

# Historically ignored community-based resource for blood-donation: A potential alternative to blood banks in Bangladesh?

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<b>Keywords:</b>	Bangladesh, Blood, Blood donation, Community-based, blood donors, voluntary nonremunerated blood donors
<b>Abstract:</b>	<p><b>Background:</b> The availability of voluntary nonremunerated blood donors (VNRBD) is a major concern in Bangladesh. There is a substantial paucity of safe blood supply against the expected demand. In this paper, we look at a possible alternative to blood banks in Bangladesh and propose a community-based solution to the country's current blood donation crisis.</p> <p><b>Method:</b> A supervised cross-sectional survey was conducted on 512 participants of religious residential academic institutions in the Jamalpur district in Bangladesh using a self-administered structured questionnaire. A stratified random sampling method was used to select institutions. Descriptive and inferential analyses were performed with statistical significance defined as <math>p &lt; 0.05</math>.</p> <p><b>Results:</b> Over 90% of the participants were students, non-smokers, and aged 18 to 30. The majority (92%) did not ever donate blood to anyone, yet over 42% wanted to be regular donors. More than 80% considered blood donation as a moral responsibility and an Islamic; those who considered blood donation to be an Islamic act were more likely to donate blood to an unknown person (OR: 3.33; CI: 2.02–5.5; <math>p &lt; 0.05</math>). Among the reasons for not donating blood, lack of knowledge (40%), lack of opportunity (20%), thinking it might be harmful to health (21%), being scared of needles (16%), no financial benefit (5.5%) was found. Interestingly, more than 67% do not know their blood group and about 61 % of the respondents said they did not hear or could not remember about any blood donation program. In total, the participants had poor knowledge of general eligibility criteria, but an overall positive attitude towards blood donation.</p> <p><b>Conclusion:</b> This research shows that a large portion of the potential healthy donors is being overlooked although they could be a valuable and massive resource to alleviate the ongoing blood donation crisis.</p>
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Dear Editor-in-Chief  
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We hereby submit a manuscript entitled “*Historically ignored community-based resource for blood-donation: A potential alternative to blood banks in Bangladesh?*” to be considered for publication.

Blood is a crucial healthcare resource as it is linked to saving lives. The task of recruiting voluntary blood donors remains one of the major challenges for any blood transfusion service. Out of 193 WHO Member States, only 62 countries (32%) reported receiving more than 99% of their blood supply through voluntary nonremunerated blood donors (VNRBD). The availability of VNRBD is a major concern in Bangladesh.

This study highlights a big pocket of community being overlooked that would otherwise be a great resource. It also sheds light on the potential areas to address to mitigate the current blood donation crisis. By building community-based models taking into account the young students from religious residential academic institutions, it will be possible to take advantage of this underutilized resource and ensure a regular supply of healthy voluntary donors. Blood donation practice within a local community is also expected to bring meaningful societal cohesion and strengthen communal bonding.

We believe these findings will be of interest to the readers of your journal. We declare that this manuscript has not been published before and is not currently being considered for publication elsewhere. We wish to confirm that there are no known conflicts of interest associated with this publication, and there has been no financial support for this work that could have influenced its outcome.

The authors fulfilled the authorship criteria defined by ICMJE and declared no known conflicts of interest associated with this publication. The manuscript has been read and approved by all the named authors.

We shall be delighted if the submission is decided in our favor.

Sincerely,

Mohammad Sorowar Hossain, PhD  
Scientist and Executive Director  
Biomedical Research Foundation, Dhaka, Bangladesh

# Historically ignored community-based resource for blood-donation: A potential alternative to blood banks in Bangladesh?

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# 1 Abstract:

## 1.1 Background:

The availability of voluntary nonremunerated blood donors (VNRBD) is a major concern in Bangladesh. There is a substantial paucity of safe blood supply against the expected demand. In this paper, we look at a possible alternative to blood banks in Bangladesh and propose a community-based solution to the country's current blood donation crisis.

## 1.2 Method:

A supervised cross-sectional survey was conducted on 512 participants of religious residential academic institutions in the Jamalpur district in Bangladesh using a self-administered structured questionnaire. A stratified random sampling method was used to select institutions. Descriptive and inferential analyses were performed with statistical significance defined as  $p < 0.05$ .

## 1.3 Results:

Over 90% of the participants were students, non-smokers, and aged 18 to 30. The majority (92%) did not ever donate blood to anyone, yet over 42% wanted to be regular donors. More than 80% considered blood donation as a moral responsibility and an Islamic; those who considered blood donation to be an Islamic act were more likely to donate blood to an unknown person (OR: 3.33; CI: 2.02–5.5;  $p < 0.05$ ). Among the reasons for not donating blood, lack of knowledge (40%), lack

of opportunity (20%), thinking it might be harmful to health (21%), being scared of needles (16%), no financial benefit (5.5%) was found. Interestingly, more than 67% do not know their blood group and about 61 % of the respondents said they did not hear or could not remember about any blood donation program. In total, the participants had poor knowledge of general eligibility criteria, but an overall positive attitude towards blood donation.

#### 1.4 Conclusion:

This research shows that a large portion of the potential healthy donors is being overlooked although they could be a valuable and massive resource to alleviate the ongoing blood donation crisis.

## 2 Introduction:

Blood is a crucial healthcare resource as it is linked to saving the lives of patients with accidents, surgeries, bleeding disorders, pregnancy-related complications, inherited/acquired hematological diseases, and malignancies. Globally, about 118.5 million blood units are collected per year, yet the demand exceeds far beyond the existing capacity [1]. Since blood cannot be stored for an indefinite amount of time, a constant source of blood donation is required. According to the WHO, the sustainable approach towards ensuring prompt and effective access to the sources of safe blood and blood products is to develop a nationwide organized blood transfusion program focused on voluntary nonremunerated blood donors (VNRBD) [2]. The task of recruiting voluntary blood donors remains one of the major challenges for any blood transfusion service. Out of 193 WHO

75 Member States, only 62 countries (32%) reported receiving more than 99% of their blood supply  
76 through VNRBD [1].

77  
78 In general, blood banks face multifaceted challenges in resource-limited conditions like rural areas  
79 of Bangladesh. Storage of blood is a big concern due to the unavailability of continuous electricity  
80 supply in many parts of Bangladesh, and similarly in other parts of the world, which can deteriorate  
81 the quality of stored blood leading to wastage. Besides, blood from voluntary donors is difficult to  
82 obtain on short notice on account of poor networking, absence of databases of potential donors,  
83 and transportation. Professional donors often take this opportunity to sell blood as a means of  
84 earning money. These blood sources can be of poor quality in consequence of blood being  
85 frequently sold (often having less than four months interval) or posing a risk of transmissible  
86 infections such as HIV, hepatitis, syphilis, malaria [3]. The blood screening program conducted in  
87 Bangladesh showed that as high as 47% of the blood collected in the year 2000 was from  
88 professional blood donors, and they were found to contain transfusion-transmitted infections  
89 (TTI). The paid donors had a high prevalence of infectious markers such as HBsAg, VDRL, Anti-  
90 HCV, and Anti-HIV [4].

91  
92 In Bangladesh, a major crisis exists in regard to safe blood sources for transfusion because it is  
93 one of the most vulnerable countries in the world in terms of beta-thalassemia patients. The  
94 prevalence of beta-thalassemia carriers could be about 10% of the total population corresponding  
95 to 16 million carriers in Bangladesh. One study estimated that as many as 60,000-70,000 patients  
96 are suffering from thalassemia; about 67% of them are dependent on blood and 41% require blood  
97 transfusion every 2-4 weeks for survival [5]. However, against an expected demand of 800,000

blood units in 2016, about 600,000 blood units were collected, of which only 31% came from voluntary donors [6]. This figure is very poor compared to other countries in South-East Asia such as Thailand, India, and Sri Lanka [6]. In addition, only half of the district health facilities in Bangladesh keep a stock of blood for later use; and almost 41 percent of them are facing a supply shortage [6]. This suggests a general gap between demand for blood and supply.

It is noteworthy that the supply of blood has been exacerbated and hampered due to the COVID-19 crisis [7]. With prolonged lockdown and burdened healthcare, Bangladesh faces an insurmountable challenge to ensure a safe blood supply to critical patients within its existing framework. While the motivation and psychology of blood donors in developed countries are well understood, research surrounding the motivational factors and barriers affecting blood donations in developing countries is scarce. In Bangladesh, most existing blood donation drives heavily rely on various occasions to collect blood from donors. A significant portion of this blood becomes unusable due to inadequate networking to reach the appropriate recipients. A recent review of what motivates people to donate showed that the convenience of a collection site was the key factor among both first-time and repeat donors [8]. Studies show that college-level students, if encouraged and recruited, can be a valuable source of voluntary blood donation with timely access [9–11].

Due to the convenience and availability of a pool of students and teachers eligible for blood donation, it appears that religious residential academic (RRA) institutions or Madrasahs hold the prospect as a viable alternative to blood banks. In Bangladesh, blood donation campaigns are usually held at conventional academic institutions while a large body of religious institutions is

historically ignored. The role of religious motivation could become a key determinant in Bangladeshi communities since religion was found to play a wide influence in people's lives [12,13]. Religious motivation as a charity was found to be effective in Iran, Brazil, and other western countries for donating blood [14–16]. Therefore, in this study, we aimed to fill up the colossal gap in the literature by investigating the knowledge, attitude, and practice (KAP) of residential students and teachers of RRA institutions regarding blood donation. This may lead to the provision of safe, quick, and voluntary blood donation in the country and form the basis for communication strategies and collaborative approaches with religious actors to influence health education as well as to advance the development of humanitarian and social work in their communities.

### **3 Materials and Methods:**

#### **3.1 Study setting**

A cross-sectional study was conducted from June 2018 to December 2018 using a structured questionnaire on the students and teachers in two upazillas (Jamalpur Sadar and Melandha) of the Jamalpur district in the Mymensingh division. Jamalpur is located 140 kilometers northwest of Dhaka and has a population of 2.3 million people according to the 2011 census. In terms of demographic and socio-cultural influences, Bangladesh is fairly homogeneous. For instance, our study environment (Jamalpur) is representative of 33 Bangladeshi districts when it comes to socioeconomic factors [17].

## 3.2 Sampling

A stratified random sampling method was used to select institutions. The inclusion criteria for participants were that they were healthy males with an age range of 16-65 years living in the religious academic residential campuses. In total two strata were considered in this study; sampling clusters (institutions) from each stratum were selected proportional to stratum size. There are 47 private residential religious institutions available in the Jamalpur Sadar and 46 such institutions in Melandha. Assuming 50 students in each religious institution, the study population size is approximately 4650. With a 5% margin of error and a 95% confidence interval for the proportion of adults likely to be a regular blood donor, a minimum of 356 students/individuals needs to be sampled. With a proportional allocation, the minimum numbers of samples for the two strata are as follows- (a) 178 students from religious institutions from Jamalpur Sadar and (b) 178 students from religious institutions from Melandha. To achieve these desired numbers, 10 religious institutes from Jamalpur Sadar and Melandha were selected using a simple random sampling method. To increase the generalizability of the study, a total of 659 respondents were surveyed in the study, of which 147 samples were carefully discarded due to incompleteness and inconsistent response, leaving 512 samples to be used in the final analysis.

## 3.3 Instrument and data collection

The study questionnaire was developed following a review of published studies and consultation with experts, including physicians, public health researchers, and a statistician [18–20]. The questionnaire had 22 questions and was written in Bengali. The printed version of the questionnaire contained two pages. Page one consisted of demographic questions as well as practices regarding

blood donation. Page two assessed the general knowledge about eligibility criteria and attitude of the participants including views on moral responsibility, religious viewpoint, and blood donation as a charity. Based on the 5 items correct answers, a knowledge score was generated scoring each correct answer as 1 and wrong answer as 0, and summing up the total to obtain the final score. The participants' attitudes towards blood donation were, however, assessed using a 5-points Likert scale (strongly agreed, agreed, don't know, disagreed, and strongly disagreed). A team of trained data enumerators administered the questionnaire after obtaining written approval from the respective college authority. Before conducting the surveys, approval was taken from respective participating schools. During the day of the survey, an announcement was made on the campus about the study. Those who were interested in the survey gathered in a hall room to fill up the study questionnaire.

### 3.4 Statistical analysis

Data were entered manually and managed using REDCap electronic data capture tool hosted at BRF. Data were analyzed using SPSS Software Version 25 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to measure central tendency and dispersion (mean, median, and range) and to obtain frequencies and percentages for categorical variables. The missing values for the cases were excluded listwise. Binary logistic regression analyses were conducted, odds ratios and 95% confidence intervals were estimated, and a p-value  $\leq 0.05$  was considered statistically significant.

### 3.5 Ethical consideration

The study protocol was reviewed and approved by the institutional review board of Biomedical Research Foundation, Bangladesh (Ref. no: BRF/ERB/2018/004). Trained enumerators first approached and explained the study purpose and nature to the prospective participants and the study questionnaire was shared or discussed with them. Informed written consent was obtained from all the participants, and confidentiality was maintained during and after the data collection.

## 4 Results:

The majority of the 512 respondents (91%) were students, while roughly 9% were teachers. More than 90% of those who took part in the study were between the ages of 18 and 30, with just a small number over the age of 30. Smoking was not a common practice among the participants, since more than 97% identified themselves as non-smokers. The mean duration of formal education as reported by the respondents was 11.34 (SD of 3.66) (**Table 1**). Despite the educational exposure, about 76% of the respondents did not know about the common blood groups and 67% of them did not know their blood group (**Fig 1**).

**Table 1: Respondent characteristics or background**

Variables	n (%)
<b>Type of respondent</b>	
Students	467 (91.2%)
Teachers	45 (8.8%)
<b>Age</b>	



16-17	27 (5.3%)
18-30	473 (92.4%)
31-40	10 (2.0%)
>40	2 (0.4%)
<b>Years of Education</b>	
Mean (SD)	11.34 (3.66)
Median (IQR)	12 (4)
<b>Smoker</b>	
Yes	12 (2.3%)
No	500 (97.7%)

Among the respondents, about 92% of the respondents said they never donated blood to anyone.

While 27% of the respondents reported that their relatives took blood from someone else, the rest reported that either the relatives did not need a blood transfusion (33.5%), or they were unaware of it (39.6%). This is consistent with the fact that 61% said either they did not hear, or they could not remember about any blood donation program. Furthermore, only 11% responded that they were encouraged by organizations working on blood donation programs. A total of only 22% of respondents reported that they were approached by individuals to donate blood (**Table 2**).

**Figure 1: Percentage of respondents aware of blood groups**

Those who did not donate blood reported diverse types of reasons. About 42% of the respondents reported that they did not know much about blood donation and 20% claimed they wanted to

donate but did not have the chance. Moreover, 42% of the respondents said they had not thought about donating blood, and as many as 21.3% refrained from donation assuming that it might be harmful to health (21.3%). More than 16% were scared of needles, with about 12% mentioning health reasons, 5.5% citing no financial benefit, and the rest 5.5% mentioned other reasons (Fig 2).

**Table 2: Current practice regarding blood donation**

Variables	n (%)
<b>Have you ever donated blood?</b>	
Yes	41 (8.0%)
No	471 (92.0%)
<b>Have you heard of blood donation program?</b>	
Yes	199 (38.9%)
No	313 (61.1%)
<b>Did any organization encourage you to donate blood?</b>	
Yes	61 (11.9%)
No/Don't remember	451 (88.1%)
<b>Did anybody other than an organization encourage you to donate blood?</b>	
Yes	112 (21.9%)
No/Don't remember	400 (78.1%)
<b>Did any of your relatives ever receive blood from others?</b>	
Yes	176 (26.83)
No	220 (33.54)
Don't know	260 (39.63)

**Figure 2: Reasons for not donating blood**

Despite the presence of some fears among the study population, the overall positive attitude was reported by the study takers; the majority of the respondents agreed that blood donation can save a life (89%), blood donation is a charitable act (57%; 34% remained neutral), blood donation was moral responsibility (83%; 12% stayed neutral), and blood donation was an Islamic act (82%; 15% remained neutral) (**Table 3**).

**Table 3: Attitude towards blood donation**

<b>Variables</b>	<b>Strongly Agree n (%)</b>	<b>Agree n (%)</b>	<b>Combined Agree n (%)</b>	<b>Neutral n (%)</b>	<b>Disagree n (%)</b>	<b>Strongly disagree n (%)</b>	<b>Combined disagree n (%)</b>
<b>Opinion</b>							
Blood donation can save a life	294 (57.4)	165 (32.2)	459 (89.6)	32 (6.3)	8 (1.6)	13 (2.5)	21 (4.1)
Donating blood is bad for health	44 (8.6)	45 (8.8)	89 (17.4)	152 (29.7)	136 (26.6)	135 (26.4)	271 (53.0)
<b>Intention towards donation</b>							
Want to donate to unknown person	217 (42.4)	196 (38.3)	413 (80.7)	40 (7.8)	31 (6.1)	28 (5.5)	59 (11.6)
Want to be a regular donor	109 (21.3)	106 (20.7)	215 (42.0)	110 (21.5)	111 (21.7)	76 (14.8)	187 (36.5)
<b>Moral and religious motivation</b>							
Donating blood is a moral responsibility	238 (46.5)	191 (37.3)	429 (83.8)	63 (12.3)	11 (2.1)	9 (1.8)	20 (3.9)
Blood donation is an Islamic act	247 (48.2)	175 (34.2)	422 (82.4)	79 (15.4)	9 (1.8)	2 (0.4)	11 (2.2)

Blood donation is charitable or sadaka	189 (36.9)	104 (20.3)	293 (57.2)	177 (34.6)	33 (6.4)	9 (1.8)	42 (8.2)
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Respondents who considered blood donation to be an Islamic act were more likely to donate blood to an unknown person (OR: 3.33; CI: 2.02–5.5;  $p < 0.05$ ). However, despite the widespread positive attitude about blood donation, 17% believed blood donation can be harmful (29% remained neutral to this question). Although there was a minor level of hesitation regarding blood donation, 80% said they would be happy to donate blood to unknown persons. The most important highlight of the study was that 42% of respondents wanted to be regular blood donors.

Only 0.2% of participants correctly answered the five-item general knowledge questions, while more than 25% were unable to provide any correct response, and 34.6% percent provided only one correct answer (**Fig 3**). Overall, the knowledge regarding blood donation was poor; only 8%, 11%, 16%, and 39% correctly identified the minimum interval required between subsequent donations (4 months), amount of blood to be taken each time (450mL), minimum weight (to be 50 kg), and minimum age (18 years) respectively. Interestingly, 66% correctly identified that blood transfusion could be a means for spreading germs from person to person. (**Table 4**)

**Table 4: General knowledge about blood donation**

Variables	Correct n (%)	Incorrect n (%)	Don't know n (%)
Duration of blood donation (Correct: 4 months)	45 (8.8)	192 (37.5)	275 (53.7)
Minimum age for blood donation (Correct: 18 years)	204 (39.8)	33 (6.5)	275 (53.7)

Minimum weight for blood donation (Correct: 50 kg)	85 (16.6)	79 (15 .4)	348 (68.0)
Every time how much blood taken (Correct: 450 ml)	60 (11.7)	69 (13.5)	383 (74.8)
Germs can be spread through infected blood (Correct: YES)	340 (66.4)	26 (5.1)	146 (28.5)

**Figure 3: Frequency distribution of the respondents based on the knowledge scores regarding five-item general knowledge questions**

## 5 Discussion:

This study explores the status of knowledge, attitude, and practice of students and teachers of residential religious academic (RRA) institutions in Bangladesh towards blood donation. To the best of our knowledge, this study is the first of its kind in Bangladesh that involves RRA institutions to address the currently underutilized resources to mitigate the blood donation crisis and to propose prospects for an alternative community-based blood donation solution.

In our study, an overwhelming majority of the participants did not ever donate blood, yet 42% of them expressed intentions to become regular blood donors. This number is less than what was observed in another survey conducted among the university students in Bangladesh which found about 74% of students showing a positive attitude towards blood donation [21]. This may indicate that blood donation drives targeting students at religious residential academic institutions were insufficient. In fact, our study revealed that the students and the teachers of the RRA institution

were hardly approached for blood donation by any organization. This demonstrates a systematic failure of blood donation campaigns that left out a large body of population capable of donating blood.

The religious academic institutions available in upazillas, villages and local communities offer a viable alternative source of voluntary blood donation service. Since the study participants were healthy males, mostly young and non-smokers, they provide an extra advantage in terms of safety in blood donation. In contrast, women are at higher risk of developing post-blood-donation adversities, and smokers pose the risk of heavy metal concentration (e.g. nickel, lead) in their blood [22,23]. The concentrations of cadmium, lead, and nickel in the blood of smokers and non-smokers were found to be significantly correlated in one study [23]. Another research observed a high concentration of carbon monoxide (CO) in donated blood from smokers [24].

The prime reason for students of RRA institutions not donating blood was the lack of knowledge. This is in line with a study conducted among university students in Tanzania where 36% of the participants did not donate blood due to poor knowledge [9]. Conversely, studies conducted in India and Nigeria showed that the primary reason for the hesitation in blood donation was the fear of pain [18,25]. Interestingly, the Nigerian study also reported that for those who donated, a large number of them did so with the hope of obtaining future hospital benefits such as antenatal registration and saving the lives of relations [25].

An assessment of knowledge regarding blood donation among university students in the USA found that a strong association was present between knowledge and intention of blood donation

[26]. The study also demonstrated that with the increase in knowledge, the blood donation intention also increases for current blood donors [26]. The absence of basic knowledge regarding blood donation was apparent among Bangladeshi Madrasah students. A lack of awareness also led a sizable proportion of participants to conclude that blood donation was potentially harmful. This requires consideration of two factors: (i) the lack of relevant content in the curriculum, and (ii) most blood-donation drives, and campus organizations are based on tertiary (i.e. university) level education.

This study also highlighted that nearly twice the number of students (22%) were approached by individuals other than organizations (12%) for blood donation. This finding might indicate a local demand; however, lack of information regarding blood groups, blood donation process, safety, and health benefits had likely prevented the young students from blood donation. Introduction with the blood donation process and its benefits both for personal health and social welfare can thus remove the common knowledge gap and increase the number of potential donors in a community.

The association of religious motivation and blood donation has been documented by various studies [16,27,28]. One study found that religiosity was more common among regular donors than those who donated only once [14]. Religious motivation towards blood donation among Madrasah students was also evident in our study. This is unsurprising given the fact that RRA institutions are grossly run by public donation and the religious actors are involved in the provision of charitable and social works for centuries [12]. As a country with high religiosity, the everyday life of many Bangladeshis as well as the cultural and social dynamics are directly impacted by religious norms [12]. Since charity remains at the heart of Muslim tradition, it is therefore important to

highlight other forms of charitable and humanitarian works such as blood donation to the concern of religious leaders [13]. Teachers of RRA institutions who are highly respected in a community, and often are the religious leaders (Imam) in prayer can act as a great resource to motivate and mobilize students to donate blood.

Our study has a few limitations and strengths. Due to the cross-sectional nature of the work, attitudes and practices could not be determined over a long period. Additionally, while generating a knowledge score, each question was given the same weight. We were also limited by a small target population focusing on the district. However, since we used a stratified random sample method and Bangladesh is a country with a homogeneous population in terms of language, culture, and demographic factors, therefore, our results are likely to be generalizable to similarly sized district towns in other parts of the country. Given the paucity of literature, we believe that our study would contribute to defining health policies and assisting future studies with more rigorous approaches.

## **6 Conclusion:**

This study highlights a big pocket of community being overlooked that would otherwise be a great resource. It also sheds light on the potential areas to address to mitigate the current blood donation crisis. By building community-based models taking into account the young students from religious residential academic institutions, it will be possible to take advantage of this underutilized resource and ensure a regular supply of healthy voluntary donors. Blood donation practice within a local community is also expected to bring meaningful societal cohesion and strengthen communal bonding.



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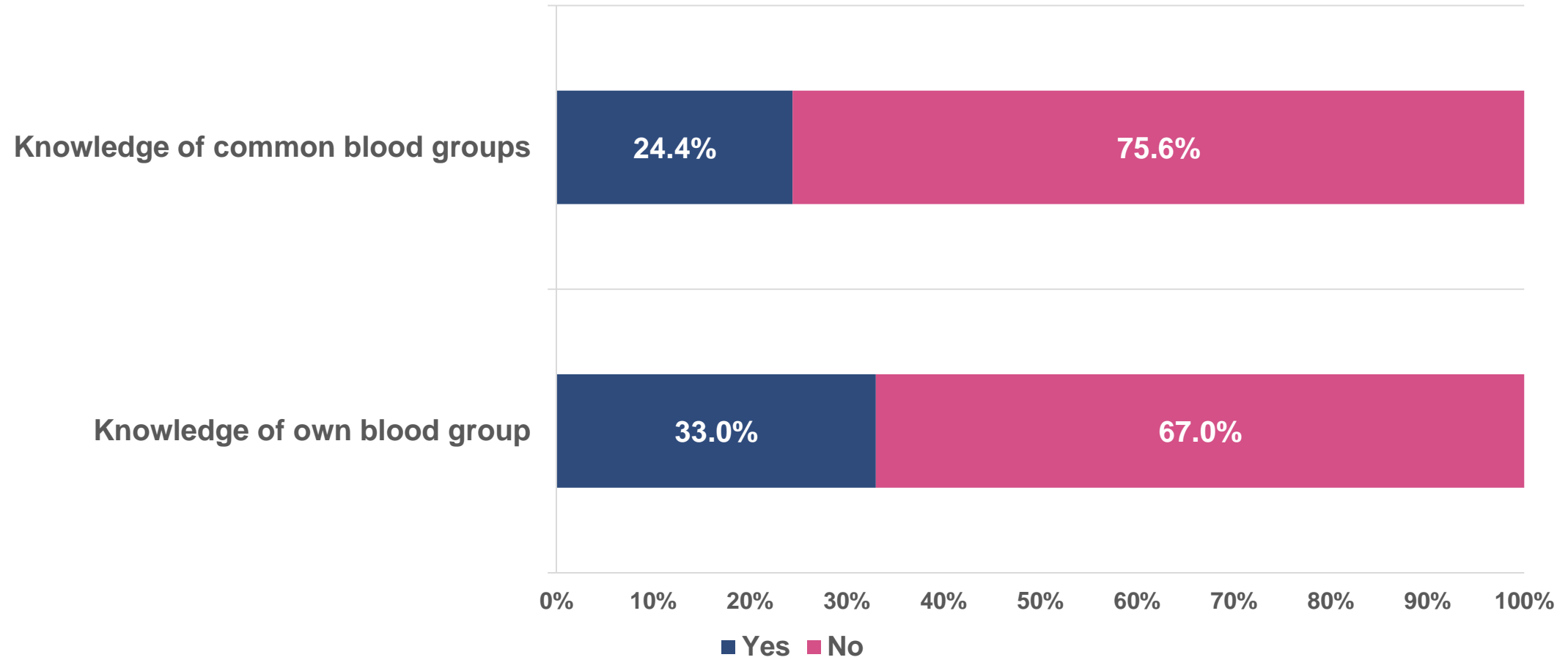
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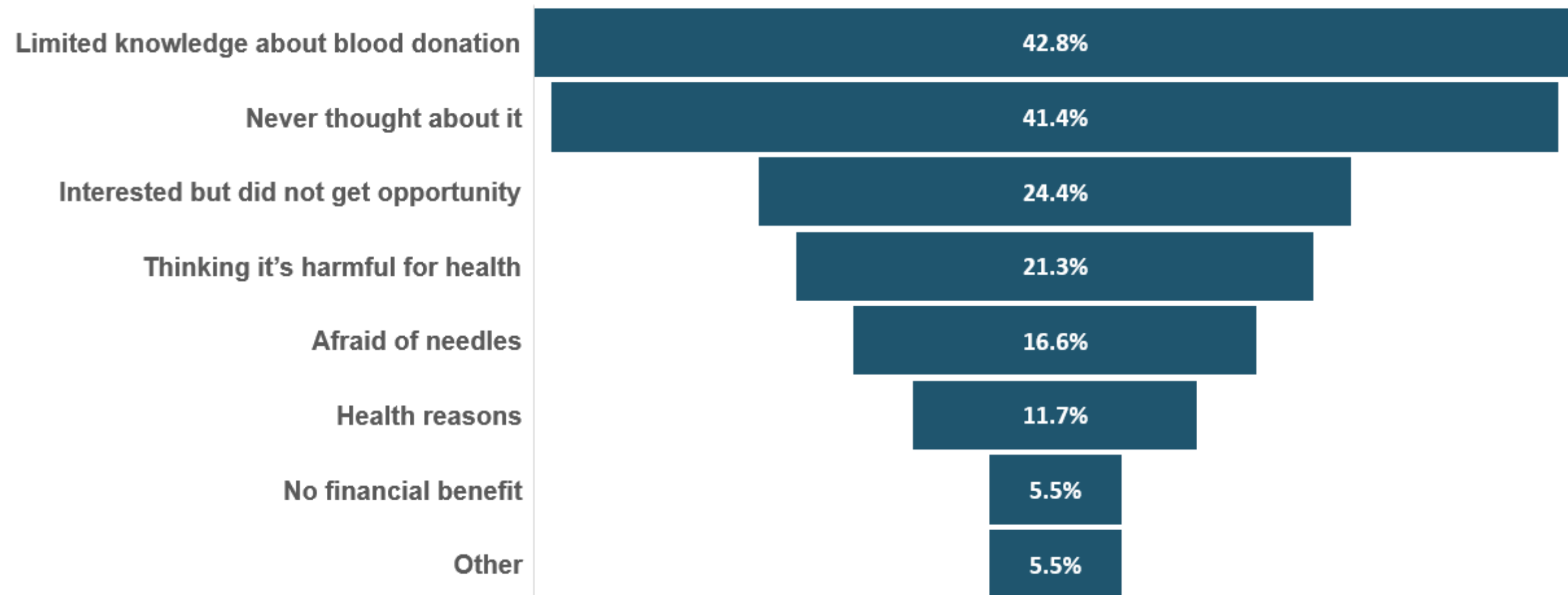


Figure 3

