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Knowledge, perceptions and practices towards blood donation among undergraduate medical students in an upcountry Ugandan university: A mixed methods study

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ABSTRACT

Background: Due to the different factors affecting the maintenance of a constant supply of human blood in health facilities, this study aimed at exploring the knowledge, perceptions, and practices towards blood donation among under graduate medical students at Busitema University Faculty of Health Sciences (BUFHS).

Methods: Using a convergent parallel mixed methods study design, 384 students were recruited into the study. Questionnaires and focused group discussions were used to collect the data. Stata version 15.0 and thematic analysis were used to analyze quantitative and qualitative data respectively.

Results: Of the respondents, 151 (39.4%) had ever donated blood and 50.4% had good knowledge about blood donation. The commonest motivating factor towards blood donation was "to save someone's life". Factors associated with practices towards blood donation included: religion, year 2 of study and prior blood donation history. Being Jehovah's Witness reduced the willingness to donate blood by 88% compared to other religions. Thematic analysis revealed four themes namely; students' experiences and thoughts, driving forces to donate blood, fears and misconceptions, and suggestions to increase blood donors.

Conclusion: The proportion of undergraduate medical students who had adequate level of knowledge about blood donation was moderately high, however, some of their perceptions towards it were unconventional. To ensure safe and adequate blood supply, design of strategies and tailored programs that promote blood donation is highly recommended..

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Introduction

Secure blood donation and transfusion is a vital element in improving the health of the people and this represses the transmission of infectious diseases worldwide (Al-Asadi & Al-Yassen, 2018; World Health Organization, 2017). Blood donation refers to the process of collecting, testing, preparing, and storing blood and blood components. The World Health Organization (WHO)

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estimates that blood donation by 1% of the total population is normally the lowest required to serve a country's most basic blood (Manikandan et al., 2013; Olivia Ogboghodo, 2015).

Human blood is an important lifesaving component, capable of saving many lives if its availability can be secured. In United States, 44,000 blood donations are needed on daily basis. However the supply of safe blood is still not counting of global demand even when there are combined efforts from the Government and International Agencies such as Red Cross Society and World Health Organization (Anwe et al., 2016).

The demand for blood and blood products depends on the health condition of the patients requiring regular safe blood transfusion such as open-heart surgery, transplant surgeries, cancer treatment, and chronic conditions like sickle cell disease, road traffic accidents, bleeding disorders, and other hematological disorders. All these services require constant blood donation from the donors. However, the major challenge facing blood donation is failure to recruit voluntary and non-remunerated donors which is basically due to knowledge gaps, perceptions and practices among populations (Baig et al., 2013; Manikandan et al., 2013).

People aged between 18 and 65 with a body weight of over 45 kg are allowed to donate blood in Uganda. Within the range of 350 and 450 ml of blood must be given in a single donation. Also to be eligible for blood donation one must have hemoglobin level greater than 12 g/dl for females and 13 g/dl for male (Idris et al., 2023).

Globally, about 13,300 blood centres in 169 countries report collecting a total of 106 million donations every year. Collections at blood centres vary according to income group. The median annual donations per blood centre is 3.2% in the low-income countries, 10.8% in lower-middle-income countries and 23% in upper-middle-income countries, as compared to 63% in high-income countries. There is a marked difference in the level of access to blood between low- and high-income countries (World Health Organization, 2022).

In Africa, 7 million blood donations are needed to meet transfusion requirements every year. Considering the current blood donation rates, only about 5.5 million donations are generated every year across Africa, leaving a deficit of more than 1.5 million. Blood donation has decreased by 17% in Africa according to World Health Organization. Most of the health facilities in the developing countries find it difficult in maintaining constant blood supply to perform different life saving procedures that need blood, due to scarcity of blood donors (Nwabueze et al., 2014).

With Uganda's population estimated at over 45 million, Ugandans were supposed to collect at least 450,000 units of blood annually, but they collect only 300,000 units. To evaluate the factors that influence a person's choice to donate blood and to inform public health campaigns that seek to promote donation, researchers collaborated with Uganda Blood Transfusion Services (UBTS) and the Uganda Red Cross Society (URCS), the primary actors in blood donation in Uganda, to conduct 50 semi-structured in-depth interviews with blood donors and non-donors and 22 key informant interviews with UBTS and URCS staff members. This study discovered some motivations that promote donation, such as altruism, civic duty, and opportunities for disease testing, as well as key deterrents, like fear of needles and blood and ignorance or lack of access to blood donation drives (Murtagh & Katulamu, 2021). Various factors were identified as the factors that hinder blood donation practice. These factors were a perception of being unfit to donate blood, fear of anemia, fear of health risks, and lack of information about blood donation. Additionally, age, gender, religion, knowledge, attitude, educational status, self-perceived health status, and family education were also identified as factors that could affect the practice of blood donation (Shama et al., 2022).

The main reason why large numbers of the potentially suitable populations do not donate blood as expected was not certain in Uganda. The blood donors' knowledge, perceptions and practices were perhaps the reasons for the smaller number of blood donors. Knowledge, perceptions and practices are commonly used as a measure to check various aspects of human behaviour. Therefore by exploring what people know (knowledge), how people interpret and the reasons why they act in a particular way (perceptions) and what they do in actual sense (practices) made the investigator

appreciate the views of the people regarding behaviour and suggest relevant corrective measures (Nair et al., 2020). Thus, the current study was aimed at exploring the knowledge, perceptions, practices and barriers towards blood donation among undergraduate medical students at Busitema University Faculty of Health Sciences in Eastern Uganda.

Materials and methods

Study design

This was a mixed methods study involving both qualitative and quantitative arms employing the convergent parallel design. This method section has been guided using STROBE guidelines (von Elm et al., 2007).

Target population

The study included all undergraduate medical students enrolled for a regular schedule of courses in pursuit of a degree in medicine and surgery, anaesthesia and /or nursing at Busitema University Faculty of Health Sciences (BUFHS).

Study area

The study was conducted at BUFHS, located in Mbale City, found in Eastern Uganda approximately 225 km by road from the capital city, Kampala. Mbale city is bordered by Sironko district to the north, Bududa district to the north east, Tororo district to the south, Manafwa district to the south east, Butaleja district to the south west, Budaka and Butebo districts to the west and Pallisa and Kumi to its north west.

BUFHS is one of the six faculties of Busitema University which started in 2013 and is approximately 220 km by road, north-east of Kampala, and about 75Kms from the University main Campus in Busia. Busitema University is a public university with approximate number of 4,000 students and BUFHS in particular having average number of 500 students offering different undergraduate health courses including Bachelors of medicine and surgery which goes for 5 years, Bachelors of Science in Nursing and Bachelors of Science in Anesthesia which go for 4 years of study. BUFHS also offers Masters Courses in Public health, in Pediatrics and child health, Internal medicine and Infectious diseases epidemiology.

Minimum sample size determination

The study size was calculated using the Leslie Kish formula as below; $N = (Z^2PQ)/d^2$, N = Sample size estimate, Z = Confidence level at 95% (standard value of 1.96), *P* = This study considered a 25% proportion of students using a similar study conducted at the faculty with 95% confidence intervals, acceptance margin error of 5% and non- response rate of 10% (Kisakye et al., 2022). This gave a minimum sample size of 316 participants. To increase the statistical power of the study, the sample size used was raised to 384 participants. All the 384 participants responded to the study.

Sampling strategy

Stratified sampling technique was used to divide the students into strata by their year of study (Year 1, Year 2, Year 3, Year 4, and Year 5). This enabled us to obtain participants from across the different levels of study. Simple random sampling technique was then used to select different respondents from each class by choosing at least 78 students from each year to participate in the study.

Sampling procedure

All students registered in BUFHS were stratified according to their level/ year of study. There are five levels/years of study for the undergraduate programs. Their class representatives were then approached to seek for an appointment to interact with the class members. A class leader of each year introduced the researchers to the students. Upon meeting students, the research objectives were explained and then proceeded with the random selection of participants. All selected participants were then invited to take part in the study following the informed consent process.

Purposive sampling was used in collecting qualitative data using a semi structured interview guide in order to collect rich information from students.

Inclusion criteria

All undergraduate medical students enrolled for a regular schedule of courses in pursuit of a degree in medicine, anesthesia and /or nursing at BUFHS.

Exclusion criteria

Those undergraduate medical students who were not available, the sick and those not willing to participate in the research were excluded from the study.

Variables

The dependent variable was blood donation. The independent variables were knowledge, perceptions, and socio demographic variables like sex, religion, marital status, year of study.

Data collection tools

Quantitative data collection

A structured self-administered questionnaire (Supplementary file 1) adapted from (Melku et al., 2019) consisting of four sections; section one about socio-demographic data, section two relating to knowledge towards the blood donation, section three pertaining practices towards blood donation and section four about perceptions towards blood donation was used to obtain data from participant. The questionnaire contained key questions that addressed the research objectives. The data aimed to address the knowledge, perceptions and practices towards blood donation of the different correspondents. The Socio-demographic section included gender, and religion, and marital status, year of study and study program.

Qualitative data collection

One Focus Group Discussion (FGD) consisting of 7 participants was conducted to collect qualitative data about the perceptions towards blood donation. All participants voluntarily gave informed consent before the start of the discussion. Qualitative data was collected using a semi-structured interview guide (Supplementary file 2). Selection of participants was through class leaders who identified from among their members, participants to join the FGD, which consisted of 7 participants including at least a male, a female, a direct entry student, a diploma entry student and with at least one student from each of the 5 strata. The discussions were conducted in English and moderated by trained research assistants with experience in conducting FGDs. Discussions were audio recorded with participant consent.

Data quality control

Pretesting of questionnaire

The questionnaire was pretested on 10 non BUFHS under graduate medical students from Soroti and Makerere University, to assess the reliability and validity of the questionnaire before data collection of the study. Data was checked, cleaned and sorted. The files were carefully stored to promote confidentiality and avoid theft.

Data storage and management

All questionnaires of the study were checked for completeness of the information to ensure reliability by the researcher and raw data was collected using a hard copy questionnaire and analyzed. The information collected from the respondents was handled with confidentiality and only accessed by the research team; no third party had to access it. For FGD, an audio recorded version of the interview was curated and the recording destroyed after analysis to prevent back track identification of participants.

Data analysis

Quantitative component

Data were analyzed using Stata version 15.0. Categorical data were summarised into frequencies and percentages and continuous data were summarised using measures of central tendency; mean, standard deviation and interquartile ranges. Knowledge about blood donation was scored using the mean of correctly answered questions, where a correct option was awarded one mark, and a wrong option was designated as zero. Scores less than the mean value were considered as poor knowledge while scores greater than the mean value were considered as good knowledge. Factors with a p-value less than 0.25 at bivariable logistic regression analysis and those known to affect willingness to donate blood from literature were put into the multivariable logistic regression model. Statistical significance was set a p-value of <0.05.

Qualitative component

Data obtained from the focus group discussion were transcribed verbatim and saved in word document files. Thematic analysis was then used to analyze the data. The analysis occurred through a five-step process. The first step involved reading through the transcript and becoming familiar with the data. The second step involved organising data in a meaningful way and generating the initial codes. Once the data had been sufficiently coded and saturation reached, themes were identified. Themes were then reviewed and modified, and all data that was relevant to each theme were gathered together. Finally, the themes were defined to identify the real meanings of each theme that had been developed. The data was managed in NVivo 12.0.0 software (QRS International, Cambridge, MA).

Results

Socio demographic characteristics of the respondents

A total of 384 respondents participated in the study. More than half [54.7% (210/384)] of the respondents were males. The majority [85.7% (329/384)] of the respondents were single while most [71.9% (276/384)] reported Bachelor of Medicine and Bachelor of Surgery as their course

of study. Only [39.4% (151/384)] of the respondents had ever donated blood. The different socio-demographic characteristics are shown in Table 1.

Knowledge about blood donation among undergraduate medical students at BUFHS

The mean knowledge score was 23.5, standard deviation ±6.8 ranging from 12 to 37. More than half (50.4%) of the respondents had good knowledge and 49.6% had poor knowledge. Regarding eligibility to donate blood, only 22.7%, 9.6%, 26.3%, 32.8% and 27.6% correctly identified the minimum age (18 years), maximum age (65 years), minimum weight (45 kgs), maximum volume of blood that can be donated (450mls) and minimum interval between subsequent donations (3 months) respectively. More than half (60.2%) reported Blood group O as the most common blood group. Majority (70.8%) reported that pregnant women can't donate blood, 40.1% didn't know whether smokers can donate blood and 71.6% reported that a person with low blood pressure can't donate blood. Other variables are shown in Table 2.

Practices of undergraduate medical students at BUFHS about blood donation

Majority (81.8%) of the respondents reported that they were willing to donate blood. 58.9% of the respondents reported a feeling of satisfaction after donation. More than half (54.2%) of the respondents were willing to be regular donors. The reasons for not donating blood ranged from being medically unfit to other reasons as shown in Table 3.

Association between practices towards blood donation and socio-demographic characteristics

Factors associated with practices towards blood donation included: Religion; Jehovah's Witness (Adjusted Odds Ratio (AOR) of 0.2, 95% Confidence Interval (CI): 0.02–0.9), and Year 2 of

Table 1. Socio-demographic characteristics of the respondents.

Variable (n = 384)	Frequency (n)	Percentage (%)
Gender		
Male	210	54.7
Female	174	45.3
Religion		
Protestant	144	37.5
Catholic	118	30.7
Muslim	45	11.7
Jehovah's witness	12	3.1
Pentecostal (Born again)	65	16.9
Marital status		
Single	329	85.7
Married	55	14.3
Course of study		
Medicine	276	71.9
Nursing	68	17.7
Anaesthesia	40	10.4
Year of study		
Year one	101	26.6
Year two	82	21.6
Year three	84	22.1
Year four	55	14.5
Year five	58	15.3
Ever donated blood (n = 383)		
Yes	151	39.4
No	232	60.6

study (AOR of 4.2, 95% CI: 1.5–11.5) and prior history of blood donation (AOR of 7.6, 95% CI: 3.2–18.0) as shown in Table 4.

Thematic analysis

Thematic analysis of the qualitative data generated four themes namely; students' experiences and thoughts, driving forces to donate blood, Fears and misconceptions, and Suggestions to increase blood donors.

Theme 1: students' experiences and thoughts

Most of the participants perceived blood donation as a good practice that saves life. They argued that donating blood makes it available to patients in need of blood thus saving their lives. One participant said; ' … *generally I feel blood donation carries more good than harm and it is a good practice.*' [R01].

Another participant said; ' … it *is a good practice because you never know the next person who might need that blood like emergency blood transfusion*' [R03].

Some participants believed that hematinics given following blood donation were a trap to keep donating and thus wouldn't take them. One participant said;

> I used to think that the iron tablets they give us after donation would cause you to have excess blood if you do not donate again and have symptoms like headache. So, we thought it was a trap for you to keep donating. So, I have actually never swallowed them I would just throw them away [R03].

Some participants also believed that blood donation causes some adverse effects including death to donors. One of the participants reported that;

> for my case I have seen and heard that people might have after effects. So, the rate I used to donate reduced. There is a story I had about some time two years ago when someone donated and passed on [R07].

The participants also perceived that one has to be mentally and physically stable before blood donation.

> Before someone donates blood they should be mentally and physically stable. Psychologically you should be ready because it calls for courage like how our friend here mentioned that the needle is big, then physically someone should qualify if they are 50 kg and at least 18 years old [R06].

> During the time of donation, you should not be having any illness like malaria [R06].

Participants also noted that the weight and age of the person matters in regards to blood donation. One participant mentioned that; '*then physically someone should qualify if they are 50 kg and at least 18 years old*' [R06].

Theme 2: driving forces to donate blood

Saving life

The passion to save lives was found to be one of the motivators for blood donation. Participants mentioned saving life and being a hero to someone who needs blood as their great drives to blood donation. Furthermore, participants were motivated by the information availed to them on the magnitude of deaths attributed to lack of blood, which lured them to donate and save lives.

> The feeling is nice knowing that you have donated blood and it will save someone's life. After donation you feel that hero within you [R02].

> We had a presenter from Red Cross who showed us statistics of how many children and women die from lack of blood so that also motivated me to be part of this life saving venture [R07].

> Also, what motivated me was me being a hero of the person who needs blood [R04].

Table 2. Knowledge about blood donation among undergraduate medical students at BUFHS.

Variable (n = 384)	Frequency (n)	Percentage (%)
Place for blood donation		
Hospital	199	51.9
Health Centre	157	40.9
School	231	60.2
Donation Centre	213	55.5
Red cross Centre	248	35.4
Others*	52	13.7
Goal of blood donation		
Saving relatives' life	57	14.9
Saving someone's life	336	87.5
Getting insurance	26	6.8
Minimum age to donate blood		
>18 years	15	3.9
<18 years	85	22.1
18 years	87	22.7
Don't know	197	51.3
Maximum age		
<65 years	31	8.1
>65 years	54	14.1
65 years	37	9.6
Don't know	262	68.2
Minimum weight		
<45 kgs	12	3.1
>45 kgs	70	18.2
45 kgs	101	26.3
Don't know	201	52.3
Maximum volume of blood drawn		
250 mls	30	7.8
350 mls	34	8.9
450 mls	126	32.8
Don't know	194	50.5
Minimum interval		
Every 3 months	106	27.6
Every 6 months	75	19.5
Once in year	48	12.5
Don't know	155	40.4
Do you know your blood group		
Yes	236	61.5
No	148	38.5
What is the most common blood group		
A	33	8.6
B	18	4.7
AB	44	11.5
O	231	60.2
Can pregnant women donate blood		
Yes	22	5.7
No	271	70.8
Don't know	90	23.5
Can females donate blood when in their menstruation period		
Yes	47	19.2
No	228	59.4
Don't know	109	28.4
Can cigarette smokers donate blood		
Yes	110	28.7
No	120	31.3
Don't know	154	40.1
Can a person get infected through blood transfusion		
Yes	289	75.3
No	53	13.8
Don't know	42	10.9
Can a person donate blood with a low BP		
Yes	33	8.6
No	275	71.6

(*Continued*)

Table 2. Continued.

Variable (n = 384)	Frequency (n)	Percentage (%)
Don't know	76	19.8
Can an HIV infected person donate blood		
Yes	37	9.6
No	314	81.8
Don't know	33	8.6
What diseases that can be transmitted through transfusion		
HBV	265	69.0
HIV	370	96.4
Malaria	171	44.5
TB	62	16.2
Don't know	25	8.3
Best way of acquiring donor blood		
Voluntary	201	52.5
Replacement	96	25.1
Remunerated	18	4.7
Don't know	68	17.8
All Surgical procedures require blood transfusion		
Yes	70	18.2
No	247	64.3
Don't know	67	17.5
Is a person with multiple partners eligible of donating blood		
Yes	211	54.9
No	173	45.1

*Other place for donation included: market ground, outreaches.

Table 3. Practices of undergraduate medical students at BUFHS about blood donation.

Variable (n = 384)	Frequency (n)	Percentage (%)
Are you willing to donate blood		
Yes	314	81.8
No	70	18.2
What do you think drives you to donate blood (n = 381)		
Voluntary	282	74.0
Replacement	99	26.0
How do you feel after donation (for those who ever donated only)		
Satisfaction	116	58.9
Tired/fatigue	59	29.9
Mixed feeling	22	11.2
What stops you from donating blood		
Being medically unfit (n = 382)	141	36.9
Scarcity of information about blood donation	61	15.9
Fear of pain	83	21.6
No one asked me to donate	43	11.2
Never thought of donating	49	12.8
Don't like the idea of donating	30	7.8
Others*	61	16.7
Do you encourage others to donate blood		
Yes	350	91.1
No	54	8.9
Are you willing to become a regular donor		
Yes	208	54.2
No	176	45.9

Perceived need for blood donation

We found that perceived need for blood donation was a driver to blood donation. The fact that there are patients who may be in need of blood and blood cannot be got from anywhere else but from people was one of the motivators for blood donation. One participant mentioned that;

Table 4. Association between practices towards blood donation and socio-demographic characteristics.

	Ever donated					
Variable	Yes, n (%)	No, n (%)	COR (95% CI)	*p*-value	AOR (95% CI)	*p*-value
Gender						
Male	176 (56.1)	34 (48.8)	*1*			
Female	138 (43.9)	36 (51.4)	0.7 (0.4-1.2)	0.257	0.9 (0.5-1.7)	0.740
Marital status						
Single	272 (86.6)	57 (81.4)	*1*			
Married	42 (13.4)	13 (18.6)	0.7 (0.3-1.3)	0.264	0.7 (0.3-1.5)	0.331
Religion						
Muslim	30 (9.6)	15 (21.4)	*1*			
Catholic	99 (31.5)	19 (27.1)	2.6 (1.2-5.7)	0.018	4.6 (1.9-11.5)	0.001*
Jehovah's witness	3 (0.9)	9 (12.9)	0.2 (0.03-0.7)	0.015	0.2 (0.02-0.9)	0.042*
Protestant	127 (40.5)	17 (24.3)	3.7 (1.7-8.3)	0.001	6.9 (2.7-17.6)	<0.001*
Pentecostal (Born again)	55 (17.5)	10 (14.3)	2.8 (1.1-6.9)	0.030	4.0 (1.4-11.1)	0.009*
Year of study						
Year 1	79 (25.3)	22 (32.4)	*1*			
Year 2	74 (23.7)	8 (11.8)	2.6 (1.1-6.1)	0.033	4.2 (1.5-11.5)	0.006*
Year 3	66 (21.2)	18 (26.5)	1.0 (0.5-2.1)	0.954	1.2 (0.5-2.6)	0.706
Year 4	46 (14.7)	9 (13.2)	1.4 (0.6-3.4)	0.419	1.2 (0.5-3.2)	0.669
Year 5	47 (15.1)	11 (16.2)	1.2 (0.5-2.7)	0.674	1.2 (0.4-3.3)	0.744
Course of study						
Nursing	54 (17.2)	14 (20.0)	*1*			
Anaesthesia	33 (10.5)	7 (10.0)	0.7 (0.3-1.5)	0.347	0.8 (0.3-2.6)	0.748
Medicine	227 (72.3)	49 (70.0)	0.7 (0.4-1.2)	0.173	1.4 (0.6-3.1)	0.443
Ever donated blood						
No	170 (54.3)	62 (88.6)	*1*			
Yes	143 (45.7)	8 (11.4)	6.5 (3.0-14.1)	<0.001	7.6 (3.2-18.0)	<0.001*

COR – Crude Odds Ratio; CI – Confidence interval; AOR – Adjusted Odds Ratio; *statistically significant at a p-value < 0.05; 1 – Reference category.

> blood cannot be bought like there is no place or shop you can go that they are selling blood. Blood has to come from us who have excess or who are capable of sharing because not everybody is capable so we help those who are need of it simply to save the lives [R05].

Incentives

We also found incentives to be a motivator for blood donation. Participants mentioned that incentives such as soda and biscuits given to donors after blood donation motivated them to donate blood. This was depicted by the following quotes;

> What motivated me was biscuits and soda [R07].

> The eats were also good on my side that's why I donated [R05].

> They were giving out free sodas and free biscuits [R01].

Free medical testing services

Some of the participants highlighted free medical testing services such as HIV testing, Hepatitis B and blood grouping to have motivated them to donate blood.

> Some of us donate blood to get free medical check-ups like HIV they first test you before you donate so I can go there to donate with the aim of knowing my HIV status and blood type [R04].

> My first time what motivated me was for me to know my blood group and the test they do like for hepatitis B HIV and many others [R03].

> I also always wanted to know my blood group [R04].

Curiosity

We also found curiosity to be a motivator for blood donation.

One participant said: '*I donated out of curiosity*' [R01].

Blood donation card

Some participants reported that getting a blood donation card motivated them to donate blood. Blood donation cards were reported to have advantages such as getting priority service in case the card owner or the relatives need blood in hospital.

> The second thing was that if they give you the blood donation card and you are in need of blood in a hospital you or your relatives receive priority service [R03].

> Personally, what motivated me was the advantages of having a blood donation card [R07].

Promotional campaigns

Participants also highlighted that blood donation drive campaigns motivate people to donate blood. A participant was quoted saying;

> I think people donate blood when there is advertising like at school they can come [R04].

Blood shortage

Shortage of blood in hospitals was also found to be a motivator for blood donation. Some participants reported that lack of blood in hospitals motivates them to donate blood and save lives.

> Me why I donate blood is because like in the hospital In The blood Bank there is no blood and people need it because I have in plenty I have enough I don't mind sharing so that's why I donate blood [R02].

> But now as I come to the hospital, I see that there is a constant need for blood and now I'm passionate about saving people's lives. I donate every after 4 months so every time there is a chance I go and donate [R01].

Theme 3: fears and misconceptions

Fear

The fear of bad occurrences after blood donation such as fainting or collapse, dizziness was found to be a barrier to blood donation. Some participants also reported fear of the big needles used for blood collection during donation.

> I had fears because some people could collapse after donating or they feel dizzy [R03].

> However, I am scared because the needle is too big, I am scared before they put the needle in to me [R03].

> I have seen and heard that people might have after effects. So, the rate I used to donate reduced [R07].

Being female

Female participants also mentioned that they weren't allowed to donate blood when they have just finished their menstrual periods.

> Also, they would not allow us to donate when you have just finished your periods [R02].

Perceived sale of blood

We found out that perceived sale of blood was a barrier to blood donation. Participants who perceived that donated blood is sold to patients rather than being given for free were reluctant to donate blood. One participant mentioned;

> My perception is when I used to be in form one, form two, and form three was that these people come and take our blood for free and then they go and sell it so, I could not allow things of blood donation [R01].

Another participant said;

> Some people say that blood is sold so if they can first arrest people who sell blood this will change people's mindset [R02].

Theme 4: suggestions to increase blood donors

Participants recommended sensitisation of the public on the benefits of blood donation and also inform them on the magnitude of deaths in hospitals due to lack of blood. One participant said;

> Sensitization should be done and the public also made aware why it is important to give blood and also to tell them how people are dying in regional referral hospitals due to lack of blood [R03].

Another one recommended that district blood banks, WHO, Red Cross and other organisations working on ensuring safe and adequate blood supply should design strategies and tailored programs that promote blood donation practice.

> For me, I recommend the red cross, district blood banks, WHO and other organization in their capacity to design strategies and programs that improve blood donation practices [RO4].

Another participant suggested that there should be more regular blood donation drives and giving monetary incentives to donors;

> Also, the Red Cross has not reached out to many places because the five years I have been here they have only been two blood donation drives another thing on top of the soda add 5,000 shillings and people will come [R06].

One of the participants further mentioned that blood donation practice should be encouraged as we are in a tropic region and are a low-income country;

> Generally, blood donation is a practice that should be encouraged especially among the youths and school going people because we are in a tropic region and malaria is so endemic and we also in a low income setting and our mothers are always getting PPH and in the management we must have blood for them so generally blood donation should be a practice that saves people's lives [R06] (Table 5).

Discussions

This study revealed only [39.4% (151/384)] of the respondents had ever donated blood which is a low level of experience towards blood donation. This is slightly higher than a study carried out in Ethiopia where only 12.5% of them had donated blood before (Melku et al., 2019). Therefore, the finding of this study would suggest that knowledge did not necessarily lead to actual blood donation practice because of the mythical beliefs and wrong perception still held by the community where participants lived (Salaudeen & Odeh, 2011). On the contrary, it is lower than studies conducted in Saudi Arabia (58.2%) (Alfouzan, 2014).

In this study, using multivariate logistic regression, religion was one of the variables significantly associated with the willingness of the participants to donate blood. Those participants who were Jehovah's witnesses were less likely to have good attitude towards blood donation. Being Jehovah's Witness reduced the willingness to donate blood by 88% compared to being a Muslim, Protestant, Pentecost and Catholic by religion. This was in line with a Nigerian study that found that 20.3% of their study population would not donate blood and, curiously enough, will not accept blood transfusion due mainly to religious beliefs, a situation reminiscent of the behaviour of Jehovah's witnesses (Alfouzan, 2014). This needs further in-depth behavioural study.

This study showed high knowledge (50.4%) about blood donation among the respondents. It is comparable to that estimated for students in Basrah Iraq (66.7%) which is slightly higher (Al-

Table 5. Examples of meanings units, codes, and themes from qualitative analysis of focused group discussion on perceptions of about blood donation among undergraduate medical students at BUFHS.

Meanings units	Codes	Themes
'Generally, I feel blood donation carries more good than harm and it is a good practice' [R01].	Blood donation as a good practice	Student's experiences and thoughts
'I used to think that the iron tablets they give us after donation would cause you to have excess blood if you do not donate again and have symptoms like headache. So, we thought it was a trap for you to keep donating. So, I have actually never swallowed them I would just throw them away' [R03].	Hematinics following blood donation are a trap	
'I have seen and heard that people might have after effects. So, the rate I used to donate reduced' [R07].	Adverse effects following blood donation	
'Before someone donates blood they should be mentally and physically stable' [R06].	One has to be mentally and physically stable before blood donation.	
'Also, what motivated me was me being a hero of the person who needs blood.' [R04].	Saving life	Driving forces to donate blood
'What motivated me was biscuits and soda' [R07].	Incentives	
'Some of us donate blood to get free medical check-ups like HIV they first test you before you donate so I can go there to donate with the aim of knowing my HIV status and blood type' [R04].	Free medical testing services	
'Me why I donate blood is because like in the hospital In The blood Bank there is no blood and people need it because I have in plenty I have enough I don't mind sharing so that's why I donate blood' [R02]	Blood shortage	
'I had fears because some people could collapse after donating or they feel dizzy' [R03].	Fear	Fears and misconceptions
'Also, they would not allow us to donate when you have just finished your periods' [R02].	Menstrual period	
'My perception is when I used to be in form one form two form three was that these people come and take our blood for free and then they go and sell it so I could not allow things of blood donation' [R01].	Perceived sale of blood	

Asadi & Al-Yassen, 2018), this could be because there is little emphasis and limited access to learning the importance of blood donation within BUFHS. Regarding eligibility to donate blood, the majority of the students lacked adequate knowledge about the essential aspects of blood donation which was similar in comparison to other studies (Manikandan et al., 2013; Melku et al., 2019; Olivia Ogbo-ghodo, 2015). However, they had good knowledge about other basic requirements of blood donation like their blood groups (61.5%), most common blood groups (60.2%) and about the transfusion transmitted diseases (91.7%), this is consistent with other similar studies in Basrah Iraq Azad Kashmir (Al-Asadi & Al-Yassen, 2018; Javaeed et al., 2020). On that note, undergraduate medical students should be taught about the importance of blood donation as they study more about saving human lives.

Majority (81.8%) of the respondents reported they are willing to donate blood. More than half (58.9%) of the respondents reported a feeling of satisfaction after donation. About reasons for not donating blood, 36.9% cited being medically unfit, 21.6% reported fear of pain, 15.9% mentioned scarcity of information about donation, 12.8% mentioned have never thought of donating, 11.2% reported no one asked them to donate and 7.8% cited other reasons. These results, were in agreement with those of other researches (Al-Asadi & Al-Yassen, 2018; Diongue et al., 2021; Melku et al., 2019). Nevertheless, more than half (54.2%) of the respondents were willing to be regular donor.

The passion to save lives was found to be one of the drivers for blood donation which was similarly got in the qualitative findings. Participants mentioned saving life and being a hero to someone who needed blood as their great drives to blood donation and this was in agreement with other studies that were carried out in different areas (Al-Asadi & Al-Yassen, 2018; Enawgaw et al., 2019; Gebresilase et al., 2017; Samreen et al., 2021). Furthermore, participants were driven by the information availed to them especially on the magnitude of deaths attributed to lack of

blood, this is in line with another study conducted in South Kerala (Nair et al., 2020). Participants mentioned that incentives such as soda and biscuits given to donors after blood donation motivated them to donate blood. In contrast, the need of receiving money or an incentive for blood donation was low in the study conducted in Basrah, Iraq (Al-Asadi & Al-Yassen, 2018). We also found out that other driving forces to blood donation were perceived need for blood, free medical testing services, shortage of blood, curiosity, promotional campaigns and need for a blood donation card which is similar with other studies (Mohammed & Essel, 2018).

The fear of bad occurrences after blood donation such as fainting or collapse, dizziness and the big needle used to collect blood during donation. This was also in line with a study carried out in Iraq (Al-Asadi & Al-Yassen, 2018). Female participants mentioned that they weren't allowed to donate blood when they had just finished their menstrual periods, which is in agreement with another study conducted in Ethiopia (Chauhan et al., 2018; Gebresilase et al., 2017). Perceived sale of blood where participants who perceived that donated blood is sold to patients rather than being given for free were reluctant to donate blood, was also found to be a barrier to blood donation and these were in agreement with other studies conducted (Al-Asadi & Al-Yassen, 2018; Diongue et al., 2021). The common reasons for not donating blood included being medically unfit fearing needles, scarcity of information about donation, some of them had never thought of donating and others said no one asked them to donate. These results were similar to a study carried out in Bangladesh (Hossain et al., 2022; Melku et al., 2016). Additionally, more students did not know, the minimum and maximum age18 and 65 years respectively to donate blood and the maximum volume of blood drawn per each donation which was also in agreement with various studies carried out worldwide that affected the practice of blood donation (Idris et al., 2023).

Limitations of the study included the fact that sampling was a purposive non-probability one for qualitative data and was limited to one university only, therefore precaution should be taken in generalising the results to all university students in Uganda. Also, information was self-reported, hence, reporting bias cannot be excluded.

Conclusion

The study revealed that the proportion of undergraduate medical students who had adequate level of knowledge about blood donation was moderately high, however, some of their perceptions towards it were unconventional. In order to ensure safe and adequate blood supply, the design of strategies and tailored programs that promote blood donation is highly recommended. Performing regular continuous medical educations and seminars on voluntary blood donation for medical students to bridge the gap in knowledge, identify and remove misconceptions, and motivate them was recommended. Finally, further studies about the association of religion especially Jehovah's Witness with blood donation are recommended.

Abbreviations

BUFHS: Busitema University Faculty of Health Sciences; MRRH: Mbale Regional Referral Hospital; WHO: World Health Organization; UBTS: Uganda Blood Transfusion Services; URCS: The Uganda Red Cross Society; UBOS: Uganda Bureau of Statistics; HIV: Human Immunodeficiency Virus; HMIS: Health Management and Information System; DHO: District Health Officer; MRRH-REC: Mbale Regional Referral Hospital Research and Ethics Committee.

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Availability of data and materials

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Competing interests

The authors declare that they have no competing interests.

Authors' contributions

This work was collaboratively carried out among all the authors and all Authors read and approved the final version of the manuscript.

Ethics approval and consent to participate

Ethical and scientific approval of the study was sought and obtained from Mbale Regional Referral Hospital Research and Ethics Committee (MRRH-REC) (approval number: MRRH-2022-213; date; 25/November/2022), Supplementary file 3. Administrative clearance was obtained from Dean BUFHS. Informed consent was obtained from each study participant which would clearly state their rights, obligations, risks, benefits and the boundaries of the research. All the consent forms were kept confidential. The study participants' identities were protected through use of initials and had a right to voluntary participation in the study or withdraw at any time of their own wish without imposing any penalties on them.

Consent for publication

Not Applicable.

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