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Original Research Article

Donor's perspectives on blood donation and challenges of National Blood Center, Yangon, during the COVID-19 pandemic

Yan L. Maung[1]*, Aye A. Win[2], Kyaw S. Mya[3]

[1]Civil Service Affairs Division, Department of Medical Services, Ministry of Health, Naypyidaw, Myanmar
[2]Department of Health Policy and Management, University of Public Health, Yangon, Myanmar
[3]Department of Preventive and Social Medicine, University of Medicine, Taunggyi, Myanmar

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***Correspondence:**
Dr. Yan L. Maung,
E-mail: lynnmaunghtet@gmail.com

ABSTRACT

Background: The ongoing COVID-19 pandemic is causing major disruption at all levels of healthcare services, including blood bank services globally. The donors' knowledge, attitudes, beliefs, and behaviors regarding blood donation in Myanmar are needed to be considered. Hence, we studied the perspectives of blood donors on their donation and the challenges faced by the National Blood Centre, Yangon (NBC), during the COVID-19 pandemic.
Methods: We conducted the cross-sectional descriptive study using mixed methods among blood donors aged 20 years and above for quantitative approach and among three purposively selected blood bank experts for key informant interviews of qualitative portion.
Results: Of the 240 donors, the mean age was 36.41±10.83 years, and the male-to-female ratio was 1.24:1. Overall, regarding blood donation, 57.1% had favorable knowledge, 59.2% had favorable attitude, and 31.3% had regular voluntary practice. The higher-income donors had more favorable knowledge (p=0.013). Male donors (p=0.037), donors aged 50 years and above (p<0.001), and who with favorable knowledge (p=0.002) had regular voluntary practice. The more knowledge and positive attitude the donors had, the more times they donated blood. Thematic analysis identified five key themes and during pandemic, NBC encountered reduced blood supply and demand, communication problems with donors, human resources shortage, poor adherence to safety precautions of COVID-19 among donors and staff, and difficulty in arrangement of continuous consumable supply and maintenance as main challenges.
Conclusions: Policymakers and medical directors should have proper plans and policies to raise awareness, mobilize regular voluntary donors, especially youth and repeated donors, and recruit potential donors.

Keywords: Blood donation, Blood donors, Challenges, COVID-19 pandemic, Myanmar, Perspectives

INTRODUCTION

Blood donation is a pillar of modern medicine and saves millions of lives annually. The World Health Organization (WHO) recommends one percent of any given population as a minimum requirement to donate blood to achieve the basic needs of a country to arrange sustainability and adequate safe blood.[1] Many financial and healthcare services sectors were primarily affected during the pandemic. Many blood bank services worldwide face challenging times, with blood shortages and reductions of blood donors. Blood donation was significantly reduced during past infectious outbreaks.[2] Blood donation decreased by about 40-67% during the current COVID-19 pandemic due to restricted movements.[3] In Myanmar, voluntary donation practice gradually increased from 35% in 2003 to 80% in 2017.[4] In 2019, the total number of donations to the National Blood Center, Yangon (NBC) was over 100,000 and was double that of blood donations in 2016. In 2020, the total

number of blood donations dropped to 65,288 donations, and were reduced to 38% during the COVID-19 pandemic (blood transfusion safety lecture, University of Public Health, Yangon, 2022 February 4, unreferenced). The availability, access to safe blood, and inadequate blood supply for blood transfusion are still significant challenges encountered at the healthcare services in Myanmar.[5]

To ensure that every one who needs safe blood has access to it, every country requires voluntary unpaid donors who donate regularly. A well-organized regular blood donation practice plan from voluntary unpaid donors is the primary determinant of quality blood service delivery.[6] The demographic characteristics of the donors are critical in formulating and monitoring donor recruitment plans.[7] During the current pandemic, potential blood donors are worried about donating blood, and understanding the current status of blood donation will help to enhance the recruitment of donors. To increase the success and retention of blood donors, it is crucial to understand the motivators of blood donation during the pandemic. To ensure a safe and adequate blood supply, improving knowledge and attitude levels toward blood donation in the community is critical.[8,9]

The donors' knowledge, attitudes, beliefs, and behaviors regarding blood donation in Myanmar during the pandemic are needed to be considered. Therefore, the results of this study may provide insight into the perspectives of blood donors, including the assessment of knowledge, attitudes, and practice (KAP) regarding blood donation and the challenges faced by NBC during the COVID-19 pandemic.

METHODS

The cross-sectional descriptive study using mixed-methods research was conducted at NBC in Yangon region from April to July 2022.

For the quantitative study, the blood donors aged 20 years and above who came to donate at the NBC during the data collection period were involved. The sample size was calculated using the formula for one sample proportion ($n=z^2_{1-\alpha/2}pq/d^2$) with the following assumptions: alpha error was set at 5%, so 'z' is 1.96; p was estimated at 0.5 to get maximum sample size, the margin of error was set at 7%.[10] The minimum required sample size was 196. To account for the incompleteness of responses, we added a 10% extra sample to get a final sample size of 216.

A person can donate blood if they are in eligible criteria for donation. According to NBC's guidelines, donors who came to donate blood were assessed for their fitness and asked COVID-19 screening questions. After the successful donations, blood donors took some relaxation and refreshment time. We asked for consent to take part in this survey. We consecutively recruited donors aged 20 years and above until the required sample size was fulfilled, and we interviewed them face-to-face using semi-structured questionnaires.

We developed the questionnaire after reviewing the literature. It included the donors' demographic characteristics, assessing donors' perspectives on blood donation, including KAP assessment, determining the motivators and deterrents of blood donation, and their suggestions to promote blood donation during the COVID-19 pandemic.

We scored one mark for a correct response and zero for an incorrect response for 40 knowledge question items. We used the 11 positive and negative attitudinal statements to eliminate biases of responding to a similar answer in all statements to assess the donors' attitude towards blood donation during the pandemic with a five-point Likert scale (scored one to five points).[11] Then, we calculated summated total score for each individual. Mean scores of knowledge and attitude as cut off points were used. The blood donors who gained the mean scores and above were categorized as having favorable knowledge and attitude, and less than the mean scores as unfavorable knowledge and attitude. For the blood donation practice, we classified a donor as a regular voluntary practice if he or she donated blood at least five times or above within the previous two years and, if not, as a non-regular voluntary practice.

All the data were entered into EpiData version 3.1 and then analysed using SPSS version 16. The knowledge, attitude, and blood donation practice level were dependent variables, and donors' demographic characteristics (age, gender, marital status, level of education, and average monthly family income) were independent variables. We used frequency distribution tables, measures of central tendency, and dispersion for descriptive analysis. For attitude items, we also calculated the average item mean score for each item. We used the Pearson's Chi-square test to determine the association between the independent and dependent categorical variables. Pearson correlation was applied for the relationships among blood donation frequency, knowledge, and attitude scores. A p value ≤ 0.05 was set as a statistical significance.

For the qualitative approach, we used key informant interview (KII) methods to assess the providers' perspectives on blood donation from medical doctors working at NBC since 2019 or during the COVID-19 pandemic. One administrator and two medical officers of NBC were purposively selected and interviewed individually. We used the interview guide, and the data were collected, recorded, and transcribed. Thematic analysis was done using a matrix manually.

We conducted all interviews after receiving informed consent and in line with the health protocols for COVID-19 issued by the Ministry of Health, Myanmar.

RESULTS

A total of 240 blood donors who gave consent participated in the quantitative survey. Table 1 describes the details demographic characteristics of the blood donors.

The eldest age was 67 years. The mean age was 36.41±10.83 years. The male-to-female ratio was 1.24:1. Of the 229 blood donors, the minimum and maximum average monthly family incomes (in kyats) were 50,000 and 15,000,000. Both the median and IQR were 600,000 kyats per month.

Table 1: Demographic characteristics of the blood donors (n=240).

Characteristics	Frequency (%)
Age group (years)	
≤30	91 (37.8)
31-40	64 (26.7)
41-50	57 (23.8)
>50	28 (11.7)
Gender	
Male	133 (55.4)
Female	107 (44.6)
Religion	
Buddhist	231 (96.25)
Christian	3 (1.25)
Hindu	3 (1.25)
Islam	3 (1.25)
Marital status	
Single	127 (52.9)
Married	110 (45.9)
Divorced/separated	2 (0.8)
Widow/widower	1 (0.4)
Occupation	
Dependent	43 (17.9)
Government	25 (10.4)
Company	88 (36.7)
Self- Employee	74 (30.8)
Daily labor	4 (1.7)
Monk	6 (2.5)
Education level	
Only read and write	1 (0.4)
Primary School	4 (1.7)
Middle School	13 (5.4)
High School	38 (15.8)
University Student	32 (13.3)
Graduated and above	152 (63.4)
Average monthly family income group (kyats/month) (n=229)	
≤300,000	47 (20.5)
300,001-1,000,000	134 (58.5)
>1,000,000	48 (21.0)
Types of blood groups	
“A”	59 (24.6)
“B”	74 (30.8)
“AB”	17 (7.1)
“O”	90 (37.5)
Types of blood donors based on history of past donation	
First-time	24 (10.0)
Repeated	216 (90.0)
Types of blood donors based on sources of donation	
Voluntary	225 (93.8)
Replacement/family	15 (6.3)

Table 2: Blood donors' knowledge regarding blood donation during the COVID-19 pandemic (n=240).

Statement	Correct responses
	Frequency (%)
General knowledge	
Human blood cannot be manufactured artificially	156 (65.0)
There are any patients who need blood transfusion continuously; so, called "transfusion dependent patients"	232 (96.6)
Sources for blood donation*	
Voluntary	238 (99.2)
Family/replacement	180 (75.0)
Remunerated/paid	138 (57.5)
Community replacement	187 (77.9)
Recommended time interval to donate blood by an individual	214 (89.2)
Volume of blood collected during each donation	98 (40.8)
Regular blood donation has medical benefits	208 (86.6)
Donor eligibility criteria	
Eligible age interval for blood donation	181 (75.4)
Minimum body weight for blood donation	130 (54.2)
Normal blood pressure to donate blood	26 (10.8)
Required hemoglobin level for a person to donate blood	16 (6.7)
Donor deferral criteria	
Can donate blood if not feeling well or having a fever?	235 (97.9)
Can donate blood with tattoos, piercings or acupuncture in last six months?	222 (92.5)
Can be infected by receiving blood transfusion?	234 (97.5)
Diseases transmittable by blood transfusion*	
HIV/AIDS	218 (90.8)
HBV	138 (57.7)
HCV	129 (53.8)
Syphilis	95 (39.6)
Malaria	39 (16.3)
Blood donation and COVID-19 pandemic	
Modes of transmission of COVID-19 infection*	
Air borne transmission via direct contact through air borne from the patient while sneezing or coughing	235 (97.9)
Indirect contact through the surfaces or objects infected by the virus through toughing nose, mouth, or eyes	165 (68.8)
Responses to preventive measures for the COVID-19 infection*	
Respiratory hygiene	239 (99.6)
Frequent hand washing	229 (95.4)
Physical or social distancing	179 (74.6)
Stay at home	34 (14.2)
Avoid overcrowded places	112 (46.7)
Avoid touching the eyes, noses, mouth with unwashed hands	50 (20.8)
Possibility of transmission of COVID-19 infection by blood transfusion	179 (74.6)
A constant requirement of blood during COVID-19 pandemic	226 (94.2)
Can donate blood with high risks of COVID-19 infection?	208 (86.7)
Recommended time to donate blood with high risks of COVID-19 infection (n=239)	45 (18.8)
Can donate blood if currently vaccinated with COVID-19 vaccine donate blood?	167 (69.6)
Recommended time to donate blood after COVID-19 vaccination (n=233)	99 (42.5)
Awareness on NBC	
Online website: (www.donatebloodmyanmar.org)	144 (60.0)
Facebook page: National Blood Centre	114 (47.5)
Facebook page: club 1 percent at National Blood Centre	4 (1.7)
Online booking/appointment system for blood donation	228 (95.0)

*Multiple response.

Table 3: Donors' responses on blood donation related to the COVID-19 pandemic (n=240).

Statement	Responses			
	Frequency (%)			
	Yes	No	Do not know	Not sure
Shortage of blood throughout the country due to the COVID-19 pandemic	225 (93.8)	9 (3.8)	6 (2.5)	NA
Concerns about the transmission of the virus when they are going to donate blood during the COVID-19 pandemic	50 (20.8)	190 (79.2)	NA	NA
Safe to donate blood during the COVID-19 pandemic	93 (38.8)	145 (60.4)	2 (0.8)	NA
Willingness to donate blood voluntarily again after four months during the COVID-19 pandemic period	210 (87.5)	1 (0.4)	NA	29 (12.1)

Table 4: Attitude towards blood donation among the blood donors during COVID-19 pandemic (n=240).

Statement	Responses					Mean
	Frequency (%)					
	1	2	3	4	5	
Blood donation can save lives, so it is a noble meritorious conduct	1 (0.4)	0 (0.0)	1 (0.4)	4 (1.7)	234 (97.5)	4.96
Donating blood can be harmful to donors and can disturb normal activities	187 (77.8)	17 (7.1)	16 (6.7)	11 (4.6)	9 (3.8)	4.51
A certificate of honor or appreciation should be given to donors as a motivational factor	23 (9.6)	13 (5.4)	70 (29.2)	60 (25.0)	74 (30.8)	3.62
Blood donation may cause blood insufficiency to donor	171 (71.1)	28 (11.7)	15 (6.3)	15 (6.3)	11 (4.6)	4.39
One should not donate upon request by an unknown person	164 (68.3)	15 (6.3)	25 (10.4)	12 (5.0)	24 (10.0)	4.18
One should encourage others for blood donation	1 (0.4)	2 (0.8)	7 (2.9)	12 (5.0)	218 (90.9)	4.85
Blood donation can lower donor's immunity and can get the infection	129 (53.7)	26 (10.8)	39 (16.3)	23 (9.6)	23 (9.6)	3.90
Blood donor and staff should follow COVID-19 protective measures strictly while collecting blood	1 (0.4)	0 (0.0)	1 (0.4)	3 (1.3)	235 (97.9)	4.96
COVID-19 precautions taken by the NBC are enough for donors' safety	1 (0.4)	5 (2.1)	14 (5.8)	47 (19.6)	173 (72.1)	4.61
Donors should tell the real health status to doctors before blood donation	1 (0.4)	1 (0.4)	1 (0.4)	6 (2.5)	231 (96.3)	4.94
One should inform the NBC if COVID-19 symptoms develop after blood donation	4 (1.7)	0 (0.0)	2 (0.8)	13 (5.4)	221 (92.1)	4.86

According to the five point Likert's scale: 1= completely disagree; 2= somewhat disagree; 3= neither agree nor disagree; 4= somewhat agree; 5= completely agree.

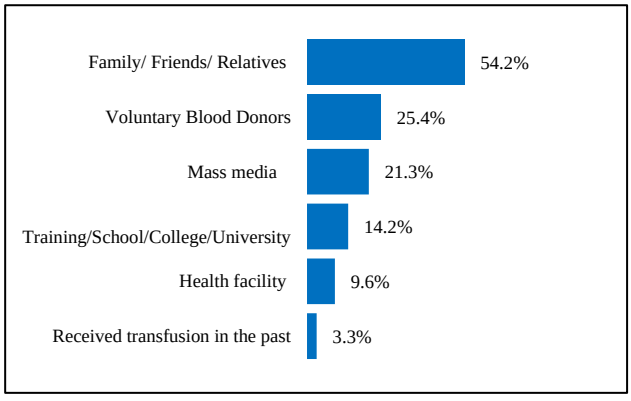

Figure 1: Sources of information about blood donation among the blood donors (n=240).

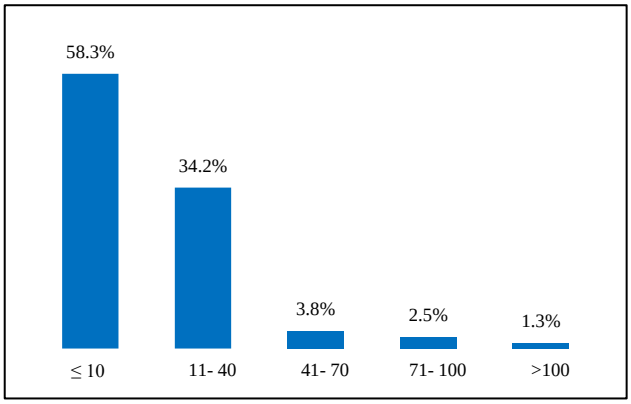

Figure 2: Donation frequency (in times) of the blood donors (n=240).

Table 5: Motivators, deterrents, and preferred choice of place to donate blood among the blood donors during the COVID-19 pandemic.

Statement	Responses Frequency (%)
Motivators of blood donation* (n=240)	
Donating to help others	229 (95.4)
NGOs working for blood donation contacting them	98 (40.8)
Family or friends or relatives who are donors had influence on them	61 (25.4)
When someone they know is in need	43 (17.9)
Their close family member/ friends require blood	28 (11.7)
Patient relative requesting to donate	23 (9.6)
Free health check	11 (4.6)
Shortage during the COVID-19 pandemic has motivated them to donate blood	6 (2.5)
The place of blood donation center is convenient	4 (1.7)
Appeal by a public figure or celebrity	2 (0.8)
Convenient working hours of blood donation center	1 (0.4)
Donors' concerns that deter blood donation (n=240)	
Yes	216 (90.0)
No	24 (10.1)
Deterrents of blood donation* (n=216)	
Restricted movement due to lockdown/ leaving the house	167 (77.3)
Fear of infection while visiting hospitals/ blood bank	146 (67.6)
Being close to other donors	80 (37.0)
Being close to health care professionals (blood collection staff)	72 (33.3)
Donation center being inside the hospital	58 (26.9)
Priorities have changed due to financial crisis	53 (24.5)
Donor motivation is reduced	6 (2.8)
Blood donation camps are not being organized	2 (0.9)
Preferred choice of place to donate blood* (n=240)	
Standalone blood bank	199 (82.9)
Hospital based blood bank	60 (25.0)
Separately in a single room in the blood collection center	41 (17.1)
Any place, ready to donate	35 (14.6)
In a mobile donation unit coming to near residence	14 (5.8)
In a campaign out of the hospital/ blood bank	8 (3.3)
Not sure	5 (2.1)

*Multiple response

All blood donors in this study correctly told their blood groups via counter-checking with donation cards from their answers. Table 2 reveals the knowledge regarding blood donation among donors during the COVID-19 pandemic. Figure 1 depicts their responses on the information source about blood donation. Blood donors' responses on blood donation related to the COVID-19 pandemic are shown in Table 3. The minimum and maximum knowledge scores were 14 and 37. The donors gained the mean score (25.88±4.14) for knowledge questions. Overall, 137 (57.1%) had favorable knowledge, and 103 (42.9%) had unfavorable knowledge.

Table 6: Reasons for not donating blood among the first-time donors and non-regular voluntary donors.

Reasons for not donating blood	Responses Frequency (%)
Among the first-time donors* (n=24)	
Not approached to donate	12 (50.0)
No time to donate blood	9 (37.5)
Lack of information on when, where and how to donate	6 (25.0)
Failing to meet the requirements (age, body weight, blood pressure, hemoglobin, etc.)	6 (25.0)
No one ever asked to give blood	3 (12.5)
Influence from friends/families	2 (8.3)
Fear (needles, feelings, dizzy)	2 (8.3)
Don't like the idea of donation by itself/ don't think about it	2 (8.3)
Lack of opportunity/No need to donate blood	2 (8.3)
Due to COVID-19 Pandemic	1 (4.2)
Fear of contracting infectious disease/I might get infection from giving blood	1 (4.2)
Fear of being tested for infectious diseases	1 (4.2)
Fear of knowing own status	1 (4.2)
Perceptions of not medically fit /unfit to donate	1 (4.2)
Among the non-regular voluntary donors* (n=141)	
Blood donation is time consuming	108 (76.6)
Far from a blood bank	84 (59.6)
Fear of being rejected as a donor	22 (15.6)
Need to donate for friends or relatives in future	21 (14.9)
Parents do not allow	20 (14.2)
Fear of contracting diseases likes hepatitis, HIV, etc.	12 (8.5)
Due To COVID-19 Pandemic	7 (5.0)
Being infected with COVID-19	4 (2.8)
Due to high cost (travel cost, food cost) for blood donation	4 (2.8)
Blood donation causes weakness and fainting	3 (2.1)
Currently working as healthcare providers	2 (1.4)
Hear of being closure of blood bank	1 (0.7)
Working in COVID-19 centers as a volunteer	1 (0.7)
Post COVID-19 vaccination status	1 (0.7)
The fear of needle pricks	1 (0.7)
The frightening sight of blood	1 (0.7)

*Multiple response

Table 4 summarizes the detailed results of attitudes toward blood donation among blood donors during the COVID-19 pandemic with the average item mean score for all attitudinal statements. The donors gained the highest average item mean score (4.96) for two items and

lowest average item mean score (3.62) in one positive statement. The minimum and maximum total attitude scores were 33 and 55. The mean score of the blood donors' attitude was 49.77±0.252. As a result, 142 (59.2%) had favorable attitude, and 98 (40.8%) had unfavorable attitude.

Table 7: Donors' suggestions on current precautionary measures of NBC and effective ways to promote blood donation during the COVID-19 pandemic.

Suggestions	Frequency (%)
On current safety measures (n=240)	
Satisfied with current measures	208 (86.6)
Need of more safety measures	29 (12.1)
Refused to advice	3 (1.3)
Advices on need of more safety precautions in addition to the current measures (n=29)	
To do more strict discipline on preventive measures such as temperature monitoring, and giving a new medical mask at entrance, more disinfection of beds after each donation, and putting more hand sensitizer	19 (65.6)
To and do more space in waiting areas, at reception, and outside the main building for strict social distancing, and limit the daily numbers of donors and determine the donation interval if possible, to avoid overcrowding	6 (20.6)
To assign more staff if possible and monitoring them for obeying disciplines	2 (6.9)
To do health education about personal hygiene and importance of COVID-19 preventive measures to all staff and donors	2 (6.9)
Ways to encourage more people to become blood donors* (n=240)	
Raising the awareness of blood donation such as distribution of pamphlets, billboard advertisements, using Telegram and TikTok, and appeal by social influencer	233 (97.1)
Carrying out educational campaigns on importance of blood donation focusing mainly on youth, with documentary movies, and frequent meeting with regular donors	206 (85.9)
Make blood banks safe and clean zone in line with health protocols for COVID-19, and announce safety precautions taken frequently to publics	143 (59.6)
Increasing the values of incentives via paying travel cost and food cost, free vaccination (e.g., HBV, Flu and COVID-19 vaccine), giving religious books, and allowing photographing in donating areas	83 (34.5)
Increasing blood donation sites such as mobile blood donation system (i.e., truck) in line with health protocols for COVID-19	77 (33.1)
Accessible more blood banks services in private and public hospitals	69 (28.8)
Availability of enquiry services, updated website and Facebook pages, and develop a mobile technology that send reminders to blood-donors when needed	55 (22.9)
Lengthening the operation hours, more skilful staff, assuring maximum confidentiality of donors, and also coordination with local NGOs	43 (17.9)

*Multiple response

Regarding the blood donation frequency, the maximum donation was 132 times. The median was 9 (IQR=3). Figure 2 illustrates the blood donation frequency groups (in times) among blood donors. Based on the blood donation practice, 75 (31.3%) had regular voluntary practice, while 165 (68.7%) had non-regular voluntary practice.

Table 5 shows the motivators, deterrents, and preferred choice of place to donate blood among the blood donors during the COVID-19 pandemic. Most blood donors revealed donating to help others as the most common motivator, restricted movement as the most common deterrent, and the standalone blood bank as the preferred choice of place to donate blood during the COVID-19 pandemic. The reasons for not donating blood among the first-time donors and non-regular voluntary donors are described in Table 6. Table 7 represents the blood donors' suggestions on current precautionary measures of NBC and effective ways to promote blood donation during the COVID-19 pandemic.

Regarding the association between donors' demographic characteristics and their knowledge level regarding blood donation as well as blood donation practice (Table 8), the higher the family income they earned, the more favorable their knowledge. Male donors and who were older age (≥50 years) had donated blood regularly. Donors with favorable knowledge had more regular voluntary practice than unfavorable ones, which was statistically significant. There were weak positive correlations between knowledge (ρ=0.142, p=0.027), attitude (ρ=0.171, p=0.008) scores and blood donation frequency.

Table 8: Association between donors' demographic characteristics and their knowledge level regarding blood donation, as well as blood donation practice (n=240).

Variables	Knowledge level		P value	Blood donation practice		P value
	Frequency (%)			Frequency (%)		
	Unfavorable knowledge	Favorable knowledge		Non-regular voluntary	Regular voluntary	
Age group (years)						
<50	87 (41.6)	122 (58.4)	0.295	153 (73.2)	56 (26.8)	<0.001
≥50	16 (51.6)	15 (48.4)		12 (38.7)	19 (61.3)	
Gender						
Male	59 (44.4)	74 (55.6)	0.614	84 (63.2)	49 (36.8)	0.037
Female	44 (41.1)	63 (58.9)		81 (75.7)	26 (24.3)	
Marital status group						
Single, divorced/ separated, and widow/ widower	60 (46.2)	70 (53.8)	0.271	94 (72.3)	36 (27.7)	0.196
Married	43 (39.1)	67 (67)		71 (64.5)	39 (35.5)	
Education level group						
Up to high school completed	29 (51.8)	27 (48.2)	0.126	35 (62.5)	21 (37.5)	0.249
University student, graduated and above	74 (40.2)	110 (59.3)		130 (70.7)	54 (29.3)	
Average monthly family income group (n=229) (kyats/month)						
≤300,000	29 (61.7)	18 (38.3)	0.013	27 (57.4)	20 (42.6)	0.198
300,001-100,0000	51 (38.1)	83 (61.9)		96 (71.6)	38 (28.4)	
>1,000,000	18 (37.5)	30 (62.5)		33 (68.8)	15 (31.3)	
Knowledge level						
Unfavorable knowledge				82 (79.6)	21 (20.4)	0.002
Favorable knowledge				83 (60.6)	54 (39.4)	

For the qualitative inquiry, three female blood bank specialists of NBC were involved in KIIs; two key informants have served more than 20 years, and the rest one has served more than four years at NBC. Thematic analysis identified five key themes. Each theme was subdivided into subthemes, and these can be summarized as the challenges faced by NBC during the COVID-19 pandemic.

Blood/components supply and demand

Reduced blood supply and demand

The two participants highlighted that the blood supply decreased by about 20% due to the reduction of blood donation during the current pandemic. And they also stated that blood shortage has not happened at the NBC as the demands were also reduced. All doctors mentioned significantly decreased numbers of blood donors, which was due to fear of COVID-19 infection, infected themselves with COVID-19 disease, the lockdown and quarantine process, transport problems during this time, no permission from their guardians, and misinformation about NBC as well as misbeliefs regarding COVID-19 infection related to blood donation. The key informer 2 explained:

"Firstly, the availability of blood and blood components was very reduced obviously, and the amount of collected blood reduced about a fifth (20%). In the past, our NBC collected blood between 8,000 to 10,000 units per month; then, it decreased to about 2,000 units per month. And so blood usage was also very reduced significantly. It was due to carrying out only emergency cases, and the admissions cases were mostly COVID-19 infection cases and also fewer admissions in hospitals during the pandemic".

Difficulty in the availability of COVID-19 convalescent plasma (CCP)

Regarding CCP, all three respondents mentioned their difficulties: not easily accessible modernized materials and machines in the early, and challenges related to potential donors. The key informer 3 said:

"After being investigated the pretest assessment, they were not fit to donate, and we could not request to donate the CCP. In these conditions, the number of CCP might be reduced. Another issue is that the donors might be lost or not come back after the pretest assessment".

Communication and coordination problems with donors

Due to cancelling of donation drives

Before the pandemic, mass donation campaigns were estimated to be about two-thirds more than individual donations. During the current pandemic, to reduce mass gatherings, NBC cancelled the blood donation campaign

programs according to health protocols for COVID-19 prevention. The key informer 2 mentioned:

"After we slightly controlled and restricted the blood supply to the hospitals, they assumed that there may not be enough blood at NBC, so it cannot supply a sufficient amount. Thus, the blood donation campaign requested to donate blood a lot. But, during that time, the rules did not allow organizing a crowd of people, so we banned them and requested them to donate blood individually via booking. If so, there was a problem with misunderstanding in their mind".

Due to changing donor eligibility criteria

During the pandemic, misinformation and rumors of blood shortage at the NBC and many blood donors were urgently needed, which were spread on social media and among the community. Therefore, many people had come to donate blood, causing overstock and making it difficult to handle the massive drives for donations. The key informer 2 highlighted:

"The first reason was that we worried about the blood wastage as it might be unused when many people come to donate blood during this time, causing the overstock. And another reason was if they got an emergency reaction in donors, such as dizziness after blood donation, we might face difficulties in referring them to hospitals because some hospitals stopped functioning then. So, finally, we immediately increased the minimum required body weight assessment to donate blood, i.e., at least 130 lbs. for first-time donors and at least 120 lbs. for repeated donors. Thus, during the current pandemic, at our NBC, increasing the minimum required body weight assessment to donate blood was challenging for us".

Human Resources (HR) of the NBC

Technician shortage causing to stop urgent cross-matching room services' function

This condition, explained by the key informer 2, was:

"Our HR' challenge was that the number of technician staff was significantly decreased, and most of these staff quit. If so, at our NBC, during the current pandemic, the technicians suffered from illness, so our NBC closed and stopped the urgent services for cross-matching. Others services of our NBC functioned and opened daily, but it had been stopped or closed urgent services for cross-matching".

Rules and regulations regarding COVID-19 infection among donors and staff

Weakness in following rules and disciplines

Due to strictly monitoring to follow the rules and disciplines regarding COVID-19 precautionary measures, all donors and some junior staff were concerned about these, and some donors did not worry about the danger of COVID-19. All participants explained this condition. For example, key informer 2 said,

"There were some blood donors who lacked awareness on prevention of COVID-19, and if someone was wearing the masks incorrectly, we explained the correct method. As we explained and counselled repeatedly, they were angry. And then, when they suffered from the flu symptoms, we heard their cough and requested them not to donate blood if they had suffered these symptoms. But they disagreed with our opinions and gave me an excuse. We encountered these things and had trouble understanding explanations and counselling".

Logistic management

During the pandemic, NBC did not encounter big problems with reagents, equipment, and machines. But, the following two were identified.

Delay in arrival of equipment and consumables

Two out of three participants explained this, and key informer 2 highlighted,

"During that time, we tried much for the materials to get continuous and uninterrupted supply; if so, we ordered with DHL Express Company, Myanmar"

Difficulty in scheduling timing between serving for machines and staff duty

All three key informants highlighted it and key informer 1 corroborated,

"We had slight trouble scheduling timing for our staff's duty and outsiders' entry time for repair at our laboratory, i.e., closed room during serving time as the protocol of avoiding closed contact with others during this pandemic".

DISCUSSION

In this study, most of the donors were younger ones, which was in line with the age distribution among donors of WHO.[7] But gender distribution slightly differed from the gender profile of donors of the WHO, as female donors in the present study donated more than others.[7] Among the 240 donors, ABO blood groups of them were consistent with those of the general population of Myanmar.[12] Most donors (90%) were repeated donors, and only one in ten were first-time donors. This data differed from two international studies.[13,14] This difference was because NBC ceased donor recruitment during the current pandemic, as the new donors were concerned about their status regarding blood donation. As this study was conducted in standalone blood blank, voluntary donors (93.8%) largely participated than

replacement or family donors (6.3%), and these differed with donors at the blood center of a tertiary care hospital in south India.[13]

Regarding the general knowledge of blood donation, a knowledge gap was observed in the correct volume of blood collected (<500 ml) during each donation, which was revealed by two-fifths (40.8%) of blood donors in this study, slightly less than that of Myanmar study in 2021.[15] Therefore, the public should be educated more about it. On the donor inclusion and exclusion criteria, in the current study, required minimum weight, needed blood pressure, and lower limit of hemoglobin level for blood donation were known by just over half (54.2%), a minority (10.8%), and a few (6.7%) of them respectively. These were similar to the Myanmar study in 2019.[16] As the facts of these criteria were not fully known by most of the donors, effective information about criteria for blood donation should be promoted to the community.

Nearly all donors of this study acknowledged the risks of infection by receiving blood transfusion, which was higher than that of the local survey in 2019.[16] Regarding transfusion-transmitted infections (TTIs), 16.3% knew malaria, 39.6% corrected syphilis, 53.8% and 57.7% correctly responded to HCV and HBV, respectively. These findings contradicted with those of the Myanmar study in 2021.[15] Therefore, improving the awareness of TTIs among the general population is also more needed. The majority (74.6%) of this study believed that coronavirus transmission via donated blood has not happened, compared to 43.1% of this response in the international study.[13] Almost all (94.2%) accepted the constant requirement of blood during the pandemic, but it was about 52.3% in the international study.[13]

Family or friends or relatives (54.2%), followed by voluntary blood donors (25.4%) and mass media (21.3%), were common sources of information regarding blood donation. But, in one international study, information about blood donation was heard mainly from social media (71.2%), followed by from friends or relatives (58.6%).[17] Therefore, the receipt of information about blood donation from mass media was reduced in this study, so it is necessary to use the mass and social media effectively to promote blood donation.

Of the 240 donors, majority (93.8%) were aware of the blood shortage throughout the country during the pandemic, which was higher than this response of the international study.[13] Nearly a fifth (20.8%) of them had concerns about the risk of infecting COVID-19 when going out to donate blood during the current pandemic, and this finding was less than the result of the Saudi Arabia study.[14] About two-fifths (38.8%) assumed it was safe to donate blood during this pandemic; the finding was lower than that of the international study.[13] The majority, 87.5%, said they would donate blood voluntarily in the future, similar to the community-based study of India and differ from another Indian study.[13,18]

Overall, the current study identified that more than half (57.1%) of the donors had favorable knowledge, slightly more than those of the community-based study of India.[18] Nearly three-fifths (59.2%) had a favorable attitude, similar to the community-based study of India. [18] Almost one out of three had a regular voluntary practice in this study, and the result was similar to the local survey in 2019.[16] As, in this study, voluntary donors who donated regularly were significantly reduced than repeated donors, well-organized plans and policies to mobilize the regular voluntary donors focusing on youth and repeated donors should be done.

On the motivation factors, similar findings were identified in donating to help others, and family or friends or relatives who are donors influenced them in this study and the Qatar study.[17] NGOs working for blood donation contacting them (40%) in this study differed from 7.6% of the Indian study in 2021 and when someone they know is in need (17.9%) which was contrasted with 66.7% of the Qatar study.[13,17] The standalone blood bank was the preferred choice of place to donate blood among this study's donors; this differed from the hospital-based blood bank of the international study in 2021.[13]

Among the 216 blood donors, their deterrents to blood donation were commonly restricted movements (77.3%), followed by fear of infection (67.6%), and being close to other donors (37.0%) and healthcare providers (33.3%). But in the Indian study in 2021, these were fear of infection (64.0%), followed by restricted movements (26.2%).[13] In the Saudi Arabia study in 2021, these were close to other donors (28%), followed by close to healthcare providers (25%).[14] So, it is also necessary to inform the community about COVID-19 preventive measures taken at the NBC and the well-plan for physical distancing among donors, blood collection staff and other medical persons.

In the community-based study in India, knowledge levels were statistically significant among marital status, education status, and employment status.[18] But, this study revealed statistically significant knowledge levels with the average monthly family income group. Young donors less than 50 had more favorable knowledge than those older than 50, but it was not statistically significant.

The qualitative findings highlighted the common challenges encountered at blood bank services during the COVID-19 pandemic. Firstly, reduced blood supply due to a significant decrease in donors was about 20% in the present study. For most blood bank services of Eastern Mediterranean Region and in two other Indian studies, this reduction ranged from 10-75%.[19-21] Although blood shortage has happened in some blood bank services of the international and Indian studies, this shortage did not occur at the NBC as the demands were also reduced.[19,21] NBC also faced the difficulties with CCP's availability like the other blood banks.[20,21]

Secondly, cancellation of blood donation drives had been made in the NBC and other blood banks.[19-21] To counter the blood demands and get sufficient supply, a whole blood donation interval was reduced in some blood bank services of eastern Mediterranean region.[19] However, in this study, NBC changed the donor's selection criteria by increasing the minimum body weight requirement to donate blood. Thirdly, at NBC, some technicians resigned, causing HR shortage, like some blood bank services in India.[20,21]

Fourthly, weakness in obeying the safety precautions of COVID-19 was explored in most donors and some junior staff of NBC, similar to the Indian study.[21] Finally, most reagents and consumables are imported from abroad at the NBC and other bank banks services of developing countries. Increases in wastage and expiration of consumables were observed in Indian studies but not in this study.[20,21]

CONCLUSION

The study results revealed that NBC should raise community awareness by expanding educational programs and giving the correct information timely to the public using mass and social media. Policymakers and blood bank medical directors should have proper plans and policies to mobilize regular voluntary donors, especially youth and repeated donors, and recruit potential donors.

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