# THE LEVEL AND ASSOCIATED FACTORS OF KNOWLEDGE, ATTITUDE AND PRACTICE OF BLOOD DONATION AMONG HEALTH SCIENCE STUDENTS OF ADDIS ABABA UNIVERSITY

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## ABSTRACT

*Introduction: Blood can save millions of life. Blood is the cure, and- man is only source of that cure. The 2012 world blood donor day campaign is "Every blood donor is a hero" focuses on the idea that every one of us can become a hero by donating blood. The percentage of blood collected from voluntary Blood donors and the average annual blood collection rate in Ethiopia are extremely low. Objective: To assess knowledge, attitude, and practice of blood donation and associated factors among health science students in Addis Ababa University. Method: A quantitative institution based cross-sectional study design was used to conduct the survey on May 2014 among health science students in Addis Ababa University. There were a total of 384 respondents selected from six departments of the College of Health Sciences in the university. Stratified sampling technique followed by systematic sampling was applied to select respondents. A pretested self-administered questionnaire was used to collect data. Data will be cleaned, edited, coded and entered on SPSS version 16. Descriptive statistics was applied to describe variables. An analysis of logistic regressions for identifying associated factors was done. A significance level of less than or equal to 0.05 was considered significant. Result: More than half of the participants, 206 (53.6%) were males and the age range of most of respondents, (90%) were from 19-24 years. Fifty six percent of respondents were studying medicine. Three hundred twenty one (83.7 %) and 63(16.4%) of respondents have high and low level of knowledge regarding blood donation. Increased year of study and being students in the department of medicine and nursing increased the odds of level of knowledge of respondents on blood donation. Being age $\geq$ 25 years increased odds of knowledge [AOR (95% CI) =5.092 (1.1, 24.2)]. One third, 123(32%) of respondents have unfavorable attitude towards blood donation. Being male increased odds of favorable attitude [AOR (95% CI) =2.2 (1.4, 3.6)]. Less than one quarter, 90 (23.4%) have ever donated blood. Among these,*

*38(42.2%) of them were a regular donors. Being male increased odds of practice [AOR (95% CI) =3.9 (1.4, 10.8)] and being age ≥25 increased odds of practice [AOR (95% CI) =6.5 (1.6, 26.9). Conclusion and recommendations The level of knowledge on blood donation is high, however, significant number of students in this study have unfavorable attitude towards blood donation. Practice of blood donation is good. In this study, being male, age ≥ 25 and increased year of study and department have significant association. The university in collaboration with Red Cross society should increase and strengthen clubs. Moreover, clubs in the university should organize different events to build students attitude positively and to increase the number of blood donors.*

**Keywords:** Blood donation, Health science students, Knowledge, Attitude, Practice, Associated factors.

## Contribution/ Originality

The percentage of blood collected from voluntary Blood donors and the average annual blood collection rate in Ethiopia are extremely low. Lack of adequate and safe blood supply results in significant number of morbidity and mortality in Ethiopia. To understand these, this study is the first of its kind to investigate the level of knowledge, attitude and practice and associated factors of blood donation among health science students.

## 1. INTRODUCTION

The 2012 world blood donor day campaign is "Every blood donor is a hero" focuses on the idea that every one of us can become a hero by donating blood. Every year about 234 million major operations are performed worldwide, of which 63 million people undergoing surgery for traumatic injuries, 31 million for treating cancers and another 10 million for pregnancy-related complications [1]. Blood can save millions of life, and world health organization (WHO) propose countries to focus on young people to achieve 100% non-remunerated voluntary blood donation by 2020 Dhingra [2]. A lack of adequate and safe blood in southern Africa accounts for an estimated 15 percent of anemia related child deaths. [3, 4] and 44 percent of maternal deaths are due to hemorrhaging during pregnancy in sub-Saharan Africa [5, 6].

Attempts globally to meet the Millennium Development Goals 4 (to reduce child mortality), 5 (Improve maternal health) and 6 (to combat HIV/AIDS, malaria and other diseases) [7] will not be achieved without persistent efforts by individual countries and the global community to develop safe and sustainable blood supplies. A country needs a blood donation rate of 10 units per 1000 population per year. Currently low-income countries only receive 2.8 units, increasing the pressure on countries to source blood supplies unsafely. [8]

Increased HIV transmission rate is associated with paid donors which is prevalent in areas with low number of VBD. HIV infection continues to be a risk associated with blood transfusions. Testing of blood is essential but remains absent in many low and middle-income countries. In Africa 250 to 500 people are newly infected with HIV each day as a result of unsafe blood transfusions [9, 10]. The prevalence of transfusion-transmissible infections (TTIs) in voluntary non-remunerated blood donors is generally much lower than among family/replacement [11] and Paid vs. Unpaid Donors (International Forum) [12]. According to WHO, countries need

voluntary, non-remunerated blood donors are those who donate on their own accord without coercion or incentives, such as money and discourages blood donation for personal gain as it might risk the safety of the blood [13] .Nevertheless, In many countries especially in developing countries like Africa, paid donors and family blood donors continue to make up a large percentage of blood donations [14].

Acquiring 100% voluntary, non-remunerated donors is a challenge for many countries. For a country to maintain a sustainable blood supply only 1 to 3 percent of a country's populations need to donate blood. However, 2007 WHO figures show the donation rate in 73 countries is less than 1 percent of the population [15]. Blood shortages can increase the risk of HIV transmission through blood transfusion as health authorities may become less stringent about the source of donated blood [16, 17]. Blood donation rates are considerably less and relatively unsafe in developing countries [8, 14, 18-21]. Sub-Saharan Africa is home to 14 percent of the world's population, yet total blood donations are estimated to be 6.3 percent of the total global blood donations [22, 23].

In Ethiopia, there has been gross inadequacy and in-equitability in access to blood. The national requirement for blood in Ethiopia is between 80,000-120,000 units per year but only 43% is collected [24]. From the total units to be collected,10units/1000 population, only 0.3 units/1000 people were collected. This indicates the severe shortage of blood supplies for the vast majority of the population. Key challenges to progress included a relatively high prevalence of HIV, poor community awareness of the importance of VNRBD with a consequent lack of voluntary donors, social taboos and misconceptions about blood donation within the community. There is a lack of management commitment, no donor database and no effective strategy for donor retention. Access to public media is limited [25].

The percentage of blood collected from voluntary Blood donors and the average annual blood collection rate in Ethiopia are extremely low. Out of the 44 WHO African countries who reported the percentage of VNRBD, with 22% of blood being donated by VBD in Ethiopia, the country is classified among countries who have least number of VBD (Group C ,countries with <50% voluntary blood donors ). Similarly, the average annual blood collection rate in the Region in 2006 was 4.15 units per 1000 population, ranging from 0.39/1000 in Ethiopia to 34.77/1000 in Mauritius [26]. Moreover, a significant proportion of donated blood remains unsafe as it is either not screened for all the major TTIs or is not screened within a quality system [27].

Moreover, the current strategy of blood donor programs in all blood centers is to make a maximum effort to recruit safe blood donors from special, young and low-risk groups. However, only 38% of reported voluntary blood donations in Ethiopia are under the age of 25 years [2].

To the best of my knowledge, there is no data regarding blood donation on youth population such as university students. Hence, this paper explored the knowledge, attitude and practice of Addis Ababa health science students on blood donation.

## 2. OBJECTIVES

**General objective**: To assess the level and associated factors of knowledge, attitude, and practice of blood donation among health science students in Addis Ababa university.

### 2.1. Specific Objectives

1. To assess the level of knowledge on blood donation
2. To assess attitude on blood donation
3. To assess the practice of blood donation
4. To assess factors associated with knowledge, attitude and practice of blood donation

## 3. METHODOLOGY

Institution based cross-sectional study design was used to conduct the survey. The study was conducted in Addis Ababa University College of medical and health science, Addis Ababa, Ethiopia. The study was conducted in May 2014.

The source populations were all health science students in the university. The study population included those selected health science students other than students on specialization program in public health and medicine who were attending their training in the university during the study period. The sample size was determined by single proportion formula .Due to absence of data on blood donation among health science students, the sample size was calculated by considering prevalence of 50 % for maximum sample size and 5% error with 1.96 significant levels. The total sample size was 384. Considering 10% non-response rate, the final sample size was 418.

A total of 2169 health science students were currently attending the study in AAU TASH. From the total number of students, 1129, 143, 287, 244, 279 and 87 students were attending their training in Medicine, Radiography, Nursing, Midwife, pharmacy and laboratory department respectively. After identifying the different departments with their respective number of students, stratified sampling was used to calculate number of students in each department. Participants in each department were selected by systematic sampling technique.

All health science students other than those who were attending specialization programs were included and those students who were seriously sick or those who were not around for different academic purposes were excluded. Dependent variables in the study include knowledge, attitude and practice of students on blood donation and independent variables of the study are age, sex, income, address, religious, department and year of study

### 3.1. Operational Definitions

**Level of knowledge:** This is the understanding level of students on the benefits, risks, eligibility criteria's of blood donation. Knowledge will be assessed by 11 questions. Respondents with all correct response will get a maximum of 11 points, higher points indicate good

knowledge. Based on total score, knowledge level on blood donation will be categorized into low (less than 6 points) and high ($\geq 6$)

**Attitude:** Attitude is intention of participants towards blood donation practice. The attitude for blood donation will be assessed through six questions with 'yes' and 'no' options. Those who score less than 3 will be categorized as having uncomfortable attitude toward blood donation and those above or equal to 3 will be labeled as having comfortable attitude towards blood donation.

**Practice**: This denotes whether a particular participant has experienced blood donation or not, the reason and frequency of blood donation for those who donate blood and reason for donating for who don't

A structured self administered English questionnaire was used to assess the knowledge, attitude and practice about voluntary blood donation. The questionnaire consist of four sections; socio-demographic, practice, knowledge and attitude. Blood donation practice was assessed through seven questions addressing the nature of donation, frequency of donation, reasons for not donating blood etc. Knowledge part covered 11 questions; knowledge on blood donation was assessed through questions covering benefits, requirements and restrictions of blood donation. The attitude for blood donation was assessed through **six** questions with 'yes' and 'no' options.

The data collection tool was adapted from WHO tools for assessing practices VBD. Pretest was made on 5% of the respondents (20 questionnaires\) in Addis Ababa university students other than health science students. Following the pretest, the content of the questionnaire was re-shaped by considering experiences from the pretest. Data was checked and cleaned both manually and using computer before and after data entry.

The data collected was cleaned, coded and entered to computer with EPI info version 3.5.1 and later it will be exported to SPSS version 20.0 for analysis. A scoring mechanism was used to understand overall knowledge level; a score of one will be given for each correct response and zero for wrong response. Respondents with all correct response get a maximum of 11 points. Based on total score, knowledge level on voluntary blood donation was categorized into poor (<6 points), average (6-8) and very good (>8). After assessing the normality of distribution of the data by using histogram, descriptive and two step (bivariate and multivariate) logistic regressions analysis was applied. Crude and adjusted Odds ratios were computed for each explanatory variable to determine the strength of association with outcome variable and to control the effect of confounding factors. Variables statistically associated with the outcome variables in the first model were taken to the final model to appreciate the maintenance of their association. P value <0.05 was considered significant. Before the start of the data collection, process ethical clearance was obtained from DMU college of medicine and health science. And this letter was submitted to concerned bodies in AAU. The study the purpose and the rationale of the study was briefly discussed to all participants. Informed consent was taken from each participant. In all courses of the study period the information of the participants was confidential.

## 4. RESULT

### 4.1. Socio-Demographic Characteristics

Out of the total 384 students participated in the survey, questionnaires from all respondents were considered for analysis making the response rate 100%.

Of the total 384 respondents, most 706(90.4%) were youths and their age ranges from 19 to 28 years with a mean age of 22 and SD of ± 1.8 years. From the total participants, 206 (53.6%) were males. More than half, 217 (56.7%) students are studying medicine. Table 1 shows the socio-demographic characteristics of the students.

**Table-1.** Socio demographic characteristics of students in AAU College of health and medicine, 2014

| Characteristics | Frequency (n=725) | Percentage |
|---|---|---|
| **Sex** | | |
| Male | 206 | 53.6 |
| Female | 178 | 46.4 |
| **Age group** | | |
| 19-24 | 348 | 90.6 |
| >24 | 36 | 9.4 |
| Mean ± SD=21±1.68 | | |
| **Year** | | |
| Year I | 32 | 8.3 |
| Year II | 97 | 25.3 |
| Year III | 104 | 27.1 |
| Year IV &above | 151 | 39.3 |
| **Religion** | | |
| Orthodox | 227 | 59.1 |
| Muslim | 75 | 19.5 |
| Protestant | 71 | 18.5 |
| Other | 11 | 2.9 |
| **Ethnicity** | | |
| Amhara | 119 | 31 |
| Oromo | 114 | 29.7 |
| Tigre | 89 | 23.2 |
| SNNP | 62 | 16.1 |
| **Marital status** | | |
| Never Married | 329 | 85.7 |
| Ever Married | 55 | 14.30 |
| **Department** | | |
| Medicine | 217 | 56.5 |
| Nursing | 63 | 16.4 |
| Pharmacy | 30 | 7.8 |
| Laboratory | 11 | 2.9 |
| Radiology | 10 | 2.6 |
| Midwifery | 53 | 13.8 |

### 4.2. Level of Knowledge on Blood Donation

Regarding level of knowledge, 14.3% and 9.6% of students did not know the age and weight limit required for blood donation respectively. Similarly, more than half (59.1%) and 8.6% of respondents did not know the minimum time interval between two blood donations and the maximum of amount of blood to be donated respectively. Taking into consideration the 11

knowledge questions, the cumulative level of knowledge was assessed. It was found that 34(9%), 287(74.7%) and 63(16.4%) of respondents have very good, average and low level of knowledge regarding blood donation. See table 2 below.

**Table-2.** Level of knowledge on blood donation among AAU students, 2014

| Level of knowledge on blood donation among | Percentage |
|---|---|
| Age limit | 85.7 |
| Weight limit | 90.4 |
| Minimum time interval between two donations | 40.9 |
| How many type blood you know | 91.1 |
| Can donated blood be given for more than one person | 91.1 |
| Investigation made before transfusion | 67.7 |
| Group not eligible for blood donation | 87.0 |
| Diseases that cab transmitted during blood transfusion | 100.0 |
| Types of donors | 100.0 |
| Over all knowledge level | 83.7 |

### 4.3. Factors Associated with Knowledge

Bivariate analysis showed a statistically significant association of level of blood donation with year of study and department of respondents. After controlling for the effects of potentially confounding variables using multivariate logistic regression, year of study and department were found to be statistically significant predictors of level of knowledge. Increased year of study and being students in the department of medicine and nursing increased the odds of level of knowledge of respondents on blood donation.

### 4.4. Factors Associated with Level of Knowledge

**Table-3.** Factors associated with knowledge level of AAU College of health science and medicine students towards blood donation, 2014

| Variables | | Knowledge | | AOR | 95%CIAOR | |
|---|---|---|---|---|---|---|
| | | No | Yes | | | |
| Year of study | 1 | 23 | 9 | 1 | | |
| | 2 | 25 | 72 | 5.500 | 2.015 | 15.012 |
| | 3 | 9 | 95 | 35.659 | 10.734 | 118.463 |
| | ≥4 | 6 | 145 | 75.724 | 19.004 | 301.741 |
| Age (yr) | 19-24 | 60 | 288 | 1 | | |
| | ≥25 | 3 | 33 | 5.092 | 1.073 | 24.170 |
| Sex | Male | 29 | 177 | .196 | .625 | 2.618 |
| | Female | 34 | 144 | 1 | | |

| Department | Medicine | 15 | 202 | 17.443 | 3.249 | 93.653 |
|---|---|---|---|---|---|---|
| | Nursing | 9 | 54 | 12.895 | 2.152 | 77.264 |
| | midwife | 13 | 40 | 4.400 | .775 | 24.992 |
| | Laboratory | 7 | 4 | 1.305 | .158 | 10.787 |
| | Pharmacy | 14 | 16 | 1.052 | .180 | 6.149 |
| | Radiology | 5 | 5 | 1 | | |

In the bivariate analysis, being age $\geq$ 25 years showed no association with level of knowledge. This was reversed in the multivariate analysis and being age $\geq$ 25 years increased odds of knowledge [AOR (95% CI) =5.092 (1.1, 24.2)] .See table 3.

**Table-4.** Attitude level of AAU College of health science and medicine students towards blood donation, 2014

| Variables | Percent |
|---|---|
| Donating blood can cause disease acquisition | 82.6 |
| Are you willing to donate blood | 100.0 |
| Does donation Makes week | 23.4 |
| Does donation causes anemia | 34.6 |
| Does donation Reduce immunity | 50 |
| Overall Attitude level | 68 |

### 4.5. Attitude towards Blood Donation

As to their attitude on blood donation, all of the respondents replied that they are willing to donate in the future. However, more than one third of students, 76.6%, 34.6%, 91.4 and 59.1% of respondents believe that blood donation makes week, causes anemia and reduce immunity. Similar to overall knowledge assessment, the cumulative level of knowledge was assessed by considering all attitude questions, around one third, 123(32%) of respondents have unfavorable attitude towards blood donation. See table 4.

**Table-5.** Factors associated with attitude level of AAU College of health science and medicine students on blood donation, 2014

| Variables | | Attitude level | | AOR | 95%CIAOR | | Remark |
|---|---|---|---|---|---|---|---|
| | | Unfavorable | favorable | | | | |
| Year of study | 1 | 8 | 24 | 1 | | | |
| | 2 | 34 | 63 | 1.027 | .387 | 2.723 | |
| | 3 | 30 | 74 | 1.345 | .506 | 3.577 | |
| | $\geq$4 | 51 | 100 | 1.389 | .529 | 3.651 | |
| Age (yr) | 19-24 | 105 | 243 | 1 | | | |
| | $\geq$25 | 18 | 18 | .533 | .246 | 1.154 | |

| Sex | Male | 57 | 149 | 2.195 | 1.351 | 3.565 |
|---|---|---|---|---|---|---|
| | Female | 66 | 112 | 1 | | |
| Department | Medicine | 89 | 128 | .142 | .017 | 1.170 |
| | Nursing | 16 | 47 | .362 | .042 | 3.131 |
| | Midwife | 13 | 40 | .413 | .047 | 3.634 |
| | Laboratory | 1 | 10 | 1.193 | .063 | 22.478 |
| | Pharmacy | 3 | 27 | 1.042 | .094 | 11.507 |
| | Radiology | 1 | 9 | 1 | | |

### 4.6. Factors Associated with Attitude towards Blood Donation

Bivariate association showed a statistically significant association with sex and age $\geq 25$.However, only sex maintains the significant association during multivariate analysis .Being male increased odds of favorable attitude [AOR (95% CI) =2.2 (1.4, 3.6)] .See table 5.

### 4.7. Practice of Blood Donation

Pertaining blood donation practice of participants, only less than one quarter, 90 (23.4%) have ever donated blood. Out of the total participants (90) who ever donated blood, less than half, 38(42.2%) of them were a regular donors. Regarding what motivates them for blood donation, 74% were motivated by moral duty, 23.3% were motivated for maintaining once health and the remaining, and 6.6% were motivated while accompanying others. Among those who didn't ever donated blood, lack of information by 68.4%, being not asked by 66.7%, fear by 56% were mentioned as reasons for not donating a blood. See table 6 below

**Table-6.** Practice of blood donation among AAU College of health science and medicine students on blood donation, 2014

| Variable and response | | Percent |
|---|---|---|
| Have you ever donated blood | Yes | 23.4 |
| | No | 76.6 |
| If yes ,how many times | Once | 60 |
| | More than once | 40 |
| What motivates your donation | Moral duty | 74.4 |
| | To maintain once health Accompanying others | 23.3 6.6 |
| How do feel donating blood | Positive Indifferent | 100 0 |
| Are you a regular donor | Yes | 42.2 |
| | No | 57.7 |
| If you don't ever donate blood, why?* | Lack of information | 68.4 |
| | Being not asked | 66.7 |
| | Fear of its effects | 18.4 |
| | Fear of knowing ones result No privacy No reason | 37.7 32.3 9.9 |

**Table-7.** Factors associated with practice of blood donation among AAU College of health science and medicine students on blood donation, 2014

| Variables | | Ever donated | | AOR | 95%CIAOR | | Remark |
|---|---|---|---|---|---|---|---|
| | | No | Yes | | | | |
| Age (yr) | 19-24 | 265 | 83 | | | | |
| | ≥25 | 29 | 7 | 6.519 | 1.581 | 26.870 | |
| sex | Male | 157 | 49 | 3.877 | 1.388 | 10.827 | |
| | Female | 137 | 41 | | | | |

### 4.8. Factors Associated with Practice of Blood Donation

Both bivariate and multivariate analysis showed a statistically significant association with only sex and age ≥25. Being male increased odds of practice [AOR (95% CI) =3.9 (1.4, 10.8)] and being age ≥25 increased odds of practice [AOR (95% CI) =6.5 (1.6, 26.9)].See table 7.

### 4.9. Discussion

In this study, an attempt has been made to assess the level and factors associated with knowledge, attitude and practice of students on blood donation.

The overall level of knowledge was around 83%. This is higher than studies conducted among health science students of India which ranged from 35.7%-53% [28-30]. It is also higher than studies conducted in Africa [31, 32]. nbHowever, the level of knowledge in this research is lower than other study conducted on physicians [33]. The fact that it is higher than studies in India and Africa may be because of the majority of students involved in this study were studying medicine. Age, year of study and department were found to be significant predictors of level of knowledge.

In this study, majority, 68% of respondents have favorable attitude towards blood donation. This is comparable to studies in India, Saudi, Pakistan and Togo [30, 32, 34, 35] but this is lower than study conducted among medical students in Iran which was 82%. Being male is associated with positive attitude. This may be due to the fact that most female's relative males perceive that they are not fit to give blood in our culture. Beside, the information access may not as equal as males.

Less than one quarter, 90 (23.4%) of students in this study have ever donated blood. This is comparable to WHO report on percentage of blood donors among WHO African countries, which categorized Ethiopia on group C with an overall 22% voluntary blood donor [28]. This is also comparable to studies in India and Africa which range from 12%-44% [31, 36, 37]. This supports that blood donation rates are considerably less in developing countries when compared to developed countries [8, 14].

Similar to other studies, significant numbers of participants in this study are not donating blood either because of misconceptions or because of lack of information. Among those who didn't ever donated blood, lack of information by 68.4%, being not asked by 66.7%, fear of result and consequences of blood donation by 56% were mentioned as reasons for not donating a blood. This

is comparable with many researches listed below. Significant number of researchers concluded that people are not donating blood because they fear of contracting disease like HIV and hepatitis [35, 38-41] lack of information [28, 32, 36, 38, 41, 42], donating blood lead to anemia and decrease immunity [37], reduce blood amount and libido [38, 42] and fear of knowing ones investigation result [32]. Majority of blood donors in this study (74%) were motivated by moral duty. Others were motivated by interest for maintaining ones health and accompanying others. Researchers in different parts of the world also concluded that people donate blood for humanity purpose [39, 42, 43], other purposes like getting gift and to help relatives [38, 39, 41, 42].

In this study, only male sex was associated with increased level of blood donation, which was comparable to studies in Pakistan, Ahmedabad and Iran. [34, 40, 44, 45], but factors like increased level of education and increases level of knowledge, which were predictors of blood donation in other studies were not found to be associated in this study. This may be due to lower sample size in this study.

### 4.10. Conclusions and Recommendations
### 4.10.1. Conclusions

The level of knowledge on blood donation is high, however, significant number of students in this study have unfavorable attitude towards blood donation. Increased level of education, age and department were associated with level of knowledge. The level of blood donors is good. Being male is associated with positive attitude and increased level of blood donation. Majority of blood donors were motivated for moral purpose. Lack of information, being not asked and fear were mentioned as reasons for not donating a blood.

### 4.10.2. Recommendations

Based on the findings of the study the following recommendations are made:

1. The university should establish or res-strengthen blood donation clubs.
2. AAU University should work in collaboration with Ethiopian red cross society to improve the low level of blood donors.
3. Intervention activities to bring about behavioral changes among the students on the wider benefit of blood donation for donors and community are recommended.
4. Clubs in the university should organize different events to build students attitude positively and to increase the number of blood donors.
5. Further study needs to be conducted to explore factors associated with blood donors.

### 4.10.3. Limitation of the Study

One of the limitations of this study comes from the fact that cross-sectional nature of study limits the study to show casual association

## 5. LIST OF ACRONUMS AND ABBREVIATION

**AAU:** Addis Ababa University, **HIV/AIDS**: Human Immune-Virus/Acquired Immune Deficiency Syndrome, **GMSC:** Gambi Medical Science College, **TASH:** Tikur Anbessa Specialized Hospital, **TTIs:** Transfusion Transmissible Infections, **UK:** United Kingdom **VBD:** Voluntary Blood Donors , **VNRBD:** Voluntary non-remunerated Regular Blood Donors , **WHO:** World Health Organization

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