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Research Article

Magnitude of Transfusion Transmissible Infections and Associated Factors Among Blood Donors at the Woliso Blood Bank, Oromia, Ethiopia: Across-Sectional Study

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Abstract

Background: Blood transfusion is an effective treatment for saving millions of lives, even though transfusion-transmissible infections are the major problem. The prevalence of transfusion-transmissible infections varies between different geographical populations. This study aims to assess the prevalence of transfusion-transmissible infections and associated factors among blood donors at Woliso Blood Bank, South West Shewa Zone, Oromia, Ethiopia. *Method:* An institutional-based cross-sectional study design was conducted. A structured and pre-tested questionnaire was used to collect data through a face-to-face interview. The data was entered in Epi Data version 3.1, and exported to STATA version 17.0 for data cleaning and analysis. A binary logistic regression analysis was performed to identify factors associated with outcome variables. Odd ratios along with the 95% confidence interval were used to present the finding and statistical significance was reported with a p-value of 0.05. *Results:* The overall prevalence of transfusion-transmissible infections was 9.5% (95% CI 6.3-12.9%). Participants without formal education [AOR=4.84; 95% CI= 1.09, 21.46], unprotected sexual intercourse with multiple partners [AOR=4.77; 95% CI= 1.38, 16.44], and participants with a lower frequency of blood donation [AOR=2.85; 95% CI: 1.16, 6.99] were significantly associated with transfusion transmissible infections. *Conclusions:* The prevalence of transfusion-transmissible infections was high in this study area. Educational level, unprotected sexual intercourse with more partners, and a number of blood donations were found to be independent predictors of transfusion-transmitted infections. Blood banks and regional health offices should work to mobilize the community and improve health promotion through prevention and control considering the associated factors identified.

Keywords

Associated Factors, Blood Bank, Blood Donor, Transfusion Transmissible Infections, South West Shewa, Woliso

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1. Introduction

Blood transfusions are a vital component of medical care that saves live and improves the quality of life of millions of people around the world. Blood transfusions are used most commonly to treat patients who have had trauma, emergency, disasters, or accidents; children with severe anemia due to malaria or malnutrition; and women who are bleeding during pregnancy or childbirth. It is also used to support complicated medical and surgical operations, such as transplants and cardiovascular surgery, in countries with modern healthcare systems. Adequate health care requires timely and universal access to safe blood and blood products, as well as the appropriate use of these resources [1].

Our society places a high priority on transfusion safety, and clinical trials are being conducted to find ways to reduce the risk of known and emerging illnesses in all blood products. Using pathogen reduction methods, the risk of infection from bacterial and viral pathogens can be effectively reduced [2]. Blood grouping and compatibility tests, safe blood collection procedures, accurate transfusion-transmissible infection tests, recruitment and retention of low-risk blood donors, and appropriate use and safe administration of blood are all factors that contribute to blood safety [3].

In Ethiopia, there are currently 43 blood banks, one central national blood bank (NBB), and 42 operational regional blood banks, with at least one in each of the country's administrative regions, so the Woliso blood bank is one of the 10 BB in Oromia region [5].

Several serious public health issues still affect blood donors, including syphilis, hepatitis B, hepatitis C, and HIV. The World Health Organization (WHO) states that syphilis, HBV, HCV, and HIV screening should be performed in all blood donors. The frequency of TTI has decreased significantly as a result of the introduction of strict donor screening protocols for blood-borne diseases [6].

Blood shortages and contaminated blood are the two most important problems associated with blood transfusions in the developing world, especially in Africa. These problems often lead to severe health consequences such as postpartum hemorrhage deaths or the spread of potentially fatal infections such as HIV and hepatitis. It would be possible to avoid these harmful effects on health by taking steps to increase blood availability and safety [7]. HIV, HBV, and HCV are very concerning due to their prolonged viremia and carrier or latent states [8].

The lack of procedures and infrastructure to ensure a safe blood supply increases the risk of infection spreading by transfusion in many countries. These problems include a shortage of knowledgeable staff, inconsistent test kit supplies or the use of low quality test kits, an unstable supply chain, and inadequate cold chain facilities. A fragmented blood supply system, with varied technical standards and no central monitoring, can further jeopardize safety measures [4].

The World Health Organization (WHO) has established a goal of improving regional blood safety by 2012 by strengthening organization and management, blood donor recruitment and collection, donor blood tests, and appropriate clinical blood usage [9]. Hepatitis viruses infect approximately 2.3 billion individuals worldwide, resulting in approximately 1.4 million deaths, 90% of which are caused by hepatitis B and C viruses [10]. The World Health Organization (WHO) announced a 2016 policy to eliminate viral hepatitis by 2030. Africa, particularly Sub-Saharan Africa, is responsible for a large share of the global burden of viral hepatitis, particularly chronic hepatitis B and C virus infections [11].

In developed countries, prevention of TTIs has been achieved by reducing unnecessary transfusions, using only regularly screened volunteer donors, excluding donors with risk factors and screening all blood donated for infection. However, in many developing countries, none of these measures is consistently implemented and the risk of TTIs remains high [12]. At the national blood bank in Ethiopia, the prevalence of the main TTIs (Hepatitis B virus = 5.23 %, HIV = 2.29 % t and Hepatitis C virus = 2.30 %) is high. As a result, regular monitoring of the amount of transfusion-transmitted infections in blood donors is critical to prevent infectious disease transmission [7].

The prevalence of infection or the proportion of blood donations with a positive result is directly related to the safety of the blood supply because this has an impact on the residual risk of blood products used for patient care and also on the risk due to errors in blood quarantine and release (even though test-positive donations are discarded). So that the prevalence of an infection in blood donations is dependent on the prevalence of the infection in the population from which donors are selected and on the effectiveness of donor motivation, mobilization and selection processes [13].

Transfusion-transmittable infections among blood donors are the subject of limited epidemiological investigations in Ethiopia [14]. Most Ethiopian studies focused on secondary data analysis /trend analysis of TTI among voluntary blood donors, which may have limitations to identify associated risk factors. No research was carried out in the Woliso Blood Bank to determine the prevalence and associated factors. Therefore, the objective of this study is to assess the prevalence and associated factors of Transfusion-transmittable infections among blood donors at the Woliso Blood Bank of the South West Shewa Zone, Oromia Region, Ethiopia, 2021.

2. Materials and Methods

2.1. Setting, Design and Period of Study

An institutional-based cross-sectional study was conducted at Woliso Blood Bank in Southwest Shewa. It is one of the 20 zones in the Oromia Regional State, located 114 kilometers from Addis Ababa, the country's capital city. The Woliso

Blood Bank is a government organization that was founded in 2013 by the Oromia Regional Health Bureau in partnership with the FMoH to promote voluntary, non-remunerated blood donation and blood collection. It aims to serve all populations of 5,561,976 (S/W/Shewa 1,110,112, N/Shewa 1,450,525, W/Shewa 2,381,072, and Orom/F/esp./zone 620,267) by preventing morbidity and death from blood shortages by providing safe and adequate blood in a timely and free basis depending on hospital demand. Currently, 14 hospitals receive blood from the blood bank on a regular basis [5]. The study was conducted from November 1 to 30 2021.

2.2. Source of Population and Study Population

All volunteer blood donors in Woliso city and the catchment district were the source population, and all volunteer blood donors whose age ranged between 18 and 65 years were the study population.

2.3. Inclusion and Exclusion Criteria

Blood donors with an age greater than or equal to 18 and less than 65 years with good health were included in the study. Furthermore, donors after 3 months with a weight greater than 48 kg and volunteer blood donors who signed consent were included in the study, and participants who were unwilling to participate in the study during data collection and those with nausea, vomiting, headache and discomfort were excluded from the study.

2.4. Sample Size Determination

The sample size (n) required for objective 1 was calculated using a single population proportion formula with a 95% CI, a 3% margin of error, and the prevalence of similar studies [12].

$$n = p\,(1-p) / d2$$

$$n = 3.8416 * 0.0776 / 0.0009 = 288$$

Taking 10% non-response, the final sample size was 0.1*288 + 288 = 317.

The sample size of the second objective was smaller than that of the first objective. Therefore, the final sample size by taking 10% nonresponses was 317.

2.5. Sampling Procedure/Technique

A systematic sampling technique was used among volunteer blood donors from the blood bank who met the facility's donation criteria. Using the blood donor database, a sampling frame was built. The blood bank receives an average of 900 blood donations each month. After calculating the k-value, a random starting point was chosen using the lottery method. The following formula is used to determine the sampling interval: K=N/n, where N is the population size (total number of blood bank collections during data collection time, which is 900), n is the calculated sample size (317) and k is 3. Using this method, each individual in the population had a known and equal chance of being chosen.

2.6. Data Collection Method

2.6.1. Data Collectors and Supervisors

Based on their experience with data collection and supervision, three data collectors of health professionals and one supervisor were assigned.

2.6.2. Data Collection Instruments

The structured questionnaire was adapted from studies conducted before this study [12, 16, 20] and modified in context. The questionnaire was prepared in English, translated into Afan Oromo for data collection, and then retranslated to English to check its consistency. It consists of two sections that comprise information on the sociodemographic characteristics of study participants and their exposure to various risk factors.

2.7. Study variables

2.7.1. Dependent Variable

Transfusion-transmissible infections.

2.7.2. Independent Variable

Sociodemographic characteristics include age, sex, marital status, education, and occupation; behavioral factors include multiple sexual partners, therapeutic drug injection, alcohol use, smoking, and chat chewing; clinical factors include previous transfusions, surgery, and health service-related factors; previous donation and post-donation counselling; previous exposure to sharp injuries (cut); history of tooth extraction; and history of blood contact.

2.8. Operational Definitions

Voluntary blood donors without remuneration: were blood donors who gave blood voluntarily without any payment and not for their own family.

Replacement donors: blood donors who replace blood used by their relatives or friends from blood bank stocks.

Donor screening criteria: Physical and clinical assessment criteria used to accept or reject a blood donor.

Transfusion-transmitted infection: blood-borne infections that can be transmitted during the blood transfusion process (human immunodeficiency virus, hepatitis B virus, hepatitis C virus and syphilis).

Positive for TTIS: If donor samples contain one or more TTIs (the donor sample should be positive for TTIS two times by the ELISA test).

2.9. Data Quality Control

To ensure data quality, the principal investigator gave a one-day training to supervisors and data collectors on the data collection tool. Pretesting was conducted outside the study area on 5% of the sample size before data collection in the same area of the study, and some amendments were made based on the pretest findings. The questionnaire was checked daily for accuracy, consistency, and completeness by the supervisor. Furthermore, the supervisor gave feedback and corrections on the data collected on a daily basis to the data collectors. Standard operating procedures were strictly followed for TTI screening. For quality assurance, all TTI positive samples and 10% of negative samples were collected to be blindly reexamined by other laboratory technologists.

2.10. Data Processing and Analysis

The data was entered into Epi Data version 3.1, and it was exported to STATA version 17.0 for data cleaning and analysis. The sociodemographic characteristics of the study participant were described using descriptive statistics and the results were presented using a frequency table. A bivariate logistic regression analysis was used to examine the determinants of TTI, and a p value below 0.25 was entered into the multivariate logistic regression model. Multivariate logistic regression analysis was used to examine the association between the determinant variables of TTI. A p-value of less than 0.05 in the multivariate logistic regression analysis was considered statistical significance in the multivariate logistic regression analysis. The crude and adjusted odds ratios were presented with a 95% confidence interval. Hosmer Leme show goodness-of-fit was used to test for model fitness.

3. Results

3.1. Sociodemographic Factors

Three hundred seventeen voluntary blood donors from 317 sampled participants participated in this study, with a 100% response rate. The study consisted of 230 (72.6%) males and 87 (27.4%) females. The mean (± standard deviation) of the participants was 28.40 (± 9.34) years. The majority of study participants (98.1%) were urban dwellers and approximately two-fifths (46.1%) were students. Approximately half (48.3%) of the participants donated blood for the first time (Table 1).

Table 1. *Sociodemographic characteristics of voluntary blood donors at the Woliso Blood Bank of South West Shewa, Oromia Region, Ethiopia, 2021.*

Variables	Categories	Frequency	Percentage
Age category	18-24 years	136	42.9
	25-31 years	60	18.9
	32-38 years	71	22.4
	39 and above years	50	15.8
Gender	Male	230	72.6
	Female	87	27.4
Marital status	Single	175	55.2
	Married	134	42.3
	Divorced	6	1.9
	Widowed	2	0.6
Residence	Rural	6	1.9
	Urban	311	98.1
Educational status	No formal education	13	4.1
	Primary	155	48.9
	Secondary and above	149	47.0
Occupational status	Civil servant	125	39.4
	Daily labor	54	17.0
	Student	138	43.5

3.2. Clinical and Behavioral Characteristics of Study Participants

Among the study participants, approximately 4.1% had received blood products and approximately 1.9% were exposed to unsafe injections. Tooth extraction, post-donation counseling, sex, a history of STD in the family, and an unprotected sex habit were found in 10.4%, 21.8%, 53.3%, 10.4%, and 14.8% of the study participants, respectively. (Table 2).

Table 2. *Clinical history and behavioral characteristics of voluntary blood donors at the Woliso Blood Bank of South West Shewa, Oromia Region, Ethiopia, 2021.*

Variables	Characteristics	Frequency	Percentage
Received blood product	Yes	13	4.1
	No	304	95.9
Number of donation	First time	164	51.7
	Repeatedly	153	48.3
Use drug	Yes	3	0.9
	No	314	99.1
Exposed to unsafe injection	Yes	6	1.9
	No	311	98.1
Tooth extraction	Yes	33	10.4
	No	284	89.6
Sharing sharps	Yes	9	2.8
	No	308	97.2
Had sex	Yes	169	53.3
	No	148	46.7
Unprotected sex	Yes	47	14.8
	No	270	85.2
History of STDs	Yes	33	10.4
	No	284	89.6
Had tattoo	Yes	16	5.0
	No	301	95.0
Post donation counselling	Yes	69	21.8
	No	248	78.2
Heard about TTIs	Yes	273	86.1
	No	44	13.9
Know how TTIs transmit	Yes	272	85.8
	No	45	14.2
Drinking alcohol	Yes	34	10.7
	No	283	89.3
Chewing chat	Yes	13	4.1
	No	304	95.9
Smoking cigarette	Yes	6	1.9
	No	311	98.1

3.3. Seroprevalence of HIV, HBV, HCV, and Syphilis Among Voluntary Blood Donors

The overall seroprevalence of transfusion-transmissible infections (the proportion of voluntary blood donors with at least one transfusion-transmissible infection marker) was 9.5% (95% CI: 6.3, 12.9). The prevalence of HBV, syphilis, HIV and HCV was 5.05% (95% CI 3.0, 7.0), 3.15% (95% CI 1.0, 5.0), 0.63% (95% CI 0.0, 2.0) and 0.63% (95% CI 0.0, 2.0), respectively. In this study, co-infections were not detected in all study participants. (Figure 1).

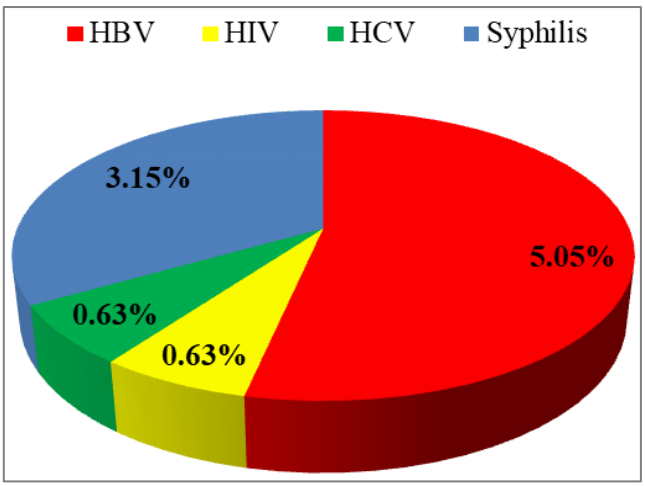

Figure 1. *Prevalence of Hepatitis B Virus, Syphilis, HIV, and Hepatitis C Virus among voluntary blood donors at Woliso Blood Bank of South West Shewa, Oromia Region, Ethiopia, 2021.*

3.4. Factors Associated with Transfusion-Transmittable Infections

A binary logistic regression analysis was used to examine the associated factors of transfusion-transmissible infections. Variables with a p-value below 0.25 in the bivariate logistic regression analysis were entered into the multivariate logistic regression model. Consequently, in the crude analysis, older age, participants without formal education, hearing information about transfusion transmissible infections, knowing how transfusion transmissible infections are transmitted, first-time donation, receiving blood products, having sex, unprotected sexual intercourse with more partners, and history of STD were significantly associated with transfusion transmissible infections.

Multivariate logistic regression analysis was then used to identify independent predictors of transfusion-transmitted infections and to declare statistical significance with a p-value less than 0.05. Therefore, unprotected sexual intercourse with more partners is 4.77 times (AOR = 4.77; 95% CI: 1.38–16.44; P<0.013) more likely to develop a transfusion-transmitted infection compared to those who have not had unprotected sexual intercourse with more partners.

Participants with the first donation were statistically significant predictors of transfusion-transmitted infections, in which the odds of having a transfusion-transmitted infection among study participants increased by a factor of 2.85 (AOR = 2.85; 95%CI: 1.16–6.99; P<0.022) as compared to those who donated repeatedly. The odds of having a transfusion-transmissible infection among participants without formal education were 4.84 times (AOR = 4.84; 95% CI: 1.09–21.46; P<0.038) higher than those of people who learned secondary and higher. (Table 3).

Table 3. *Variables associated with TTI by both the crude and adjusted odds ratio among voluntary blood donors at the Woliso Blood Bank of South West Shewa, Oromia Region, Ethiopia, 2021.*

Variables	TTIs status		COR (95%CI)	AOR (95%CI)
	Yes N (%)	No N (%)		
Age (Years)				
18-24	6(1.9)	130 (41.0)	1	1
25-31	5(1.6)	55(17.4)	1.9(0.58-6.73)	2.96(0.48-17.99)
32-38	9(2.8)	62(19.6)	3.14(1.07-9.23)	6.57(0.76-56.78)
>=39	10(3.2)	40(12.6)	5.42(1.85-15.83)	8.08(0.86-75.42)
Educational status				
No formal edu.	5(1.6)	8(2.5)	4.85(1.42-16.54)	4.84(1.09-21.46)
Primary	8(2.5)	147(46.4)	0.42(0.1-1.01)	1.42(0.21-9.56)
Secondary& above	17(5.4)	132(41.6)	1	1
Heard TTIs				

Variables	TTIs status		COR (95%CI)	AOR (95%CI)
	Yes N (%)	No N (%)		
Yes	22(6.9)	252(79.5)	1	1
No	8(2.5)	35(11.0)	3.08(1.31-7.27)	1.49(0.47-4.75)
Knowhow transmit				
Yes	21(6.6)	250(78.9)	1	1
No	9(2.9)	37(11.7)	2.46(1.01-5.92)	1.02(0.33-3.19)
Number of donate				
First time	20(6.3)	133(42.0)	2.31(1.04-5.12)	2.85(1.16-6.99) *
Repeatedly	10(3.2)	154(48.6)	1	1
Received blood				
Yes	5(1.5)	8(2.5)	4.75(1.36-16.49)	2.22(0.47-7.10.39)
No	26(8.2)	278(87.7)	1	1
Had sex				
Yes	21(6.6)	148(46.7)	2.19(0.97-4.95)	0.47(0.11-2.06)
No	9(2.8)	139(43.8)	1	1
Unprotected sex				
Yes	14(4.4)	33(10.4)	6.73(3.01-15.04)	4.77(1.38-16.44) *
No	16(5.0)	254(80.1)	1	1
History of STD				
Yes	9(2.8)	24(7.6)	4.69(1.94-11.39)	1.18(0.34-4.12)
No	21(6.6)	263(83.0)	1	1

Key:* Significant at p-value <0.05; COR: crude odds ratio; AOR: adjusted odds ratio; CI: confidence interval. Those with a p value of 0.25 and less than were entered into multivariate regression; TTI: transfusion-transmissible infection; STD: sexually transmitted disease

4. Discussion

In this study, the overall Seroprevalence of transfusion-transmitted infections was 9.5% (95% CI 6.3 to 12.9). It was similar to the study carried out at the Yemeni National Blood Transfusion and Research Center in Sana'a (8.8% (95% CI: 5.79–11.81) [16], the study in Tanzania (10.1% (95% CI: 9.92–10.28) [17], the Sidama region of Ethiopia (7.29% (95% CI: 4.69–9.89) [12] and Eastern Ethiopia (12.4% (95% CI: 9.5–15.3) [20]. However, it was higher than another study conducted in northern Ethiopia, which was 6% (95% CI: 5.75–6.25) [22] and and Harar blood bank of eastern Ethiopia, 6.6% (95% CI: 6.14–7.06) [20] and lower than reports from Kenya, 14.1% (95% CI: 11.3–16.9) [18]. These variations may be due to differences in the study population, the study setting, and the sample size used to estimate prevalence.

The seroprevalence of HBV in this study was 5.05% (95% CI: 2.65, 7.45). This finding was similar to the study conducted in Tanzania (5.1% (95% CI: 4.97, 5.23) [17], the Regional Blood Transfusion Center Nakuru and Tenwek Mission Hospital Regional Blood Transfusion Center of Kenya (6.0% (95% CI: 4.1, 7.9) [18], Eastern Ethiopia (6.6% (95% CI: 4.42, 8.78) [20], and the Sidama Region of Ethiopia (4.2% (95% CI: 2.2, 6.2) [12]. However, this finding was higher than previous systematic review reports from Pakistan 2.04% (95% CI: 0.81, 4.22) [15], Yemen's national blood transfusion and research center in Sana'a 2.5% (95% CI: 0.84, 4.16) [16], and lower than the study of the Bahir Dar district blood bank in northwest Ethiopia 6.0% (95% CI: 5.75, 6.25) [19]. The possible explanation for these variations could be due to behavioral characteristics such as unprotected sex, tooth extraction, and tattoos, which were high in these study participants. Furthermore, HBV has a high prevalence in the general population, which arises from the high potential for virus infection.

In this study, the seroprevalence of syphilis was 3.15% (95% CI 1.25, 5.05). This result was similar to studies carried out in

eastern Ethiopia (3.4%; 95% CI: 1.8–5.0) [20]. However, it was higher compared to other studies conducted in Kenya 2.0% (95% CI: 0.87, 3.13) [18], Sidama Region of Ethiopia 0.8% (95% CI: 0.0, 1.6) [12], northwest Ethiopia 1.1% (95% CI: 0.91, 1.29) [19], Kenya 1.2% (95% CI: 1.10, 1.30) [21] and Yemen's national blood transfusion and research center in Sana'a 1.2% (95% CI: 0.00, 2.4) [16]. The lower rate of seroprevalence of syphilis in most studies might be due to the conceivable fact that syphilis is less often transmitted by blood. The duration of the study and the cultural and behavioral characteristics of the study participant could be some of the possible explanations.

The seroprevalence of HIV in voluntary blood donors in this study was 0.63%. This finding was similar to a study conducted in the Harar blood bank of eastern Ethiopia (0.6% (95% CI: 0.46, 0.74) [20], the Sidama Region of Ethiopia (1.6% (95% CI: 0.4, 2.8) [12] and Eastern Ethiopia (1.4% (95% CI: 0.37, 2.43) [20]. However, it was lower than the Kenyan reports (9.0% (95% CI: 6.7, 11.3) [18], and higher than study results of the Yemen's national blood transfusion and research center in Sana'a (0.3% (95% CI: 0.0, 0.6) [16] and Northern Ethiopia (0.5% (95% CI: 0.43, 0.57) [22]. These discrepancies could be due to the behavioral characteristics of study participants with different study areas and sample sizes.

In this study, the seroprevalence of HCV was 0.63%. This finding was similar to the study conducted in the Yemen National Blood Transfusion and Research Center in Sana'a: 1.2% (95% CI: 0.0, 2.4) [16], in eastern Ethiopia: 1.0% (95% CI: 0.13, 1.87) [20], in northern Ethiopia: 0.6% (95% CI: 0.52, 0.68) [22], and in the Sidama Region of Ethiopia: 0.5% (95% CI: 0.0, 1.0) [12]. However, it was lower than the Kenyan reports (8.0% (95% CI: 5.82, 10.18) [18], and the Harar blood bank in eastern Ethiopia (0.8% (95% CI: 0.64, 0.96) [20]. A possible reason might be due to the behavioral characteristics of the study participants with different study areas and sample sizes.

In this study, the chances of developing one of the TTI were 4.85 [AOR = 4.85; 95% CI 1.42, 16.54] times higher among voluntary blood donors without formal education compared to those who learned secondary and above. This finding is comparable to the study done in Eastern Ethiopia [20]. The seroprevalence of TTI in this study was found to decrease with increasing level of education. This could be attributed to the fact that as the level of education increases, there is a high probability that people are aware of preventive measures against TTI.

The study also showed that the odds of developing one of the TTIs were 4.77 [AOR = 4.77; 95% CI 1.38, 16.44] among voluntary blood donors who had unprotected sexual intercourse compared to those who did not practice unprotected sex. This corresponds to the research conducted in Eastern Ethiopia, Kenya and the South Gonder of Ethiopia [20, 23] and [22] respectively. A possible explanation could be that sexual activity with multiple partners is the key mode of acquisition of sexually transmitted infections.

The study also showed that the odds of developing one of the TTIs were 2.85 [AOR = 2.85; 95% CI: 1.16, 6.99] times higher among people who donated for the first time compared to those who had donated repeatedly. This finding was supported by the findings of a cross-sectional study conducted at the South Gondar District Blood Bank, Northwest Ethiopia [22]. The reason might be to obtain awareness about TTIs from post-blood donation counseling while participating repeatedly in such activities.

This study was intended to evaluate the prevalence of transfusion-transmissible infections with highly specific and sensitive laboratory methods. The methodological parts need particular attention because this study was limited by its cross-sectional study design, in which the temporal relationship between risk factors and outcome could not be determined because both were examined at the same time.

5. Conclusion

The prevalence of at least one transfusion-transmissible infection in this study was relatively high compared to studies conducted earlier in Ethiopia. Furthermore, the study identified the determinants of TTI among voluntary blood donors based on sociodemographic, clinical and behavioral characteristics. Finally, the level of education, the number of donations and the unprotected sexual intercourse with more partners were found to be independent predictors of one of the TTI.

6. Recommendations

Special attention should be paid to transfusion-transmitted infections, particularly HBV and syphilis infections in the southwest Shewa region of Oromia, Ethiopia. The national blood bank should work in collaboration with different stakeholders and all other district blood banks to strengthen a screening plan and post-donation counselling strategies to monitor implementation at all levels to reduce TTI. More prospective studies must be conducted rigorously to identify the cause and effect relationship of TTI with its contributing factors. Additionally, each of the blood banks and Regional Health Bureaus in the study area should mobilize the community to increase the number of voluntary donors and improve health promotion of prevention and control of transmissible transmission infections considering the associated factors identified.

Abbreviations

CI	Confidence Interval
ELISA	Enzyme-Linked Immune Sorbent Assay
ETB	Ethiopian Birr
EU	European Union
FMOH	Federal Ministry of Health
HBV	Hepatitis B Virus

HBsAg	Hepatitis B Surface Antigen
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
NBB	National Blood Bank
STD	Sexually Transmitted Disease
TTIs	Transfusion Transmissible Infections
WHO	World Health Organization

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Author Contributions

Alemnesh Wolde Amlak: Conceptualization, Data curation, Formal Analysis, Methodology, Writing – original draft, Writing – review & editing

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Sisay Dabi Begna: Conceptualization, Data curation, Formal Analysis, Methodology, Software, writing – original draft, Writing – review & editing

Ethics Approval and Consent to Participate

Ethics approval and approval were obtained from the Ethics and Research Review Committee of the Ambo University College of Medicine and Health Sciences (Ref. No: PGC / 272 / 2021**)** In addition to that, informed, voluntary, written, and signed consent was obtained from each study participant after a brief explanation of the study objective, ensuring that participation was voluntary. The participant was informed that the questionnaires were confidential and that they had the right to refuse to respond to the questionnaire or participate in the study at any time they wanted. Post-donation counseling was provided to those positive donors in a confidential manner. Finally, the test result was kept in soft copy using Pass Word, as well as in hard copy by locking it at Woliso Blood Laboratory.

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Disclosure

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Data Availability Statement

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest.

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