KNOWLEDGE, ATTITUDE AND PRACTICE OF VOLUNTARY BLOOD DONATION AMONG UNIVERSITY AND COLLEGE STUDENTS IN YANGON, MYANMAR

Miss Aye Chan Oo

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Public Health in Public Health
Common Course
College of Public Health Sciences
Chulalongkorn University
Academic Year 2018

ความรู้ ทัศนคติ และพฤติกรรมในการบริจาคโลหิตด้วยความสมัครใจของนักศึกษามหาวิทยาลัยและวิทยาลัยในเมืองย่างกุ้ง ประเทศเมียนมา

น.ส.เอ ชาน โอ

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรมหาบัณฑิต
สาขาวิชาสาธารณสุขศาสตร์ ไม่สังกัดภาควิชา/เทียบเท่า
วิทยาลัยวิทยาศาสตร์สาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2561

Thesis Title	KNOWLEDGE, ATTITUDE AND PRACTICE OF VOLUNTARY BLOOD DONATION AMONG UNIVERSITY AND COLLEGE STUDENTS IN YANGON, MYANMAR
By	Miss Aye Chan Oo
Field of Study	Public Health
Thesis Advisor	Pramon Viwattanakulvanid, Ph.D.

Accepted by the College of Public Health Sciences, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Public Health

..... Dean of the College of Public Health Sciences
(Professor SATHIRAKORN PONGPANICH, Ph.D.)

THESIS COMMITTEE

..... Chairman
(Assistant Professor NUTTA TANEEPANICHSKUL, Ph.D.)

..... Thesis Advisor
(Pramon Viwattanakulvanid, Ph.D.)

..... Examiner
(MONTAKARN CHUEMCHIT, Ph.D.)

..... External Examiner
(Nipunporn Voramongkol, M.D., M.P.H.)

เอ ชาน โอ : ความรู้ ทัศนคติ และพฤติกรรมในการบริจาคโลหิตด้วยความสมัครใจของนักศึกษามหาวิทยาลัยและวิทยาลัยในเมืองย่างกุ้ง ประเทศเมียนมา. (KNOWLEDGE, ATTITUDE AND PRACTICE OF VOLUNTARY BLOOD DONATION AMONG UNIVERSITY AND COLLEGE STUDENTS IN YANGON, MYANMAR)
อ.ที่ปรึกษาหลัก : ประมณฑ์ วิวัฒนกุลวานิช

ความเป็นมา: ในเชิงคลินิกนั้นโลหิตสามารถช่วยเหลือชีวิตผู้คนได้จำนวนมาก โดยองค์การอนามัยโลกได้เน้นว่างานบริการเกี่ยวกับการถ่ายเลือดควรมุ่งเป้าหมายไปที่กลุ่มคนหนุ่มสาวที่บริจาคโลหิตด้วยความสมัครใจ (Young voluntary blood donors) เพราะว่าเป็นแหล่งสำรองโลหิตที่ยั่งยืน ทั้งนี้ประเทศเมียนมาเป็นประเทศกำลังพัฒนาที่เผชิญกับความท้าทายในการมีแหล่งสำรองโลหิตที่เพียงพอและทันเวลาในการช่วยเหลือผู้ป่วยในยามที่จำเป็น สำหรับการคัดเลือกผู้บริจาคโลหิตด้วยความสมัครใจอย่างมีประสิทธิภาพนั้น จำเป็นต้องเข้าใจถึงความรู้ ทัศนคติ และพฤติกรรมในการบริจาคโลหิตด้วยความสมัครใจของนักศึกษามหาวิทยาลัยและวิทยาลัย ดังนั้นการศึกษานี้จึงมีจุดประสงค์ในการศึกษาพฤติกรรมการบริจาคโลหิตด้วยความสมัครใจและปัจจัยที่เกี่ยวข้องกับพฤติกรรมนั้น และค้นหาเหตุผลในการไม่บริจาคโลหิตของนักศึกษามหาวิทยาลัยและวิทยาลัยในเมืองย่างกุ้ง *ประเทศเมียนมา*

ระเบียบวิธีการวิจัย: การศึกษาภาคตัดขวาง (เมษยาน ถึง พฤษภาคม 2562) ด้วยแบบสอบถามชนิดให้ผู้ตอบกรอกข้อมูลเอง ประกอบด้วยข้อมูลด้านคุณลักษณะประชากร ความรู้ ทัศนคติและพฤติกรรม โดยได้สอบถามนักศึกษามหาวิทยาลัยที่เรียนเต็มเวลา อายุมากกว่าหรือเท่ากับ 18 ปี ที่มหาวิทยาลัย Yangon Technological Yangon Technological University (YTU) และที่วิทยาลัย National Management Degree College (NMDC) ในเมืองย่างกุ้ง ประเทศเมียนมา โดยได้ใช้การสุ่มตัวอย่างแบบไม่ใช้ความน่าจะเป็น (Non-probability) ชนิดการเลือกกลุ่มตัวอย่างแบบโควต้า (Quota sampling) และ การสุ่มตามความสะดวก (Convenience Sampling) ทั้งนี้แบบสอบถามดังกล่าวได้ประเมินความเที่ยงตรงด้วยวิธี Item-Objective Congruence (IOC) และทดสอบความเชื่อมั่น ด้วยค่า Cronbach's Alpha และ KR20 ก่อนเริ่มทำการเก็บข้อมูล

ผลการศึกษา: นักศึกษาจำนวน 341 คน (60% เพศหญิง และ 40% เพศชาย) ได้เข้าร่วมในการศึกษา โดยมีอายุเฉลี่ย 19.1 ปี (ส่วนเบี่ยงเบนมาตราฐาน ± 1.1) พบว่า 110 (32.3%) คนมีการบริจาคโลหิตมาก่อนและเป็นผู้บริจาคโลหิตด้วยความสมัครใจ ทั้งนี้มีส่วนน้อยในผู้เข้าร่วมการศึกษาที่มีความรู้ระดับสูง 74(21.7%) และมีระดับทัศนคติที่ดี 61(17.9%) ต่อการบริจาคโลหิต อย่างไรก็ตามผู้เข้าร่วมการศึกษาส่วนใหญ่ 286(83.9%) มีความเต็มใจในการที่จะบริจาคโลหิตในอนาคตข้างหน้า ส่วนตัวแปรทำนายที่มีผลต่อการเป็นผู้บริจาคโลหิตด้วยความสมัครใจ พบว่า เป็นเพศชาย AOR (95%CI): 3.03 (1.70, 5.43) p<0.001 การมีโรคที่เกี่ยวข้องกับระบบโลหิต AOR (95%CI): 0.25 (0.09, 0.71) p=0.01ระดับความรู้เกี่ยวกับการบริจาคโลหิตสูง AOR (95%CI): 8.24 (3.06, 22.20) p<0.001และทัศนคติที่ดีต่อการบริจาคโลหิต AOR (95%CI): 7.01 (1.97, 24.90) p=0.003 ส่วนเหตุผลในการไม่บริจาคโลหิตในผู้เข้าร่วมการศึกษาที่ไม่เคยบริจาคโลหิตมาก่อน คือ ไม่มีโอกาสในการบริจาคโลหิต 43.3 % รู้สึกกลัวในการบริจาคโลหิต 35.1% และมองว่าอายุน้อยที่จะบริจาคโลหิต 32.9%

สรุปผลการวิจัย อภิปรายและข้อเสนอแนะ: พฤติกรรมของการเป็นผู้บริจาคโลหิตด้วยความสมัครใจในผู้เข้าร่วมการศึกษาค่อนข้างต่ำ รวมถึงส่วนน้อยเท่านั้นที่มีความรู้และทัศนคติที่ดีในระดับสูงต่อการบริจาคโลหิต นักศึกษาชายที่ไม่มีโรคที่เกี่ยวข้องกับระบบเลือดที่มีความรู้และทัศนคติที่ดีในระดับสูงต่อการบริจาคโลหิตมีแนวโน้มที่จะเป็นผู้บริจาคโลหิตด้วยความสมัครใจ ส่วนเหตุผลหลักในการไม่บริจาคโลหิตคือขาดโอกาสและข้อมูลเพียงพอในการบริจาคโลหิต ดังนั้นควรมีการรณรงค์และสร้างความตระหนักในเรื่องการบริจาคโลหิตในนักศึกษามาหาวิทยาลัย เช่นเดียวกับชุมชนเพื่อเพิ่มการบริจาคโลหิตในประเทศเมียนมา

สาขาวิชา	สาธารณสุขศาสตร์	ลายมือชื่อนิสิต .....
ปีการศึกษา	2561	ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

6178852053 : MAJOR PUBLIC HEALTH
KEYWORD: Knowledge, Attitude, Practice, Voluntary blood donation, University students, Yangon, Myanmar

Aye Chan Oo : KNOWLEDGE, ATTITUDE AND PRACTICE OF VOLUNTARY BLOOD DONATION AMONG UNIVERSITY AND COLLEGE STUDENTS IN YANGON, MYANMAR. Advisor: Pramon Viwattanakulvanid, Ph.D.

Background: Blood can save millions of lives in different clinical settings. According to WHO, blood transfusion services should target young voluntary blood donors as the potential source of sustainable blood supply. As a developing countries, Myanmar have challenges in providing timely and adequate blood supply to patients in need. For effective voluntary donor recruitment, understanding knowledge, attitude and practice towards blood donation among young university and college students is important. The aim of the study is to determine the practice of voluntary blood donations and its associated factors and to find out the reasons for not donating blood among the university and college students in Yangon, Myanmar.

Methods: Cross Sectional Study (April to May 2019) with self-administered questionnaires including socio-demographic, knowledge, attitude and practice was conducted among the full time students who are ≥ 18 years old in Yangon Technological University (YTU) and National Management Degree College (NMDC) in Yangon, Myanmar. Non-probability Quota and convenience sampling method was used. Questionnaires were validated with Item-Objective Congruence (IOC) index and reliability tested with Cronbach's Alpha and KR 20 prior to data collection.

Results: Total 341 students (60% females and 40% males) participated in the study with mean age of 19.1 years (SD ± 1.1) and. Among them, 110 (32.3%) practiced blood donation before and all were voluntary blood donors. Minority of the participants have high knowledge level, 74 (21.7%) and high attitude level, 61 (17.9%) towards blood donation. However, most of the participants 286 (83.9%) have willingness to donate blood in the future. The predictors of being voluntary blood donor are 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=0.01, 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. The main reasons for not donating blood in non-donor participants include no opportunity 43.3%, fear to donate 35.1% and still underage to donate 32.9%.

Discussion and conclusion: Practice of voluntary blood donor among the participants is relatively low. Minority have high knowledge and attitude towards blood donation. Male students free from blood disorders with higher knowledge and attitude levels are more likely to donate blood voluntarily. Main reasons for not donating blood were based on lack of opportunity and information. More regular blood donation campaigns and awareness raising in the university students society as well as in community is needed to increase the voluntary blood donations in the country.

Field of Study: Public Health Student's Signature .....
Academic Year: 2018 Advisor's Signature .....

ACKNOWLEDGEMENTS

This thesis could not be completed without the help, guidance, motivation and kindness of many individuals and I owe my sincere appreciation and gratitude to them.

First and foremost, I would like to express my gratitude and love to both of my parents who supported me in every way they can. Without their eternal love and encouragement, I will not be able to make it this far.

I would like to express my appreciation and heartfelt thanks to my respectful mentor and advisor Dr. Pramon Viwattanakulvanid, Ph.D. who guided me throughout my study in College of Public Health Sciences and also for his kindness and inspirational advices for all the students, not only me.

I also would like to deliver my sincere thanks to my thesis exam committee; Asst. Prof. Nutta Taneepanichskul, Ph.D, Dr. Montakarn Chuemchit, Ph.D and Dr. Nipunporn Voramongkol, M.D., M.P.H. for sharing their valuable time, precious guidance and remarks for my thesis to be completed.

And I also sincerely acknowledge Dean, Prof. Sathirakorn Pongpanich, Ph.D. and all the teachers, lecturers and staffs of College of Public Health Sciences for all the support and kindness towards the students.

I am very much grateful to Dr. Thida Aung, Deputy Director General of National Blood Center, Myanmar, Dr. Kyaw Moe Min, Computer Science Department Head (NMDC), Mr. Aung Ko Ko Oo, Student President (YTU) and all the responsible authorities for all the help and accepting me to conduct the study conveniently without any difficulties. And I owe my gratitude to all my family and friends who worked hard as my research assistants and helped me during my data collection period.

I would like to thanks my best friends who walked with me throughout my MPH course for all the moral support, kindness and happiness we shared together.

The last but not the least, I would like to appreciate and thank to all the participants who gave me their valuable time to answer the questionnaires to make this study accomplished.

Aye Chan Oo

TABLE OF CONTENTS

Page

..... iii

ABSTRACT (THAI) iii

..... iv

ABSTRACT (ENGLISH) iv

ACKNOWLEDGEMENTS v

TABLE OF CONTENTS vi

LIST OF TABLES x

LIST OF FIGURES xi

Chapter I 1

Introduction 1

1.1. Background and Rationale 1

1.2. Research Questions 4

1.3. Research Objectives 5

1.3. Research Hypothesis 5

1.4. Conceptual Framework 6

1.5. Operational Definitions 6

Chapter II 9

Literature Review 9

2.1. Blood, the essence of life 9

2.1.1. Function and components of blood 9

2.2. Blood Transfusion 10

2.2.1. Blood Types in Human 11

2.2.2. Risks of Blood Transfusion 12

2.2.3. Safe Blood Transfusion 12

2.3. Blood Donation 13

2.3.1. Types of Blood Collection 14
2.3.2. Types of Blood Donor 14
2.3.3. General Donor Selection: Donor Eligibility Criteria 15
2.3.4. Benefits of Blood Donation 19
2.4. Importance of Voluntary Blood Donation 20
2.5. Role of young adults in increasing voluntary blood donation 22
2.6. Blood availability in developed and developing countries 23
2.7. Blood Transfusion Service in Myanmar 24
2.8. Knowledge, Attitude and Practice Survey (KAP) 27
2.9. Previous Researches 29
Chapter III 33
Methodology 33
3.1. Study Design 33
3.2. Study Area 33
3.3. Study Population 33
3.4. Duration of the Study 33
3.5. Sample Size 33
3.6. Inclusion and Exclusion Criteria 34
3.7. Sampling Technique 34
3.8. Measurement Tool 36
3.8.1. Socio-demographic characteristics 36
3.8.2. Knowledge related to blood donation 36
3.8.3. Attitude toward blood donation 37
3.8.4. Practice of voluntary blood donation 38
3.8.5. Reasons for not practicing blood donation 38
3.9. Validity and reliability 39
3.9.1. Validity 39
3.9.2. Pretest and reliability 39
3.10. Data Collection 39

3.11. Data entry and analysis 40
3.12. Ethical Considerations 41
3.13. Expected benefit and application 41
Chapter IV 42
Results 42
4.1. Descriptive findings 42
4.1.1. Socio-demographic Characteristics 42
4.1.2. Practice of voluntary blood donation 44
4.1.3. Participants' knowledge regarding blood donation 45
4.1.4. Participants' attitude towards blood donation 50
4.1.5. Reasons for not donating blood among non-donor participants 53
4.2. Inferential Findings 54
4.2.1. Comparing knowledge and attitude scores between voluntary donors and non-donors 54
4.2.2. Association of socio-demographic characteristics, level of knowledge and level of attitude towards practice of voluntary blood donation by Chi Square test 55
4.2.3. Multiple Logistic Regression Analysis 57
Chapter V 59
Discussion, Conclusion and Recommendation 59
5.1. Discussion 60
5.1.1. Practice of voluntary blood donation in university and college students 60
5.1.2 The knowledge and attitude towards blood donation among donor and non-donor students 61
5.1.3. Association of socio-demographic characteristics, level of knowledge and level of attitude towards practice of voluntary blood donation 65
5.1.4. Reasons for not donating blood among non-donor participants 67
5.2. Conclusions 67
5.3. Strength and limitation of the study 68
5.4. Recommendations 69
5.4.1. Recommendations for program implementation 69

5.4.2. Recommendation for further research 70
REFERENCES 71
Appendix 75
Appendix A: Ethical Approval 75
Appendix B: Participant Information Sheet 76
Appendix C: Informed Consent Form 80
Appendix D: Self-administered Questionnaires (English) 82
Appendix E: Self-administered Questionnaires (Myanmar) 90
VITA 97

LIST OF TABLES

Page

Table 1 Major blood types and Matching (The Blood Center US, 2018) 11

Table 2 Blood usage and availability in developed and developing countries (World Health Organization, 2010a) 24

Table 3 Demographic Characteristics of participants (N=341) 43

Table 4 Frequencies and distribution of Practice of voluntary blood donation 44

Table 5 Frequencies and distribution of knowledge scores (correct answers and incorrect answers) regarding blood donation 47

Table 6 Score and level of knowledge regarding blood donation 49

Table 7 Frequencies and distribution of attitude towards blood donation 51

Table 8 Scores and level of attitude towards blood donation 53

Table 9 Comparison of knowledge and attitude scores between voluntary donors and non-donors by Mann-Whitney U test 55

Table 10 Association of socio-demographic characteristics, knowledge and attitude levels towards voluntary blood donation practice (N=341) 56

Table 11 Factors predicting practice of voluntary blood donation among participants (N=341) 58

LIST OF FIGURES

Page

Figure 1 Proportion of voluntary non-remunerated donations (whole blood and apheresis donations combined) by country, 2013(World Health Organization, 2017e) 22

Figure 2 Nature of 3 types of blood donors 22

Figure 3 Myanmar Blood Donation Status in 7 Regional Blood Centers (2010 – 2016) (National Blood Center, 2017) 26

Figure 4 Myanmar Voluntary and Replacement Donor trend with HIV screening positive rate among donors (Aung & Nozaki, 2017) 27

Figure 5 Knowledge, Attitude and Practice Model/ Rational Model (Jitkritsadakul, Boonrod, & Roongroj., 2017; Légaré, 2010; World Health Organization, 2012b) 28

Figure 6 Flow Chart of Sampling Technique..... 35

Figure 7 Sources of Information for Blood Donation 50

Figure 8 Reasons for not donating blood among non-donor participants 54

Chapter I
Introduction

1.1. Background and Rationale

Blood is an essential and vital part of human body as well as an essential resource of health care which is used in wide variety of clinical settings. From whole blood, blood can be separated into many different components which contain RBCs, plasma, platelets, etc. that are being used to treat different types of diseases in wide range of patients. Therefore, several patients can be treated by single blood unit (World Health Organization, 2016) . Every year worldwide, millions of blood units are used to save lives of the patients in both routine and emergency situations such as trauma, road traffic accidents, malignancies, obstetric and gynecological complications, severe childhood anemia, etc.

In developed or high income countries with modern health care services, the need for blood and blood products is rising as the medical and surgical treatments and procedures become more sophisticated due to routine demand such as trauma and hematological disorders. With the increasing elderly population, the more blood is needed for more medical care. In low income or developing countries, diagnostic and treatment options are more limited. In these countries, blood and its components are mainly used for the management of hemorrhage in pregnancy related to hemorrhage, severe childhood anemia, trauma and the management of congenital hematological diseases(World Health Organization, 2010a) .

Blood donation is philanthropic deed when the blood of a healthy person is collected for purpose of transfusion for patient in need (Melku et al., 2016) . Every year, the blood collected globally is approximately 112.5 million donations. More than 50% of these donations are from developed or high income nations, which account for 19% of the population in the world (World Health Organization, 2017a) . Although millions of blood and blood product units are collected annually worldwide, many more are still needed to meet the demand globally to ensure timely and adequate supply. This urges

blood bank services to find out more effective ways of blood donor recruitments (Abderrahman & Saleh, 2014) .

Blood donors can be classified into 3 types as 1) Voluntary unpaid or non-remunerated blood donors, 2) Family or replacement blood donors and 3) Paid blood donors. Among the 3 types, adequate and reliable supply of safe blood is mainly achieved by donations of regular, voluntary, non-remunerated blood donors. Generally, safe blood can be defined as blood without trace of viruses, parasites, or any other inclusions that can be harmful to the recipient (Aung, 2009) . Voluntary non-remunerated or unpaid blood donor is the one who donates blood voluntarily with own free will and does not receive any payment for the donation, whether in cash, or in a form as a substitute for money (Nair & Mammen, 2015) . Currently, only 62 countries in the world have 100% of voluntary blood donations for their national blood supply, while 34 countries in the developing world still have more than 75% of their blood supply from family/replacement donors and even paid donors(World Health Organization, 2016).

To get the sustainable and stable base of voluntary unpaid blood donors, blood transfusion services have to focus in recruiting young blood donors. Young blood donors are the potential donors who can supply the blood regularly and in long term basis. By recruiting young blood donors and retaining them, country's blood supply can be improved as well as safe and healthy lifestyle of young adults can be promoted. In 2010 World Blood Donor Day campaign with the slogan of "New Blood for the World" , WHO also stated that young generation motivated and enthusiastic voluntary non-remunerated blood donors are the best potential source of donors to provide the safest supply of blood to save life everywhere (World Health Organization, 2010b). In major urban facilities, sophisticated and advanced health care provision may be available, but for those in rural areas who are also the larger sector of the population, there is difficult access to the limited health services where the blood can be unsafe or not sufficient (World Health Organization, 2010a) . In addition to that, in developing countries, payment for blood donation may create a risk of exploitation of the poor and also result

in a temptation for the donor to hide his/her lifestyle, illnesses thereby increasing the risk of transfusion transmitted infections (Koistinen, 2008). .

According to the report from WHO, low and middle income countries show an increase in voluntary non-remunerated blood donations in recent years. More than 10 million voluntary non-remunerated blood donations increased from 2008 to 2013 according to reports of 159 countries. The peak rise of voluntary non-remunerated blood donations is observed in the South-East Asian Region (75%) followed by African Region (37%)(World Health Organization, 2017a).

In Myanmar, blood donation activities are initiated by the Myanmar Red Cross Society (MRCS) in 1961, followed by regular organization of blood donation. The MRCS encourages the 'national blood and blood product law' (enacted in January 2003) which promote voluntary non-remunerated blood donation to prevent transfusion transmitted infection and to save lives of the patients through transfusion of good quality blood and blood components.

In 1899, Yangon General Hospital started blood transfusion and in 1939, Ministry of Health formulated blood transfusion services and started the services with paid blood donation program. In 1945, blood bank facility which is now known as National Blood Center (NBC) was established at Yangon General Hospital. Since then, National Blood Center with collaboration of MRCS, initiated the promotion activities of healthy lifestyle and identification of potential low risk blood donors for advocacy and to raise public. NBC enforces the crucial role of safe and adequate blood supply by explaining about the risk factors causing transfusion transmitted infections and ways to avoid risky behavior among general public with the involvement of local authorities (Aung, 2009).

In 2016, 397,278 blood donations are collected form 153 services around the country and voluntary blood donation rate was 79%. HIV rate in Transfusion Transmitted Infection (TTI) screening was also declined from 1.01% (2002) to 0.2% (2016) (National Blood Center, 2017). In order to secure the blood safety, the current

challenges of Myanmar blood transfusion service are like other developing countries, sustainability of blood supply and to get timely blood supply in all area of the country equally. To reach the WHO goal of 100% voluntary blood donation by 2020 (World Health Organization, 2009), Myanmar needs to actively find out the strategies to effectively recruit more voluntary blood donors at the same time phasing out the replacement/family donors and paid donors.

In reviewing KAP studies conducted in developing countries, it is recommended by all the investigators that strategies to sustain voluntary blood donation can be formulated from the information obtained from KAP. The investigators further concluded that although there are different adopted approach, studied samples, demographic characteristics, etc. in various studies, it was founded that fear to donate blood, misinformation about blood donation, doubt of selling the blood lead to not donating blood despite the presence of good and positive attitude and altruism and willingness to donate blood (Mishra, Sachdev, Marwaha, & Avasthi, 2016).

In Myanmar, there is no published information or data regarding KAP of blood donation and to fill that information gap, this study is aimed to understand and generate information required to improve voluntary blood donation in the country. The university students are aimed at in this study since they represent the potential long term blood donor population pool that can be sustained as regular and safe blood donors (Amatya, 2013) . The finding of this study will provide the vital information in planning for raising awareness and generating strategies to increase the voluntary donations in the country.

1.2. Research Questions

1.2.1. What are the proportion of the university and college students in Yangon who practice voluntary blood donation?

1.2.2. What are the knowledge level towards voluntary blood donation between blood donors and non-donors among university and college students in Yangon?

1.2.3. What are the attitude level towards voluntary blood donation between blood donors and non-donors among university and college students?

1.2.4. Are knowledge and attitude of voluntary blood donation different between blood donor and non-donors among university and college students?

1.2.5. Are there any association between socio-demographic factors, knowledge and attitude towards voluntary blood donation and practice of blood donation among university and college students in Yangon?

1.2.6. What are the reasons of not practicing blood donation among university and college students in Yangon?

1.3. Research Objectives

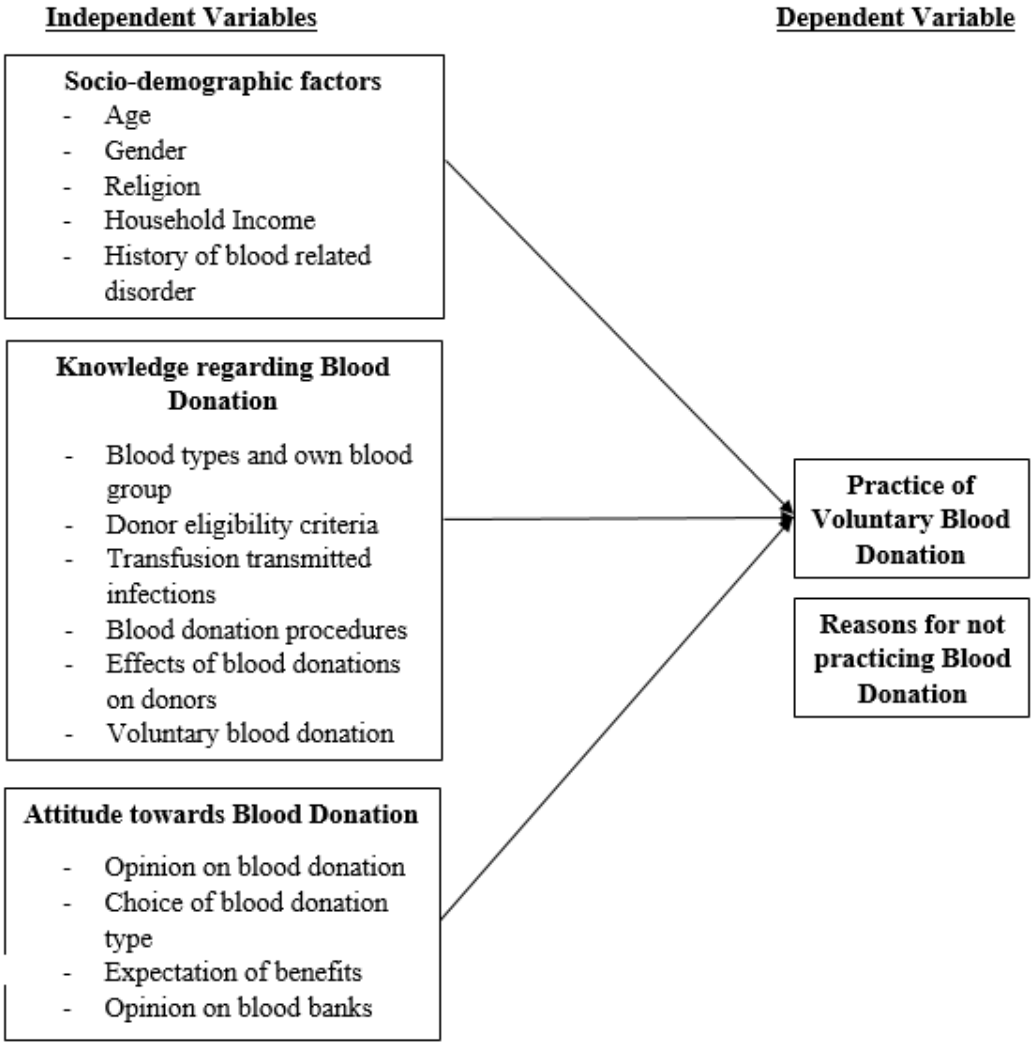
- To determine the practice of voluntary blood donation among university and college students in Yangon
- To compare the knowledge regarding blood donation between blood donors and non-donors among university and college students in Yangon
- To compare the attitude towards blood donation between blood donors and non-donors among university and college students in Yangon
- To determine the association of socio-demographic factors, knowledge and attitude towards practice of voluntary blood donation among university and college students in Yangon
- To identify the reasons for not practicing blood donation among university and college students in Yangon

1.3. Research Hypothesis

- There is difference between knowledge regarding blood donation of blood donors and non-donors among university and college students in Yangon
- There is difference between attitude towards blood donation of donors and non-donors among university and college students in Yangon

- There is association between socio-demographic factors and practice of voluntary blood donation among university and college students in Yangon
- There is association between knowledge and practice of voluntary blood donation among university and college students in Yangon
- There is association between attitude and practice of voluntary blood donation among university and college students in Yangon

1.4. Conceptual Framework



1.5. Operational Definitions

1.5.1. **Voluntary non-remunerated blood donor:** donor who gives blood, plasma or cellular components of his or her own free will and receives no payment,

either in the form of cash or in kind which could be considered a substitute for money.

1.5.2. **Family/replacement blood donor:** donor who gives blood when it is required by a member of their own family or community.

1.5.3. **Paid/commercial blood donor:** donor who gives blood in return for payment or other benefits that satisfy a basic need or can be sold, converted into cash or transferred to another person.

1.5.4. **Age:** self-reported age of respondent in completed year, the age of respondents in this study will be ≥18 years old.

1.5.5. **Religion:** religion of respondent which include Buddhist, Christian, Islam, Hindu and other.

1.5.6. **Household income:** self-reported estimated family income per month of the respondent in Myanmar Kyats

1.5.7. **Knowledge regarding blood donation :** the knowledge level of the respondent regarding blood donation which include blood types and own blood group, donor eligibility criteria , transfusion transmitted infections, blood donation procedures, effects of blood donations on donor and understanding of voluntary blood donation

1.5.8. **Donor eligibility criteria:** the conditions or criteria that must be met by a person at the time of blood donation to be able to give blood

1.5.9. **Transfusion Transmitted Infection:** infectious diseases that can be transmitted via blood as a result of transfusion of infected blood, the main transfusion transmitted infections screened routinely in blood donors are HIV, Hepatitis B and C, Syphilis and Malaria

1.5.10. **Attitude towards blood donation:** the views and thoughts of respondent toward blood donation which include opinion on blood donation, choice of blood donation type, expectation of benefit and opinion on blood bank

1.5.11. **Practice of voluntary blood donation :** there is previous blood donation by the respondent which is voluntary regardless of frequency of donation

Chapter II
Literature Review

2.1. Blood, the essence of life

Blood can be named as the “river of life” which carry numerous essential elements to every part of the human body via arteries, veins and capillaries of circulatory system. With the circulatory system, blood circulate and deliver essential elements such as oxygen and nutrients throughout the body to supply the tissues and body cells and take way carbon dioxide and metabolic waste products from these cells to lungs and kidneys for excretion. Blood is original very own precious source of human body regarded as the essence of life for centuries (Shilpa, Mehta, & Parekh, 2004) .

2.1.1. Function and components of blood

Blood is special body fluid composed of four main components; red blood cells (RBCs), white blood cells (WBCs), platelets (PLTs) and plasma. The main functions of the blood are

- Transportation of oxygen and nutrients from lungs and gastrointestinal tract to various tissues and body cells
- Collecting and bringing carbon dioxide and metabolic wastes to lungs, kidneys and livers to filter and clean the blood again
- Circulation of antibodies, antigens and cells to fight infection
- Carrying hormones form endocrine system to the body parts in which they perform their functions
- Blood clotting to prevent excessive bleeding
- Regulation of body temperature

The blood circulating in circulatory system (arteries, veins and capillaries) is called whole blood and it is composed of 45% blood cells and 55% plasma fluid. About 8% of body weight is composed of blood and an average adult has 4 to 5 liters of blood in the body (American Society of Haematology, 2017) . Blood volume can also be

estimated as approximately 70 mL/kg for adults, 80 mL/kg in children and 100 mL/kg in neonates (Australian Red Cross Blood Service, 2019) .

Red Blood Cell (RBCs) are produced from the bone marrow and represent 40-45% of the blood volume. RBCs contain the red pigment called hemoglobin (Hb) which carry oxygen to all parts of the body. Hemoglobin level plays essential role for adequate supply of oxygen in the body to carry out metabolic activities. The normal Hb level in adult male is 13.5 to 17.5 g/dL and that of adult female is 12.5 to 15.5 g/dL.

White blood cells (WBCs) are also produced from bone marrow and account for 1% of blood volume. WBCs play an important role in fighting the foreign substances such as virus and bacteria and protect the body against illness and infections as natural body defense system.

Platelets are smallest of the blood cells and their function is to control the bleeding at the wound site by forming plug and there by facilitate the healing.

Plasma is the yellowish fluid composed mainly of water and also protein, sugar, salts, fats. The function of plasma is to transport blood cells, nutrients and other functional elements such as antibodies and hormones throughout the body.

2.2. Blood Transfusion

Blood transfusion is the common procedure in medical practice where the blood is given to the patient in need of blood in a blood vessel via an intravenous line. The procedure can take 1-4 hours depending on the transfusion rate and amount of blood the patient need. Blood transfusion can replace all the components of blood (whole blood) or more often, just individual parts (red blood cells, platelets and clotting factors or plasma component) according to the diagnosis of the patient (NIH US, 2018) .

Generally, blood transfusion is performed for some of the main reasons as below.

- Anemia (lack of red blood cells) – for example, severe iron deficiency anemia, aplastic anemia, hemolytic anemia
- Conditions of reduced or abnormal blood cell production – thalassemia, sickle cell disease, leukemia, thrombocytopenia
- Cancer or treatment of cancers that can affect blood cells – such as chemotherapy or stem cell transplants
- Severe bleeding –surgery, childbirth, accident (NHS UK, 2018)

2.2.1. Blood Types in Human

The major blood types in human are in 2 categories according to the antigen contained; ABO blood group category and Rh blood group category. ABO blood group category includes four blood types (A, B, AB or O) and for each of this four blood types, it is either Rh-positive (Rh+) or Rh-negative (Rh-). This means if the blood type of a person is A, it will be either A positive (A+) or A negative (A-) blood. A person can receive blood from another person who has the same ABO antigens as theirs, and also O blood type. Rh+ can receive from either Rh+ or Rh-, but Rh- can only receive from Rh- blood. Blood Type O, found in 40% of all population is Universal Donor type and it is safe to transfuse to almost all other blood groups. And blood type AB is Universal Recipient type which can receive any type of blood (The Blood Center US, 2018).

Table 1 Major blood types and Matching (The Blood Center US, 2018)

Blood Type	Can Give to	Can receive from
O positive (O+)	O+, A+, B+, AB+	O+, O-
A positive (A+)	A+, AB+	A+, A-, O+, O-
B Positive (B+)	B+, AB+	B+, B-, O+, O-
AB positive (AB+)	AB+ Only	All blood types
O Negative (O-)	All blood types	O- only
A Negative (A-)	A-, A+, AB-, AB+	A-, O-
B Negative (B-)	B-, B+, AB-, AB+	B-, O-
AB Negative (AB-)	AB-, AB+	AB-, A-, B-, O-

2.2.2. Risks of Blood Transfusion

Blood transfusion is usually a safe and common procedure, however although rare, there can be mild to serious side effects. The most common but less severe risks are allergic reaction febrile non-hemolytic reaction and chill-rigor reaction. More serious risks include Acute Immune Hemolytic Transfusion Reaction due to ABO incompatibility, transfusion associated circulatory overload and lung injury, graft versus host disease and transfusion transmitted infections (TTIs) (MSD Manual, 2018)

TTIs are infections acquired by the transfusion of unsafe blood containing infectious pathogens which can include viruses, bacteria or parasites. To reduce the risk of TTIs, blood transfusion services use the standard donor screening questionnaires and the laboratory testing (CDC, 2011) .

2.2.3. Safe Blood Transfusion

Although blood is generally required for the routine and emergency medical conditions, the pattern of blood usage differs among the countries. In high income and developed world, blood transfusion is commonly used during advanced and sophisticated surgical and medical procedures such as cardiovascular surgery, transplantation, etc. Meanwhile, in the low income and developing world with limited diagnostics and treatment options, blood is mainly utilized for obstetric and gynecological complications in women and for children with severe anemia often due to malaria or malnutrition (World Health Organization, 2008b) .

Despite of different development level in health services, blood transfusion plays a crucial part in saving lives of many patients. Every year millions of blood units are transfused for survival of patients in different clinical settings. All the countries need to ensure that blood and blood products are free from infections to get safe blood supply. Safe blood supply is also takes an important part in HIV/AIDS programs in preventing infection and also reducing child mortality and improving maternal health (United Nations, 2015) .

Patients in need of blood transfusion have the right to get assess to save and adequate blood supply as much as possible, but many patients still suffer or die due to lack of access to safe blood timely and adequately. In many developing countries, there are challenges of safe blood supply requirement and shortage (World Health Organization, 2010a) .

To ensure the safe blood supply, rigorous and routine screening of all donated blood is required. WHO recommended the screening of all the blood and blood products for infections before clinical use. Mandatory screening of HIV, Hepatitis B and C and Syphilis are recommended by WHO, additional infection screening may different among countries. Additionally, donated blood must be tested cross-matching of ABO and Rh blood groups for compatibility to the patient(World Health Organization, 2017b) .

2.3. Blood Donation

Blood donation is philanthropic deed when the blood of a healthy person is collected for purpose of transfusion for patient in need (Melku et al., 2016) . By donating blood, millions of lives can be saved all over the world. Blood is indeed the most precious gift that anyone can give for another person in need of life – the gift of life. With a single blood donation, one or more lives can be saved as the blood can be separated into different components and can be used for different patients with specific diagnosis.(World Health Organization, 2017d)

Every year, it is estimated that 112.5 millions of blood and blood products are collected worldwide. More than 50% of these blood donations are from high-income countries, which represent 19% of the total world's population. In the low- and middle-income countries, the median annual donations per blood center is 5,400 as compared to 16,000 in the high-income countries. The general blood availability of a country is indicated by the rate of whole blood donation. In high income countries, the median blood donation rate is 32.1 donations per 1,000 people. Compared to that, donation rate in upper-middle income, lower-middle income and low income countries are 14.9, 7.8 and 4.6 donations per 1000 people respectively (World Health Organization, 2017a) .

Although millions of blood and blood product units are collected annually worldwide, many more are still needed to meet the global demand to ensure sufficient and timely supply. This urges blood banks to constantly look for more effective solutions in recruiting blood donors (Abderrahman & Saleh, 2014) .

2.3.1. Types of Blood Collection

Blood collection can be generally divided into two categories; whole blood collection and apheresis collection.

- **Whole blood collection:** This is the common way of donating blood all over the world where the blood is extracted from the donor as a whole containing all the red blood cells, white blood cells, platelets and plasma. Usually, 450 to 550 ml of blood is collected in whole blood donation and it is the simple procedure. The whole blood can be transfused directly to the patient or it can be later separated into different components such as platelets, plasma and use in different patients or purposes.
- **Apheresis Collection:** In this type of blood collection, donor blood is extracted as specific components and not as a whole blood. The extraction of only platelet from donor is called as plateletpheresis and extraction of only plasma is called as plasmapheresis. Advantage of apheresis collection is that donor can donate once a month. And apheresis can collect more number of platelets than that of whole blood and also platelets form apheresis collection are more effective in stopping bleeding. However, apheresis collection need more advance equipment than the whole blood collection and it cannot be done in blood banks with limited facilities as in developing countries(Health Science Authority, 2017).

2.3.2. Types of Blood Donor

The source of blood is only from the blood donors, which make the blood and blood products precious and unique. Blood cannot be substituted with any other fluid. There is still long way before we can produce the artificial blood. Therefore, patients in need of blood have to rely solely on the generous blood donors to donate blood.

Most of the nations are in need of sustainable number of blood donors who are eligible and willing to donate blood to save lives. This is the most important step to ensure country's requirement of safe and stable blood supply.

There are three types of blood donor according to nature of the donation; voluntary non-remunerated blood donor, family/replacement blood donor and paid commercial blood donor (World Health Organization, 2010a).

- **Voluntary non-remunerated donor:** donor who donates blood and blood products in his or her own free will without receiving any payment for that, either in cash or in any form of incentive in replacement of cash. But, small gifts, refreshments and sometimes reimbursements of direct travel costs as tokens of gratitude can be given to voluntary non-remunerated donors.
- **Family/Replacement Donor:** those who donate blood and blood products when requested by family members and friends from their own community. Most common scenario is that hospital staffs request the patient's family and relatives for blood donation and some hospitals also ask for the patients to find the compulsory replacement donors in every emergency or planned surgical conditions which may require blood transfusion. In these cases, there may be hidden payment in cash or any other forms to the donors by the patients' families.
- **Paid or commercial donor:** those who give blood and blood products in order to receive money or any other form of payment or benefits that can be exchanged into money. These paid donors also tend to give blood regularly for a payment and some may even make a contract with blood bank to donate blood for agreed fee. Often, they approach the families of the patients and try to sell their blood and pretend as replacement donor in front of health staffs.

2.3.3. General Donor Selection: Donor Eligibility Criteria

Individual should be in good health in order to be accepted as blood donor. Generally, donor should feel well on the day of donation without any limitation of daily activities. To determine eligible to donate or not, blood banks usually do the routine processes such as pre donation questionnaires containing brief medical history, physical

examination such as blood pressure measurement and testing of hemoglobin level. With these pre donation assessments, individuals are determined to be able to donate for defer for temporary or permanently. The followings criteria are generally included in blood donor selection according to WHO while some differences may apply for different countries (National Blood Center, 2018; World Health Organization, 2012a).

- **Age**

The lower limit of age to donate blood is 18 years old in most countries including Myanmar. Some countries' blood transfusion services permit starting from 16 years old if they are physically and hematological acceptable with appropriate consent.

The usual upper limit of age for blood donation is 65 years old and in some countries, the upper limit for regular and healthy blood donors have been removed. But for the first time donors, the usual age limit is 60 years old. Myanmar Blood Transfusion Service set the upper age limit to 55 years old because of the concerns regarding potential adverse reactions and cardiovascular incidence come with age.

- **General Appearance**

General appearance is observed during physical examination. The individual should not have fever, shortness of breath or coughing. The signs of malnutrition and general debility should be ruled out. They should be in sound mental status and free from influence of alcohol or drugs. The color of skin and mucous membranes should be normal without serious skin infections or visible enlarged lymph nodes. In case of individuals with tattoos or body piercings, risks of TTIs must be ruled out. Depending on the condition, the individuals fall into above appearances may be deferred temporarily or permanently.

- **Minor Illnesses**

Individuals with non-specific minor symptoms such as fever, general malaise, cough, diarrhea, etc. may indicate the acute infection that may be transmissible by blood

transfusion. These individuals with suspected current infection should be defer for 14 days from full recovery and cessation of treatment and antibiotics.

- **Weight**

To protect the blood donors from adverse effects such as vasovagal reaction, the weight limit must be set for donor selection. Normally, there is no upper weight limit for blood donation and individual should weigh at least 45kg (100 lb) to 50kg (110 lb) to donate whole blood or apheresis blood. In Myanmar, males must weigh 50 kg (110 lb) and females must weigh 45kg (100 lb) to donate blood.

- **Vital signs**

Routine physical examination for donors include pulse, body temperature and blood pressure assessment. Pulse rate of 60-100 per minute with normal rhythm, body temperature not more than 37.6 C and normal blood pressure (systolic 120-129 mmHg, diastolic 80-89 mmHg) are ideal to donate blood. However, these vital signs can be fluctuated in conditions such as anxiety, nervousness, etc. For this reason, the donor selection according to vital signs is flexible in many settings.

- **Donor iron status by hemoglobin screening and frequency of donation**

Pre blood donation assessment of hemoglobin level is the best way to indicate the donor iron status. The minimum hemoglobin threshold for male is 13g/dl and that of female is 12 g/dl to donate blood. Iron deficiency is global issue and donation induced iron deficiency can be a concern particularly for women of reproductive age and adolescents. Therefore the frequency of donation is important to keep the iron to replenish in donors. In most settings, the minimum interval between two successive whole blood donations for male is 12 weeks for male and 16 weeks for female. The minimum interval for platelet donation is 4 weeks and that of plasma is 2 weeks. Myanmar Blood Transfusion Service set the minimum interval for whole blood donation (more than 80% of total blood collection) as 16 weeks (4 months) in both male and female.

- **Pregnancy, lactation and menstruation**

Additional iron of 350-500 mg is needed for iron balance in pregnant women. To allow the replenishment of iron, women with pregnancy and up to six months of delivery or termination of pregnancy should be deferred. Lactating mothers should also be deferred for same reason. Generally, menstruation is not a reason for deferral but the female should be deferred if there is report of excessive menstrual bleeding. In some countries, currently menstruating women are not accepted for the concern of vasovagal reactions induced by uterine muscle contraction and anemia. In Myanmar, pregnancy, lactation and menstruation all applicable for reasons to defer.

- **Donor Medical History**

- Hematological Disorders: Assessment for hematological disorders is needed to protect the donors against any risk of anemia, bruising and blood clotting due to venipuncture. Past history of iron deficiency anemia and B12 or folate deficiency should be acceptable if fully recovered or completed the treatment. Permanent deferral is needed if there is chronic anemia of unknown cause or due to systemic diseases such as renal disease. In most countries, other blood related disorders such as thalassemia, sickle cell disease, hemophilia, G6PD deficiency and thrombocytopenia are criteria for deferral.
- Cardiovascular diseases: asymptomatic donors with past cardiovascular disease history are acceptable to donate. Symptomatic ischemic heart disease, history of myocardial infarction, severe cardiac arrhythmia and other symptomatic cardiac and peripheral vascular disorders should be deferred permanently.
- Hypertension: Raised or low blood pressure are not predictive of adverse reaction in blood donation and individuals with well controlled blood pressure with medications are acceptable.
- Respiratory diseases: Asthma and acute respiratory infections, depending on the severity, can be accepted to donate or defer temporarily until recovery. Permanent deferral is required in case of severe obstructive airway disease, cyanosis, chronic or recurrent respiratory infection.

- **Donor risk assessment and Transfusion Transmitted Infections (TTIs)**

The safety of donated blood is affected donor's exposure to HIV, Hepatitis B and C, Syphilis and other TTIs. Transfusion of infected blood can cause morbidity and mortality in patients who receive blood and therefore need the routine and strict assessment and screening is required. Prospective donors must complete the pre donation questionnaires including the general health status, history, signs and symptoms of infections, risky behaviors, travel history and contact history of infectious diseases. WHO recommended mandatory screening of all the donated blood, in minimum, for HIV, Hepatitis B, Hepatitis C and Syphilis. Screening of other TTIs depends on each country prevalence and incidence of certain infections. In Myanmar, Malaria is screened in addition to 4 major TTIs as Myanmar is endemic area of Malaria. The individuals infected with these infections are permanently deferred (National Blood Center, 2018; World Health Organization, 2012a).

2.3.4. Benefits of Blood Donation

While how blood donations can save lives of the recipients is very clear, many benefits for the donors are often underrated. The blood donors have several health benefits both physically and emotionally. Blood donation can reduce stress, help get rid of negative feeling and improve the emotional wellbeing. Not only that, blood donation can improve the physical health of donors in following aspects(Borreli, 2013; Longhurst, 2018; Nagdeve, 2018).

Prevention of hemochromatosis: Blood donation can reduce the risk of hemochromatosis where the body absorb excessive iron which lead to iron overload. Donating blood can maintain the iron balance in the body.

Lower the cancer risk: By regularly donating blood, body iron are maintained in healthy level. This can reduce the chance of cancers relating to high iron levels such as cancer of lung, liver, esophagus, stomach and colon.

Prevention of cardiovascular diseases: Blood donation can reduce the oxidative iron from the body and thereby reduce the cardiovascular disease risk. Blood donation can reduce the heart attack and stroke.

Weight loss: Blood donation can burn the calories and reduce the weight of the regular blood donor. However, blood donation cannot be taken as weight loss plan by any means.

New blood cells production: After the blood donation, body produce the new blood cells to replenish the blood loss which is good for the health.

Although there are many benefits of blood donations for donors, misconceptions are often observe among the population according to several studies (Baig et al., 2013; Dubey, Sonker, Chaurasia, & Chaudhary, 2014; Kowsalya, Vijarakjumar, & Chidambaram, 2013; Salaudeen & Odeh, 2011). The studies had similar report of the most common misconception being the risk of infection to donor such as HIV and hepatitis. The other reported misconceptions include the risk of having insufficient blood volume in donor or anemia, affecting physical strength and weight gain.

2.4. Importance of Voluntary Blood Donation

Among the 3 types of blood donors, adequate and reliable supply of safe blood is mainly achieved by donations of regular, voluntary, non-remunerated blood donors. Generally, safe blood can be defined as blood without trace of viruses, parasites, or any other inclusions that can be harmful to the recipient (Aung, 2009) . Voluntary non-remunerated or unpaid donor is the one who donate blood voluntarily with own free will and does not receive any payment for the donation, whether in cash, or in a form as a substitute for money(Nair & Mammen, 2015) . In Melbourne Declaration, voluntary unpaid blood donation has been declared to be the key source of safe blood supply universally and World Health Organization recommends that all the national blood transfusion services should base on the supply of voluntary non-remunerated blood donors.

When reinforced with donor questionnaires and infection screening, voluntary blood donors have very low incidence of infectious disease. The analysis also shows that countries with risen voluntary blood donors are also reported the increase in the number of regular blood donors. This indicates that voluntary blood donors tend to donate regularly than other types of blood donors. In well-organized voluntary donation programs, the need of blood in emergency situations tends to be solved timely as the regular voluntary donors are more responsive in commitment to save lives. Voluntary blood donors have good health education and they tend to maintain the healthy lifestyle in order to donate blood regularly. This come from the sense of self satisfaction and self-esteem as a result of positive recognition in the society. Voluntary blood donors are also effective recruiters and donor educators, they are effective influencers in new donor recruitments (World Health Organization, 2010a).

Family/ replacement blood donors only donate by the request of individual patients and that cannot cover the requirement of the community. Paid blood donors can affect the principle of voluntary non-remunerated donors negatively. In the presence of paid donors, donors who otherwise donate voluntarily may want to get paid and hence weaken the voluntary blood donor programs.

Currently, only 62 countries in the world have 100% of voluntary blood donations for their national blood supply, while 34 countries in the developing world still have more than 75% of their blood collections from family/replacement donors and even paid donors (World Health Organization, 2016) .

Figure 1 Proportion of voluntary non-remunerated donations (whole blood and apheresis donations combined) by country, 2013(World Health Organization, 2017e)

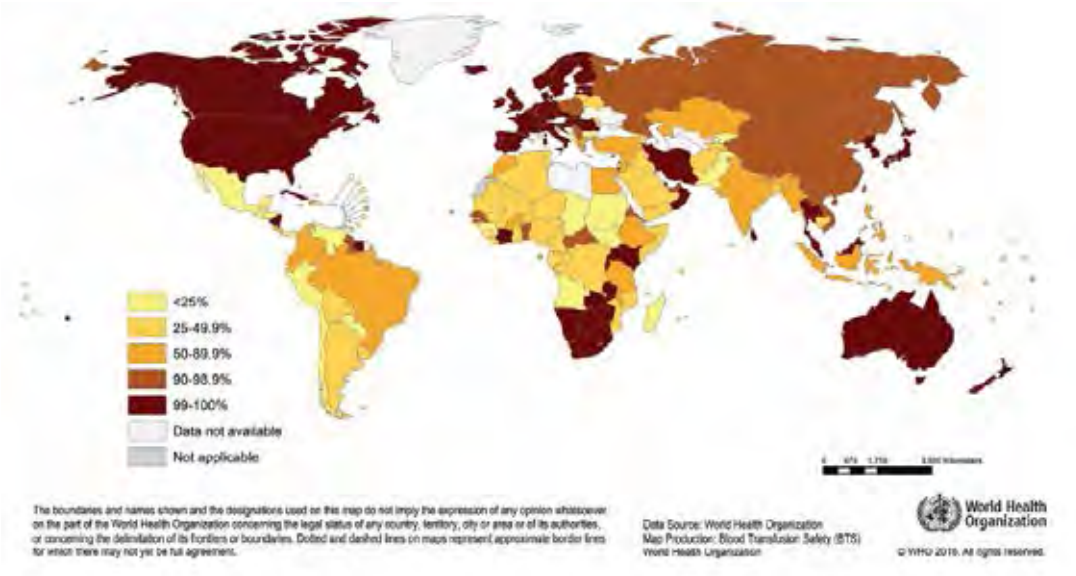
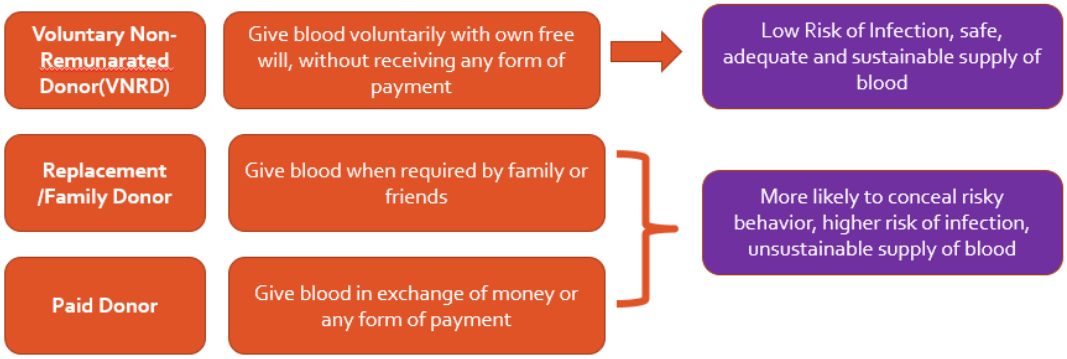


Figure 2 Nature of 3 types of blood donors



2.5. Role of young adults in increasing voluntary blood donation

The most important thing to consider when targeting a population to recruit as the potential donors is that they are healthy and blood donation cannot harm themselves or the patients who receive their blood. To meet the clinical demands of blood and blood products, the country need sufficient numbers of young and healthy individuals who can maintain safe and sustainable voluntary donor base. Young people can contribute not only by donating blood, they also have ability to advocate other young people to become blood donors(World Health Organization, 2010a).

Young donors are the potential donors who can supply the blood regularly and in long term basis. By recruiting young blood donors and retaining them, country's blood supply can be improved as well as safe and healthy lifestyle of young adults can be promoted. In 2010 World Blood Donor Day campaign with the slogan of "New Blood for the World" , WHO also stated that young generation motivated and enthusiastic voluntary non-remunerated blood donors are the best potential source of donors to provide the safest supply of blood to save life everywhere (World Health Organization, 2010b).

2.6. Blood availability in developed and developing countries

In developed or higher income countries, the demand of blood and blood products usually meets their supply as these countries have well-structured health facility and strong voluntary donor base. In contrast, in developing or mid and low income countries, chronic blood shortages are common. Out of 108 million blood donations all over the world each year, 50% of those are from developed countries/high-income countries which contributes less than 20% of total population in the world. The average rate of blood donation is 9 folds higher in the developed countries than the developing countries (World Health Organization, 2016).

In major urban facilities, sophisticated and advanced health care provision may be available, but for those in rural areas who are also the larger sector of the population, there is difficult access to the limited health services where the blood can be unsafe or not sufficient (World Health Organization, 2010a). In addition , in developing countries, blood donation in return of payment may create a risk of exploitation of the poor and also result in a temptation for the donor to conceal the own lifestyle an illnesses thereby increasing the risk of transfusion transmitted infections (Koistinen, 2008).

According to WHO report, low and middle income countries show an increase in voluntary non-remunerated donations in recent years. More than 10 million voluntary non-remunerated blood donations increased from 2008 to 2013 according to reports of 159 countries. The peak rise of voluntary non-remunerated blood donations is observed

in the South-East Asian Region (75%) followed by African Region (37%) (World Health Organization, 2017a).

Table 2 Blood usage and availability in developed and developing countries (World Health Organization, 2010a)

	Developed Countries	Developing Countries
Use of Blood	To support increasingly sophisticated medical and surgical procedures, trauma care and the management of hematological disorders	For the management of hemorrhage in pregnancy and childbirth, severe childhood anemia, trauma
Source of Blood	Nearly 100% from voluntary blood donation (62 countries)	25% from voluntary blood donations and 75% from replacement/paid donations (34 countries)
Donation rate (donations/1000 people)	High income: 32.1 Upper middle income: 14.9	Lower middle income: 7.8 Low income : 4.6
Blood supply	Generally enough supply due to well-structured health system and voluntary donors	Chronic blood shortage are common

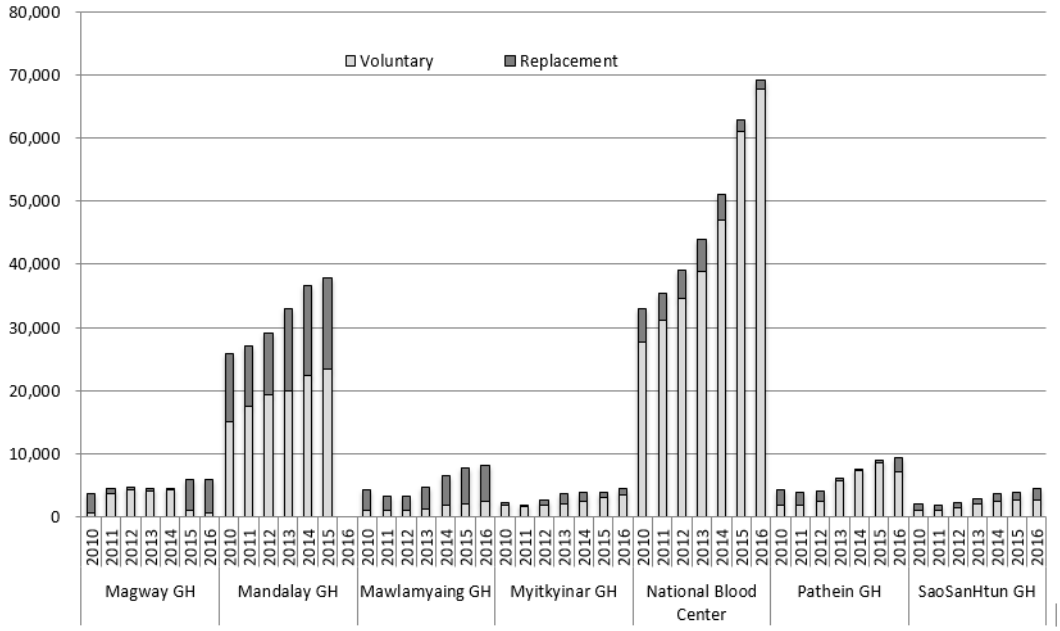
2.7. Blood Transfusion Service in Myanmar

In Myanmar, the Myanmar Red Cross Society (MRCS) started blood donation activities in 1961 and regular blood donation activities have been organized since then. MRCS strongly encourages the health care staffs and facilities to follow the 'national blood and blood product law' (enacted in January 2003) by promoting voluntary non-remunerated donations which can assure the quality of blood and also prevent the risk of transfusion transmitted infections. Every day thousands of people in Myanmar require blood transfusion for routine and emergency clinical conditions. In every blood transfusion, there is always a risk of infection from contaminated blood. A crucial element in ensuring safety of blood is to know about the source of donated blood as much as possible. Voluntary non-remunerated blood donors who are also regular blood donors have low-risk of infection as their motivation is solely by altruism and have no reason to hide their health status. For these reasons, blood transfusion service in Myanmar have to emphasize on the foundation and improvement of effective blood donor program with education, motivation, and recruitment of voluntary blood donors, assessing the eligibility of these donors, constantly upgrading blood collection procedures, and high-quality donor care.

In 1899, Yangon General Hospital initiated the blood transfusion and in 1939, Ministry of Health formulated blood transfusion services and started the services with paid blood donation program. In 1945, separate blood bank facility was established at Yangon General Hospital, which is now known as National Blood Center (NBC). Since then, National Blood Center with collaboration of MRCS, raise the public awareness and advocacy by identifying the low risk-groups and promoting healthy lifestyle. Efforts are made to educate the importance of safe blood supply by explaining about the risk factors causing transfusion transmitted infections and to promote healthy lifestyle behavior among general public with the involvement of local authorities. Eventually, these efforts help identify the low-risk groups as potential blood donors. After identifying the low risk donor pool in the community, the blood transfusion services around the country continue the steps of careful donor selection and quality screening with ultimate aim as an output of safe blood transfusion (Aung, 2009).

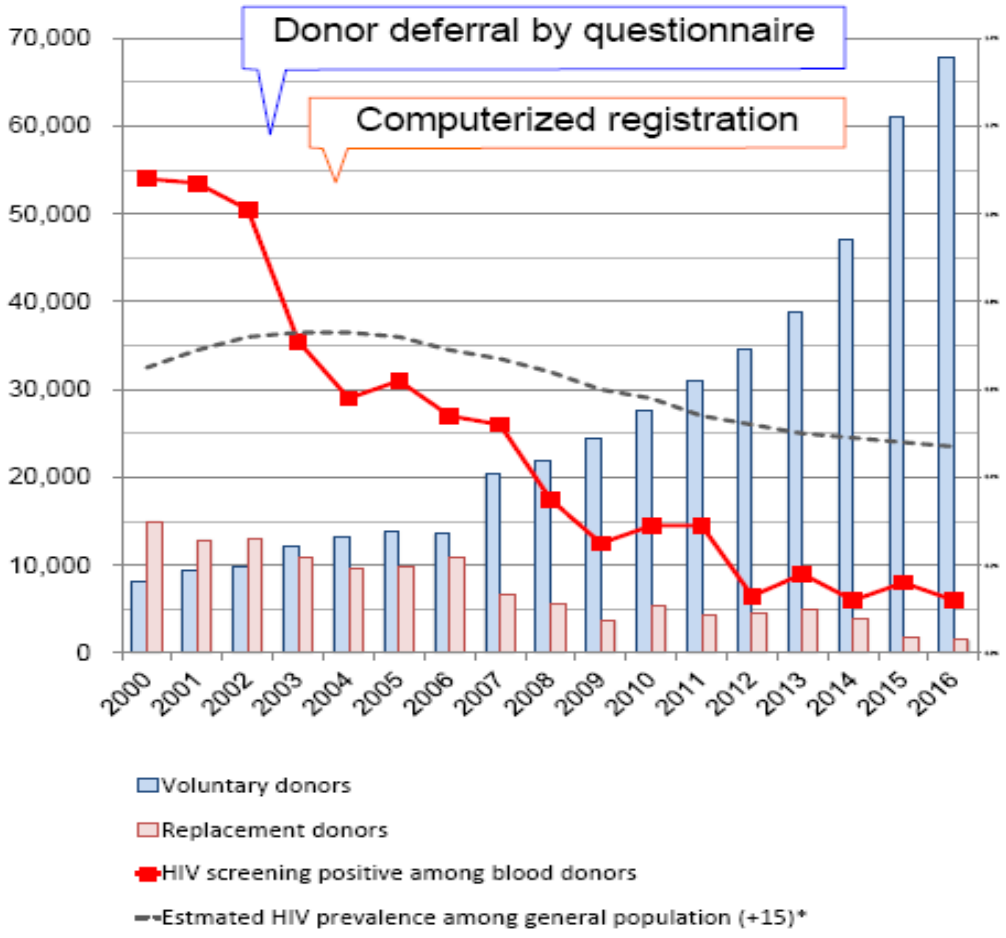
After years of great efforts and commitment form Ministry of Health, Myanmar blood transfusion service shows the remarkable outcome of increasing voluntary donors with decreasing replacement and paid donor and rate of transfusion transmitted infection are also declining especially HIV. According to the annual report of NBC, total blood donations including voluntary and replacement donations increase remarkably from 2010 to 2016 in 7 main regional blood centers (National Blood Center, 2017) . The NBC in Yangon is the main center which supply blood and blood products to more than 11 public hospitals, private hospitals and some regions outside of Yangon. As a result, there is still a high demand for blood supply in NBC compared to other regional centers. The numbers of voluntary blood donors are also in increasing trend in most regional blood centers but Magway and Mawlamyaing still have higher proportion of replacement donors than voluntary donors (Figure 3).

Figure 3 Myanmar Blood Donation Status in 7 Regional Blood Centers (2010 – 2016) (National Blood Center, 2017)



In 2016, 397,278 blood donations are collected form 153 services around the country and voluntary donation rate was increased to 79%. HIV rate in Transfusion Transmitted Infection (TTI) screening was also declined from 1.01% (2002) to 0.2% (2016). This strongly indicate the lower incidence of TTIs among the voluntary blood donors (Figure 4) (National Blood Center, 2017) . As parts of blood safety program, National Blood Center also established several systems such as identification of voluntary donor groups through awareness raising activities, donor deferral system using questionnaire adapted to Myanmar's situation, and computer based donor registration system. But with increasing demand from patient side, the public awareness regarding voluntary donations need to be strengthened furthermore.

Figure 4 Myanmar Voluntary and Replacement Donor trend with HIV screening positive rate among donors (Aung & Nozaki, 2017)



The current challenges of Myanmar blood transfusion service are like other developing countries, sustainability of blood supply and to get timely blood supply in all area of the country equally. To reach the WHO goal of 100% voluntary blood donation by 2020 (World Health Organization, 2009), Myanmar need to actively find out the strategies to effectively recruit more voluntary blood donors at the same time phasing out the replacement/family donors and paid donors.

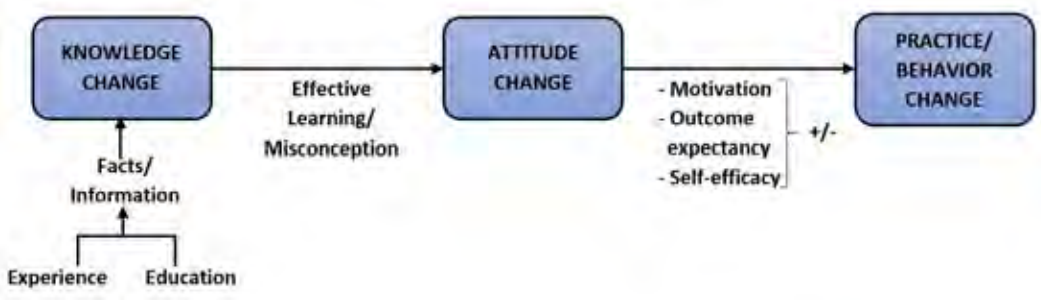
2.8. Knowledge, Attitude and Practice Survey (KAP)

Knowledge, Attitude and Practice (KAP) surveys are quantitative method formatted in predefined questionnaires, but they can provide both quantitative and qualitative information for the researcher. KAP also serve as the education tool for the

community. KAP survey is the representative method to explore and collect information on what is known, believed and done in relation to particular topic in specific population. In health related research, KAP surveys can provide the baseline or reference information which is useful to measure the effectiveness of health care services in changing health related behaviors and to proceed for the further assessment. KAP surveys can suggest specific intervention strategies fit to local circumstances and cultural influence (Raina, 2013; USAID, 2011; World Health Organization, 2008a).

In Knowledge, Attitude and Practice Model, the intended groups and individuals are facilitated for positive behavior or practice while preventing negative behavior or practice. This model is also known as the Rational Model. This model is based on the theory that action, practice or behavior of individuals are more or less derived directly from the knowledge obtained from experiences and education and mediated by the attitude or beliefs that are also rooted in that knowledge. If the information received for knowledge is incorrect or inconsistent with existing knowledge, it can lead to misconceptions, thereby negative attitude and negative behavioral choices (World Health Organization, 2012b). However, knowledge and attitude are necessary but not always sufficient to change the individual or collective behavior. Motivation, self-efficacy and outcome expectancy of the individuals often reinforce to get the expected positive behavior (Légaré, 2010).

Figure 5 Knowledge, Attitude and Practice Model/ Rational Model (Jitkritsadakul, Boonrod, & Roongroj., 2017; Légaré, 2010; World Health Organization, 2012b)



Note ➔ **Motivation**: reason(s) drive the individual to act or behave in particular way, **Outcome expectancy**: judgment of possible consequences a behavior will produce,

which may drive the behavior or practice, **Self-efficacy:** individual's perception or confidence in their ability to perform a behavior (World Bank & CommGAP, 2010).

In developed countries, safe and sufficient blood supply is achieved by developing evidence-based strategies. Developing and transitional countries are making efforts toward this goal by utilizing the time-tested approach based on surveys conducted to identify knowledge, attitude, and practice (KAP) of blood donation. Factual information obtained from KAP studies of blood donation can also reinforce the government commitment on blood transfusion services.

In reviewing KAP studies conducted in developing countries, it is recommended by all the investigators that strategies to sustain voluntary blood donation can be formulated from the information obtained from KAP. The investigators further concluded that although there are different adopted approach, studied samples, demographic characteristics, etc. in various studies, it was founded that fear to donate blood, misinformation about blood donation, doubt of selling the blood lead to not donating blood despite the presence of good and positive attitude and altruism and willingness to donate blood (Mishra et al., 2016).

2.9. Previous Researches

Several studies done in different countries relating to KAP of the blood donation among university and college students or the other specific populations show the similar result of practice of blood donation is significantly associated with being male gender and have positive correlation with knowledge regarding to blood donation. The knowledge level and proportion of participants who practiced the blood donation before is widely different among various studies. Most of the studies reported positive attitude towards blood donation and willingness to become blood donors among the majority of the participants. The most commonly observed reasons for not donating blood in different studies include lack of information regarding where to donate blood, fear, not receiving any request to donate, lack of opportunity and no interest in donating blood.

A study done in Jordan found that only 28.6% of the participants had the knowledge above the average and friends, culture, religion and media influence the knowledge and attitude related to blood donation (Abderrahman & Saleh, 2014).

In a study done in interns of medical college in Mumbai showed that 47.7% of the participants had donated blood before and it had male propensity. Although the participants being the medical interns, more than half (55%) of the participants did not have adequate knowledge regarding blood donation. The most common reason for not donating blood was being medically unfit to donate (Sahoo, Patil, & Dehmubed, 2017).

A KAP study in different colleges in Nepal showed 18% practice of blood donation among the participants with 31.5% boys and 8.7% girls. 32.4% of the participants had the knowledge score above the average. The most common causes of not donating are lack of information about the blood banks and not receiving request to donate (Amatya, 2013).

Study done in King Abdulaziz Medical City (KAMC) population in Saudi Arabia reported 45.8% of participants with history of blood donation. Participants with higher knowledge level and positive attitude, age range of 31 to 50 years, male gender and higher education status are found to be associated with practice of blood donation. The common reasons for not practicing blood donations are not consider about blood donation (52.4%), no time to donate (45%) and difficulty in accessing the facility (41.3%) (Alfouzan, 2014).

A study conducted among undergraduate university students in Southeast Nigeria showed the majority of the students 86.7% were heard of blood donation and 69.3% had good level of knowledge. However, only 13.3% had donated blood before and 55% of them only donated one time. The main reasons for not donating include fear (53.8%), not interested (19.6%) and culture/religious influence (9.2%). More than half (59.3%) showed the willingness to donate in the future. The practice of blood donation is predicted by male gender, willingness to donate in the future and low socio-economic status (En, 2018) .

A study conducted in transfusion medicine department of a hospital in Dhaka city showed 56% of the participants donated blood before which include 82.7% male and 17.3% female. More than 50% of the participants demonstrated the good knowledge regarding blood donation and 69% showed the positive feeling like satisfaction after donating blood. Majority of them 87% are willing to donate blood regularly in the future (Sharifa Akhtar, Sultana, Farzana, Ahmed, & Golam Rubby, 2017).

In knowledge and attitude study done in rural area of India reported 17.5% of previous blood donation practice among the participants and among them, 55% donated as replacement donors. The main reason of not donating blood is never come cross their mind 34%. More than 75% of the respondents showed willingness to donate in the future(Shidam, Lakshminarayanan, Saurabh, & Roy, 2015).

A study in North India conducted among donors and non-donors population showed the most common reason for not donating blood being “no one asked to donate blood” 41%. Voluntary donors showed more satisfaction than replacement donors after the blood donation and hence 90% of them were willing to donate again in the future. Knowledge level was highest among voluntary donors followed by replacement donors and non-donors. Television and media were main source of information for blood donation (Dubey et al., 2014).

In a study of university students in Bangladesh, 34.3% of the participant had history of blood donation in the past. Most of the non-donor students 73.3% showed the positive attitude toward blood donation. Male gender is associated with willingness to donate blood in the future. The only reason for not donating blood observed in this study is fear (Karim, Alam, Jafrine Labone, & Farazi, 2012).

The study conducted in university students of Tanzania showed 30% of previous blood donation history, 55% being the repeated blood donors. Most of the participants 93% showed positive attitude towards blood donation and 88% showed desire to donate in the future. Factors associated with previous donation history are being male, knowing

the blood donor, knowledge of the blood donation and willingness to donate (Elias et al., 2016).

Another study of tertiary institution students in Nigeria showed 15% of the blood donation history among the respondents, among them, only 3% was voluntary blood donors. More than half of the blood donors are males 57%. More than half 61% of the respondents showed good knowledge related to blood donation. The major reasons observed for not practicing blood donation were lack of opportunity 45% and lack of knowledge 24% (Salaudeen & Odeh, 2011).

In a KAP study of adult population in Gondor town, Northwest Ethiopia reported 18.4% of blood donation practice among the respondents. Half of the participants 57% had the adequate knowledge towards blood donation and 82% showed the positive attitude. The participants with protestant religion was found to have good attitude towards blood donation (Melku et al., 2016).

Chapter III
Methodology

3.1. Study Design

Study design of this study was cross-sectional survey study.

3.2. Study Area

Study areas were Yangon Technological University (YTU) located in Insein Township and National Management Degree College (NMDC) located in Botahtaung Township of Yangon Region in Myanmar.

3.3. Study Population

Study population was students currently studying in Yangon Technological University (YTU) and National Management Degree College (NMDC), ≥ 18 years of age since the eligible age for blood donation in Myanmar is 18 years old (National Blood Center, 2018).

3.4. Duration of the Study

The study was conducted from April 2019 to May 2019.

3.5. Sample Size

The Sample size of this study was calculated by using Estimation of finite population proportion formula method (Daniel, 1995) .Population Size (N) which is the total number of students ≥ 18 years old studying in YTU and NMDC is 1,600. Estimated proportion of blood donors (p) = 0.5 (50%) is used since the proportion of blood donor among studied students is unknown.

$$n = \frac{Np(1-p)z^2_{1-\propto/2}}{d^2(N-1)+p(1-p)z^2_{1-\propto/2}}$$

$$n = \frac{1600\ x\ 0.5(1-0.5)1.96^2_{1-0.05/2}}{0.05^2(1600-1)+0.5(1-0.5)1.96^2_{1-0.05/2}}$$

$$\text{n} = 310 + 31\ (10\%\ missing\ rate)$$

n = 341

n = Required minimum sample size

N = Population size of study area = 1600

p = Proportion of study population expected to be blood donors = 0.5

d = Error allowance = 0.05

α = Level of significance (Type I error) = 0.05

z = standard value for 95percent confidence interval = 1.96

The sample size in this study was 341 after taking into account of 10% missing rate (31).

3.6. Inclusion and Exclusion Criteria

Inclusion Criteria

- Both male and female students at the age of ≥ 18 years old (3rd and 4th year students)
- Fulltime students attending at YTU and NMDC

Exclusion Criteria

- Students who refuse to participate in the research

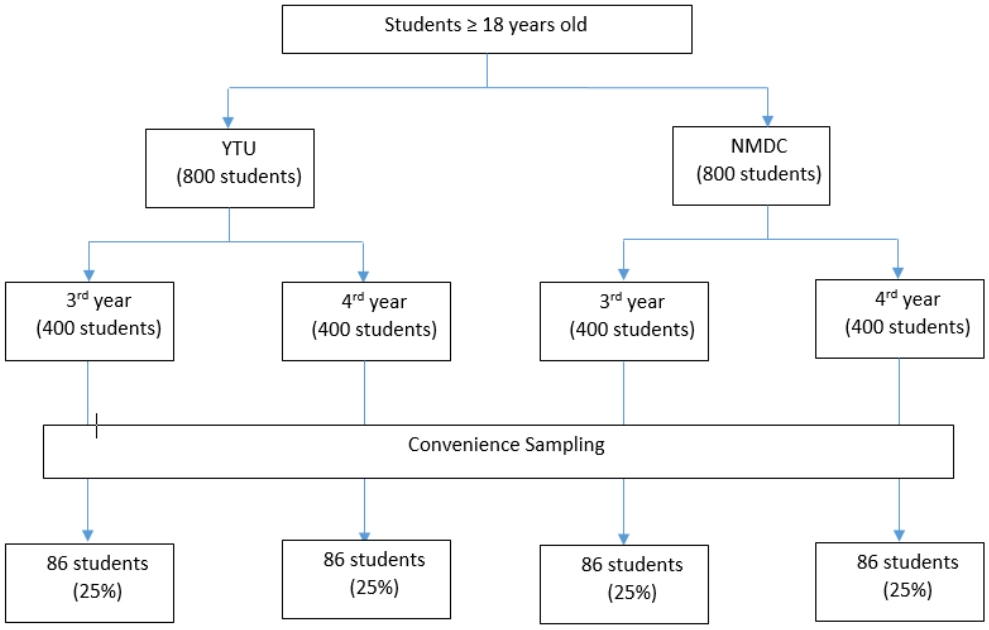
3.7. Sampling Technique

The researcher purposively selected YTU and NMDC for 2 reasons. Firstly, researcher wants to study non-medical university students since the knowledge and attitude of medical students are generally superior compared to other non-medical

students and this can lead to selection bias for better outcomes. Therefore, YTU and NMDC selected as non-medical university and college with highest student admission rate in Yangon. Secondly, students studying in YTU and NMDC comes from different townships of Yangon, which means covering most of the areas of Yangon compared to other institutions. Both YTU and NMDC have the regular and full time academic classes starting from 1st year (freshman) to 4th year. In Myanmar, all the university and college entry age started at 16 years old, which means in general, 1st year (freshman) is 16 years old and 2nd year is 17 years old and so on(Ministry of Education, 2013) . In this study, since the participants should be in blood donor eligible age of Myanmar (18 years old and above), researcher will only collect the data from 3rd and 4th years students who are at the age of 18 years or more and also full time students in both institutions.

Sampling method used in this study was non-probability Quota and convenience sampling method. The size of the sample selected from each subgroup was proportional to the size of that subgroup in entire study population. There were 2 subgroups (YTU and NMDC) and each subgroup was further subdivided into 3rd year and 4th year students. Samples were selected from each small subgroup with convenience sampling method.

Figure 6 Flow Chart of Sampling Technique



3.8. Measurement Tool

In this study, self-administered semi-structured questionnaires was used for data collection.

The structured questionnaires contain 5 parts.

1. Socio-demographic characteristics
2. Knowledge related to blood donation
3. Attitude towards blood donation
4. Practice of voluntary blood donation
5. Reasons for not practicing blood donation

The questions were prepared, adopted and modified from various institutional sources, Myanmar National Blood Center website and literature reviews (Abderrahman & Saleh, 2014; Amatya, 2013; Elias et al., 2016; En, 2018; Mishra et al., 2016; National Blood Center, 2018; Pan American Health Organization, 2005; Sahoo et al., 2017).

3.8.1. Socio-demographic characteristics

There were 6 questionnaires contains general information of the respondents including age in completed years, gender, religion, current academic year, estimated household income per month and history of blood related disorder.

3.8.2. Knowledge related to blood donation

This section contained 31 questions (30 knowledge questions relating to blood donation and 1 question for source of information for blood donation).

There are 30 questions for 6 main parts of knowledge which were

- Blood types and own blood group (Q. 7-12)
- Donor eligibility criteria including fit conditions and unfit conditions (Q.14-26)
- Transfusion transmitted infections (Q.27-30)
- Blood donation procedures (Q. 13, 31)
- Effects of blood donations on donors (Q. 32-35)
- Voluntary blood donation (Q. 36)

There were 21 questions with 3 responses (Yes/No/Don't know) and 9 multiple choice questions with one correct answer. The score was categorized as "1" for correct answer and "0" for incorrect and "Don't know" answer. Another question about source of information for blood donation (Q.37) is also included in this section which was excluded in the scoring. After the survey, correct answers of these knowledge questionnaires was given to participants.

Score of each questions will be summed up for total score and vary from 0 to 30. Bloom's cut off point will be used for classification of knowledge score into 3 levels as follow.

Poor Knowledge (0%-59%): Score 0 – 17

Moderate Knowledge (60% - 80%): Score 18 – 24

Good Knowledge (81% - 100%): Score 25 – 30

3.8.3. Attitude toward blood donation

This section aimed to find out the respondents' attitude towards the blood donation which covers

- Opinion on blood donation (Q.38, 41, 45-47)
- Choice of blood donation type (Q. 39, 43, 44)
- Expectation of benefits (Q. 40, 42)
- Opinion on blood banks (Q.48, 49)

This was measured by 12 questions and scale used for statements is Likert's scale. Q. 38, 41, 44-47 were positive statements and Q. 39, 40, 42, 43, 48, 49 were negative statements. The response to statements were ranged from "Strongly Agree" to Strongly Disagree" and scored with 5 points Likert's scale as mentioned below.

Positive statements		Negative statements	
Choice	Scores	Choice	Scores
Strongly agree	5	Strongly agree	1
Agree	4	Agree	2
Not sure	3	Not sure	3

Disagree	2	Disagree	4
Strongly disagree	1	Strongly disagree	5

For calculating scores attitude towards blood donation, the cut-off point will be mean scores±standard deviation. All respondents' answer score of 12 questions will be summed up and calculated mean and standard deviations. The score range from 12-60. The attitude score will be classified as follow;

Negative attitude - Scores < mean score - standard deviations
Neutral attitude - Score = mean score ± standard deviations
Positive attitude - Scores > mean score + standard deviations

3.8.4. Practice of voluntary blood donation

This section included 7 questions to find out the practice of voluntary blood donation among the students, frequency of donation, willingness to donate in the future, place of last donation and post donation experience. There are 3 "Yes/No" response questions (Q 50, 51, 56) and 4 multiple choice questions (Q. 52-55). There was no correct or incorrect answer and no scoring for this section.

If the participant answer "No" in "Q. 50 Have you ever donated blood before?", the participant only need to answer Q. 51 and skip to Section 5. If the participant answer "Yes" in Q. 50, then Q.51 is skipped and Q.52-56 will be answered. Among those, the practice of voluntary blood donation is determined by Q.54. If the participant choose the voluntary blood donation as his/her previous blood donation practice regardless of choosing more than one answer, this participant will be regarded as blood donor who practices voluntary blood donation.

3.8.5. Reasons for not practicing blood donation

This section was instructed to answer by the respondents who never donated blood before according to response in "Section 4: Practice of voluntary blood donation". This section contained 1 question with list of possible reasons of not donating blood as multiple choice. The respondent can choose one or more reasons which he/she think influencing for not donating blood.

3.9. Validity and reliability

3.9.1. Validity

The structured questionnaires in English was produced and reviewed for content validity by three experts (Two form College of Public Health Science, Chulalongkorn University and one expert from Myanmar with hematologist level) and scored for each question (+1/0/-1). The Index of Item-Objective Congruence (IOC) was conducted. After validating the questionnaires, IOC scores by three experts was summed up and divided by three. The questions with score equal or less than 0.5 were revised or deleted accordingly (Rovinelli & Hambleton, 1977). After the revision, the questions were requested to review by experts again for confirmation.

The validated questionnaires were translated into Myanmar language and one expert who do not know the original English questionnaire with competency in both languages was asked for back translation.

3.9.2. Pretest and reliability

Prior to actual data collection, a pilot test was conducted in 35 samples in another university in Yangon with similar characteristics (10% of total sample size). By using SPSS ver.22, reliability of attitude scale questions was tested by Cronbach's Alpha and that of knowledge binary questions was tested by Kudar-Richardson formula 20, and the results are 0.63 and 0.71 respectively. Reliability test was also done after all the data collection and Cronbach's alpha for attitude questions was 0.65 and KR 20 for knowledge questions was 0.74. This showed high reliability in knowledge questions (cutoff 0.7-0.9) and moderate reliability in attitude questions (cutoff 0.5-0.7) (Hinton, Brownlow, McMurray, & Cozens, 2004).

3.10. Data Collection

Data was collected by self-administration of questionnaires of the participants and total 30 minutes was given to complete the questionnaires. The principal researcher together with 5 assistants did the data collection process of getting informed consent, distribution of questionnaires, explaining questionnaires when confusions occur in

participants, collection of questionnaires and checking the completeness of the answers. The criteria for research assistants were those who has medical background such as medical doctors and medical technologists who can clearly understand the medical terms and have enough knowledge and competent to explain and answer about the research objectives and questions from the participants. The assistants were explained and trained in advance about purpose of research (research objectives), research methodology and detailed information about questionnaires and ethics about conducting research. The same questionnaires were used for all the participants. After the data collection, correct answers of knowledge related to blood donation was explained verbally by the research team to the participants.

3.11. Data entry and analysis

Principle researcher checked the data and the questionnaire were coded before entering data to the computer. After that, data entry was done by double entry process and data cleaning will be performed before the analysis. Data analysis was processed by using SPSS software version 22 (licensed from Chulalongkorn University) for windows.

The descriptive statistical analysis was presented as below:

Categorical data -frequency and percentage

Continuous data -Mean, standard deviation, range, frequency and percentage

The inferential statistical analysis was performed as below:

To compare the knowledge and attitude scores of blood donors and non-donors, Normality test of Kolmogorov-Smirnov was performed and the results showed significant with P value <0.05 which indicated the data were not normally distributed. Therefore, non-parametric Mann Whitney U Test was used for comparison.

In order to identify the important influencing factors associated with dependent variables through model building, we used the purposeful selection of covariates as below.

Step 1. Bivariate analysis with Chi-square test to explore the unadjusted association between variables and outcomes

Step 2. Selection of independent variables with p value less than 0.2 from step 1 so other variables of known relevance can be included for multivariable analysis (binary logistic regression)

Step 3. Put selected variables from step 2 into binary logistic regression and consider the variables with p value less than 0.05

A p-value of < 0.05 (2-tailed) was considered to be statistically significant.

3.12. Ethical Considerations

Ethical consideration for this study was approved by Ethics Review Committee of Chulalongkorn University, as attached in Appendix A. Permission from academic administrators of the University and relating authorities were attained prior to data collection. Moreover, the participation of the respondents was voluntary and the decision to participate in the study was not disclosed to any authority. The researcher clearly stated the objectives of the study and obtained informed consent from respondents before distributions of the questionnaires. Research ethics were being served during and after the data collection. All answer sheets and data reports were kept in locked cabinet. The collected data were put into the database and then all the answer sheets were destroyed by burning.

3.13. Expected benefit and application

This is the first study of KAP relating to voluntary blood donation in Myanmar and expected to provide the information to understand the perception of the young population regarding blood donation and generate strategies required to improve voluntary blood donation in the country. The university students in this study represent the potential long term blood donor population pool that can be sustained as regular and safe blood donors. The data will be useful for the National Blood Transfusion Services and the Ministry of Health as it will enlighten challenges or barriers in addressing to increase voluntary non-remunerated blood donors among university students.

Chapter IV

Results

The aim of this study was to determine the practice of voluntary blood donation among university and college students, to compare the knowledge and attitude towards blood donation among donor and non-donor students in university and college, to find the association of sociodemographic factors, knowledge and attitude towards practice of voluntary blood donation and finally to find out the reasons for not donating blood among the non-donor students. The study population was university and college students from 2 academic institutions in Yangon, Myanmar and total 341 samples who fulfilled the inclusion criteria participated in the study.

The results are divided into 2 parts; descriptive and inferential findings. The first part contains descriptive findings of socio-demographic characteristics, knowledge regarding blood donation, attitude towards blood donation and practice of voluntary blood donation. In this part, other descriptive findings such as source of information for blood donation and reasons for not donating blood among non-donor participants are included. The second part contains the bivariate analysis and multivariable analysis to find the association between dependent and independent variables. The dependent variable is practice of voluntary blood donation (dichotomous: Yes/No) and independent variables include age, sex, religion, household income, history of blood related disorder, level of knowledge regarding blood donation and level of attitude towards blood donation.

4.1. Descriptive findings

4.1.1. Socio-demographic Characteristics

Table 3 showed the demographic characteristics of the respondents. The mean age of the students was 19.1 with standard deviation of 1.1. The minimum and maximum age were 18 and 22 respectively. Most of the respondents, 90.3%, were age between 18- 20 years old. More than half of the respondents, 60.1% were female students and 39.9% are males. Majority of the students have religion as Buddhism 93.8% followed by Islam, Christian and Hindu. Most of the respondents 80.6% showed

the monthly household income of 500,000 kyats or more. 15.2% of students revealed they have history of blood related disorder such as anemia.

Table 3 Demographic Characteristics of participants (N=341)

Characteristics	**Frequency**	**Percentage (%)**
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
History of blood disorder		
No	289	84.8
Yes	52	15.2
Blood Disorders	n= 52	

Anemia	48	92.3
Blood Pressure Problems	4	7.7

* 1 USD = ~ 1,500 Myanmar kyats

4.1.2. Practice of voluntary blood donation

As shown in Table 4, out of total 341 participants, 110 (32.3%) had donated blood previously and all of them chose their previous donation(s) being voluntary in nature. Most of the blood donors donated blood for one time (82.7%) and the main place of the last donation was school blood donation campaign chosen by 89.1% of the blood donor participants. Almost all of the donors stated that they feel satisfy after the blood donation (94.5%) and are willing to donate regularly in the future (91.8%). Majority of the non-donor participants 80.1% also showed their willingness to donate blood in the future.

Table 4 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

4.1.3. Participants' knowledge regarding blood donation

Distribution of incorrect and correct answers are described in three groups; non-donors (ND), voluntary donors (VD) and total respondents.

Regarding "Blood Types and Own Blood Group" topic, majority of the total respondents know that blood group O is the universal donor blood group (87.1%), however most of them does not know blood group AB as the universal recipient blood group (74.5%). Although still considered low, donor group answered correctly for universal recipient blood group (41.8%) compared to non-donors (17.7%). More than half of all the respondents also gave the wrong answer for average blood volume in human body (57.2%) and nearly half (41.6%) respondents have no knowledge of Rh blood group. In comparing donors and non-donors for average blood volume and knowledge of Rh group, correct answers of donors are (56.4%) and (68.2%) respectively which is more than non-donors with (36.4%) and (53.7%), respectively. Almost all of the respondents know their own blood group (97.7%).

In "Donor Eligibility Criteria" topic, more than fourth fifth of the total respondents know the minimum age of blood donation (83.3%), but almost half of them doesn't know the maximum age for blood donation (40.8). More than half of the respondents gave wrong answer of interval between 2 successive blood donations

(53.1%). Most of the respondents answered correctly to unfit conditions of blood donation such as anemia (98.5%), not feeling well/have fever (94.7%), alcohol drinking (92.4%) and high/low blood pressure (89.1%). In comparing donors and non-donors, donors had much higher correct answers in minimum (92.7%) and maximum age of blood donation (67.3%), interval between blood donation (67.3%), unfit condition of tattoo, piercing, acupuncture (75.5%) and menstruation (85.5%) than non-donors with correct answer percentage of (78.8%), (55.4%), (37.2%), (61.9%) and (68.4%), respectively.

In knowledge regarding "Transfusion Transmitted Infections" topic, almost all of the respondents were aware of HIV being transmitted by blood, however nearly half of them did not know that malaria can also be transmitted by blood (48.4%). And although donors had higher knowledge in all the questions of this topic than non-donors, only (59.1%) of them know that malaria can be transmitted by blood. In "Blood Donation Procedures" topic, almost fourth fifth of the total respondents did not know the amount of blood removed in blood donation (78%) and majority of them were aware of donated blood being screened for infection (89.7%). Also, less than half of the donors know the amount of blood removed in blood donation (47.3%) which is still higher than non-donors (10%).

In "Effects of Blood Donation on Donors" topic, more than half of the total respondents misbelieved that donors can acquire infectious diseases such as HIV/hepatitis (56%) and did not know the benefit of the blood donation which can prevent heart disease and cancer (59.8%). In comparing donors and non-donors, donors had much higher correct answers in all the questions of the topic than non-donors.

And almost all of the respondents can differentiate the voluntary blood donor from other types of blood donors (99.4%). Table 5 showed the detailed frequencies and distribution of incorrect and correct answers of knowledge section.

Table 5 Frequencies and distribution of knowledge scores (correct answers and incorrect answers) regarding blood donation

Total N=341, Non-donor (ND) n= 231, Voluntary Donor (VD) n=110

Statement	Number (%)					
	Incorrect Answers			Correct Answers		
	ND	VD	Total	ND	VD	Total
Blood Types and Own Blood Group						
Average blood volume in human body	147 (63.6)	48 (43.6)	195 (57.2)	84 (36.4)	62 (56.4)	146 (42.8)
Knowledge of ABO blood group	80 (34.6)	35 (31.8)	115 (33.7)	151 (65.4)	75 (68.2)	226 (66.3)
Knowledge of universal donor blood group	32 (13.9)	12 (10.9)	44 (12.9)	199 (86.1)	98 (89.1)	297 (87.1)
Knowledge of universal recipient blood group	190 (82.3)	64 (58.2)	254 (74.5)	41 (17.7)	46 (41.8)	87 (25.5)
Knowledge of Rh blood group	107 (46.3)	35 (31.8)	142 (41.6)	124 (53.7)	75 (68.2)	199 (58.4)
Knowing own blood group	7 (3)	1 (0.9)	8 (2.3)	224 (97)	109 (99.1)	333 (97.7)
Donor Eligibility Criteria						
Minimum age of blood donation in Myanmar	49 (21.2)	8 (7.3)	57 (16.7)	182 (78.8)	102 (92.7)	284 (83.3)
Maximum age of blood donation in Myanmar	103 (44.6)	36 (32.7)	139 (40.8)	128 (55.4)	74 (67.3)	202 (59.2)
Minimum body weight to donate blood	27 (11.7)	5 (4.5)	32 (9.4)	204 (88.3)	105 (95.5)	309 (90.6)
Minimum interval between 2 successive blood donations	145 (62.8)	36 (32.7)	181 (53.1)	86 (37.2)	74 (67.3)	160 (46.9)
Can donate blood if not get enough sleep?	34 (14.7)	16 (14.5)	50 (14.7)	197 (85.3)	94 (85.5)	291 (85.3)

Can donate blood after alcohol drinking?	17 (7.4)	9 (8.2)	26 (7.6)	214 (92.6)	101 (91.8)	315 (92.4)
Can donate blood if not feeling well/have fever?	15 (6.5)	3 (2.7)	18 (5.3)	216 (93.5)	107 (97.3)	323 (94.7)
Can donate blood with tattoo, piercings or acupuncture in last 6 months?	88 (38.1)	27 (24.5)	115 (33.7)	143 (61.9)	83 (75.5)	226 (66.3)
Can donate blood if there is high/low blood pressure?	32 (13.9)	5 (4.5)	37 (10.9)	199 (86.1)	105 (95.5)	304 (89.1)
Can donate blood if have anemia?	4 (1.7)	1 (0.9)	5 (1.5)	227 (98.3)	109 (99.1)	336 (98.5)
Can donate blood during menstruation?	73 (31.6)	16 (14.5)	89 (26.1)	158 (68.4)	94 (85.5)	252 (73.9)
Can donate blood during pregnancy and lactation?	43 (18.6)	20 (18.2)	63 (18.5)	188 (81.4)	90 (81.8)	278 (81.5)
It is safe to donate blood for 1st degree relatives	108 (46.8)	41 (37.3)	149 (43.7)	123 (53.2)	69 (62.7)	192 (56.3)
Transfusion Transmitted Infections						
HIV can be transmitted from blood	17 (7.4)	1 (0.9)	18 (5.3)	214 (92.6)	109 (99.1)	323 (94.7)
Hepatitis can be transmitted from blood	75 (32.5)	23 (20.9)	98 (28.7)	156 (67.5)	87 (79.1)	243 (71.3)
Syphilis can be transmitted from blood	87 (37.7)	19 (17.3)	106 (31.1)	144 (62.3)	91 (82.7)	235 (68.9)
Malaria can be transmitted from blood	120 (51.9)	45 (40.9)	165 (48.4)	111 (48.1)	65 (59.1)	176 (51.6)
Blood donation procedures						
Amount of blood removed during blood donation	208 (90)	58 (52.7)	226 (78)	23 (10)	52 (47.3)	75 (22)
Donated blood is screened for infection	27 (11.7)	8 (7.3)	35 (10.3)	204 (88.3)	102 (92.7)	306 (89.7)

Effects of blood donation on donors						
Donor can get infections such as HIV/hepatitis	161 (69.7)	30 (27.3)	191 (56)	70 (30.3)	80 (72.7)	150 (44)
Donor can get anemia or bleeding disorders	98 (42.4)	19 (17.3)	117 (34.3)	133 (57.6)	91 (82.7)	224 (65.7)
Donor can gain weight	78 (33.8)	17 (15.5)	95 (27.9)	153 (66.2)	93 (84.5)	246 (72.1)
Donor can prevent heart disease and cancer	163 (70.6)	41 (37.3)	204 (59.8)	68 (29.4)	69 (62.7)	137 (40.2)
Voluntary blood donation						
Knowing the meaning of voluntary blood donation	1 (50)	1 (50)	2 (0.6)	230 (99.6)	109 (99.1)	339 (99.4)

Level of knowledge regarding blood donation

Knowledge scores are categorized into high, moderate and low levels by Bloom's cutoff point. Among total 431 respondents, more than half scored moderate knowledge level (64.2%) followed by high knowledge level (21.7%) and low knowledge level (14.1%). And more voluntary donors got high knowledge level (53.6%) than non-donors (6.5%). About three forth of the non-donors had the moderate knowledge level (77.5%).

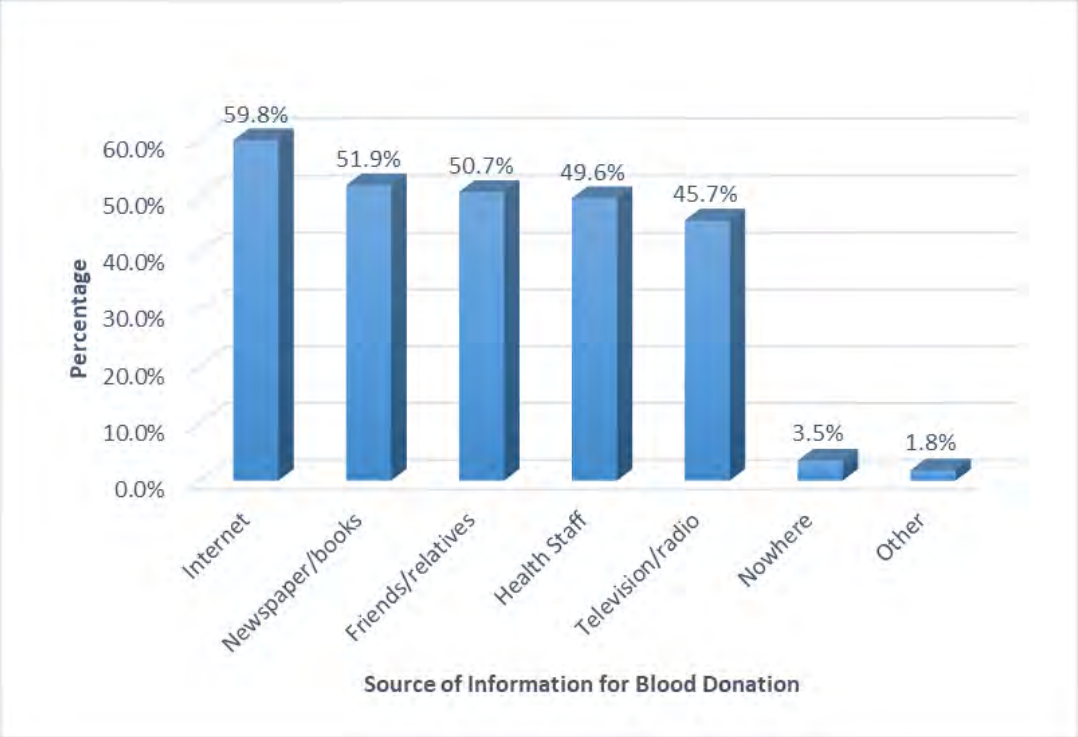
Table 6 Score and level of knowledge regarding blood donation
Total N=341, Non-donor (ND) n= 231, Voluntary Donor (VD) n=110

Level of Knowledge (N=341)	**Number (%)**		
	ND	**VD**	**Total**
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)
Median (Interquartile Range)		21 (19, 24)	
Minimum, Maximum		12, 27	

Source of information for blood donation

Majority of the respondents received information related to blood donation (96.5%) and a few (3.5%) stated that they did not receive any information from anywhere. Response of the participants showed the main source of information obtained is from internet (59.8%). The respondents also selected other sources of information such as newspaper/books, friends/relatives, health staff and television/radio with more or less similar percentage around 50%. The total percentage exceeded 100% since it is multiple response question.

Figure 7 Sources of Information for Blood Donation



4.1.4. Participants' attitude towards blood donation

There are 12 statements (6 positive statements and 6 negative statements) for attitude section and Table 7 showed the frequency of participants' response for these statements. The score of each statement is given b 5 points Likert scale, and the responses are grouped into 3; strongly agree/agree, uncertain and disagree/strongly disagree for clear understanding of the descriptive findings. Majority of the respondents agreed that blood donation is a moral responsibility (95%) and that it can save lives

(95.9%). Most of them agreed that voluntary blood donation is the best (96.2%) an only some misbelieved that replacement donation is the best (18.8%). Most of the respondents agreed that one should disclose the health status before blood donation (95%). More than half of the respondents were uncertain that blood donation is good for donor health. And about 40% of the respondents doubt about blood banks selling the blood to the patients and also the discrimination of blood banks to those who need blood.

Table 7 Frequencies and distribution of attitude towards blood donation Total N=341, Non-donor (ND) n= 231, Voluntary Donor (VD) n=110

Statement	Number (%)								
	Strongly agree/Agree			Uncertain			Disagree/ Strongly Disagree		
	ND	VD	Total	ND	VD	Total	ND	VD	Total
Blood donation is moral responsibility	216 (93.5)	108 (98.2)	324 (95)	12 (5.2)	2 (1.8)	14 (4.1)	3 (1.3)	0	3 (0.9)
Blood should be donated only in the emergency.*	67 (29)	14 (12.7)	81 (23.8)	61 (26.4)	24 (21.8)	85 (24.9)	103 (44.6)	72 (65.5)	175 (51.3)
One should donate blood to get health screening*	60 (26)	22 (20)	82 (24)	89 (38.5)	31 (28.2)	120 (35.2)	82 (35.5)	57 (51.8)	139 (40.8)
Blood donation is good for blood donor's health	31 (13.4)	35 (31.8)	66 (19.4)	135 (58.4)	53 (48.2)	188 (55.1)	65 (28.1)	22 (20)	87 (25.5)
Blood donor should get	81 (35.1)	25 (22.7)	106 (31.1)	69 (29.9)	26 (23.6)	95 (27.9)	81 (35.1)	59 (53.6)	140 (41)

payment or incentive*									
Best way for donating blood is replacement donation*	52 (22.5)	12 (10.9)	64 (18.8)	74 (32)	25 (22.7)	99 (29)	105 (45.4)	73 (66.4)	178 (52.2)
Best way for donating blood is voluntary donation	219 (94.8)	109 (99.1)	328 (96.2)	8 (3.5)	1 (0.9)	9 (2.6)	4 (1.7)	0	4 (1.2)
Blood donation can save lives	0	110 (100)	327 (95.9)	14 (6)	0	14 (4.1)	217 (94)	0	0
Blood donor must disclose own health status before donation	216 (93.5)	108 (98.1)	324 (95)	10 (4.3)	0	10 (2.9)	5 (2.2)	2 (1.8)	7 (2.1)
Blood donor should get self-satisfaction and recognition in society	177 (76.6)	96 (87.3)	273 (80)	45 (19.5)	10 (9.1)	55 (16.1)	9 (3.9)	4 (3.6)	13 (3.8)
Blood banks may sell blood to patients*	85 (36.8)	21 (19.1)	106 (31.1)	92 (39.8)	43 (39.1)	135 (39.6)	54 (23.4)	46 (41.9)	100 (29.4)
Blood availability is difficult and there may be discrimination in blood banks*	94 (40.7)	21 (19.1)	115 (33.7)	92 (39.8)	49 (44.5)	141 (41.3)	45 (19.5)	40 (36.3)	85 (24.9)

*Negative statements

Level of attitude towards blood donation

Attitude scores are categorized into negative (mean – SD), neutral (mean ± SD) and positive (mean + SD) levels. The mean score of the attitude section is 44.11 and SD is 3.9. Negative attitude score range from 12 to 39, neutral attitude from 40 to 48 and positive attitude from 49 to 60. Table 8 shows that nearly three fourth of the total respondents had neutral attitude level (71.6%) and only some of them scored the positive attitude level (17.9%). Both non-donors and voluntary donors had most percentage of neutral attitude with (77.5%) and (59.1%) respectively. However, voluntary donors still got much higher frequency in positive attitude (36.4%) compared to non-donors (9.1%).

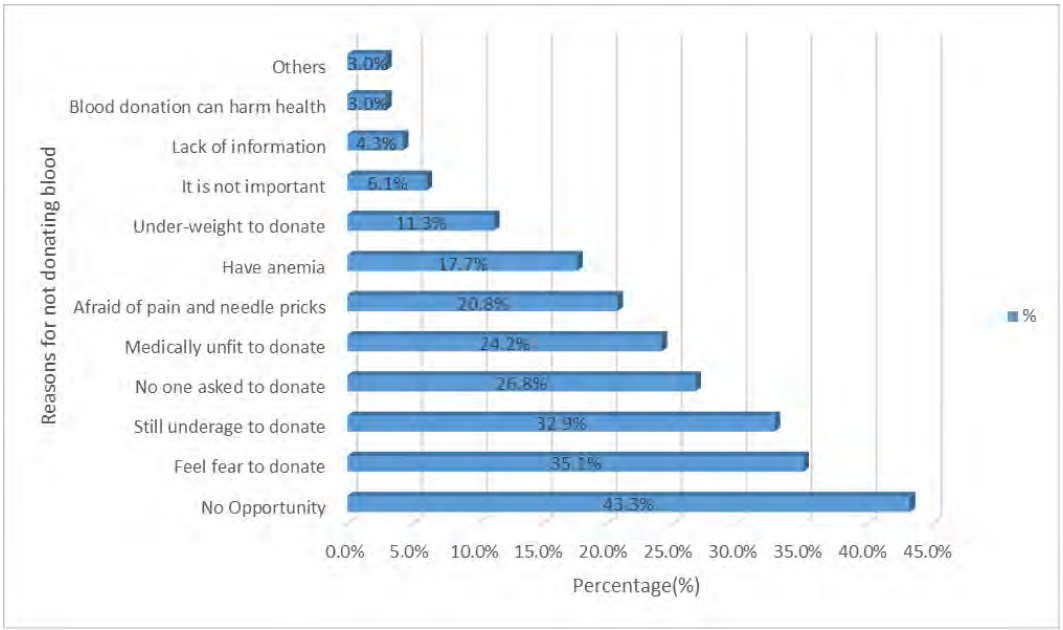
Table 8 Scores and level of attitude towards blood donation
Total N=341, Non-donor (ND) n= 231, Voluntary Donor (VD) n=110

Level of Attitude (N=341)	Number (%)		
	ND	VD	Total
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)
Median (Interquartile Range)		44 (42, 47)	
Minimum, Maximum		32, 53	

4.1.5. Reasons for not donating blood among non-donor participants

There were 231 (67.7%) of the participants who never donated blood previously and Figure 4.2. shows the reasons for not donating blood stated by those non-donor participants. The top 3 reasons selected by them was “no opportunity to donate” (43.3%) followed by “fear to donate blood” (35.1%) and “still underage to donate blood” (32.9%). The total percentage exceeded 100% since it is multiple response question.

Figure 8 Reasons for not donating blood among non-donor participants



4.2. Inferential Findings

4.2.1. Comparing knowledge and attitude scores between voluntary donors and non-donors

To confirm the difference between knowledge and attitude towards blood donation among blood donors and non-donors, bivariate analysis was done. The knowledge and attitude scores of the respondents were not normally distributed. Therefore, Mann-Whitney U test in SPSS was used to find out if there is statistically significant different between blood donors and non-donors in knowledge and attitude score. As shown in Table 9, both knowledge and attitude scores are significantly different between voluntary blood donors and non-donors with p value <0.001.

Table 9 Comparison of knowledge and attitude scores between voluntary donors and non-donors by Mann-Whitney U test

Variable	Voluntary Donor	N	Mean Rank	Z	U	p value#
Knowledge Score (Range 0 – 30)	Yes	110	226.95	-10.933	6550	**<0.001**
	No	231	144.36			
Attitude Score (Range 12 – 60)	Yes	110	245.29	-9.637	4533	**<0.001**
	No	231	135.63			

p value from Mann-Whitney U test, comparing 2 independent samples

4.2.2. Association of socio-demographic characteristics, level of knowledge and level of attitude towards practice of voluntary blood donation by Chi Square test

The dependent variable which is practice of voluntary blood donation is dichotomous categorical data and all independent variables are also grouped into categorical data as mentioned in data analysis part of methodology section to simplify the analysis and results.

Chi-Square test was used in bivariate analysis to find out the unadjusted association of independent variables and dependent variable and to select independent variables that contributes to the multivariable model (binary logistic regression model). A cut-off p value < 0.2 was used for the selection of the independent variables from bivariate analysis. The results of the Chi-square test showed the significant association of 3 variables from socio-demographic characteristic which were sex (p value <0.001), Buddhism religion (p value 0.181) and history of blood disorder (p value 0.012) towards practice of voluntary blood donation. Additionally, knowledge level and attitude level related to blood donation were also statistically significantly associated with practice of voluntary blood donation with p value <0.001.

Table 10 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	
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), * P value <0.2

4.2.3. Multiple Logistic Regression Analysis

Binary logistic regression with enter method was used to analyze the associations between the selected independent variables with p values less than 0.2 in bivariate analysis and dependent variable which is practice of voluntary blood donation. The significant variables from bivariate analysis which were sex, Buddhism religion, level of knowledge related to blood donation and level of attitude towards blood donation were put together at the same time to run with enter method in binary logistic regression in SPSS.

Among the 5 independent variables from bivariate analysis, Buddhism religion lost its significance and other four variables remained their significance. Male students are 3.034 times more likely to practice blood donation than female students with p <0.001, 95% CI (1.696, 5.428). Students with history of blood disorders have 75% less likely to practice blood donation compared to those without blood disorders with p = 0.010, 95% CI (0.086, 0.712). Students with high knowledge level are 8.24 times more likely to practice blood donation than those with low knowledge level with p <0.001, 95% CI (3.058, 22.199). Students with positive attitude level are 7.005 times more likely to practice blood donation than those with negative attitude level with p = 0.003, 95% CI (1.971, 24.898**).**

Table 11 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	0.491	7.598
No				1		
History of blood disorder						
Yes	-1.398	.540	**0.010***	0.247	0.086	0.712
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	0.245	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	0.692	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

Chapter V

Discussion, Conclusion and Recommendation

The objectives of this study were 1) To determine the practice of voluntary blood donation among university and college students, 2) To compare the knowledge and attitude towards blood donation among donor and non-donor students, 3) To find the association of socio-demographic factors, knowledge and attitude towards practice of voluntary blood donation and finally 4) To find out the reasons for not donating blood among the non-donor students. The study was conducted in Yangon Technological University and National Management Degree College in Yangon, Myanmar.

Total 341 full time students participated in the study with mean age of 19.1, ranging from 18 to 22 years old. More than half of the students were female. Most of the participants were Buddhism and have average household income of ≥ 500,000 kyats. About 85% of the respondents perceived that they do not have blood related disorders.

The findings of the study showed that 32.2% of the total 341 participants had practiced blood donation before and all of them were voluntary blood donors. Most of them donated blood one time at school blood donation campaign.

Regarding the knowledge and attitude towards blood donation, low proportion of the participants got high knowledge (21.7%) and positive attitude (17.9%) levels toward blood donation. In comparing blood donors and non-donors, blood donors showed higher knowledge and attitude than non-donors. Additionally, the top most selected source of information for blood donation by the participants were internet, newspaper/book and friends/relatives, respectively.

Also, the results showed that males, not having history of blood related disorder, high knowledge level and positive attitude level toward blood donation were the important influencing factors on the practice of voluntary blood donation in this study.

While asking the reasons for not donating blood among the non-donors, the most common reasons selected were “no opportunity” followed by “feel fear to donate blood” and “still under age to donate”, respectively.

5.1. Discussion

5.1.1. Practice of voluntary blood donation in university and college students

Within the total 341 participants, about one third (32.3%) had donated blood previously for at least one time. This finding is similar to other studies done in Tanzania with (30%) (Elias et al., 2016) and in Bangladesh (34.3%) (Karim et al., 2012). And this proportion is higher than other studies done in university students in Nepal (18%) (Amatya, 2013) and Nigeria (13.3%) (En, 2018), but lower than a study in United States (56%) (Allerson, 2012). The latter may be due to that donor recruitment programs in developed countries are much better than that in developing countries. Although this proportion is a little low, it is convincing that most of the donors and non-donors had willingness to donate in the future with 91.8% and 80.1% respectively.

All of the blood donors answered that they practiced blood donation voluntarily which showed 100% voluntary blood donation among blood donors. And it showed higher voluntary blood donation of students compared to other studies in Tanzania (90.5%)(Elias et al., 2016) and in southeast Nigeria (75%)(En, 2018). Most of the blood donors donated blood for one time (82.7%). The minimum age of blood donation in Myanmar is 18 and average age of participants is 19 years old. So, many of them may not be able to donate frequently as the minimum interval between blood donation is 4 months and it can take more longer if there was deferral conditions such as anemia, high/low blood pressure. It is also important to note that if properly motivated, the students could donate more than one time. The main place of the last donation was school blood donation campaign chosen by 89.1% of the blood donor participants. This means 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. Almost all of the blood donors in this study were satisfied with their experience of blood donation which is essential because it could contribute for them to become regular blood donors in the future.

5.1.2 The knowledge and attitude towards blood donation among donor and non-donor students

Based on the findings, blood donors showed better knowledge and attitude level compared to non-donors. It was possible that blood donors were better informed than non-donors and these correct information and knowledge might also contribute to positive attitude towards blood donation. This is supported by Rational Theory of "Knowledge, Attitude and Practice" where the attitude or beliefs are assumed to be rooted form knowledge (World Health Organization, 2012b).

5.1.2.1 Participants' knowledge regarding blood donation

In assessing the participants' knowledge regarding blood donation, the questions covered 6 topics as follow.

In "Blood Types and Own Blood Group" topic, more than half of the participants (57.2%) did not know the average blood volume in human body, the correct answer percentage is only 56.4% even among the blood donors. This is supported by other studies in Jordan and Nepal (Abderrahman & Saleh, 2014; Amatya, 2013). Overall knowledge on ABO and Rh blood groups are also quite low with correct answers of (66.3%) and (58.4%) respectively, however this finding is higher than another study done in Nepal which showed (36%) and (14%) respectively (Amatya, 2013). Majority of participants know that blood type O is universal donor blood type, however only (25.5%) of them know AB is universal recipient group. Since blood group O is the most common blood group and being universal donor group, it is frequently used in most transfusion and emergency conditions (American Red Cross, 2017). Therefore, high knowledge regarding universal blood donor group is expected to give rise to more blood donors in the future. Almost all of the respondents know their own blood group, this might be due to general medical checkup programs in primary and secondary schools which include blood type testing, there by most of the students know their own blood group.

In knowledge regarding "Donor Eligibility Criteria" topic, we can see about half of the participants did not know the maximum age of blood donation and interval between 2 successive blood donations. And majority of the participants knew most of

the unfit conditions of the blood donation. However, many of the participants did not know that they cannot donate blood if there was tattoos, piercings and acupuncture during last 6 months. And nearly half of the participants also misunderstood that it is safe to donate blood between 1st degree relatives. The overall knowledge on donor eligibility criteria is satisfying as majority of the respondents are knowledgeable in minimum age/body weight for blood donation and most of the conditions unfit to donate blood. In comparison between donors and non-donors, the knowledge of donors is better than that of non-donors in this topic.

On the topic of "Transfusion Transmitted Infections", most of the respondents knew that HIV being transmitted by blood, however nearly half of them did not know that malaria can also be transmitted by blood (48.4%). The findings are supported by a study done in Nigeria (En, 2018). Even within blood donors, only 59.1% were aware that malaria can be transmitted by blood transfusion. This may be due to that most of the people only know malaria being transmitted by mosquito bites and malaria awareness campaign are not popular in Yangon region because of the low prevalence. Meanwhile, the transmission of HIV is hot and popular topic with many awareness raising campaign in student society.

In "Blood Donation Procedures", (78%) of the total respondents, (52.7%) of blood donors and (90%) of non-donors did not know the amount of blood removed in blood donation. This finding is similar to studies done in Tanzania and Iraq (Elias et al., 2016; Jasim N. Al-Asadi & Asaad Q. Al-Yassen, 2018). Despite of that, majority of the participants were aware of donated blood being screened for infection (89.7%). This finding is similar to a study done in Nigeria (En, 2018).

In "Effects of Blood Donation on Donors" topic, more than half of the participants (56%) misbelieved that blood donors can get infectious diseases such as HIV/hepatitis. This idea might be arise form doubting of the contamination in blood collection procedure. This misconception is also found in several studies done in Nepal, Iran , Moldova and south Africa (Abderrahman & Saleh, 2014; Amatya, 2013; Javadzadeh Shahshahani, Yavari, Attar, & Ahmadiyėh, 2006; Mwaba & Keikelame, 1995; United States Agency for International Development, 2011). Nearly 60% of the participants did not know the benefit of blood donation which is prevention of heart

disease and cancer. In comparing donors and non-donors, donors have remarkably higher knowledge on effects of blood donation on donors.

Almost all of the participants were able to differentiate meaning of voluntary blood donations from other types of blood donations. Since there were school blood donation campaigns and activities one/twice per year, may be the students were familiar with the term.

The knowledge scores were divided into 3 categories; low, moderate and high for clear understanding of overall knowledge level of the participants. Only (14.1%) of total participants had low knowledge, most of them are in moderate knowledge level (64.2%) and (21.7%) had high knowledge. Among the voluntary donor group, most of them gained high knowledge level with (53.6%), meanwhile only (6.5%) of the non-donors got high knowledge level. Overall, blood donors showed higher knowledge than non-donors and it is supported by several studies (Alam & Masalmeh, 2004; Dubey et al., 2014; United States Agency for International Development, 2011; Zaller et al., 2005). This means that blood donors are better informed than non-donors.

Source of Information for Blood Donation

Majority of the participants (96.5%) received information for blood donation form several different sources. The most selected source of information is from internet followed by newspapers/books and friends/relatives. This finding is similar to previous studies (Abderrahman & Saleh, 2014; Nigatu & Demissie, 2014; Shidam et al., 2015). With the wide availability of mobile phones, internet and social media can affect the instant knowledge and information sharing. Awareness raising by using internet and social media can be efficient and effective strategy for the blood donation program. At the same time, the influence of the close people such as family and friends also play an important role in raising awareness although there may be possibility of sharing incorrect information which can lead to misconception. Especially among the young adults, influence of peers is significant in changing behaviors and one of the study showed that there is significant influence of peers on blood donation practice in a society (Smith, Matthews, & Fiddler, 2011).

5.1.2.2. Participants' attitude towards blood donation

In assessing the attitude towards blood donation, most of the participants express positive view on blood donation and agreed that it is moral responsibility and can save lives. And almost all of the participants agreed that voluntary blood donation is the best way of blood donation and that blood donation is good for their health. This demonstrates very good perception and understanding regarding voluntary blood donation and it is critical in recruiting more voluntary blood donors and reducing replacement and paid donors among the young adults. Only small proportion of the participants agreed on donating blood while expecting remuneration and in order to get health screening. The finding are supported by previous studies (Alfouzan, 2014; En, 2018; Hong & Loke, 2011).

Most of the respondents also agreed that one should disclose own health status before blood donation. Although blood donation procedures in different settings have pre-donation assessment followed by laboratory testing with simple rapid test kits or sophisticated testing, there is always risk of transfusion transmitted infections which can lead to serious and lifelong infection in patients such as HIV(World Health Organization, 2008b) . Therefore, donor deferral system is highly reliant upon the donor's honesty about his/her own health conditions especially in settings with limited resources for testing procedures (Wong, Lee, Lee, & Chan, 2015).

Regarding opinion on blood banks topic, it was found that around 40% of the participants were uncertain about the blood being sold to patients and discrimination to those who need blood although blood bank services in Myanmar provide blood free of charge and equally to all the patients in need. This kind of doubt and uncertainty on the service of the blood banks can be significant barrier in donating blood voluntarily and only donating on request of the patients as replacement donors. This misconception may be due to their own experience of paid donors or information obtained from close people or social media. This kind of finding was also observed in a study done in Nepal (Amatya, 2013), in which, even worse, more than 50% agreed that blood is sold to needed.

By categorizing attitude scores into 3 levels: negative, neutral and positive attitude, most of the participants showed the neutral attitude (71.6%) and only (17.9%) have positive attitude. This is much lower than the previous study done in Tanzania which showed 95% of positive attitude in university students (Elias et al., 2016). This difference may be due to leveling of the attitude score into 2 levels in that study, and we leveled into 3 in our study. In both voluntary donors and non-donors, neutral attitude level is also observed as most common attitude level. However, positive attitude level of voluntary donors is more than that of non-donors. The attitude of the young students towards blood donation is important for blood donation behavior. The low level of positive attitude and high level of neutral attitude in this study reflect that there is need of awareness raising and correct information sharing to change their unclear and false perception on blood donation.

5.1.3. Association of socio-demographic characteristics, level of knowledge and level of attitude towards practice of voluntary blood donation

To find the association of socio-demographic characteristics, level of knowledge and level of attitude towards practice of voluntary blood donation, bivariate analysis of Chi Square test followed by binary logistic regression were performed. The significant variables in Chi Square test include socio-demographic characteristics of sex, Buddhism Religion and history of blood related disorders; knowledge level and attitude level regarding blood donation. However, after testing with binary logistic analysis, Buddhism Religion lost its significant and only other 4 variables remained as predictors of practice of voluntary blood donation.

Sex and Practice of voluntary blood donation: The analysis showed that male students are 3 times more likely to practice blood donation than female students. This finding is consistent with previous studies done in Mumbai, Nigeria, Tanzania, Dhaka and North India (Dubey et al., 2014; Elias et al., 2016; En, 2018; Sahoo et al., 2017; Sharifa Akhtar et al., 2017). This significant male propensity may be due to outgoing nature and less likely to have deferral conditions compared to females. 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.

History of blood related disorders and Practice of voluntary blood donation: The analysis showed that those who answered that they have history of blood disorder have 75% less likely to practice blood donation previously. Students with pervious blood disorder described that most of them have anemia and some have blood pressure problems. Both of these disorders were temporary deferral conditions and they may misunderstand that they cannot donate blood because of these conditions. Thus, awareness about deferral conditions and clear explanation for follow up appointment in case of deferral should be reinforced in blood donation sites.

Knowledge regarding blood donation and Practice of blood donation: The analysis showed that 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 where knowledge is significantly associated with practice of blood donation (Amatya, 2013; En, 2018; Jasim N. Al-Asadi & Asaad Q. Al-Yassen, 2018; Nigatu & Demissie, 2014). This finding reinforce the idea that more blood donation awareness programs and campaigns are needed to effectively increase the voluntary blood donors. However, there is also possibility of reverse association where students were better informed when they donate blood, and gained the knowledge.

Attitude towards blood donation and Practice of blood donation: 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 negative level of attitude. The result is contrary to some studies where they found the failure to convert positive attitude to actual practice of blood donation (Amatya, 2013; Elias et al., 2016; United States Agency for International Development, 2011). Although there was quite low positive attitude level among the participant in our study, we can say that having positive attitude influence the blood donation behavior in young university and college students. 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.

5.1.4. Reasons for not donating blood among non-donor participants

The participants who had never donated blood before were asked to answer the reasons for not donating blood where they can choose multiple responses. The most common reason selected by non-donors was "no opportunity". This finding is similar to one study in North India (Dubey et al., 2014). Other top reasons for not donating blood were "feeling fear to donate", "still underage to donate" and "no one asked to donate". Some studies also showed "fear" and "no one ever asked" as common reasons for not donating blood (En, 2018; Jasim N. Al-Asadi & Asaad Q. Al-Yassen, 2018; Salaudeen & Odeh, 2011; United States Agency for International Development, 2011). This finding showed that there is need of creating more frequent occasions for blood donation campaign in both public and academic society to create opportunity to donate blood. And also sharing experience of blood donation between students can also motivate to overcome the fear of the blood donation. Although the author did not find in the literature review of other studies, we found that 3rd common reason for not donating blood was "still underage to donate blood". Since we only recruited the students with 18 years old or more, all of them are eligible age to donate blood, however their knowledge gap showed that they thought they were still underage. It is surprising since these university and college have regular blood donation campaigns with the students and there might be some gap in information sharing during recruitment of donors.

5.2. Conclusions

The current study aimed to understand knowledge, attitude and the practice of voluntary blood donation among university and college students in Yangon, Myanmar. The findings of the study showed that 32.2% of the total participants had practiced blood donation before and all of them were voluntary blood donors. Most of them donated blood one time at school due to the blood donation campaign. Despite the low proportion of blood donors, most participants showed their willingness to donate blood in the future. The most common reasons for not donating blood among the non-donors were "no opportunity", "feel fear to donate blood" and "still underage to donate", respectively.

Regarding the knowledge and attitude, low proportion of the participants got high knowledge and positive attitude levels toward blood donation. Blood donors showed higher knowledge and attitude than non-donors. The top most selected source of information for blood donation by the participants were internet, newspaper/book and friends/relatives. Finally, the important influencing factors on voluntary blood donation practice in this study were male, no history of blood related disorders, high knowledge level and positive attitude level toward blood donation.

5.3. Strength and limitation of the study

5.3.1. Strength of the study

- This is the first study in Myanmar which assess the knowledge, attitude and practice of blood donation in young university and college students who are the key source of safe and sustainable blood supply.
- This study explored the knowledge on different topics of blood donation such as blood types and own blood group, donor eligibility criteria, transfusion transmitted infections, blood donation procedures, effect of blood donation in donors and understanding of voluntary blood donation.
- This study also explores the reasons for not donating blood which is essential information for understanding the requirements in recruiting blood donors.

5.3.2. Limitation of the study

- Since this study was conducted among students of one university and one college in Yangon only and the data may not be generalized for whole country university student population.
- Sampling method used convenience sampling, which might lead to selection bias
- Being a cross sectional study design, the associations observed cannot determine the cause and effect of voluntary blood donation among university students
- Another limitation is lack of previous study done in Myanmar, which make the comparison difficult for reference of same context.

5.4. Recommendations

This study was aimed to generate baseline information related to knowledge, attitude and practice of voluntary blood donation among young students who are key population of potential blood donors. The data will be useful for the National Blood Transfusion Services and the Ministry of Health as it will enlighten challenges or barriers in addressing to increase voluntary non-remunerated blood donors among university and college students.

5.4.1. Recommendations for program implementation

Reinforce awareness raising activities:

- The low knowledge level of students indicates the need of adequate public enlightenment and regular blood donation awareness campaigns among the students and community at large.
- Since students get most of the information from internet, National Blood Transfusion Services should use internet and social media as a medium to deliver the education and information regarding blood donation.
- The awareness raising should reinforce more on donor eligibility, temporary and permanent deferral conditions, interval of blood donations and benefits of donating blood to recipients as well as donors; to improve the understanding and knowledge of the young students thereby motivating the blood donation practice. This can also help in conversion of one time donors to repeat and become regular donors in the future.
- Female oriented education messages should be developed to encourage more female students to involve in blood donation.
- Academic administrators should also collaborate closely with blood centers to help bridge between young students and blood donation knowledge since they have more direct communication with key population.

Creating opportunity for blood donation:

- Blood Transfusion Services should collaborate more with academic and community organizations to hold more frequent blood donation campaigns to increase the voluntary blood donors.
- To get donor retention, one time donors should be motivated to keep their blood donation practice by proper registration and follow up appointments for subsequent donations.

Finally, both political and financial commitments from government and policy makers are crucial for implementation of above recommendations to increase young voluntary blood donors in the country to supply adequate blood to every patient in need.

5.4.2. Recommendation for further research

- Further research studies should involve more academic institutions from other cities besides Yangon in order to be more representative and reflect the country situation.
- Qualitative research study such as focus group discussions or in-depth interview should be conducted to understand more about reasons for not donating and motivational factors for donating among non-donors and blood donors.
- Future research studies should explore more on motivational factors to donate blood among the students to help in planning for motivational campaigns.

REFERENCES

Abderrahman, B. H., & Saleh, M. Y. N. (2014). Investigating Knowledge and Attitudes of Blood Donors and Barriers Concerning Blood Donation in Jordan. *Procedia - Social and Behavioral Sciences, 116*, 2146-2154. doi:https://doi.org/10.1016/j.sbspro.2014.01.535

Alam, M., & Masalmeh, B. D. (2004). Knowledge, attitudes and practices regarding blood donation among the Saudi population. *Saudi Medical Journal 2004, 25*.

Alfouzan, N. (2014). Knowledge, Attitudes, and Motivations towards Blood Donation among King Abdulaziz Medical City Population. *International Journal of Family Medicine, 2014*, 8. doi:10.1155/2014/539670

Allerson, J. (2012). Assessment of Selected University Students' Knowledge of Blood Donation and the Relationship with Intent to Donate Blood.

Amatya, M. (2013). Study on knowledge, attitude and practice of blood donation among students of different colleges of Kathmandu, Nepal. *International Journal of Pharmaceutical & Biological Archives 2013, 4*, 424 - 428.

American Red Cross. (2017). Facts About Blood and Blood Types. Retrieved from https://www.redcrossblood.org/donate-blood/blood-types.html

American Society of Haematology. (2017). Blood Basics. Retrieved from http://www.hematology.org/Patients/Basics/

Aung, T. (2009). Status report of the blood transfusion services in Myanmar. *Asian journal of transfusion science, 3*(1), 22-25. doi:10.4103/0973-6247.45258

Aung, T., & Nozaki, I. (2017). Assessment of Effectiveness of safer blood Transfusion Service in Myanmar.

Australian Red Cross Blood Service. (2019). Haemorrhage. Retrieved from https://transfusion.com.au/disease_therapeutics/haemorrhage

Baig, M., Habib, H., H Haji, A., T Alsharief, F., M Noor, A., & G Makki, R. (2013). Knowledge, Misconceptions and Motivations Towards Blood Donation Among University Students in KSA. *Pakistan journal of medical sciences, 29*(6), 1295-1299.

Borreli, L. (2013). Why donating blood is good for your health. Retrieved from https://www.medicaldaily.com/why-donating-blood-good-your-health-246379

CDC. (2011). Blood Safety; Diseases and Organisms. Retrieved from https://www.cdc.gov/bloodsafety/bbp/diseases-organisms.html

Daniel, W. W. (1995). *Daniel, Wayne W.: Biostatistics — A Foundations for Analysis in the Health Sciences. Wiley & Sons, New York—Chichester—Brisbane—Toronto—Singapore, 6th ed. 1995, 780 S., £58.—, ISBN 0–471–58852-0 (cloth)* (Vol. 37): John Wiley & Sons, Ltd.

Dubey, A., Sonker, A., Chaurasia, R., & Chaudhary, R. (2014). Knowledge, attitude and beliefs of people in North India regarding blood donation. *Blood transfusion = Trasfusione del sangue, 12 Suppl 1*(Suppl 1), s21-s27. doi:10.2450/2012.0058-12

Elias, E., Mauka, W., Philemon, R. N., Damian, D. J., Mahande, M. J., & Msuya, S. E. (2016). Knowledge, Attitudes, Practices, and Factors Associated with Voluntary Blood Donation among University Students in Kilimanjaro, Tanzania. *J Blood Transfus, 2016*, 8546803. doi:10.1155/2016/8546803

En, O. (2018). Determinants of practice of blood donation among undergraduate students of Ebonyi State University Abakaliki, Southeast Nigeria. *4*, 001-007. doi:10.17352/2455-5479.000032

Health Science Authority. (2017). Apheresis Donation. Retrieved from https://www.hsa.gov.sg/content/hsa/en/Blood_Services/Blood_Donation/What_is_the_Donation_Process/Apheresis_Donation.html

Hinton, P. R., Brownlow, C., McMurray, I., & Cozens, B. (2004). *SPSS Explained*.

Hong, J., & Loke, A. Y. (2011). Hong Kong young people's blood donation behavior. *Asian journal of transfusion science, 5*(1), 49-52. doi:10.4103/0973-6247.76000

Jasim N. Al-Asadi, & Asaad Q. Al-Yassen. (2018). Knowledge, attitude and practice of blood donation among university students in Basrah, Iraq: A comparison between medical and

non-medical students. *Asian Journal of Medical Sciences*. doi:10.3126/ajms.v9i6.20904

Javadzadeh Shahshahani, H., Yavari, M. T., Attar, M., & Ahmadiyėh, M. H. (2006). Knowledge, attitude and practice study about blood donation in the urban population of Yazd, Iran, 2004. *Transfusion Medicine, 16*(6), 403-409. doi:10.1111/j.1365-3148.2006.00699.x

Jitkritsadakul, O., Boonrod, N., & Roongroj., B. (2017). Knowledge, attitudes and perceptions of Parkinson's disease: A cross-sectional survey of Asian patients. *ELSEVIER, Journal of Neurological Sciences, 374 (2017)*.

Karim, M. R., Alam, M., Jafrine Labone, u., & Farazi, M. M. (2012). Factors Influencing Blood Donation Behavior of University Level Students in Bangladesh. *1*, 35-40.

Koistinen, J. (2008). Building Sustainable Blood Services in Developing Countries. *Transfusion Alternatives in Transfusion Medicine*. doi:10.1111/j.1778-428X.2008.00105.x

Kowsalya, V., Vijarakjumar, R., & Chidambaram, R. (2013). A study on knowledge, attitude and practice regarding voluntary blood donation among medical students in Puducherry, India. *Pakistan Journal of Biological Sciences, 16*.

Légaré, F. (2010). Assessing barriers and facilitators to knowledge use. Retrieved from http://www.cihr-irsc.gc.ca/e/42293.html

Longhurst, A. S. (2018). The bnefits of donating blood. Retrieved from https://www.healthline.com/health/benefits-of-donating-blood#1

Melku, M., Terefe, B., Asrie, F., Enawgaw, B., Melak, T., Tsegay, Y. G., . . . Shiferaw, E. (2016). Knowledge, Attitude, and Practice of Adult Population towards Blood Donation in Gondar Town, Northwest Ethiopia: A Community Based Cross-Sectional Study. *J Blood Transfus, 2016*, 7949862. doi:10.1155/2016/7949862

Ministry of Education. (2013). Education System in Myanmar: Education Structure. Retrieved from http://203.81.81.180/dhel/education-system-in-myanmar/education-structure/

Mishra, S., Sachdev, S., Marwaha, N., & Avasthi, A. (2016). Study of Kknowledge and Attitude among College-going Students toward Voluntary Blood Donation from North India. *Journal of Blood Medicine, 7*, 19-26. doi: https://doi.org/10.2147/JBM.S91088

MSD Manual. (2018). Complications of Transfusion. Retrieved from https://www.msdmanuals.com/en-jp/professional/hematology-and-oncology/transfusion-medicine/complications-of-transfusion

Mwaba, K., & Keikelame, M. (1995). Blood donation behaviour and beliefs among a sample of high school students in Mmabatho.

Nagdeve, M. (2018). 5 Impressive Benefits Of Blood Donation. Retrieved from https://www.organicfacts.net/health-benefits/other/blood-donation.html

Nair, S. C., & Mammen, J. J. (2015). Repeat voluntary non-remunerated blood donor is the best quality indicator for blood safety. *The Indian journal of medical research, 141*(6), 749-752. doi:10.4103/0971-5916.160687

National Blood Center. (2017). *2016 Annual Report on Blood Transfusion Services*. Yangon: National Blood Center, Ministry of Health and Sports Myanmar.

National Blood Center. (2018). Blood Donor Criteria. Retrieved from www.donatebloodmyanmar.org

NHS UK. (2018). Blood Transfusion. Retrieved from https://www.nhs.uk/conditions/blood-transfusion/

Nigatu, A., & Demissie, D. B. (2014). Knowledge, Attitude and Practice on Voluntary Blood Donation and Associated Factors among Ambo University Regular Students, Ambo Town, Ethiopia. *Journal of Community Medicine & Health Education*.

NIH US. (2018). Blood Transfusion. Retrieved from https://www.nhlbi.nih.gov/health-topics/blood-transfusion

Pan American Health Organization. (2005). *METHODOLOGICAL GUIDELINES FOR SOCIO-CULTURAL STUDIES ON ISSUES RELATED TO BLOOD DONATION*.

Raina, S. (2013). Assessment of knowledge, attitude, and practice in health care delivery. *North American journal of medical sciences, 5*(3), 249-250. doi:10.4103/1947-2714.109226

Sahoo, D. P., Patil, C., & Dehmubed, A. (2017). A study of knowledge, attitude and practice of voluntary blood donation among interns of a municipal medical college. *International Journal Of Community Medicine And Public Health; Vol 4, No 4 (2017): April 2017DO - 10.18203/2394-6040.ijcmph20171343*.

Salaudeen, A., & Odeh, E. (2011). Knowledge and behavior towards voluntary blood donation among students of a tertiary institution in Nigeria. *Nigerian Journal of Clinical Practice, 14*(3), 303-307. doi:10.4103/1119-3077.86773

Sharifa Akhtar, B., Sultana, N., Farzana, S., Ahmed, R., & Golam Rubby, M. (2017). Awareness about blood donation among donors at a specialized tertiary level public hospital. *6*, 21. doi:10.3329/updcj.v6i2.31724

Shidam, U., Lakshminarayanan, S., Saurabh, S., & Roy, G. (2015). KNOWLEDGE AND ATTITUDE REGARDING BLOOD DONATION IN RURAL PUDUCHERRY, INDIA. *6*, 64-68.

Shilpa, P., Mehta, S. J., & Parekh, E. J. D. (2004). Blood: The Essence of Humanity. *Encyclopedia of Life Support Systems (EOLSS), BIOTECHNOLOGY – Vol .XI*.

Smith, A., Matthews, R., & Fiddler, J. (2011). Blood Donation and Community: Exploring the Influence of Social Capital. *International Journal of Social Inquiry, 4-1*, 45-63.

The Blood Center US. (2018). Blood Facts. Retrieved from http://www.thebloodcenter.org/donor/Bloodfacts.aspx

United Nations. (2015). UN Millennium Development Goals. Retrieved from http://mdgs.un.org/unsd/mdg/default.aspx

United States Agency for International Development. (2011). Blood Donation in Moldova: Knowledge, Attitudes, and Practice in the General Population: Survey Final Report. Retrieved from http://aids.md/aids/files/342/reportcap-blood-donation-2007-en-ro.pdf

USAID. (2011). The KAP Survey Model (Knowledge, Attitudes, and Practices). Retrieved from https://www.spring-nutrition.org/publications/tool-summaries/kap-survey-model-knowledge-attitudes-and-practices

Wong, H. T. H., Lee, S. S., Lee, C.-K., & Chan, D. P. C. (2015). Failure of self-disclosure of deferrable risk behaviors associated with transfusion-transmissible infections in blood donors. *Transfusion, 55*(9), 2175-2183. doi:10.1111/trf.13106

World Bank, & CommGAP. (2010). *Theories of Behavior Change*.

World Health Organization. (2008a). A guide to developing Knowledge, Attitude and Practice surveys.

World Health Organization. (2008b). *Universal Assess to Safe Blood Transfusion*. Geneva: World Health Organization.

World Health Organization. (2009). The Melbourne Declaration on 100% Voluntary Non-remunerated Donation of Blood and Blood Components.

World Health Organization. (2010a). *Towards 100% voluntary blood donation, A global framework for action*: World Health Organization.

World Health Organization. (2010b). World Blood Donor Day 2010, New Blood for the World. Retrieved from http://www.who.int/worldblooddonorday/archives/2010/en/

World Health Organization. (2012a). *Blood Donor Selection*: World Health Organization.

World Health Organization. (2012b). *Health education: theoretical concepts, effective strategies and core competencies*.

World Health Organization. (2016). Voluntary unpaid blood donations must increase rapidly to meet 2020 goal. Retrieved from http://www.who.int/news-room/detail/13-06-2016-voluntary-unpaid-blood-donations-must-increase-rapidly-to-meet-2020-goal

World Health Organization. (2017a). Blood Safety and Availability. Retrieved from http://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability

World Health Organization. (2017b). Blood Transfusion Safety; Testing of Donated Blood. Retrieved from https://www.who.int/bloodsafety/donation_testing/en/

World Health Organization. (2017c). *Global Status Report on Blood Safety and Availability 2016*. Geneva: World Health Organization.

World Health Organization. (2017d). Why should I donate blood? : Online Q&A. Retrieved from https://www.who.int/features/qa/61/en/

Zaller, N., Nelson, K. E., Ness, P., Wen, G., Bai, X., & Shan, H. (2005). Knowledge, attitude and practice survey regarding blood donation in a Northwestern Chinese city. *Transfusion Medicine, 15*(4), 277-286. doi:10.1111/j.0958-7578.2005.00589.x

Appendix

Appendix A: Ethical Approval

AF 02-12

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University

Jamjuree 1 Building, 2nd Floor, Phyathai Rd., Patumwan district, Bangkok 10330, Thailand, Tel/Fax: 0-2218-3202, 0-2218-3409 E-mail: eccu@chula.ac.th

COA No. 135/2019

Certificate of Approval

Study Title No. 063.1/62 : KNOWLEDGE, ATTITUDE, AND PRACTICE OF VOLUNTRY BOOLD DONATION AMONG UNIVERSITY AND COLLEGE STUDENTS IN YANGON, MYANMAR

Principal Investigator : MISS AYE CHAN OO

Place of Proposed Study/Institution : College of Public Health Sciences, Chulalongkorn University

The Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University, Thailand, has approved constituted in accordance with Belmont Report 1979, Declaration of Helsinki 2013, Council for International Organizations of Medical Sciences (CIOM) 2016, Standards of Research Ethics Committee (SREC) 2013, and National Policy and guidelines for Human Research 2015.

Signature: Prida Tasanapradit
(Associate Prof. Prida Tasanapradit, M.D.)
Chairman

Signature: Nuntaree Chaichanawongsaroj
(Assistant Prof. Nuntaree Chaichanawongsaroj, Ph.D.)
Secretary

Date of Approval : 17 May 2019

Approval Expire date : 16 May 2020

The approval documents including:

1) Research proposal
2) Participant information Sheet and Consent Form
3) Researcher
4) Questionnaire

063.1/62
17 MAY 2019
16 MAY 2020

The approved investigator must comply with the following conditions:

1. The research/project activities must end on the approval expired date of the Research Ethics Review Committee for Research Involving Human Research Participants, Health Sciences Group, Chulalongkorn University (RECCU). In case the research/project is unable to complete within that date, the project extension can be applied one month prior to the RECCU approval expired date.
2. Strictly conduct the research/project activities as written in the proposal.
3. Using only the documents that bearing the RECCU's seal of approval with the subjects/volunteers (including subject information sheet, consent form, invitation letter for project/research participation (if available).
4. Report to the RECCU for any serious adverse events within 5 working days.
5. Report to the RECCU for any change of the research/project activities prior to conduct the activities.
6. Final report (AF 08-12) and abstract is required for a one year (or less) research/project and report within 30 days after the completion of the research/project. For thesis, abstract is required and report within 30 days after the completion of the research/project.
7. Annual progress report is needed for a two-year (or more) research/project and submit the progress report before the expire date of certificate. After the completion of the research/project processes as No. 6.

Appendix B: Participant Information Sheet

Title of Research: "KNOWLEDGE, ATTITUDE AND PRACTICE OF VOLUNTARY BLOOD DONATION AMONG UNIVERSITY AND COLLEGE STUDENTS IN YANGON, MYANMAR"

Principle Investigator: Ms. Aye Chan Oo

Contact Address: No.16, 146th Street, Ayoe Gone Ward, Tamwe Township, Yangon

Telephone: 095140474

Email: ayechanoo1991@gmail.com

1. Introduction

My name is Ms. Aye Chan Oo, Master of Public Health Student studying at College of Public Health Science, Chulalongkorn University in Thailand. I am doing research on the "Knowledge, Attitude and Practice of Voluntary Blood Donation Among University and College Students in Yangon" and I would like to give you information about this research and invite you to participate in this research. There may be some words you do not understand and please do not hesitate to ask me for clarification, we will explain so that you can clearly understand.

2. Purpose of the Research

This study is aim to access the knowledge, attitude and practice of voluntary blood donation and to determine the associated factors of voluntary blood donation practice and reasons for not donating blood among the university and college students.

In Myanmar, there is no published information or data regarding KAP of blood donation and this study is aimed to understand and generate information required to improve voluntary blood donation in the country. The university students are aimed at in this study since they represent the potential long term blood donor population pool that can be sustained as regular and safe blood donors.

3. Type of Research Intervention

University and college students of blood donor eligible age ≥ 18 years old (3rd and 4th year students) will be asked to answer the self-administered questionnaire containing 57 questions which can take about maximum 30 minutes.

4. Participant Selection

We are inviting all the university and college students of Yangon Technological University (YTU) and National Management Degree College (NMDC) with blood donor eligible age ≥ 18 years old and full time students (3rd and 4th year students) to participate in this study. The minimum number of participants needed for this study is 341.

5. Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. It will not affect any health service you need to receive even if you choose not to participate. You may change your mind later and stop participating even if you agreed earlier.

6. Procedure and Protocol

Information sheet regarding the research will be distributed to invited university and college students in the classrooms. The research team will also explain verbally about purpose of research (research objectives), research procedure, and detailed information about questionnaires and ethics about conducting research. If you agree to participate, we will ask you to sigh in the informed consent form. After that, we will distribute the self-administered questionnaires to the participants to answer. The structured questionnaires contain 5 parts with total 57 questions covering Socio-demographic characteristics, Knowledge related to blood donation, Attitude towards blood donation, Practice of voluntary blood donation and Reasons for not practicing blood donation. It may take about maximum 30 minutes to complete the questionnaires. If there is any confusion anytime in this process, do not hesitate to ask the principal researcher or research team, we will explain until you clearly understand.

7. Harm/Risk

No harm/risk of any kind will be inflicted on the participants. You may refuse to answer any question or not take part in the survey if you feel the questions are personal or you feel uncomfortable to answer.

8. Benefits

Participation in this study will not benefit you directly, but the information obtained from your participation will provide the vital information in planning for raising awareness and generating strategies to increase the voluntary donations in the country. As your participation is voluntary and no special compensation for participation in this study will be done. Nevertheless, the researcher will give you a small present such as stationary to appreciate your participation. And after collecting the questionnaires from participants, research team will verbally provide the correct answers of knowledge related to blood donation to gain knowledge.

9. Confidentiality

Any information that is linked to you will be kept confidentially. Even though the study will be published, your names or other identifying information will not be mentioned in the report or summaries of the study. The final report can be available from principal researcher and the report will not be used with another intension. The data will be kept confidentially during the process of report and research and all data files together with the participants' answer on questionnaires will be destroyed after final report has been done.

10. Right of the participant

You have the right to choose or refuse for giving consent and participating in this study. Even after giving consent, you can withdraw from the study at any time. There will not be any bad consequence to you for this reason. You can also ask anything you want to

know before, during and after the study conduct any time. You can contact the principal researcher with given address mentioned above or you can make report to the Research Ethics Review Committee, Chulalongkorn University (RECCU)., Jamjuree 1 Bldg., 2nd floor., 254 Phayathai Road., Pathuwam District, Bangkok 10330, Thailand, Tel/Fax +662218-3202 E-mail: eccu@chula.ac.th at any time if you have any questions or complaints about this study.

Appendix C: Informed Consent Form

Institution Name…….

Date…….

Code of participant…….

I have been invited to participate in research about;

Title: "KNOWLEDGE, ATTITUDE AND PRACTICE OF VOLUNTARY BLOOD DONATION AMONG UNIVERSITY AND COLLEGE STUDENTS IN YANGON, MYANMAR"

Principle researcher's name: Ms. Aye Chan Oo

Contact address: No.16, 146th Street, Ayoe Gone Ward, Tamwe Township, Yangon, Myanmar

Telephone: 095140474

Email : ayechanoo1991@gmail.com

I have been informed about purpose of the research, how the participants are selected, and procedure of the research. I understand that there is no risk/harm from the research and I am also aware that there will not be direct benefit for me but the information from my participation will benefit the community and health care services implementation. I have had the opportunity to ask questions that I am not clear and the researcher has explained to my satisfaction.

I understand that I have the right to withdraw from this research at any time without causing any negative impact upon my medical care in the future anywhere. And I am aware that the report will be come out as full picture and my personal information in this research will be kept confidential and will not appear in the report. Researcher also explained that the questionnaires and data files will be destroyed after the final report.

I have been provided with the name and address of a researcher who can be easily contacted. If I am not treated as indicated in the information sheet, I am aware that I can report to the Research Ethics Review Committee for Research Involving

Human Research Participants, Health Sciences Group, Chulalongkorn University (RECCU); Jamjuree 1 Building, 2nd Fl., 254 Phyathai Rd., Patumwan district, Bangkok 10330, Thailand, Tel./Fax. 0-2218-3202 E-mail: eccu@chula.ac.th.

I also have received a copy of information sheet and informed consent form. I willingly and voluntarily agree to participate in this research and consent the researcher to response to questionnaires.

Sign: ……..……	Sign: ……..……
Name: ……..……	Name: …….
Researcher	Participant

Appendix D: Self-administered Questionnaires (English)

Appendix D: Self-administered Questionnaires (English)

QUESTIONNAIRES ON "KNOWLEDGE, ATTITUDE AND PRACTICE OF VOLUNTARY BLOOD DONATION AMONG UNIVERSITY AND COLLEGE STUDENTS IN YANGON, MYANMAR"

Respondent Code: ..... **Date:** .....

Academic Institution: ☐ Yangon Technological University (YTU)

☐ National Management Degree College (NMDC)

SECTION 1: SOCIODEMOGRAPHIC CHARACTERISTICS

Tick one answer only in the box for each question AND/OR fill in the blank to answer.	**Code (Do not fill)**
1. What is your age in completed year? ..... Years	
2. What is your sex? ☐ (1)Male ☐ (2)Female	
3. Which academic year are you in? ..... year	
4. What is your religion? ☐ (1)Buddhism ☐ (2)Christianity ☐ (3)Islam ☐ (4)Hinduism ☐ (5)Other (Specify)	
5. Your estimated household income per month (Please put the approximate figures, not range) ..... Kyats/ Month	

6. Do you have any blood related disorders such as anemia, bleeding disorder, Thalassemia, G-6-PD deficiency, etc? ☐ (1)Yes ☐ (2)No If Yes, specify	

SECTION 2: KNOWLEDGE RELATED TO BLOOD DONATION

Tick one answer only in the box for each question AND/OR fill in the blank to answer.	**Code (Do not fill)**
7. How much blood is there in human body with average weight of 60-70kg? (L = Litre) ☐ (1) 1L ☐ (2) 2-3L ☐ (3) 4-5L ☐ (4) 6-7L ☐ (5) more than 7L ☐ (6) Don't know	
8. There are 3 blood types (A, B and O) in ABO blood group. Is that true? ☐(1) Yes ☐ (2) No ☐ (3) Don't Know	
9. Which blood group is the universal donor in ABO blood group? ☐(1) A ☐ (2) B ☐ (3) AB ☐ (4) O ☐ (5) Don't know	
10. Which blood group is the universal recipient in ABO blood group? ☐(1) A ☐ (2) B ☐ (3) AB ☐ (4) O ☐ (5) Don't know	
11. Rh blood group has Rh + and Rh – blood types. Is that true? ☐ (1) Yes ☐ (2) No ☐ (3) Don't Know	
12. Do you know your own blood group? ☐ (1) Yes ☐ (2) No If Yes, what is it?	
13. Do you know how much blood is removed during a blood donation? (ml = millilitre)	

☐ (1) 250-350ml ☐ (2) 350-450ml ☐ (3) 450-550ml ☐ (4) more than 550ml ☐ (5) Don't know	
14. What is the minimum age (years old) for blood donation in Myanmar? ☐ (1) 16 ☐ (2) 18 ☐ (3) 20 ☐ (4) Other (specify)..... ☐ (5) Don't know	
15. What is the maximum age (years old) for blood donation in Myanmar? ☐ (1) 45 ☐ (2) 55 ☐ (3) 65 ☐ (4) Other (specify)..... ☐ (5) Don't know	
16. What is the minimum weight required to donate blood? (lb = pound) ☐ (1) ≥80 lb ☐ (2) ≥100 lb ☐ (3) ≥120 lb ☐ (4) ≥140 lb ☐ (5) Don't know	
17. What is the minimal interval between 2 successive blood donations by a person? ☐ (1) 2 month ☐ (2) 4 months ☐ (3) 6months ☐ (4) 1 year ☐ (5) Don't know	
18. Can one donate blood if he/she did not get enough sleep on the night before intended blood donation? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
19. Can one donate blood after alcohol drinking? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
20. Can one donate blood if he/she have current fever or illness? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
21. Can one donate blood if he/she had tattoo, piercing or acupuncture within last 6 months? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	

22. Can one donate blood if he/she has high or low Blood Pressure? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
23. Can one donate blood if he/she has anemia? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
24. Can women donate blood when on their menstrual period? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
25. Can women donate blood if they are pregnant or lactating? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
26. It is safe to donate blood from 1st degree relatives such as son to mother, brother to sister. Is that true? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
27. Can HIV be transmitted by blood donation? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
28. Can hepatitis be transmitted by blood donation? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
29. Can syphilis be transmitted by blood donation? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
30. Can malaria be transmitted by blood donation? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
31. After blood donation, the donated blood is screened for infections in blood banks. Is that true? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
32. Can blood donor get infectious diseases such as HIV, hepatitis by donating blood? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
33. Can blood donor get anemia or bleeding disorders by donating blood? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
34. Can blood donor get weight gain by donating blood?	

☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
35. Blood donation can prevent heart disease and cancer in blood donors. Is that true? ☐ (1) Yes ☐ (2) No ☐ (3) Don't know	
36. Voluntary blood donor is the donor ☐ (1) Who give blood by own free will for anyone in need of blood and not receive any payment or incentive ☐ (2) Who give blood on request of family, relatives or friends when needed ☐ (3) Who give blood in exchange of payment/incentives for the donation	
37. What is your source of information related to blood donation? **(can tick more than one answer)** ☐ (1) Nowhere ☐ (2) Internet ☐ (3) Television/Radio ☐ (4) Newspaper/Books ☐ (5) Health Staffs ☐ (6) Friends/Relatives ☐ Others (specify).....	

SECTION 3: ATTITUDE TOWARDS BLOOD DONATION

Tick one answer only that is true for you in the box for each question.	**Strongly Agree**	**Agree**	**Not Sure**	**Disagree**	**Strongly Disagree**
38. Blood donation is moral responsibility.	☐	☐	☐	☐	☐
39. Blood should be donated only in the emergency.	☐	☐	☐	☐	☐
40. One should donate blood to get health screening.	☐	☐	☐	☐	☐
41. Blood donation is good for blood donor's health.	☐	☐	☐	☐	☐
42. It will be better if person donating blood can get payment or incentive.	☐	☐	☐	☐	☐

43. Best way for donating blood is on request of family, relatives or friends when needed.	☐	☐	☐	☐	☐
44. Best way for donating blood is donation to anyone in need of blood with own free will, without expecting any benefit or payment in return.	☐	☐	☐	☐	☐
45. Blood donation can save lives.	☐	☐	☐	☐	☐
46. Person donating blood must disclose correct information about his/her health prior to donation.	☐	☐	☐	☐	☐
47. Person donating blood should get more satisfaction for self and recognition in the society.	☐	☐	☐	☐	☐
48. Blood collected in the hospital blood banks may be sold to the patients in need.	☐	☐	☐	☐	☐
49. It is difficult to get blood in hospitals and blood banks and there may be discrimination.	☐	☐	☐	☐	☐

SECTION 4: PRACTICE OF VOLUNTARY BLOOD DONATION

Tick one answer only in the box for each question AND/OR fill in the blank to answer.	**Code (Do not fill)**
50. Have you ever donated blood before? ☐ (1)Yes ☐ (2) No ⇨ **If Yes, skip Q.51 and go to Q. 52- 56** ⇨ **If No, answer Q. 51 and Q.57 only**	
51. Do you want to donate blood in the future? ☐ (1) Yes ☐ (2) No ➔ **Go to Q. 57**	
52. How many times have you donated blood? .....time(s)	
53. Where is the place of your last blood donation? ☐ (1) National Blood Bank ☐ (2) Hospital ☐ (3) Blood donation Campaign ☐ (4) Other (specify).....	
54. What was the type of your blood donation(s)? **(Can tick more than one answer)** ☐ (1) Donation with own freewill for anyone who need blood, without any payment ☐ (2) Donation on request of family, relatives or friends ☐ (3) Donation in exchange of payment or incentive	
55. Do you feel satisfaction after blood donation? ☐ (1) Yes ☐ (2) No ☐ (3) Not Sure	
56. Do you want to donate blood regularly in the future? ☐ (1) Yes ☐ (2) No ➔ **FINISH**	

SECTION 5: REASONS FOR NOT PRACTICING BLOOD DONATION

57. If you have **never donated blood before** , please **tick** the reasons below which you think influence you not to donate blood. ***(Can tick more than one answer)***

☐ (1) I think I am still underage to donate blood

☐ (2) I am underweight to donate blood

☐ (3) No one have ever asked me to donate blood

☐ (4) I want to donate, but there was no opportunity.

☐ (5) I think it is not so important

☐ (6) There are religious influences which forbid to donate blood

☐ (7) I have low Hemoglobin level (anemia)

☐ (8) I am medically unfit for blood donation

☐ (9) I believe blood donation can harm my health

☐ (10) I feel fear to donate blood

☐ (11) I am afraid of pain that I will experience if I donate blood such as needle prick

☐ (12) I do not have information where to donate blood

☐ (13) Other reason

(specify).....

.....

"THANK YOU FOR PARTICIPATING"

Appendix E: Self-administered Questionnaires (Myanmar)

မြန်မာနိုင်ငံ ရန်ကုန်မြို့ ရှိ တက္ကသိုလ်/ကောလိပ် ကျောင်းသားများ တွင် သွေးလှူဒါန်းခြင်းဆိုင်ရာ အသိပညာ၊ အတွေးအမြင် နှင့် ပါဝင်လှူဒါန်းမှုအား လေ့လာခြင်း

ဖြေဆိုသူ ကုဒ်နံပါတ် : ..... နေ့စွဲ : .....

ကျောင်း အမည် : ☐ Yangon Technological University (YTU)

☐ National Management Degree College (NMDC)

အပိုင်း ၁။ အထွေထွေ အချက်အလက်များ

မေးခွန်းတစ်ခုချင်းစီ အတွက် အဖြေအား ☐ တွင် အမှန်ခြစ်ပါ (သို့မဟုတ်) ကွက်လပ်ဖြည့်ပါ။	မဖြည့်ရ
၁။ ပြည့်ပြီး အသက် ..... နှစ်	
၂။ လိင် ☐ (1) ကျား ☐ (2) မ	
၃။ ယခုတက်ရောက်နေသော စာသင်နှစ် ..... နှစ်	
၄။ ကိုးကွယ်သော ဘာသာ ☐ (1) ဗုဒ္ဓဘာသာ ☐ (2) ခရစ်ယာန် ☐ (3) အစ္စလာမ် ☐ (4) ဟိန္ဒူ ☐ (5) အခြား ဘာသာ(ဖြည့်ပါ)	
၅။ သင့် အိမ်၏ ပျမ်းမျှ တစ်လဝင်ငွေ (အတိအကျဖြစ်ရန်မလိုပါ) ..... ကျပ်	
၆။ သင့်တွင် သွေး နှင့် ပတ်သက်သော ရောဂါ တစ်မျိုးမျိုးရှိပါသလား? ဥပမာ။ သွေးအားနည်းရောဂါ၊ သွေးပတိတ်သောရောဂါ၊ စသည်။ ☐ (1) ရှိသည် ☐ (2) မရှိပါ ရှိပါက ရောဂါ အမည်ကို ဖော်ပြပါ	

အပိုင်း ၂။ သွေးလှူဒါန်းခြင်းနှင့်ဆိုင်သော အသိပညာ ဗဟုသုတ

မေးခွန်းတစ်ခုချင်းစီ အတွက် အဖြေအား ☐ တွင် အမှန်ခြစ်ပါ (သို့မဟုတ်) ကွက်လပ်ဖြည့်ပါ။	မဖြည့်ရ
၇။ ပျမ်းမျှ ၆၀-၇၀ kg ရှိသူ၏ ခန္ဓာကိုယ်တွင် သွေးပမာဏ မည်မျှရှိသနည်း? (L = လီတာ) ☐ (1) ၁ L ☐ (2) ၂-၃ L ☐ (3) ၄-၅ L ☐ (4) ၆-၇ L ☐ (5) ၇ L နှင့်အထက် ☐ (6) မသိပါ	
၈။ ABO သွေးအုပ်စုတွင် A, B နှင့် O ဟူ၍သွေးအမျိုးအစား သုံးမျိုးရှိသည်။ ဟုတ်ပါသလား? ☐(1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	

၉။ ABO သွေးအုပ်စုတွင် မည်သည့် သွေးအမျိုးအစားပိုင်ရှင်သည် အခြား သွေးအုပ်စုအားလုံးကို သွေးလှူဒါန်း၍ ရသနည်း? ☐(1) A ☐ (2) B ☐ (3) AB ☐ (4) O ☐ (5) မသိပါ	
၁၀။ ABO သွေးအုပ်စုတွင် မည်သည့် သွေးအမျိုးအစားပိုင်ရှင်သည် အခြားသွေးအုပ်စု အားလုံးထံမှ သွေးလက်ခံနိုင်သနည်း? ☐(1) A ☐ (2) B ☐ (3) AB ☐ (4) O ☐ (5) မသိပါ	
၁၁။ Rh သွေးအုပ်စုတွင် Rh + နှင့် Rh - ဟူ၍ သွေးအမျိုးအစား နှစ်မျိုးရှိသည်၊ ဟုတ်ပါသလား? ☐(1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	
၁၂။ သင်၏ သွေးအမျိုး အစားကို သိပါသလား? ☐ (1) သိပါသည် ☐ (2) မသိပါ သိပါက ဖော်ပြပါ	
၁၃။ သွေးလှူဒါန်းမှုတစ်ခုတွင် သွေးပမာဏ မည်မျှထုတ်ယူသနည်း? (ml= မီလီလီတာ) ☐ (1) ၂၅၀-၃၅၀ ml ☐ (2) ၃၅၀-၄၅၀ ml ☐ (3) ၄၅၀-၅၅၀ ml ☐ (4) ၅၅၀ ml နှင့်အထက် ☐ (5) မသိပါ	
၁၄။ မြန်မာနိုင်ငံတွင် သွေးစတင်လှူဒါန်းနိုင်သော အသက်မှာ? ☐ (1) ၁၆ နှစ် ☐ (2) ၁၈ နှစ် ☐ (3) ၂၀ နှစ် ☐ (4) အခြား (ဖော်ပြပါ) ..... ☐ (5) မသိပါ	
၁၅။ မြန်မာနိုင်ငံတွင် သွေးလှူဒါန်းနိုင်သော အကြီးဆုံးအသက်မှာ? ☐ (1) ၄၅ နှစ် ☐ (2) ၅၅ နှစ် ☐ (3) ၆၅ နှစ် ☐ (4) အခြား (ဖော်ပြပါ)..... ☐ (5) မသိပါ	
၁၆။ သွေးလှူဒါန်းနိုင်ရန် ရှိသင့်သော ပေါင်ချိန်မှာ? (lb = ပေါင်) ☐ (1) ≥၈၀ lb ☐ (2) ≥၁၀၀ lb ☐ (3) ≥၁၂၀ lb ☐ (4) ≥၁၄၀ lb ☐ (5) မသိပါ	
၁၇။ သွေးလှူဒါန်း မှု တစ်ကြိမ်နှင့် တစ်ကြိမ်ကြား အချိန်မည်မျှခြားရန်လိုအပ်သနည်း? ☐ (1) ၂ လ ☐ (2) ၄ လ ☐ (3) ၆ လ ☐ (4) ၁ နှစ် ☐ (၅) မသိပါ	
၁၈။ သွေးမလှူဒါန်းမီ အိပ်ရေးပျက်ခြင်းရှိပါက သွေးလှူနိုင်ပါသလား? ☐ (1) လှူနိုင်သည် ☐ (2) မလှူနိုင်ပါ ☐ (3) မသိပါ	
၁၉။ သွေးမလှူဒါန်းမီ အရက်သေစာ သောက်စားထားပါက သွေးလှူနိုင်ပါသလား? ☐ (1) လှူနိုင်သည် ☐ (2) မလှူနိုင်ပါ ☐ (3) မသိပါ	
၂၀။ သွေးလှူဒါန်းမည့် အချိန်တွင် ဖျားနေခြင်း/နေမကောင်းခြင်း ရှိပါက သွေးလှူနိုင်ပါသလား? ☐ (1) လှူနိုင်သည် ☐ (2) မလှူနိုင်ပါ ☐ (3) မသိပါ	

၂၁။ သွေးမလှူဒါန်းမို့ မိလအတွင်း တက်တူးထိုးခြင်း၊ ခန္ဓာကိုယ်တွင် အပေါက်ဖောက်ခြင်း၊ အပ်စိုက်ခြင်းများ ပြုလုပ်ထားပါက သွေးလှူနိုင်ပါသလား? ☐ (1) လှူနိုင်သည် ☐ (2) မလှူနိုင်ပါ ☐ (3) မသိပါ	
၂၂။ သွေးလှူဒါန်းမည့် အချိန်တွင် သွေးပေါင်ချိန်တက်ခြင်း/ကျခြင်း ရှိပါက သွေးလှူနိုင်ပါသလား? ☐ (1) လှူနိုင်သည် ☐ (2) မလှူနိုင်ပါ ☐ (3) မသိပါ	
၂၃။ သွေးလှူဒါန်းမည့် အချိန်တွင် သွေးအားနည်းနေပါက သွေးလှူနိုင်ပါသလား? ☐ (1) လှူနိုင်သည် ☐ (2) မလှူနိုင်ပါ ☐ (3) မသိပါ	
၂၄။ အမျိုးသမီးများ ရာသီသွေးပေါ်နေချိန်တွင် သွေးလှူဒါန်းနိုင်ပါသလား? ☐ (1) လှူနိုင်သည် ☐ (2) မလှူနိုင်ပါ ☐ (3) မသိပါ	
၂၅။ ကိုယ်ဝန်ဆောင်ကာလနှင့် ကလေးနို့တိုက်သော ကာလများတွင် သွေးလှူနိုင်ပါသလား? ☐ (1) လှူနိုင်သည် ☐ (2) မလှူနိုင်ပါ ☐ (3) မသိပါ	
၂၆။ ဆွေမျိုးအရင်းအချာ အချင်းချင်း သွေးလှူဒါန်းမှုပြုခြင်းသည် အန္တရယ်ကင်းသည်၊ ဟုတ်ပါသလား? (ဥပမာ။ သားအဖချင်း၊ မောင်နှမအရင်းချင်း သွေးလှူဒါန်းခြင်း) ☐ (1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	
၂၇။ သွေးသွင်းခြင်းမှ တဆင့် HIV ရောဂါပိုး ကူးစက်နိုင်သည်။ ဟုတ်ပါသလား? ☐ (1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	
၂၈။ သွေးသွင်းခြင်းမှ တဆင့် အသည်းရောင်အသား(ဘီ) ရောဂါပိုး ကူးစက်နိုင်သည်။ ဟုတ်ပါသလား? ☐ (1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	
၂၉။ သွေးသွင်းခြင်းမှ တဆင့် ကာလသား ရောဂါပိုး ကူးစက်နိုင်သည်။ ဟုတ်ပါသလား? ☐ (1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	
၃၀။ သွေးသွင်းခြင်းမှ တဆင့် ငှက်ဖျား ရောဂါပိုး ကူးစက်နိုင်သည်။ ဟုတ်ပါသလား? ☐ (1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	
၃၁။ သွေးလှူဘဏ်များတွင် လှူဒါန်းလိုက်သောသွေးများကို ကူးစက်ရောဂါ ရှိ/ရှိ စစ်ဆေးပါသည်။ ဟုတ်ပါသလား? ☐ (1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	
၃၂။ သွေးလှူဒါန်းခြင်းမှတဆင့် သွေးလှူရှင်များတွင် HIV၊ အသည်းရောင်အသား(ဘီ)ရောဂါပိုး ကဲ့သို့ ရောဂါပိုးများ ကူးစက်နိုင်သည်။ ဟုတ်ပါသလား? ☐ (1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	
၃၃။သွေးလှူဒါန်းခြင်းမှတဆင့် သွေးလှူရှင်များတွင် သွေးအားနည်းရောဂါ၊ သွေးမတိတ်သောရောဂါ စသည့် သွေးရောဂါများဖြစ်စေနိုင်သည်။ ဟုတ်ပါသလား? ☐ (1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	

၃၄။ သွေးလှူဒါန်းခြင်းသည် သွေးလှူရှင်၏ ကိုယ်အလေးချိန်ကို တိုးစေသည်။ ဟုတ်ပါသလား? ☐ (1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	
၃၅။ သွေးလှူဒါန်းခြင်းသည် နလုံးရောဂါ၊ ကင်ဆာရောဂါများဖြစ်ခြင်းကို ကာကွယ်နိုင်သည်။ ဟုတ်ပါသလား? ☐ (1) ဟုတ်သည် ☐ (2) မဟုတ်ပါ ☐ (3) မသိပါ	
၃၆။ စေတနာ သွေးလှူရှင် ဆိုသည်မှာ ☐ (1) မိမိ ဆန္ဒအလျောက် အခကြေးငွေရယူခြင်း မရှိဘဲ သွေးလိုအပ်သူ မည်သည့် လူနာကိုမဆို ရည်စူး၍ လှူဒါန်းသူ ကိုဆိုလိုသည်။ ☐ (2) မိမိ၏ မိသားစု၊ဆွေမျိုး နှင့် အသိမိတ်ဆွေ များမှ အကူအညီတောင်းခံလာပါက လှူဒါန်းသူကို ဆိုလိုသည်။ ☐ (3) အခကြေးငွေ သို့မဟုတ် အလားတူ အဖိုးအခ ရယူ၍ လှူဒါန်းသူကို ဆိုလိုသည်။	
၃၇။ သွေးလှူဒါန်းခြင်းနှင့် ပတ်သက်သော အကြောင်းအရာ အချက်အလက်များကို မည်သည့်နေရာမှ ရသနည်း? **(အဖြေတစ်ခုထက်ပို၍ ဖြေဆိုနိုင်သည်)** ☐ (1) ဘယ်နေရာကမှ မရပါ ☐ (2) အင်တာနက် ☐ (3) တီဗွီ/ရေဒီယို ☐ (4) သတင်းစာ/စာအုပ် ☐ (5) ကျန်းမာရေးဝန်ထမ်း ☐ (6) မိသားစု/ အသိမိတ်ဆွေ ☐ အခြား (ဖော်ပြပါ).....	

□	□	□	□	□	□	□
□	□	□	□	□	□	□
□	□	□	□	□	□	□
□	□	□	□	□	□	□
□	□	□	□	□	□	□
□	□	□	□	□	□	□
□	□	□	□	□	□	□
□	□	□	□	□	□	□
□	□	□	□	□	□	□
□	□	□	□	□	□	□

အပိုင်း ၄။ စေတနာသွေးလှူရှင် အဖြစ်ပါဝင်လှူဒါန်းခြင်း

မေးခွန်းတစ်ခုချင်းစီ အတွက် အဖြေအား ☐ တွင် အမှန်ခြစ်ပါ (သို့မဟုတ်) ကွက်လပ်ဖြည့်ပါ။	မဖြည့်ရ
၅၀။ သင် ယခင်က သွေးလှူဒါန်းဖူးပါသလား? ☐ (1)လှူဖူးသည် ☐ (2) မလှူဖူးပါ ➪ **လှူဖူးသည်ဟု ဖြေပါက နံပါတ် ၅၂ မှ ၅၆ အထိဖြေပါ။ (၅၁ အားကျော်ပါ)** ➪ **မလှူဖူးပါဟု ဖြေပါက နံပါတ် ၅၁ နှင့် ၅၇ ကိုသာ ဆက်ဖြေပါ။**	
၅၁။ နောင်တွင် သွေးလှူဒါန်းရန် ဆန္ဒရှိပါသလား? ☐ (1) ရှိပါသည် ☐ (2) မရှိပါ ➔ **နံပါတ် ၅၇ သို့သွားပါ။**	
၅၂။ သင် အကြိမ်မည်မျှ သွေးလှူဒါန်းဖူးသနည်း? ..... ကြိမ်	
၅၃။ သင် နောက်ဆုံးအကြိမ်သွေးလှူဒါန်းစဉ်က မည်သည့် နေရာတွင် လှူဒါန်းခဲ့သနည်း? ☐ (1) အမျိုးသားသွေးဌာန ☐ (2) ဆေးရုံ ☐ (3) သွေးလှူဒါန်းပွဲ ☐ (4) အခြား (ဖော်ပြပါ).....	
၅၄။ သင်၏ သွေးလှူဒါန်းခြင်းနှင့် ကိုက်ညီသော အဖြေကို အမှန်ခြစ်ပါ။ **(အဖြေတစ်ခု ထက်ပို၍ ဖြေနိုင်သည်။)** ☐ (1) မိမိ ဆန္ဒအလျောက် အခကြေးငွေရယူခြင်း မရှိဘဲ သွေးလိုအပ်သူ မည်သည့် လူနာကိုမဆို ရည်စူး၍ လှူဒါန်းခြင်း ☐ (2) မိမိ၏ မိသားစုဆွေမျိုး နှင့် အသိမိတ်ဆွေ များမှ အကူအညီ တောင်းခံသောကြောင့် လှူဒါန်းခြင်း ☐ (3) အခကြေးငွေ သို့မဟုတ် အလားတူ အဖိုးအခ ရယူ၍ လှူဒါန်းခြင်း	
၅၅။ သွေးလှူဒါန်းပြီးချိန်တွင် စိတ်ကျေနပ်မှု ရှိပါသလား? ☐ (1) ရှိသည် ☐ (2) မရှိပါ ☐ (3) မသေချာပါ	
၅၆။ နောင်တွင် ပုံမှန် သွေးလှူဒါန်းမှု ပြုလုပ်ရန် ဆန္ဒရှိပါသလား? ☐ (1) ရှိသည် ☐ (2) မရှိပါ ➔ **သွေးလှူဖူးသူများအတွက် ပြီးပါပြီ**	

အပိုင်း၅။ သွေးမလှူဒါန်းခြင်း၏ အကြောင်းအရင်းများ

၅၇။ သင်သည် ယခင်က သွေးမလှူဖူးသူ ဖြစ်ပါက သင်မလှူဖြစ်ခြင်း၏ အကြောင်းအရင်း (များ)ကို အောက်ပါ အဖြေများတွင် အမှန် ခြစ်ပါ။ **(အဖြေတစ်ခုထက်ပို၍ ဖြေနိုင်သည်။)**

- ☐ (1) သွေးလှူဒါန်းရန် အသက်မပြည့်သေးသောကြောင့်
- ☐ (2) ကိုယ်အလေးချိန် (ပေါင်ချိန်) မပြည့်သောကြောင့်
- ☐ (3) မည်သူကမှ သွေးလှူဒါန်းရန် မတောင်းဆိုသောကြောင့်
- ☐ (4) အခါအခွင့် မသင့်သောကြောင့်
- ☐ (5) အရေးမကြီးသောကြောင့်
- ☐ (6) ဘာသာရေးဆိုင်ရာ အယူအဆများနှင့် မကိုက်ညီသောကြောင့်
- ☐ (7) သွေးအားနည်းရောဂါ ရှိသောကြောင့်
- ☐ (8) ကျန်းမာရေး အခြေအနေ မကောင်းသောကြောင့်
- ☐ (9) သွေးလှူဒါန်းခြင်းသည် ကျန်းမာရေးကို ထိခိုက်စေနိုင်သောကြောင့်
- ☐ (10) သွေးလှူဒါန်းရန် ကြောက်ရွံ့သောကြောင့်
- ☐ (11) သွေးလှူဒါန်းရာတွင် အပ်ထိုးခံရခြင်းကဲ့သို့သော နာကျင်မှုကို မခံနိုင်သောကြောင့်
- ☐ (12) မည်သည့်နေရာတွင် လှူဒါန်းရမည်ကို မသိသောကြောင့်
- ☐ (13) အခြား (ဖော်ပြပါ).....

.....

"ပါဝင်ဖြေဆိုခြင်းအတွက် ကျေးဇူးတင်ပါသည်"

VITA

NAME	Ms. Aye Chan Oo
DATE OF BIRTH	22 June 1991
PLACE OF BIRTH	Myeik, Myanmar
INSTITUTIONS ATTENDED	University of Medicine 2, Yangon, College of Public Health Sciences, Chulalongkorn University
HOME ADDRESS	No.488, Petchaburi Soi 18, Khwaeng Thanon Petchaburi, Ratchathewi District, Bangkok, Thailand