

	married	48	13.7
	divorced	0	0
	widow	1	0.3
Program	MLT	179	51.1
	Physiotherapy	53	15.1
	Clinical Nutrition	55	15.7
	Radiology	63	18
Study Year	First	97	27.7
	Second	0	0
	Third	90	25.7
	Fourth	100	28.6
	MSCs	35	10
	Internship	28	8

FAMS student`s history of blood donation

We then looked at the history of blood donation in our participants and its association with their gender, program and year of study. The percentage of the previously donated group in (Table 2) was calculated from the total number of donors, and the percentage of each category from non-donation group was calculated based on the total number of non-donors. The donated

group was mostly male students (65.6%), from MLT department (62.4%) who are in their fourth year (31.2%). The difference between the donor and non-donor group was significant in the program of study and study year ($p < 0.05$). Male is more active donors in our university level students compared to female. Also, being in their fourth grade and accessibility to hospital as part of their program made donors mostly from the fourth year.

Table 2: Previously donated blood. Data presented as number and percentage for n=350.

		Previously donated blood				p-value
		Yes (26.5%)		No (73.4%)		
		N	%	N	%	
Gender	Male	61	65.6	83	32.3	0
	Female	32	34.4	174	67.7	
Program	Medical Technology	58	62.4	121	47.1	0.032
	Physiotherapy	15	16.1	38	14.8	
	Clinical Nutrition	9	9.7	46	17.9	
	Radiology	11	11.8	52	20.2	
Study Year	First	15	16.1	82	31.9	0.000
	Second	0	0	0	0	
	Third	18	19.4	72	28	
	Fourth	29	31.2	71	27.6	
	MSCs	20	21.5	15	5.8	
	Internship	11	11.8	17	6.6	

FAMS students' knowledge about blood donation

The knowledge of students was looked at first about their sociodemographic data. Our data shows that 92.3% female and 79% of male students had good knowledge about blood transfusion. Table 3 shows that regardless of the program, all our participants showed good knowledge and the difference between good and poor

knowledge concerning the program was significant ($p < 0.005$). However, 92% of MLT students answered the question correctly, reflecting the best knowledge in transfusion medicine and only 73.5% of physiotherapy students answered 50% or more of the questions correctly. Our statistics in Table 3 show that the % of good knowledge did not majorly differ among third,

fourth, intern year or MSc and ranged from 90%-97%. Only first-year students showed a lower level of knowledge 71% correct responses. The difference between the answers with respect to the study year was statistically significant. The student field of study, particularly, MLT, but not progression in their program

impacted good knowledge in blood transfusion. The statistics in Table 3 show that only 10.9% of poor knowledge students donated blood previously and 89% of them never had that experience. On the other hand, from the good knowledge group, 28.9% donated before and 71% did not have a past donation.

Table 3: FAMS students’ knowledge about blood donation. Data presented as number and percentage for n=350.

Knowledge about blood donation		Poor		Good		P-Value
		N	%	N	%	
Age (M ± SD)		21 ± 2	23 ± 4	P= 0.000		
Gender	Male	30	20.8	114	79	P= 0.000
	Female	16	7.7	190	92.3	
Program	MLT	13	7.3	166	92	P= 0.002
	Physiotherapy	14	26.4	39	73.5	
	Clinical Nutrition	8	14.5	47	85.4	
	Radiology	11	17.4	52	82.5	
Study Year	First	28	28.8	69	71	P= 0.000
	Third	9	10	81	90	
	Fourth	6	6	94	94	
	MSc	1	2.8	34	97	
	Internship	2	7.1	26	92.8	
Donated Blood Before	Yes	5	10.9	88	28.9	P= 0.010
	No	41	89	216	71	

FAMS students’ perception of blood donation

The perception of students was measured by two questions. One-Is blood donation is beneficial for patients. Two-Is blood donation beneficial to society. Table 4 indicated that almost the majority 341 (97.4%) of the FAMS students had good perception towards blood donation with the first questions and the percentage of

students who answered yes, reflecting good perception were statistically significant when answers distributed concerning program of study or year of study(p<0.05). Furthermore, Table 4 shows the student response to question number two and display how almost all students agree with that statement, blood donation is beneficial to society.

Table 4: FAMS students’ agreement to this statement:(A) Blood donation is beneficial to patients, and (B) blood donation is beneficial to society. Data are presented as frequency (n) and percentage (%) for n=350.

Demographic		(A) Blood donation is beneficial to patients				P-value
		Yes (97.4%)		No (2.5%)		
		n	%	n	%	
Gender	Male	141	97.9	3	2.1	0.63
	Female	200	97	6	2.9	
Program	MLT	177	98.9	2	1.1	0.011
	Physiotherapy	52	98	1	1.2	
	Clinical Nutrition	50	91	5	9	
	Radiology	62	98.4	1	1.6	
Study Year	First	97	100	0	0	0.050
	Second	0	0	0	0	

Third	84	93	6	6.6
Fourth	98	98	2	2
MSc	34	97	1	2.8
Internship	28	100	0	0

(B) Blood donation is beneficial to Society

Demographic	Yes		No		p-value	
	N	%	N	%		
Gender	Male	143	40.9	1	0.3	0.231
	Female	206	58.9	0	0	
Program	MLT	178	50.9	1	0.3	0.811
	Physiotherapy	53	15.1	0	0	
	Clinical Nutrition	55	15.7	0	0	
	Radiology	63	18	0	0	
Study Year	First	97	27.7	0	0	0.060
	Second	0	0	0	0	
	Third	90	25.7	0	0	
	Fourth	100	28.6	0	0	
	MSCs	34	9.7	1	0.3	
	Internship	28	8	0	0	

Positive (motivators) and negative (demotivators) for blood donation

As it shows in the Figure 1, most students 93% (% strongly agree + % agree) agreed with the fact that increasing awareness about blood donation would impact donation rates positively. Having a cell phone application that would help in registering donor information and communication with blood donation centre was one of the main reasons that our participants think it would increase the donor rates by 78% of our students. The third main reason FAMS students agreed with by 78% is the impact of increasing the blood donation centres. Almost 55% agrees with having a gift as an incentive for donation and 44% agrees with the having money in return as a positive motivator for donation. Finally, as religious play an important part of our community, we looked at wither viewing blood donation as religious duty may be a motivator to donate and 40% agrees with that statement.

As shown in Figure 2, almost 59% (% strongly agree + agree) agrees with fear of needle as a demotivating cause. Almost 41% of students agree with blood donation can cause anaemia and 36% agrees with blood donation can transmit diseases. Thus, reflecting how much students still have doubts about their safety and patients' safety.

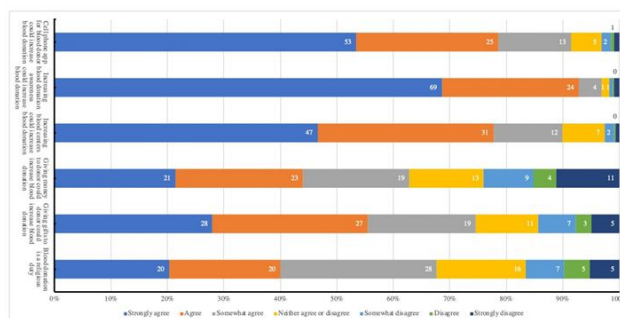


Figure 1: Bar chart showing responses to questions assessing positive attitude (motivators) towards blood donation among FAMS students.

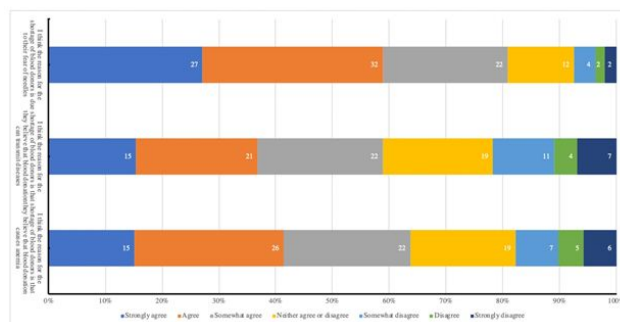


Figure 2: Bar chart showing responses to questions assessing negative attitudes (Demotivators) towards blood donation among FAMS students.

DISCUSSION

The shortage of blood supply in hospitals and blood donation centers may lead to global health problems for recipients. The main reasons for this shortage are associated with the need to recruit donors, and keep them motivated and committed to donating blood for blood transfusions. These factors are affected by the cultural, social, and educational backgrounds of the donors. The young population of university-level students are highly influential [8-10]. Therefore, the present study aimed to analyze their behaviours, knowledge's about, and attitudes toward blood donation and to examine the factors that negatively influenced their willingness to donate blood within their community. The sociodemographic data of our FAMS students shows that the male-to-female ratio in this study was 1:1.4 and their mean age was 22 years; most were students in the MLT department. The remaining students were from the radiology, clinical nutrition, or physiotherapy programs.

We aimed to identify the percentage of students who had previously donated blood, in general, and to determine if their decision was impacted by the speciality area they were studying within FAMS. Our data showed that the number of FAMS students who had previously donated blood was less than 30%; this shows a shortage in number of FAMS students that have participated in blood donations. The majority of these donors were male and were enrolled in the MLT program. It is not surprising to see increased rates of male donors because it correlates with many studies in the literature that have reported high blood donation rates from male donors in different communities [8,11,12]. In the MLT program, the undergraduate and postgraduate courses enable students to be more exposed to blood banks from a clinical, diagnostic, or research point of view, which might have played role in the high rate of previous blood donations from the MLT students in our study. Not only the specialty that the students chose may have affected the number of donors in our study, the students' academic level or progression also impacted donation rates as 31% of our donors were from the fourth year which is the year that students begin their clinical application in the hospital as part of all FAMS program in KAU.

The second part of the study addressed the current awareness of how significant blood transfusions care for patients in need of such a procedure and the community. In general, the FAMS students had a positive response to the question that measured their understanding of the health benefit of blood donation on a recipient's health. Interestingly, only 9 of the 350 FAMS students (2.6%) disagreed with the fact that blood donation is essential for a patient's health. The remaining 341 students acknowledge the health benefits of blood transfusions, particularly on a recipient's health. We found that almost all students agree with importance of blood donation to the society. These data indicates that the majority of the FAMS students are aware of the benefits of blood donations, regardless of their field of study or their academic level. This finding also means that the

reduction in number of donors among FAMS students is not due to the lack of knowledge about its importance of this procedures to persons health or to the community.

We then investigated if the students' age, gender, the program that each student was enrolled in, and their academic year affected their knowledge about donating blood. Our statistical analysis shows that the main factor that contributed to a good level of knowledge about blood donation was the students' field of study within the FAMS. Only 11.1% to 14.9% of the physiotherapy, clinical nutrition, and radiology students had a good level of knowledge about blood donation, in comparison to 47.4% of the students in the MLT program. This could be because students in the MLT program are the only FAMS students that are eligible to work in blood bank laboratories in hospitals or blood donation centres as one of their career options after they graduate, as previously mentioned.

Among the questions that measured positive attitudes toward blood donations, the main factors that FAMS students believed would increase blood donations were increasing the public's awareness about the necessity of blood donations as well the accessibility and availability of blood donation centres. Most of the FAMS students responded positively to the fact that using an application to facilitate access to information about donating blood and registering to do so, would improve the current responses and lessen the need for recruiting donors in Saudi Arabia. Red Cross and Blood Donor Finder applications by Neologix are examples of applications that are available in the market that can facilitate communication with registered donors. The BLOODR application is currently being used by donors, requestors, and administrators to create a communication channel to contact local donors based on matching blood groups to the needs of recipients [13].

Religion is a deeply rooted aspect of life in Saudi Arabia, and there is little doubt how that factor motivates donors, as they believe that donating is a religious duty. The current study emphasizes that point, showing that 40% of all the FAMS students agreed on the importance of blood donation, from a religious perspective. However, 16.6% of the students in the present study did not agree with the fact that blood donation may be a religious act.

Receiving something in return for donating blood was one of the motivational factors that most of FAMS students believed would increase the number of blood donations. Most of the study participants agreed with the idea of giving donors gifts in comparison to paying them for donating blood. Only a minority of students objected to receiving monetary compensation in return for donating blood. In Saudi Arabia, the blood supply has shifted dramatically from using imported blood to paying local donors, and, lately, to complete dependence on the indigenous population, which comprises 71% of all voluntary donors and 29% of all involuntary donors who donate only if a relative, a friend, or co-worker needs a transfusion [9].

Such factors, which measure the students' negative attitudes about blood donations, were discussed in this study. Interestingly, 41% of FAMS students agreed that blood donation could be a predetermining factor for anaemia in donors. According to several studies, blood donation is associated with positive health outcomes. It can lower the risk of cardiovascular disease (CVD) by up to 88% in donors in comparison to non-donors [14,15]. Moreover, repeated donations can ultimately reduce blood viscosity and, potentially, lower blood pressure [16].

In the present study, it is not surprising to find that most of the FAMS students responded yes to a question asking about the relationship between blood donations and transmitting diseases. In Tanzania, and areas where HIV is a common problem, people are, typically, discouraged from donating blood due to the fear of contracting the human immunodeficiency viruses (HIV) [17]. In areas, such as Scotland, where acquired immunodeficiency syndrome (AIDS) is not the main health concern, responders did not express any concerns about transmitting HIV to blood donors [18]. Therefore, it is imperative to identify the main issues that discourage a certain group in our society and correct any misconceptions they have when donor recruitment campaigns occur.

The number of pathogens that can be transmitted in a red blood cell transfusion to recipients was updated recently to include more than 22 viruses, 14 types of bacteria, and six species of protozoa [19]. Fortunately, the number of recipients infected as a result of a blood transfusion is extremely rare; it is 1 in 1.5 million cases for HIV, 1 in 1.1 million cases for hepatitis C virus, and 1 in 282,000 cases for hepatitis B, due to strict adherence to screening tests before donation [20].

Finally, and considering that the mean age of the FAMS students was around 22 years, fear of needles was the main reason that the FAMS students thought caused a low rate of donating blood or blood components.

CONCLUSION

There is a great need to create awareness among of students about blood donations to maintain a regular blood supply. The data we gathered from the FAMS students reflect the baseline level information that our students have about blood transfusions. It shows that the reasons for the low rates of blood donors from FAMS students are not due to lack of knowledge about the necessity of blood transfusions. The negative responses provide a platform for future blood donation awareness campaigns that should help recruit donors and keep them motivated to consistently donate blood.

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COMPETING INTERESTS

All authors declare that they have no competing of interest associated with this publication.

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