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ORIGINAL RESEARCH

Detection of Transfusion Transmissible Infections Among Voluntary Blood Donors at a Regional Blood Bank in Western Uganda: A Cross-Sectional Study

Moses Asiimwe[1,2,*], Brenda Nabawanuka[1], David Francis Olebo[3], Mubaraka Kayiira[4], Conrad Lubwama[1], Laban Turyamuhika[5,6], Archbald Bahizi[7,*], John Rubaihayo[1,*]

[1]Faculty of Health Sciences, Mountains of the Moon University, Fort Portal, Uganda; [2]Center for Epidemic Research and Outbreak Preparedness, Kampala, Uganda; [3]Directorate of Graduate Studies and Research, Kampala International University, Kampala, Uganda; [4]Department of Medicine, College of Health Sciences, Makerere University, Kampala, Uganda; [5]College of Veterinary Medicine, Animal Resources & Biosecurity, Makerere University, Kampala, Uganda; [6]Faculty of Health Sciences, Victoria University, Kampala, Uganda; [7]Fort Portal Regional Referral Hospital, Ministry of Health, Fort Portal, Uganda

*These authors contributed equally to this work

Correspondence: Moses Asiimwe, Mountains of the Moon University, Saka, 50017, Fort Portal, Uganda, Email mosesae19@gmail.com

Background: Although blood and blood components are well established as medical therapies, they are not without risk and they have the potential for transmission of infectious diseases from donors to recipients. The study aim was to assess the seroprevalence and predictors of blood transfusion transmissible infections among blood donors at Fort Portal Regional Blood Bank.

Materials and Methods: We conducted a retrospective cross-sectional study of donor data from 3211 blood donors who donated blood between January and September, 2021, at Fort Portal Regional Blood Bank. The seroprevalence of transfusion transmissible infections (TTIs) was determined by tabulating the proportion of donors who tested for at least one TTI. A bivariate logistic regression was used to determine the association between the prevalence of TTIs and sociodemographic characteristics.

Results: Majority of the blood donors were below 27 years (41.9%) with a mean age of 30.64 (SD:10.75) years, and males accounted for 86.9% of the donors, while more than half (53.8%) were repeat donors. The overall seroprevalence of transfusion transmissible infections was at 7.4%. The prevalence of HBV, HCV, HIV and Syphilis was 1.96%, 0.4%, 1.68% and 3.39%, respectively, of the total units tested. Syphilis was the most prevalent of all TTIs, accounting for 109 (45.6%) of all positive TTIs in the study. Blood donors between 39 and 49 and 50–60 years of age had significantly higher odds of HBV infection (COR 0.51, 95% CI 0.26–0.98, P = 0.04) and HIV infection (COR 0.42 95% CI 0.15–1.12, P = 0.05) respectively, and males were more likely to test for HIV (COR 1.91, 95% CI 0.99–3.66, P = 0.05).

Conclusion and Recommendation: The study found substantial levels of Transfusion Transmissible Infections among blood donors. Strict donor recruitment strategies should be maintained to minimize potential transmission and reduce blood discard.

Keywords: blood safety, blood transfusion, transfusion transmissible infections

Introduction

Blood transfusion is a medical procedure which involves the transfer of blood or certain blood products into a patient's circulation.[1] The process is widely performed globally for supportive therapy for patients with active or chronic bleeding, surgical events and other hematological disorders.[2] The provision and availability of blood transfusion services is dependent on a complex series of events, which usually begins with recruitment of adequate blood donors who may be voluntary (non-remunerated), paid or family members. The donor blood is then screened for the presence of transfusion transmissible infections (TTIs) and grouped to ensure safety and reduce transfusion complications.[3]

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Whereas there has been a gradual increase in annual total global blood donations over the years, majority of the collections (42%) occurred in high-income countries, which are home to only 16% of the world's population in 2018.[4] This reality has a health implication with lower- and middle-income countries having the largest burden of diseases and conditions that require prompt blood transfusions.

Although blood and blood components are well established as medical therapies, they are not without risk, and they have the potential for transmission of infectious diseases from donors to recipients. Infectious agents such as Hepatitis B virus, Hepatitis C virus, human immunodeficiency virus and Treponema pallidum, an organism that causes syphilis have been documented with evidence of transmission through blood transfusion.[5] These infections form a group known as the classical Transfusion Transmissible infections although there are a variety of other TTIs, including West Nile virus and a myriad of bacterial and protozoal pathogens.[6]

Transmission of infections through blood transfusion remains a global challenge, and countries in Lower and Middle income ranks are particularly most affected.[7] Sub Saharan Africa, Middle East, Mediterranean regions, South Asia and South America are regions with significant prevalence of transfusion transmissible infections.[8] According to recent estimates, for example, blood transfusion has been accounted for 5–10% of HIV infections and 4–12.5% of post-transfusion hepatitis in Sub Saharan Africa.[6]

The high prevalence of classical TTIs in lower income countries such as Uganda is partly due to the persistence of these infections in the general population.[9] The latest statistics from the United Nations Joint Aids Program (UNAIDS) estimate that about 1.5 million people were living with HIV/AIDS in Uganda in 2014 with a prevalence of 4.9% among adults (15–49 years), a key population recommended for blood donation.[10]

Although there is no official data from Uganda about the seroprevalence of TTIs, it is estimated that Uganda shares a similar trend of a higher prevalence with other East African countries such as Ethiopia (9.0%) and Tanzania at 15.1%.[11] Moreover, it is estimated that about 5–7% of blood transfusions in Uganda potentially lead to infection transmission.[12]

Despite national screening protocols, there is limited data on the prevalence and predictors of TTIs among blood donors in Western Uganda, particularly at Fort Portal Regional Blood Bank. Understanding this is essential to improving donor selection and ensuring blood safety.

Materials and Methods

Study Design and Setting

A cross-sectional study design was used where quantitative data was retrieved from blood bank databases at Fort Portal Regional blood bank. The blood bank is a constituent department under Uganda Blood transfusion Services and is established at Fort Portal Regional Referral Hospital (FPRRH) for analysis. The study population comprised all donors who had donated blood at Fort Portal Regional Referral Hospital or its auxiliary sites in between January and September 2021.

Sample Size and Sampling Method

The number of blood donors to participate in the study will be determined using Taro Yamane's formula of sample size determination.[13] Considering that Fort Portal regional blood bank collects an average of 3,000 units of blood on a monthly basis. This study sought to analyze existing data from 353 donors per month from January to October 2021. The formula states that;

$n = N/1 + Ne^2$

Where;

n = Sample size

N = the study population size

e = acceptable margin of error

n = 3000/1 + 3000(0.052)

=353

Therefore, 353 donors per month were considered, giving a total of 3530 donors who were considered to participate in this study. However, data from 3211 were considered during the analysis after omitting incomplete data.

Participant data was selected using a systematic random sampling approach. For each month, every 8th donor data entry was retrieved and considered in this study.

Laboratory Methods & Analysis

Fort Portal regional blood bank uses a two-step analysis method for the detection Syphilis antibodies among donor blood. Serum from donor blood was extracted and tested for the presence of Treponema antibodies using rapid plasma reagin (RPR) test. Antibodies to *Treponema pallidum* were later confirmed with *Treponema pallidum* Haemagglutination Assay (TPHA). All donor samples were screened for HIV-1 and 2 using the Architect HIV Ag/Ab Combo Assay (Abbot Laboratories, Diagnostic Division, Abbot Park. IL). This micro-particle immunoassay was used for simultaneous detection of HIV p24 antigen and antibodies to HIV type 1 and 2 in human serum or plasma. All donor blood was screened for the presence of Hepatitis B and C surface antigens in serum or plasma using the Architect i2000 analyzer ((Abbot Laboratories, Diagnostic Division, Abbot Park. IL).

Data Collection, Processing and Analysis

A data extraction checklist was developed and used to collect data from the donor database. Participant data including donor demographic characteristics and laboratory results of tested transfusion transmissible infections was obtained from the blood bank database. After data extraction, data coding was performed to develop an appropriate data structure and data was the entered in Microsoft Excel software. The data was then checked, cleaned and corrected for errors to set it ready for analysis. Data analysis was then performed using STATA Version 14.[14] Descriptive statistics were used to describe the data and proportions of the positivity of transfusion transmissible infections were generated to determine the prevalence of TTIs among blood donors. Bivariate logistic regression analysis was performed in order to identify sociodemographic predictors of TTIs among blood donors at Fort Portal Regional blood bank.

Inclusion Criteria

All donors whose data was completely entered into the data registers were included as potential participants of the study. All donors have met the minimum requirements for blood donation according to the National Blood Transfusion Services/Ministry of Health and the World Health Organization guidelines.[15]

Ethical Considerations

The study was approved by the Mulago National Referral Hospital Research Ethics Committee with a protocol number MHREC 2170. A waiver of consent was granted by the Research Ethics Committee for a retrospective study and no individual donor identifier characteristics were collected from the data base. Administrative approval was given by the FPRRH Hospital Director and Fort Portal Regional Blood Bank Principal Medical Officer In charge. The study was conducted in compliance with the declaration of Helsinki.

Results

Demographic Characteristics of Blood Donors

Majority of the blood donors were below 27 years 1346 (41.9%). The majority were male 2790 (86.9%) and more than half 1728 (53.8%) were repeat donors. The participant mean age was 30.64 years (SD, 10.75). Nearly half (47.84%) of the participants were blood group O, whereas nearly all (95.98%) participants were Rhesus positive (Table 1).

Distribution of Transfusion Transmissible Infections

Overall, Syphilis was the most common TTI, accounting for 45.6% of all positive transfusion transmissible infections. HBV and HIV accounted for 26.4% and 22.6% of all transfusion transmissible infections, respectively, while only 5.4% tested positive for HCV (Figure 1).

Table 1 Demographic Characteristics of Respondents

Donor characteristic	Frequency (n)	Percentage (%)
Age category Mean 30.64 (SD 10.75) 17-27 28-38 39-49 50-60	 1346 1289 452 125	 41.9 40.1 14.1 3.9
Sex Female Male	 422 2790	 13.1 86.9
Number of donations Repeat New	 1728 1484	 53.8 46.2
Rhesus status Negative Positive	 129 3082	 4.02 95.98
Blood Group A AB B O	 916 160 599 1536	 28.53 4.98 18.65 47.84

Seroprevalence of Transfusion Transmissible Infections at Fort Portal Regional Referral Hospital

The overall prevalence of transfusion transmissible infections was 7.4% of the total sample in this study, while only 0.37% of the blood donors were infected with more than one TTI (Table 2). The prevalence of HBV, HCV, HIV and Syphilis was 1.96%, 0.4%, 1.68% and 3.39% of the total sample size (3211), respectively.

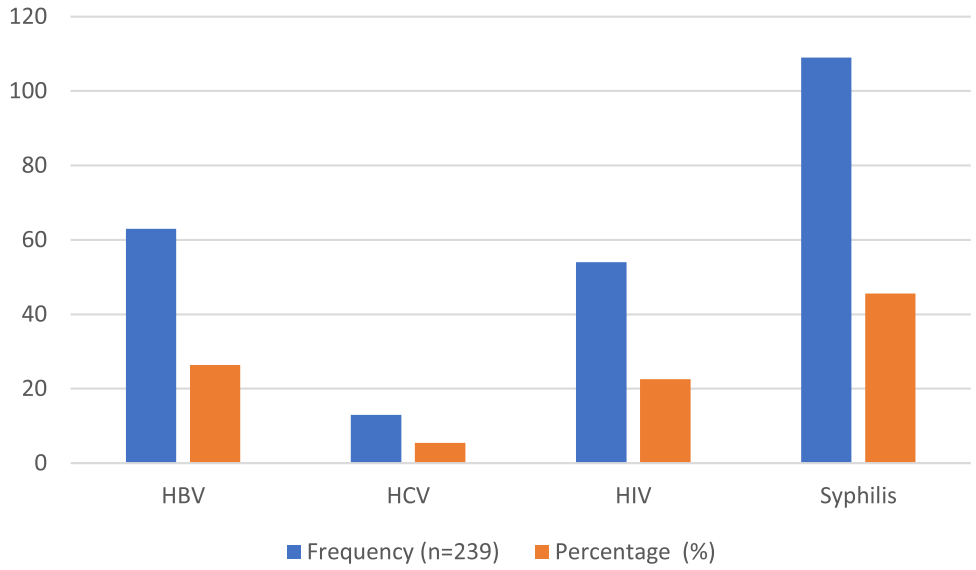

Figure 1 Proportion of Transfusion Transmissible Infections among blood donors at Fort Portal Regional blood bank.

Table 2 Seroprevalence of Transfusion Transmissible Infections (n = 3211)

Variable	Frequency	Percentage
HBV		
Reactive	63	1.96
Non-Reactive	3,148	98.04
HCV		
Reactive	13	0.40
Non-Reactive	3,198	99.60
HIV		
Reactive	54	1.68
Non-Reactive	3,157	98.32
Syphilis		
Reactive	109	3.39
Non-reactive	3,103	96.61
Infected with more than one TTI	12	0.37
Overall Prevalence	239	7.4

Frequency of Transfusion Transmissible Infections Among New and Repeat Donors

Generally, the frequency of all transfusion transmissible infections was higher for new donors compared to repeat donors (Table 3).

Predictors of Transfusion Transmissible Infections Among Blood Donors at Fort Portal Regional Blood Bank

The odds of testing positive for Hepatitis B virus were significant among blood donors aged between 39 and 49 years (COR 0.51, 95% CI 0.26–0.98, P = 0.04) while blood donors between 50 and 60 years were more likely to test positive for HIV (COR 0.42, 95% CI 0.15–1.12, P = 0.05). Male donors were more likely to test positive for HIV compared to females (COR 1.91, 95% CI 0.99–3.66, P = 0.05) (Table 4).

Table 3 Frequency of Transfusion Transmissible Infections Among New and Repeat Donors

Infection	New Donors (n=1484)	Repeat Donors (n=1728)	Total
HCV	7	6	13
HBV	41	22	63
HIV	31	23	54
Syphilis	67	42	109

Table 4 Predictors of Transfusion Transmissible Infections Among Blood Donors at Fort Portal Regional Blood Bank

Donor characteristics	HCV			HBV			HIV			Syphilis total		
	N (%)	COR (95% CI)	p-value	N (%)	COR (95% CI)	p-value	N (%)	COR (95% CI)	p-value	N (%)	COR (95% CI)	p-value
Age group (years)												
17-27 (N=1346)	5(0.4)	1		23 (1.7)	1		23 (1.7)	1		44 (3.3)	1	
28-38 (N=1289)	5(0.4)	0.96 (0.28–3.31)	0.94	23 (1.9)	0.96 (0.53–1.71)	0.88	23 (1.9)	0.95 (0.53–1.71)	0.880	42 (2.3)	1.0 (0.65–1.54)	0.99

(*Continued*)

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Table 4 (Continued).

Donor characteristics	HCV			HBV			HIV			Syphilis total		
	N (%)	COR (95% CI)	p-value	N (%)	COR (95% CI)	p-value	N (%)	COR (95% CI)	p-value	N (%)	COR (95% CI)	p-value
39-49 (N=452)	1(0.3)	1.68 (0.19–14.43)	0.63	15 (3.3)	0.51 (0.26–0.98)	0.04	3 (0.7)	2.60 (0.77–8.71)	0.121	20 (4.2)	0.74 (0.42–1.25)	0.25
50-60 (N=125)	2(1.6)	0.22 (0.04–1.19)	0.08	2 (1.6)	1.07 (0.25–4.59)	0.93	5 (4.0)	0.42 (0.15–1.12)	0.05	3 (2.4)	1.37 (0.42–4.49)	0.59
Sex												
Female (N=422)	1 (0.2)	1		8 (1.4)	1		12 (2.8)	1		17 (4.1)	1	
Male (N=2790)	12 (0.5)	0.55 (0.71–4.23)	0.56	55 (2.0)	0.96 (0.45–2.03)	0.91	42 (1.5)	1.91 (0.99–3.66)	0.05	92 (3.3)	1.23 (0.72–2.09)	0.44
Donation history												
New (N=1484)	8 (0.6)	1		29 (2.1)	1		28 (1.9)	1		44 (3.0)	1	
Repeat (N=1728)	5 (0.3)	1.87 (0.61–5.72)	0.51	34 (2.0)	1.006 (0.610–1.659)	0.98	26 (1.6)	0.79 (0.46–1.37)	0.40	65 (3.8)	0.782 (0.539–1.153)	0.21

Discussion

Seroprevalence of Transfusion Transmissible Infections

In this study, the overall prevalence of TTIs at Fort Regional blood bank was 7.4% (Table 2). This is in line with the World Health Organization's estimates that about 5–7% of donor blood could potentially lead to infection transmission.[12] Findings from this study follow a similar trend with some African countries such as Ethiopia at 6.0%,[11] and in 9.4% in Kenya.[16] However, regional and global variations exist as low as 1% in India[17] to 29% in some States in Nigeria.[18]

According to findings in this study, the prevalence of HBV among blood donors was 1.96% and Hepatitis B virus infection accounted for 26.4% of all the transfusion transmissible infections in the sample. A similar study conducted in the Democratic Republic of Congo revealed an HBV prevalence of 1.1%;[19] however, a relatively higher prevalence of 3.8% was reported in Ethiopia.[20] The reported HBV prevalence was less than the national prevalence according to recent studies including the Uganda Population-Based HIV Impact Assessment and a 2016 HBV modelling study, which estimated the Uganda national prevalence of HBV at 4.3% and 5.5%, respectively, with regional variations.[21,22] This is possibly due to strict adherence to the donor recruitment guidelines, which reduces the chances of blood donation among risk populations.

Data from this study further revealed that the prevalence of HIV among blood donors at Fort Portal Regional Blood Bank was 1.68% and this accounted for about 22.6% of all Transfusion transmissible infections in the sample. Similarly, a study conducted in Ethiopia found a low HIV prevalence among blood donors at 1.4%[23] Other studies have shown a higher HIV prevalence among blood donors in different countries, particularly in lower-income countries in Sub Sahara Africa.[24] Findings from this study also showed a prevalence that is far less than the Western Uganda regional HIV prevalence (5.5%), according to the preliminary results of the 2020 Uganda HIV Impact Assessment.[25] Significant adherence to national blood transfusion recruitment criteria reduces the prevalence of HIV and other TTIs; thus, minimising the chances of infection transmission and the rates of blood discard by the blood bank.

Compared to other transfusion transmissible infections, the prevalence of Syphilis among tested blood donors in this study was relatively higher at 3.39%, and accounted for almost 46% of all transfusion transmissible infections. This is higher than the Africa regional prevalence of 1.6% and 1.9% among men and women, respectively.[26] Other studies done recently have revealed varying Syphilis prevalences among blood donors from 0.3% in Namibia,[27] 2.5% in Nigeria[28] to 7.5% in Ethiopia.[29] Programs for effective treatment and elimination of Syphilis have been rolled out across Uganda including male partner notification for treatment of Syphilis among couples, screening and early treatment of Syphilis among key populations such as sex workers and advocacy for behavioral change for the prevention of Syphilis. These programs will further reduce the prevalence of Syphilis among the general population.[30]

This study identified important demographic correlates of transfusion-transmissible infections among blood donors, with age being significantly associated with hepatitis B virus (HBV) infection and sex being significantly associated with

HIV infection. Donors aged 39–49 years demonstrated a significantly different likelihood of HBV infection compared with younger donors aged 17–27 years. This age-related difference may reflect cumulative lifetime exposure to HBV risk factors.[31] Donors aged 39–49 years had an increased likelihood of HBV infection compared with those aged 17–27 years (COR = 0.51, 95% CI: 0.26–0.98; p = 0.04).

Sex was significantly associated with HIV infection, with male donors exhibiting almost twice the odds of HIV seropositivity compared with females (COR = 1.91, 95% CI: 0.99–3.66; p = 0.05). These findings are in contrast with the national prevalence of HIV stratified by sex, which has shown that HIV infection is more prevalent among women (7.2%) than males (4.3%).[32]

Conclusion and Recommendations

The overall prevalence of transfusion transmissible infections at Fort Portal Regional Blood bank was 7.4% with Syphilis as the most prevalent TTI. Age and sex were key predictors of TTIs among donors.

Regular monitoring of TTI trends and further studies incorporating behavioural and contextual risk factors are recommended to better understand drivers of infection and inform evidence-based policy.

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Disclosure

The authors report no conflicts of interest in this work.

References

1. Lotterman S, Sharma S. Blood Transfusion. *StatPearls*. *StatPearls*. 2025.
2. Ri M, Kasai M, Kohno A, et al. A survey of blood transfusion errors in aichi prefecture in Japan: identifying major lapses threatening the safety of transfusion recipients. *Transfus Apheresis Sci*. 2020;59:102735. doi:10.1016/j.transci.2020.102735
3. Roberts N, James S, Delaney M, Fitzmaurice C. The global need and availability of blood products: a modelling study. *Lancet Haematol*. 2019;6:e606–e615. doi:10.1016/S2352-3026(19)30200-5
4. World Health Organization. Global status report on blood safety and availability 2021. 2022. Available from: https://www.who.int/publications/i/item/9789240051683. Accessed July 22, 2025.
5. Song Y, Bian Y, Petzold M, Ung COL. Prevalence and trend of major transfusion-transmissible infections among blood donors in Western China, 2005 through 2010. *PLoS One*. 2014;9(4). doi:10.1371/journal.pone.0094528
6. Deressa T, Birhan W, Enawgaw B, et al. Proportion and predictors of transfusion-transmissible infections among blood donors in North Shewa Zone, Central North Ethiopia. *PLoS One*. 2018;13:e0194083. doi:10.1371/journal.pone.0194083
7. Dhingra N, Lloyd SE, Fordham J, Amin NA. Challenges in global blood safety. *World Hospitals and Health Services*. 2004;40:45–9,51,52.
8. Barro L, Drew VJ, Poda GG, et al. Blood transfusion in sub-Saharan Africa: understanding the missing gap and responding to present and future challenges. *Vox Sanguinis*. 2018;113:726–736. doi:10.1111/vox.12705
9. Mandal R, Mondal K. Transfusion transmissible infections among blood donors from a sub-Himalayan rural tertiary care centre in Darjeeling, India. *J Traditional Complementary Med*. 2016;6(3):224–229. doi:10.1016/j.jtcme.2015.02.003
10. UNAIDS. Uganda | UNAIDS. 2025. Available from: https://www.unaids.org/en/regionscountries/countries/uganda. Accessed July 22, 2025.
11. Shiferaw E, Tadilo W, Melkie I, Shiferaw M. Sero-prevalence and trends of transfusiontransmissible infections among blood donors at Bahir Dar district blood bank, northwest Ethiopia: a four year retrospective study. *PLoS One*. 2019;14:e0214755. doi:10.1371/journal.pone.0214755
12. World Health Organization. Global Status Report on Blood Safety and Availability 2016. Available from: https://www.who.int/publications/i/item/9789241565431. Accessed July 22, 2025.
13. Uakarn C, Chaokromthong K, Sintao N. Sample size estimation using yamane and cochran and krejcie and morgan and green formulas and cohen statistical power analysis by g*power and comparisions. *APHEIT Intl J Interdisciplinary Soc Sci and Technol*. 2021;10(2):76–86.
14. StataCorp. Stata 14 | stata. 2021. Available from: https://www.stata.com/stata14/. Accessed July 22, 2025.
15. Dodd RY, Crowder LA, Haynes JM, Notari EP, Stramer SL, Steele WR. Screening Blood Donors for HIV, HCV, and HBV at the American Red Cross: 10-Year Trends in Prevalence, Incidence, and Residual Risk, 2007 to 2016. *Transfusion Med Rev*. 2020;34:81–93. doi:10.1016/j.tmrv.2020.02.001
16. Onyango CG, Ogonda L, Guyah B, et al. Seroprevalence and determinants of transfusion transmissible infections among voluntary blood donors in Homabay, Kisumu and Siaya counties in western Kenya. *BMC Res Notes*. 2018;11(1):1–6. doi:10.1186/S13104-018-3276-Y/FIGURES/1
17. Karmakar PR, Shrivastava P, Ray TG. Seroprevalence of transfusion transmissible infections among blood donors at the blood bank of a Medical College of Kolkata. *Indian Journal of Public Health*. 2014;58:61. doi:10.4103/0019-557X.128172

18. Afolabi A, Abraham A, Oladipo E, Adefolarin A, Fagbami A. Transfusion transmissible viral infections among potential blood donors in Ibadan, Nigeria. *Afr J Clin Exp Microbiol*. 2013. doi:10.4314/ajcem.v14i2.6
19. Kabinda JM, Bulabula AN, Donnen P, et al. Residual risk of transmission of hiv and hepatitis b and c by blood transfusion in bukavu in the democratic republic of congo. *Open J Epidemiol*. 2014;4(3):157–163. doi:10.4236/OJEPI.2014.43021
20. Tessema B, Yismaw G, Kassu A, et al. Seroprevalence of HIV, HBV, HCV and syphilis infections among blood donors at Gondar University Teaching Hospital, Northwest Ethiopia: declining trends over a period of five years. *BMC Infect Dis*. 2010;10. doi:10.1186/1471-2334-10-111
21. Kitandwe PK, Muyanja E, Nakaweesa T, et al. Hepatitis B prevalence and incidence in the fishing communities of Lake Victoria, Uganda: a retrospective cohort study. *BMC Public Health*. 2021;21(1):1–8. doi:10.1186/S12889-021-10428-1/TABLES/2
22. Rugaatwa Ndibarema E, Olum R, Ayebare D, Kabakyenga J. Prevalence and factors associated with hepatitis b infection among outpatient adults in South-Western Uganda. *Hepat Med*. 2022;14:163–172. doi:10.2147/HMER.S381809
23. Heyredin I, Mengistie B, Weldegebreal F. Sero-prevalence of transfusion-transmittable infections and associated factors among blood donors in Eastern Ethiopia: an Institutional-based cross-sectional study. *SAGE Open Medicine*. 2019;7. 10.1177/2050312119834468.
24. Bartonjo G, Oundo J, Ng'ang'a Z. Prevalence and associated risk factors of transfusion transmissible infections among blood donors at regional blood transfusion center nakuru and tenwek mission hospital, kenya. *Pan Afr Med J*. 2019;34. doi:10.11604/PAMJ.2019.34.31.17885.
25. PHIA. Uganda Summary Sheet 2020-2021. PHIA Project. 2022. Available from: https://phia.icap.columbia.edu/uganda-summary-sheet-2020-2021/ . Accessed July 22, 2025.
26. Workneh M, Hamill MM, Kakooza F, et al. Antimicrobial resistance of neisseria gonorrhoeae in a newly implemented surveillance program in Uganda: surveillance report. *JMIR Public Health Surveill*. 2020;6(2):e17009. doi:10.2196/17009
27. Mavenyengwa RT, Mukesi M, Chipare I, Shoombe E. Prevalence of human immunodeficiency virus, syphilis, hepatitis B and C in blood donations in Namibia. *BMC Public Health*. 2014;14(1):1–7. doi:10.1186/1471-2458-14-424
28. Akaba K, Nwogoh B. The relationship between donor deferral and seropositivity of transfusion-transmissible infections: implication for transfusion services in the University of Calabar Teaching Hospital, Calabar. *Ann Trop Pathol*. 2022;9(1):22. doi:10.4103/ATP.ATP_24_18
29. Bisetegen FS, Bekele FB, Ageru TA, Wada FW. Transfusion-transmissible infections among voluntary blood donors at wolaita sodo university teaching referral hospital, south ethiopia. *Canadian J Infectious Dis Medl Microbiol*. 2016;2016:1–6. doi:10.1155/2016/8254343
30. Nakku-Joloba E, Kiguli J, Kayemba CN, et al. Perspectives on male partner notification and treatment for syphilis among antenatal women and their partners in Kampala and Wakiso districts, Uganda. *BMC Infect Dis*. 2019;19(1):1–13. doi:10.1186/S12879-019-3695-Y/TABLES/3
31. Degenhardt L, Charlson F, Stanaway J, et al. Estimating the burden of disease attributable to injecting drug use as a risk factor for HIV, hepatitis C, and hepatitis B: findings from the Global Burden of Disease Study 2013. *Lancet Infect Dis*. 2016;16(12):1385–1398. doi:10.1016/S1473-3099(16)30325-5
32. Nabayinda J, Kizito S, Nagawa A, Ssewamala FM. Reducing HIV in young women in Uganda: the need for autonomy. *Lancet*. 2024;404 (10452):519–520. doi:10.1016/S0140-6736(24)01442-9