

A survey assessing knowledge and attitude about blood donation among blood donors in Jordan

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Abstract

Background: Recruitment of low risk blood donors can be challenging. Efforts should be made to increase the level of awareness and positive attitude towards blood donation. An essential step to achieve this is obtaining comprehensive data about the current situation of awareness, knowledge and attitudes of the population towards blood donation.

Methods/materials: The present study was conducted at two blood donation centres in Amman, Jordan, during 2021. A total of 536 whole blood donors were included. Data regarding their demographic characteristics, blood donation history as well as their knowledge and attitudes regarding blood donation were collected by a questionnaire.

Results: Four hundred ninety participants (91.4%) were males, whereas only 46 participants (8.6%) were females. Ninety seven subjects (18.1%) were first time donors, whereas 431 subjects (81.9%) had previous donations. The participants' median score in the knowledge section was 19.0 points (range 5–25 points). Based on a cut-off of 15 out of 28: 84% of the participants were knowledgeable. Similarly 97% of the participants had a positive attitude based on a cut-off of 17 out of 32 points. Multivariate analysis revealed that high knowledge score was significantly associated with study major and employment status, whereas a positive attitude was significantly associated with a higher income. More than half of first time donors stated lack of awareness as being the reason for not donating blood before.

Conclusion: Measures to improve awareness, knowledge and attitudes towards blood donation should be implemented in order to meet the increasing demand for blood and blood components. Targeted campaigns, correction of some misconceptions and using different motivations are suggested.

Keywords

Blood donors, transfusion medicine, Jordan

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What we already know

- Blood shortage is fairly common in Jordan and developing countries
- A large proportion of blood donations are directed (family replacement) and not voluntary

What this article adds

- Lack of adequate knowledge/awareness and misconceptions are important contributors that limit voluntary blood donations

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- Educational and awareness raising campaigns are urgently needed to increase the percentage of voluntary donors.

Introduction

Blood is a major vital component of human body and safe blood transfusion is essential for improving healthcare and prevention of the spread of infectious diseases.

Despite countless years of studies and rigorous research, it does not seem to be promising that an ideal substitute for blood will be imminently found in the near future.¹ Hence, the human blood donated is currently the sole option for replacement of blood and its various components.²

World Health Organization estimated that 118.5 million blood donations are collected globally, 40% of these are collected in high-income countries, home to 16% of the world's population.³ It also estimates blood donation frequency to be 31.5 donations per 1000 people in high-income countries compared to 5.0 donations per 1000 people in low-income countries.³

In Jordan, the number of blood donations executed in 2023 was approximately 250,000 donations. The frequency per 1000 population is 21.5% which is situated in the middle between high and low-income countries. This number of donations is not adequate to meet the needs of patients as the estimated requirements for patients is approximately 360,000 blood donations per year.

Donors in Jordan are either replacement (e.g. relatives, friends and work colleagues) or voluntary non-remunerated donors. Male donors constitute more than 90% of all donors in Jordan.

Recruiting suitable donors for blood donations remains a challenge in both developed and developing countries.⁴⁻⁶ In view of the fact that voluntary unpaid donors comprise a much safer and a more reliable source of blood for transfusion compared to family replacement donors,^{3,7} efforts towards achieving self-sufficiency in terms of blood units must mainly focus on recruiting and retaining more volunteer donors in place of replacement donors. Several studies have been conducted to address awareness and attitude towards blood donation and suggested measures to enhance recruitment.^{4-6,8-13} Analysis of 20 studies including 8546 subjects concluded that being knowledgeable about blood donation was 2.85 times more likely to result into blood donation.¹⁴

Another study among health professions students including 598 students concluded that despite that 422 students (70.6%) did not take any courses regarding blood donation, 360 students (60.2%) had sufficient knowledge and 502 students (83.9%) showed high willingness to donate.⁹ Taş and Evcı Kiraz¹⁵ found that the rates of blood donation and promoting people to donate blood were significantly higher in students who had received blood donation training compared to those who had not received such training.

It should be noted that results obtained from different studies do not necessarily apply to all populations due to different cultural, educational and socio-economic factors, along with varying perspectives across different populations.

Since reports on blood donation knowledge and attitudes in Jordan are generally lacking,¹⁶ such comprehensive studies are crucial before making any attempts towards growing population awareness and positive attitudes towards blood donation in the country.

This study aims to assess the knowledge and attitudes of Jordanian donors towards blood donation. It also proposes various motivational factors and obstacles affecting the process of blood donation in Jordan. Such information will form a solid base for the attainment of total voluntary blood donations, which are indeed the foundation of a sustainable blood supply.

Materials and methods

Research design. The present research is based upon a cross-sectional, local population-based study which was conducted over a period of time extending from January to February 2021 at two blood donation centres in Amman, Jordan.

Research approach and sampling method. The study includes 536 adult (18 years or older) Jordanian participants. The sample size was determined based on Draugalis and Plaza¹⁷ which was found to be at least 381 participants. The inclusion criteria includes all referred blood donors who are Jordanians and 18 years or older. There were no exclusion criteria.

Data collection method. Ethical approval: This study was approved by the Institutional Review Board at King Hussein Cancer Center (KHCC), Jordan under the numbers: 21KHCC011.

A survey questionnaire (see Supplemental material file questionnaire) was developed based on review of previously published surveys and expert opinions of blood bank staff, and it was pilot tested on 20 participants (5.25% of the intended population) in terms of scope and clarity. The pilot testing showed that no revisions were necessary because the questions were understandable. In general, the process of pilot survey filling went smoothly.

Prior to collecting data, a written informed consent was obtained from the participants.

Data were collected by means of an electronic form through a link sent out to participants at KHCC of whom 112 responded. The participants filled in the survey in the presence of the researchers.

On the other hand, data were collected from participants at Jordan University Hospital (JUH) using a paper-based form by the researchers. This form was an exact replica of the electronic form previously described for the interview. Interviews with the participants lasted for an average of 15–18 min. A total of 424 responses were obtained from JUH.

Most survey questions required fixed-choice responses, though for some items there was the facility for brief text responses. The questions mainly covered four areas: participants' demographic data, their blood donation history, their knowledge about blood donation, along with their attitudes and motivation towards blood donation.

Data analysis method. Data from completed surveys were directly exported into a computer data sheet (Microsoft Excel, Redmond, WA).

The univariate analysis of the data was done using SPSS 25.0 for Windows (IBM Inc. Armonk, NY). This yielded frequencies, corresponding percentages of the whole data, valid percentages, means, medians, standard deviations, as well as minimum and maximum values.

The bivariate analysis of the data was also done using SPSS version 25.0 for Windows. Knowledge was calculated based on 28 questions, in which a correct answer was given a score of 1, and any other answer was given a score of 0, including I do not know. The sum of the scores for each of the aforementioned questions yielded a knowledge total score out of 28 points.

Attitude was calculated based on eight questions. Questions that had four options were given scores of 1, 2, 3 and 4. Questions which had two options were given scores of 1 or 4. A score of 4 was given to the answer with the most positive attitude while a score of 1 was given to the answer with the most negative. The sum of the scores for each of the eight questions yielded an attitude total score out of 32 points.

Knowledge total score, attitude total score and all the questions were correlated to ordinal and scale variables of the questionnaire using Spearman's correlation. The level of significance was considered when $p < 0.05$. Knowledge total score and attitude total score were categorized to scores with a range of five and were then correlated to nominal variables using a Chi-squared test. The level of significance was considered when $p < 0.05$.

Results

The study included 536 participants recruited from blood banks affiliated to JUH and KHCC, Amman, Jordan. Out of the 536 study subjects, 490 of them (91.4%) were males, whereas only 46 of them (8.6%) were females. About 75% of the population were younger than 40. In terms of education, 60.4% of them had a post-high school education. Additionally, 396 of them (74.0%) reported that they have previously done a blood test to know their blood type, but only 376 participants (74.1%) said that their actual blood type matches the one stated in their national identity card.

Ninety seven subjects (18.1%) were first time donors, whereas 439 subjects (81.9%) had previous donations (previous donors). Multiple previous donations (four or more) were observed in more than 50% of previous donors. Among

previous donors, voluntary donation was the most common motivation (66.1%) followed by replacement donation for a family member or a friend (63.6%). The majority of previous donors have not reported to have had any complications post donation (81%).

Among first time donors, lack of awareness and/or having never been asked to donate before were the most common causes for not previously donating (51%). Table 1 summarizes the basic demographics and health characteristics of participants and history of blood donations. Supplementary Figures 1–3 show the causes for previous donations, causes for not previously donating and reported adverse effects post-previous donations, respectively.

Knowledge

Knowledge was assessed based on a calculated result of 28 questions. The sum of the scores for each of the 28 questions yielded a knowledge total score of 28 points. The participants' median score in the knowledge section was 19.0 points, and the mean was 18.7 (range 4–26 points). Using 15 as a cut-off for being knowledgeable 84% of the participants achieved this score or more. Supplemental Table 1 shows the 28 questions and the number and percentage of participants providing the correct answers.

More than half of the participants (53.1%) recognized that there are four major blood types and 75.9% knew that blood groups are genetically inherited. The majority of the participants (93.8%) thought that blood is screened before being given to patients, whereas only (68.6%) of them thought that blood gets processed (to separate different blood components) before being given to patients. Moreover, a significant proportion of the participants (85.6%) acknowledged that hepatitis B and/or C infection affects an individuals' eligibility to donate blood. Upon asking whether patients can only receive blood from their first degree relatives, 484 participants (90.5%) disagreed.

Interestingly, 525 participants (98.1%) agreed that blood donation is safe for donors, and 515 participants (96.3%) agreed that blood donation has positive benefits upon donors' health. Despite the fact that 521 participants (97.4%) agreed that blood units stored in blood banks are safe for use by patients, only 327 participants (61.1%) knew that blood units have an expiry date.

When it comes to blood banks status in Jordan in terms of blood unit sufficiency, 47.5% of the participants thought that blood banks in Jordan were short in terms of blood units, compared to 52.5% who thought blood banks had enough blood units or were not aware of the status, altogether.

Table 2 depicts the association between knowledge score mean and demographics. The findings revealed that the overall knowledge score was not affected by participants' age. However, knowledge was found to be significantly higher among female donors, those with a higher educational level, those with medical or scientific study major, and those

Table 1. Participants' demographics characteristics and health history (n = 536).

Demographic characteristics and blood donation history	Frequency (n)	Percentage (%)
Age (years)		
Less than 20	33	6.2
20–29	227	42.4
30–39	145	27.1
40–49	100	18.7
50–59	29	5.4
Greater than 60	2	0.4
Total	536	
Gender		
Male	490	91.4
Female	46	8.6
Total	536	
Marital status		
Single	270	50.4
Married	266	49.6
Total	536	
Level of education		
Below high school	77	14.4
High school	135	25.2
Diploma	54	10.1
University	232	43.3
Postgraduate	38	7.1
Total	536	
Area of study (major) (if applicable)		
Medical specialties	43	13.1
Scientific specialties	126	38.3
Literature and Humanitarian specialties	141	42.9
Arts	19	5.8
Total	329	
Occupation		
Employed	383	71.5
Unemployed	153	28.5
Total	536	
Monthly income (JDs)		
Less than 200	24	4.5
200–399	133	24.8
400–799	177	33
800–1199	49	9.1
More than 1200	28	5.2
No income	125	23.3
Total	536	
Previous blood donation		
Yes	439	81.9
No	97	18.1
Total	536	
Frequency of previous donations in previous donors		
Once	82	18.9
2–3 times	128	29.4
4–5 times	67	15.4
More than 5 times	158	36.3
Total	435	

(Continued)

Table 1. (Continued)

Demographic characteristics and blood donation history	Frequency (n)	Percentage (%)
Smoking		
Yes	354	66.0
No	182	34.0
Total	536	100.0
Diagnosis of chronic disease		
Yes	36	6.7
No	500	93.3
Vaccination		
Total	536	
Yes	498	92.9
No	38	7.1
Total	536	100.0
Blood type		
A–	21	4.2
A+	166	33.3
B–	5	1.0
B+	50	10.0
O–	25	5.0
O+	195	39.1
AB–	3	0.60
AB+	34	6.8
Total	499	100.0
Previous test for blood type		
Yes	396	73.9
No	140	26.1
Total	536	100.0
Are you sure your actual blood type matches the one listed on your national ID card?		
Yes	376	74.1
No	127	25.2
Total	503	100.0
Blood donation incentives		
Money	51	9.5
Free blood tests	362	67.5
Mobile blood donation caravans	417	77.8
Day off work	361	67.4
How do you think blood donation affects donor's health?		
Positive	516	96.3
Negative	20	3.7
Total	536	100
Do you take care of your health in general?		
Yes	467	87.1
No	69	12.9
Total	536	100.0
Have you ever participated in voluntary activities?		
Yes	355	66.2
No	181	33.8
Total	536	100.0
Has your perspective towards blood donation changed after your first blood donation experience?		
Yes	272	56.4
No	210	43.6

(Continued)

Table 1. (Continued)

Demographic characteristics and blood donation history	Frequency (n)	Percentage (%)
Total	482	100.0
Do you feel satisfied following donating blood if you have previously donated?		
Yes	477	98.8
No	6	1.2
Total	483	100.0
Do you recommend blood donation to your friends and relatives?		
Yes	534	99.6
No	2	0.4
Total	536	100.0
Would you accept receiving blood transfusion if you ever needed to?		
Yes	530	98.9
No	6	1.1
Total	536	100.0
Would you rather get blood from		
From relative	64	12.1
From Any donor	465	87.9
Total	529	100.0

with higher income (p -value < 0.01). Unexpectedly, those who said they were unemployed had a higher mean knowledge score. Table 3 depicts the association between mean knowledge score and health history and attitude towards donation.

Interestingly, donors with a higher level of education recognized more than others that blood units stored in blood banks have an expiry date and that blood banks in Jordan lack sufficient blood units (both with a p -value of < 0.01). In addition, participants who have achieved a higher level of education were more likely to have previously donated blood because they thought it was healthy and in response to blood donation campaigns calling for blood donors through social media (both with a p -value of < 0.01).

More interestingly, participants who have ever participated in voluntary activities in their lifetime were found to achieve higher scores in the knowledge questions (p -value < 0.01).

Our study did not detect a statistically significant difference between first time and previous donors when it comes to the total knowledge score. However, first time donors, who have not donated blood previously because they claimed that they would only do so to replace blood units needed by family members or friends, were more likely to think that blood donors and recipients should be first degree relatives (p -value < 0.01).

Finally, a general linear regression shown in Table 4 shows that only educational study major and employment status as the only significant variables in a multivariate analysis.

Attitude

Attitude was assessed based on a calculated result of eight questions. The sum of the scores for each of the eight questions yielded an attitude total score of 32 points. The participants' median score in the attitude section was 26.0 points, and the mean was 25.7 (range 12–32 points). Using an attitude cut-off of 17 of 32 points as representing a positive attitude, 97% of the participants had a positive attitude.

Tables 5 and 6 depict the associations between the attitude score and the demographics and the health characteristics respectively. Univariate analysis revealed that marital status, employment status, income and previous blood donations were significantly related to a positive attitude towards blood donations. The general linear regression for multiple variables revealed only income to be statistically significant in that those with higher income were more likely to have a positive attitude towards donation (Table 7). Participants' views on blood donation in terms of it being an ethical act, a religious or national duty and a healthy habit are summarized in Table 8.

When it comes to motivational factors, a great percentage of the participants (77.8%) agreed that mobile blood donation caravans roaming around public areas will further motivate them to donate blood, whereas almost two-thirds of them agreed that both getting free blood tests (67.5%) in return for blood donation or getting a day off work (67.3%) will make them more likely to donate blood in the future. On the other hand, about 9.5% of them agreed that receiving monetary compensation in return for blood donation will increase their likelihood of donating blood.

However, older participants were more likely to agree that blood donation is both a national duty and a religious duty (both with a p -value < 0.01). In addition, participants who achieved higher levels of education were more likely to agree that blood donation is both an ethical act and a healthy habit (both with a p -value < 0.01). Interestingly, participants with higher income were more likely to agree that blood donation is an ethical act, a religious duty, a national duty and a healthy habit (p -value < 0.01).

Discussion

Our study showed that the majority of blood donors are males. In Jordan, according to the directorate of blood bank, the proportion of females among blood donors is 6.7%, whereas in our study, females constitute 8.6% of the study population. This is consistent with previous reports from Saudi Arabia and Nigeria.^{10,18} On the other hand, reports from Iceland and Germany showed a more even distribution.^{19,20} Despite the fact that females only comprised 8.6% of our study population, they were more knowledgeable of blood donation in general when compared to males. This can be attributed to the fact that medical-related professions were more common among female donors when compared to male donors (35.6% and 5.5%, respectively).

Table 2. Association between mean knowledge score and demographics.

Demographic	N	Mean knowledge score	p-value
Age			
Less or equal 40	405	18.593	0.246
Above 40	131	19.031	
Gender			
Male	490	18.539	<0.001
Female	46	20.413	
Marital status			
Single	270	18.652	0.767
Married	266	18.748	
Educational level			
Below high school	77	16.883	<0.001
High school	135	17.200	
Diploma	54	19.074	
University	232	19.910	
Post graduate	38	19.790	
University study major			
Medical specialist	43	21.209	<0.001
Scientific specialties	126	20.008	
Literature and humanitarian	141	18.979	
Arts (Music, drawing)	19	17.842	
Employment			
Employed	383	18.321	<0.001
Unemployed	153	19.647	
Income			
Less than 200 JD	24	16.375	<0.001
200–399 JD	133	17.805	
400–799 JD	177	18.672	
800–1199	49	19.510	
More than 1200	28	19.929	
No income	125	19.544	

Only 24.5% of our study population were older than 40 years of age. Older first time donors have not donated previously because of an impression of being ineligible to donate. This highlights the need to raise awareness regarding eligibility criteria for donation.

The rate of first time donors among different populations is variable. Suemng et al.²¹ reported a first time donor rate of 14.3%, whereas Niazkar et al.²² reported 26.5%. In addition, a previous study from Jordan revealed a first time donor proportion of 25.4%.¹⁶ In our present study, about one-fifth (19.4%) of the participants were first time donors.

In our study, more than half of previous donors had four or more previous donations. The most common cause behind previous donations was voluntary donation. This is consistent with previous reports, which found altruism and the wish to help others to be the most common driving force behind blood donation.^{13,23}

It has been reported that proper knowledge of blood donation was indeed an important factor for donating blood. In a study conducted among the Saudi population, Alfouzan¹³ reported that more knowledgeable subjects

tended to donate blood more than those of lower levels of knowledge. Interestingly, first time blood donors in this study who reported not having donated blood before because they would only do so to replace blood units exclusively needed by their family members, were more likely found to believe that blood donors and recipients should be first degree relatives. This indicates that correction of such a misconception may alter donation attitudes among the Jordanian population.

In contrast to studies conducted in Tanzania²⁴ and Nigeria,²⁵ which inferred that voluntary donations were correlated to secondary school education, our study did not detect a correlation between participants' attitude towards blood donation and their corresponding level of education. However, in our study, participants with a higher level of education were found to be more knowledgeable of blood donation in general, as they were found to achieve relatively higher total knowledge scores than those with lower levels of education.

A strong ethical and religious drive was noted among our study population. In accordance with previous studies among

Table 3. Association between mean knowledge score and health history and attitude towards donation.

Health History/Attitude	N	Mean knowledge score	p-Value
Previous blood donation			
Yes	439	18.761	0.473
No	97		18.423
Frequency of previous donations in previous donors			
Once	82	18.5732	0.135
2–3 times	128		18.313
4–5 times	67		18.716
More than 5 times	158		19.291
Certainty of blood type			
Yes	376	18.875	0.112
No	127		18.268
Smoking			
Yes	354	18.322	0.001
No	182		19.434
Diagnosis of chronic disease			
Yes	36	18.917	0.720
No	500		18.684
Vaccination			
Yes	498	18.610	0.046
No	38		19.868
Blood type			
A-	21	19.429	0.993
A+	166		18.693
B-	5		18.400
B+	50		18.820
O-	25		18.480
O+	195		18.667
AB-	3		19.333
AB+	34		18.618
Previous test for blood type			
Yes	396	19.030	0.001
No	140		17.764
How do you think blood donation affects donor's health?			
Positive	516	18.775	0.018
Negative	20		16.750
Do you take care of your health in general?			
Yes	467	18.685	0.817
No	69		18.797
Have you ever participated in voluntary activities?			
Yes	355	19.090	0.001
No	181	17.934	
Has your perspective towards blood donation changed after your first blood donation experience?			
Yes	272	19.1176	0.081
No	210	18.5333	
Would you rather get blood from			
From relative	64	18.328	0.337
From any donor	465	18.804	

Saudis,^{10,13} most participants from our study agreed that blood donation is an ethical act, and both, a religious and a national duty. In fact, in our study, this drive was mainly observed among older participants, as well as those with a higher level of education and a higher income.

A previous report on barriers to blood donation in Jordan¹⁶ revealed that participants having not received blood when needed was the single major barrier affecting blood donation among Jordanians, comprising 78.4% of the participants' answers. This was followed by side effects of blood

Table 4. General linear regression for knowledge score and all significant variables.

Source	F	p
Gender	1.969	0.162
University study major	5.329	0.001
Employment	6.085	0.014
Income	1.105	0.358
Smoking	0.497	0.481
Vaccination	2.694	0.102
Previous blood test	0.441	0.644
Blood donation health effect	3.295	0.070
Participation in voluntary activities	0.003	0.956

F: variation between sample means.

Table 5. Associations between the attitude score and the demographics.

Demographic	N	Mean attitude score	p
Age			
Less or equal 40	405	25.6	0.207
Above 40	131	26.0	
Gender			
Male	490	25.8	0.118
Female	46	24.8	
Marital status			
Single	270	25.2	0.001
Married	266	26.1	
Educational level			
Below high school	77	25.6	0.148
High school	135	25.3	
Diploma	54	25.8	
University	232	25.7	
Post graduate	38	26.8	
University study major			
Medical specialist	43	25.7	0.957
Scientific specialties	126	26.0	
Literature and humanitarian	141	25.8	
Arts (Music, drawing)	19	25.5	
Employment			
Employed	383	25.9	0.002
Unemployed	153	24.9	
Income			
Less than 200 JD	24	23.4	<0.001
200–399 JD	133	25.6	
400–799 JD	177	26.3	
800–1199	49	25.6	
More than 1200	28	26.8	
No income	125	25.1	

Table 6. Associations between attitude score and health characteristics.

Health characteristics	N	Mean attitude score	p
Previous blood donation			
Yes	439	25.8	0.027
No	97	24.9	
Frequency of previous donations in previous donors			
Once	82	25.5	0.480
2–3 times	128	25.8	
4–5 times	67	26.3	
More than 5 times	158	25.7	
Sureness about blood type			
Yes	376	25.7	0.479
No	127	25.5	
Smoking			
Yes	354	25.6	0.663
No	182	25.7	
Diagnosis of chronic disease			
Yes	36	25.2	0.377
No	500	25.7	
Vaccination			
Yes	498	25.7	0.115
No	38	24.8	
Blood type			
A–	21	25.3	0.752
A+	166	25.6	
B–	5	26.0	
B+	50	26.5	
O–	25	25.1	
O+	195	25.6	
AB–	3	26.3	
AB+	34	25.6	
Previous test of blood type			
Yes	376	25.7	0.479
No	127	25.5	
Do you take care of your health in general?			
Yes	467	25.7	0.861
No	69	25.6	
Have you ever participated in voluntary activities?			
Yes	355	25.7	0.773
No	181	25.6	

Table 7. General linear model for attitude score and variables.

Source	F	p
Marital status	3.418	0.065
Employment	0.007	0.934
Income	2.424	0.035
Previous blood donation	3.118	0.078

F: variation between sample means.

extraction (18.8%), having health problems (9.6%) and fear from blood (7.8%). In our present study, lack of awareness regarding blood donation and/or having never been asked to

donate blood before were the predominant barriers (50.9%) to blood donation among first time donors, followed by absence of the need for direct donations to family members

Table 8. Participants' views on blood donation.

View on blood donation	Participants' response (%)				Total(%)
	I strongly agree	I agree	Neutral	I disagree	
Ethical act	72.9	25.0	1.5	0.6	100.0
Religious duty	49.5	34.0	11.8	4.7	100.0
National duty	54.0	34.8	7.1	4.1	100.0
Healthy habit	53.2	38.9	5.8	3.0	100.0

(11.5%), conflict with participants' working hours (11.5%) and fear of the blood donation process in general (7.7%).

It has been previously reported by Thomson et al.²⁶ that 80% of first time donors globally would never return to donate. Therefore, the efficacy of various methods used in attempts to increase the return rate of first time donors was assessed in previous studies. Hashemi et al.²⁷ found that different interventions, including phone reminders, educational and emotional letters, along with motivational meetings, were effective in improving the return rate. In our study, donors would likely return if mobile blood donation units were available in public areas, and if they get free blood tests or a day off work in return for their donation.

On the other hand, monetary compensation was disfavoured as an incentive to blood donation in several previous studies. A study which probed the factors motivating the Nigerian population towards blood donation found that only 13.6% of the respondents would donate blood in return for money.²⁵ Similarly, a study conducted in the United States to assess blood donor attitudes towards various incentives reported that only 30% of the donors would be encouraged to donate if they received cash.²⁸ Data obtained from our study were much in line, as 90.5% of our participants objected donating blood in return for money.

In Jordan, citizens' national identity (ID) card includes holder's blood type. In our study, only 396 participants (74.0%) reported that they have ever undergone testing to know their blood type. Only 70.1% of them reported that their actual blood type matches the one stated on their ID. The reasons for this discrepancy is probably related to the source of the info on the national ID card which is usually the holder him/herself and the issuing government agency does not ask for an official document for the blood group test result. It is well known by medical personnel in Jordan that you cannot rely on it for management. This discrepancy in reporting calls for the need of applying more strict measures to ensure the correct documentation of blood groups on national ID cards. Indeed, knowledge of the distribution of ABO blood groups is essential for safe transfusion of blood in cases of emergency.²⁹

This study has some limitations. One of the main limitations is that this study included participants who are donors at the time of data collection, so that it does not represent the entire population but those who were somehow already motivated to donate blood. In addition, it was conducted

over a short period of time, so there is limitation in representing that period of time only.

Conclusion and suggestions

Blood donation is an essential component of patients care and efforts should be made to increase recruitment of voluntary donors and increase return rate of first donors. Based on our findings among blood donors at JUH and KHCC, we suggest:

- Blood donation awareness campaigns need to target people with least knowledge towards blood donation found in our study, such as the unemployed and those who have not completed their education beyond high school. Programmes, such as school educational courses or school visits to blood banks, are suggested.
- Females comprised only 8.4% of total donors' population. Measures to encourage females to participate should be implemented. Television advertisements or campaigns to target university students or health club members can be of help.
- Correction of misconception or inaccurate information such as that blood units has no expiry date, that blood donors and recipients should be first degree relatives or that blood banks in Jordan had sufficient blood units.
- Consider designing and starting a blood donation motivation scheme. Mobile units, free blood tests and days off work were thought by our study population to increase their likelihood of donation.

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Author contributions

R.O. draft manuscript writing, data collection; Z.A. data collection; S.M.A. data collection; S.Y.A. data collection; S.K. data collection;

I.N. data collection; S.B. data collection; T.A. survey design; K.A. survey review; F.A. conception, survey design; M.S. Conception, design and manuscript editing. All authors: data analysis, final manuscript review, editing and approval.

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Informed consent

Written informed consent was obtained from all subjects before the study.

Trial registration

Not applicable.

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Supplemental material

Supplemental material for this article is available online.

References

1. Lowe KC and Ferguson E. Benefit and risk perceptions in transfusion medicine: blood and blood substitutes. *J Intern Med* 2003; 253: 498–507.
2. Al-Drees AM. Attitude, belief and knowledge about blood donation and transfusion in Saudi population. *Pak J Med Sci* 2008; 24: 74–79.
3. Blood safety and availability. *World Health Organization*, <http://www.who.int/mediacentre/factsheets/fs279/en/> (2020, accessed 15 February 2021).
4. Hollingsworth B and Wildman J. What population factors influence the decision to donate blood? *Transfus Med* 2004; 14: 9–12.
5. Anwer MO, Ul Fawwad SH, Anwer S, et al. Attitude toward blood donation among medical and nonmedical students across Karachi. *Asian J Transfus Sci* 2016; 10: 113–117.
6. Melku M, Asrie F, Shiferaw E, et al. Knowledge, attitude and practice regarding blood donation among graduating undergraduate health science students at the University of Gondar, Northwest Ethiopia. *Ethiop J Health Sci* 2018; 28: 571–582.
7. Addai-Mensah O, Bashiru PA and Dogbe EE. Safety of family replacement donors vs. voluntary non-remunerated donors in Komfo Anokye Teaching Hospital, Ghana: a comparative study. *J Medical Biomed Sci* 2015; 4: 11–16.
8. Al-Asadi JN and Al-Yassen AQ. Knowledge, attitude and practice of blood donation among university students in Basrah, Iraq: a comparison between medical and non-medical students. *Asian J Med Sci* 2018; 9: 62–67.
9. Alsalmi MA, Almalki HM, Alghamdi AA, et al. Knowledge, attitude and practice of blood donation among health professions students in Saudi Arabia; a cross-sectional study. *J Family Med Prim Care* 2019; 8: 2322–2327.
10. Abdel Gader AG, Osman AM, Al Gahtani FH, et al. Attitude to blood donation in Saudi Arabia. *Asian J Transfus Sci* 2011; 5: 121–126.
11. Abolfotouh MA, Al-Assiri MH, Al-Omani M, et al. Public awareness of blood donation in central Saudi Arabia. *Int J Gen Med* 2014; 7: 401–410.
12. Alharbi SH, Alateeq FA, Ahmed IB, et al. Assessment of levels of awareness towards blood donation in Saudi Arabia. *AIMS Public Health* 2018; 5: 324–337.
13. Alfouzan N. Knowledge, attitudes, and motivations towards blood donation among King Abdulaziz Medical City population. *Int J Family Med* 2014; 2014: 539670.
14. Getie A, Wondmieneh A, Bimerew M, et al. Blood donation practice and associated factors in Ethiopia: a systematic review and meta-analysis. *Biomed Res Int* 2020; 2020: 8852342.
15. Taş A and Evci Kiraz ED. Are future doctors ready to donate blood and encourage blood donation? *Transfus Apher Sci* 2018; 57: 569–572.
16. Abderrahman BH and Saleh MYN. Investigating knowledge and attitudes of blood donors and barriers concerning blood donation in Jordan. *Proc Soc Behav Sci* 2014; 116: 2146–2154.
17. Draugalis JR and Plaza CM. Best practices for survey research reports revisited: implications of target population, probability sampling, and response rate. *Am J Pharm Educ* 2009; 73(8): 142.
18. Ugwu AO, Madu AJ, Efobi CC, et al. Pattern of blood donation and characteristics of blood donors in Enugu, Southeast Nigeria. *Niger J Clin Pract* 2018; 21: 1438–1443.
19. Jóhannsdóttir V, Gudmundsson S, Möller E, et al. Blood donors in Iceland: a nationwide population-based study from 2005 to 2013. *Transfusion* 2016; 56: 1654–1661.
20. Chandler T, Hiller J, Peine S, et al. Blood donation and donors: insights from a large German teaching hospital (2008–2017). *Vox Sang* 2020; 115: 27–35.
21. Suemig A, Konerding U, Hron G, et al. Motivational factors for blood donation in first-time donors and repeat donors: a cross-sectional study in West Pomerania. *Transfus Med* 2017; 27: 413–420.
22. Niazkar HR, Dorgalaleh A and Rad F. First-time blood donors are double-edged swords for blood transfusion centers: a retrospective study in Southwest Iran. *Turk J Haematol* 2020; 37: 30–35.
23. Tey YS, Arsil P, Brindal M, et al. Motivation structures of blood donation: a means-end chain approach. *Int J Health Econ Manag* 2020; 20: 41–54.

24. Jacobs B and Berege ZA. Attitudes and beliefs about blood donation among adults in Mwanza Region, Tanzania. *East Afr Med J* 1995; 72: 345–348.
25. Olaiya MA, Alakija W, Ajala A, et al. Knowledge, attitudes, beliefs and motivations towards blood donations among blood donors in Lagos, Nigeria. *Transf Med* 2004; 14: 13–17.
26. Thomson RA, Bethel J, Lo AY, et al. Retention of “safe” blood donors. The retrovirus epidemiology donor study. *Transfusion* 1998; 38: 359–367.
27. Hashemi S, Maghsudlu M, Nasizadeh S, et al. Effective ways to retain first-time blood donors: a field-trial study. *Transfusion* 2019; 59: 2893–2898.
28. Glynn SA, Williams AE, Nass CC, et al. Attitudes toward blood donation incentives in the United States: implications for donor recruitment. *Transfusion* 2003; 43: 7–16.
29. Ur Rehman G. ABO and Rh (D) blood groups distribution in Pakistan: a systematic review. *Forensic Res Criminol Int J* 2020; 8: 237–244.