Assessment of Blood Donation Practice and Its Associated Factors Among Wollega University Undergraduate Students, Ethiopia

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Introduction: Blood donation is the process of collecting blood from donors who are at low risk for infection and unlikely to jeopardize their own health. Blood donation addresses maternal and child mortality and contributes to saving millions of lives. But many African countries including Ethiopia are far below the minimum blood collection rate. Furthermore, the blood donation practice is not well studied among young university students in the study area. Hence, this study was done to assess the blood donation practice and associated factors among Wollega University students, Ethiopia.

Methods: A cross-sectional study was conducted among 387 students of Wollega University. The students were selected by systematic random sampling. Self-administered questionnaire was used to collect the data. The data were entered into Epidata V.3.1 and exported to SPSSV.25 for analysis. Both bivariate and multivariate logistic regressions were used to identify the associated factors. Adjusted odds ratio with 95% confidence interval and P-value <0.05 were used to declare the statistically significant associations in the multivariable regression. The analyzed result was presented using tables, graphs, and text.

Results: Of the 360 respondents, 147 (40.8%; 95% CI: 35.7–46.1%) ever donated blood. Blood donation practice was significantly associated with college of the students (AOR = 3.247; 95% CI: 1.348–7.820), not taking part in blood donation campaigns (AOR = 0.285; 95% CI: 0.161–0.503), knowledge of blood bank location (AOR = 5.297; 95% CI: 3.081–9.110), knowledge about blood donation (AOR = 2.035; 95% CI: 1.123–3.686) and attitude toward blood donation (AOR = 2.266; 95% CI: 1.122–4.577).

Conclusion: The magnitude of blood donation in this study was found to be less than the recommended level by the World Health Organization. Absence of the blood donation campaigns, college of study, lack of knowledge, and poor attitude toward blood donation were the factors that influence the blood donation practice. All health and related institutions including the Wollega University must work in coordination to improve the blood donation practice focusing on the regular voluntary blood donors.

Keywords: blood, blood donation, voluntary blood donation, practice, associated factors, students, Ethiopia
category of blood donation by which a person donates blood in exchange of money or other form of payment. This last category of blood donation is also known as professional blood donation. Among the categories, voluntary non-remunerated blood donation or voluntary blood donation in short is the safest form of blood donation because the transfusion-transmitted infection is lowest among these donors. In Ethiopia, a replacement donor system was applied before 2011, while voluntary blood collection system is used since 2011.

The World Health Organization (WHO) recommends 10 donations per 1000 populations to satisfy the blood needs of a given country. Despite the World Health Organization’s suggestion for countries to focus on young people to achieve 100% non-remunerated voluntary blood donation, there is insufficiency in blood donation to meet the demand in different corners of the world. Globally, over 80 million units of blood are donated each year; however, only two million units are donated in low-income countries where the need is very high. In sub-Saharan Africa (SSA), where over 12% of world’s populations live, only 38% was collected out of the yearly 18 million estimated units of safe blood need. In Ethiopia, adequate and safe blood supply has remained a challenge where there has been great inadequacy and inequity in access to blood. The national blood requirement in Ethiopia is 18,000 units per day, while only 1100 units are being collected.

The previously conducted studies in different parts showed that the magnitude of blood donation practice range from 10% to 35.69% in Asia and 10.64% to 61.69% in Africa, which was relatively incomparable with high-income countries. It was found to be 29% in Saudi Arabia, 26.7% in India, 27.1% in Ghana, 15.3% in Nigeria and 22.6%–47.8% in different regions of Ethiopia. On top of this, various factors are identified as the factors that hinder blood donation practice. These factors are a perception of being unfit to donate blood, fear of anemia, fear of health risks, and lack of information about blood donation. Furthermore, age, gender, religion, knowledge, attitude, educational status, self-perceived health status, and family education are also factors that can affect the blood donation practice.

Insufficient blood donation and shortage of blood contribute to preventable deaths, which result from major surgery, trauma, cancer, anemia, and pregnancy-related complications. In developing countries, about half a million mothers die each year during pregnancy and childbirth with hemorrhage. Children are particularly vulnerable to a shortage of blood in the malarious area because of severe anemia.

The youngsters in University contribute in life-saving not only through blood donation, but also they can serve as long-term donors, less risky blood donors, role models, and motivators to increase the number of donors as they pursue their career. The students provide the safest blood, and the country’s blood supply can be improved by recruiting and retaining the student donors. However, the practice of blood donation among these populations was not well studied. Therefore, this study was aimed to assess the magnitude and factors associated with blood donation practice among Wollega University students in western Ethiopia.

Materials and Methods

Study Area
The study was conducted from Dec 13, 2021 to Dec 28, 2021 at Wollega University Nekemte Campus, which is located 331km from Addis Ababa. The University runs 60 undergraduate and 17 graduate programs on three different campuses in Nekemte, Gimbi, and Shambu towns. Four thousand forty-eight (4048) students were attending undergraduate programs in all departments.

Study Design and Period
An institutional-based cross-sectional study design was employed.

Source and Study Population
All undergraduate students who were attending their class at Wollega University, Nekemte campus were the source population. All regular students who were from the three randomly selected colleges of Wollega University were the study population.
Inclusion and Exclusion Criteria

Inclusion Criteria
All regular students found in Wollega University, Nekemte campus.

Exclusion Criteria
Students who were not present in the compound during the data collection period were excluded.

Sample Size Determination
The sample size for the study was calculated using a single population proportion formula 
\[ n = \left( \frac{Z\alpha/2}{d} \right)^2 p(1-p) \]  
where \( n \) = the calculated sample size, \( z \) = level of significance, \( p \) = blood donation proportion, \( d \) = margin of error. The assumptions like 95% confidence interval, 5% margin of error, \( \alpha = 0.05 \), and 10% non-response rate were considered. The proportion (p) of blood donation used to calculate the sample size for this study was taken from the study conducted among college students in Mizan-Aman, Southwest Ethiopia, and it was 35.5%. Accordingly, the sample size was calculated as 
\[ n = \frac{(1.96)(1.96)(0.355)(0.645)}{(0.05)(0.05)} \approx 352 \]

By adding 10% for non-response rate, the final sample size of the study was 387.

Sampling Technique
Initially, one-third of the colleges/institutes were considered from the total nine colleges/institutes in the Wollega University, Nekemte campus. Accordingly, three colleges/institutes (College of Business and Economics, Institute of Health Sciences, and Institute of Language Studies and Journalism) were selected randomly by lottery method. The calculated sample size was proportionally allocated to colleges based on their size. List of the students was taken from the colleges to prepare the sampling frame, while the systematic random sampling technique was used to select the final study participants. The sampling interval (\( K = 4 \)) for the systematic random sampling was calculated using the formula, 
\[ K = \frac{N}{n} \]  
where \( N \) is the total number of students in the selected college/institute, and \( n \) is the calculated sample size. The first participant was selected by lottery method and continued every 4th student in each selected institute/college until the allocated sample size was achieved (Figure 1).

Data Collection Tool, Techniques and Data Collectors
The data were collected by using a self-administered questionnaire, which was adapted from different literatures based on the objectives of the study. Socio-demographic factors, knowledge, attitude, and practice-related questions were the components of the questionnaire. It was developed and distributed in English language (see Supplementary File 1). Five master of public health students collected the data, while 2 master of public health holder lecturers supervised the data collection procedures. Two days of training were given for both data collectors and supervisors on the data collection tools and procedures, objectives of the study, ethical issues and data collection period.

Study Variables

Dependent Variable
The practice of blood donation.

Independent Variables
Socio-demographic and economic factors, knowledge of blood donation, attitude toward blood donation, and other behavioral factors (smoking, alcohol consumption, khat chewing, and social media usage).

Operational Definitions
Attitude towards blood donation was assessed by using twelve questions and those students who scored more than the mean value were considered as having a favorable attitude and vice versa.
Knowledge of blood donation was assessed by using fourteen knowledge-related questions, whereas the mean value was considered to classify the students as having good knowledge or poor knowledge.

Remunerated/paid donors: Those individuals who give blood in favor of money or other payment.

Practice of Blood Donation
Those students who donated blood (voluntarily, replacement, and paid) at least once in a lifetime were categorized as “ever donated” whereas who never donated blood at all in a lifetime were categorized as “never donated”.

Data Quality Control
The data collection tool was pretested on 5% (19) of the sample size on students in Gimbi campus which was out of the study setting. Besides, two-day training was given to data collectors and supervisors. During the data collection period, the supervisors supervised the data collectors frequently and the collected data was checked for consistency and completeness on a daily basis. In case the quality problem raised, it was brought for discussion and necessary corrections were made through returning the questionnaire for respective data collector. After data collection, the collected data were entered into Epi-data software version 3.1. (the EpiData Association, Odense Denmark) twice by different individuals and checked for consistency.

Data Processing and Analysis
The data were entered into epi-data version 3.1. (the EpiData Association, Odense Denmark) and then exported into SPSS version 25 (IBM, Armonk, New York, US) for data coding and further analysis. The data were summarized using percentages, mean, and presented by texts, figures and frequency tables. The dependent variable (blood donation

Figure 1 Sampling techniques for the study of blood donation practice and associated factors among Wollega University undergraduate regular students, 2021.
practice) was recoded as practiced or not practiced. The bivariable binary logistic regression analysis was run and the variables that showed association at p-value <0.25 were considered as candidates for multivariable logistic regression. The multicollinearity was checked, and none of the independent variables had the collinearity problem at variance inflation factor >10. The multivariable logistic regression was done. Adjusted odds ratio with their respective 95% confidence interval was used to express the magnitude of association and p-value <0.05 to declare the statistically significant association. Model fitness was checked using Hosmer and Lemeshow’s test with a p-value of 0.283. Being above 0.05, the value indicated that the model fitted the data.

Results

Socio-Demographic Characteristics of the Students
Out of 387, 360 students participated with a response rate of 93.02%. The respondents’ mean age was (22.45±2.096SD) years old and it ranges from 18 to 30 years. The majority of the participants were males (227 (63.1%)). Regarding religion, 194 (53.9%), 102 (28.3%) and 49 (13.6%) of the respondents were Protestant, Orthodox and Muslim, respectively. About 263 (73.1%) and 219 (60.8%) of the study participants reported that their fathers and mothers ever attended education, respectively. Two-third (239 (66.4%)) of the students get monthly pocket money of less than/equal to 500 Ethiopian birr/ETB (Table 1).

| Characteristics                  | Category       | Frequency (%) |
|----------------------------------|----------------|---------------|
| Age                              | 16–20          | 62 (17.2%)    |
|                                  | 21–25          | 269 (74.7%)   |
|                                  | 26–30          | 29 (8.1%)     |
| Gender                           | Female         | 133 (36.9%)   |
|                                  | Male           | 227 (63.1%)   |
| Religion                         | Orthodox       | 102 (28.3%)   |
|                                  | Muslim         | 49 (13.6)     |
|                                  | Protestant     | 194 (53.9%)   |
|                                  | Catholic       | 5 (1.4%)      |
|                                  | Othera         | 10 (2.8%)     |
| Ethnicity                        | Amhara         | 85 (23.6%)    |
|                                  | Oromo          | 202 (56.1%)   |
|                                  | Otherb         | 73 (20.3%)    |
| Marital status                   | Single         | 300 (83.3%)   |
|                                  | Married        | 27 (7.5%)     |
|                                  | In relationship| 33 (9.2%)     |
| Previous area of Residence       | Urban          | 188 (52.2%)   |
|                                  | Rural          | 172 (47.8%)   |
| College                          | College of Business and Economics | 76 (21.1%) |
|                                  | Health Science Institute/HIS | 239 (66.4%) |
|                                  | Institute of Language Studies and Journalism/ILSJ | 45 (12.5%) |
| Academic year                    | 1st year       | 61 (16.9%)    |
|                                  | 2nd year       | 100 (27.8%)   |
|                                  | 3rd year       | 155 (43.1%)   |
|                                  | 4th year       | 44 (12.2%)    |
| Father ever attended school      | Yes            | 263 (73.1%)   |
|                                  | No             | 97 (26.9%)    |

(Continued)
Behavioral Factors of the Students

One fifth (20.4%) of those students who have a habit of alcohol consumption consume alcohol more than five days per month, while 8 (33.3%) of the students who chew khat chew more than five days/month. Among the cigarette smokers, 8 (80%) of them smoke more than five sticks per event (Figure 2).

Knowledge About Blood Donations and Blood Bank Locations

Overall, 189 (52.5%) of the students had good knowledge about blood donation. On the other hand, 135 (37.5%) of the students have knowledge of blood bank location in their current or previous area of residence (Table 2).

Regarding the sources of information about blood donation, majority (221 (61.4%)) reported that school/training is their primary source of information, while mass media is reported as primary source of information for 188 (52.2%) of the students (Figure 3).

Attitude Toward Blood Donation

Majority (325 (90.3%)) of the study participants thought that donating blood is a good idea, while about three quarters (274 (76.1%)) are willing to donate if called upon next time. About 210 (58.3%) perceive that blood should be donated
Table 2 Level of Blood Donation-Related Knowledge Among Wollega University Students, Ethiopia, 2021 (n = 360)

| Characteristics                                      | Category       | Frequency (%) |
|-------------------------------------------------------|----------------|---------------|
| Knowledge/hearing or seeing blood donation             | Yes*1          | 308 (85.6%)   |
|                                                       | No             | 52 (14.4%)    |
| Minimum age required to donate blood                   | <18 years      | 57 (15.8%)    |
|                                                       | 18 years*1     | 68 (18.9%)    |
|                                                       | >18            | 126 (35.0%)   |
|                                                       | I do not know  | 109 (30.3%)   |
| Maximum age required for donating blood                | 45–55 years    | 107 (29.7%)   |
|                                                       | 56–64 years    | 26 (7.2%)     |
|                                                       | 65 years*1     | 49 (13.6%)    |
|                                                       | Do not know    | 178 (49.4%)   |
| Minimum weight required to donate blood                | <45kg          | 54 (15.0%)    |
|                                                       | 45kg*1         | 48 (13.3%)    |
|                                                       | >45 kg         | 135 (37.5%)   |
|                                                       | Do not know    | 123 (34.2%)   |
| Time gap required to donate again                      | 3 months*1     | 142 (39.4%)   |
|                                                       | 6 months       | 36 (10.0%)    |
|                                                       | Year           | 53 (14.7%)    |
|                                                       | Do not know    | 129 (35.8%)   |
| Amount of blood taken from a single person in one event | <500mL*1       | 131 (36.4%)   |
|                                                       | 500–1000mL     | 52 (14.4%)    |
|                                                       | Do not know    | 177 (49.2%)   |
| Time taken to donate for a single voluntary blood donor| <= 20 minutes*1| 82 (22.8%)    |
|                                                       | 20–60 minutes  | 91 (25.3%)    |
|                                                       | I do not know  | 187 (51.9%)   |
| Site/body part where blood is drawn                    | Arm*1          | 256 (71.1%)   |
|                                                       | Buttock        | 9 (2.5%)      |
|                                                       | Another site   | 11 (3.1%)     |
|                                                       | Do not know    | 84 (23.3%)    |
| Know place where blood can be donated                  | Health facility*1 | 181 (50.3%) |
|                                                       | Blood bank*1   | 249 (69.2%)   |
|                                                       | Campaign*1     | 62 (17.2%)    |
|                                                       | Do not know    | 48 (13.3%)    |
| Number of persons benefited from a unit of blood       | One            | 72 (20.0%)    |
|                                                       | Two            | 22 (6.1%)     |
|                                                       | Three*1        | 24 (6.7%)     |
|                                                       | Four and above | 58 (16.1%)    |
|                                                       | Do not know    | 184 (51.1%)   |
| Awareness of Health benefits of donating blood for donor| Yes*1          | 256 (71.1%)   |
|                                                       | No             | 36 (10.0%)    |
|                                                       | Do not know    | 68 (18.9%)    |
| Awareness of Transmission of Infection by blood transfusion | Yes*1         | 317 (88.1%)   |
|                                                       | No             | 43 (11.9%)    |
| Knowledge of common blood group types                  | Yes*1          | 286 (79.4%)   |
|                                                       | No             | 74 (20.6%)    |
| Knowledge of respondents about their blood group type  | Yes*1          | 210 (58.3%)   |
|                                                       | No             | 150 (41.7%)   |
| Overall knowledge about blood donation                 | Good           | 189 (52.5%)   |
|                                                       | Poor           | 171 (47.5%)   |
| Know blood bank location in current or previous resident | Yes            | 135 (37.5%)   |
|                                                       | No             | 225 (62.5%)   |

Note: *1Correct answer for knowledge related questions.
for anyone in need. About 189 (52.5%) of the students perceive that something harmful could happen to a donor during/after blood donation. Among the total respondents, 284 (78.9%) had a positive attitude towards voluntary blood donation (Table 3).

**Practice of Blood Donation**

Among the 360 participants, only 147 (40.8%; 95% CI: 35.7–46.1%) have ever donated blood in their lifetime. Voluntary blood donation was found to be 105 (29%), while it was reported to be 71.4% among those donated. Of those who had donated, majority of them 80 (54.4%) have donated once. One third (118 (32.8%)) of the students ever participated in blood donation campaigns. Some of the reasons hindering blood donation were family or relatives never been in need of blood transfusion (12.7%), lack of knowledge/courage (8.6%), and fear of anemia (17.8%) (Table 4).

**Table 3 Attitude Towards Blood Donation Among Wollega University Regular Students, Ethiopia, 2021 (n = 360)**

| Characteristics                                                                 | Category                        | Frequency (%) |
|---------------------------------------------------------------------------------|---------------------------------|---------------|
| Thought about blood donation                                                     | It is a good idea               | 325 (90.3%)   |
|                                                                                 | It is a bad idea                | 7 (1.9%)      |
|                                                                                 | Have no idea                    | 28 (7.8%)     |
| Persons who should receive blood donation                                       | No one                          | 25 (6.9%)     |
|                                                                                 | Paid                            | 6 (1.7%)      |
|                                                                                 | Relatives                       | 52 (14.4%)    |
|                                                                                 | Anyone in need                  | 210 (58.3%)   |
|                                                                                 | Do not know                     | 67 (18.6%)    |
| Willingness to donate blood next time if get the chance or by their schedule    | Yes                             | 274 (76.1%)   |
|                                                                                 | No                              | 86 (23.9%)    |
| Willingness to encourage others to donate blood                                  | Yes                             | 292 (81.1%)   |
|                                                                                 | No                              | 68 (18.9%)    |
| Ever encountered a disease or emergency on yourself or a family where by you needed a blood | Yes                             | 123 (34.2%)   |
|                                                                                 | No                              | 237 (65.8%)   |
| Perception about Something harmful happening to a blood donor during or after blood donation | Yes                             | 189 (52.5%)   |
|                                                                                 | No                              | 171 (47.5%)   |
| Overall attitude                                                                | Favorable                       | 284 (78.9%)   |
|                                                                                 | Unfavorable                     | 76 (21.1%)    |


Figure 3 Primary sources of information about blood donation among Wollega University students, Ethiopia, 2021 (n = 360; some students cited more than one source of information).
Factors Associated with Blood Donation Practice

In bivariable binary logistic regression, eleven factors, namely, age, college of the students, year of study, father’s educational status, monthly pocket money, khat chewing, cigarette smoking, participating in blood donation campaigns, knowing the location of blood bank in the previous and current residence, knowledge about blood donations and attitude toward blood donation, showed significant associations with blood donation practice. However, only five factors showed significant association with blood donation practice in the multivariable logistic regression analysis. Accordingly, college of the students (AOR = 3.247; 95% CI: 1.348–7.820), not taking part in blood donation campaigns (AOR = 0.285; 95% CI: 0.161–0.503), knowledge of blood bank location (AOR = 5.297; 95% CI: 3.081–9.110), knowledge about blood donation (AOR = 2.035; 95% CI: 1.123–3.686) and attitude toward blood donation (AOR = 2.266; 95% CI: 1.122–4.577) were the independent factors of blood donation practice. The odds of blood donation were 3.2 times more likely for the students in Institute of Language Studies and Journalism than health science students. Those students who did not take part in blood donation campaigns were 71.5% less likely to donate blood as compared to their counterparts. Students who know the blood bank location in the current or previous residential areas had 5 times more odds of blood donation than their counterparts. Similarly, those students who had good knowledge about blood donation had practiced blood donation 2 times more likely than those who had poor knowledge of blood donation. In addition, the students who had favorable attitude regarding blood donation had 2.2 times more odds of blood donation compared to their counterparts (Table 5).

Discussion

This study was aimed to assess the magnitude of blood donation practice and associated factors among university students. The study showed that 147 (40.8%) of the students have ever donated blood in their lifetime. This result is greater than the findings of the study in Debre Markos (16.1%), Mizan-Aman Health Sciences College (35.5%), Aman sub city (26.4%), Madda Walabu (18.4%), Ambo University (23.6%), and Gondar University students.
Table 5 Factors Associated with Voluntary Blood Donation Practice Among Wollega University Regular Students, Ethiopia, 2021 (n = 360)

| Variables                      | Category          | Ever Donated | Bivariable | Multivariable |
|--------------------------------|-------------------|--------------|------------|--------------|
|                                | No=N (%)          | Yes=N (%)    | P-value    | COR with 95% CI | AOR with 95% CI |
| Age                            | 16–20             | 45(72.6%)    | Ref        | Ref          | Ref           |
|                                | 21–25             | 156(58.0%)   | 0.005*     | 0.267(0.106–0.673) | 1.741(0.810–3.738) |
|                                | 26–30             | 12(41.4%)    | 0.09i      | 0.511(0.235–1.113) | 1.43(0.731–8.714) |
| Gender                         | Female            | 78(58.6%)    | 0.878      | 1.035(0.670–1.599) |           |
|                                | Male              | 135(59.5%)   | Ref        | Ref          | Ref           |
| Marital status                 | Single            | 176(58.7%)   | Ref        | Ref          | Ref           |
|                                | Married           | 16(59.3%)    | 0.952      | 0.976(0.43–2.175) |           |
|                                | In relationship   | 21(63.6%)    | 0.582      | 0.811(0.385–1.709) |           |
| Previous area of residence     | Urban             | 112(59.6%)   | Ref        | Ref          | Ref           |
|                                | Rural             | 101(58.7%)   | 0.869      | 1.036(0.680–1.578) |           |
| College                        | Health science    | 143(59.8%)   | Ref        | Ref          | Ref           |
|                                | Business and economics | 50(65.8%)   | 0.354      | 0.775(0.451–1.329) | 0.188(0.785–3.420) |
|                                | Institute of language studies and journalism | 20(44.4%) | 0.058* | 1.862(0.980–3.540) | 0.009** | 3.247(1.348–7.820) |
|                                | Year of study     |              |            |              |              |
|                                | 1st year          | 42(68.9%)    | 0.115      | 1.413(0.720–2.775) | 0.544 | 0.770(0.330–1.792) |
|                                | 2nd year          | 61(61.0%)    | 0.315      | 1.555(0.829–2.917) | 0.417 | 0.721(0.327–1.590) |
|                                | 3rd year          | 91(58.7%)    | 0.169      | 1.247(0.695–2.246) | 0.466 | 1.477(0.518–4.210) |
|                                | 4th year          | 19(43.2%)    | 0.009**    | 2.909(1.299–6.512) |           |
| Religion                       | Orthodox          | 62(60.8%)    | 0.392      | Ref          | Ref           |
|                                | Muslim            | 32(65.3%)    | 0.592      | 0.823(0.405–1.675) |           |
|                                | Protestant        | 110(56.7%)   | 0.499      | 1.184(0.726–1.929) |           |
|                                | Catholic          | 3(60.0%)     | 0.972      | 1.033(0.165–6.460) |           |
|                                | Other             | 6(60.0%)     | 0.961      | 1.033(0.274–3.892) |           |
| Father’s ever attended school  | No                | 50(51.5%)    | Ref        | Ref          | Ref           |
|                                | Yes               | 163(62.0%)   | 0.075*     | 0.653(0.408–1.044) | 0.476 | 0.807(0.448–1.455) |
| Mother’s ever attended school  | No                | 80(56.7%)    | 0.452      | 1.179(0.767–1.812) |           |
|                                | Yes               | 133(60.7%)   | Ref        | Ref          | Ref           |
| Monthly pocket money           | 0–500             | 150(62.8%)   | Ref        | Ref          | Ref           |
|                                | 501–1000          | 484(58.8%)   | 0.258      | 1.334(0.809–2.200) | 0.179 | 1.530(0.822–2.847) |
|                                | >1000             | 154(52.9%)   | 0.027*     | 2.247(1.095–4.612) | 0.072 | 2.397(0.926–6.204) |
| Alcohol consumption            | Yes               | 30(61.2%)    | 0.753      | 0.905(0.488–1.679) |           |
|                                | No                | 183(58.8%)   | Ref        | Ref          | Ref           |
| Smoking cigarette              | Yes               | 202(60.1%)   | 0.222*     | 2.223(0.616–8.021) | 0.324 | 2.517(0.403–15.728) |
|                                | No                | 209(59.7%)   | Ref        | Ref          | Ref           |
| Social media usage             | Yes               | 206(59.5%)   | 0.479      | 1.471(0.505–4.287) |           |
|                                | No                | 7(50.0%)     | 0.497      | 1.471(0.505–4.287) |           |
| Heard or seen about blood      | Yes               | 181(58.8%)   | Ref        | Ref          | Ref           |
| donation                       | No                | 32(61.5%)    | 0.707      | 0.897(0.487–1.628) |           |
| Taken part in blood            | Yes               | 175(72.3%)   | 0.000**    | 0.182(0.113–0.293) | 0.000** | 0.285(0.160–0.503) |
| donation campaign              | No                | 169(75.1%)   | Ref        | Ref          | Ref           |
| bank                           | Yes               | 44(32.6%)    | 0.000*     | 6.241(3.901–9.986) | 0.000** | 5.297(3.081–9.110) |
| Knowledge about blood donation  | Poor              | 119(69.6%)   | Ref        | Ref          | Ref           |
|                                | Good              | 94(49.7%)    | 0.000*     | 2.313(1.500–3.566) | 0.019** | 2.035(1.123–3.686) |
| Attitude toward blood donation  | Unfavorable       | 55(72.4%)    | Ref        | Ref          | Ref           |
|                                | Favorable         | 158(55.6%)   | 0.009*     | 2.089(1.200–3.637) | 0.023** | 2.266(1.122–4.577) |

Note: *p-value<0.25, **p-value<0.051.
Abbreviations: COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval; Ref, reference; N, number.

(12.5%), Nigeria (13.3%), Tanzania (30%). However, this finding is lower than the one from the study conducted in Tigray (47.8%). This might be due to the difference in study population as the study in Tigray was among the health professionals.
Regarding the practice of voluntary blood donation, 105 (71.4% and 29%) among those donated and among the total participants respectively) were volunteers, which is comparable with the study conducted in Bale. However, this result is higher than 10.6% voluntary blood donation practice in Birbir town, 18 16.8% voluntary practice in Bahir Dar, and 63.7% in Debre Markos’ study. The increment in this study could be due to the awareness creation and mobilization activities done in the University in collaboration with Nekemte blood bank. The observed difference might be also attributed to the difference in the study period and populations as social mobilization and awareness creation activities are increasing from time to time.

Of the 147 ever blood donors, only 17% donated the blood more than three times. This result is greater than the study in Debre Markos town (7.4%), while it is consistent with the finding in Mizan Aman health college (13%). However, it is low when compared to the recommended regular (every three months) non-remunerated voluntary blood donation in sustaining the blood supply and overcome the shortage of blood. On top of this, majority of the blood donors (103 (70%)) were elapsed donors and it was greater than one year since they donated the blood. This value is far greater than the result in the study of Mizan Aman Health College. This indicates that besides the improving status of regular blood donation from time to time, there is a need to work for the achievement of the country’s blood need.

Among the non-blood donors, fear of anemia, being unfit to donate, and absence of transfusion need by relative or family members were some of the main reasons that hindered the blood donation in this study. Similar to this study, 16% of non-donors in the study of Mizan Aman health college mentioned that they were unfit to donate the blood. Besides, significant proportion (38%) had no specific reason to not donate the blood in our study. This later group would donate the blood if someone approach and convince them.

Nearly half (52.5%) of the students in this study were knowledgeable about blood donation. The result is comparable with the study conducted in Assosa University (48.5%) but higher than the finding from Ambo University (40.4%). The variation in the level of knowledge could be from the difference in the study period, and blood donation campaigns as about 1/3rd of the students in this study also witnessed blood donation campaigns.

In the current study, more than three-quarters (78.9%) of the respondents had favorable attitude towards blood donation. The finding was better when compared to the previous studies conducted in Assosa University (68.9%), Ambo University (47.6%), and India (57.8%). The observed difference could be due to the difference in the study period as the attitude may change when time goes.

The odds of blood donation practice were 5 times more likely for those students who know the blood bank location in the current or previous residential area as compared to their counterparts. This is in line with the study conducted in Kampala that the availability and accessibility of blood donation centers have association with blood donation practice. This could be due to the fact that knowledge of blood bank location will make the students become aware of where they should donate blood, and lacking the opportunity will also decrease motivation to donate blood. In another way, the practice of blood donation could lead the students to know the location of blood bank. Hence, it might be difficult to say whether this association is causal as this study is limited due to its cross-sectional nature of study design.

The odds of blood donation practice were 2 times more likely for those students who were knowledgeable compared to their counterparts. Besides, students having favorable attitude toward blood donation were also found to practice blood donation 2 times more likely than students who have unfavorable attitude. This finding was supported by the studies conducted in other parts of Ethiopia, and Kenya. This could be explained by the fact that both knowledge and attitude are important precursors for the behavioral change and improved practice.

The odds of blood donation among students who did not participate in blood donation campaign were 71.5% less likely as compared to those participated in the campaign. This is in agreement with the study conducted in Bale Robe town. The possible reason to this association is that taking part in blood donation campaign can make the students aware about the importance of blood donation. In turn, it might increase the students’ motivation to donate blood.

Surprisingly, the likelihood of practicing blood donation was more likely for students from the Institute of Language Studies and Journalism than health science students. The possible justification could be that health science students stay frequently out of the campus for apparent ships. They could miss the blood collection campaign in the campus. Besides, the students in the Institute of Language Studies and Journalism might donate for relatives/replacement since this study...
did not differentiate the blood donation practice into its categories (voluntary non-remunerated, replacement/relatives and paid donors). The association was checked for overall ever blood donation practice.

**Limitation**
The cross-sectional nature of the study could not ascertain the cause–effect relationship. Although the sample size was predetermined, it might be small and could affect the generalizability of this finding. Besides, the risk of recall bias would not be ruled out.

**Conclusion**
The 40.8% lifetime blood donation practice in this study was low. Particularly, the voluntary non-remunerated blood donation (29%) is less than the WHO recommendations of 100% non-remunerated voluntary blood donation practice by youngsters. This low level of blood donation could result from lack of awareness regarding blood donation benefits, poor understanding of the impact of blood scarcity, and inadequate mobilization. College/institute of the students, lack of knowledge, poor attitude, and blood donation campaigns were found to be the factors influencing blood donation practice.

All health institutions whether private or governmental including the Wollega University Referral Hospital, Nekemte Blood Bank, Red Cross Society Nekemte branch, health bureaus in Nekemte town, and the university must work in coordination to increase the level of knowledge and to shift the attitudes towards positive regarding blood donation. On top of this, it is better if blood donation club is established in the campus in order to facilitate the awareness creation activities and to increase the number of regular voluntary blood donors. Periodic campaigns for community mobilization need to be strengthened to improve the low blood donation practice particularly to increase and sustain the number of regular blood donors. It would also be better if incentives like t-shirts and certificates were given to regular donors. To make willful contribution for life saving activities, it is better if the students engage actively in the blood donation campaigns and also donate their blood voluntarily.

**Data Sharing Statement**
Data are available on reasonable request from corresponding author.

**Ethics Approval and Informed Consent**
The study was conducted in accordance with the Helsinki declaration, and ethical approval was obtained from the Institutional Review Board (IRB) of Wollega University. Cooperation letter was written from Wollega University, Institute of Health Sciences. The purpose of the study was clearly explained to the respondents, and they were told that the confidentiality is kept strictly. The respondents were also told that they have the right to involve or not at all in the study. Finally, informed, voluntary, written and signed consent was secured from the study participants and no personal detail was needed to record on the questionnaire.

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**Author Contributions**
All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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References

1. Viwattanakulvanid P. Influencing factors and gaps of blood donation knowledge among university and college students in Myanmar: a cross-sectional study. *J Health Res.* 2021;36(1). doi:10.1108/JHR-10-2020-0500

2. Malako D, Yosepf F, Bekele ML. Assessment of knowledge, attitude and practice and associated factors of blood donation among health care workers in Ethiopia: a cross-sectional study. *BMC Hematol.* 2019;19(10). doi:10.1186/s12878-019-0140-9

3. Giet A, Wondmieneh A, Bimerew M, Gedefaw G. Blood donation practice and associated factors in Ethiopia: a systematic review and meta-analysis. *Hindawi Biomed Res Int.* 2020. doi:10.1155/2020/8852342

4. World Health Organization. Blood donor selection: guidelines on assessing donor suitability for blood donation. *World Health Organization;* 2012. Available from: [https://apps.who.int/iris/handle/10665/76724](https://apps.who.int/iris/handle/10665/76724). Accessed July 25, 2022.

5. Arage G, Ibrahim S, Adimasu E. Blood donation practice and its associated factors among health professionals of university of Gondar Hospital, Northwest Ethiopia: a cross sectional study. *BMC Res Notes.* 2017;10(1):294. doi:10.1186/s12859-017-1618-5

6. Definitions related to blood donors / donations. Available from: [http://sbtcup.org/Definition.aspx](http://sbtcup.org/Definition.aspx). Accessed October 8, 2022.

7. World health organization. Blood safety and availability. Available from: [https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability](https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability). Accessed July 26, 2022.

8. Feature: Voluntary blood donation gains momentum in Ethiopia. Source: Xinhua, Editor: Huaxia; 2021. Available from: [http://www.xinhuanet.com/english/africa/2021-08/17/c_1310131011.htm](http://www.xinhuanet.com/english/africa/2021-08/17/c_1310131011.htm). Accessed October 8, 2022.

9. World Health Organization & International Federation of Red Cross and Red Crescent Societies. Towards 100% voluntary blood donation: a global framework for action. World Health Organization; 2010. Available from: [https://apps.who.int/iris/handle/10665/44359](https://apps.who.int/iris/handle/10665/44359). Accessed July 25, 2022.

10. Sachdev S, Das K, Kaur B, Singh CI, Nongbri D. Knowledge, attitude and practices of blood donors toward blood donation. *J Postgrad Med Edu Res.* 2014;48(3):123–127. doi:10.5005/jp-iournals-10028-1116

11. Salaudeen AG, Odeh E. Knowledge and behavior towards voluntary blood donation among students of a tertiary institution in Nigeria. *Niger J Clin Pract.* 2011;14:303–307. doi:10.4103/1119-3077.86773

12. Diane MK, Dembele B, Konate S. Blood collection to cover national needs in sub-Saharan Africa: the reality of the Ivory Coast. *Blood Transfus.* 2014;12:624–625. doi:10.2450/014.0101-14

13. United nations office on drugs and crime. Staff voices: UNODC Ethiopia rolls up sleeves for blood donation. Available from: [https://www.unodc.org/easternafrica/Stories/unodc-ethiopia-rolls-up-sleeves-for-blood-donation.html](https://www.unodc.org/easternafrica/Stories/unodc-ethiopia-rolls-up-sleeves-for-blood-donation.html). Accessed July 25, 2022.

14. Chopra D, Jauhart N. Knowledge attitude & practices towards voluntary blood donation among medical students in Barabanki. *Indian J Comm Health.* 2015;27(3):386–390.

15. Ariffin SM, Rafi N, Aung KT. Knowledge, attitude and practice of nursing and computer science students on blood donation. A comparison study. *IOSR J Nurs Health Sci.* 2017;6(5):PP73–PP77. doi:10.9790/1595-0605047377

16. Amaty DM. Study on knowledge, attitude and practice of blood donation among students of different colleges of Kathmandu, Nepal. *Int J Pharm Biol Arch.* 2013;4(3):424–428.

17. Melku M, Asire F, Shiferaw E, et al. Knowledge, attitude and practice regarding blood donation among graduating undergraduate health science students at the university of Gondar, northwest Ethiopia. *Ethiop J Health Sci.* 2018;28(5):571. doi:10.4314/ejhs.v28i5.8

18. Addisug AG, Sultan H, Deginet T, et al. Assessment of knowledge, attitude, and practice of voluntary blood donation and associated factors among workers in Birbir Town. *J Community Med Health Educ.* 2017;7(1):504. doi:10.4172/2161-0711.1000504

19. Mahfouz MS, Ryani M, Hamzi NAS, et al. Blood donation among university students: practices, motivations and barriers, Saudi Arabia. *Avicenna J Med.* 2021;11:70–76. doi:10.4103/ajm.ajm.113_20

20. Singh P, Gupta RK, Shora TN, et al. Gender based knowledge, attitude and practice study about blood donation among medical students in a sub-Himalayan state. *Int J Res Med Sci.* 2017;5(5):1882–1887. doi:10.18203/2320-6012.ijrms20171811

21. Isaac N, George BA, Daniel A. Knowledge, attitude and practice towards blood donation among nurses in Komfo Anokye Teaching Hospital, Kumasi. *Afr Sanguine.* 2016;18(2):8–12.

22. Osaii EN, Eze NC, Chukwu O, et al. Determinants of practice of blood donation among medical students of Ebonyi State University Abakaliki, Southeast Nigeria. *Arch Community Med Public Health.* 2018;4(1):001–007. doi:10.17352/2455-5479.000032

23. Urgesa K, Hasen N, Seyoum A. Knowledge, attitude, and practice regarding voluntary blood donation among adult residents of Harar town, Eastern Ethiopia: a community-based study. *J Blood Med.* 2017;8:13–20. doi:10.2147/JBM.S121460

24. Yosef T, Wondimw W, Zewad A, Tesfaw A. Factors associated with blood donation practice among college students in Amhara region, Ethiopia. *Transfus Apher Sci.* 2017;56(3):434–438. doi:10.1016/j.trasc.2017.04.005

25. Fadhi HT, Gosselin R, Debas HT, Gosselin R, McCord C, Thind A. Surgery. In: Jameson DT, editor. *Disease Control Priorities in Developing Countries.* 2nd ed. Washington DC: World Bank/Oxford University Press; 2006. Available from: [https://www.ncbi.nlm.nih.gov/books/NBK11719/](https://www.ncbi.nlm.nih.gov/books/NBK11719/). Accessed July 26, 2022.
31. Peden M. World report on road traffic injury prevention; 2004. Available from: https://www.researchgate.net/publication/260288299. Accessed July 26, 2022.

32. World blood donor day, celebrating the gift of blood; 2006. Available from: http://apps.who.int/iris/bitstream/handle/10665/69363/WBD_2006_kit_eng.pdf?sequence=1. Accessed July 26, 2022.

33. World Health Organization. World malaria report 2008. Geneva: World Health Organization; 2008. Available from: http://apps.who.int/iris/bitstream/handle/10665/43939/9789241563697_eng.pdf?sequence=1. Accessed July 26, 2022.

34. Bharatwaj RS, Vijaya K, Rajaram. P. A descriptive study of knowledge, attitude and practice with regard to voluntary blood donation among medical undergraduate students in Pondicherry, India. JCDR. 2012;6(4):602–604.

35. Jemberu YA, Esmael A, Ahmed KY. Knowledge, attitude and practice towards blood donation and associated factors among adults in Debre Markos town, Northwest Ethiopia. BMC Hematol. 2016;16:23. doi:10.1186/s12878-016-0062-8

36. Mensa M, Bassa B. Prevalence and predictors of voluntary blood donation among adult ambulatory patient attendants at Arba Minch general hospital, SNNPR GamoGofa Zone, Southern Ethiopia, September 2016. J Hematol Transfus. 2017;5(1):1060.

37. Talie E, Wondiye H, Kassie N, Gutema H. Voluntary blood donation among Bahir Dar university students: application of integrated behavioral model, Bahir Dar, Northwest Ethiopia, 2020. J Blood Med. 2020;11:429–437. doi:10.2147/JBM.S277411

38. Mulatu K, Hailu T, Yegezu A, Tena B. Assessment of knowledge, attitude and practice on blood donation in Aman Sub city residents, South West, Ethiopia, 2015. Health Sci J. 2017;11(1). doi:10.21767/1791-809x.1000485

39. Darega B, Dida N, Lencha B. Voluntary blood donation practices and associated factors among regular undergraduate Madawalabu University students, Southeast Ethiopia: a facility-based cross sectional study. J Blood Disord Transfus. 2015. doi:10.4172/2152-1558.100058-005Corpus

40. Elias E, Mauka W, Philemon RN, et al. Knowledge, attitudes, practices, and factors associated with voluntary blood donation among university students in Kilimanjaro, Tanzania. J Blood Transfus. 2016;2016:8546803. doi:10.1155/2016/03

41. Ayenew BA, Adulla MA. Knowledge, attitude, practices, and factors associated with voluntary blood donation among graduating class students of Assosa University, Benishangul Gumuz, Ethiopia, 2018. Haematol Int J. 2020;4(1):000155.

42. Uma S, Arun R, Arumugam P. The knowledge, attitude and practice towards blood donation among voluntary blood donors in Chennai, India. J Clin Diagn Res. 2013;7(6):1043–1046. doi:10.7860/JCDR/2013/34851.3033

43. Alex J. Factors associated with the practice of voluntary blood donation among community members aged 15–50 years in Mutundwe-Kiggaga Zone, Lugbara Division in Kampala. Available from: http://dspace.ciu.ac.ug/bitstream/handle/123456789/1390/ALEX%20DISSERTATION%202013456.pdf?sequence=1&isAllowed=y. Accessed July 11, 2022.

44. Moore MB, Gitau T, Kerochi A. Factors influencing blood donation practices among students of private universities in Thika Town, Kiambu County, Kenya. Int J Community Med Public Health. 2020;7(6):2090–2099. doi:10.18203/2394-6640.ijcmph20202457