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Research Article

Knowledge, Attitude and Practice of Voluntary Blood Donation among Higher Education Students in Nepal

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ABSTRACT

The demand for blood and its components is constantly rising around the globe. Unlike in developed regions, recruiting donors to collect sufficient amount of blood regularly on non-paid and voluntary basis is a challenging activity in less developed countries like Nepal. Low donation rates, limited awareness, various perceived barriers and misconceptions are likely contributing factors to this public health concern. Therefore, this paper explores the knowledge, attitude, and practice of university students toward voluntary blood donation in Pokhara and examines the factors influencing their participation in blood donation. The cross-sectional quantitative study was conducted among 424 college students admitted to different academic programs. Approximately one-fourth had adequate knowledge on blood donation, but nearly two-thirds had favorable attitude. Only one in five participants had ever donated blood. Among blood donors, about one-half participants donated only once until the survey date. Male students who were 22 years or older, studying at Master's level and had good knowledge about blood donation were more likely to have donated blood. The findings of the study concluded that students at early adolescence, including female students, should be motivated through tailored awareness and educational programs to improve participation in voluntary blood donation.

KEYWORDS: Higher education, voluntary blood donation, healthcare system, blood supply system, family replacement donors

INTRODUCTION

Blood donation has become an integral part of healthcare system in our society. It provides blood or blood components that improves health or even saves

life of people. There are three types of blood donations in practice: voluntary, replacement, and paid. The blood donation that is free and non-remunerated is termed as voluntary blood donation (VBD) and considered most sustainable approach to ensure a safe and adequate national blood supply. This is because of the participation of most generous group of people who believe donated blood benefits someone in need and participate in blood donations on regular basis. Replacement donors provide blood to compensate for units transfused to a patient, usually a family member, relative, or friend. In contrast, paid donors donate in return for money or other rewards rather than voluntarily for general use. Evidence from many countries indicates that family or replacement donor blood is unsuitable more often than blood from unpaid voluntary donors (World Health Organization [WHO], 2009). It further states that paid donors are more likely to carry transfusion-transmissible infections. Despite substantial national and sub-national efforts to promote voluntary blood donation, the demand for this vital resource still exceeds its supply, particularly in less-developed regions. In developed countries, voluntary donors provide over 90% of the total blood supply, whereas in developing regions their contribution remains below 50% (WHO, 2025).

The Nepal Red Cross Society reported that 262,439 units of whole blood were collected across Nepal in 2023 (Paudel & Nepal, 2025). As an indicator of national blood demand, this number is likely to grow annually with rising life expectancy, improved health awareness, and rapidly advancing medical procedures. However, the donation rate remains insufficient to meet these demands, standing at only 5 donations per 1,000 people in 2025 (WHO, 2025). To cope with this challenge of lower donor participation, WHO (2020) has suggested that countries should manage at least 1% (i.e.10 per 1000) of their citizen donate blood on regular basis to ensure the consistent supply of blood and its products. While high-income countries have largely achieved self-sufficiency through VBD, many developing countries, including Nepal, continue to face shortages. These disparities underscore the importance of understanding the factors that influence individuals' willingness to participate in blood donation.

Several studies have investigated knowledge, attitudes, and practices (KAP) related to blood donation in different context. In a recent study of 227 blood donors, from six blood donation campaigns organized by Nepal Red Cross Society Central Blood Transfusion Service Centre in different parts of Kathmandu valley, only 5% had good knowledge, 46% had average knowledge on blood and blood donation, 72% showed positive attitude towards blood donation and had a high donation practice of 89% prior to the survey period. In same study, 30% donors experienced some adverse affects after donation and being unfit to donate due to under age, having low BP, and lack of time were reported reasons for not donating in the past (Sing et al., 2023). Kayastha et al. (2022) in a study of 116 Bachelor level (Social Work, Business Studies and Computer Application) students, found only 4.5% had good knowledge, 63.7% had average knowledge, and 31.2% had poor knowledge on blood donation. Although 78.2% of the surveyed students had positive attitude towards blood donation, only 23.6% had ever donated blood (Kayastha et al., 2022).

A study involving 216 health science students in Kathmandu found that 62% had adequate knowledge, 97% held positive attitudes, and 90% intended to donate blood in the future, but the actual donation rate was only 27.7%. The most commonly reported barriers to blood donation were fear of needles, lack of time, and low interest (Neupane et al., 2022). Numerous studies across South Asia have explored knowledge, attitude, and practice (KAP)

related to voluntary blood donation among young populations. Research from India and Bangladesh has shown that although awareness about the role of blood donation is generally high among university students, blood donation practices are substantially low. Fear of weakness, lack of motivation, and misconceptions about eligibility were found to be major barriers after reluctance to blood donation (Bhosale & Amruta, 2025; Verma et al., 2018; Islam et al., 2022).

In Nepal, only a small number of studies have assessed KAP related to blood-donation behavior among youths, and these have largely concentrated either on existing blood donors or on health science and medical students in selected urban areas. Consequently, there remains limited empirical evidence on the KAP status of students from diverse academic disciplines, particularly those enrolled in higher education institutions outside major urban centers. Pokhara valley, located in the Kaski District of Gandaki Province, is a major urban center of western Nepal, recognized for its growing educational institutions and healthcare facilities. Large number of colleges and universities in the area attract students from diverse geographical and socio-cultural backgrounds, mostly from Kaski district and surrounding areas such as Syangja, Tanhaun, Lamjung, Gorkha, Baglung, Parbat and Myagdi. College students, who are generally healthy and socially active, represent a crucial cluster of potential voluntary blood donors. However, their knowledge, attitudes, and practices (KAP) related to voluntary blood donation may vary depending on their exposure to awareness programs, cultural beliefs, and access to accurate information. Understanding the KAP among college students in Pokhara valley is essential for identifying existing gaps and developing targeted interventions to enhance participation in voluntary blood donation. Therefore, this study aims to address the existing gap in understanding the awareness, attitude and practice of college enrolled students towards VBD as well as to look in to the factors that affect their involvement in blood donation in study area.

RESEARCH METHODS

An analytical cross-sectional research design was used to assess college students' knowledge and attitude toward VBD and to investigate the factors shaping their involvement in blood donation practices. This design is well suited for KAP (Knowledge, Attitude, and Practice) studies because it not only describes what young people know, feel, and do about blood donation but also helps identify the factors that influence these behaviors. A self-administered questionnaire was developed and validated prior to data collection in the selected study area. Using random sampling technique, 424 college students residing in Pokhara Valley were selected, and their responses on knowledge, attitude, and donation practices were obtained. Descriptive statistics were applied to summarize students' KAP levels, while inferential analyses were used to examine associations between blood donation practice and key socio-demographic and cognitive factors.

Rationale for the selection of the study area

As the study area, Pokhara valley was selected because it is a major urban center with multiple blood transfusion services yet experiences periodic shortages of blood, indicating gaps in voluntary donation. College students in this area were chosen as they represent a large, healthy, and educated segment of the population with high potential to become regular voluntary donors. Their attitudes and behaviors can substantially influence community participation in blood donation. Therefore, assessing their knowledge, attitude, and practice provides valuable insight for designing effective donor promotion strategies.

Nature and source of data

The study used primary, quantitative data collected from college students in Pokhara to assess their knowledge, attitudes and practices (KAP) toward voluntary blood donation. Data were collected using a structured, pre-tested questionnaire, which was administered either as a self-completed form or through interviewer assistance on campus. Collected responses were then coded for score-based KAP analysis.

Research Design

A cross-sectional research design was used to assess awareness, attitude and the possible contribution of relevant factors in blood donation practice among college students based on collected field data.

Population and Sample

The population for the intended study consisted of all the students currently enrolled to one of the colleges for higher education in Pokhara at the time of survey. The selected study area hosts several universities and their affiliated colleges, including Pokhara University, Gandaki University, and campuses of Tribhuvan University offering diverse programs ranging from medicine, engineering, management, and social sciences to technical and vocational education. Using formula suggested by Charan et al. (2021) for calculating sample size; $n=Z^2 *P* (1-P)/ d^2$, with z-value of 1.96 at 95% confidence interval, precision (d) of 0.05 and a prevalence (P) of 60% (from similar past study on KAP on blood donation), sample size was obtained as 385. To account for an anticipated 10% non-response rate, an additional number of participants was added, yielding a final sample size of 424.

Sampling Design

Multistage probability sampling was used to allocate the sampling units. In first stage, Probability Proportion to Size (PPS) of student enrollment across four major study disciplines in Gandaki province (UGC, 2023, P-26) was employed to assign sample numbers according as Health Science & allied fields;30, Humanities & Social Sciences;130, Management;194 and Science & Technology; 68. Next, random sampling techniques was used to select required number of students within each study disciplines with efforts made to maintain representation from across different study domains such as age, gender, study level, and institution type (constituent, community and private).

Research Instruments

A structured questionnaire was developed by adapting the questionnaires from similar past studies (Neupane et al., 2022; Kayastha et al., 2022; Pokhrel et al., 2015). The survey instrument consisted of close-ended questions organized into four sections, described as follows:

Section-I; Demographic and social information: It consisted of age, sex, religion, study level, study program and institution type admitted.

Section-II; Knowledge-based questions: It consisted of 16 questions of which 9 were yes/no type and remaining were multiple choice types along with correct answer options. Hence, maximum achievable score for each respondent was 16 and minimum score was 0. Knowledge scores were calculated as the percentage of correct responses. These scores were categorised on the basis of widely-used convention: ≥80% = good, 60–79% = moderate, and<60% = poor knowledge in recent KAP studies (Dahal et al., 2025; Sing et al., 2023).

Section-III; Attitudinal items: Attitude of survey participant was assessed using 16 statements on a 5-point Likert scale – 1= strongly agree, 2= agree, 3= neutral, 4 = disagree and 5 = strongly disagree. Both positive and negative attitudinal statements on VBD were included in equal numbers and arranged consecutively to prevent possible biases. The participant's scores obtained from negative statements were reversed before making further analysis. Then, the

scores for all 16 statements were summed up and average score was calculated. Cut-off was based on Likert mean ranges - 1–2.33, favorable attitude; 2.34–3.66, neutral attitude; 3.67–5, unfavorable attitude.

Section- IV: Blood donation practice: This section consisted of two main questions querying whether participant donated blood in the past and about their willingness to donate blood in the future including conditional tail questions on donation practice, motivations and hindrances.

Validity and Reliability of Research Instrument

The validity and reliability of the survey instrument was confirmed by pretesting designed questionnaire among 40 perspective respondents and through consultation with subject experts.

Data collection Methods

Responses were then collected from targeted individuals through respondent self-administered questionnaire, followed by briefing on purpose and process of data collection in cases. All collected data were screened for accuracy, consistency and completeness and then prepared for analysis.

Ethical Approval

Informed consent was taken from every survey candidates verbally before making queries on research topics.

Data Analysis

The field survey data, collected from July to August 2025, were analyzed using IBM SPSS Statistics version 25. Descriptive statistics measures, frequency and percentage were calculated for gender, age, religion, study level, study year, academic discipline, institute type, attitudinal items, knowledge level, blood donation practices, donation frequency, influencing factors for VBD, adverse impact after blood donation, reasons for not donating blood and future intention to donate blood. Mean and standard deviation were calculated for age and attitudinal items.

As a part of data analysis, inferential statistical method- binary logistic regression was used at 5% level of significance to investigate the possible linkage between various socio-demographic factors with the blood donation practice of the participants. Logistic regression was applied under key assumptions: the dependent variable was binary, and observations were independent of each other (Hosmer et al., 2013). Univariate logistic model was fitted with blood donation practice as dependent variable and gender, age, institution type, academic discipline, study level, attitude and knowledge level as independent variables separately. The independent variables found significant from this study were then included in multivariate logistic regression analysis. In this study, the dependent variable was the participant's blood donation practice, coded as a binary categorical variable (1 = donated blood; 0 = did not donate). Adequacy of model fit with the observed data was evaluated using the Hosmer–Lemeshow goodness-of-fit test. And the effectiveness of the final model with the inclusion of independent variables to predict participant's donor status was examined with the help of Omnibus test (Chi-square test).

RESULTS

This section consists of major findings obtained from data analysis using the field survey information. Results showed an unbalanced distribution of respondents between genders with 38 % male and 62% female participants. Majority of the respondents are 20 - 24 years followed by near 14% aged below 19 years. Large fractions of respondents were followers of Hindu religion (89.9%). Above 90% of the participant students were enrolled to Bachelor program and remaining 9% to Masters' program. Nearly half of them were in their first or second year of academic journey. Large portion of participants were management students (45.8%) followed

by Humanities & Social Sciences (30.7%) and Science & Technology (16%). Nearly half of the respondents were admitted to constituent institutions where as a quarter of respondents was admitted to each of the community and private type institutions offering higher education (see Table1).

Table 1

Socio-demographic information of participants (n=424)

Characteristics	Number	Percent
Gender		
Male	162	38.2
Female	262	61.8
Age (in years)		
Below 19	59	13.9
20-24	312	73.6
25-29	44	10.4
30 and above	9	2.1
Mean=21.96, SD=2.89, Min=18, Max=40		
Religion		
Hindu	381	89.9
Buddhist	30	7.1
Muslim	6	1.4
Christian	2	0.5
Other	5	1.2
Study level		
Bachelor	388	91.5
Master	36	8.5
Study year		
1st	98	23.1
2nd	111	26.2
3rd	79	18.6
4th	136	32.1
Academic discipline		
Health Sciences and Allied fields	32	7.5
Humanities and Social Sciences	130	30.7
Management	194	45.8
Science & Technology	68	16
Type of institute		
Constituent	210	49.5
Community	107	25.2
Private	107	25.2

Respondents demonstrated varying levels of correct responses to the knowledge-based questions administered. A large majority of participants demonstrated good knowledge regarding the eligibility of individuals with chronic illnesses to donate blood (95.5%), awareness of blood donation events (92.9%), and the ineligibility of persons with low hemoglobin or anemia (89.6%). In contrast, substantially fewer respondents correctly identified the typical time required for the body to replace donated blood (14.9%), the volume of blood collected per donation (31.6%), and the minimum body weight required to donate (37.7%) (see Table 2).

Table 2

Percentage of participants with correct answers (n=424)

Knowledge questions	Correct Answer	Number	Percent
Have you heard about blood donation?	Yes	394	92.9
Do you know your blood group (Type)?	Yes	349	82.3
Knew about the organizer of blood donation?	Yes	261	61.6
Minimum age for blood donation?	18 yrs	318	75.0
Minimum body weight required for blood donation?	45 kg	160	37.7

Minimum time interval between two successive blood donations?	3 months	231	54.5
Volume of blood that can be collected during each donation?	500 ml	134	31.6
How long does it take for the body to replace the donated blood?	4 to 6 weeks	63	14.9
Blood donation is beneficial for donor's health.	Yes	353	83.3
Can a person with fever, flu or cold can donate blood?	No	375	88.4
Can persons with chronic illness (like cancer, HIV/ AIDS, TB) donate blood?	No	405	95.5
Can a person with Low Hemoglobin or Anemia donate blood?	No	380	89.6
Can a female donate during menstruation?	No	268	63.2
Can a female donate during pregnancy?	No	360	84.9
Who is universal donor?	O -ve	251	59.2
Who is universal recipient?	AB +ve	227	53.5

The analysis of composite knowledge score was also carried out. Table 3 demonstrates that about 23% of the respondents had good knowledge (score above 80), 48.3% had moderate knowledge (60 to 79) and 28.8% had poor knowledge (below 60) regarding blood and different aspects of blood donation (see Table 3).

Table 3

Knowledge of Participants on Blood and Blood Donation

Level	Number	Percent
Good Knowledge	97	22.9
Moderate Knowledge	205	48.3
Poor Knowledge	122	28.8
Total	424	100

Table 4

Attitude of participants regarding blood donation

Type	Frequency	Percent
Favorable attitude	273	64.4
Neutral attitude	151	35.6
Unfavorable attitude	0	0.0
Total	424	100

The summarized score for attitude (see Table 4) shows that nearly two-thirds of the participants possessed favorable attitude towards blood donation, while little more than one-third have had neutral attitude on matters of blood donation. Table 5 & 6 presents the distribution of respondents according to position on positive and negative attitudinal statements regarding blood donation, respectively. Study found that large majority of participants agreed 'Blood donation can save life', 'Blood donation awareness should be increased', 'Youth is a role model for the practice of blood donation' and 'Donating blood is a moral act'. However, relatively smaller fraction of students agreed on four statements- Blood donation is a safe process, Blood donation does not cause any harm to donor's health, Someday I may need blood transfusion, and Blood should not be sold (see Table 5). Similarly for negative attitude statements, larger percentage of participants disagreed 'Donating blood more than once is bad for health', 'Donations should be made in an emergency only' and 'Reduction in blood donation practice does not affect the public health'. In rest of the statements provided, relatively smaller portion of participants were disagreed with and larger portion remained neutral (see Table 6).

Table 5

Attitude level (%) of participants towards positive statement on BD (n = 424)

Statements	SA	A	N	D	SD	Mean
Donating blood is a moral act.	39.6	47.6	8.3	1.4	0.5	1.72
Blood donation can save a life.	66.3	29.7	2.1	0.5	0.5	1.38
Blood donation is a safe process.	23.1	50.5	19.8	2.6	0.5	2.03
Blood donation does not cause any harm to donor's health.	18.6	48.3	20.8	6.1	1.7	2.2
Someday I may need blood transfusion.	25.0	42.7	17.9	5.2	5.4	2.2
Blood donation awareness should be increased.	51.4	37.7	2.8	3.8	0.7	1.6
Youth is a role model for the practice of blood donation.	45.0	44.8	4.2	0.9	1.7	1.65
Blood should not be sold.	35.4	25.0	13.0	10.1	11.8	2.35

Note. SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree

Table 6

Attitude level (%) of Participants Towards Negative Statement on BD (n = 424)

Statements	SA	A	N	D	SD	Mean
Blood donation weakens the immune system.	3.3	14.6	24.3	35.8	15.1	3.48
Blood donation is very painful.	1.9	8.7	33.5	41.5	9.2	3.5
A person cannot take part in any physical activities after BD.	3.1	18.2	21.0	34.7	11.3	3.37
Only physically strong can donate blood.	14.4	36.3	19.6	20.5	5.4	2.65
There is sufficient motivation for BD as it needs to be.	15.1	41.5	22.2	11.1	4.7	2.46
Reduction in BD practice does not affect the public health.	12.5	16.7	17.2	24.8	23.3	3.31
Donating blood more than once is bad for health.	5.7	6.4	10.6	40.3	32.8	3.92
Donations should be made in an emergency only.	6.6	11.6	14.9	35.4	26.7	3.67

Note. SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree

Out of surveyed 424 students in higher education, nearly 20% have ever donated blood in their lifetime. Among these donors, almost half donated once only till the survey period, 18% donated three times and about 17% did so five or more times. Voluntary donation was the top influencer to donate blood (47 %), followed by feeling of the social responsibility (30%) and relatives or family's need (12%). Nearly half of the blood donors reported none of the adverse effects after participating in blood donation, 36.1% experienced weakness and 6% experienced sustained pain in the body as the adverse impact of blood donation (see Table 7).

Table 7

Distribution of Participants by Blood Donation Practices and Experiences (n=424)

Characteristics	Frequency	Percent
Ever donated blood		
Yes	83	19.6
No	341	80.4
Frequency of BD (n=83)		
Only once	41	49.4
2 times	11	13.3
3 times	15	18.1
4 times	2	2.4
5 or more times	14	16.9
Influencing factor to blood donation (n = 83)		
Relatives or family's need	10	12
Voluntary donation	39	47
Feeling social responsibility	25	30.1
Altruism/ doing good to others	3	3.6
For an experience	3	3.6
Being in a group of donor (peer)	3	3.6
Adverse impact after BD *		
Weakness	30	36.1
Sustained pain	5	6.0
Nothing	39	47.0
Reasons for not donating blood (n=83)		
Fear of Needle	39	11.4
It may harm or weaken body	30	8.8
No one asked/ approached to donate	81	23.8
Unfit to donate	43	12.6
Parents not allow	15	4.4
Lack of time	22	6.5
Under weight	24	7
Lack of blood in the body	31	9.1
Limited knowledge about blood donation	24	7
Fear of infectious disease such as HIV/AIDS	13	3.8
Prohibited by cultural and religious belief	6	1.8
Concern that the blood collected will be sold out	7	2.1
Other	6	1.8
Future intention to participate in BD		
Yes	322	75.9
No	14	3.3
Undecided	88	20.8

*Note. * multiple response, n=83*

Nearly 24% of the non-donor replied no one asked or approached to donate blood, 12.6% thought they were unfit (being under age or with other unfavorable physical conditions) to take part in blood donation, 11.4 % said fear of needle as the reason de-

motivating them to donate blood. 76% of the respondents showed their willingness to participate in blood donation in future, one-in-five still undecided and remaining 3.3% said they were unlikely to donate blood (see Table 7).

Table 8

Univariate and Multivariate Logistic Regression Analysis Showing Predictors of Blood Donation Among the Participants

	Donation History				
Characteristics	Yes (n=83)	No (n=341)	Total	Univarite OR (95% CI)	Multivariate aOR (95% CI)
Gender					
Female ®	22 (8.4)	240 (91.6)	262	-	-
Male	61 (37.65)	101 (62.35)	162	6.59 (3.84-11.31, p = 0.00**)	6.38 (3.4-11.81, p = 0.00**)
Age group					
≤ 21®	24 (11.01)	194 (88.99)	218	-	-
22 and above	59 (28.64)	147 (71.36)	206	3.24 (1.93-5.46, p = 0.00**)	2.11 (1.15-3.89, p = 0.016*)
Institution type					
Private ®	21 (19.63)	86 (80.37)	107	-	-
Constituent	55 (26.19)	155 (73.81)	210	1.45 (0.82-2.56, p = 0.197)	1.34 (0.7-2.56, p = 0.383)
Community	7 (6.54)	100 (93.46)	107	0.29 (0.12-0.71, p = 0.007**)	0.47 (0.17-1.28, p = 0.139)
Study level					
Bachelor ®	62 (15.98)	326 (84.02)	388	-	-
Master	21 (58.33)	15 (41.67)	36	7.36 (3.6-15.06, p = 0.00**)	6.7 (2.73-16.47, p = 0.00**)
Knowledge level					
Poor Knowledge ®	19 (15.57)	103 (84.43)	122	-	-
Moderate Knowledge	31 (15.12)	174 (84.88)	205	0.97 (0.52-1.8, p = 0.913)	0.98 (0.49-1.97, p = 0.957)
Good Knowledge	33 (34.02)	64 (65.98)	97	2.8 (1.47-5.33, p = 0.002**)	2.38 (1.14-4.99, p = 0.021*)

*Note. OR= Odds ratio, aOR= Adjusted odds ratio, CI= Confidence interval, ® reference category, * p<0.05, ** p<0.01*

The logistic regression analysis was performed to predict associated factors of blood donations among students (see Table 8). Result of univariate analysis indicated that male students were 6.6 times more likely than female students to participate in blood donation. Students age 22 years or older were 3.24 times more likely to donate the blood than junior students. Students enrolled in community institutions were less-likely to donate blood than those in private institutions. Participant students pursuing Masters level were 7.36 times more likely than Bachelor level students to donate blood. Also, participant students with good knowledge on blood and blood

donation were 2.8 times more likely to give away the blood from their body comparing to the habit of students with poor knowledge on blood donation. Likewise, the final model with five independent variables (i.e. gender, age group, institution type, study level and knowledge level) was found to be statistically significant (χ^2=107.002, df=7, p<0.001), suggesting that the model was able to predict respondent's donor status, was a blood donor or was not a blood donor. The result of Hosmer-Lemeshow test pointed a good fit to the data, (χ^2=13.384, df=8, p=0.099).The output of this multivariate analysis showed that being male, aged 22 years or above, pursuing Masters' level and possessing good knowledge on blood donation were more likely to donate blood (see Table 8).

DISCUSSION

Increasing demand of blood transfusion has prompted health care planners to look for ways to promote voluntary blood donation among young adults on regular basis. To achieve this, understanding the knowledge, attitude and practice of VBD among potential donors is quite important. The result in this study indicated relatively low percentage (23%) of participant students from colleges possessed good knowledge on blood donation, which is similar to the finding by Eltewacy et al. (2024, 28.5%), but higher than the result from recent studies in Nepal (Sing et al., 2023, 5.3%) and from Iran (Majdabadi et al., 2018, 15.5%) and lower than the outcomes from Bangladesh (Khan et al., 2024, 68.58%), and India (Raghuwanshi et al., 2016, 57%). In our study, particularly, participant students were comparatively less knowledgeable on time duration for the body to replace the donated blood (14.9%), volume of blood collected generally during each donation (31.6%) and minimum body weight to be eligible for BD (37.7%). Although some differences in knowledge level is permissible due to variation in cut-off standards, these findings suggest that there was a remarkable knowledge gap on blood and blood donation among students in higher education in the study area.

In addition to knowledge level, attitude is also considered as a crucial factor in drive to voluntary blood donation. Near about two-third (64.5%) of the participants showed favorable attitude towards different aspects of blood donation, which was higher than the finding from Central Ethiopia (Beyene, 2020, 48%) but lower in comparison to many recent studies from within Nepal (Kayastha et al., 2022, 78.2%) and from Bangladesh (Khan et al., 2024, 93.83%). This study reaffirmed that majority of survey participants agreed on main statements such as 'Blood donation can save life', 'Youth is a role model for the practice of blood donation' and 'Donating blood is a moral act', aligning with the goal of making blood donations completely voluntary and non-remunerated.

Among the learner participants, the prevalence of blood donation was about one in five (19.6%), which is in line with the findings in Nepal by Amatya (2013, 18.1%) and Pokhrel et al. (2015, 23.4%), in Central Ethiopia (Beyene, 2020, 17%) and in Sri Lanka (Ziyard et al., 2021, 21%). However, higher donation rates were observed among donors in recent studies in Nepal (Sing et al., 2023, 89%), in Bangladesh (Khan et al., 2024, 64.71%) and in Hong Kong (Suen et al., 2020, 49.4%), and lower donation rate was found among student and teachers in a study in Bangladesh (Hossain et al., 2022, 8%). About one-half of the donors were the one time donors and 17% of these donated 5 times or more often till the survey date. Voluntary donation, feeling of social responsibility and relatives or family's needs were the reported common motives for donating blood among donors which are consistent with the findings from earlier studies conducted in Nepal (Kayastha et al., 2022) and in Iraq (Ahmed et al., 2017). This study forther examine the factors

participants cited for not participating in blood donation, even when they demonstrate good knowledge and attitude. The leading reasons reported were not being approached to donate, perceiving themselves as unfit or underage, fear of needles, and insufficient knowledge about blood donation. Regarding future intentions, more than three-fourths of participants expressed willingness to donate blood, while the remaining respondents were either undecided or unlikely to do so. This may hints at possible underlying connection between poor knowledge and unwillingness to donate blood for someone's betterment.

The logistic regression analysis provided valuable insights into the characteristics and patterns associated with blood donation. Association between gender and blood donation was found significant indicating that male (37.7%) participants were more likely than female (8.4 %) to participate in blood donation. This gender gap in blood donation is documented in studies form different countries (Khan et al., 2024; Eltewacy et al., 2024 & Suen et al., 2020). Knowledge gap, misconception and cultural taboos may be fueling this lower donation rate. Age was found to be associated with higher odds of donating blood among participants, suggesting that individuals transitioning to their adulthood (22 or above) have a greater chance to be blood donor. Similarly, there are discrepancies across institution types and between study levels regarding the likelihood of donating blood. According to findings, students in community institutions were less likely than their counterpart in private institutions to become blood donors. Participants pursing Master's program had a higher odds of belonging to donor groups than the Bachelor level students. Although this outcome may partly reflect the effect of age, it is concerning that a large share of young people enroll in Bachelor's programs yet show a lower rate of blood donation. Categorical regression was performed between blood donation versus major study programs and blood donation versus attitude level on blood donation as well as no significant association was found between them and hence excluded from the study. Instead, the knowledge level of the participants on blood donation was significant predictor of blood donation. Following the common trend, those with good knowledge were nearly three times more likely to donate blood than with poor knowledge which is in agreement with findings from the study done by Eltewacy et al. (2024) and Khan et al. (2024).

CONCLUSION

The study concludes with some notable findings on perceived knowledge, attitude and practice regarding voluntary blood donation among students in higher education. There is a substantial gap in students' knowledge on key aspects of blood donation, despite high awareness of general eligibility criteria for a potential donor. While most participants correctly identified whether chronically ill individuals and anemic persons were eligible to donate, far fewer understood essential procedural details such as the volume of blood collected, the time required for blood replacement in body, and minimum weight requirements. Overall, a relatively small proportion of participants demonstrated adequate knowledge about blood and blood donation, suggesting that limited awareness may influence young people's attitudes and their intention to donate for altruistic reasons. Although most prospective donors reported a favorable attitude toward blood donation—an essential prerequisite for actual behavior—this did not translate into higher donation rates. Only one in five students had ever donated blood, and half of these were one-time donors, highlighting a considerable challenge in achieving a fully voluntary, non-remunerated blood supply. The analysis further showed that male students aged 22 years or older, those enrolled in Master's programs, and those with good knowledge of blood donation

were more likely to donate.

Given the growing demand for blood and blood products alongside persistently low donation rates, targeted and effective interventions are essential. Tailored education and awareness programs should be designed to engage female students, who remain underrepresented among donors. Additionally, encouraging healthy, willing, and receptive students to begin donating from early adolescence may help establish a stable, safe, and equitable blood supply system capable of meeting societal needs.

CONFLICTS OF INTEREST

Authors declare that they have no conflicts of interest.

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