

Assessing Knowledge, Attitude, Potential Barriers and Analysis of Motivational Factors of Blood Donation among Young Adults in an Endemic Area of Hemoglobinopathies in Saudi Arabia

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ABSTRACT

Background: Blood and blood products are indispensable, lifesaving and essential in all components of healthcare systems globally. Blood (and blood product) transfusion is crucial for both routine and emergency medical practices. The adequacy of blood products is based on a sophisticated strategy for attracting and retaining donors, which is significantly influenced by the motivations that drive them. The success of Saudi Arabia's blood services may rely on understanding the motivational factors and potential barriers to donation among young adults. **Materials and Methods:** A cross-sectional descriptive study, with 773 participants of both genders, was conducted among young adults at Jazan University and Gizan City, Jazan region. The participants were asked to rate the significance of motivational factors and potential barriers that might affect their decision to donate blood in the future through a self-administered questionnaire. **Results:** The current study reported a notably low blood donation rate among young adults in Jazan region. The key potential barriers to the low blood donation rate were attributed to time constraints and being medically unfit, with more than one-third of participants reporting being unqualified/medically unfit. Conversely, the study revealed the primary motivators for blood donation as a sense of duty, religious beliefs and altruism. Furthermore, factor analysis approaches indicated a three-factor solution for blood donor motivation, explaining a total of 75.50% of the variance: understanding factors (31.41%), enhancement and value factors (23.29%) and socio-demographic factors (20.78%). Notably, young men exhibited a higher attitude toward blood donation than young women, despite being outnumbered in the sample. **Conclusion:** The findings revealed a low donation rate due to identified potential barriers such as time constraints and medical eligibility, which need targeted intervention to improve blood donation rates among study participants. Implementing strategies that influence motivational factors, particularly among females, could enhance donor recruitment. The study provides empirical evidence for the necessity of the Voluntary Functions Inventory (VFI) within Saudi Arabian society and highlights the mandatory need for comprehensive education and awareness programs that address all aspects of blood donation.

Keywords: Blood, Donation, Voluntary Functions Inventory (VFI), Motivation, Barriers, Factor analysis, Knowledge, Awareness.

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INTRODUCTION

Blood and blood products are irreplaceable, lifesaving and essential in all hospitals. Blood (and blood products) transfusion is important in routine and emergency medical practices. Blood

transfusion is essential for both routine and emergency medical practices such as transfusion-dependent hematological disorders, including thalassemia and sickle cell disease, bleeding disorders, malignancies and surgical conditions.¹ However, maintaining an adequate blood supply remains a significant challenge globally and particularly in developing regions.² The sole source of human blood and its products is voluntary blood donation and there is no replacement for blood which emphasizes the critical role of public engagement. Healthy blood donors represent a vital source of safe blood supply (free of transfusion-transmitted infectious



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agents) due to their good health condition and enthusiasm.³ The increase in demand for blood has not only been observed in Saudi Arabia but also in many countries worldwide.^{3,4} Moreover, the demand for blood is increasing by 2-3% annually.⁴

The World Health Organization (WHO) has established a policy regarding blood donation to ensure an adequate supply of safe blood due to the increased demand. The WHO has estimated that a minimum of 1% of the population is required to ensure an adequate supply of blood in any nation, which is a fundamental necessity.⁵ Yet, many countries have not achieved the 1% blood donation rate.⁶ The requirement for blood and/or blood products varies from country to country, but these products are in increased demand in many countries due to the high incidence of transfusion-dependent hematological disorders.⁵ Transfusion-dependent disorders are also prevalent in Saudi Arabia, especially in the Jazan region.^{7,8} Developed countries face less burden than developing countries, as their rate of blood donation is 15 times higher than that of developing countries.⁶ However, the recruitment of blood donors is quite challenging around the globe, especially in low- and middle-income countries.⁹ The blood donation process has also been affected by the Coronavirus Disease 2019 (COVID-19) outbreak.¹⁰ The WHO suggests attracting more young people to donate blood to get an adequate supply of blood and its components.⁵ Therefore, understanding the factors impacting blood donation decisions is mandatory to be paved for developing effective recruitment strategies.

Saudi Arabia, in common with many countries, encounters difficulties in maintaining adequate blood supply to meet the growing healthcare demand. Despite notable advancements in blood services, there remains a need to further increase voluntary blood donation within the country. Several previous reports have investigated and highlighted various factors impacting blood donation in Saudi Arabia, including knowledge, attitudes, motivations, beliefs and misconceptions. While some reports found an overall positive attitude toward blood donation,¹¹⁻¹³ other research studies highlighted significant gaps in knowledge and negative attitudes alongside prevalent misconceptions.¹⁴⁻¹⁷ These discrepancies highlighted the need for targeted educational interventions to enhance understanding and address the barriers that may hinder potential donors. Importantly, these factors have not been studied comprehensively in Jazan region. To the best of the authors' knowledge, there was only one study published in 2021 related to this field and it focused mainly on medical students.¹⁸ The situation has not been studied in the local public, especially in an area with endemic hemoglobinopathies, where an adequate blood supply is highly needed.⁸ This raises the need to study the reasons and alternative methods to attract, inspire and engage more blood donors, especially young adults. In

addition, the number of women donating blood in Saudi Arabia is very low.¹⁶ The rate of blood donation among women has been studied in another part of Saudi Arabia,¹¹ but not in the Jazan region. The current study, therefore, aimed to evaluate the knowledge, attitudes, motivational factors and potential barriers related to blood donation among young adults in an area of endemic hemoglobinopathies, Jazan region in Saudi Arabia. This assessment aims to potentially contribute to the development of educational and strategic initiatives.

MATERIALS AND METHODS

Study design and setting

The current cross-sectional study was conducted from October 3, 2022, to October 15, 2022, among students at Jazan University and young adults in Gizan city, Jazan region, Saudi Arabia. The study was composed of closed-ended questions adopted from previous studies.¹⁰⁻¹⁸ The designed questionnaire was validated by a pilot study involving 30 participants to determine the questions' consistency. Experts in the field of transfusion services were also consulted to validate the questionnaire. The validated questionnaire was designed in Google Forms and distributed among students at Jazan University and the city. The responses of the study participants were kept anonymous and confidential.

The self-administered questionnaire consisted of four parts covering participants' demographic information, knowledge, attitude, motivational factors and barriers regarding blood donations. The first part included questions about socio-demographic characteristics. The second part solicited general information on previous blood donation. The third part was composed of questions about attitude toward blood donation and the final part addressed the barriers to and motivation for blood donation. Questions about demographic variables, knowledge and attitude were adopted from available literature and motivational factor domain questions were designed using the Voluntary Functions Inventory (VFI).¹⁹

Target population and sample size

The sample size was estimated with Fischer's formula in single proportion form:

$$N = \frac{(Z_{(1-\frac{\alpha}{2})} + Z_{(1-\beta)})^2 * P * (1 - P)}{d^2}$$

Where, N=sample size, Z=reliability coefficient (Z=1.96 at 5% level of significance), P=Prevalence (assumed to be 50% due to the lack of published information on motivational factors and potential deterrents in Saudi Arabia) and d=absolute precision of 5%, type I error (α) of 0.05 and type II error (β) of 0.2 (power of the test 80%). The sample size was calculated as 762. A total of 773 participant responses were used for the study analysis.

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy

Kaiser-Meyer-Olkin (KMO) value scores range between 0 and 1, with higher values indicating better sampling adequacy. In this study, the overall KMO score achieved was 0.843, confirming the sample size was adequate for the factor analysis conducted.

Ethical considerations

The current study was approved by the Standing Committee for Scientific Research Ethics - Jazan University (reference number REC-44/04/356). The study participants had read, understood and signed the study consent. The study information was confidential. The study was carried out according to the declaration of Helsinki.

Data collection and statistical analysis

Data were collected from individuals who showed interest in participating in the study and gave their consent to complete the questionnaire regardless of their blood donation experience. Statistical computations were carried out with Statistical Package for Social Sciences (SPSS) version 22.0 software (SPSS Inc., IBM, Chicago, Illinois, USA). Data for the qualitative variables are presented as frequencies and percentages. Measures of central tendency, dispersion, skewness, kurtosis, Kolmogorov Smirnov statistics, histograms and Mahalanobis distance were observed to test the univariate and multivariate normality tests. The Chi-square test was used to test the independence of attributes.

Multivariate analysis

A data reduction procedure was applied for exploratory factor analysis to analyze the motives for driving blood donation. The principal component technique was used to extract the factors. Then, the Eigen value criterion was applied for retained factors with a scree plot matrix (unrotated factor matrix). Factors with an Eigen value > 2.5 were included in the analysis.²⁰ Moreover, the factor matrix was then rotated by varimax rotation, which resulted in a simple factor pattern. The results of factor loading correlations $\geq \pm 0.50$ were only considered. Cronbach's alpha test was applied for factors' reliability analysis. p values > 0.05 were considered significant.

RESULTS

Socio-demographic characteristics

The Socio-demographic characteristics including gender, age, nationality, marital status, educational level, field of study and place of living of the study participants are shown in Table 1. The current study involved 773 individuals, of whom 19.9% (154 responses) were men and 80.1% were women (619 responses) ($p < 0.05$). Most of the study participants were students (71.2%) while 28.8% were non-students ($p < 0.05$).

The age of the majority of the study participants was 18-29 years (overall 81.6%; male 78.9% and female 82.1%), followed by 30-39

years (13.3%) ($p > 0.05$) (Table 1). Most of the study participants (97.9%) were Saudis; the difference among male and female Saudi participants was not significant ($p > 0.05$). Overall, 71.2% (male 79.2% and female 69.1%) of the study participants were single and 28.8% (male 20.5% and female 30.9%) were married ($p < 0.05$). Please refer to Table 1 for the distribution of study level, field of study and place of living.

General information of the study participants on previous blood donation

A small portion of the participants (4.8%; $n=37$) responded that they were regular blood donors ($p < 0.05$) (Supplementary Table 1). Similarly, a minute number of participants had a prior history of blood donation ($p < 0.05$). Detailed descriptions of blood donation during the last two years, donation intervals, type of blood donation (voluntary/replacement, etc.), donation site and post-donation effects are noted in Supplementary Table 1.

Knowledge of blood groups and blood donation

All of the study participants indicated that they knew their blood group type, with O+ representing 43.1% and A accounting for 33.8%, followed by other blood group types ($p > 0.05$) (Table 2). Only 7.2% of the study participants indicated the correct volume of blood donation, while the majority selected "do not know" ($p < 0.05$) (Table 2). The sources of information on blood donation were schools and universities at 29.5%, followed by media (TV and radio) at 26%, blood donation campaigns at 24.5% and hospitals at 19.4% ($p < 0.05$) (Table 2). A major portion of the study participants (95.1%) were aware that donated blood can be used to save lives and 84.9% knew someone who had donated before ($p < 0.05$).

Attitude of the study participants toward blood donation

Attitudes toward future blood donation showed a positive trend, as 90% of the study participants showed willingness to donate blood (Table 3). Reluctance to make future blood donations was similar in both genders ($p > 0.05$) (Table 3). In addition, 95% of males and 89.3% of females will donate voluntarily ($p > 0.05$).

Barriers and motivation of blood donation among study participants

Analysis of the data showed that the main reason for not donating blood was not having free time (29.1%), with the same ratio in both genders (male 26.0% vs female 28.6%), followed by being medically unfit (22.3%), other reasons (20.4%), never been asked (15.7%) ($p < 0.05$) and the remaining reasons were fear and misconception representing 12.5% (Supplementary Table 2).

The overall main motivators of blood donation among the study participants were the call (sense) of duty for those in need (40.2% overall), followed by religious motivation (28.8%), the desire to

Table 1: Demographic characteristics of the study participants (n=773).

Characteristics	Total n=773 (100%)	Male n=154 (19.9%)	Female n=619 (80.1%)	*p value
Age (years)				
18-29	631 (81.6%)	123 (78.9%)	508 (82.1%)	0.680
30-39	102 (13.2%)	22 (14.3%)	80 (12.9)	
40-49	35 (4.5%)	7 (4.5%)	28 (4.5)	
50>	5 (0.7%)	2 (1.3)	3 (0.5)	
Nationality				
Saudi	757 (97.9%)	146 (94.8%)	611 (98.7%)	0.147
Non-Saudi	26 (2.1%)	8 (5.2%)	18 (1.3%)	
Marital status				
Single	550 (71.2%)	122 (79.2%)	428 (69.1%)	0.013*
Married	223 (28.8%)	32 (20.8)	191 (30.9%)	
Year of study				
First Year	60 (7.8%)	5 (3.2%)	55 (8.9%)	0.009**
Second Year	60 (7.8%)	13 (8.4%)	47 (7.6%)	
Third Year	93 (12.0%)	25 (16.2%)	68 (10.9%)	
Fourth Year	120 (15.8%)	25 (16.2%)	95 (15.3%)	
Fifth year	26 (3.4%)	10 (6.5%)	16 (2.6%)	
Sixth Year	39 (5.1%)	10 (6.5%)	29 (4.7%)	
Internship	151 (19.3%)	20 (13.0%)	131 (21.2%)	
Not a student	224 (28.8%)	46 (29.9%)	178 (28.8%)	
Field of study				
Health and Medical	319 (41.3%)	80 (51.9%)	239 (38.6%)	0.009**
Science and Engineering	82 (10.6%)	15 (9.8%)	67 (10.8%)	
Religious and Humanities	379 (49.1%)	59 (38.3%)	313 (50.6%)	
Place of living				
City	492 (63.6%)	84 (54.5%)	408 (65.9%)	0.008**
Village	281 (36.4%)	70 (45.5%)	211 (34.1)	

**Highly significant, *Significant, [‡]Chi-square test.

donate to family or friends (14.4%) and then altruism (13.3%) (Supplementary Table 2). In the male population religion was the primary motivator, while in the female population it was the call of duty to those in need ($p < 0.05$) (Supplementary Table 2). Despite these differences, the primary encouragement to donate blood for both groups was the desire to help those in need.

Reliability tests (Cronbach's alpha)

The Cronbach's alpha test was performed to test the reliability of the factors. The value of Cronbach's alpha ranges between 0 and 1, with higher values representing a higher reliability. The current reliability tests showed strong reliability for all the factors (Table 4). Cronbach's alpha for these factors as factor 1 equal to 0.942, factor 2 equal to 0.882 and factor 3 equal to 0.937. The overall reliability value was 0.816 (a strong measure of internal consistency) (Table 4).

Factor analysis

Statements Q9 and Q11 corresponded to the values factor, statements Q14, Q15, Q17 and Q16 corresponded to the social factor, statements Q2 and Q3 corresponded to the understanding factor and statements Q10, Q12, Q7, Q8 and Q1 corresponded to the (Table 4) and the frequency of each factor is shown in Supplementary Table 3. Statements Q4, Q5, Q6 and Q13 were designed to cover reasons as some were not covered by the VFI and for frequency data (Supplementary Table 3).

About 72.9% of the study participants were in support and favor of the statement "My friends donate blood" and rated it as moderately to extremely accurate. About 17% of the study participants were in support and favor of the statement "People I know share an interest in donating blood" and rated it as moderately to extremely accurate and 46.6% of the participants

were in support and favor of the statement “People I am close to want me to donate blood” and rated it as moderately to extremely accurate. These three statements corresponded to the social factor and suggested that most of the donors became blood donors due to social influence from family, relatives, friends and colleagues. Factor analysis was carried out through the principal component axis method. A scree plot was constructed at the Kaiser’s rule (Eigenvalue>2.4). Three factors were extracted at the cut-off Eigenvalue. The first factor had largest Eigenvalue, at 5.340, followed by the second factor at 3.961 and the third factor at 3.533. The remaining factors fell at the bottom of the cut-off Eigen value (Figure 1). The three-factor matrix was then rotated with varimax rotation. Factor loadings greater than 0.5 were considered important. The first factor accounted for 31.414% of the total variance, the second accounted for 23.298% and the third accounted for 20.785% of the total variance. All of these three retained factors explained 75.50% of the total variance.

Factor 1

The first extracted factor was shaped by the correlation between the following variables (statements) Q1, Q2, Q3, Q4, Q5, Q6 and Q7 (Table 4). Variables Q2 and Q3 corresponded to the understanding factor of the VFI. Variables Q1 and Q7 corresponded to the enhancement factor, while other variables including Q4, Q5 and Q6 were linked to the understanding factor. Factor 1 explained the largest proportion of the total variation (31.4%) and that factor was labeled the understanding factor (Table 4).

Factor 2

The second factor comprised the following variables Q8, Q9, Q10, Q11, Q12 and Q13 (Table 4). Variables Q8, Q10 and Q12 corresponded to the value and enhancement factor and variables Q9 and Q11 corresponded to the values factor. Variable Q13 is clearly related to the enhancement factor. The results illustrated that all six variables had factor loadings greater than 0.5. The highest factor loading was 0.902 and the lowest was 0.648. The loadings were arranged in ascending order of a combination of the value factor and enhancement factor of the VFI. The second factor accounted for 23.3% of the total variation and was considered as both value and enhancement, which is termed a merged factor (Table 4).

Factor 3

The final factor, corresponding to the social factor of the VFI, was determined by the correlation between the following variables Q14, Q15, Q16 and Q17 (Table 4). The highest and the lowest loading were 0.948 and 0.789, respectively. The factor was identified as the social factor, representing blood donation as a way to progress and support social ties. Notably, this factor accounted for 20.785% of the total data variation (Table 4).

DISCUSSION

The current study reported a higher number of study participants than other studies in Saudi Arabia.^{11,13-18,21-23} The prevalence of blood donation among young adults who participated in the current study was very low (13.3%) in comparison to a local study (29.0%) in Jazan,¹⁸ national studies (14-45.8%) in Saudi Arabia,²¹⁻²³ and international studies (13.0% in Iraq,²⁴ 15% in

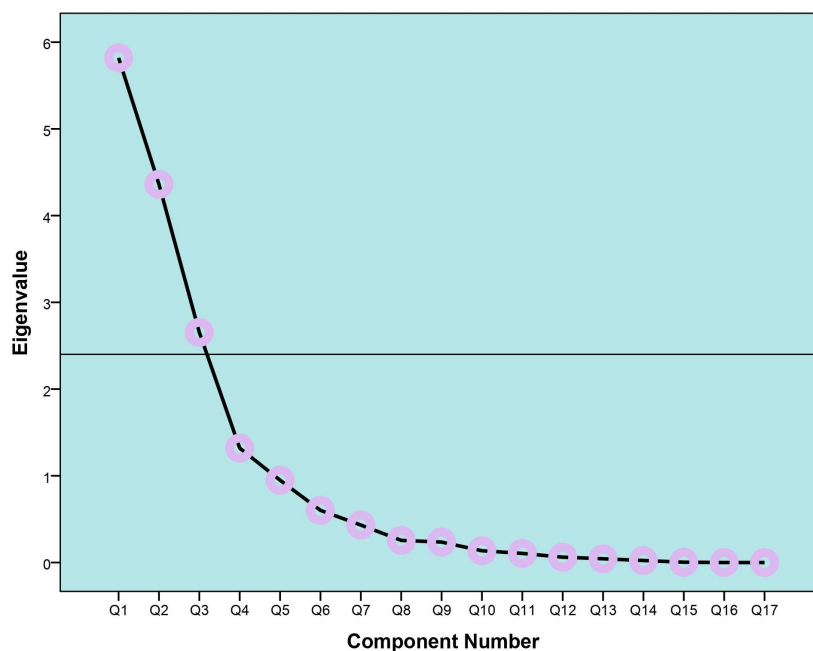


Figure 1: Screen plot of extracted factors.

Table 2: Knowledge of blood group and blood donation among study participants.

Knowledge	Total n=773 (100%)	Male n=154 (19.9%)	Female n=619 (80.1%)	*p value
Blood group/type				
O+	333 (43.1%)	75 (48.7%)	258 (41.7%)	0.508
A+	261 (33.8%)	49 (31.8%)	212 (34.2%)	
B+	68 (8.8%)	13 (8.4%)	55 (8.9%)	
AB+	37 (4.8%)	3 (1.9%)	34 (5.5%)	
O-	40 (5.2%)	8 (5.2%)	32 (5.2%)	
A-	22 (2.8%)	5 (3.3%)	17 (2.7%)	
B-	8 (1.0%)	1 (0.7%)	7 (1.1%)	
AB-	4 (0.5%)	0 (%)	4 (0.7%)	
Volume of blood donation				
100 mL	47 (6.1%)	13 (8.4%)	34 (5.6%)	0.000**
250 mL	34 (4.4%)	17 (11.0%)	17 (2.7%)	
450 mL (correct answer)	56 (7.2%)	38 (24.7%)	18 (2.9%)	
1000 mL	5 (0.7%)	2 (1.3%)	3 (0.5%)	
I do not know	631 (81.6%)	84 (54.6%)	547 (88.3%)	
Can you get a disease from donation?				
Yes	210 (27.2%)	41 (26.6%)	169 (27.3%)	0.031*
No	172 (22.2%)	46 (29.9%)	126 (20.4%)	
I do not know	391 (50.6%)	67 (43.5%)	324 (52.3%)	
Source of information for blood donation				
Media (TV and Radio)	206 (26.6%)	28 (18.2%)	178 (28.8%)	0.031*
School/University	228 (29.5%)	47 (30.5%)	181 (29.2%)	
Blood donation campaign	189 (24.5%)	40 (26.0%)	149 (24.1%)	
Hospitals	150 (19.4%)	39 (25.3%)	111 (17.9%)	
Do you know someone who has donated blood before?				
Yes	656 (84.9%)	145 (94.2%)	511 (82.6%)	0.000**
No	117 (15.1%)	9 (5.8%)	108 (17.4%)	
Do you know that donated blood can save lives?				
Yes	735 (95.1%)	147 (95.5%)	588 (95.0%)	0.549
No	10 (1.3%)	3 (1.9%)	7 (1.1%)	
I do not know	28 (3.6%)	4 (2.6%)	24 (3.9%)	

**Highly significant, *Significant, [‡]Chi-square test.

Nigeria,²⁵ 23.4% in Ethiopia,²⁶ 24% in Greece,²⁷ 24.6% in Iran,²⁸ 29.9% in Tanzania,²⁹ 30.2% in Poland,³⁰ 56% in USA³¹ and 68.6% in Jordan).³² The lower trend of blood donation in the current study and Saudi Arabia compared to other countries could be attributed to many factors, including social and cultural factors and overall public awareness. In addition, these studies were mainly done on medical students, unlike the current study.

Moreover, the percentage of the female participants in this current study was significantly higher than that of the male participants

(80.1% vs 19.9%; $p < 0.0001$) and the overall rate of blood donation among women was low. The rate of blood donation among female participants was 10.0%, similar to other studies conducted in Saudi Arabia.²¹⁻²³ In other studies, the percentage of the female participants was lower than that of the male participants. There are several reasons for the low number of female blood donors including the high prevalence of microcytic hypochromic anemia in Jazan region and across Saudi Arabia among women of reproductive age,³³⁻³⁵ gap in knowledge, misconception and lack of motivation.^{11,36}

However, male participants made up around 46.8% (72 out of 154 responses) of the total participants in the current study, which indicates a high rate of blood donation, similar to the rate reported by Mahfouz *et al.*, (2021) of blood donation among university students in Jazan.¹⁸ Male blood donors are more common than female blood donors in Saudi Arabia¹⁶ and elsewhere.³⁷ Indeed, the percentage of Saudi women who are blood donors is 5%.¹¹ Therefore, the authors of the current study suggest reaching out to the female population and focusing on them to increase the blood supply not only in the Jazan region but all over Saudi Arabia, as they constitute around 50% of Saudi society. In the current study, the number of female participants was 619 out of 773 as compared to 22 out of 391 female participants in a study by Syed *et al.*, (2022),³⁸ 201 out of 468 in a study by Mahfouz *et al.*, (2021),¹⁸ 113 out of 469 in a study by Abolfotouh *et al.* (2014)¹⁶ and similar findings from a study from Jordan.³²

The need for an adequate blood supply is increasing due to the increase in transfusion-dependent blood disorders^{3,4,7,8} and due to COVID-19 outbreak.¹⁰ In addition, the blood is donated by unpaid volunteers under strict donation criteria applied by the WHO to ensure a safe blood supply. Voluntary, unpaid donation is the main goal to be achieved by policymakers. Although only 134 of the study's participants had donated blood before, 82.2% of these (110 out of 134) had made voluntary donations and 23% had donated to relatives. These findings are in line with previous report²⁴ and are better than reported in Nigeria, where the rate of voluntary donations was 3%.²⁵ In addition, >85% of the participants in the current study showed a willingness to donate blood and >90% would donate blood voluntarily. These findings are similar to those in previous studies, which reported similar willingness in Saudi society.¹² The positive attitude toward blood donation has been proposed to be due to the soft nature of the Saudi people and Islamic beliefs.¹² In addition, the positive attitude toward blood donation could be also attributed to the high incidence of hemoglobinopathies in Jazan region; many of these disorders are transfusion-dependent.⁸

The current study showed that the main reasons for not donating blood were being medically unfit, having no time, having never been asked, misconceptions, fear (needle/pain) and no specific reasons. These findings are in agreement with previous reports in Saudi Arabia,^{23,38} Iraq,²⁴ Jordan,³² and India.³⁹ Some of the study participants also indicated a lack of knowledge as a barrier to donating blood, which has been reported by others.^{39,40} In addition, the current study showed that the study participants lacked knowledge of blood donation, as only 7.2% selected the correct volume of blood donation, similar to a previous study.²⁴ Therefore, direct blood donation educational campaigns could be a strategy to educate young adults and attract them to be regular blood donors by eliminating all barriers to blood donation explaining all its health benefits and motivating them.

Motivation is the key tool to be used to attract young adults to donate blood and might encourage them to be regular donors. The current study shows that the call of duty (40.2%), religious belief to help those in need (28.8%), donating to a friend/relative (14.4%) and altruism (13.3%) were the main motivators for blood donation, unlike in other studies in Saudi Arabia, which have reported different motives including money and token gifts.^{12,23} However, these previous studies have also reported that Saudis think that blood donation is a duty, which agrees with the current study.

In this study, all the study participants knew their blood group type, which indicates excellent knowledge. On the other hand, the study participants do not know the volume of blood donation, which suggests poor knowledge, similar to the local study by Mahfouz *et al.*, (2021).¹⁸ However, others have reported fair to excellent knowledge of blood donation in Saudi Arabia.^{21,38} The variation in the study outcomes between our study and Mahfouz *et al.*, (2021) compared to other studies in Saudi Arabia could be due to the framing and types of the questions in each study.¹⁸

Most of the participants in the current study understood that blood can save more than one life and is needed by patients, indicating a positive awareness. In addition, the current study

Table 3: Attitude of the study participants toward blood donation.

General information	Total n=773 (100%)	Male n=154 (19.9%)	Female n=619 (80.1%)	[¥] p value
Are you willing to donate blood in the near future?				
Yes	661 (85.5%)	136 (88.3%)	525 (84.8%)	0.269
No	112 (14.5%)	18 (11.7%)	94 (15.2%)	
I do not know	0 (0)	0 (0)	0 (0)	
Are you ready to donate blood voluntarily?				
Yes	700 (90.6%)	147 (95.5%)	553 (89.3%)	0.020*
No	73 (9.4%)	7 (4.5%)	66 (10.7%)	

*Significant, [¥]Chi-square test.

Table 4: Exploratory factor analysis of blood donation motivation.

Q. No.	Statement	Factor 1	Factor 2	Factor 3	Commonalities
Q2	I can learn how to deal with a variety of people	0.898			0.81
Q5	I think blood donation benefits my own health	0.874			0.80
Q7	Donating blood makes me feel needed	0.872			0.79
Q4	I want to help my school donate more than any other school	0.865			0.76
Q1	Donating blood is a way to make new friends	0.850			0.74
Q3	I can explore my own strength	0.850			0.74
Q6	For me blood donation is primarily a moral duty	0.830			0.73
Q10	Donating blood makes me feel important		0.902		0.82
Q11	I can do something for a cause that is important to me		0.827		0.78
Q9	I am concerned about those less fortunate than myself		0.810		0.66
Q8	Donating blood makes me feel better about myself		0.780		0.61
Q12	Donating blood increases my self-esteem		0.772		0.68
Q13	Donating blood allows me to gain a new perspective on things		0.648		0.52
Q16	Others with whom I am close place a high value on donating blood			0.948	0.90
Q17	People I know share an interest in donating blood			0.948	0.90
Q15	People I'm close to want me to donate			0.923	0.87
Q14	My friends donate blood			0.789	0.69
% of variance explained		31.414	23.298	20.785	-
Eigen value		5.340	3.961	3.533	-
Cronbach's alpha (Reliability test)		0.942	0.882	0.937	-
Cronbach's alpha (Whole system)		-	-	0.816	-

shows that despite their lack of knowledge, they had positive awareness and attitude, which could be the key to minimizing the barriers to blood donation, including misconception, through an education campaign to make young adults participate regularly and voluntarily in blood donation to ensure the adequate blood supply when needed.

A close examination reveals that men donate more than women. The disparity in the numbers could be explained by the fact that men often have higher iron levels than women, making them less likely to have their donation requests declined because of low hemoglobin. Earlier research that was carried out in Norway involved a factor analysis and important factors included those with loadings higher than 0.4.⁴¹ To identify the variables that strongly predicted the motivation for blood donation, a stepwise regression analysis was also carried out. Another study found that motivation plays a significant role in the start and continuation of volunteer work.⁴² These results highlight the significance of looking into the factors that influence blood donation among blood donors to supply the Saudi population with safe and sufficient blood and blood products.

The results of the exploratory factor analysis showed that the understanding factor, value and enhancement factor and the social factor were all important motivators for blood donors.

Interesting results from the investigation included variables that strongly loaded on three factors that were retrieved from the VFI.^{42,43}

Four factors from the VFI were used to develop the questionnaire. The findings of the factor analysis showed a three-factor solution despite the fact the second factor was a merged one. However, it was evident that the VFI structure existed. These findings are similar to previous publications from Zimbabwe.⁴³

The study has limitations like any other study. It is highly recommended to increase the sample size and equal numbers of male and female participants, although the current research had a very high sample size relative to other studies. The possibility of biased answers cannot be ruled out.

CONCLUSION

The outcomes of the current study revealed that young adults in Jazan region have the willingness to be voluntary blood donors, despite their overall fair knowledge of blood donation. The analysis of motivational factors and the potential barriers to planning for educational and awareness programs related to blood donation is highly needed to encourage blood donation in Saudi Society. In addition, the involvement of young adults

especially females in donating blood could be a future strategy to have adequate blood supply.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

VFI: Voluntary Functions Inventory; **WHO:** World Health Organization; **COVID-19:** Coronavirus disease 2019; **SPSS:** Statistical Package for Social Sciences; **KMO:** Kaiser-Meyer-Olkin.

ETHICAL CONSIDERATIONS

The current study was approved by Scientific Research Ethics at Jazan University (reference number REC-44/04/356). The study participants had read, understood and signed the study consent. The study information was confidential. The study was carried out according to the declaration of Helsinki.

SUMMARY

Blood donation has been affected by the Coronavirus Disease 2019 (COVID-19) outbreak. The present study provide evidence for the use of the Voluntary Functions Inventory (VFI) in Saudi Arabian society. The present study demonstrated that young adult donors were motivated mainly by the understanding factor.

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Supplementary Table 1: General information of the study participants on previous blood donation.

General information	Total n=773 (100%)	Male n=154 (19.9%)	Female n=619 (80.1%)	*p value
Are you a regular blood donor?				
Yes	37 (4.8%)	12 (7.8%)	25 (9.0%)	0.051
No	9736 (95.2%)	142 (92.2%)	594 (91.0%)	
Have you donated blood before?				
Yes	134 (13.3%)	72 (46.8%)	62 (10.0%)	0.000**
No	634 (82.7%)	82 (53.2%)	557 (90.0%)	
Type of donation you did before?				
Voluntary	110 (82.2%)	53 (73.6%)	56 (93.3%)	0.08
For Family and Friends	23 (17.2%)	17 (23.6%)	6 (9.7%)	
For license	1 (0.8%)	1 (1.4%)	0 (0%)	
Paid	1 (0.8%)	1 (1.4%)	0 (0%)	
Place of your blood donation?				
In hospitals	89 (66.4%)	52 (72.2%)	37 (59.7%)	0.125
Blood donation campaign	45 (33.6%)	20 (27.8%)	25 (40.3%)	
Post blood donation adverse effect (s)				
Pain	34 (22.1%)	25 (34.7%)	9 (14.5%)	0.007**
Dizziness	85 (55.2%)	36 (50.0%)	49 (79.0%)	
Fever	3 (1.9%)	2 (2.8%)	1 (1.6%)	
No effect	12 (7.8%)	9 (12.5%)	3 (4.8%)	

Highly significant, *Significant, [‡]Chi-square test.Supplementary Table 2: Barriers and motivation of blood donation among study participants.**

Characteristics	Total n=773 (100%)	Male n=154 (19.9%)	Female n=619 (80.1%)	¥p value
Reason for not donating blood				
Lack of knowledge/awareness	21 (2.8%)	8 (5.2%)	13 (2.1%)	0.000**
Misconception (Medically unfit (weight/Hb low)	172 (22.3%)	27 (17.5%)	145 (23.4%)	
Fear (from needle/pain)	54 (7.0%)	12 (7.8%)	44 (7.1%)	
I have no time	225 (29.1%)	40 (26.0%)	183 (29.6%)	
Never been asked	121 (15.7%)	17 (11.0%)	104 (16.8%)	
Others	159 (20.4%)	42 (27.3%)	117 (18.9%)	
Motivation to donate blood?				
Donate to a friend or relative/family	111 (14.4%)	20 (13.0%)	91 (14.7%)	0.000**
to get allowance/paid	7 (0.9%)	3 (1.9%)	4 (0.6%)	
for knowing the condition	18 (2.3%)	2 (1.3%)	16 (2.6%)	
Altruism	103 (13.3%)	11 (7.1%)	92 (14.9%)	
Call of duty for those in need	311 (40.2%)	53 (34.4%)	258 (41.7%)	
Religious	223 (28.8%)	65 (42.2%)	158 (25.5%)	
What encourage you to donate blood?				
To give those in-need	493 (67.8%)	108 (70.1%)	513 (82.9%)	0.000**
To give relative and friends	192 (24.8%)	6 (3.9%)	80 (12.9%)	
Only for emergency conditions e.g. RTA	68 (8.8%)	35 (22.7%)	11 (1.8%)	
Nothing encourages me	20 (2.6%)	5 (3.2%)	15 (2.4%)	

**Highly significant, [‡]Chi-square test.

Supplementary Table 3: Frequency of the Motivation of blood donation among study participants.

Item	Factor	VFI-Motivation	2	3	4	5	6	7	Total
Q2	Understanding	I can learn how to deal with a variety of people	0 (0%)	7 (5.3%)	30 (22.6%)	24 (18.0%)	42 (31.6%)	30 (22.6%)	133 (100%)
Q3	Understanding	I can explore my own strength	3 (2.3%)	14 (10.5%)	21 (15.8%)	81 (60.9%)	8 (6.0%)	6 (4.5%)	133 (100%)
Q1	Enhancement	Donating blood is a way to make new friends	3 (2.3%)	14 (10.5%)	21 (15.8%)	81 (60.9%)	8 (6.0%)	6 (4.5%)	133 (100%)
Q4	Understanding	I want to help my college donate more than any other college	0 (0%)	3 (2.3%)	26 (19.5%)	32 (24.1%)	42 (31.6%)	30 (22.6%)	133 (100%)
Q5	Understanding	I think blood donation benefits my own health	0 (0%)	31 (23.3%)	19 (14.3%)	20 (15.0%)	37 (27.8%)	26 (19.5%)	133 (100%)
Q6	Understanding	For me blood donation is primarily a moral duty	0 (0%)	36 (27.1%)	15 (11.3%)	68 (51.1%)	8 (6.0%)	6 (4.5%)	133 (100%)
Q7	Enhancement	Donating blood makes me feel needed	0 (0%)	0 (0%)	4 (3.0%)	71 (53.4%)	19 (14.3%)	39 (29.3%)	133 (100%)
Q8	Enhancement	Donating blood makes me feel better about myself	0 (0%)	3 (2.3%)	20 (15.0%)	0 (0%)	45 (33.8%)	65 (48.9%)	133 (100%)
Q9	Value	I am concerned about those less fortunate than myself	3 (2.3%)	22 (16.5%)	14 (10.5%)	66 (49.6%)	28 (21.1%)	0 (0%)	133 (100%)
Q10	Enhancement	Donating blood makes me feel important	0 (0%)	39 (29.3%)	39 (29.3%)	55 (41.4%)	0 (0%)	0 (0%)	133 (100%)
Q11	Value	I can do something for a cause that is important to me	0 (0%)	0 (0%)	78 (58.6%)	35 (26.3%)	20 (15.0%)	0 (0%)	133 (100%)
Q12	Enhancement	Donating blood increases my self-esteem	0 (0%)	0 (0%)	63 (47.4%)	35 (26.3%)	35 (26.3%)	0 (0%)	133 (100%)
Q13	Enhancement	Donating blood allows me to gain a new perspective on things	0 (0%)	26 (19.5%)	57 (42.9%)	49 (36.8%)	1 (0.8%)	0 (0%)	133 (100%)
Q14	Social	My friends donate blood	0 (0%)	0 (0%)	36 (27.1%)	41 (30.8%)	38 (28.6%)	18 (13.5%)	133 (100.0%)
Q15	Social	People I'm close to want me to donate	0 (0%)	24 (18.0%)	47 (35.3%)	46 (34.6%)	14 (10.5%)	2 (1.5%)	133 (100%)
Q16	Social	Others with whom I am close place a high value on donating blood	18 (13.5%)	49 (36.8%)	43 (32.3%)	19 (14.3%)	4 (3.0%)	0 (0%)	133 (100%)
Q17	Social	People I know share an interest in donating blood	18 (13.5%)	49 (36.8%)	43 (32.3%)	19 (14.3%)	4 (3.0%)	0 (0%)	133 (100%)

1-Not at all important/accurate, 2-Low importance/accurate, 3-Slightly important/accurate, 4-Neutral, 5-Moderately important/accurate, 6-Very important/accurate, 7-Extremely important/accurate.