj Center of Research Excellence in Theranostic Nanomedicine and Siriraj Graduate Scholarship.

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ORAL HEALTH STATUS OF PRIMARY SCHOOL STUDENTS UNDER PRIMARY CARE UNIT NETWORK OF PRANANGKLAO HOSPITAL, NONTHABURI PROVINCE

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ABSTRACT

Introduction: There are 8 primary care units (PCU) networks in Nonthaburi province. Dental caries status of primary school students in Pranangklao Hospital primary care unit (PNH-PCU) network was higher than Nonthaburi the whole province. Environment both at home and school may affect to oral health status among primary school children. Information obtain may help on designing the control measured to improve their oral health status.
Objectives: To assess oral health status and identify the relationship between intrapersonal and institutional factors and oral health status of grade 1-3 students.
Methodology: Oral examination and face-to-face interview was performed among 304 children studying in Grade 1-3 from 13 randomly selected schools. Self-administered was obtained from 12 teachers who responsible on oral health school program of the sampled school from January – March 2019.
Results: Intrapersonal factor: Of 304 students, their age was 6-9 years-old and studying in Grade 1, 2 and 3 almost the same proportion. Girls were slightly more than boys, 11.2% reported having chronic diseases (asthma 6.6% and allergic diseases 3.3%), and 63.5% was at optimal growth. Some of them (2.0%) informed not spending money to buy food risky to caries, 80.6% brushing teeth 2-3 times/day, 36.5% was at moderate level of eating at risk to dental caries behavior. From observation on brushing teeth at school, 16.8% brushed properly.

Institutional factors: Of 12 schools, there were 8 government schools and 4 private schools. 7 schools had activity on brushing teeth after lunch in all classes. 9 schools promote brushing teeth before bed and half of the schools had sweet enough campaign.

Oral health status: It was found that those having permanent and primary teeth without caries, missing or disappeared from being extraction and has been filling, 18.4% had caries free. The intrapersonal and institutional factors were not significantly related to caries free (p-values>.05). However, it should be noted that older students had less caries free. Girl had more caries free than boy (19.3% and 17.4% respectively). Not spending money on buying food risky to dental caries was more likely to caries free. Brushing teeth 2-3 times/day were 1.71 times caries free than not brushing. Students at very low risk of food consumption behavior were more likely to have caries free than those at high risk. Students in government school were less likely to caries free than private schools (16.7% and 18.1%). Caries free of students in schools with brushing activities after lunch in all classes was slightly more than those from school with some classes having such activities (17.6% and 16.5%).
Conclusion: Even though intrapersonal and institutional factors are not significantly related with caries free status, the findings still showed the need of educating students about oral health, especially regular brushing before bedtime and after breakfast and lunch, as well as after eating foods susceptible to negatively affect dental health. Proper brushing with good quality toothbrushes and fluoride toothpaste is strongly recommended. Strengthening school health initiatives in Thailand, such as Sweet Enough Program (SEP), to follow and implement public nutrition policies should be encouraged.
Keywords: Caries free, Intrapersonal factors, Institutional factors

INTRODUCTION

Dental caries was found to be a major oral health problem in 2010 affecting 2.43 billion people, or 35.3% of the world population [1]. In Thailand, dental caries increased during the past two decades. The eight National Oral Health Survey in 2018 found that 75.6% of 5-year children were affected by dental caries of primary teeth [2].

From the report of The Oral Health Survey among 6 years-old children conducted by Nonthaburi Provincial Public Health Office [3-4], dental caries in primary teeth among these target children in Pranangklao Hospital primary care unit (PNH-PCU) network was increased from 61.6% in 2017 to 68.3% in 2018. It was higher than Nonthaburi province which was 63.3% in 2018. Although oral health of children has been improving, tooth caries still remain a public health problem. It is preventable [5], but it is still commonly found among primary school students [6-8].

Dental caries cause teeth pain, discomfort, eating impairment, and loss of teeth affect children's nutritional status and delay and their language development. Dental caries also affect children's concentration in school and present a financial burden on the families [9-11]. This dental problem shows intrapersonal characteristics such as age [12,13], school grade [12], gender [14-18], nutritional status [19-21], eating habits [22], oral hygiene [23] and institutional factors like type of school and oral health activities practiced at school [24-25].

Dental caries have high morbidity potential, and have received particular attention from dental health professionals [10]. Therefore, the researcher aimed to assess oral health status and its related factors which will be useful for designing an intervention to prevent dental caries and early loss of teeth. As a result, their quality of life will be improved.

METHODOLOGY

Study design

This cross-sectional study aimed to evaluate oral health status and identify intrapersonal and institutional factors in relation to oral health status of grade 1-3 students in PNH-PCU network. Data was collected from January-March 2019, after being approved by The Human Resource Research Ethics Committee of Thammasat University No.3 Faculty of Science (Certificate No. 280/2018)

This research study applied the conceptual framework of the Ecological model by applying intrapersonal and institutional factors. Pursuing both factors is likely to lead to good oral health.

Study population

Total of 10,488 Grade 1-3 students from 54 primary schools in PNH-PCU network who were studying in semester 2 of the academic year 2018[26] and school health teachers.

Sample size

Using dental caries status of 6-year-old children in 2018 of PNH-PCU network (68.3%) [3,4], at 95% confidence, the maximum allowable error 6.5% and Design effect (deff) 1.50 by using the following formula[27]:

$$n = \frac{NZ^2_{\alpha/2}\, P\,(1-P)}{d^2\,(N-1) + Z^2_{\alpha/2}\, P\,(1-P)} * \text{deff}$$

Symbol

N = total of number of Grade 1-3 students in PNH-PCU = 10,488
α = significant level, set at 5%
Zα/2 = standard normal value at α/2 = 1.96
P = caries status of 6-year old children in 2018 of PNH-PCU = 0.68
d = the maximum allowable error = 0.065
deff = design effect = 1.50

Total estimated sample size was 293 students. The 2-stage PPS cluster sampling was adopt to recruit 13 schools and 8 students per grade were randomly included into the study. School health teacher of the 13 sampled schools was included into the study. Therefore, total of 312 grade 1-3 students was planned to include into this study. However, only 304 samples were able to use in the further analysis.

Research instruments

The instrument for intrapersonal factors comprised of 4 parts.

Part 1 General characteristics of student: it consisted of weight, height, school, gender, date of birth, religion, chronic disease, grade of studying and the amount of money spent for snacks/drinks. Total of 9 questions were included in this part.

Part 2 Oral health behaviors: it consisted of 3 yes/no items for tooth-brushing behavior

and 3 yes/no items food eating behavior. Total of 6 Yes/No questions were included in this part.

Tooth-brushing behavior referred to brushing behavior of the day before data collection. It was divided into 3 levels: did not brush the teeth at all, brushed once in a day and brushed 3-2times a day.

Either score "1 or 0" was assigned to the response "yes or no" of item measuring food eating risky to caries status. The score was summed up to evaluate food consumption a behavior risky to dental caries was divided into 4 levels: very low risk, low risk, moderate risk and high risk as follows:

0 point means A student with dietary habits that are at risk of dental caries in a very low-risk level.

1 point means a student with dietary habits that are at risk of dental caries in low-risk levels.

2 points mean a student with dietary habits that are at risk of dental caries at a moderate risk level.

3 points mean a student with dietary habits that are at risk of dental caries in high-risk levels.

Part 3 Oral health evaluation: An evaluation form according to the World Health Organization (WHO) was adopted and WHO periodontal probe and plane mouth mirror were also used. Codes used were according to WHO Guideline [28].

Caries free referred to student without caries teeth, missing or disappeared from being extraction and has been filling in both primary and permanent teeth.

Since the studied students have both primary and permanent teeth, for each student who has permanent teeth: decayed (D), missing (M) and filled (F) tooth, DMF total)DMFT) was assessed and for primary teeth: decayed (d), missing (m) and filled (f) teeth, dmf total)dmft) was also counted.

Part 4 Observation on tooth-brushing: Those students having toothbrush at school was observed on brushing teeth after lunch at school. The checklist consisted of 2 - yes/no items on quality of toothbrush and brushing methods. Among those students having no toothbrush at school, the dental model was used for students to demonstrate on how to brush their teeth.

The instrument for institutional factors comprised of 2 parts.

Part 1 General characteristics of school: it consisted of school name and type of school. Total of 2 open-ended questions were included into this part.

Part 2 Oral health activities in school: it consisted of brushing teeth activity after lunch, promotion of brushing activities before bedtime at home and activity to reduce food consumption that risky to caries. Total of 3 questions were included into this part.

Quality of instrument

The content validity was validated by three experts in oral health. The Index of Item Objective Congruence (IOC) for student and for school health teacher.

Inter-examiner calibration was made between the researcher and one dentist of Bangkok Heath Center, the kappa was 0.96. Since the researcher was the only one who examined oral health of student, calibration was performed for validation of intra-observer variation 3 times, twice before collecting data and at 1- month apart, the kappa was 0.99.

The data of student's oral health status were collected by the researcher by using face to face interviews and observation of tooth brushing after lunch at school.

Statistical Analysis

Descriptive statistics were used for the analysis of oral health conditions, intrapersonal factors and institutional factors, including number, percent, minimum, maximum, mean, and standard deviation (SD). Binary logistic regression was applied to identify the relationship between intrapersonal factors and institutional factors and caries free at the significance level set at 5%.

RESULTS

Oral Health Status

It was found that 18.4% had full mouth caries-free. Caries-free in primary and permanent teeth were 21.4% and 73.4% respectively. Caries without treatment in primary teeth was higher than on permanent teeth, 71.7% and 22.4% respectively. An average dmft per student in primary teeth was 3.6 (SD=3.1). For permanent teeth DMFT per person was 0.5 (SD=1.0), as the detailed shown in Table 1.

Table: 1 Oral health status of 304 students

oral health status	Number	%
Full mouth		
Caries-free	56	18.4
Dental caries with no treatment	229	75.3
Primary teeth		
Caries-free	65	21.4
Dental caries with no treatment	218	71.7
dmft (Mean±SD teeth/student)	3.6±3.1	
Permanent teeth		
Caries-free	223	73.4
Dental caries with no treatment	68	22.4
DMFT (Mean±SD teeth/student)	0.5±1.0	

Intrapersonal factors

Among 304 students, their age varied between 6-9 years-old, studying in Grade 1, 2 and 3 almost the same proportion. Girls were slightly more than boys, 11.2% informed having chronic diseases, and they were asthma (6.6%) and allergy (3.3%). In regards to nutritional status, 63.5% was at optimal growth, 68.8% ideal weight for age. The amount of money spent daily on food risky to dental caries was 20.11 Baht (SD=13.12 Baht). Only 2.0% informed not spending and some of them spent up to 80 baht/day. Majority of them (80.6%) reported brushing teeth 2-3 times/day, 36.5% was at moderate level of eating food risky to dental caries. From observation on brushing teeth after school lunch among 46.1% having toothbrush at school and 53.9% did not have an individual toothbrush at school. For students was having a toothbrush, only 16.8% brushed properly. However, among those having toothbrush at school, 80.0% the toothbrush was at good quality; soft and no fungus, as the detailed shown in Table 2.

Institutional factors

Table 2 was also depicted institutional factors. School health teachers from 12 sampled primary schools (8 government and 4 private schools) were inquired regarding oral health program activities in school within the last one year. 7 schools had activity on brushing teeth after lunch in all classes and 5 schools had such activity only in some classes. 8 out of 12 schools organized activities to promote brushing teeth before bedtime at home and 9 schools promote brushing teeth before bed and half of the schools had sweet enough campaign.

Factors related to caries-free

1. Intrapersonal factors and caries-free

Considering the relationship between intrapersonal factors and caries-free, we found that older students had less caries-free. Caries-free in 6 years old was higher than those aged 7 years (22.5% and 17.0% respectively, COR=1.13 and 95% CI: 0.63-2.04). Caries-free was rather similar according to their current level of studying. Girl had more caries free than boy (COR=1.42 and 95% CI: 0.57-3.54). Student without chronic disease was likely to have caries-free than those with chronic disease (18.1% and 20.6% respectively, COR=1.17 and 95% CI: 0.48-2.84). Optimal growth students were likely to caries-free than that non-optimal growth (6.6% and 21.6% respectively).

The more the daily expense students purchased on food risky to dental caries was the more likely to caries-free. It should be noted that the better the level of food eating behaviors risky to dental caries increased caries-free.

Frequency of daily brushing teeth affected to caries-free status, those brushed 2-3 times a day were likely to caries-free than the lesser frequency. Caries-free among students

who brushed their teeth 2-3 times a day was 1.71 times of students who do not brush their teeth (95% CI COR: 0.20-14.19) Having toothbrush and its quality at school was also observed, it was surprised that students had no toothbrush used at school had more caries-free than students with toothbrush (21.3% and 15.0% respectively). Those having good quality of toothbrush at school had more caries-free than those with poor quality of toothbrush (17.0% and 7.1% respectively, COR=2.66, 95%CI: 0.58-2.12). Brushing teeth properly was likely to caries-free more than those improper brushing (21.6% and 17.8% respectively) as the detailed shown in Table 2.

2. Institutional factors and caries-free

Considering the relationship between institutional factors and caries-free, students in government school were less likely to caries-free than those in private schools (16.7% and 18.1%, respectively). Students in schools having brushing activities after lunch in all classes were slightly more caries-free than those from school with some classes having such activities (17.6% and 16.5%). Similar caries-free was observed from both groups of students from schools with and without promotion of brushing activities before bedtime at home (17.0 % and 17.0 %, respectively). Schools not having activity to reduce food consumption that risky to caries, their students had caries-free more than those schools that having such activity (20.7% and 13.6% respectively), as the detailed shown in Table 2.

Table 2 Intrapersonal factors and institutional factors and their related to students caries-free

	Total Sample		Caries-Free		p-value	COR	95% CI COR	
	Number	Percent	Number	Percent			LL	UL
Total	**304**	**100.0**	**56**	**18.4**				
Intrapersonal factors								
Age					.903			
6 years	40	13.2	9	22.5		1.42	0.57	3.54
7 years	94	30.9	16	17.0		ref		
8 years	87	28.6	16	18.4		1.10	0.51	2.36
9 years	83	27.3	15	18.1		1.08	0.50	2.34
Mean ±SD = 8.19 ± 0.98 years								
Grade					.937			
Grade 1	100	32.9	19	19.0		1.12	0.55	2.29
Grade 2	100	32.9	19	19.0		1.12	0.55	2.29
Grade 3	104	34.2	18	17.3		ref		
Gender					.673			
Boy	138	45.4	24	17.4		ref		
Girl	166	54.6	32	19.3		1.13	0.63	2.04
Chronic Disease					.730			
No	270	88.8	49	18.1		ref		
Yes	34	11.2	7	20.6		1.17	0.48	2.84
Optimal growth					.276			
No	111	36.5	24	21.6		1.39	0.77	2.50
Yes	193	63.5	32	16.6		ref		
Weight for age					.493			
low weight	17	5.6	4	23.5		1.64	0.50	5.34
underweight	25	8.2	6	24.0		1.68	0.63	4.53
ideal weight	209	68.8	33	15.8		ref		
overweight	21	6.9	6	28.6		2.13	0.77	5.90
Obese	32	10.5	7	21.9		1.49	0.60	3.74
Daily expense for food risky of caries					.991			
0 Baht	6	2.0	1	16.7		ref		

	Total Sample		Caries-Free		p-value	COR	95% CI COR	
	Number	Percent	Number	Percent			LL	UL
1-20 Baht	218	71.7	40	18.3		1.12	0.13	9.88
21+ Baht	80	26.3	15	18.8		1.15	0.13	10.62
Mean ±SD = 20.11 ± 13.12 Baht Min – Max = 0 – 80 Baht								
Level of food consumption that risky to caries					.933			
Very low risk	35	11.5	7	20.0		1.31	0.47	3.62
Low risk	77	25.3	15	19.5		1.27	0.56	2.87
Moderate risk	111	36.5	21	18.9		1.22	0.57	2.61
High risk	81	26.6	13	16.0		ref		
Daily Brushing teeth (before survey day)					.565			
None	8	2.6	1	12.5		ref		
Once	51	16.8	7	13.7		1.11	0.12	10.48
2-3 time	245	80.6	48	19.6		1.71	0.20	14.19
Having toothbrush at school					.157			
No	164	53.9	35	21.3		1.54	0.85	2.79
Yes	140	46.1	21	15.0		ref		
Quality of toothbrush at school					.208			
Not Good	28	20.0	2	7.1		ref		
Good	112	80.0	19	17.0		2.66	0.58	12.15
Proper brushing teeth					.526			
No	253	83.2	45	17.8		ref		
Yes	51	16.8	11	21.6		1.27	0.61	2.67
Institutional factors								
Type of School					.776			
Government	186	66.4	31	16.7		ref		
Private	94	33.6	17	18.1		1.10	0.58	2.12
After Lunch brushing teeth activity					.818			
Some grade	115	41.1	19	16.5		ref		
All grades	165	58.9	29	17.6		1.08	0.57	2.03
Promotion of brushing activities before bedtime at home					1.000			
No	70	25.0	12	17.0		1.00	0.49	2.05
Yes	210	75.0	36	17.0		ref		
Activity to reduce food consumption that risky to caries					.115			
No	140	50.0	29	20.7		1.66	0.88	3.13
Yes	140	50.0	19	13.6		ref		

DISCUSSION

Oral health status

Since the studied population has primary and permanent teeth, full mouth caries-free was 18.4%. Caries-free in primary teeth and permanent teeth were 21.4% and 73.4% respectively. Dental caries prevalence in Grade 1-3 students of PNH-PCU network of primary teeth was 63.8% and of permanent teeth was 22.4%. Caries-free in primary teeth is lower than the report of Nonthaburi Provincial Health Office in 2018 [3,4], 36.7% (in 6-year), central region 25.8% (in 5-year) and 24.4% (in 5-year) of Thailand [2] Caries-free in permanent teeth is lower than the report of Nonthaburi Provincial Health Office in 2018 [3,4], 94.7% (in 6-year), but higher than central region 50.8% (in 12-year) and Thailand 48.0% (12-year) of Thailand [2].

An average dmft in primary teeth was 3.6 (SD=3.1) and DMFT in permanent teeth was 0.5 (SD=1.0) per person. dmft in primary teeth is higher than the report of Nonthaburi Provincial Health Office in 2018 [3,4], 3.4 per person among 6-year old, but lower than central region 5.2 per person in 5-year old and 4.5 per person in 5-year of Thailand [2].

DMFT in permanent teeth is higher than the report of Nonthaburi Provincial Health Office in 2018 [3,4], 0.1 in 6-year old, but lower than central region 1.3 per person in 12-year old and 1.4 per person in 12-year old of Thailand[2].

The difference can be explained by the fact that our study focused on children ages of 6-9 years unlike the provincial and countrywide study, which focused on children aged 5 to 12 years old.

Intrapersonal factors

Caries-free decreased as and increasing of both age and grade of studying. In other word we can say that caries prevalence increased as student getting older. For Risk of dental caries in new permanent teeth due to the teeth have deep pit and fissures [12]. It is an explanation of the reduction of caries free in primary teeth in permanent teeth when student getting older. If there exists one tooth decayed, it does not matter it is a primary or permanent tooth, chance of having other tooth decayed is higher within 6-12 months [13].

It was found from this study that caries free in girls was slightly more than boys. The result of this study is consistent other studies [14-16]. This finding is inconsistent with other studies which reported that girls have less caries free than boys. Due to the development of the teeth which girls grow faster than boys [17,18].

Nutritional status and caries free, caries free among students at optimal growth was lower than those at non-optimal growth and at an ideal weight for age was lower than those at below and overweight and obese. This finding is consistent with the study of Kokal E, Tekcicek M [19] and Sunate J [20], the low and high body weight effect significantly on caries status. Daily expense on food risky to dental caries was not significantly related to caries free, caries free was slightly increased as an increasing of the daily expense. This finding is contradicted to the study of Phuangrach N. reported that the more the expense was the higher the risk of dental caries or less caries in other word [21].

Dental caries is caused by the action of acids on the enamel surface. The acid produced from sugars in foods or drinks react with bacteria present in the plaque on the tooth surface leads to a loss of calcium and phosphate from the enamel [22]. The result of this study shown that a better oral health care, intake less sweet foods, brushing teeth after lunch at school and brushing teeth before bedtime every day is the less likely dental caries and increase the caries free. Only 46.1% of students having toothbrush at school, 80.0% of the toothbrush at school was at good quality and only 16.8% brushing teeth properly may affect to the low prevalence of caries free in this particular group of student. Proper brushing takes at least two minutes, use short, gentle strokes, paying extra attention to the gum line, hard-to-reach back teeth and areas around fillings, crowns or other restoration. Concentrate on thoroughly cleaning each section as follows: 1) Clean the outer surfaces of upper teeth, then lower teeth 2) Clean the inner surfaces of upper teeth, then lower teeth, 3) Clean the chewing surfaces, and 4) Be sure to brush your tongue to remove odor-causing bacteria. Toothbrush is suggested to change when it begins to show wear, or every three months, whichever comes first. It is also very important to change toothbrushes after having a cold, since the bristles can collect germs that can lead to reinfection. Brushing teeth properly with a good quality of toothbrush will help on tooth decay [23].

Institutional factors

Students in private schools were less likely caries free than those in government schools (18.1% and 16.7% respectively), may be due to parental characteristics. In general, parents of student in private school have higher socio-economic status than the government schools. They may put more attention to oral health of their kids more. A student to teacher ratio in governmental school is higher than in private school. It may affect to monitor on quality of brushing teeth after lunch at school. Brushing teeth properly will stay away from tooth decay [24-25]. All studied 12 schools have had brushing teeth after school lunch program, but some schools having this activity only in some class. Those schools with brushing teeth after lunch in all classes, their students were more likely caries free. Not only brushing teeth, but fluoride toothpaste is also important to prevent tooth decay. This study did not observe quality of brushing teeth, that is plaque, and tooth paste at school. Oral health promotion as a part of school health program especially in primary school, brushing

teeth after lunch with fluoride toothpaste is required. Brushing teeth together in a group of students and let them check their friend on cleanliness of teeth is suggested. Details of information from school regarding the brushing teeth activity were not collected in this study.

Promotion on brushing teeth before bedtime was reported in all schools but and sweet enough program was reported in some studied schools and both were not significantly related to caries free of their students. It can be explained that students may pay less attention to what was going on at school. School may set up environment that students cannot easily access to food that risky to caries, but outside school and in the community that they live and at home those risky foods are available. It is rather difficult to control the environment which can make students less accessible to such kind of foods. Therefore increasing awareness and perception on brushing teeth after eating any kind of food and not eating any food within 30 minutes after brushing teeth is strongly suggested. It will be very good no to eat anything within 2 hours after the brushing. Not only school play an important role on caries prevention, but parents also especially brushing teeth before bedtime and in the morning. Quality of toothbrush at home, fluoride toothpaste and proper brushing teeth at home have to be emphasized.

CONCLUSIONS

Even though interpersonal factors and institutional factors do not relate to caries free, but it is possible to observe the trend and situation of dental caries and Behavior in oral health care In addition, at the institutional factor, the results of oral health promotion in schools that have not yet been able to reduce the incidence of dental caries in students which we found that older students will have less caries free but brushing teeth after lunch, proper brushing teeth and good quality of toothbrush as well as promoting environmental both at school at community that student can less accessible to foods that are risky to dental caries. Sweet enough programs are strongly suggested to implement especially in school continuously, since it is not effected to not only oral health status but also nutritional status of students. The main limitation of this study was its cross-sectional study design, limiting the ability to identify causal relationships.

Future research should use qualitative research techniques, such as a case study, to find answers to factors causing oral health care behavior. Results of this research can be used in oral health programs intervention to prevent dental caries of primary school students.

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PREVALENCE OF CAESAREAN SECTION AND THE IMPLEMENTATION OF THE NATIONAL HEALTH INSURANCE PROGRAM IN INDONESIA

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ABSTRACT

Introduction: Caesarean section, when examined for medically indicated reasons, plays an important role to save the life of women and newborns. Globally, including in Indonesia, the caesarean section rate has continuously increased. However, the maternal mortality rate in Indonesia is still very high and the financial factor is still a barrier to the obstetric service. Since Indonesia has established the national health insurance program in 2014 as protection in fulfilling basic health needs, not only the ease to access health services but also the disparity of the use of caesarean section still happens within the country. This study is important to provide evidence for the improvement of national health insurance.
Objectives: This study aimed to examine the prevalence of caesarean section and association between the membership of the national health insurance program and C-section as well as to explore other factors associated with C-section in Indonesia.
Methodology: This was a cross-sectional study using secondary data of Indonesia Demographic and Health Survey 2017 which was conducted in 34 provinces. Women aged 15 to 49 years who gave birth to the last child in the year 2017 and delivered in the health facilities were chosen as the eligible sample, resulting in 1,639 respondents. Binary logistic regression was employed for multivariate analysis.
Results: Prevalence of C-section in institutional delivery in Indonesia in 2017 was 24.9 percent. Women who were members of the national health insurance under category non-recipients of aid for healthcare benefit premium (JKN-non PBI) (OR=1.40), attained higher education (OR=1.85), aged 35-49 years at birth time (OR=2.61), socio-economic quintiles (Q4 and Q5) (OR=1.74 and 2.27, respectively), and experienced complications during pregnancy (OR=1.51) were more likely to undergo caesarean section than other groups. On the other hand, mothers who delivered second or more than third children, delivered in the private hospitals, experienced complications and anxiety during delivery were less likely to get caesarean section.
Conclusion: The prevalence of C-section in the institutional delivery in Indonesia in 2017 was higher than optimal rate suggested by WHO. The extension of the national health insurance coverage was found to improve access to caesarean section, though that was only significant for the JKN-non PBI ones but not yet for the JKN-PBI. Expanding the membership coverage, ensuring all participants receiving equitable access to quality care, and focusing on supply side for future studies should be recommended.
Keywords: Prevalence, Caesarean Section, Indonesia National Health Insurance, IDHS 2017

INTRODUCTION

Caesarean section, when examined for medically indicated reasons, plays an important role to save the life of women and newborns [1]. Caesarean section rate has continuously increased worldwide and has exceeded the optimal number of 10 – 15 percent of births stated by the WHO [2]. Globally, in 2015, the caesarean section rate was 21.1 percent which increased 9 percent from rates in 2000 [2]. The rate varied between countries with the highest rate of caesarean use was in Latin America and Caribbean i.e 44.3 percent and the lowest rate happened in West and Central Africa, i.e. 4.1 percent [2]. Among countries in Southeast Asia which conducted the demographic and health survey (DHS), Indonesia has the highest rate of caesarean section, i.e. 12.8 percent in 2012 [3]. However, in the recent Indonesia DHS in 2017 showed that the caesarean section rate was 17 percent [4].

Availability of caesarean section services is needed to reduce maternal mortality in Indonesia [5]. In the Millenium Development Goals era, Indonesia failed to achieve the target of decreasing maternal mortality by 102 in 2015. Maternal mortality rate per 100,000 live births in Indonesia at the end of the MDGs era was still very high, i.e. 305 per 100,000 live births. The high maternal mortality describes nonoptimal healthcare services in Indonesia. The use of caesarean section as delivery a method is an indicator of the progress in obstetric emergency care programs. However, a financial factor is still a barrier for poor people to improve access to obstetric emergency care [6].

On the other hand, the increasing number of the unnecessary caesarean section also contributes to the maternal and newborns health outcomes. The study proved that the unnecessary caesarean section surgery causes maternal health outcomes such as maternal mortality, treated in the intensive care unit, blood transfusion, and the removal of the mother's uterus [7]. This kind of surgery also shows the association with increased respiratory morbidity, such as transient tachypnea of the newborn (TTN), and fetal lacerations among newborn delivered by elective caesarean section, especially those who were born in 37 weeks or earlier, compared to vaginal birth delivery [8].

Government of Indonesia in 2014 launched the national health insurance program which now is considered as the biggest single-payer system in the world [9]. This health insurance scheme is a form of healthcare protection so that participants receive benefits in healthcare and as a protection of basic health needs. Maternal health service is one of the benefits of JKN program and increasingly utilized by women, including delivery services [9].

Recently, the sustainability of this program becomes a big issue since the deficit of this program happened continuously [9]. The high use of caesarean section among JKN members is indicated contributing to that deficit. However, the practice of caesarean section is also an important action to reduce the high rates of maternal mortality. This study aimed to examine the prevalence and association between the membership of the national health insurance program and caesarean section as well as to explore other factors associated with caesarean section in Indonesia. By exploring the association between the membership of the national health insurance and other independent variables and caesarean section, the evidence will be used for the improvement of policy implementation especially in the context of the implementation of national health insurance program in Indonesia.

Following the Andersen's Behavioral Model of Health Service Use, three factors grouped to examine factors associated with caesarean section in Indonesia. The first factor namely predisposing factor that determines individual's predisposition in utilizing healthcare services while the second factor i.e. enabling factor which includes both personal and interpersonal factors and the last factor, need factor, that looks at how individuals view on their health as well as how they experience signs of sickness, pain, and anxiety about their health [10]. The conceptual framework of this study can be seen in Figure 1 below. The descriptive analysis was employed to see the characteristics of the respondents. The multivariate analysis was tested using the binary logistic regression to examine the association between independent variables and dependent variable.

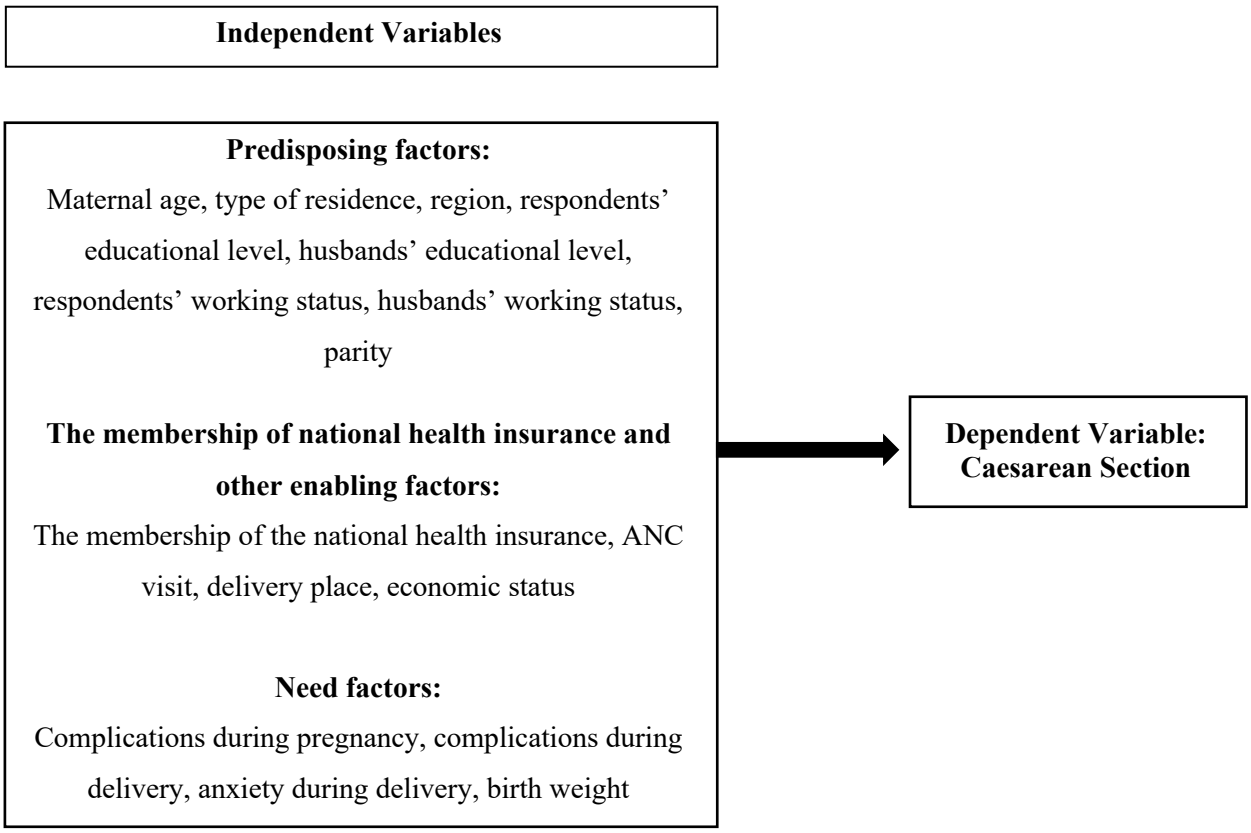


Figure 1. Conceptual Framework

METHODOLOGY

Data source

This was a cross-sectional study using secondary data from the latest Indonesia Demographic and Health Survey (IDHS) 2017. The IDHS 2017 was conducted in all 34 provinces of Indonesia by the National Population and Family Planning Board of Indonesia together with the Ministry of Health of Indonesia and Statistics Indonesia. The approval letter to use this open dataset was obtained after registering through the DHS official website. This study was also reviewed and received the certificate of exemption from the IRB committee of the Institute for Population and Social Research, Mahidol University. The reference code is COE. No. 2019/06/-208.

Study Population and Sample size

This study focused on women aged 15 to 49 years who gave birth in the year 2017 in the health facilities. Missing values were assigned as exclusion criteria in this study. Eligible sample on this study was 1,639 women. Sample selection procedures can be seen in Figure 2 below.

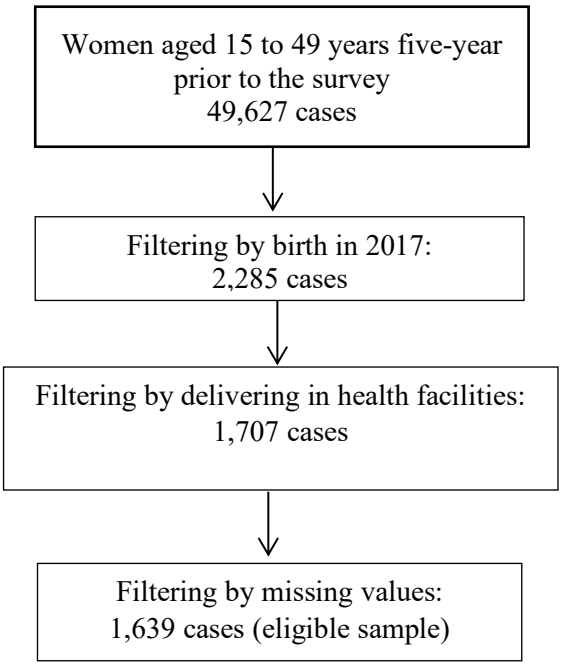


Figure 2. Sample Selection Procedures

RESULTS

Table 1 presents the characteristics of respondents and the proportion of caesarean section among different groups. The prevalence of caesarean section among women at reproductive age in institutional delivery in Indonesia in 2017 was 24.9%. Respondents lived in the urban area was higher than those who lived in the rural area with the percentage of caesarean section in the urban area was also higher compared to those who were living in the rural area, i.e. 27.2% and 22%, respectively. Majority of respondents lived in the Java, Bali and Nusa Tenggara islands while the caesarean section in all regions reached around 20% with Sumatran women were as the highest group, i.e. 29%. More than fifty percent of respondents and their husbands completed a secondary school. Respondents and their husband attained a higher educational level had a higher occurrence of caesarean section rather than other groups. Half of the respondents chose to not work while their partners mostly worked. However, caesarean delivery was higher among women who worked, i.e. 29.2% compared to women who did not work, i.e. 21.3%. Women with their second children were lower in undergoing caesarean section compared to those who were in their first birth or their third pregnancy or over. Most respondents were women aged 20 – 34 years when they gave birth, while the older age when they delivered their children, the more caesarean section done.

The coverage of national health insurance (NHI or *jaminan kesehatan nasional/JKN*) program among women at reproductive age in 2017 was 65.6%, including 34.2% of participants were "*penerima bantuan iuran* (PBI)" or participants that were poor and near-poor who got assistance from the government in paying the premium of the national health insurance program. Prevalence of caesarean section was higher among JKN-non PBI members compared to JKN-PBI and non-JKN, i.e. 34.1%, 22.3%, and 19.1%, respectively. The distribution of the sample by household economic status was similar among respondents. The better economic status, the more women did the caesarean section. Almost all of the mothers visited health professionals at least four times during pregnancy and 25.5% of women visited health facilities during pregnancy at least four times were higher at caesarean section rate compared to those who only visited less than four times, i.e. 17.1%. It was also found that caesarean section was conducted more in the government health

facilities rather than in the private health facilities. Women experienced any complications during pregnancy and the birth weight of their babies greater than 4,000gram were the higher event of caesarean section, whereas those who did not get the experience of prolonged labor during delivery and did not feel anxious during delivery were higher undergone a caesarean section.

Table 1. Characteristics of the mothers and those who had caesarean section in 2017

Characteristics	Number of Respondents	Delivered by Caesarean Section	Delivered by Vaginal Delivery
	N(%)	N(%)	N(%)
Total respondents	1,639(100)	408(24.9)	1,231(75.1)
Predisposing Factors			
Type of residence			
Rural	723(44.1)	159(22.0)	564(78.0)
Urban	916(55.9)	249(27.2)	667(72.8)
Region			
Sumatra	489 (29.8)	142(29.0)	347(71.0)
Jawa, Bali & Nusa Tenggara	705 (43.0)	155(22.0)	550(78.0)
Kalimantan	136 (8.3)	28(20.6)	108(79.4)
Sulawesi	215 (13.1)	59(27.4)	156(72.6)
Maluku & Papua	94 (5.7)	24(25.5)	70(74.5)
Respondent educational level			
Primary and below	303 (18.5)	56(18.5)	247(81.5)
Secondary	968(59.1)	209(21.6)	759(78.4)
Higher	368(22.5)	143(38.9)	225(61.6)
Husband educational level			
Primary and below	334(20.4)	58(17.4)	276(82.6)
Secondary	986(60.2)	246(24.9)	740(75.1)
Higher	319(19.5)	104(32.6)	215(67.4)
Respondent working status			
Not working	897(54.7)	191(21.3)	706(78.7)
Working	742(45.3)	217(29.2)	525(70.8)
Husband working status			
Not working	12(0.7)	3(25.0)	9(75.0)
Working	1,627(99.3)	405(24.9)	1,222(75.1)
Parity			
First	535(32.6)	146(27.3)	389(72.7)
Second	600(36.6)	132(22.0)	468(78.0)
Third or over	504(30.8)	130(25.8)	374(74.2)
Maternal age			
15-19 years	447(27.3)	94(21.0)	353(79.0)
20-34 years	872(53.2)	198(22.7)	674(77.3)
35-49 years	320(19.5)	116(36.3)	204(63.7)
Enabling Factors			
Membership of national health insurance program			
Non-JKN	565(34.5)	108(19.1)	457(80.9)
JKN-PBI	561(34.2)	125 (22.3)	436(77.7)
JKN-Non PBI	513(31.3)	175(34.1)	338(65.9)

Characteristics	Number of Respondents	Delivered by Caesarean Section	Delivered by Vaginal Delivery
	N(%)	N(%)	N(%)
Economic status			
Poorest	281(17.1)	42(14.9)	239(85.1)
Poorer	342(20.9)	73(21.3)	269(78.7)
Middle	338(20.6)	78(23.1)	260(76.9)
Richer	343(20.9)	92(26.8)	251(73.2)
Richest	335(20.4)	123(36.7)	212(63.3)
ANC visit	123(7.5)	21(17.1)	102(82.9)
Less than four	1,516(92.5)	387(25.5)	1,129(74.5)
At least four			
Delivery place			
Government health facilities	802(48.9)	208(25.9)	594(74.1)
Private health facilities	837(51.1)	200(23.9)	637(76.1)
Need Factors			
Complications during pregnancy			
No	1,297(79.1)	298(23.0)	999(77.0)
Yes	342(20.9)	110(32.2)	232(67.8)
Complications during delivery			
No	972(59.3)	285(29.3)	687(70.7)
Yes	667(40.7)	123(18.4)	544(81.6)
Birth weight			
Less than equal 4,000gr	1,590(97.0)	393(24.7)	1,197(75.3)
More than 4,000gr	49(3.0)	15(30.6)	34(69.4)
Anxiety during delivery			
No	697(42.5)	223(32.0)	474(68.0)
Yes	942(57.5)	185(19.6)	757(80.4)

As seen in table 2, binary logistic regression resulted in the significance of nine independent variables with caesarean section. Focusing on predisposing factors, after controlling with other independent variables, caesarean section was more likely to occur among women who reached higher education (OR=1.85) compared to primary or lower, delivered at age 35 – 49 years (OR=2.61) compared to 15 – 24 years old, and less likely happened to women with their third children or over (OR=0.61) compared to their first children. Concentrating to the enabling factors after controlling for other independent factors, probability of getting caesarean section was 1.4 times more likely to occur among women who were JKN-non PBI members ($p<0.05$) compared to non-JKN members whereas chance of undergoing C-section was higher in women from the upper-2 socio-economic quintiles (Q4 and Q5) (OR=1.73 and 2.27, respectively) compared to poorest group.

The study also found that women delivered in the private health facilities were less likely to undergo C-section compared to those who delivered in the government health facilities. Complication during pregnancy (OR=1.51) and delivery (OR=0.66), as well as anxiety during delivery (OR=0.58), were significantly associated with caesarean section.

Table 2 Binary logistic regression model of explanatory variables on caesarean section

Variables	OR	CI 95%	
		Lower	Upper
Predisposing Factors			
Type of residence			
Rural®			
Urban	1.018	0.779	1.331
Respondent educational level			
Primary and below®			
Secondary	1.062	0.725	1.555
Higher	1.848*	1.132	3.017
Husband educational level			
Primary and below®			
Secondary	1.248	0.862	1.807
Higher	1.092	0.667	1.788
Respondent working status			
Not working®			
Working	1.049	0.812	1.355
Maternal age			
15 – 24 years®			
25 – 34 years	1.096	0.781	1.539
35 – 49 years	2.612***	1.670	4.086
Parity			
First®			
Second	0.697*	0.506	0.961
Three or over	0.611*	0.413	0.905
Enabling Factors			
Membership of national health insurance program			
Non-JKN®			
JKN-PBI	1.201	0.881	1.636
JKN-Non PBI	1.400*	1.026	1.910
Economic status			
Poorest®			
Poorer	1.389	0.889	2.170
Middle	1.520	0.963	2.399
Richer	1.739*	1.084	2.788
Richest	2.274**	1.368	3.779
Delivery place			
Government health facilities®			
Private health facilities	0.706**	0.548	0.911
ANC visit			
Less than four®			
At least four	1.332	0.797	2.226
Need Factors			
Complication during pregnancy			
No®			
Yes	1.508**	1.142	1.992
Complication during delivery			
No®			
Yes	0.661**	0.508	0.860
Anxiety			
No®			
Yes	**0.587*** **	**0.457**	**0.754**

*®Reference *significant at p<0.05 ** significant at p<0.01 ***significant at p<0.001*

DISCUSSION

The study found that the prevalence of caesarean section among women at reproductive age in Indonesia in 2017 was 24.9 percent. This situation explains that the number already surpassed the optimal number stated by the World Health Organization (WHO), namely 10 – 15 percent [1]. However, except for the poorest group of women, this study revealed that the C-section rates in all sub-categories of women were above 15%. Based on the national survey, the rate of C-section increased over a decade [4]. The increasing proportion of women giving births in health institutions leads to an increasing proportion of the use of C-section [2]. Since the implementation of the national health insurance program (*jaminan kesehatan nasional* – JKN) in 2014, there was an increasing proportion of women delivering in the health institutions [4, 11].

This study also found that the coverage of JKN program among women in childbearing age was still 65.6 percent while Indonesia set to achieve the universal health coverage in 2019. In the overall picture of coverage in 2017, around 188 million people [12] or 71 percent of the total population of Indonesia were covered by the JKN with the majority of them were subsidised group by the government [9, 12]. Obstacles to enroll this new health insurance scheme have been documented including already covered by the private health insurance and dissatisfaction of the program such as high occurrence of out-of-pocket, difficult to access to services, perceived long waiting times and low quality of care [9], geographical challenge and disparity of health professionals [13]. In the context of maternal health benefits, the JKN covers maternal health services including delivery services, both vaginal and caesarean delivery with medical indications.

The membership of national health insurance categorized as JKN-Non PBI was found positively associated with caesarean section. The insurance program is an important factor for people using health services [10]. Similar studies revealed that social health insurance drives pregnant women to use their card when they underwent the caesarean section [14 – 18]. The effect of the JKN in accessing to C-section services could be seen as financial protection or reduction for pregnant women [19]. However, the high use of caesarean section might be seen as an alarm for the financial sustainability of the JKN program.

In this study, those who were members of JKN-non PBI were more likely to undergo caesarean delivery compared to non-JKN members. This finding confirms the previous study using that showed a rising trend of utilization of outpatient and inpatient services among JKN participants compared to the uninsured people [20]. In general, the JKN program has increased the utilization of outpatient and inpatient services among its members [20] However, for both outpatient and inpatient services, the contributory members (JKN-non PBI) received higher impact on the presence of JKN program compared to the subsidized members (JKN-PBI) [20]. In the specific area, the availability of health facilities or geographical barriers showed the ineffectiveness of premium paid by the government for JKN-PBI members that resulted in the low utilization of health services among them [21]. Since the JKN-PBI members are more likely to live in the area with limited health facilities, the cost of transportation to access the health facilities is another challenge [20].

Other factors from enabling factors group that showed statistically associated with caesarean section were economic status and delivery place. Women from the upper-2 socio-economic quintiles (Q4 and Q5) were more likely to undergo caesarean section compared to the poorest. The positive association in this study was in line with previous studies conducted in Bangladesh and urban Indonesia women [22, 23] The accessibility, affordability, and availability to caesarean delivery is better among rich women [22]. Besides, another reason that may explain this situation including the high awareness of rich women of their sickness and it leads them to consider undergone caesarean section [22]. This study showed the contrast results to the most studies that private health facilities were less likely to give the caesarean section. Since the fact that most respondents in this study were among middle and lower economic status, the likelihood to undergo caesarean section was indicated higher occur in public hospitals compared to C-section in private hospitals. The more inexpensive cost of C-section delivery in public health institutions and the ease to access

them might be the reasons behind less C-section in private hospitals.

Predisposing factors that showed statistically significant with caesarean section were respondents' educational level, maternal age, and parity. Educational level is well-known as the effect of human health-seeking behavior, including the method of the delivery process among pregnant women. Education proved as a significant factor to the experiences of caesarean section among pregnant women. This study found that women with higher educational level were 1.8 times higher to undergo caesarean section than those who were in lower education. Educated women tend to take more attention to their health during pregnancy. The higher education attained, it is expected from mothers to be aware of difficulties during pregnancy and delivery, thus they regularly checking their health. Therefore, the C-section is potentially chosen by women [17]. This result was also supported by the research conducted in Australia and Bangladesh [22, 24]. Higher maternal age (35 years or over) was a predictor of caesarean section in this study. This finding had the same result with previous studies [24, 26] and explained that the higher risk of high blood pressure and gestational glucose intolerance among advancing mother's age at birth lead these group of women to choose caesarean delivery [27]. Another finding showed that women with their second or more pregnancy were less likely to experience caesarean section compared to those who were in their first pregnancy. This result was similarly found in Iran that fear of delivery and physician's advice were among the reasons behind women not prefer undergoing C-section compared to vaginal delivery [28, 29].

In terms of need factors, women experienced complications during pregnancy were 1.5 times more likely to do C-section compared to those who did not experience it. This also confirms others studies that complication during pregnancy had an association with caesarean section. Complications experienced by women during pregnancy including anemia, fetus problems, symptoms, and signs of preeclampsia like high blood pressure and the presence of protein in the urine [30, 31]. Meanwhile, women got complication during delivery, which in this study defined as those who experienced prolonged labor one day and one night during delivery, were less likely to undergo a caesarean section. This finding contrasted with most reported studies that prolonged labor is the common reason for doing caesarean delivery. However, vaginal delivery might lead to this condition more than a caesarean section. Another study found that prolonged second stage was correlated with the highly vaginal delivery rates [32]. Interestingly, this study revealed that women with anxiety were less likely to get caesarean delivery. The qualitative research in Iran, especially for those who did previous caesarean section, explained that they experienced future complications after C-section such as pain in the incision site, itching of the incision site, and amnesia [33]. Mothers with previous caesarean section experiences mostly will undergo C-section delivery in their next pregnancy [33].

RECOMMENDATIONS

The prevalence of caesarean section in the institutional delivery in Indonesia in 2017 was high and has exceeded the optimal international standard rates. The extension of the national health insurance coverage was found to improve access to caesarean section, though that was only significant for the JKN-non PBI ones but not yet for the JKN-PBI. This study also concluded that women aged 35 or over, attained higher education, women from upper Q4 and Q5 economic status, experienced complication during pregnancy chose caesarean section as their mode of delivery. However, women delivered in private health facilities, experienced complication, and anxiety during delivery were less likely to undergo C-section. Strengthening on the dissemination of comprehensive information about the benefit packages of national health insurance especially about maternal health benefit, expanding the membership coverage to achieve universal health coverage (UHC), and ensuring all participants receiving equitable access to quality care should be recommended. Besides, raising public awareness of normalizing the vaginal delivery should be another recommendation to keep the financial sustainability of the national health insurance program. Since this study employed secondary data, other important factors not available in this study might not be explored. A future study

using data from BPJS Kesehatan and hospitals as well as focusing on supply side are needed to get more understanding on the caesarean section in the implementation of national health insurance era.

ACKNOWLEDGEMENTS

The author would like to thank the Faculty of Graduate Studies (FGS) and Institute for Population and Social Research (IPSR), Mahidol University for providing full scholarship during my study at IPSR. I would like to express my deepest gratitude to all lecturers and staff of IPSR for their guidance and continuous support during my study. Finally, the authors would like to thank the Demographic and Health Survey (DHS) for giving permission to use the dataset for this study.

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FACTORS ASSOCIATED WITH CONSISTENT CONDOM USE AMONG MEN WHO HAVE SEX WITH MEN (MSM) IN INDONESIA

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ABSTRACT

Introduction: The men who have sex with men (MSM) in Indonesia recognized as the highest risk group of HIV infection. HIV prevalence in MSM has rose rapidly because of low practices in consistent condom use. The new cases of HIV among MSM can be decreased by increasing consistent condom use during have sexual intercourse. This study is important in order to provide evidence for the improvement for making effective preventive intervention to decrease HIV prevalence in MSM.
Objectives: This study aimed to examine factors that associated with consistent condom use such as socio-demographic factors and risk behavior among MSM in Indonesia.
Methodology: This study used cross-sectional data from Integrated Biological and Behavior Surveillance (IBBS) for MSM conducted by 2015. The criteria for MSM as sample were aged 15 years or older, biologically man, recognized themselves as bisexual/homosexual, and had sex with a man in the previous year. Totally, 1497 MSM was recruited in this study. Dependent variable in this study was consistent condom use which referred to always use condom when having sexual intercourse. Independent variables consisted of socio-demographic factors and risk behavior among MSM. Binary logistic regression analyses were used to analyze the factors of consistent condom use among MSM.
Result: 61.7 percent of respondent used condom consistently every time have sexual intercourse. The odd ratio shows that MSM who have aged 15-24 years is 1.5 times more likely to have consistent condom use. For MSM who have male steady partner 66 percent less likely to have consistent condom use. MSM who have female casual partner is 2.7 times more likely to use condom consistently. Regarding to hangout place, MSM who are gather in non-venue based such as city-park and street are 1.1 times more likely to use condom. MSM who had experience of being forced at the first sexual intercourse is 31 percent less likely to use condom consistently. MSM who get the condom free is 1.52 times more likely to have consistent condom. MSM who ever had STI is 3 times more likely to use condom consistently
Conclusion: Promoting the use of condom among MSM who gather not only in venue-based (bars, spa, hotel) but also non-venue based (city parks and street) and guaranteeing the availability of condoms in places that easily to access for MSM such as in primary health care.
Keywords: *MSM, HIV, socio-demographic factors, risk behavior, Indonesia*

INTRODUCTION

HIV in Indonesia is a serious threat because of the prevalence of cases since 2000 has exceeded five percent of the population [1]. The number of HIV cases in Indonesia rose rapidly from around twenty-one thousand cases in 2011 to more than forty thousand cases in 2016. This situation has been able to change the level of HIV epidemic in Indonesia from a low-level epidemic country to a concentrated epidemic level [2]. The main transmission currently occurs in groups of injecting drug users and in groups that have sexual intercourse freely especially in men who have sex with men (MSM) [3]. MSM defined as a man who had penetrative penile-anal sex with other man, regardless of sexual orientation or gender identity [4]. Indonesia was at the leading

position of HIV transmission among MSM in 2016 followed by Australia, Mongolia, Vietnam and Thailand for Asia and Pacific region [5].

Since the first epidemic of HIV in 1987, the men have reported getting the higher risk to HIV infection. In Indonesia, the estimated number of populations of MSM is three million, this group recognized to be the highest risk for HIV infection in the country [6]. The new infection in the MSM group has continuously increased from around one thousand cases in 2011 to around thirteen thousand cases in 2016 [7]. The major of HIV transmission among MSM was happened because of unprotected anal intercourse [8]. The number of new HIV infections among MSM can be decreased by increasing consistent condom use. Consistent condom use means always using condom when do sexual intercourse with all type of partners. The risk of HIV transmission in unprotected anal sex including receptive and insertive anal sex is around 18 times higher than unprotected vaginal sex and 78% of it can be decreased by using condom consistent [9].

Based on the Indonesia Integrated Biology and Behavior Survey (IBBS) report in 2015, around 79.73 % of MSM reported have used condom in last anal intercourse. 55.66% of MSM reported have used condom consistently in the last month with their partners including steady male partner, steady female partner, casual male partner and casual female partner [10].

Some studies mentioned that unprotected anal intercourse related with risk behavior of MSM such as having history of forced sex, age at sexual debut, having both steady and casual partner, HIV status, alcohol use and drug use [11]. Meanwhile, some studies that held outside Asian countries found out if socio-demographic factors such as age especially younger age, single, and poor HIV knowledge related to the consistent condom use among MSM [12].

It is important to analyze factors associated with consistent condom use among this group. Increased consistent condom use has a big role to reduce the new HIV infections among MSM. The information about factors associated with consistent condom use among MSM are crucial to inform the policymaker in making preventions program. This study aims to explore the factors associated with consistent condom use among MSM in Indonesia based on Integrated Biology and Behavior Survey (IBBS) 2015.

METHODOLOGY

Data source

This study used 2015 Indonesia IBBS which already permitted by Ministry of Health of Indonesia. This study has been reviewed and received an approval letter COE. No. 2019/06-219 from IRB committee from IPSR at the Mahidol University 2015 Indonesia IBBS was a survey conducted to get an information of magnitude of the problem, risk factors, knowledge, and program scope, due to understand the dynamic of HIV epidemic in Indonesia among key population such as MSM.

Study Population and Sample size

Since this study focus on MSM, the population was MSM group in Indonesia. The sample size was 1,497 respondents who had aged 15 years or older, biologically man, recognize themselves as bisexual/homosexual, had lived in the survey city for at least one month and had sex with a man in the previous year. Dependent variable in this study was consistent condom use. Independent variables consisted of socio-demographic factors (age, education, occupation, marital status, hangout place, access to condom, level of knowledge, and perception of getting HIV) and risk behavior (STI history, being forced at sexual debut, type of partner, having sex party, alcohol use).

This study combined the Andersen Behavioral Model and Health Belief Model to describe the socio-demographic factors and risk behavior of MSM that associated with consistent condom use. Data was analyzed using STATA version 15. Binary logistic regression was used to measure the odd ratio that most influence towards dependent variable after controlling some variables.

RESULTS

The total number of 1,497 MSM included in this study. Among of them, 61.7 percent of MSM had consistent condom use every time have sexual intercourse in the past month. The results showed that the majority of respondents who consistent used condom was adult had aged 25 and older with 64.4 percent, 62.6 percent of respondent had high education level, 64.2 percent was an employee for someone else, and not married 62.5 percent. Around 62.2 percent of MSM who consistent used condom gathered in non-venue spot (city-park and street). MSM who had male steady partner 47.7 percent consistent to use condom. Meanwhile, MSM who have male casual partner 73 percent use condom consistently and 82.3 percent consistent to use condom with their female casual partner. 64.6 percent of MSM who did the first sexual intercourse without coercion were consistent to use condom. 59.1 percent of MSM who drink alcohol and 61.4 percent of MSM who did not use drug before have sexual intercourse were consistent to use condom. 58 percent of MSM who have sex party in the past year and 62.5 percent of MSM who had comprehensive knowledge of HIV/AIDS were consistent to use condom.

Around 59.8 percent of respondent who consistent using condom got the condom free from government or NGO. MSM who ever had STI (70.3 %) and had perception that themselves was in risk to get HIV transmission (61.3 %) were consistent to use condom. Table 1 showed the descriptive analysis result of this study. Descriptive analysis described the frequency and percentage of respondent in this study based on factors that has been explained in the conceptual framework. Factors that described in conceptual framework reflected the socio-demographic factors and risk behavior of MSM that associated with consistent condom use.

Table 2 showed the multivariate analysis result of this study. In binary logistic regression, age, type of sexual partner, hangout place, being forced at sexual debut, access to condom and ever had STI were statistically significant with consistent condom use.

Table 1 Descriptive analysis between independent variables on consistent condom use among MSM

Variables	Not consistent condom use		Consistent condom use	
	(N=573)	(%)	(N=924)	(%)
Total	**1,497**			
Age				
Adolescent(15-24)	219	43.5	284	56.5
Adult (25 and older)	354	35.6	640	64.4
Education level				
Low (never attend school, primary and secondary school)	127	37.9	208	62.1
High (high school and university)	446	38.4	716	62.6
Marital status				
Not married	490	37.5	815	62.5
Married	83	43.1	109	56.9
Occupation				
Not working	87	52.6	79	8.5
Self-employed	135	35.6	244	64.4
Employed for someone else	337	35.8	601	64.2
Hangout place				
Venue	70	42.2	97	57.8
Non-venue	502	37.8	828	62.2

Variables	Not consistent condom use		Consistent condom use	
	(N=573)	(%)	(N=924)	(%)
Risk perception of getting HIV				
Yes	380	38.7	601	61.3
No	192	37.3	323	62.7
Access to condom				
Buy	136	40.9	196	59.0
Get free	151	62.6	90	37.3
Buy and get free	376	40.7	547	59.2
Being forced at sexual debut				
Yes				
No	199	45	245	55
	373	35.4	680	64.6
Type of sexual partner				
Steady(male/ female)				
Casual (male/ female)	315	49.6	320	50.4
Steady and casual	215	26	612	74
	165	45.5	165	55.5
Alcohol				
Yes	199	40.9	288	59.1
No	373	37	636	63
Sex party				
Yes	103	42	143	58
No	469	37.5	782	62.5
Ever had STI				
Yes	273	29.7	645	70.3
No	300	51.7	278	48.3
Knowledge of HIV				
Comprehensive	284	37.5	475	62.5
Not comprehensive	288	39	450	61

Table 2 Multivariate Analysis

Variables	Multivariate Analysis	
	OR	95% CI
Age		
15-24 (Ref)		
25 and older	1.53*	1.07-2.21
Education		
Low (Ref)		
High	0.92	0.59-1.41
Occupation		
Not working (Ref)		
Self-employed	1.37	0.88-2.14.
Employed for others	1.45	0.87-2.43.
Marital status		
Not married (Ref)		
Married	0.63	0.17-2.33
Hangout place		

Variables	Multivariate Analysis	
	OR	95% CI
Venue (Ref)		
Non-venue	1.10*	0.69-1.48
Knowledge of HIV		
Not comprehensive (Ref)		
Comprehensive	0.99	0.75-1.33
Type of sexual partner		
Steady		
Don't have steady partner (Ref)		
Male steady partner	0.34*	0.19-0.62
Female steady partner	0.76*	0.43-1.54
Casual		
Don't have casual partner (Ref)		
Male casual partner	0.76	0.43-1.34
Female casual partner	2.72**	1.24-5.99
Steady/ casual only (Ref)		
Both steady and casual	0.93	0.57-1.52
Being force at sexual debut		
No (Ref)		
Yes	0.69*	0.53-0.91
Alcohol use		
No (Ref)		
Yes	0.93	0.71-1.23
Had sex party		
No (Ref)		
Yes	0.94	0.68-1.31
Access to condom		
Not get condom (Ref)		
Get free	1.52**	1.04-2.21
Buy	1.45	0.98-2.15
Get free and buy	1.15	0.78-1.72
STI history		
No (Ref)		
Yes	3.00***	2.30-3.92
Risk perception of getting HIV infection		
No (Ref)		
Yes	0.87	0.66-1.14

* p≤0.01, ** p≤0.05, *** p≤0.001

DISCUSSION

In this study, MSM who had aged 25 and older are 1.5 times more likely to have consistent condom use than those who had aged 15-24 years. This finding is similar with some previous studies that conducted in developing country [4,5,8]. It may reflect if prevention strategies of HIV among MSM in developed country start to focus from the young MSM because sexual health behavior at young age will affect to the rest of their life. Meanwhile, for the developing country they focus on adult MSM to sustain preventive sexual behavior and avoid relapsing of risky behavior.

Hangout place as a location where men meet other men to arrange transactional sex or just gather among MSM is associate with consistent condom use. In this study, MSM who gather in non-venue spot (mall, city park, street, terminal, campus) 1.10 times more likely to use condom consistently after controlling other variables. Hotspot mapping can help locate MSM in a concentrated epidemic and help determine the optimal strategy prevention of HIV [13].

In terms of type of sexual partner, it is significant with consistent condom use only for MSM who have male steady and female casual partner. Based on IBBS definition, steady partner defined as a person with whom the MSM had a relationship for at least 3 months, whom he is seeing at least once a week and with whom he had frequent sexual intercourse. Meanwhile for casual sex partner defined as a person with whom the MSM had sexual intercourse at least once, without having been paid, or having received drugs or other rewards in return.The result of this study shows that MSM who have male steady partner 66 percent less likely to have consistent condom use. MSM who have female casual partner is 2.7 times more likely to use condom consistently. This finding is similar with some prior studies. Based on two qualitative studies, MSM who had relationship with steady partner or regular partner was associated with unprotected anal sex [14,15].

MSM who used condom was higher with their casual partner compared with regular partner. This result similar with previous study that reported MSM in casual relationships are more likely to have consistent condom use. However, when the relationship become more stable or regular, the condom use will decline [16].

MSM who have female casual partner were more likely to have consistent condom use [17]. The reason to avoid pregnancy with female partner was the main motivator for them to more likely use condom than with male partner. They less likely to use condom with their regular partners because of the trust, far stronger familiarity and relational bond between them. It might make the conscious of HIV protection less important [18]. The reason for MSM who have female partner for low condom usage because they did not disclosure their sexual orientation with their female steady partner [19]. Therefore, they will struggle to explain about using condom with their female steady partner. Moreover, society in Indonesia against same-sex marriage. Therefore, some of MSM in Indonesia hide their sexual orientation and

follow the norm in society including married. Married MSM were more likely to practice condomless vaginal sex in order to have child for the family line [20].

In terms of being force at sexual debut, the finding in this study shows that MSM who had experience of being force at the first sexual intercourse is 31 percent less likely to use condom consistently when have sexual intercourse than those who did first sexual intercourse without coercion. The histories of sexual abuse during childhood and adulthood are influenced rest sexual practice. Being forced to do first sexual intercourse played important role in subsequent risk and condomless sex during the rest of sexual life [21]. It may reflect that being force at sexual debut will bring impact to do protective sexual behavior in the rest of sexual life.

Regarding to the access to get condom, MSM who get free condom from government or NGO is associate with consistent condom use every time have sexual intercourse. MSM who get the condom free is 1.52 times more likely to use condom consistently when have sexual intercourse than those who not get the condom during past month.

Based on study of Musinguzi et al (2015), shows that MSM who get free condoms more likely to have consistent condom use than those who buy condom [14]. The study of Shrestha et al (2016) mentioned that increasing the distribution and access of condom for MSM by giving free condom through health facilities and provider can increase the frequent of condom use [22]. It may reflect the frequent of condom use among MSM influenced by the availability and affordability of accessing condom.

In terms of ever had STI before, MSM who ever had STI before is 3 times more likely to use condom consistently when have sexual intercourse than those who never had STI before. Several studies mentioned about ever had STI before related to use condom among MSM [23]. MSM who had STI was in high risk to get HIV infection. This finding may imply that MSM who realized themselves in HIV risk will continue to apply consistent condom use every time have sexual intercourse due to not get transmitted by HIV virus.

CONCLUSIONS

This study covered 1,497 MSM that been recruited from six cities in Indonesia. Around 61.7 percent of the MSM are using condom consistently every time have sexual

intercourse during past month with all type of partners including male steady and female steady partner or male casual and female casual partner.

Based on this study, in Indonesia context MSM who have older age, hangout in the non-venue based, have female casual partner, do the first sexual intercourse without coercion, get free condom from government and NGO, and ever had STI are more likely to have consistent condom use. On the other hand, in this study found that factors such as education, marital status, knowledge of HIV, had sex party, and risk perception of getting HIV are not statistically significant associated with consistent condom use among MSM in Indonesia.

Promoting condom to prevent from STIs and HIV as part of health services is important. Promoting and guaranteeing the availability of condoms in places that MSM easily to access such as primary health care. The government must evaluating and monitoring the giving free condom program among MSM and collaborate with NGO in distributing and increasing the self-awareness to use condom among MSM and their partners. It must be applied to MSM in all age groups whether young or old and who gather in venue or non-venue based.

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FACTORS ASSOCIATED WITH HIV TESTING AMONG SEXUALLY EXPERIENCED YOUTH IN MYANMAR: THE ANALYSIS OF 2015-2016 MYANMAR DEMOGRAPHIC AND HEALTH SURVEY

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ABSTRACT

Introduction: HIV testing is a key effective way for HIV prevention and control, however, HIV testing uptake persist very low among youth in Myanmar. More than half of all new HIV infections occur among young people aged 15-24 years old. It is vital to find the factors that influence young people to get the test. Knowing HIV status benefits young people acquire the advance treatment, practice safer sex and reduce the risk of transmission.
Objectives: This study aimed to explore what are the factors influence young people in uptake of HIV testing.
Methodology: This study utilized the data from the Myanmar Demographic and Health Survey (MDHS) 2015-2016, a cross-sectional survey conducted on a nationally representative sample. The total sample size for this study includes 1,034 females and 318 males aged 15-24 who had sexual experienced. Descriptive analysis was performed and the chi-square test was used to verify the association between independent and outcome variable. Multivariate analysis was employed to predict the association between related factors and HIV testing.
Results: Overall, more than 74% of the sexually experienced youth had never been tested for HIV. The HIV testing rate is low, particularly among males (17.5%) and younger youth aged 15-19 (10.4%). The results from binary logistic regression reveals that, age, sex, residence place, wealth status, employment, and HIV knowledge were found to be associated with HIV testing service utilization among youths. HIV testing rate among older youth age (20-24) is 2.8 times higher than younger youth age (15-19), 2.3 times higher among those who have greater HIV knowledge level as compared to lower knowledge level and 3 times higher among richer and richest compared to the poorest. Young people who were not working had 1.8 times more likely to uptake HIV test than those who were working. Youth residing in urban areas were by 1.4 times more likely to be tested for HIV compared to youth residing in rural areas. Females were 1.6 times more likely to take an HIV test rather than males.
Conclusion: The uptake of HIV testing predominantly found to be influenced by higher HIV knowledge, higher wealth status, older age, and female. The intervention should be strengthened to increase awareness on HIV/AIDS and scaling up the integrated HIV testing tailored for youth, free and accessible to all youths.
Keywords: HIV testing, Youth, Myanmar

INTRODUCTION

Myanmar is highly burdened by the epidemic of HIV/AIDS and rank the second highest HIV prevalence (0.7 per 100,000 population) among the Southeast Asian region. Young people in Myanmar are vulnerable to HIV in Myanmar. Of the total prevalence, young people aged 15-24 account for (0.4 per 100,000 population). Furthermore, more than half of new HIV infection were occurring among young people [1].

HIV Testing is the only pathway to know whether people have HIV and it is a crucial gateway to prevention, treatment and care and support. People who test and know their HIV positive status can acquire early treatment and live well and can prevent HIV transmission to others, such as from mother-to-child and between injecting drug partners. It can also enable them to be aware of and practice effective HIV prevention (i.e. use of condoms, take pre- and post-exposure prophylaxis, and voluntarily undertaking medical male circumcision) [2]. Testing for HIV is the only mean to know if a person is living with the virus and if they know they are living with HIV, they will practice safer behaviors so as to enable to decrease the likelihood of transmission [3].

Despite the improvements in expanding HIV prevention activities and upsurge of HIV testing accessibility in the country, HIV testing uptake persists very low particularly among young people including young key populations. A large proportion of PLHIV in Myanmar do not know their HIV status and are predominantly pursuing testing and discovering their status when they are already suffering from related illness [4]. According to Myanmar Demographic and Health Survey Report 2015-2016, 60% of young women ages 15-24 known where to get HIV testing but only 9.2% obtained the test. Similarly, 10.5% young men had ever tested for HIV, although 56% aware of the place to get tested [5]. The HIV testing coverage among key affected populations is also far from optimal. Only 20% of MSM, 27% of PWID and 34% of FSW were undertaken HIV test in 2014 [4]. Furthermore, the low uptake of HIV testing among youth and its determinants were not largely studied in Myanmar.

Factors associated with HIV testing among young people identified by other previous studies include socio-demographic factors (age, sex, education, religion, ethnicity, wealth, employment, marital status) [6-10], HIV knowledge [11-15], HIV related stigma attitudes (8,12,16,17), media exposure [6,8,18,19], HIV risk behavior [9,20-23] .

Knowing HIV status benefits young people acquire the advance treatment, practice safer sex and reduce the risk of transmission and it is vital to identify and address the challenges of young people in accessing HIV testing. This study was conducted with the hope to help inform the need of integrated intervention policy and practice and further research that address barriers to HIV testing among young people. Although the estimates show low uptake of HIV testing among youth, its determinants were not largely studied among this general population and age group in Myanmar, apart from few studies among young MSM and PWID. It is crucial to understand the determinants of youth in accessing HIV testing, with the hope that it might help inform existing policy, practice regarding interventions to address young people's barriers to the service and as well as the future research for further studies on other possible factors. The objective of this study was to find the factors associated with HIV testing among sexually experienced youth aged 15–24 years in Myanmar.

METHODOLOGY

Data source

This study utilized the data from the Myanmar Demographic and Health Survey (MDHS) 2015-2016, a cross-sectional survey conducted on a nationally representative sample, which data was collected from December 7, 2015, until July 7, 2016. The MDHS is a national representative survey and covered the sample of the country, interviewed people from all states and regions based on the sampling frame of the Myanmar Population Housing Census 2014. It uses the two-stage sampling process. 442 neighborhoods were selected at the first stage with equal probability by systematic sampling from all states and regions. And then at the second stage, 30 households from each cluster were selected by using equal probability systematic sampling. The women samples were collected from all selected households, while men samples were counted in every second household. The MDHS

covered 13,260 households and 17,622 reproductive age women and men (12,885 women and 4,737 men).

Study Population and Sample size

The unit of analysis in this study is youth aged 15-24 who had sexual experienced. The total eligible sample for this study is 1,352 which includes 1,034 females and 318 males. Individual datasets of women and men were used to choose the units of analysis. The sample was selected from the national sample size of 12,885 women and 4,737 men.

In terms of the exclusion criteria, both women and men aged 15-24 were selected and those who never had sexual intercourse were omitted, based on the question of "How old were you when you had sexual intercourse for the very first time? which holds the answers of "never had sexual intercourse", "age in years", and "first time when started living with (first) wife/husband. After the exclusion, the sample was down to 1,546 (1,189 women and 357 men) including missing values. The final sample after dropping of the missing values was 1,352 (1,034 females and 318 males).

Ethical Consideration

To undertake this study, approval from the IPSR-Institutional Review Board (IRB) from Institute of Population and Social Research was obtained with reference no. (COE. No. 2019/05-175) and the permission to use the data was attained from the Demographic and Health Survey program.

Measurement of Variables

HIV Knowledge Level

The HIV knowledge level was resulting from 10 HIV related questions which consist of knowledge of HIV prevention methods, comprehensive knowledge about AIDS and knowledge of prevention of mother-to-child transmission of HIV. The knowledge level was categorized as "Low" if the score is lower than the mean value and classified as "High" if the score is higher than the mean value.

Wealth Index

DHS's wealth index was used in this study. According to DHS, wealth index was computed by scoring the ownership of consumer goods including electricity, mobile & landline telephone, television, radio, refrigerator, chair, sofa, table, bed, cupboard, electric fan, air conditioner, computer, sewing machine, watch, bicycle, motorcycle, animal-drawn cart, car/truck, htawlargyi, motor boat, boat, bank account, and proprietorship of house and land, materials used in housing (floors, wall), sanitation (source of drinking water, toilet utilities), and possession of animals.)

Stigma attitude to PLHIV

This variable implies the attitude of respondents towards PLHIV which was developed from four questions of HIV related stigma: 1) Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus? Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus? 2) If a member of your family got infected with the AIDS virus, would you want it to remain a secret or not?; 3) If a member of your family became sick with AIDS, would you be willing to care for her or him in your own household?; 4) In your opinion, if a female teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in the school?. If the individual had no stigma indicators, will be categorized as no stigma, if experienced 1 = low stigma, 2 = medium stigma and, 3-4 stigma indicators as high stigma.

RESULTS

Univariate Analysis

Socio-demographic characteristics of respondents were presented in Table 1. Among 1,352 youth, (76.48%) were female and the majority of respondents (79.36%) were aged 20-24. About half of the youth have secondary education level (50.07%), followed by (35.28%) primary education, (4.81%) above secondary level education, whereas (9.84%) has no education. The proportion of married were the highest at (86.32%) while (7.17%) were never married, (4.66%) divorced, (1.26%) separated and (0.59%) widowed. In terms of wealth status, (24.04%) of youth were the poorest, followed by middle and richer (21.45% and 21.30% respectively), while (19.53%) poorer and (13.68%) the richest. Over (60%) were currently working and most of the participants were from rural area (75.22%).

Regarding the knowledge level on HIV prevention methods, comprehensive knowledge about HIV and knowledge about mother to child transmission, more than 60% of youth had higher knowledge. Only 10.36% of youth reported to have had STI history. When categorizing the level of stigma attitude towards PLHIV, 28.55% of youth shown to have no stigma, followed by (27.59%, 23.89%, 19.97%) of medium, low, and high levels. Over 50% of youth do not read newspaper or magazine nor listening to the radio, but they watched television at least once a week (59.32%). Of the total respondents, only 25.44% had ever tested for HIV.

Table 1 Percent Distribution of Sexually Experienced Youth included in the Analysis, by background characteristics (n= 1,352)

Variable	Number	Percentage
Sex		
Female	1,034	76.48
Male	318	23.52
Age		
15-19	289	20.64
20-24	1,073	79.36
Education		
No education	133	9.84
Primary Level	477	35.28
Secondary Level	677	50.07
Higher Level	65	4.81
Marital Status		
Never married	97	7.17
Married	1,167	86.32
Widowed	8	0.59
Divorced	63	4.66
Separated	17	1.26
Place of Residence		
Urban	335	24.78
Rural	1,017	75.22
Wealth Status		
Poorest	325	24.04
Poorer	264	19.53
Middle	290	21.45
Richer	288	21.30
Richest	185	13.68
Employment Status		
Currently not working	519	38.39
Currently working	833	61.61
HIV knowledge		
Low	507	37.50
High	845	62.50
STI History		
No	1,212	89.64
Yes	140	10.36
Stigma Attitude		
No	386	28.55
Low	323	23.89

Variable	Number	Percentage
Medium	373	27.59
High	270	19.97
Media Exposure		
Newspaper/Magazine		
Do not read at all	764	56.51
Read less than once a week	393	29.07
Read at least once a week	195	14.42
Radio		
Do not listen at all	729	53.92
Listen less than once a week	284	21.01
Listen at least once a week	339	15.07
Television		
Do not watch at all	319	23.59
Watch less than once a week	231	17.09
Watch at least once a week	802	59.32
HIV testing		
No	1,008	74.56
Yes	344	25.44

Bivariate analysis

In the bivariate analysis, chi-square test was employed in order to identify an association between independent variables and HIV testing. The relationship between socio-demographic, HIV knowledge, STI history, Stigma Attitude, Media Exposure and HIV testing are shown in Table 2. Considering the p-value less than or equal to 0.005 as significant level, there were significant association between HIV testing and sex, age, education, place of residence, wealth status, employment status, HIV knowledge, STI history, stigmatizing attitude towards PLHIV and media exposure (newspaper/magazine and television). Sex was strongly associated with HIV testing (χ^2 = 12.39, P<0.001) with the increased testing proportion among female (27.76%). The testing rate among youth age (20-24) was higher than youth age (15-19) (89.528.703% vs 12.90%) and it has a significant relationship with HIV testing at χ^2 =29.14, P<0.001 levels. The testing proportion of education were no education (8.27%), primary education (21.17%), secondary (30.13%), higher (43.08%) with the significant association level at (χ^2 =43.76, P<0.001). In terms of marital status, married youths were more tested than those never married (26.22% vs 20.62%) while widow had (25.00%), divorced (15.87%), separated (35.29%) but there was no statistically significant association with HIV testing. Regarding wealth status, youth with richer and richest status were most tested (33.68% and 40.00%) with the statically significant level (χ^2 =66.49, P<0.001). Employment also had significant relation to HIV test with higher propotion among those unemployed compared to those employed (32.18% vs 21.25%) (χ^2 =20.13, P<0.001). Place of residence had an influence on HIV testing at (χ^2 = 29.83, P<0.001) and urban residents account larger propotion in testing (36.72%) than rural residents (21,73%). HIV knowledge also significantly correlated with HIV testing at (χ^2 = 68.14, P<0.001), testing rates were higher among those with greater knowledge (33.02%) compared to those with low knowledge (12,82%). Youth with STI history shows higher testing rate of (30.71%) than who had no STI history (24.83%) but it has no significant association with HIV screening. People who have low, medium and no stigma attitude were more likely to test (34.06%, 26.81% and 21.50% respectively) compared to high stigma attitude (18.89%). The association is statistically significant at (χ^2 = 22.27, P<0.001). Regarding the media exposure, reading newspaper/magazine and watching television were related with HIV testing behavior (χ^2 = 23.17, 21.67, P<0.001.

Table 2 HIV Testing Characteristics (n= 1,352)

Variable	Ever Tested N (%)	P-Value	Chi Square Value
Sex			
Male	57 (17.92)	<0.001	12.39 ***
Female	287 (27.76)		
Age			
15-19	36 (12.90)	<0.001	29.14 ***
20-24	308 (28.70)		
Education			
No education	11 (8.27)	<0.001	43.76***
Primary Level	101 (21.17)		
Secondary Level	204 (30.13)		
Higher Level	28 (43.08)		
Marital Status			
Never married	20 (20.62)	0.242	5.47
Married	306 (26.22)		
Widowed	2 (25.00)		
Divorced	10 (15.87)		
Separated	6 (35.29)		
Place of Residence			
Urban	123 (36.72)	<0.001	29.83***
Rural	221 (21.73)		
Wealth Status			
Poorest	36 (11.08)		
Poorer	66 (25.00)		
Middle	71 (24.48)	<0.001	66.49***
Richer	97 (33.68)		
Richest	74 (40.00)		
Employment Status			
Currently not working	167 (32.18)	<0.001	20.13***
Currently working	177 (21.25)		
HIV knowledge			
Low (min 0 - max 5.99)	65 (12.82)	<0.001	68.14***
High (min 6 - max 10)	279 (33.02)		
STI History			
No	301 (24.83)	0.130	2.29
Yes	43 (30.71)		
Stigma Attitude			
No	83 (21.50)		
Low	110 (34.06)	<0.001	22.27***
Medium	100 (26.81)		
High	51 (18.89)		
Media Exposure			
Newspaper/Magazine			
Do not read at all	158 (20.68)		
Read less than once a week	117 (29.77)	<0.001	23.17***
Read at least once a week	69 (35.38)		
Radio			
Do not listen at all	183 (25.10)		
Listen less than once a week	79 (27.82)	0.557	1.17

Variable	Ever Tested N (%)	P-Value	Chi Square Value
Listen at least once a week	82 (24.19)		
Television			
Do not watch at all	50 (15.67)		
Watch less than once a week	61 (26.41)	<0.001	21.67***
Watch at least once a week	233 (29.05)		

*p<0.05; **p<0.01; ***p<0.001

Multivariate analysis

Results from the adjusted logistic regression model are presented in Table 3. In the multivariate analysis, sex, age, place of residence, wealth, employment, and HIV knowledge were found remain statistically associated with HIV testing. After controlling the other variables, young females were 1.65 times more likely to take an HIV test as compared to young males [OR=1.65, 95% CI (0.40, 0.92)]. Older youths aged (20-24) had higher odds of HIV testing than younger youths aged (15-19) [OR=2.76, 95% CI (1.84, 4.13)]. The other significant variable was type of residence. Youth from the urban area were by 1.4 times more likely to be tested for HIV as compared to rural youth [OR=1.40, 95% CI (1.01, 1.95)]. Regarding the wealth index, youth who belonged to richer and richest had around 3 times, while middle and poorer had about 2 times more likely to uptake HIV test compared to the poorest. Interestingly, people who were not working had 1.8 times more likely to go for HIV test than those who were working [OR=1.83, 95% CI (1.36, 2.45)]. Young people who have higher levels of HIV knowledge has 2.3 times higher tendency towards utilization of HIV testing service compared to those with lower level of HIV knowledge [OR=2.3, 95% CI (1.63, 3.18)].

Table 3 Factors Associated with HIV testing (N=1,352)

Variable	OR	SE	95% CI	
			Lower	Upper
Sex				
Male	**Ref**			
Female	1.65*	0.35	1.08	2.50
Age				
15-19	**Ref**			
20-24	2.76***	0.57	1.84	4.13
Education				
No education	**Ref**			
Primary Level	1.87	0.67	0.93	3.77
Secondary Level	1.59	0.59	0.78	3.29
Higher Level	1.43	0.67	0.57	3.56
Marital Status				
Never married	**Ref**			
Married	1.04	0.33	0.55	1.95
Widowed	2.87	2.71	0.45	18.37
Divorced	0.61	0.30	0.24	1.58
Separated	1.85	1.18	0.53	6.43
Place of Residence				
Rural	**Ref**			
Urban	1.40*	0.24	1.01	1.95
Wealth Quintile				
Poorest	**Ref**			

Variable	OR	SE	95% CI	
			Lower	Upper
Poorer	2.42***	0.59	1.50	3.91
Middle	2.14***	0.54	1.31	3.50
Richer	3.08***	0.80	1.84	5.12
Richest	3.40***	1.02	1.89	6.13
Employment Status				
Currently working	**Ref**			
Currently not working	1.83***	0.27	1.36	2.45
HIV knowledge				
Low	**Ref**			
High	2.28***	0.39	1.63	3.19
STI History				
No	**Ref**			
Yes	1.19	0.26	0.78	1.81
Stigma Attitude				
No	**Ref**			
Low	1.33	0.25	0.92	1.92
Medium	1.10	0.21	0.76	1.59
High	0.83	0.18	0.54	1.27
Media Exposure				
Newspaper/Magazine				
Do not read at all	**Ref**			
Read less than once a week	1.09	0.18	0.79	1.50
Read at least once a week	1.47	0.31	0.97	2.21
Radio				
Do not listen at all	**Ref**			
Listen less than once a week	1.11	0.20	0.78	1.57
Listen at least once a week	0.84	0.14	0.60	1.17
Television				
Do not watch at all	**Ref**			
Watch less than once a week	1.48	0.35	0.93	2.37
Watch at least once a week	1.27	0.25	0.86	1.88
Constant	**0.03*** **	**0.02**	**0.01**	**0.09**

*p<0.05; **p<0.01; ***p<0.001

DISCUSSION

The findings indicate that overall, less than 30% of sexually experienced youth had ever been tested for HIV, males (16.57%) and females (27.26%). HIV knowledge, employment status, wealth, age, and sex were found to be the most important determinants of HIV testing behavior among sexually experienced youth. The study found that having good HIV-related knowledge was strongly associated with HIV testing. Youth who a had high level of knowledge about HIV/AIDS were more likely to be tested for HIV as compared to those who had low levels of HIV/AIDS knowledge. This finding corroborates with earlier evidences, from studies conducted in Myanmar among young MSM [15], Thailand [9], Jamaica [13], South Africa [14] and Ethiopia [27]. The possible reason could be those who had better HIV knowledge have the chance of knowing how HIV is transmitted, how to prevent and the benefits of HIV testing. This study Interestingly found out that, youths who have job were unlikely to take an HIV test in comparison with those who were not working. This finding contradicts with some

other studies in Brazil [7], Ethiopia [27] and Kenya [28] in which employed people were found more likely to test. The possible reason for this study's result could be that the youth who had job may reluctant to test for HIV due to fear of testing positive and its consequences; being stigmatized and lose their job. Anxiety over the privacy of their positive status could be a reason for not taking HIV test. In Myanmar culture, social acceptance of HIV/AIDS remains suboptimal in many areas and stigma and discrimination on PLHIV still exists. In addition, the favorable employment policies towards PLHIV is still insubstantial in Myanmar. Young people with wealth index of richest, richer, middle and poorer were more likely to be tested as compared to the poorest. Studies conducted in Ethiopia [9], Brazil [11], and Kenya were in agreement with this study that people with higher wealth status had increased tendency to uptake HIV test rather than people in low wealth status. This could be assumed that those who have higher economic status afford to reach and get the HIV related service.

In terms of demographic characteristics, age was found to be significant predictors of HIV testing. The age group between 20-24 years was more likely to go for HIV test than the age group 15-19 years. This was consistent with the studies conducted in the US [6], Thailand [9,29], Brazil [7] and Africa [14,27,30,31]. This could be due to mostly this age group [20-24] have higher levels of education, more chance to access HIV information and service and the importance of HIV testing.

Like several studies, males were found to be less likely tested than females by 0.6 times [6,11,29,32]. The possible reason could be that males are conscious to know about their HIV status due to their risky behavior to HIV. In addition, the majority of the participants are women and are married, therefore access to ANC services might enhance the testing uptake among pregnant women. Of the total

HIV test among women (287), more than half were tested as part of antenatal visit (186). Rural residents were less likely to undergo for HIV test as compared to the urban residents, which the finding was in agreement with studies conducted in Vietnam [19], US [6], Ghana [33] and Ethiopia [27]. This might be because of limited access of health facility and awareness of HIV testing in rural areas.

Media exposure in this study was not found significant association with HIV testing, whereas other various studies found out that media exposure was influenced HIV testing behavior [6,8,28]. Media is one of the effective and useful communication tools to provide message that influence HIV service uptake, HIV risk behavior among young people. Sharing Inforamtion on HIV awareness, available HIV testing services, benefits of HIV testing through media can be reached to a wide range of populations who have access to the media. Exposure to HIV/AIDS information through mass media may lead to high levels of awareness, which may in turn influence self-assessed risk of HIV infection and the need to test for HIV. Nowadays, social media is one of the best communication tools to reach youth, who almost all of them access to media via different device (mobile, tablet, laptop, etc). The social media can be reached to high-risk populations, such as MSM, SW and PWID who have limited access HIV services and information due social disapproval, stigma discrimination and criminalization on same sex, sex work and drug use.

Stigma attitude towards PLHIV was statistically significant associated with HIV testing in the bivariate analysis, but it was turned to be insignificant in the multivariate analysis after controlling other variables. It could be due to the effect of controlling variables, such as education, HIV knowledge that may have influence on stigma attitude.

CONCLUSIONS

This study demonstrated that HIV knowledge, wealth, employment, age, sex, and place of residence are associated with the HIV testing behavior among youth. The HIV testing level is lower among those who have lower HIV knowledge, low economic status, who are younger, male and residing in rural area.

RECOMMENDATION

The intervention should be strengthened to increase awareness on HIV/AIDS and scaling up the integrated HIV testing tailored for youth, free and accessible to all youths including linkages to treatment and care. To upsurge the accessibility for all youth in all regions, mobile testing should be enhanced and community based testing should be promoted. Education and awareness raising on HIV/AIDS should be promoted throughout the societies, such as in community, schools, universities, workplace. HIV awareness and testing campaign in the public events.

Education on HIV/AIDS for all populations should be scaled up in order to help eradicate social stigma and discrimination, which will in turn, increase uptake of HIV testing. Use different types of mass media, social networking sites and promote HIV information and a message that may influence people's HIV risk behavior, HIV service uptake and social stigma attitude.

LIMITATIONS OF THE STUDY

Due to utilizing the secondary data for the analysis, the potential determinants of HIV testing such as religion, ethnicity, and individual attitude to HIV service providers were not included in the MDHS. In addition, the question on number of sexual partners was questioned to men but was not asked in the women questionnaire and therefore women cannot be measured with this variable. Moreover, the information on whether the participants are being drug user, transgender, sex workers and therefore cannot identify the high risk behaviors with them. As a result, the findings of this study can only reflect the determinants of HIV testing based on available factors from the dataset although there may be some other associated factors. Including these variables and use of both quantitative and qualitative methods, would be of help identifying the factual reason behind the behavior of HIV testing among youth in Myanmar.

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FACTORS ASSOCIATED WITH SLEEP QUALITY AMONG POLICE OFFICERS IN MUEANG DISTRICT, PHRAE PROVINCE, THAILAND

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Introduction: Recent studies indicated that people with good quality of sleep had improved performance better learning and memorized. Many covariate risk factors interfere with sleep cycle. There is no evidence reported of sleep quality in police officers at northern part of Thailand.
Objectives: The study aims to estimate the prevalence of poor sleep quality among police officers of Mueang District, Phrae Province, Thailand and to determine the associate between demographic characteristic, covariate risk factors and sleep quality among police officers.
Design/approach/methodology: This study was a cross-sectional study which approached 244 Thai police officers at Mueang District, Phrae Province, Thailand. The participants were including from each selected office by proportional random sampling method. Data were collected by self-administrative questionnaire to find the information involving demographic characteristic, covariate risk factors, and sleep quality during working as police officers. Data was analyzed by using bivariate statistics for determination of association between these factors.
Conclusion: Present study reported 50.8 percent of police at Mueang District, Phrae Province, Thailand had poor sleep quality with PSQI score > 5. This poor sleep quality was associated with several factors including monthly income status, work place, and caffeine drink.
Key words: Sleep, Sleep quality, Police officer

INTRODUCTION

Sleep is an important tool that helps to restore, refresh and maintain the body system. It helps the body to slow down the functions after getting tired during day time. Sleep is a mental and physical body condition of relaxation at night for a several hours at night time with closed eyes and body remains in immobile posture. The normal recommend sleep length is around 7-8 hours in humans and vary at various life stages.

Recent studies indicated that people with good quality of sleep had improved performance, better learning and memorized things faster. People having adequate sleep can achieve good physical and mental health besides boosted life quality. Quality of sleep also improves decision making. Lack of sleep in people may leads to mood swing, sadness, depression and lack of motivation. Hence, sleep quality is an important tool to monitor health [1].

Many factors interfere with the sleep cycle like energy and caffeine drinks, smoking, drinking alcohol, and stress conditions. Many studies have established the link between the covariate factors and sleep quality. One survey study in college students of Thailand pointed out that stimulant dinks, alcohol consumption and smoking are positively associated with poor sleep quality [2]. Furthermore, overtime and shift work could cause circadian rhythm imbalance modulated by the light exposure [3]. It is claim that carrying physical activity and exercise can induce a good sleep. Other covariate factors of sleep quality are education, marital status and monthly income.

Job stress in police is related to occupational tension shift work, personal issue, and facing violence situation and easy approach to weapons or gun. Thus, police escape these problems by committing suicide. Royal Thai Police record during 2016 points out 279 suicide cases among police professionals. Previously, 260 police personals committed suicide during 2008-2015. From the estimate 8 years ago, police had committed suicide 33 persons/year and 14 / 100,000 persons. Thus, Suicide commitment among Thai police is about 2 times more than other occupation [4].

The sample of this study was police officers at Mueang District, Phrae Province supervised by Provincial Police Region 5. The reason behind was the heighted committed suicide rate in Provincial Police Region 5 or the northern part of Thailand (Department of Psychiatry and Drug Dependence, Police General Hospital, 2017). Mostly the police here trend to have high stress in their duties and their work conditions. Moreover, Mueang district has higher police population and many police stations. It can be the representative of police in local area. This study was aimed to investigate the association between covariate factors with poor sleep quality among police officers in Phrae province, Thailand.

OBJECTIVE

1. To estimate the prevalence of poor sleep quality among police officers of Mueang District, Phrae Province, Thailand.
2. To determine the association between demographic characteristic, covariate risk factors and sleep quality among police officers of Mueang District, Phrae Province, Thailand.

METHODOLOGY

Study Design

This study was a cross-sectional study design.

Sample size and Sampling technique

The sample size number was calculated by using the Taro Yamane formula [5]. Total population of police officers was 500 persons.

$$n = \frac{N}{1 + N(e)^2}$$

The sample size of this study was 222 persons with estimated 10% of the non-respondent cases. The final sample size chosen was 244 persons. These participants were selected from the police officers using proportional random sampling method. The inclusion criteria for this study was 1) police officers of both genders (male and female), working in the police station at Mueang District, Phrae Province, Thailand; and 2) police officers aging between 20-60 years.

Measurement tools

This study questionnaires comprised of following two pasts:

Socio-demographic Questionnaire: 18 questions

The socio-demographic question-naire was designed to focus on the demographic characteristic background and covariate risk factors. The participant was asked to fill a self-administered questionnaire after assessment of inclusion criteria though a short conversation.

Sleep Quality: 19 questions

The second part was standard self-administered questionnaire to measure the overall sleep quality of the participant during the last 1 month, following Pittsburgh Sleep Quality Index (PSQI) by Buysee and colleaques, 1989. The questionnaire consisted of 10 items with 4 questions in each domain were Not during the past month-0, Less than once a week-1, Once or twice a week-2, and Three or more times a week-3. The questionnaire score is 0-21 and the effective cut off point was adjusted 5. The participant with score more than 5 was considered as poor sleep. Each item of the total 19 questions were belonging to 7 components including sleep quality, sleep latency, sleep duration, habitual sleep efficacy, sleep disturbances, sleep medication use, and daytime

dysfunction over the last month. Sum score of all components were calculated as sleep quality.

This study was based on PSQI Thai version by Tullaya Sitasuwan and team, 2014 with improved test-retest reliability (intraclass correlation coefficient = 0.83). The permission was already obtained by researcher to use the PSQI Thai version.

Data collection

Data collection design was a self-administration questionnaire. A prior information letter was sent to each office regarding data collection from their officers. The Ethical approval obtained from The Ethics Review Committee for Research Involving Human Research Subject, Health Science Group, Chulalongkorn University approved this study.

Data analysis

Descriptive statistical data analysis was used to describe demographic characteristic, covariate risk factors, prevalence of stress and poor sleep quality among police officers.

Bivariate inferential statistics was used to find the association among demographic characteristic, covariate risk factors and sleep quality in police officers.

RESULTS

In this study, there were 244 participants, 205 were male (84%) and 39 were female (16%). The participant age ranged from 20-60 years. The majority belonged to age groups 41-60 years. Almost total participants of 54.1% were bachelor's degree graduate, 26.2% studied in high school, 11.1% were higher than bachelor's degree, and 8.6% were having diploma. About 75.4 % participants were married, 13.1% were single, 9% were divorce, and 2.5% were widow.

In term of financial, about 45.9% participants were earning more than 30,000 baht/month, 44.3% were earning between 20,001 to 30,000 baht/month, 9% were earning between 10,001 to 20,000 baht/month, and 0.8% were earning less than 10,000 baht/month. A total of 77.5% police officers were savings less than 10,000 baht/month salary while remaining 22.5% were saving more than 10,000 baht/month. Financial constraints in term of savings were in all participants. Only 39.5% participants choose overtime while rest 60.5% participant do not selected overtime. Among the participants who were not carrying out part time 69.3% while 30.7% of participants adopted part time.

The covariate risk factor that effect the sleep quality 244 police was non-consumption of energy drink (67.2%) and consumption energy drink (32.7%). The frequency consuming energy drink was about 15.2% (1 time/week), 13.9% (2-3 times daily or at interval of 2-3 days) and 3.7% daily. For quantity of energy drink, most of the participant drink energy drink 1-2 bottle/time (27.9%) and drink energy drink 3-4 bottle/time (4.9%). Drinking caffeine as a part was recorded in 81.9% and no caffeine drinking in remaining 18.1% participants. Regarding the frequency of caffeine drinks, majority of participants drink caffeine daily (57.8%), followed by 1 drink/2-3 days (13.9%) and 1 drink/week (9%). The quantity of caffeine thirst was 1 glass per day, 2 glasses per day and 3 glasses per day in 71.3%, 7% and 2.9% participants, respectively. The preferred time of caffeine beverage was morning, afternoon, at night and evening in 58.2%, 18.9%, 2.6% and 0.8% participants, respectively. The source of this caffeine in participants was coffee (70.5%), tea (9.8%) and sparkling water (0.8%). The behavior of smoking was observed in 81.6% while 18.4% participants were non-smokers. The relationship of smoking frequency in participants was 7.8% per day, 6.6% often, 2.5% less than per week and 1.6% per week was observed. The quantity of smoke, most of participants smoke 2-5 roll/day (6.6%), followed by smoke more than 20 roll/day (4.9%), smoke 11-20 roll/day (3.3%), smoke 6-10 roll/day (2.8%), and smoke 1 roll/day (0.8%). Alcohol drinking behavior in participants was occasional (65.2%), often (9%), and non-drinkers (25.8%). Regarding the frequency of alcohol intake, majority of participants drink alcohol but not

daily (27%), followed by consuming after 1-2 days (24.2%), less than a week (21.3%) and daily (0.8%). The quantity of alcohol desire in order of 2-5 glasses, 1 glass, more than 10 glasses and 6-10 glasses per day was recorded in 28.7%, 16%, 15.2% and 10.7% participants, respectively. Activity of doing and not doing exercise was detected in 83.2% and 16.8% participants, respectively. Frequency of exercise activity among participants was 3-4 days per week (41.8%), 1-2 day per week (28.3%) and 5-7 days per week (13.1%) and its duration was more than 30 minutes (61.9%) and less than 30 minutes (21.3%).

Subjective sleep quality

Table 1 Subjective sleep quality of police (N=244)

Sleep quality	Number	Percent
Very good (0)	219	89.8
Fairly good (1)	13	5.3
Fairly bad (2)	9	3.7
Very bad (3)	3	1.2

Most of participants were assessed subjective sleep quality indicating 89.8% very good sleep quality, 5.3% fairly good, 3.7% fairly bad, and 1.2% very bad as shown in Table 1.

Subjective sleep latency

Table 2 Subjective sleep latency of police (N=244)

Sleep latency	Number	Percent
No difficulty (0)	85	34.8
Mild difficulty (1-2)	112	45.9
Moderate difficulty (3-4)	41	16.8
Severe difficulty (5-6)	6	2.5

For subjective of sleep latency, it refers to the time duration to accomplish the stages of sleep from wakefulness. This subjective was measured by the length of duration in falling asleep each night and during the past month. How often you had trouble in sleeping because of getting to sleep within 30 minutes. As descriptive analysis found that mild difficulty (45.9%) to sleep latency was presented among police officers, 34.8% no difficulty, 16.8% moderate difficulty, and 2.5% severe difficulty to sleep latency as shown in Table 2.

Subjective sleep duration

Table 3 Subjective sleep duration of police (N=244)

Subjective sleep duration	Number	Percent
>7 hours	115	47.1
6-7 hours	77	31.6
5-6 hours	35	14.3
<5 hours	17	7.0

Sleep duration was measured by the duration of actual sleep hours getting by each participant at night during the past month. Almost of participants sleep duration more than 7 hours with 47.1%, 31.6% sleep 6-7 hours, 14.3% sleep 5 – 6 hours, and sleep < 5 hours as 7% Table 3.

Subjective habitual sleep efficiency

Table 4 Subjective habitual sleep efficiency of police (N=244)

Subjective habitual sleep efficiency	Number	Percent
No difficulty (> 85%)	235	96.3
Mild difficulty (75 – 84%)	8	3.3
Moderate difficulty (65 – 74%)	0	0
Severe difficulty (< 65%)	1	0.4

For subjective habitual sleep efficiency was calculated by number of hours slept/Number of hours spent in bed) x 100. Mostly 96.3% no difficulty of habitual sleep efficiency (>85%), 2.9% mild difficulty (75 – 84%), 0.4% severe difficulty (65 – 74%) and no one have severe difficulty habitual sleep efficiency (<65%) as shown in Table 4.

Subjective sleep disturbances

Table 5 Subjective sleep disturbances of police (N=244)

Sleep disturbances	Number	Percent
No difficulty	16	6.6
Mild difficulty	168	68.9
Moderate difficulty	51	20.9
Severe difficulty	9	3.7

Sleep disturbance was measured by during the past month, how often have you had trouble sleeping because you cannot get to sleep within 30 minutes, wake up in the middle of the night or early morning, have to get up to use the bathroom, cannot breathe comfortably, cough or snore loudly, feel too cold, feel too hot, have bad dreams, and have pain. Mostly 68.9% mild difficulty to sleep, 20.9% moderate difficulty to sleep, 6.6% no difficulty and 3.7% have severe difficulty sleep disturbances as Table 5.

Subjective use of sleeping medication

Table 6 Subjective use of sleeping medication of police (N=244)

Subjective use of sleeping medication	Number	Percent
Not during the past month	220	90.2
Less than once a week	18	7.4
Once or twice a week	6	2.5
Three or more times a week	0	0

Mostly of participants use sleeping mediation not during the past month with 90.2%, 7.4% use sleeping medication less than once a week, 2.5% use sleeping medication ones or twice a week, and no one use sleeping mediation three or more times a week Table 6.

Subjective daytime dysfunction

Table 7 Subjective daytime dysfunction of police (N=244)

Daytime dysfunction	Number	Percent
No difficulty	88	36.1
Mild difficulty	133	54.5
Moderate difficulty	21	8.6
Severe difficulty	2	0.8

Daytime dysfunction was assessed by the sum of How often have you had trouble staying awake while driving, eating meals, engaging in the social activity and How much of a problem has it been for you to keep up the enthusiasm to get things done during the past month. Most of participants 54.5% mild difficulty to sleep, 36.1% no difficulty to sleep, 8.6% moderate difficulty to sleep, and 0.8% severe difficulty to sleep because of daytime dysfunction.

Overall sleep quality

Table 8 Overall sleep quality of police (N=244)

Sleep quality	Number	Percent
Good	120	49.2
Poor	124	50.8

Estimated 50.8% and 49.2% participants had a poor and good sleep quality sleep, respectively monitored through Pittsburgh Sleep Quality Index (PSQI) as Table 8.

The socio-demographic and sleep quality among 244 participants, 205 (84%) were male and 39 (16%) were female which assessed poor sleep quality by PSQI indicating more than 5 score.

The majority of age were 41-60 years was about 81.5% and 20-40 years (18.4%). There were police age 41-60 years had poor sleep quality about 52.8% and had good sleep quality was about 47.2%. Police who age 20-40 years had good sleep quality was about 57.8% and had poor sleep quality (42.2%). However, Age was not significantly associated to sleep quality.

Education level, there were 217 police had education in bachelor's degree or lower, 111 police (51.2%) was assessed to good sleep quality but 106 police (48.8%) was assessed to poor sleep quality. There were 27 police had education in higher than bachelor's degree level, 9 police (33.3%) was assessed to good sleep quality and 18 police (66.7%) was assessed to poor sleep quality. However, education was not significantly associated to sleep quality.

In marital status, married people 94 police (51.1%) were assessed poor sleep quality and good sleep quality 90 police (48.9%). While unmarried 30 police (50.0%) were assessed good sleep quality and 30 police (50.0%) as poor sleep quality.

In term of financial, the majority of monthly income were less than 10,000-30,000 baht/month, 72 police (54.5%) was assessed to good sleep quality but 60 police (45.5%) was assessed poor sleep quality. There were 112 participants have monthly income more than 30,001 baht/month, 64 police (57.1%) was

assessed to poor sleep quality but 48 police (42.9%) was assessed to good sleep quality. Hence, monthly income was not significantly associated to sleep quality.

Most of police officers was saving money less than 10,000 baht/month, 100 police (52.9%) was assessed to poor sleep quality but 89 police (47.1%) was assessed to good sleep quality. The participants were saving more than 10,000 baht/month, 31 police (56.4%) was assessed to good sleep quality but 24 police (43.6%) was assessed to poor sleep quality. Monthly income status, there were 90 police (57.7%) that had enough money for saving was assessed to good sleep quality but there were 66 police (42.3%) that had enough money for saving was assessed to poor sleep quality. There were 58 police (65.9%) that had not enough money for saving was assessed poor sleep quality but 30 police (34.1%) that was not enough money for saving was assessed good sleep quality. Monthly income status or saving money from salary was significantly associated to sleep quality.

The covariate risk factor and sleep quality that showed result, almost of participant choose over time work 55 (63.5%) while 89 (36.5%) do not choose overtime. Police officers choose over time 1-2 days/week was poor sleep quality about 28 (60.9%) and was good sleep quality about 18 (39.1%). Police who choose over time more than 2 days/week that was poor sleep quality was about 27 (58.7%) and was good sleep quality 19 (41.3%). Police who selected do over time work more than 3 hours that was poor sleep quality about 29 (58%) and was good sleep quality 21 (42%). Police selected do over time work less than 3 hours was poor sleep quality about 26 (61.9%) and was good sleep quality 16 (38.1%). Overtime was associated with sleep quality at p-value <0.009.

Energy drinking, there were 164 participants (67.2%) was non-consumption of energy drink but 80 participants (32.8%) consumption of energy drink. Frequency of energy drink, most of participant energy drink 64.8% (1 time/week) was assessed to poor sleep quality and 35.2% was assessed to good sleep quality. The quantity of energy drink, most of participant drink energy drink 1-2 bottle/time 66.2% was assessed to poor sleep quality and 68% was assessed to poor sleep quality. There were 12 police drink energy drink 3-4 bottle/time, 58.3% was assessed to poor and good sleep quality. Energy drink was associated to poor sleep quality of p-value <0.001.

Drinking caffeine as a part was recorded, caffeine drinking remaining 195 (79.9%) of participants and no caffeine drinking 49 (20.1%). Regarding the frequency of caffeine drinks, majority of participants drink caffeine daily (57.8%) that was assessed to good sleep quality (51.1%) and poor sleep quality 48.9% followed by 1 drink/>3 days (22.9%) that was assessed to poor sleep (67.9%) and good sleep quality (32.1%).The quantity of caffeine thirst was 1 glass per day, and >2 glasses per day and 3 glasses per day in 71.3%, 9.8% participants, respectively. Police who drink 1 glass had poor sleep quality (50.6%) and good sleep (49.4%). Police who drink more than 2 glass that had poor sleep quality (79.2%) and good sleep quality (20.8%). The preferred time of caffeine beverage was morning, and afternoon in 58.2%, and 22.5% participants, respectively. Police who beverage in morning had good sleep quality (50.7%) and poor sleep quality (49.3%), and beverage in afternoon was assessed to poor sleep quality (67.3%) and good sleep quality (32.7%). Caffeine drinking was significantly associated to sleep quality at p-value<0.005.

Smoking behavior, most of participants don't smoke 199 (81.6%) and smoking 45 (41.7%). Smoking frequency, most of participants often smoke 26 police, 53.8% was assessed to good sleep quality and 46.2% was poor sleep quality. There are 19 police that smoke every day, 78.9% was assessed to poor sleep quality but 21.1% was good sleep quality. The quantity of smoke, almost of participants smoke 1-10 roll/day was about 24 police, 58.3% was assessed to good sleep quality but 41.7% was poor sleep quality. There are 21 police smoke more than 10 roll/day, 80.9% was assessed to poor sleep quality but 23.8% was good sleep quality. That showed who smoking high quantity was associated to poor sleep quality.

Alcohol drinking behavior, the majority of participants drink alcohol 181 (74.2%) and don't drink alcohol about 63 (25.8%). The frequency of alcohol intake, most of them drink

less than 7 days/week was about 50%, 64.3% was assessed to good sleep quality and 35.7% was poor sleep quality. The participant that often drink alcohol or drink 7 days/week about 27.8%, 60.3% was assessed to poor sleep quality and 39.7% was good sleep quality. The quantity of alcohol drinking, most of them drink 1-5 glass/time was 44.6%, 58.7% was assessed to good sleep quality and (41.3%) poor sleep quality. The participant drink more than 5 glass was 25.8%, 54% was assessed to poor sleep quality but 46% was assessed to good sleep quality at p-value< 0.005.

In exercise part, majority of participants exercise 203 (90.6%) and 41 (16.8%) do not exercise. Most of participant doing exercise more than 30 minute/day 151 (61.9%), 76 (50.3%) was assessed to poor sleep quality, 75 (49.7%) was assessed to good sleep quality. Almost participants doing exercise more than 2 days/week was about 134 (54.9%), 70 (52.2%) was assessed to good sleep quality but 64 (47.8%) was poor sleep quality. Nevertheless, exercise was not significantly associated to sleep quality.

Table 9 Adjusted odd ratio of characteristics and poor sleep quality (N=224)

Variable	Crude odds ratio	Adjusted odds ratio	95% CI		P-value
			Lower	Upper	
Monthly income status					
Enough	1.00 (ref)				
Not enough	2.63	1.96	1.53	4.54	.039
Work place					
Phrae Provincial Police	1.00 (ref)				
Phrae Police Station	0.38	0.30	0.21	0.68	.002
Caffeine drink frequency					
No	1.00 (ref)				
≥3 day/week	0.45	0.23	0.24	0.87	.009
Everyday	0.27	0.36	0.12	0.61	.013

CONCLUSION

The study found that 50.8 percent of police in Mueang District, Phrae Province, Thailand had reported poor sleep quality with PSQI score more than 5. The poor sleep quality was associated with several factors including monthly income status, work place, caffeine drink. Therefore, strategic development policy is required to improve public health by promoting safe health behavior to prevent adverse effects among police officers.

Those whose police who did not have enough savings were 2 times more likely to have poor sleep quality (AOR = 1.96; 95% CI 1.53 – 4.54). work place increased 0.30-fold odds (AOR = 0.30; 95% CI 0.21 – 0.68). frequency of caffeine drink, consumption caffeine drink more than 3 day/week increased 0.23-fold odds (AOR = 0.23; 95% CI 0.24 – 0.87) and consumption caffeine drink daily was increased 0.36-fold odds (AOR = 0.36; 95% CI 0.12 – 0.61) as Table 9.

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ASSESSMENT OF KNOWLEDGE, ATTITUDE, AND PRACTICES OF ANTIBIOTIC USE OF BANGLADESHI MEDICAL TOURISTS AT BANGKOK, THAILAND: A CROSS-SECTIONAL STUDY

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ABSTRACT

Introduction: Irrational use of antibiotics and the development of antibiotic resistance is a growing problem in Bangladesh and worldwide. The role of international medical tourists colonized with multidrug resistant microorganism is difficult to detect and largely unexplored. Study shows knowledge about antibiotic use related to health behavior of an individual person.
Objectives: The aim of this study was to describe the socio-demographic characteristics and to assess the level of knowledge, attitude, and practices of antibiotic use in Bangladeshi medical tourists at Bangkok, Thailand.
Methodology: A Cross-sectional study was conducted by structured self -administered questionnaire which consist of 4 parts. Participants were selected according to convenience sampling method, age limit was 18 to 75 years and able to response questionnaire. Total number of participants were 362. SPSS version 22 software was used for data analysis. Descriptive study, Chi square, Fisher's Exact test and Spearman rank correlation test were used in data analysis.
Result: 44.2% participants had good level of knowledge. There were significant association between knowledge with antibiotics use within last 1year (P = 0.002). There were significant associations between attitude with education (Pvalue-0.004), family member related with health profession(P-value-0.001) and antibiotics use within last 1year (P-value-0.008). There were significant associations between practice with family member related with health profession (P-value-0.002). There were moderately strong positive correlation between knowledge and attitude which is statistically significant (r=0.473, P- <0.001), there were moderately strong positive correlation between attitude and practice which is statistically significant (r=0.436, P- <0.001).
Conclusion: This study found that there is gap between knowledge , attitude and practice towards antibiotic use among Bangladeshi medical tourist .These findings will help health policymaker to implement intervention programmes, greater international collaboration to improve survillance systems for medical tourists also increasing the awareness about importance of appropriate antibiotics use and preventing development of antibiotic resistance.
Keywords: Knowledge, Attitudes, Practices, Antibiotics use, Medical tourists.

INTRODUCTION

Antibiotics are special drugs used for the prevention and treatment of bacterial infections. Antibiotic resistance happens when bacteria tends to change response to antibiotics. These resistant bacteria spread infection , which is very difficult to treat as a result of huge medical expenses, prolonged hospital stays and increased death rate [1].Antibiotics are not only major essential drugs for mankind but also have vital non- medical applications like growth of livestock. The overuse of antibiotics threatens drug efficacy and increase the spread of antibiotic resistant bacteria. Essential drugs are becoming very limited against multi-drug resistance organism as there are no new discovered antibiotics in the last 20-30 years [2].

Nowadays antibiotic resistance results in reduced efficacy of drugs which makes treatment more challenging and expensive. According to the World Health Organization (WHO) Fact sheet, 2018 mechanism of antibiotic – resistance is related to structural change in microorganisms when introduced with a specific drug. Micro-organisms which develops resistance against antibiotics are sometimes referred as "superbugs". These kind of micro-organisms are becoming more powerful against existing medicines and infections continue to exist in the body and spread to others [3]**.**Antibiotic resistance is an alarming global health problem. Antibiotics are the most frequently used group of drugs in common practice and in hospital settings. Bangladesh is a densely populated country, where infectious disease is a basic public health problem, hence the widespread use of numerous antibiotics against different microorganisms such as bacterial infection is required. The important characteristics related to resistant bacteria are bad hospital hygiene, overpopulation, lack of material for infection control and shortage of trained manpower for controlling the infection in hospitals. Lack of communication between patient and physician, lack of proper monitoring of antibiotic selling is also an alarming reason of rising antibiotic resistance [4,5]**.**

Antibiotic resistance is a global public health concern with a huge economic and clinical load to every nation. According to the WHO this resistance increased mortality of 25,000 people each year in European hospital only with a huge economic burden. Over the next 35 years, 300 million people will die pre-maturely due to infectious disease as a result of drug resistance micro-organism. If the drug resistance is not effectively tackled the world may expect to lose sixty to hundred trillion US dollars in economic output from 2014-2050. Two million people are affected by resistance pathogen and 63,000 people might die each year from hospital acquired infection in USA [6-10]. Essential drugs are one of the important medicine to improve and maintain human health. But to many people across the globe this essential drugs are still unaffordable, unavailable, unsafe and not properly used. Irrational use of antibiotics is a major concern around the world. Inappropriate use such as overuse , misuse of antibiotics may result health hazards. Antibiotics are most commonly sold drugs in developing countries and most sales are without prescript-tions [11].

The rate of asymptomatic carriage of Extended Spectrum Beta Lactamases (ESBL)-producing *Enterobacteriaceae* is increasing in general population and international travel plays an important role in its global spread. International travel has a direct link with transmission of asymptomatic diseases with higher risk of community-acquired infections [12].With the globalization of healthcare many peoples from developing countries are travelling to Thailand. These peoples are usually known as Medical Tourists. Many Bangladeshi patients especially middle class and upper-middle class are not satisfied with the poor quality of the domestic public health system and tend to visit private health care services. Thailand is one of the popular destination among Bangladeshi medical tourists for treatment and follow up visits. This is due to Thailand's friendly hospitality, quality of healthcare services, advanced world class medical facilities and pharmaceutical medicine [13].

International traveling to different tourists places often results in a quicker spread of antibiotic resistant micro-organisms around the globe. Infections with antibiotics resistant microorganisms can be acquired in hospitals and community [14]. Social cognitive factors at a personal level such as knowledge and beliefs may influence health-related behaviors. Using antibiotics is also includes in the health behavior of individual. Sometimes knowledge is not enough to change behavior but knowledge plays an important role to shape up personal beliefs and attitudes regarding a particular habit [15]. Studies found that people in the community settings around the globe mostly have poor knowledge, wrong attitudes, and inaccurate practices regarding irrational use of antibiotics . Many research papers show a relationship between peoples knowledge, attitude and practices towards antibiotic use [11]. In Bangladesh only a few studies were carried out to assess the peoples knowledge , attitude, and practice towards the rational use of antibiotics. The people who come to Thailand for seeking medical treatment are belong to middle class or upper-middle class. No previous study has been taken in Bangladeshi medical tourist at Bangkok, Thailand. The aim of this study was to strengthen the research gap to describe the

socio-demographic factor and to assess the level of knowledge, attitude and practices toward antibiotic use among Bangladeshi medical tourist at Bangkok, Thailand.

METHODOLOGY

Study design

A cross-sectional descriptive research design was used to assess the level of knowledge, attitude and practices of antibiotics use among Bangladeshi Medical tourists at Bangkok, Thailand.

Participants

Participants were Bangladeshi nationality traveling to Thailand for check- up and medical treatment, visited OPD of private hospitals. In the first stage of selection purposive sampling method used for the selection of private hospital as most of medical tourist visit out - patient department for check-up. In the 2nd stage participants were selected through convenience sampling technique and were based on characteristics of the population and study objectives. Those medical tourists having age limit between 18 to 75 years old, both male and female, able to provide responses in questionnaire, taking treatment as out -patient department case, agree to participate with informed written consent were included in this study. The sample size was calculated by the Cochran sample size calculation formula and the total sample size calculated was 362 participants.

Materials and procedure

A self administered structured questionnaire was used for data collection in this study. A self administered structured questionnaire, was designed based on a previously published questionnaire.The questionnaire was developed based on literature review and studies on antibiotics worldwide and in Thailand. The questionnaire items were internally reviewed for content validity by three experts and modifications of questinnaire items were made based on their feedback and recommendations. The pre-test was conducted on 30 Bangladeshi medical tourists fulfilling the same inclusion criteria of the study participants. After a pre-test minor changes and improvement were made. The KR-20 score was 0.88 for 21 knowledge questions, Cronbach's alpha showed 0.86 for 22 attitude questions and 0.79 for 29 practice questions which were appropriate. The questionnaire was divided into 4 parts. First part of the questionnaire contained 11 questions about general information on the socio-demographic factors of the study participants, which includes sex , age, religion, marital status, education , occupation, monthly income, family member related to health profession, antibiotic use within last 1 year, current use of any other medications, comorbid disease. Second part of questionnaire is knowledge part regarding antibiotics use which is composed of 21 questions such as identification of antibiotics, appropriate indications of antibiotic, antibiotics allergy and side effects, knowledge about infections , knowledge about antibiotics resistance , compliance and completion of antibiotic course , leftover antibiotics , antibiotic for children , storage of antibiotics. For the knowledge section when the respondent answered correct knowledge about antibiotics use , 1 score was given. On the other hand, if the answer is incorrect or does not know, 0 score was given. The third part of the questionnaire was the attitude part regarding antibiotics use which was composed of 22 questions such as source of antibiotics , leftover antibiotics, indications of antibiotics, infection control attitude, compliance and completion of antibiotic course, administration of pediatrics antibiotic. For this section 5 points Likert scale was used and scoring criteria were like following . The respondent can answer five options, strongly agree, agree, not sure, disagree and strongly disagree. Reverse score was given for negative statements. Fourth part of questionnaire is practice part regarding antibiotics use which was composed of 29 questions such as aappropriate indications of antibiotic, administration of antibiotic in children and adult, compliance and completion of antibiotic course, source of antibiotic and method to collect, label reading and checking for trade name, expiry date, self-medication ,sharing antibiotic with others , storage of antibiotic for emergency case , antibiotic allergies and side effects. For this section answer had 3 levels: "Usually" means respondents practice more than half of their time. "Sometimes" means respondent practice one third to half of their times. "Never" means respondent practice less than one third of their times. For scoring, if the respondent answered

usually, 3 score was given. If the respondent answered sometime, 2 score was given. If the respondent answered never ,1 score was given. For incorrect practices reverse scoring was given.

Data collection

Data was collected from April to May 2019 using an anonymous self-administered questionnaire. The researcher briefed the study, asked for both verbal and written consent prior to data collection. All participants were provided adequate information regarding study before their decision to participate and they were assured concerning confidentiality and privacy.

Ethical approval

The study protocol was approved by The Research Ethics Review Committee for Research involving Human Research Participants, Health Sciences Group, Chulalongkorn University by COA No. 132/2019.

Data analysis

The completed questionnaire were coded and entered for analysis by Statistical Program for Social Scientists (SPSS) software version 22 (licensed for Chulalongkorn University). Descriptive statistics of study participants were expressed as mean and standard deviation or frequency and percentages were used for analyzing the general characteristics of the respondents and knowledge, attitude, and practices about antibiotics use. Chi-square test , Fisher's Exact test were used to determine the association between socio demographic factors, know-ledge and attitude (independent variable) and practices (dependent variables) at 0.05 significant level. Spearman's correlation test was used to find a correlation between knowledge , attitude and practices about antibiotics use. Bloom's cut off point was used for classification of knowledge score. The knowledge score less than 60% correct answer were considered as "poor knowledge" level group, knowledge score between 60% to 80% were considered as "moderate knowledge" level group, knowledge score more than 80% were considered as "good knowledge" level group. Attitude score was categorized into three attitude level using the mean score of respondents and standard deviation. "Poor attitude" level was categorized by less than mean minus standard deviation. "Moderate attitude" level was categorized by score between mean ± standard deviation, "Good attitude" level was categorized by score more than to mean plus standard deviation. Practice score was categorized into three level using the mean score of respondents and standard deviation. "Poor practice" level was categorized by less than mean minus standard deviation. "Moderate practice" level was categorized by score between mean ± standard deviation, "Good practices" was categorized by score more than to mean plus standard deviation.

RESULTS

Socio-demographic factors of the study participants are presented in Table-1.Among the study participants 56.4% were male, 43.6% were female. The majority of the respondents 45.6% were in age group 33-47years followed by 23.2% in age group 18-32 years old, most of the participants believed in Islam 81.2%, majority of the participants 70.4% were married ,majority 48.1% of the participants were having master's degree and above, most of the respondents 39.2% mentioned business as occupation, majority 84.5% mentioned monthly income >1000USD,12.2% had family member related to health profession, more than half of the participants (58%) took antibiotics over past 1years with or without prescription. About half of the participants (55.2%) were using some other medication currently, majority 71.3% mentioned had co-morbid disease.

Table 1 Socio-demographic factors of study participants (n-362)

Sociodemographic factors	Number (n)	Percentage (%)
SEX		
Male	204	56.4
Female	158	43.6
Age (years)		
18-32	84	23.2
33-47	165	45.6
48-62	76	21.0
63-75	37	10.2
Religion		
Islam	294	81.2
Hindu	34	9.4
Others (Buddhist, Christian)	34	9.4
Marital Status		
Single	58	16.0
Married	255	70.4
Widowed/separated/divorce	49	13.5
Education		
Higher secondary	15	4.1
Bachelor degree	173	47.8
Masters degree and above	174	48.1
Monthly Income(USD)		
1000-4900	306	84.5
5000-10000	56	15.5
Family member in health		
Yes	44	12.2
No	318	87.8
Antibiotic use within 1year		
Yes	210	58.0
No	152	42.0
Any other medication		
Yes	200	55.2
No	162	44.8
Comorbid disease		
Yes	258	71.3
No	104	28.7

Table -2 described association between sociodemographic factors and level of knowledge, attitude and practices of antibiotics use.

Chi square test and Fisher's Exact test was the statistical measurement used. Significant difference were determined at P-value <0.05.There were significant association between level of knowledge and antibiotic use within last 1year with or without physician prescription(P-value 0.002)There were significant association between level of practice and education(P-value 0.003), family member related with health profession(P-value 0.002), antibiotic use within last 1year with or without physician prescription(P-value0.008).There were significant association between level of practice and family member related with health profession(P-value 0.002).

Table 2 Association between sociodemographic factors and level of knowledge, attitude and practices of antibiotic use(n-362)

Sociodemographic factors	**Level of knowledge**			**Chi-square**	**P-value**
	Poor	**Mod**	**Good**		
Antibiotic use within 1year				12.847	0.002*
Yes	29	96	85		
No	5	72	75		
	Level of Attitude				
	Poor	Mod	Good		
Education				15.124	0.003#
Higher secondary	3	12	0		
Bachelor degree	30	124	19		
Masters degree and above	22	109	43		
Family member in health				12.081	0.002#
Yes	3	25	6		
No	52	220	46		
Antibiotic use within 1year				9.751	0.008*
Yes	42	131	37		
No	13	114	25		
	Level of Practice				
	Poor	Mod	Good		
Family member in health				12.657	0.002*
Yes	2	28	14		
No	43	235	40		

*Significant difference at p-value (<0.05), #Fisher's Exact test

Table-3 demonstrates correlation between knowledge, attitude and practice of antibiotics use.

There was moderately strong positive correlation between knowledge and attitude which was statistically significant (r=0.473, P-value-<0.001), The participants having good knowledge more likely to have good attitude towards antibiotics use. There was weak positive correlation between knowledge and practice levels which was statistically significant (r=0.388, P-value-<0.001), respondents having good knowledge tendency to have good practice. There was moderately strong positive correlation between attitude and practice which was statistically significant (r=0.436, P-value-<0.001), study subjects having good attitude were more likely to have good practice regarding antibiotics use.

Table 3 Correlation between knowledge level, attitude level and practice level towards antibiotics use

Variables	**Knowledge**	**Attitude**	**Practice**
Knowledge	**1.000**	.473	.388
		(p-<0.001)	(p-<0.001)
Attitude	**.473****	1.000	.436
	(p-<0.001)		(p-<0.001)
Practice	**.388****	**.436****	1.000
	(p-<0.001)	**(p-<0.001)**	

**Correlation is significant at the 0.01 level (2-tailed)

DISCUSSION

Mal-practices and over prescription of antibiotics are a very common problem in Bangladesh. Inappropriate and irrelevant prescribing antibiotics are a threatening concerns not only in Bangladesh but worldwide. There is a meticulous link between inappropriate use of antibiotics and development of their resistance. Therefore, proper use of antibiotics is an vital issue for patient treatment and public health issue with national preference [16].Essential drugs are one of the important medicine to improve and maintain health. However, many people around the world cannot afford essential drugs . Irrational use of antibiotics is a major concern around the world. Inappropriate use such as overuse , misuse of antibiotics may results health hazards. Antibiotics are most commonly sold drugs in developing countries and most sales are without prescriptions [11]**.** According to this study 58% of the respondents used antibiotics within last 1 year, 55.2% participants currently using some medications and 71.3% mentioned they have co-morbid diseases as this group of populations are seeking better medical management for their disease. With globalization of healthcare many patients from developing country like Bangladesh are travelling to Thailand. Thailand is a popular destination to Bangladeshi upper-middle class. Thailand has an excellent healthcare and medical tourism system to take care of patients which attract many Bangladeshis [13]. The majority (91.4%) of the study participants replied amoxicillin/ penicillin is an antibiotic**.** Similar were reported in a Palestine study by (Abu Taha et al) where 71.2% participants replied correctly [14].Antibiotic are useful for viral infection like flu" and more than one third of responded (37%) response as true which is a wrong knowledge and this is why the people often take antibiotics when they caught common cold, flu or fever. Study in Korea Kim et al found that 30.1% answered correctly that antibiotics cannot be used for viral infections [18]. For the appropriate indication of antibiotics participants had inappropriate knowledge and wrong perceptions. Study in Thailand by Kanjanachaya Sirijoti found that majority 62.37% of respondents gave right answer that antibiotics were useful in bacterial infections, 44.19% respondents thoughts antibiotics were useful for viral infection like flu this finding is similar and in accordance to previous researcher [10].

A 21.3%participants disagreed that antibiotics should be purchased on physician prescriptions , 28.7% thought that it was good to buy antibiotics without consulting a physician, 43.2% of participants had wrong attitude they thought antibiotics made them faster recovery from cold, 24.6% disagreed with the statement about which medicines are antibiotics when they take cold medicine, 21.6 % participants took leftover antibiotics when they have similar flu symptoms , 23.2% believed antibiotics should be saved for future personal use, 27.3% thought that antibiotic injections recover from infections faster,15.4% would stopped taking prescribed antibiotics if they got better,19.5% wanted to share their antibiotics with their friend while 28.2% were not sure about their attitude regarding sharing of antibiotics. All these findings are about peoples wrong attitude towards antibiotics use which is similar to study carried in Palestine adult by Abu Taha et al. (2015) [17], Korea by Kim et al.(2011) [18] , Malaysia by Ling et al (2011) [19].

This study found that there were significant association between level of knowledge and antibiotic use within last 1year with or without physician prescription. There were significant association between level of practice and education, family member related with health profession , antibiotic use within last 1year with or without physician prescription, There were significant association between level of practice and family member related with health profession. Study also found that there were correlation between knowledge, attitude and practice of antibiotic use among Bangladeshi medical tourist.

LIMITATIONS

The study results only describe the level of knowledge ,attitude and practice towards antibiotic use among Bangladeshi medical tourist at Bangkok , Thailand. This result may be similar to other studies and it is difficult to interpret any cause-effect relationship in a cross-sectional study. The result of this study is limit to the high socio-economic status of Bangladeshi medical

tourists form different part of the country, who seek the better medical management for their health problems in Thailand. It is not able to extrapolate Knowledge, Attitude, Practices of antibiotics use of all Bangladeshi citizen.

CONCLUSIONS

Regarding knowledge, attitude and practices towards antibiotics use study participants has inadequate knowledge , wrong attitude and incorrect practices in different ways. There was a significant association between knowledge attitude and practice level. More awareness program regarding antibiotic use and antibiotic resistance will increase peoples knowledge , attitude and practices. Further, in depth study is needed for current situation of medical tourists in Thailand. Increase international collaboration, improve surveillance system, monitor travel and migration history. Also, legal restriction should be increased for accessing antibiotics.

ACKNOWLEDGEMENTS

The researcher would like to thank all the participants who agreed to complete this survey. Furthermore researcher would like to express thanks and gratitude to Research Ethics Review Committee for Research involving Human Research Participants, Health Sciences Group, Chulalongkorn University for ethical approval to conduct this study.

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RISK ASSESSMENT OF COMMUNITY PERSPECTIVES FOR MALARIA PREVENTION AND CONTROL IN HIGH ENDEMIC AREA: A CASE STUDY OF HPAPUN TOWNSHIP, KAYIN STATE, SOUTH-EAST MYANMAR

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ABSTRACT

Introduction: Malaria remains a major cause for global morbidity and mortality. Identifying effective and efficient strategies to monitor populations at the high risk of malaria in high -transmission settings is essential for malaria elimination. As the vision of National Plan for Malaria Elimination, the government of Myanmar aims to achieve malaria elimination by 2030. Poor knowledge, attitude, practice and poor housing conditions in high transmission settings are key challenges for malaria elimination. The One Health approach is a cooperative, multisectoral, and transdisciplinary method by working at the local, regional, national and global levels to achieve optimal health results.
Objectives: This study aims to analyze the risk assessment of community perspectives for malaria prevention and control in high endemic area, Hpapun Township, Kayin State, South-East Myanmar.
Methodology: A cross-sectional descriptive study was performed in five villages with high malaria risk (National Malaria Control Program cover area) of the Hpapun Township between April and May, 2019. Chi-square and multiple logistic regression analyses were conducted to determine potential factors associating with malaria risk.
Results: Of 308 households, 55.8% had high risk of malaria and 44.2% had low risk of malaria. Factors of age, literacy, ethnicity, education, income, and stayed overnight among respondents were strongly associated with malaria risk. Knowledge, attitude, practice, treatment seeking behavior, housing condition and housing environment were also strongly associated with high risk of malaria. The results of multiple regression analysis indicated that middle school education (AOR=5.06, 95% CI=(2.19-11.70), financial difficulty in access to malaria health services (AOR=2.09, 95% CI= (1.03-4.25), poor knowledge level of respondents (AOR=2.20, 95% CI=1.17-4.13), poor practice level of respondents (AOR=4.12, 95% CI=2.22-7.64), people who didn't know and remember hole in mosquito bed net (AOR=3.89, 95% CI=1.57-9.62), status of "didn't know and remember" in openings in the subject's room (AOR=3.49, 95% CI=1.17-10.43) and opening in the subject's room with the hole (AOR=3.34, 95% CI= 1.71-6.50) were significantly associated with malaria risk.
Conclusion: Health for sustainable development, health personnel or integrated community malaria volunteer should be contributable to human resource enrichment in high risk areas. To reduce malaria risk more, MOHS should proceed cross-cutting interventions and develop the strategic plan including monitoring and evaluation plan. Community delivered models using One Health approach under the coordination mechanism among human, animals and environmental health communities could be a feasible approach to maximize public health benefits in any levels of societies, and may lead to malaria elimination in Myanmar.
Keywords: Malaria, Risk factors, High endemic area, South-East Myanmar

INTRODUCTION

Malaria continues a main public health issue of global morbidity and mortality [1]. As global malaria burden, the current malaria cases occur in sub-Saharan Africa (SSA), the following is the South East Asia (SEA) region [2].

In order to fight the transmission of infection, WHO and GMS nations have agreed to completely eradicate malaria in the region by 2030 [3]. Unfortunately, novel strategies, like improved housing [4] and housing environmental for malaria prevention and control, have hardly been studied [5].

In Myanmar, malaria is becoming an increasingly focal disease. In 2015, a total of 138 townships had APIs of less than 1 per 1000 at-risk population compared to 45 townships in 2006. In 2015, five states/ regions (Rakhine, Sagaing, Ayeyarwady, Kachin and Chin) out of Nay Pyi Taw territories and 14 states/regions together accounted for 63% of confirmed P. falciparum cases. Rakhine and Sagaing accounted for 20% and 16% respectively [6].

As stated by Myanmar Population and Household Census 2014 [7], there are 46,502 population in Hpapun Township. As reported by Kayin's VBDC report, malaria morbidity is very high in Hpapun township, and the second is Kyarinseikgyi township and Myawaddy township. And at Hlaingbwe, Kawkareik, Hpa An, Thandaunggyi township, malaria morbidity is still founding. As stated in macro-stratification map by API, Kayin state shows moderate and high risk area of malaria elimination. Community perspectives in malaria prevention and control is vital to reach malaria elimination goal [8].

Hence, the aim of this study was to identify risk assessment of community perspectives for malaria prevention and control of high endemic area among household representatives. The expected benefits of this study are followed: (a) providing evidence on the prevalence and the factors associated with malaria risk among household representatives in Kayin State; (b) providing information for health policy makers to develop and upgrade health services and (c) providing strategy information for malaria elimination such as malaria screening for population in high risk area, distribution of LLIN/ITN and special preventative measures.

METHODOLOGY

Data source

This cross sectional study was performed by using structured questionnaires with face to face interview to determine risk assessment of community perspectives for malaria prevention and control of high endemic area from April to May 2019.

Study Population and Sample size

Two stages cluster sampling were used. There were 305 villages in Hpapun Township and highest malaria transmission risk areas of five villages were selected by purposively sampling. Each village was selected by proportional and systematic sampling. To obtain 308 respondents, simple random sampling was used. The inclusion criteria were; (a) households representatives (b) male and female who aged over 18 and (c) people who voluntarily agree to contribute in the present study.

Measurement of variables

The structural questionnaire consists of socio-demographic characteristics, occupational characteristics, Knowledge, attitude, practice towards malaria, treatment seeking behavior, house characteristics and housing environment and behavior related to protective and control as a dependent variable.

Socio-demographic Information about age, gender, marital status, literacy, ethnicity and education level was provided by respondents.

Occupation Respondents provided information about their occupation and monthly income and daily life activities.

Knowledge was assessed by 26 items involving knowledge on malaria vector, transmission, symptoms, diagnosis, prevention and control, drug resistant malaria. The mean score was 20.19 (SD=2.171), while the respondents' range score was 13 to 26. Knowledge was categorized by three group into poor knowledge (<60%), fair knowledge (60-80%) and good knowledge (≥80%) based on the Bloom's cut off point.

Attitude was assessed by 15 items including belief on susceptibility, seriousness/threat, prevention methods and treatment. The criteria set for positive attitude scoring in each question was strongly agree=4, agree=3, neutral=2, disagree=1 and strongly disagree=0. For

negative attitude, scoring was used by conversely. The result of attitude level was categorized into poor attitude (<47) and good attitude (≥47). The obtained average mark was 47.1 with standard deviation of 4.6. The attitude score ranged from 31 to 60.

Practice was assessed by 13 items containing of use of personal protection, bed net utilization and care, control of mosquito breeding sites and treatment seeking behavior. The scoring system was 0 to 4, ranging from never, once, sometimes, often and always. The mean of practice score was 18.2 and SD was 6.0. The participant score more than 18 was categorized as good practice and one less than 18 was categorized as poor practice.

Behavior related to protective and control was assessed by 8 items including frequency of opening the window in the subject's room, taking IRS, use of household insecticide spray, sleeping with bed net, using insecticide treated net, using mosquito repellent coil at night time, bathing in the canal or stream and washing clothes in the canal or stream. The scoring system was 0 to 4, ranging from never, once, sometimes, often and always. The mean of behavior score was 16.3 and SD was 4.1. The responded with score of more than 16 was categorized as a good behavior individual and one of less than 16 was considered as a poor behavior individual.

Treatment seeking behavior was assessed by 9 items covering about early/late treatment seeking behavior, provider choice, affordability, accessibility, duration to go nearest health facility.

House condition and house environment factors was assessed by 19 items focusing on age of house in years, house tenure, housing conditions, room density, animals sleep in house, mosquito bed net, kind of mosquito bed net, mosquito bed net's hole, size of hole in the mosquito bed net, opening in the room and number of windows that close in the room. And the characteristics of the housing environment was assessed by nearest water resource, nearest forest, living on the flat ground, bushes but not trees, number of nearby houses, number of potential breeding sites, number of owned hectares/acres of land and numbers of livestock in the compound.

Data analysis

IBM SPSS version 22 was utilized to analyze the collected data that identified risk assessment of community perspectives for malaria prevention and control of high endemic area. Descriptive statistics included frequency, percentages, mean, median and standard deviation, inter-quartile range were used to analyze the data. Chi-square and multiple logistic regression analyses were conducted to determine potential factors associating with malaria risk.

Ethical consideration

The protocol was approved by the Ethical Committee of Mahidol University (MU-SSIRB) and the Certificate of Approval number was (COA-No: 2019/ 097 B1).

RESULTS

Among the socio-demographic characteristics, the group of over 40 years-old was significantly associated with malaria risk. In literacy level, people who can read only part was associated with malaria risk. For education, people who attended middle school were significantly associated with risk of malaria. Burma ethnicity was associated with high malaria risk shown as in table 1.

People who got less than 100,000 MMK per month and stayed overnight during work was significantly associated with malaria high risk. Table 1 presents that knowledge, attitude and practice were significantly associated with malaria high risk.

For treatment seeking behavior, people with financial difficulties, people with history of past malaria infection, treatment lately after 24 hours were associated with malaria risk.

For housing conditions, house with only the first floor, items of wood or branches covered with mud or branches not covered with mud, Straw or palm used for roof, houses without ceiling, other bed net type, the status of "don't know and remember hole in mosquito bed net, Openings in the subject's room was significant risk factor for malaria.

For housing environment, numbers of one and two breeding sites and acres owned house land less than one were significantly associated with malaria risk.

Table 1 Independent variables associated with malaria risk

Characteristics	Low		High		Crude OR	95% CI	P-Value
	n	%	n	%			
Age							
<40 years	81	51.6	76	48.4	1		
≥40 years	55	36.4	96	63.6	1.86	1.18-2.94	**0.008***
Literacy							
Cannot read at all	38	49.4	39	50.6	1.63	0.90-2.95	0.108
Able to read only part	33	26.6	91	73.4	4.37	2.50-7.64	**0.001***
Able to read whole	65	61.3	41	38.7	1		
Ethnicity							
Shan	57	50.9	55	49.1	1		
Karen	60	48.8	63	51.2	0.92	0.55-1.53	0.746
Burma	17	30.4	39	69.6	2.19	1.12-4.27	**0.022***
Education							
Middle school	90	36.1	159	63.9	6.25	3.21-12.19	**<0.001****
High school, University	46	78.0	13	22.0	1		
Income (kyat)							
<100000	52	36.2	90	63.8	1.83	1.16-2.90	**0.010***
≥100000	85	50.9	82	49.1	1		
Stayed overnight							
Yes	13	23.2	43	76.8	3.57	1.81-7.01	**<0.001****
No	111	51.9	103	48.1	1		
Knowledge							
Poor	48	29.6	114	70.4	3.60	2.25-5.78	**<0.001****
Good	88	60.3	58	39.7	1		
Attitude							
Poor	46	32.4	96	67.6	2.47	1.55-3.94	**<0.001****
Good	90	54.2	76	45.8	1		
Practice							
Poor	41	23.6	133	76.4	7.90	4.74-13.18	**<0.001****
Good	95	70.9	39	29.1	1		
Financial difficulties							
No financial difficulties	104	49.3	107	50.7	1		
Having financial difficulties	32	33.0	65	67.0	1.97	1.20-3.26	**0.008***
History of malaria infection							
Yes	30	34.9	56	65.1	1.75	1.05-2.94	**0.034***
No	106	48.4	113	51.6	1		
Seeking malaria treatment							
Within 24 hours	46	38.0	75	62.0	1		
After 24 hours	4	30.8	9	69.2	3.67	1.07-12.60	**0.039***
Number of floors							
1 floor	98	41.2	140	58.8	1.99	1.12-3.49	**0.018***
2 floors	36	58.1	26	41.9	1		
Composition of house Walls for first floor of house							

Characteristics	Low		High		Crude OR	95% CI	P-Value
	n	%	n	%			
Brick or adobe	12	70.6	5	29.4	1		
Wood or branches covered with mud or branches not covered with mud	81	38.4	130	61.6	3.85	1.31-11.34	**0.014***
Composition of house Walls for second floor of house							
Brick	23	71.9	9	28.1	1		
Wood or branches covered with mud or branches not covered with mud	13	41.9	18	58.1	3.54	1.24-10.11	**0.018***
Materials used for roof of house							
Zinc sheet	103	48.8	108	51.2	1		
Straw or palm	30	35.7	54	64.3	1.72	1.02-2.89	**0.042***
Other	2	18.2	9	81.8	4.29	0.91-20.34	0.066
Ceiling							
Yes	37	61.7	23	38.3	1		
No	99	40.6	145	59.4	2.36	1.32-4.21	**0.004***
Kind of mosquito bed net							
LLIN	14	73.7	5	26.3	1		
ITN	114	43.7	147	56.3	3.61	1.26-10.32	0.17
Others	8	29.6	19	70.4	6.65	1.79-24.73	**0.005***
Number of hole in the mosquito bed net							
None	38	63.3	22	36.7	1		
1-6	65	43.3	85	56.7	2.26	1.22-4.18	**0.010***
Don't know / remember	33	34.0	64	66.0	3.35	1.71-6.56	**<0.001****
Size of hole in the mosquito bed net							
1-2 cm	53	46.9	60	53.1	1		
3-4 cm	4	66.7	2	33.3	0.44	0.78-2.50	0.357
Don't know/ remember	29	22.5	100	77.5	3.04	1.75-5.30	**<0.001***
Openings in the subject's room							
No	77	56.6	59	43.4	0.39	1	
Yes	46	33.8	90	66.2	2.55	1.56-4.17	**<0.001****
Don't know/ remember	13	37.1	22	62.9	2.21	1.03-4.75	**0.042***
Number of any kinds of potential breeding sites							
None	67	34.0	130	66.0	1		
1	28	34.1	54	65.9	3.74	2.17-6.44	**<0.001***
2	14	50.0	14	50.0	1.94	0.87-4.31	**<0.001***
Acres of owned house land							
< 1 hectare	115	49.4	118	50.6	2.51	1.42-4.41	**0.001***
>1 hectare	21	28.0	54	72.0	1		

Table 2 shows the significant independent variables potentially predicting malaria risk in the multivariate model. Education of the respondents was a significantly predicted risk factor for malaria. People who had middle school was 5.06 times at higher malaria risk than those had high school or university. Financial difficulty in access to malaria health services was still statistically risk factor for malaria risk and was 2.09 times at higher malaria risk than no financial difficulties.

Both poor knowledge and poor practice were still risk factors for malaria. Poor knowledge and poor practice were 2.00 and 4.12 times at higher malaria risk than the reference group, respectively. Therefore, poor knowledge and poor practice were important determinant factors for malaria risk even in the multivariable regression model.

Housing characteristics including number of hole in mosquito bed net and openings in the subject's room with the hole associated with malaria risk. People who didn't know and remember hole in mosquito bed net was 3.89 times at higher malaria risk than the reference group. The status of "didn't know and remember" in openings in the subject's room was 3.49 times at higher malaria risk than the reference group. Opening in the subject's room was also 3.34 times at higher malaria risk than the reference group.

Table 2 Predictor factors for malaria risk

Independent variables		**95% CI**		**P-value**
	Adj OR	**Lower**	**Upper**	
Education				
Middle school	5.06	2.19	11.70	**<0.001****
High school, University	1			
Financial Difficulty				
No financial difficulties(No)	1			
Having financial difficulties(Yes)	2.09	1.03	4.25	**0.041***
Knowledge				
Poor	2.20	1.17	4.13	**0.014***
Good	1			
Practice				
Poor	4.12	2.22	7.64	**<0.001****
Good	1			
Number of hole in the mosquito bed net				
None	1			
1-6	2.09	0.94	4.67	0.072
Don't know / remember	3.89	1.57	9.62	**0.003***
Openings in the subject's room				
No	1			

Independent variables		95% CI		P-value
	Adj OR	Lower	Upper	
Yes	3.34	1.71	6.50	**<0.001****
Don't know/ remember	3.49	1.17	10.43	**0.025***

DISCUSSION

As for education, people who had middle school were associated with high malaria risk. This result was similar with another study conducted in Taninthari Region, Myanmar, which revealing knowledge, attitude and practice level of malaria was associated with education level [9]. This study suggested that the more education level increase, the more likely the respondents were to implement good practice. In the present study, education might enhance people autonomy, hence increasing ability of decision making of people regarding their own health.

In the present study, total family monthly income less than 100000 MMK was associated with malaria risk. This finding was similar with the another study was done in Tanintharyi region, Myanmar in 2015 that total family yearly income were risk factors for malaria infection [10]. In this study, the finding revealed that lower income family have poor housing conditions because they have not enough money to repair or maintain their houses. In the current study, low income family may have a lower purchasing capacity for, and access to malaria-protective measures and not accessing radio and television for health messages.

Majority of the respondents had poor knowledge (52.6%) while some respondents had good knowledge (47.4%). Poor level of knowledge were statistically associated with malaria risk. This outcome is same as another study at Myanmar in which poor knowledge had high odd ratio for malaria infection than good knowledge [10]. In the present study, it might be that poor knowledge level had less to access health information and awareness and less to access IEC material for malaria and take appropriate malaria preventive actions and it was relatively high malaria risk.

Only 43.5% of the respondents had good practice whereas about 56.5% of respondents had poor practice. The current study indicated that people who had poor practice level was significantly associated malaria risk. It might be that low knowledge and utilization of malaria prevention methods including wear long-sleeved clothes, use of mosquito repellent spray and sleep under LLIN/ITN in the endemic setting. This finding agreed with the previous study which practice on malaria was statistically associated with malaria infection [11]. This study suggested that it may be upgraded practice about malaria and provided anti-malarial supplements to reduce malaria infection.

One to six hole in the mosquito bed net was the risk factor for malaria in the present study. People who didn't know and didn't remember how many hole in mosquito bed net was significantly associated with malaria risk. These results were correlated with the finding in the previous study that 28% of bed nets with big holes was strongly associated with higher malaria infection prevalence [12].The reason may be that the mosquito bed nets with holes allow to entry the mosquito and stay longer in bed net in the present study. Similarly, people who did not know and remember how large the size of hole in the mosquito bed net was significantly associated with increased malaria risk.

In the present study, opening in the subject's room and the status of "did not know and remember" were statistically significant with malaria risk. This finding was remarkably similar to the another study in 2017, it showed that household factors such as having open eaves or gaps in walls were associated with increased risk of *malaria* infection [13]. In the presence study, it may be that these factors were increased with transmission for malaria.

CONCLUSIONS

In terms of multiple logistic regression, the current study found that education, financial

difficulty, knowledge, practice, hole in the mosquito bed nets, gap in the subject's room were predictive of malaria risk among respondents.

RECOMMENDATION

Community delivered models using One Health approach under the coordination mechanism among human, animals and environmental health communities could be a feasible approach to maximize public health benefits in any levels of societies, and may lead to malaria elimination in Myanmar.

ACKNOWLEDGEMENT

This study was supported by South-East Asia One Health University Network Scholarship. The authors would like to thank Dr Norikazu Isoda, Associate Professor of Unit of Risk Analysis and Management Hokkaido University, Japan for supporting and developing the project.

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PATTERNS OF BETEL NUTS CHEWING AMONG WORKERS OF MYITNGE TRAIN CARRIAGE AND WAGONS WORKSHOP

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ABSTRACT

Introduction: Betel nut has been used widely throughout the history and deeply cultivated in some religious and some sociocultural events. Although betel nut chewing is not a problem for worldwide but still affects the Asia and Pacific regions such as Myanmar, Sri Lanka, India, Cambodia and Papua New Guinea. Betel nuts are defined and classified as carcinogen by World Health Organization (WHO). Many studies, researches and statistics show that betel chewing is related to health impacts and diseases such as oral and oesophageal cancer. In Myanmar, when people have betel nuts chewing habits, they also tend to have alcohol drinking habits.

Objectives: This study identified the patterns of betel nuts chewing among workers of Myitnge Train Carriage and Wagons Workshop.

Methodology: This was a cross-sectional study with representative sample of 320 workers (men) selected from total 1467 workers of Myitnge Train Carriage and Wagons Workshop. The workshop is under management of Ministry of Transportation and is located in Myitnge Township, Mandalay Division. Simple random sampling was used for sampling technique. Descriptive and Chi-square test (bivariate analysis) was used for statistical analysis. The researcher team conducted the study by face to face interview.

Results: The mean age of the participants was 37.97± 10.42 years.16-20 years age was the highest age group (42.2%) in started betel nuts chewing age. 208 participants (65%) have consumed “92” which is one of the betel nuts type. 23.8% of participants chewed 5 packs and more of betel buts in the past 12 months. They chew betel nuts mostly at work and home. 30 participants in this study have gum diseases because of betel nuts chewing.

Conclusion: Almost half of the participants in this study started chewing betel nuts at age 16-20 years old. “92” betel nut is the most popular betel nuts among workers and 1-3 days per month is most common chewing habits among all participants. Future interventions and programs should be done for participants who chew betel nuts a lot in this study. Also, studies about patterns of betel nuts chewing should be conducted more in workers in Myanmar since there are only a few studies about them.

Keywords: Betel nuts, Pattern, Workers

INTRODUCTION

Betel nut which is also known Areca Nut, is the seed of fruit of areca palm (Areca Catechu). There are different names, pronunciations, ingredients depend on cultural and traditional groups. The seed is supposed to be taken out from outer layer of the fruit and there are various types to be used such as dried, fresh, boiled, baked, roasted or cured. Popular method for betel nut is slice into thin pieces and roll all the pieces into betel leaves with lime powder or crushed seashells. This type of mixture is called betel quid, betel chew, betel nut chew and betel pan [1].

Betel nut has been used widely throughout the history and deeply cultivated in some religious and some sociocultural events. In United Kingdom and other developed countries, betel nut chewing continues and enhanced the use of betel nut during migration to other continents. British Asian have brought the betel nut chewing habits from India, Pakistan, Bangladesh and other countries and it becomes culturally bound to them. So there were a lot betel nuts chewers among UK and other countries decades ago. Nowadays, betel nuts chewing can be found only among Asian and Pacific regions [2].

Dr.William Adu-Krow, World Health Organization Country Representative of Papua New Guinea, present a speech at the ceremony of 'National No Betel Nut Day' in 2008 that Papua New Guinea is the number one country in highest incidence rate of oral cancer all over the world. WHO statistics of 2008 indicated that Papua New Guinea is the highest rate country of oral cancer with 32.3 out of 100,000 citizens [3].

There are a lot of psychoactive alkaloids contained in betel nut which can affect to human health. These alkaloids especially arecoline can damage to autonomic nervous system and damages to human body [4]. Some people have immediate side effects after they chewing betel nuts or areca nuts. The side effects are feeling alert, rapid heart rate and palpitations, high blood pressure, mild euphoria, red face,feeling warm and sweating. People who chew areca nut for the first time can get side effects such as tremor, dizziness, upset stomach, diarrhea, vomiting and psychosis. If people chew betel nuts for a long time, there are so many risk and diseases that can affect to human body especially around the mouth, oral cavity and so many others. The long effects of betel nut chewing are mouth ulcer, gum disease and dental caries, and gum discolouration,which can be turned into reddish brown colour,submucous fibrosis and oral cancers stomach ulcer and cancer, dependence on betel nut and heart disease [1]. There are different types of betel nuts such as ninety two, forty five, parajet, star, signal, hundred, steamed leaves and without tobacco. Ninety two (92) is the most common type among betel nut consumers. Star, signal and parajet are very strong type of betel nuts which can cause alcohol-like effect. Some people like to chew betel nuts which is mixed with other indgredients.

In a study of betel nut chewing and its related factors in adolescent students in Taiwan, it stated that betel trees were planted in different kinds of regions in Taiwan. Betel chewing is a routine habit for some places and also particular ethnic groups. 59.0% -88.2% of oral cancer patients were caused by betel nut chewing. This study also indicates that there are rising numbers of betel nut chewing in different places and regions of Taiwan. Also, prevalence rate of betel chewing in cities is lower than villages [5].

In Myanmar, betel chewing habit is very popular since ancient times. Not only Myanmar royalties like to consume betel nuts but also commoners are really fond in chewing betel nuts or areca nuts. Both men and women consume betel nuts and other varieties of areca. Also, betel nut chewing habits are more common in rural areas than urban areas nowadays. Oral cancer is the fourth highest in male and sixth highest in women [6]. Myanmar has the highest prevalence of betel chewing in South East Asia in 2009 according to WHO. Betel chewing rate in Myanmar is 51.4% in male and 16.1% in female with total average of 29.6% in 2009.The age group is 15-60 years old because all of the betel nuts chewers were between these age groups. The survey was done by STEPwise approach to surveillance which is also known as STEPS [7].

There are still only a few research articles that focus on betel nuts chewing Myanmar. Also, there are no study about

workers that are working in factories of Myanmar. So, this study will focus on betel nuts chewing and determine the patterns of use towards betel nuts chewing among workers. Implication of the findings will help providing baseline information to the concerned local authorities for the necessary intervention as well as for further study.

METHODOLOGY

Study Design, Population and Sample size

The study was a cross-sectional study and was conducted in Myitnge Train Carriage and Wagons Workshop which was located on Mandalay region. There were 1467 workers in Myitnge Train Carriage and Wagons Workshop. The reason of doing research in this factory is that there was no previous study that conducted in this area before. The sample for this study was 320 participants that were selected from workers. Simple random sampling method was used in this study. Inclusion criteria for this study was the participants who were chewing betel nuts.

Materials and Procedure

This study determined the different measurements that are related to patterns of betel nuts chewing such as frequency, amount, type of betel nuts, reasons of use and others. There are different types of betel nuts included in the study such as ninety two, forty five, parajet, betel nut without tobacco and other types of betel nuts. In terms of amount, one pack contain 3 pieces of betel nuts. In the questionnaire, there were three main parts; (1) Socio-demographic factors, (2) History of betel nuts chewing and (3) Patterns of betel nuts chewing in the past 12 months. The structure of questionnaire was approved by 3 specialists with related field in order to gain content validity. The Index of Item-Objective Congruence (IOC) was conducted and the score was 0.9 (≥0.8). This study was approved by Chulalongkorn Ethical Review Committee.

Data Collection

This study was conducted by face to face interview using structured questionnaire. The interviews took 10 days and the whole data collection process took 2 weeks.

Data Analysis

Data analysis was performed using SPSS software, version 22. Frequencies, means, standard deviations and ranges were used to describe the demographic characteristics of the participants. Chi-square test was used for bivariate analysis to determine the association between socio-demographic characteristics and betel nuts chewing.

RESULTS

Socio-demographic factors

Table 1 include descriptive statistics of socio-demographic characteristics of the participants such as age, marital status, education, religion and ethnic groups. The age groups were divided into 5 groups such as younger than 20, 20-29 years old, 30-39 years old, 40-49 years old and older than 50. The average age of the participants in this study was 37 years old. The youngest age was 16 years old and the oldest was 60 years old. There were 7 participants who are younger than 20 and 66 participants (20.6%) who were in age group of 20-29 years old. 30-39 years old age group have the highest percentage (34.4%) of total participants. Also, there are 51 participants who were 50 years and above. There were 4 different marital status in this study with single, married, divorced and widowed. Most of the participants in this study were married (72.1%) and 78 participants were single. There were 6 participants who were divorced and 5 participants who were widowed. In this study, the education level were divided into 4 groups. These were primary school, middle school, high school and above high school. 85 participants (26.6%) in this study had education level of college and higher degree. 95 participants (29.7%) had middle school education level and 92 participants (28.7%) had high school education level. Primary school education level is the lowest in this study with 48 participants (15%). Also, 4 different groups were of religions were included in this study. Most of the participants were Buddhist with 82.4% with only Christian (6.6%), Hindu (4.4%) and Muslim (6.6%). 226 participants (70.6%) in this study were Myanmar with Kayin (3.1%), Shan (3.1%) and others (23.2%).

History of betel nuts chewing among participants

Table 2 showed that the average age for started chewing was 25 years old. The youngest age was 14 years old and the oldest age was 50 years old. There are 2 participants who started chewing at the age of younger than 15 years old. 29.1% of total participants were starting to chew betel nuts at the age group of 20-24 years old which have the highest percentage.

34 participants started having betel nuts chewing habits because of the problems in work, family, relationship. Experiment (42.2%) is the main reason for started chewing betel nuts among all the participants. Events such as festivals, celebrations make 10.6% of the participants to start chewing.

Patterns of betel nuts chewing among participants in the past 12 months

In table 3, one hundred participants (31.3%) have consumed betel nuts tobacco in the past 12 months. “92” (65%) is the betel nuts type that the participants mostly chew. “Parajet” (28.2%) have been chewed by total 90 participants within 12 months. After these 3 betel nuts types, there are “Signal” (25.6%), Steam leaves (25%), “45” (23.4%), “Star” (23.4%) and “100” (23.1%).

176 participants (55%) have habits of chewing betel nuts 1-2 packs per single occasion. 23.8% of total participants can chew 5 packs and more of betel nuts per single occasion in the past 12 months as mentioned in table 3.

103 participants consumed betel nuts frequently for the whole day in the past 12 months. Chewing habits in afternoon is in second place with 28.4% and chewing habits in morning (20.9%) is third. Only 10 participants used to chew betel nuts at night. 143 participants stated that they chewed betel nuts in the past 12 months because of their own intention with no other reasons. 105 participants (32.8%) were chewing betel nuts because they have encouraged by co-workers or friends. Problems in work, relationship and family cause 24 participant to chew in the past 12 months. 84 participants said that they have chewed betel nuts in any place and 46.2% have habits of chewing at work. 48 participants (15%) like to chew betel nuts at home.

Association between socio-demographic characteristics and amount of betel nuts chewing per single occasion

Relationships of the characteristics and amount of betel nuts chewing per single occasion were measured in table 4. According to statistics, older age were chewing more packs than younger ones with p-value=0.27 and people who do not have partners have higher chance of chewing more betel nuts than those who have partners (p-value=0.59). There is no significance between education and amount of betel nuts chewing per single occasion (p-value=0.4) and also income (p-value=0.75). Religion have statistically significant difference with amount of betel nuts chewing per single occasion (p-value=0.01) with other religions were chewing more packs than Buddhists. Also, there were no significant difference between characteristics and amount of betel nuts chewing by measuring chi-square test.

Table 1 Socio-demographic characteristics of the participants

Socio-demographic characteristics	Number	%
Age		
Younger than 20	7	2.2
20-29 years old	66	20.6
30-39 years old	110	34.4
40-49 years old	86	26.9
50 years and older	51	15.9
Mean±SD= 37.97±10.42 Range= 42.00 Median= 36.00		
Marital Status		
Single	78	24.4
Married	231	72.1
Divorced	6	1.9
Widowed	5	1.6
Education		
Primary school	48	15
Middle school	95	29.7
High school	92	28.7
College and higher degree	85	26.6
Income		
80 USD	236	73.8
100 USD	64	20.0
120 USD	20	6.2
Religion		
Buddhist	264	82.4
Christian	21	6.6
Hindu	14	4.4
Muslim	21	6.6
Ethnic groups		
Myanmar	226	70.6
Kayin	10	3.1
Shan	10	3.1
Others	74	23.2

Table 2. History of betel nuts chewing among participants

History of betel nuts chewing	Number	%
Age of started chewing betel nuts		
Less than 15 years old	2	0.6
15-19 years old	80	25.0
20-24 years old	93	29.1
25-29 years old	49	15.3
Older than 30	96	30.0
Mean ± SD = 25.09± 7.89 Range = 14.00-50.00 Median = 22.50		
Reason for started chewing betel nuts		
Problems in work, family and relationships	34	10.6
Experiment	135	42.2
Encouraged by boss or co-worker	49	15.3
Encouraged by family members	33	10.3
Events (e.g.-festivals, celebrations etc)	34	10.7
Others	35	10.9

Table 3 Patterns of betel nuts chewing among participants (past 12 months)

Patterns of betel nuts chewing	Number	%
Type of betel nuts		
Without tobacco	100	31.3
" 92 "	208	65.0
" Parajet "	90	28.1
" 45 "	75	23.4
" 100 "	74	23.1
" Signal "	82	25.6
" Star "	75	23.4
" Steamed leaves "	80	25.0
Betel nuts chewing frequency per month		
Monthly	43	13.4
2-4 days per month	93	29.1
1-3 days per week	99	30.9
4 days per week and more	85	26.6
Amount of betel nuts chewing in single occasion		
1-2 packs	176	55.0
3-4 packs	68	21.2
5 packs and more	76	23.8
Mean ± SD= 3.16 ± 2.39 Range= 1.00-15.00 Median= 2.00		
Time of chewing		
Morning	67	20.9
Afternoon	91	28.4
Evening	49	15.3
Night	10	3.1
Above all	103	32.3
Reason for drinking		
Problems in work, family and relationships	24	7.5
Events (e.g- festivals, celebrations etc)	48	15.0
Encouraged by co-workers or friends	105	32.8
Just want to chew (no other reason)	143	44.7
Place of chewing		
Home	48	15.0
Work	148	46.2
Restaurants and bars	25	7.8
Others	15	4.7
Above all	84	26.3

Table 4 Association between characteristics of the participants and amount betel nuts chewing per single occasion

Characteristics	Amount of betel nuts chewing per single occasion		p-value	X^2
	Less than 5 packs N (%)	5 or more packs N (%)		
Age			0.26	1.23
Younger than 36 years old	117 (48.0%)	42 (55.3%)		
36 years old and older	127 (52.0%)	34 (44.7%)		
Marital status			0.58	0.70
Single/Divorced/Widowed	66 (27.0%)	23 (30.3%)		
Married	178 (73.0%)	53 (69.7%)		
Education			0.40	0.06
Primary/middle/high school	182(74.6%)	53 (69.7%)		
College and higher	62(25.4%)	23 (30.3%)		
Income			0.75	0.40
100 USD and less	181 (74.2%)	55(72.4%)		
More than 100 USD	63 (25.8%)	21 (27.6%)		
Religion			0.01	0.75
Buddhist	203 (83.2%)	61 (80.3%)		
Other religion	41 (16.8%)	15 (19.7%)		
Ethnic groups			0.50	0.45
Myanmar	170 (69.7%)	56 (73.7%)		
Other ethnic groups	74 (30.3%)	20 (26.3%)		
Alcohol drinking			0.70	0.94
Less than 5 drinks	170 (69.7%)	55 (72.4%)		
5 or more than 5 drinks	74 (30.3%)	21 (27.6%)		

DISCUSSION

In this study, average age of started chewing was 25 years old among all participants. 70 % of participants started chewing before they turned 30 years old. It is similar to a study in Myanmar that conducted in 2016. There are more participants who started chewing before 30 than those who stated chewing after they turn 30. In a study from Myanmar, average age of started chewing is 29 years old. So, it is almost similar as average age of this study was 25 years old. The previous study was conducted among adult males of Insein Township, Yangon [8]. Experimental chewing is the main reason for started chewing betel nuts among all participants. No study had done for research in main reason for started chewing betel nuts yet.

As betel nuts chewing is still popular in Myanmar, there are a lot of people who chew betel nuts. Also, there are still a lot betel nuts chewers not only in rural areas but also in big cities such as Yangon and Mandalay [8]. In Mandalay, there are a lot of betel nuts shops and sellers. People can get different kinds of betel nuts such as “92”, “45”, “100” and many others. The most popular types of betel nuts in Mandalay were betel nuts without tobacco and “92”. In this study, “92” is also the most popular betel nuts type among participants and it is followed by betel nuts tobacco, “100”, “ Parajet”, “45”, “Signal”, steam leaves and “Star”. It means that “92” is the most popular betel nuts in Mandalay.

Patterns of betel nuts chewing in the past 12 months are measured in this study. There will be types of betel nuts, frequency, amount, reason of use, place and time of use for betel nuts chewing in the past 12 month. As people like to chew “92” betel nuts the most, it is also the most popular betel nuts type in the past 12 months in this study. In the past 12 months, 1-3 days per week is most common chewing habits among workers. The average of betel nuts chewing per single occasion in the past 12 months is also 3 packs. So, it is also lower than the study that conducted in Insein Township which have 16 packs average. But the previous study was conducted on general population and this study only focus on workers. So, the results can be different. A lot

of workers in this study have habits of chewing betel nuts the whole day. But other people like to chew at specific time such as morning, afternoon, evening and night. In this study, the main reason for chewing betel nuts chewing in the past 12 months is own satisfaction but no other reasons. So, it is different from previous study that conducted in Myanmar. In the previous study, own satisfaction to chew betel nuts is not the most common reason [8]. There was only one significant difference in association between socio-demographic factors and betel nuts chewing and it was only religion. There was no previous study that focus on religion and btetel nuts chewing. So, it cannot be compared with other study in this aspect. In this study 320 participants have alcohol drinking habits too. They like to chew before they drink alcohol.

CONCLUSIONS

Betel nuts chewing is still popular around Myanmar. Betel nuts sellers sell mostly with small shops which provide betel nuts and other snacks. So people can buy betel nuts easily from the shops and there are thousands of betel nuts shops in Mandalay and Myitnge Township. Also, there are lots of signs that said betel nuts chewing is harmful to the people around Myanmar but many people are still consuming betel nuts. So community wide programs and plans are needed to conduct. Education programs for risks of betel nuts should be implemented. Frequency of betel nuts chewing in this study was smaller compared to previous study. As this study focus only on workers, it is hard to provide comparison with general population. Still, lots of people in this factory are chewing betel nuts and future interventions, to prevent oral cancer and other diseases because of betel nuts chewing, should be conducted in the future in this factory. And, education for risks of betel nuts chewing should be conducted more around the Myanmar. So, people will get more information about betel nuts and its risks.

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DISCRIMINATION AGAINST *HIJRA* (TRANSGENDER) IN ACCESSING BANGLADESH PUBLIC HEALTHCARE SERVICES

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ABSTRACT

Introduction: The *hijra* (transgender) are socially excluded population in Bangladesh. Access is a key concept in the study of healthcare which measures the capability of the health system to reach all level of the population. In spite of the legal recognition of their gender identity, *hijra* have limited access to health service deliveries as various studies revealed. Moreover, they are socially discriminated and it could be assumed that *hijra* might be discriminated in accessing public healthcare services.
Objectives: To examine healthcare experiences of *hijra* individuals and also service providers and non-*hijra* patients who are involved in creating a healthcare environment for *hijra* individuals in public hospitals.
Methodology: A total of 25 in-depth interviews (14, 8 and 3 with *hijra*, service providers and non-*hijra* patients respectively), and 3 key-informant interviews (a *hijra* community leader and 2 high-ranking government health professionals) along with hospital observations, were conducted. Data were analyzed utilizing thematic analysis.
Results: The findings revealed that only 'male' and 'female' focused facilities were available in public hospitals with no specific facilities for '*hijra*' identified patients. *Hijra* experienced verbal harassment, blame for health sufferings and denial of equal treatment. They stated that prevention, test and treatment facilities were inadequate and irregular for them. Service providers had a limited understanding of *hijra* care and culture and they were reluctant to communicate efficiently with *hijra* patients. According to service providers and non-*hijra* patients, *hijra* individuals act as 'panic-makers' and show 'poor' social manners in the care environment of hospitals. Several health needs and loopholes of public hospitals were reported by *hijra* and service providers, with expectations for a change in the future.
Conclusion: This study recommends that *hijra* identity as a gender category should be institutionally incorporated in the healthcare system to decrease discrimination and increase equitable healthcare services for the *hijra* population. Culturally competent healthcare, education and training of service providers, along with adapting guidelines for *hijra* care are suggestions from this study to ensure appropriate, safe, and respectful healthcare services in public hospitals.
Keywords: *Hijra*; Discrimination; Healthcare access; Public hospital; Bangladesh

INTRODUCTION

Recently, Bangladesh government has officially recognized *hijra* as 'third gender'. However, the mainstream society does not accept *hijra* beyond the dichotomous 'male-female' gender range. As a result, their vulnerabilities, dissatisfactions, and socio-political uncertainties remain out of focus, and their socio-economic conditions, social networks and mobility face discrimination that leads them to have low self-esteem, low income and poor social dignity [1].

Poor economic condition of the *hijra* does not allow them to seek healthcare services from the private sector. As a result, they seek available cost free services mostly from NGO based health centers. However, those NGO based health centers only provide services for STI and HIV infection for *hijra* patients but no

services for other health sufferings. Often, those initiatives are interrupted by financial uncertainty as they are supported by aid agencies only for short-term. In this circumstance, public health care is the ultimate option for *hijra*.

Studies show that transgender accessing general healthcare is difficult on various levels due to the type of their relationship with healthcare and discrimination, stigma, harassment, ignorance, and structural barriers [2-5]. *Hijra* experiences with marginalization as a result of their lack of access to health in many countries in South Asia [6]. They are dissatisfied with modern healthcare as they are not fairly treated for their gender identity, which leads them to seek healthcare in the traditional sector or depend on self-medication.

In Bangladesh, very few studies on *hijra* health situation have been conducted and these were not focused on *hijra* access to public healthcare services. Therefore, an understanding of their health needs and access has remained obscure. Little attention has been paid on empirical research. It is important to conduct empirical research which can produce first-hand knowledge for policy formulation. For *hijra* population, policy action is important part of the government to address the organizational (hospitals), professional (service providers), and *hijra* social context. This study aims to examine experiences and views among the study participants about *hijra* care and health needs in public healthcare settings in Bangladesh.

Theoretical Perspectives: Access Theory and Theory of Statistical Discrimination

To understand the phenomenon of *hijra*'s access to health care, the study embraced "Access Theory" and theory of Statistical Discrimination. Access theory, developed by Penchansky and Thomas[7], was used to have an in-depth analysis of existing service gaps and the relationship between *hijra* patients and service providers within the public healthcare settings. Theory of Statistical Discrimination was used to analyze the relationships between discrimination in society and specific disparities of *hijra* populations in healthcare settings.

METHODOLOGY

This study applied qualitative tools of data collection. Three groups, who interact with each other in public healthcare environment, have been considered as target groups of the population: self-identified *hijra* as demand-side group, supply-side group who are the healthcare service providers working in the public health sector, and other group is non-*hijra* patients seeking healthcare in the public health sector.

The study used purposive sampling technique to identify and select the informants. This study has set up participant's inclusion criteria, such as, for *hijra*, (a) individuals who identified themselves as *hijra*, (b) age must be over 18 years, (c) having accessed or tried to access healthcare services in the public health sector; for service providers (a) service providers who were providing healthcare services, and (b) dealt with *hijra* patients in the public health sector; and for non-*hijra* patient, (a) individuals who did not identify themselves as *hijra*, (b) age must be over 18 years, (c) having accessed healthcare services in the public health sector.

Data Collection

First, the interview guidelines for different groups of participants were developed based on the literature review. The researcher conducted 'field test' the instrument to identify problems that could be experienced by respondents during the actual study. Semi-structured interview was applied. It was open ended but followed guidelines that created space for interviewees. Clear, short and open-ended questions were used to elicit informative responses. Twenty-five in-depth interviews and three key-informant interviews were conducted. All interviews were recorded and transcribed.

This study has started with the ethical approval of Mahidol University Institutional Review Board (MU-IRB). Ethical standards have been maintained to not put participants in a situation where they might be at risk of harm as a result of their participation. As *hijra* is a socially stigmatized and discriminated identity, so this study protected their rights, along with other participants by ensuring voluntary participation, informed consent.

Data Analysis

Atlas.ti software was used only for coding and sorting out all data, allowing for the development of themes. Themes were identified and analyzed to represent the content of the entire data set and given an understanding of predominant themes. *Hijra*, non-*hijra* and healthcare service providers were first analyzed separately to allow for relevant themes to emerge. Themes that appeared then began to meet across participant groups and answer the research questions. 'The six phases of thematic analysis' developed by Braun and Clarke[8] was followed to effectively conduct a strong thematic analysis for identifying, analyzing, and reporting patterns within the dataset.

RESULTS

Encountering Difficulties in Ticket Counter: Where is 'hijra'?

In outdoor services of a public hospital, it was observed that there were only two gender-specific counters serving male and female patients separately. They were not formally entitled for services due to the unrecognized *hijra* identity in the hospital. Therefore, to receive a ticket, they are supposed to be documented either male or female.

They had experienced verbal and physical abuse when they stood in a queue with both male and female patients at the ticket counter. Sometimes, non-*hijra* patients complained about *hijra*'s presence to the receptionist of the counter. They could not stay in the queue due to negative attitudes of non-*hijra* patients and staffs. The negative attitudes include verbal insults, poking, teasing, and bullying.

Encountering Difficulties in the Waiting Area: Who Goes First?

Non-*hijra* patients sat on a chair or bench but *hijra* patients were not allowed to sit with non-*hijra* patients at the doctor's room. As a result, *hijra* stood away from non-*hijra* patients. It was informed that doctors' assistants tried to skip *hijra* patients' serial number and showed favor towards non-*hijra* patients. Non-*hijra* patients shared about their health problems and kept social interactions among themselves during the waiting time, but they did not welcome *hijra* patients in their conversations. Moreover, there is toilet facility only for male and female but no specific toilet for *hijra*; and they reported that they had faced uncomfortable experiences when they needed to use toilet. Absence of toilet for *hijra* makes them to use either male or female toilet, which further make them embarrassed.

Encountering Difficulties in Doctor's Room: No Patience for Hijra Patients

Majority of *hijra* participants reported that doctors had felt uncomfortable when they entered their rooms. Doctors asked about their health problem but showed unwillingness to know in detail. In some cases, doctors blamed *hijra* patients for their 'unhealthy' sexual practice, that is, anal sex. Many claimed that doctors spent enough time for examining health problems of non-*hijra* patients, but did not want to listen problems of *hijra* patients. They also perceived that service providers, including doctors, have no idea about *hijra* culture and sexuality.

Wards for Male and Female: Where is Hijra Ward/Bed?

There are two specific genders (male and female) ward available in the hospital setting. *Hijra* do not feel comfort staying in male or female ward. They were allowed in female ward as their gender attitude is feminine. But, female patients and their family members felt embarrassed for this. Moreover, hospital staff were not attentive and cordial to them. In spite of having beds available in wards, *hijra* patients could not get a bed. Often, they are told to stay on floor.

Inadequate and Irregular STI and HIV Services

Most of the *hijra* participants said that they were worried and frustrated for not having pre and post-test counselling service, free condom and lubricant for prevention and treatment practices of STI/HIV in public hospitals. A NGO intervention provided these services free of cost, but it was stopped. This created a situation where most of the *hijra* were involved in unsafe sexual practice due to unavailability of condom and lubricant. Most participants also expressed that they could not afford the cost of condom and lubricant in the market.

Unavailability of Other Hijra Specific Services

Services relating to hormonal therapy for breast development, laser treatment for hair removal, counselling for psychological or mental health problems and surgical castration are expected by *hijra*. Hormone therapy helps to change their secondary sex characteristic, which requires specialist surgeon's prescription, but most of them take this therapy without a prescription. Castration, the sex change surgery among *hijra*, is not available in the hospital. *Hijra* go to untrained doctors or local health practitioners for this treatment which is expensive. As a result, they face dual vulnerabilities: the risk of infection and economic burden.

Castration surgery for the conversion of sex was not available and even not welcomed in hospitals. A female doctor, specialized in plastic and reconstructive surgery, told that operations in relation to sex change goes against religious and social harmony, that is why, many doctors keep themselves away from giving such services to *hijra* in public hospitals. However, some private practitioners and clinics may provide such a risky operation in the exchange of a huge money, it may cause infection in private parts of body.

Hijra: 'The Panic Maker'

Both non-*hijra* and service providers stated that the *hijra* population is not well-mannered and does not know enough social etiquette as they live outside the mainstream society. Most of them were aggressive and created panic in the hospital. They had the least amount of patience to adjust with hospital environment.

Receptionist reported that *hijra* patients did not want to maintain the queue and made trouble in front of the ticket counter. Generally, *hijra* patients came to the hospital with their *hijra* friends. In most of the instances, they quarreled with non-*hijra* patients and used offensive words, which created panic situations at the counter premise. Other patients complained to get them out of the queue.

Difficulties in Serving Hijra Patients

As there was no option for '*hijra*' gender, the receptionist had nothing to do regarding *hijra* gender classification. Most of the cases, *hijra* preferred to recognize themselves as a 'female' due to having no '*hijra*' or third gender option. Many service providers stated that *hijra* patients could not explain their problem and also understand advice properly due to lack of education and having no societal manners. Therefore, they talked unnecessarily which wasted time and also affected the time management for other patients. Moreover, the hospital has rules and practices for visiting patients: when and how many visitors can visit their patients. In many instances, *hijra* visitors did not follow the rules and practices; they entered the ward and interrupted the execution of proper health services. The concerned staff tried to make them understand the situation and also requested them to leave the ward, but they ignored it.

DISCUSSION

In practice, public hospital's services are utilized mostly by poor people. But, in spite of being poor, *hijra* do not get the services which are designed only for poor patients. Study findings suggest that *hijra* patients do not have enough access to the healthcare service system. This service system is embedded with the strictness of the dichotomous gender category is so powerful that it confines the opportunity for *hijra* who are considered against the gender norms of the mainstream society [1]. Therefore, *hijra* is not adopted as a different gender category in the health system of the country and this impacts on their 'proof of access' and 'adequate access' considering their use of services and socioeconomic position in society respectively [9,10].

Exclusion of *hijra* gender identity in public healthcare system indicates that public hospitals are not ready to serve *hijra* patients and have no effective environment to accommodate *hijra* patients formally in existing service provision of the hospitals.[7] On the other hand, the service delivery of public hospitals to *hijra* patients is not appropriate, and the discriminatory care environment cannot satisfy them.

An unequal power relation between service providers and *hijra* patients exists, and this relation has been an obstacle for giving healthcare delivery, otherwise stigmatizing attitudes of service providers constitute inequality in systems which contribute to health disparities [11]. It is obvious that service

providers are from mainstream society and have prejudice about *hijra* culture and health needs. Social stigma is associated with transsexualism and this circumstance hampered access to treatments as per their need [12].

Service provider and *hijra* patient belong to different cultural groups in the society, and both are not aware of each other's cultural norms, which results in negative impacts on the quality of communication between both sides during service delivery [13]. Social discrimination influences health inequalities for marginalized *hijra* populations in healthcare settings [14]. Service providers' biases represent explicit prejudice against *hijra* patients which indicates that service providers ignore *hijra* patients. It can be stated that service providers, who are mainly familiar with mainstream culture and education, barely understand *hijra* patients' gender orientation and cultural aspects, which have been historically marginalized. On the other hand, findings suggest that, *hijra* do not adapt with hospital service norms due to their extreme marginalized position in the society [1].

It is crucial to take initiatives for service providers' education and training on transgender health needs and a culturally sensitive healthcare system for closing the knowledge and healthcare gaps and preventing hindered care [15]. This study infers that lack proper education and training, about cultural and physiological aspects of *hijra* among service providers, creates the ways in which *hijra* patients are unfairly, intentionally or unintentionally, treated by the service providers. If *hijra* patients meet their expectations and can be satisfied with the services provided by the supply-side that gives confidence in their interactions with service providers, which is more likely to sustain the patient-provider relationship and the utilization of health services [16,17]. Therefore, cultural and medical knowledge regarding *hijra* care required for ensuring proper health services to *hijra*.

Globally, the HIV epidemic has forced health systems to recognize transgender population and respond to their STI/HIV needs [17]. According to Khosla [18], HIV prevalence of Bangladesh is low, which is less than 1%, and this country has a commitment to fight against the HIV epidemic through broad and strategically feasible prevention measures and protecting its transmission from the key populations (like *hijra*) to the general population. However, the study finds existing STI/HIV prevention and care facilities of public hospitals are not adequate and sustainable for well-being of *hijra* and fighting against the HIV epidemic as well.

Health needs are only determined by service providers not on the basis of demand from the patients [19]. However, self-perception or demand (perceived need) of *hijra* patients is important to understand their point of views about their health sufferings. Only service providers' point of views (evaluated need) cannot be considered as an effective and dependable measure for their health needs; health-seeking behaviors and treatment adherence of *hijra* patients should be taken seriously [20]. Therefore, *hijra*-specific health needs are warranted to improve their health and quality of life.

CONCLUSIONS

This study infers on the urgent need to formulate and implement policy guidelines that could ensure '*hijra*' gender identity to be respected and their access to public healthcare. The government should establish non-discriminatory policies that forbid bias and discrimination based on gender identity. Hospital administration should establish gender-specific registration and documentation for *hijra* patients, along with separate or inclusive toilet and patient wardroom facilities and other *hijra*-specific health needs. '*Hijra* culture and healthcare' should be incorporated in routine content of medical and nursing college syllabuses, so doctors and nurses will be prepared to provide competent care to *hijra* patients. Moreover, hospital management should provide proper training/workshop on *hijra* sexuality, sexual practices, health problems, treatments, and management for all service providers to improve their performance. A successful collaboration with *hijra* CBOs is warranted. Besides this, the government should take initiatives for sensitizing non-*hijra* and *hijra* people on *hijra* health rights and hospital service norms respectively.

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ASSESSMENT OF THE CHARACTERISTICS OF CAREGIVERS OF END STAGE RENAL DISEASE PATIENTS UNDERGOING HEMODIALYSIS AND THEIR QUALITY OF LIFE IN YANGON, MYANMAR

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ABSTRACT

Introduction: The caregivers of end stage renal disease patients undergoing hemodialysis play an important role in caring of patients. Because of the chronic conditions, patients are not capable to look after themselves very well as they have weak physical and cognitive function, and so they need caregivers in their daily life. But caregivers are usually being ignored although they are important to produce the better outcomes of the patients. Different characteristics of caregivers can show different quality of life.
Objectives: This study was done to explore the characteristics of caregivers and their quality of life to provide baseline information when interventions are considered for them.
Methodology: A cross-sectional study conducted in three units of hemodialysis centers in Yangon, Myanmar during May 2019 involving 195 caregivers of End-stage Renal Disease Patients using the self-administered questionnaire for demographic assessment (age, gender, education, occupation, income, marital status) and caring hours per day. Purposive sampling was used for data collection and WHO QoL BREF in Myanmar version (Cronbach alpha = 0.861) was used to evaluate QOL. Descriptive analysis, ANOVA test and independent t test were used.
Results: As total 195 caregiver, 64.6% accounted as female participated in this study. The average of total QoL score of the caregivers was 84.1 ± 11.96 or 64 % from the maximum score. The overall quality of life of the caregivers are found to be significantly different among their age (p value < 0.001), Marital status (p value = 0.001), Education level (p value = 0.021), monthly family income (p value = 0.003).
Conclusion: Quality of life in caregiver of End-Stage-Renal Disease with hemodialysis were different depending on the characteristics of caregivers. These characteristics provide baseline data and they should also be considered when interventions for caregivers are designed.
Keywords: Quality of life, Caregivers' characteristics, Hemodialysis

INTRODUCTION

Chronic kidney disease is a huge public health issue and may eventually lead to end stage renal disease (ESRD) which is called kidney failure which needed regular dialysis treatment or kidney transplant for survive.

Hemodialysis extend the life span of individuals with ESRD. But because of the persistent nature of the disease and the need of lifelong hemodialysis, it causes physical, financial, emotional and psychosocial problems in both patients and their caregivers [1]. Patients undergoing hemodialysis rely on their unpaid family caregivers not only to assist in their daily activities but also to fulfil their medical needs and diet. Caregivers provide physical support of patients in daily activities, households chores and preparing appropriate meal for patients, personal care of patients in

showering and dressing. They also have to give emotional support as the lifelong nature of illnesses and long-term treatment cause discomfort, inpatient, negative thoughts, inability to cope with their sicknesses, loss of satisfaction in life, feeling isolated and depression in patients [2,3]. Although caregivers are essential to produce better outcomes in patients, they are usually being ignored and often get little support or recognition of their work [4].

Researches about caregivers of end stage renal disease patients were done across the world including some countries in Asia, but there are only a few limited researches for Myanmar. So, there is a noticeable gap in the study of caregivers of ESRD patients in Myanmar. There is only an article about a cross sectional descriptive study of the caregivers of stroke patients that can be assessed online. This study was done in 2011 and it studied about the level and nature of burden experienced by stroke patients and characteristics that influence the burden of caregivers [5].

The characteristics of the caregivers of ESRD patients will be studied first as this will provide the baseline data about the caregivers of ESRD patients to guide the future researcher for further studies and interventions. Different groups of caregivers have different quality of life and therefore caregivers will need different types of intervention depending on their characteristics. Previous studies found out that there was a difference of quality of life among the different age group of caregivers. Some studies reported the older caregivers had better quality of life [6,7] but there were also other studies which showed the younger caregivers had better quality of life [8,11]. There are also studies which showed the quality of life among different genders[12,13]. Moreover, there are other studies which show that the difference of quality of life among the characteristics of caregivers such as marital status, education, occupation, monthly income, etc [11,13,14].

Caregivers should guard their wellbeing, maintain the healthy life styles, satisfy with themselves and with the support and guidance they receive so that they can offer the appropriate care to the patients. The long-term involvement in taking care of patients, regulating their physical, mental and emotional complications along with managing the family, occupational matters can emerge the problems in physical, mental and social areas of caregivers which can lower their quality of life. Due to a decline in caregiver's health related quality of life, they may not be able to continue in the caregiving role and affect the outcomes of the patients [15].

Therefore, it is important to study the quality of life of these caregivers so that the health care professional will know the condition of the caregivers, set the proper objectives and intervention to improve the quality of life of caregivers. So, this study is designed to explore the characteristics of the caregivers of end stage renal disease patients undergoing hemodialysis and their quality of life.

METHODOLOGY

Data source

A cross-sectional study was conducted in Iris, Thuka and Muslim free hospital hemodialysis centers in Yangon, Myanmar during May 2019.

Study Population and Sample size

For calculating sample size, as there is no baseline data of caregivers, it is calculated by the preferred ratio of observations to variables is 20:1 (Joseph F. Hair. JR, 2010). There are altogether 7 variables so at least 140 samples were needed. 200 caregivers participated in this study.

Convenient sampling was applied in this study and caregivers with 18 years old and above, who take care of end stage renal disease patients undergoing hemodialysis, for a minimum of 3 months are included and those who are not daily regular caregivers are excluded in this study.

The outcome of the study is the caregiver's quality of life. The assessment tool has two parts; the first part is the evaluation of the characteristics of caregivers such as age, sex, marital status, education level, occupation, monthly family income, hours per day taking care of patients; and the second part is assessing their quality of life. To assess the quality of life, WHOQOL-BREF 26 items was used. The questionnaire contains 24 items for assessing four domains: Physical Health, Psychological Health, Social relationships and Environment and another 2 items for assessing the Overall QOL and General Health. The four domain

scores indicate an individual's perception of quality of life in each particular domain. For the 26 questions, the possible scores range between 26 and 130 points. Each item is rated on a 5-point Likert scale and scored from 1 to 5 on a response scale. Raw domain scores are scaled in a positive direction (i.e., higher scores denote higher QOL)[16].

Cronbach's alpha coefficient of overall QOL for the Burmese language questionnaire is 0.861 (with physical health 0.752, Psychological health 0.720, social relationship 0.744, environmental health 0.82) [17]. Ethical approval was obtained from Chulalongkorn University Ethic Review Committee. Required permission for the study was obtained from the authorities of 3 private hemodialysis centers in Yangon prior to study.

Statistical analysis was conducted by using SPSS version 22.0. All of independent variables were categorical and they are showed in frequencies and percentage. Dependent variable which is quality of life is a continuous variable so it is described in mean, standard deviation. To compare the quality of life of 3 different groups, ANOVA test was used and independent t test was used to compare between 2 groups. Missing data were excluded as listwise.

RESULTS

Although 200 caregivers participated in this study, 5 were removed because of the incomplete data.

Table 1: shows the characteristics of the study population. The majority of caregivers are female (64.6%), married (68.2%) and (71.3%) of them had high school and University level education. For monthly family income, 42.1% of the caregivers had low family income whereas 10.3% had the high family income. 64.6 % are employed and only 35.4 % of them had no job. Of the hours per day caring for patients, 40.5% of the participants spent about 8 or less than 8 hours and 59.5 % of them spent more than 8 hours.

Table 1 Characteristics of caregivers of ESRD patients undergoing hemodialysis

Characteristics of caregivers	Caregivers (n = 195)	
	n	(%)
Age		
≤ 31	49	(25.1)
32-46	56	(28.7)
47-56	44	(22.6)
>56	46	(23.6)
Sex		
Male	69	(35.4)
Female	126	(64.6)
Marital Status		
Single	50	(25.6)
Married	133	(68.2)
Widowed/Divorced	12	(6.2)
Education Level		
≤ Middle School	56	(28.7)
High School	61	(31.3)
University	78	(40.0)
Occupation		
Unemployed	69	(35.4)
Government sector	20	(10.3)
Private sector/NGO	22	(11.3)
Business or Entrepreneur	69	(35.4)
General worker	15	(7.7)

Characteristics of caregivers	Caregivers (n = 195)	
	n	(%)
Monthly Family Income (thousand kyats) *		
≤ 200	82	(42.1)
201-300	45	(23.1)
301-500	48	(24.6)
> 500	20	(10.3)
Caring hours per day		
≤8	79	(40.5)
>8	116	(59.5)

* 1USD = 1535.5 Kyats

Table 2 shows the different mean scores of total QOL among the different groups of caregivers. The mean scores among the different age groups are significantly different, [F (3,191) = 7.12, p value < 0.001]. There are also different QoL among different marital status [F (2,192) = 7.25, p value = 0.001], different education level [F (2,192) = 3.94, p value = 0.021] and among caregivers with different monthly family income [F (3,191) = 4.73, p value = 0.003].

Post hoc analysis indicated that the mean score of the caregivers aged 31 and below was significantly higher than all the other aged groups. Married caregivers had a significant lower mean score than single caregivers. Caregivers with university level education had a significant better score than caregivers with below or at middle school level education. Moreover, caregivers who had monthly family income more than 500 thousand kyats scored significantly greater than those with monthly family income less than or equal 200 thousand kyats. There is no significance difference among the other characteristics of caregivers such as sex, occupation and caring hours per day.

Table 2 Comparison between different mean scores of total QoL of caregivers

Characteristics of caregivers	Total QOL (Mean ±SD)	P value
Total	84.1 ± 11.96	
	Range 38-119	
Age		
≤ 31	90.0 ± 11.05	<0.001**
32-46	83.2 ± 10.83	
47-56	79.3 ± 10.90	
>56	83.4 ± 12.95	
Sex		
Male	86.3 ± 12.18	0.058
Female	82.8 ± 11.72	
Marital Status		
Single	89.4 ± 13.72	0.001**
Married	82.4 ± 10.52	
Widowed/Divorced	81.0 ± 13.39	
Education Level		
≤ Middle School	80.7 ± 12.27	0.021**

Characteristics of caregivers	Total QOL (Mean ±SD)	P value
High School	84.1 ± 11.82	
University	86.5 ± 11.41	
Occupation		
Unemployed	82.0 ± 13.30	0.064
Government sector	83.8 ± 10.66	
Private sector/ NGO	87.4 ± 11.62	
Business or Entrepreneur	86.3 ± 10.44	
General worker	79.0 ± 12.16	
Monthly Family Income (thousand kyats) *		
≤ 200	81.6 ± 11.76	0.003**
201-300	83.9 ± 10.94	
301-500	86.7 ± 10.96	
> 500	92.4 ± 11.66	
Caring hours per day		
≤8	83.6 ± 12.31	0.658
>8	84.4 ± 11.76	

ANOVA, T test, *1USD = 1535.5 Kyats,

** significant p value < 0.05

Table 3 shows the different mean scores of physical QoL among the caregivers. The mean scores of physical QoL among the different age groups are significantly different, [F (3,191) = 8.89, p value < 0.001]. There are also different physical QoL among different marital status [F (2,192) = 8.57, p value < 0.001] and among caregivers with different monthly family income [F (3,191) = 4.10, p value = 0.008]. There is no significance difference among different sex, educational level, occupation and caregiving hours.

Post hoc analysis showed that the mean score of the caregivers aged 31 and below was significantly higher than all the other aged groups. Married caregivers had a significant lower mean score than single caregivers and caregivers with monthly family income less than or equal 200 thousand kyats had a significant lower score than those with income more than 500 thousand kyats.

Table 3 Comparison between different mean scores of Physical QoL of caregivers

Characteristics of caregivers	Physical QOL (Mean ±SD)	P value
Total	24.4 ± 3.68 Range 15-35	
Age		
≤ 31	26.6 ± 3.41	<0.001**
32-46	23.9 ± 3.79	
47-56	23.3 ± 3.13	
>56	23.7 ± 3.47	
Sex		
Male	25.1 ± 3.69	0.069
Female	24.1 ± 3.65	
Marital Status		
Single	26.2 ± 4.06	<0.001**
Married	23.8 ± 3.41	
Widowed/Divorced	23.7 ± 26.4	
Education Level		
≤ Middle School	23.6 ± 3.71	0.143
High School	24.5 ± 3.58	
University	24.9 ± 3.69	
Occupation		
Unemployed	23.8 ± 3.69	0.122
Government sector	24.2 ± 3.44	
Private sector/ NGO	25.4 ± 3.98	
Business or Entrepreneur	25.0 ± 3.39	
General worker	23.1 ± 4.34	
Monthly Family Income (thousand kyats) *		
≤ 200	23.7 ± 3.37	0.008**
201-300	24.6 ± 3.63	
301-500	24.5 ± 4.01	
> 500	26.9 ± 3.41	
Caring hours per day		
≤8	24.2 ± 3.94	0.517
>8	24.6 ± 3.51	

ANOVA, T test, *1USD = 1535.5 Kyats,

** significant p value < 0.05

Table 4 shows the different mean scores of psychological QoL among the caregivers. The mean scores of psychological QoL among the different age groups are significantly different, [F (3,191) = 5.04, p value = 0.002]. The psychological QoL among different sex were also significant [t (193) = 2.45, p value = 0.015). The mean scores were also different among different marital status [F (2,192) = 4.54, p value = 0.012], among caregivers with different educational level [F (2,192) = 5.43, p value = 0.006 and among caregivers with different monthly family income [F (3,191) = 2.96, p value = 0.03]. There is no significance difference among different occupation and caregiving hours.

Post hoc analysis showed that the mean score of the caregivers aged 31 and below was significantly higher than those in 47-56 age group, male scored higher than female, married and widowed caregivers had a significant lower mean score than single caregivers, caregivers with university education significantly scored higher than those with middle or below middle school level and caregivers with monthly family income less than or equal 200 thousand kyats had a significant lower score than those with income more than 500 thousand kyats.

Table 4 Comparison between different mean scores of Psychological QoL of caregivers

Characteristics of caregivers	**Psychological QOL (Mean ±SD)**	**P value**
Total	18.5 ± 3.71	
	Range 8-28	
Age		
≤ 31	19.9 ± 3.56	0.002**
32-46	18.5 ± 3.36	
47-56	17.1 ± 3.61	
>56	18.4 ± 3.90	
Sex		
Male	19.4 ± 3.72	0.015**
Female	18.1 ± 3.63	
Marital Status		
Single	19.7 ± 4.22	0.012**
Married	18.2 ± 3.28	
Widowed/Divorced	16.8 ± 4.85	
Education Level		
≤ Middle School	17.3 ± 3.85	0.006**
High School	18.6 ± 3.68	
University	19.4 ± 3.43	
Occupation		
Unemployed	17.9 ± 4.38	0.055
Government sector	18.1 ± 3.27	
Private sector/ NGO	19.9 ± 2.99	
Business or Entrepreneur	19.1 ± 3.22	
General worker	17.1 ± 3.24	
Monthly Family Income (thousand kyats) *		
≤ 200	17.8 ± 3.93	0.033**
201-300	18.4 ± 3.75	
301-500	19.1 ± 3.05	
> 500	20.9 ± 3.58	
Caring hours per day		
≤8	18.4 ± 3.66	0.715
>8	18.6 ± 3.76	

ANOVA, T test, *1USD = 1535.5 Kyats,

** significant p value < 0.05

Table 5 shows the different mean scores of social QoL among the caregivers. The mean scores of social QoL among the different age groups are significantly different, [F (3,191) = 3.13, p value = 0.027]. There is no significance difference among the rest of the characteristics of caregivers.

Post hoc analysis showed that the mean score of the caregivers aged 31 and below was significantly higher than those in 47-56 aged groups.

Table 5 Comparison between different mean scores of Social QoL of caregivers

Characteristics of caregivers	**Social QOL (Mean ±SD)**	**P value**
Total	10.6 ± 1.64	
	Range 5-15	
Age		
≤ 31	11.1 ± 1.54	0.027**
32-46	10.4 ± 1.54	
47-56	10.2 ± 1.44	
>56	10.8 ± 1.92	
Sex		
Male	10.6 ± 1.71	0.991
Female	10.6 ± 1.61	
Marital Status		
Single	10.9 ± 1.93	0.268
Married	10.5 ± 1.51	
Widowed/Divorced	10.6 ± 1.68	
Education Level		
≤ Middle School	10.3 ± 1.67	0.098
High School	10.7 ± 1.74	
University	10.9 ± 1.50	
Occupation		
Unemployed	10.5 ± 1.84	0.154
Government sector	10.6 ± 1.70	
Private sector/ NGO	10.7 ± 1.86	
Business or Entrepreneur	10.9 ± 1.17	
General worker	9.9 ± 1.94	
Monthly Family Income (thousand kyats) *		
≤ 200	10.5 ± 1.76	0.105
201-300	10.6 ± 1.53	
301-500	10.7 ± 1.66	
> 500	11.5 ± 1.10	
Caring hours per day		
≤8	10.5 ± 1.79	0.277
>8	10.7 ± 1.52	

ANOVA, T test, *1USD = 1535.5 Kyats,

** significant p value < 0.05

Table 6 shows the different mean scores of environmental QoL among the caregivers. The mean scores of environmental QoL among the different age groups are significantly different, [F (3,191) = 4.06, p value = 0.008]. There are also different environmental QoL among different marital status [F (2,192) = 5.71, p value = 0.004] and among caregivers with different monthly family income [F (3,191) = 4.46, p value = 0.005]. There is no significance difference among different sex, educational level, occupation and caregiving hours.

Post hoc analysis showed that the mean score of the caregivers aged 31 and below was significantly higher than those in 47-56 age groups. Married caregivers had a significant lower mean score than single caregivers and caregivers with monthly family income less than or equal 200 thousand kyats had a significant lower score than those with income more than 500 thousand kyats.

Table 6 Comparison between different mean scores of environmental QoL of caregivers

Characteristics of caregivers	**Environmental QOL (Mean ±SD)**	**P value**
Total	24.1 ± 4.04 Range 13-38	
Age		
≤ 31	25.5 ± 3.98	0.008**
32-46	24.1 ± 3.43	
47-56	22.6 ± 3.73	
>56	23.9 ± 4.64	
Sex		
Male	24.6 ± 4.07	0.199
Female	23.8 ± 4.01	
Marital Status		
Single	25.7 ± 4.64	0.004**
Married	23.5 ± 3.60	
Widowed/Divorced	23.7 ± 4.39	
Education Level		
≤ Middle School	23.2 ± 3.98	0.094
High School	24.1 ± 4.06	
University	24.7 ± 3.99	
Occupation		
Unemployed	23.3 ± 4.34	0.132
Government sector	24.4 ± 3.62	
Private sector/ NGO	25.0 ± 3.57	
Business or Entrepreneur	24.7 ± 3.80	
General worker	22.7 ± 4.37	

Characteristics of caregivers	Environmental QOL (Mean ±SD)	P value
Monthly Family Income (thousand kyats) *		
≤ 200	23.3 ± 3.92	0.005**
201-300	24.0 ± 3.56	
301-500	24.3 ± 4.18	
> 500	26.8 ± 4.17	
Caring hours per day		
≤8	23.9 ± 3.75	0.744
>8	24.2 ± 4.23	

ANOVA, T test, *1USD = 1535.5 Kyats,

** significant p value < 0.05

DISCUSSION

In this study, we could see that a significance difference among the aged groups was found in all domains of QoL. In physical domain, the caregivers aged 31 or below had a significant higher QoL than the other aged groups. In the rest of domains, those with aged 31 or below scored significantly higher than those in 47-56 aged groups. This can be due to younger caregivers are more energized in their earlier years as caregivers and have better physical and mental functioning than older caregivers whereas older caregivers have many other responsibilities and they are vulnerable to illnesses. Moreover, for caregivers in 47-56 age groups, they have lower QoL because people in this aged groups usually have higher position in their job with many responsibilities, and usually this age group have to support their adult children who needs higher education and they would probably need to take care of their aging parents. So, they can have more stress with few leisure times for themselves. This result regarding with age is similar with other studies in Japan and Iran, where the older caregivers also had lower QoL. But In contrasts with other studies in Hong Kong and Thai, younger caregivers experienced lower QoL and they explained that it could be that as the caregivers gets older, they acquired more experiences and could adapt to the situations and so their QoL was not as low as the younger groups [18,19].

The significant difference among sex was found only in Psychological domain and it is congruent with the another studies [8,20]. It can be due to the fact that female caregivers are usually housewives and they have to spend most of their time at home with the patients and also had to take care of their children and moreover, if their partners were ill, they have to take more extra roles and so it makes them distressful. Another study of caregivers stated that in a case of male caregivers, there is another family member and this could lead to less burden. But in the case of women caregivers, because they were traditionally assumed as the one who have to take responsibility in taking care of family members who got sick and they were also believed to fulfill these caregiving tasks without assistance. That study also mentioned that women showed more risk of depression and psychological problems and they had tensions in the role as caregivers [21].

The scores of married caregivers were also significantly lesser than other groups in all domain except in social domain. This result is also corresponded with the other study in India and Turkey [8,20]. But this result is contrary to studies in China, India and Sudan in which married caregivers had scores more than divorced or widows [14,22,23]. They argued that married caregivers could have more physical and emotional support and security from their partners. But this study would be different with them in such a way that the patients could be the spouse of these caregivers who were participated as married in this study. So, in this case as these married caregivers

could not be supported by their partners, and they would have more emotional concern for their loved ones who were suffering the illnesses.

The significance difference among different educational level was found in total Qol and only in psychological QoL. Caregivers with university level education scored better than those with middle school and below middle school level. This is because educated people can reach out to health resources, understand the disease process better and handle better with unpleasant situations and therefore they feel less anxiety and distress [24]. So, they have better psychological QoL than those with lower educational level.

The difference of QoL among various monthly family income was significant in all the domains except social domain. Social domain is related with the social support and sexual life and so income has no relation with social domain. Because patients need to receive treatment for their whole lifetime, so caregivers with lower family income experienced more burden which could further affect most aspects of their quality of life. Moreover, in Myanmar, which still do not get the universal health coverage, the government's expenditure for health is also still low. Therefore, the expenses for hemodialysis was only paid by out of pocket money, and this can lead to more burden and lower quality of life.

There are studies which showed caregivers who employed in high skill job and self-employed caregivers had better QOL and those who are homemakers or daily wage workers had lower QOL [14,25]. But this study shows no difference among various occupation.

CONCLUSIONS

This study was done only in Yangon and so cannot be generalized for the whole population of caregivers in Myanmar. Moreover, there are also other characteristics of caregivers that needed to be studied. But this study provides the baseline information for health professionals when intervention for caregivers are developed as different interventions will be needed depending on different characteristics of caregivers. Future studies need to be considered to explore more about the other characteristics of caregivers and caregivers of other chronic diseases should also be studied.

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FACTORS OF LIVING WITH OR APART FROM CHILDREN AMONG OLDER PEOPLE IN URBAN AREA OF SALAYA, THAILAND: A PILOT QUALITATIVE STUDY

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ABSTRACT

Introduction:
A few studies from developing countries discussed about elderly people living alone or only with spouse. Most of them showed that traditional norm, which elderly people should live with children, influences elderly people's living arrangement. Discussion about elderly people living without children were shown in developed countries. Many urban areas in developing countries has experienced modernization signed by increasing number of people with higher education level and wider economic opportunity, thus people in urban area may not hold traditional view strictly anymore. As a developing country, Thailand showed increasing percentage of elderly people living alone and only with spouse. Change in traditional norm in urban area of Thailand could be happening.
Objectives:
Objective of this study is to explores factors influencing living arrangement of elderly people in urban area of Salaya, Thailand.
Methodology:
Face-to-face in-depth interviews were conducted with three men and three women aged from 60 to 74 years old living in urban area of Salaya sub district, Nakhon Pathom Province, at the border of Bangkok. A list of open-ended questions covering about family life, current activity, and financial situation was used as interview guidance. A non-random quota sampling was employed to recruit participants with diverse backgrounds. Three of them were living with at least one of children and the others are without children. Gender, education level, marital status, and kind of living arrangement were considered to choose the participants. Interview transcripts were transcribed verbatim and analyzed by themes emerged from the interviews.
Conclusion:
This study found that factors of living with or apart from children in urban area of Salaya came both from parents' and children's socioeconomic condition. Parents' norm view, income, health condition, social support, and marital status as well as children's education and access to public facility were factors determining elderly people's living arrangement. When elderly people hold norm view of "everybody has own life", experience self-financial sufficient, have self-mobility because of good health condition, receive social support from work colleague, and live with a spouse, they have self-esteem and self-confident to live apart children. From children side, having access to better public facility attracts them to leave hometown and old parents live apart from children. Public facility, such as public transportation, support their activity in education and work. Meanwhile, holding traditional norm makes them prefer to live with at least one of children, especially single female child. In this setting, family business transfer from parents to children happens as economic incentive for children.
Keywords: elderly people, living arrangement, urban, Thailand, qualitative study

INTRODUCTION

With whom elderly people may vary along with time change. At the early stage of their life, people may start it with their spouse and then have children. Parents live with their children until the children were being adult and started their own life. When they become older, they may live with one of their children, live with spouse, or prefer living alone although they have family or relatives. Other people may have different experience. Some of them may not have spouse and children and they live alone. Some of them may live with other people. With whom people live with usually refers to living arrangement.

Studies about elderly people living alone or with spouse only usually relates with developed countries when those about elderly people living with children exist in developing countries. For elderly people, having privacy [2], being independent in finance, and having independent children [9] are reasons for elderly people in developed countries to live alone, such as in Australia and Japan. Meanwhile, traditional view hold that elderly people should live with a child having the longest life course with parents, a child that parents take care his/her children [8], especially daughters such as in Latin America [13], or a married son such as in China [7].

It is known that number of elderly people living alone or without children has increased in developed countries, but developing countries start experiencing the same condition. According to Office for National Statistics of United Kingdom, number of elderly people at age 65 or over living alone keep increasing from 6,650 in 1997 to 7,720 in 2017 [14]. According to Statistics Singapore, couple-based without children with household heads aged 65 years and over was increasing from 27.4% in 2006 to 28.7% in 2016 while 16.7% in 2006 to 19% in 2016 for living alone [16]. Nowadays, as a developing country, Thailand is experiencing this phenomenon too. According to Thai Gerontology Research and Development Institute, 6% of elderly people in Thailand were living alone and 16% of them were living with spouse in 2002. Those living alone increased up to 9% and those living with spouse only went up to 19% in 2014 [5].

Objective of this qualitative study is to explore factors influencing living arrangement of elderly people in urban area of Salaya, Thailand. To have picture of living arrangement where influence of traditional culture might be reduced, this study focuses on factors of living arrangement in urban area.

METHODOLOGY

Data source

This qualitative study used face to face in-depth interview and purposeful sampling because information depth becomes main concern.

Questionnaire was used as the interview guideline and conversation with respondents is unstructured interview usually applied in qualitative study. Purpose of questions on questionnaire is to collect information about with whom respondents living and factors influence them to live with or apart with children. Questionnaire covered questions about personal information (such as the highest education attainment, age, occupation, marital status), family life (place where children live, spouse's and children's activity), social life (whether respondents still meet old friends or colleague, and involve in religious activity), financial sources (whether respondents get pension, salary, remittance from children), health condition (ability to do daily activities, schedule and how they visit doctor, and how they manage health condition), and life satisfaction covering family relationship, financial situation, overall satisfaction, and living arrangement preference in the future.

Study Population and Sample size

Participants are people aged 60 years old or above living in Sub District of Salaya, at the border of Bangkok metropolitan area. Quota participants are six respondents consisting of three men and three women. Participants were recruited based on snowball sampling as well as referral from local resident in Salaya. Face-to-face in-depth interviews were conducted. There are two respondents that cannot speak English. There was a translator when a respondent is not comfortable to do conversation in English. All interviews were recorded by cellphone as well as hand-writing note and transcribed.

Transcription was provided in English and Thai language if an interview was in Thai language.

Research Ethic

This research protocol was approved by Institutional Review Board of Institute for Population and Social Research, Mahidol University (COA. No. 2018/09-278) in October 2018. The researcher had explained to respondents about purpose of study, description of questions would be asked, and reasons why they were being targeted participants before the researcher conducted in-depth interview. List of questions, information of study, and written informed consents were provided in English and Thai language before the interview.

RESULTS

Table 1 shows respondent's characteristics. All of them had official retirement but now are working because of extension opportunity or new job offered in another place different from previous one.

Their current living arrangements are various, which are living alone; living alone with spouse; living with spouse and relative; living with spouse, child, and relative; and living with spouse and children. When interview was conducted, two of respondent would change their living arrangement. A male respondent currently living with spouse and child would have living alone with spouse because of his child's marriage plan. A female respondent living with spouse and children would move to other city and live with her parents (father and mother) living alone. Three respondents living with children must live with single daughters.

Work activity and social interaction

Regardless kinds of living arrangement, elderly people like being busy with their work and making interaction with others. Being busy with work has several implications, which are they have opportunity to earn money and support their life, to interact with colleagues and others, to be active, and to spend time [15]. Need of interaction with others is similar with previous studies. Some elderly people live alone but sometimes they have socialization with family [2], others live with apartment mate [17], or live nearby to children [12].

All respondents got their official retirement in the past, but now they are still working because of work extension opportunity from office, other job opportunity in other area, or have own business. Some respondents working as lecturer got official retirement when they were 65 and received work extension approval after that. At their current 70s, working is still their passion. Another respondent who just retired is moving to other area because job opportunity offered by her parents to manage her family asset. This woman leaves her current area, spouse, and daughters to manage the asset and live with her parents, but she still visits her family sometimes.

More interesting thing is some respondents had prepared their busyness for aging era before they got official retirement. A woman worked at a bank had built rental room business and learned how to involve in stock market before she asked fast retirement. Another female respondent had started learning how to run plantation business from social media. She also had taken care her health by eating good food from two years before her retirement because she wants to handle her family business.

> The size of garden is 25 ha for rubber and 10 ha for coconut. I will only manage the garden and take care my parents. I told him (my husband) 2 years before I got pension. At the first time I decided to live with my parents, I take care myself. I eat good food, drink warm water, and eat selected food. My husband is ok with this decision. (Respondent 5, female, 60-64)

Living with children and taking care grandchildren is not a way to express themselves. This field finding is in line with study of elderly people in Malay [4].

View of life of "everybody has own life", self-financial sufficient, and self-mobility and living apart from children

Wide opportunity outside respondents' living area attracts their children to live apart from parents. Some respondents have children working abroad, previously studied abroad and working in central of Bangkok because children have those opportunity. Based on respondents' view, they do not have to live with children

because everybody has own life. This is a phenomenon in a modern society where more people with higher education attainment and work far away from hometown, such as in Japan [9] and China [7].

Self-esteem for elderly people relates with self-financial sufficient and self-mobility to support their own life. They can go to work place, visiting friends, buying foods, and even visiting doctor by themselves.

> I drive myself from house to office. I drive everywhere. I drive to my hometown. Like yesterday, I drove to my hometown (Respondent 1, male, 70-74)

All respondents living alone or with spouse do not receive any money from their children as financial support because they think that they do not need it, although they do not mind supporting their children life. A finding in previous study in Thailand that elderly people do not want to be a burden is similar with this fact [11]. They receive a little amount of money from their children just for gift as an attention form from children to parents.

Holding traditional culture, having unmarried or single children, family business transfer, and living with children

Similar with finding in Latin America culture [13], there are three respondents living with children and the children are single and female. This field finding in line with traditional culture in Thailand.

> Interviewer: Why do you live with your daughters?
> Respondent: You must ask me why my daughters live with me (She is laughing). It is because my daughters are not married. (Respondent 6, female, 60-64)

Because traditionally Thai elderly people living with daughter, parents will transfer their asset to daughters. Finding in Thai culture that family transfer asset affects elderly people's living arrangement is similar with traditional culture in China [7] and Latin America [13]. A respondent together with her husband previously managed their room rental business, but now their daughters living with parents are responsible for this family business and household's financial management. The oldest daughter allocates family business income for parents, children, and household needs. Another respondent lives with daughters and receive money transfer from them although she and her husband do not need that money. The money is saved and will be transferred back to daughters one day in the future. This female respondent was planning to move alone to other province where her parents live to run plantation family business although she has brothers living around that area. She receives part of family business income.

Young generation's preference of living area with adequate public facilities and elderly people living alone

Effect of young generation need of public facility on living arrangement for elderly people relatively is a new issue. Adequate public facility in an area attracts younger people to live in that area because it makes their life easier in doing their job, pursuing higher education level, and chasing dream.

Adequate public facility deals not only with comfortableness but also with time. Uncomfortable traffic jam wastes time for active young generation. Some respondents have children living apart from them because of education and job matter. There is a respondent that has a son living at an apartment in Bangkok to pursue higher education level. Another respondent has two children working in Bangkok. He provides an apartment for his children because living in Bangkok saves time to arrive at their office.

Social support from work colleague to strengthen elderly people's financial status to live alone

Field finding show that work opportunity caused by support from current work colleague provides financial ability for elderly people to live alone, besides to avoid feeling of loneliness. Experiences from some respondents, they work after official retirement because their work colleague support considering their education, skill, and experience.

> Do you remember about the factory? Owner of that factory is owner of this apartment and restaurant. The owner has

known me for long time. I was just a factory worker, but I can cook. (Respondent 3, female, 60-64)

Normally, pension time in Thailand is 60 years old but it can be extended if we have approval from director or university. Now, I am 73 years old and I still teach. I realize that the university do not need us, but I like working. (Respondent 4, male, 70-74)

Preference of living with children or nearby relative after spouse's death

Some respondents currently living with spouse and without children prefer to live with children or nearby relative after death's spouse. This response come from a respondent whose children living in Bangkok which far enough from Salaya, and from a respondent whose relatives are in his hometown abroad.

While their current work and house is near Salaya, this finding eliminates previous one that elderly people live in a place where they can be busy. A respondent also stresses about distance from house to hospital as a consideration for life place.

Interviewer: Are you ready for living alone without your wife? Do you consider living with your children if it happens?
Respondent: It would be ideal if one of our children a daughter or son, can accommodate us. (Respondent 2, male, 70-74)

Table 1 Characteristics of respondents

No.	Gender	Number of children	Living arrangement	Number of children living with	Gender of children living with	Marital status of children living with parents
1	Male	4	With spouse, children, relative, changed to with spouse & relative	1	Female	Single
2	Male	2	With spouse & relative	0	-	-
3	Female	2	Alone	0	-	-
4	Male	2	With spouse	0	-	-
5	Female	2	With spouse & children, changed to with parents	2	Female	Single
6	Female	2	With spouse & children	2	Female	Single

DISCUSSION

Elderly people still like being busy after their official retirement, regardless of living with or living apart from children. Although they live alone, only with spouse, or with other, they still interact with their children. Working and living with or nearby other people are some ways to interact with others [12, 4, 3]. Importance of interaction with other people were shown by finding that even elderly people living alone with spouse, living alone is the last thing they will choose after spouse's death.

View of life that "everybody has their own life", self-financial sufficient, and self-mobility because of good health condition makes elderly people can live apart from children. Working after retirement means income provision to support their life [10]. With job after official retirement, they can earn money to support their modest life and do not depend on their children. Not only income yielded by working, enough

pension income influence elderly people to choose to live apart from their children [11, 6]. Having self-mobility ability to visit doctor, buying food, and go to work place makes them confident to live alone. Some previous studies found that there is a relationship between health condition and living arrangement and showed that elderly people with health problem tend to live with children [6, 20].

Social support from work colleague increases ability to live apart from children. Work opportunity after official retirement offered by work colleague support elderly people to live without financial dependency on children. Support from work colleague comes from good relationship in previous work time.

Although elderly people now have ability to live apart from children, death of spouse influence them to live with children. As previous studies showed, spouse is the closest person that can be relied especially for men [10].

Following Thai traditional culture, elderly people that have daughters, especially single daughters, live with them. This way of living arrangement is also accompanied by family business transfer. A respondent having two single daughters transferred family business to those daughters. Elderly people can ask their married daughter to live with them and to manage their family business. It is similar in China where family business transfer is part of culture that supports elderly people to live with their children [7] accompanied with feel of filial piety from children [6].

From younger generation side, provision public facilities in a city, such as public transportation, to support their higher education and better work opportunity attracts them to live in a more modernized city. They prefer to leave their hometown and live apart from parents. More people with higher education, wider work opportunity, and better public facilities are features of modernization [18].

However, traditional culture is changing to modern one featured by phenomena of increasing number of elderly people living alone. This change is caused by job opportunity for elderly people after retirement, increasing health status of elderly people, wider economic opportunity for younger generation outside their hometown, and better public service provision needed by younger generation outside their hometown.

Regardless of types of living arrangement, current elderly people have preparation to face after-official retirement time before they got retired. They concern about health and daily food, have adequate education level, learn new skill, and develop good relationship with colleagues.

CONCLUSIONS

Elderly people live apart from children when they have far away children combined with view of life of “everybody has own life”, self-financial sufficient, good health especially in term of ability of self-mobility, social support from work colleague, and spouse. They live with children when they still hold traditional culture that parents live with children because of intergenerational dependency, family business transfer, and feel of filial piety exist [19, 1]. Family business transfer becomes economic incentive for younger generation to live with parents. The pilot study adds that view of life that “everybody has their own life”, self-mobility, and support from work colleague influence elderly people to live apart from children.

Provision of better public facilities in other area, such as public transportation, influence younger generation to leave their hometown, thus old parents live apart from children. In the future, public facilities will affect living arrangement. Increasing traffic jam and insufficient public transportation force young generation to move to other area with better public transportation facility near their work place and leave parents in their hometown.

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ประกาศ วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย

เรื่อง แต่งตั้งคณะกรรมการจัดการประชุมวิชาการบัณฑิตศึกษานานาชาติ

ด้านประชากรและวิทยาศาสตร์สาธารณสุข ครั้งที่ 10

(The 10th International Graduate Students Conference on Population and Public Health Sciences)

ตามที่ สถาบันวิจัยประชากรและสังคม สถาบันพัฒนาสุขภาพอาเซียน มหาวิทยาลัยมหิดล และวิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย ได้มีบันทึกข้อตกลงความร่วมมือระหว่างสามสถาบัน เพื่อการพัฒนาวิชาการด้านการเรียนการสอน การวิจัย และกิจกรรมนิสิตนักศึกษาระดับบัณฑิตศึกษา ทั้งนี้ได้กำหนดให้มีการนำเสนอผลงานวิจัยของนิสิต อาจารย์ และบุคลากรร่วมกันทั้งสามสถาบัน ในการประชุมวิชาการบัณฑิตศึกษานานาชาติด้านประชากรและวิทยาศาสตร์สาธารณสุข ครั้งที่ 10 "The 10th International Graduate Students Conference on Population and Public Health Sciences" (IGSCPP) ในวันที่ 25 กรกฎาคม 2562 ณ วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย เพื่อให้การดำเนินการเป็นไปโดยเรียบร้อย มีประสิทธิภาพ และบรรลุวัตถุประสงค์ จึงขอแต่งตั้งคณะกรรมการในการดำเนินงานประชุมดังกล่าว ตามรายนามและตำแหน่งต่อไปนี้

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ให้คณะทำงานปฏิบัติงานหน้าที่การเตรียมการด้านการเชิญวิทยากร ประสานงานวิทยากร จัดทำระบบประชาสัมพันธ์ การรับสมัคร การลงทะเบียน และการเตรียมการด้านสถานที่จัดประชุม ด้านเอกสารประกอบการประชุม ด้านการเงินการบัญชีของการประชุม รวมทั้งกิจกรรมอื่นใดที่เกี่ยวข้อง และประสานงานกับหน่วยงานอื่นใดที่เกี่ยวข้อง

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36. ผู้ช่วยศาสตราจารย์ ดร.ปิยวัฒน์ เกตุวงศา	กรรมการ

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ให้คณะทำงานปฏิบัติงานหน้าที่พิจารณาบทความวิจัยเพื่อการนำเสนอในการประชุมของผู้สมัครพิจารณาให้รางวัลการนำเสนอดีเด่น (Outstanding Oral / Poster Presentation Award) รวมทั้งจัดทำบทความวิจัยตีพิมพ์เผยแพร่ลงใน Proceeding งานประชุม / Journal of Health Research และหน้าที่อื่นๆ ที่เกี่ยวข้อง

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