

Determinants of syphilis among blood donors aged 17-65 at Mengo Hospital in Kampala District. A retrospective study.

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ABSTRACT

Background:

Syphilis is a sexually transmitted infection caused by the bacterium *Treponema pallidum* and continues to pose a significant public health challenge due to its potential for asymptomatic infections, vertical transmission, and possible spread through contaminated blood products. The study aimed to assess the prevalence, socio-demographic and behavioural determinants of syphilis among blood donors.

Methodology:

A retrospective cross-sectional study design was utilised, involving the selection of 222 blood donor records through systematic sampling. Data were collected using a data extraction form. The study utilised records of blood donors aged 17-65 who donated blood at Mengo Hospital from September 2025 to December 2025.

Results:

Among the 222 blood donors analysed, 10(4.5%) tested positive for syphilis. The seropositivity rate was higher in males (4.6%) compared to females (3.6%). Donors aged 26- 35 years exhibited the highest positivity rate (6.7%) relative to other age groups. Urban donors had a higher seropositivity (5.0%) compared to those from rural areas (2.4%). First-time donors showed an increased positivity rate of 5.8%, while donors with multiple sexual partners had a significantly higher positivity rate of 13.0%. Individuals with a history of sexually transmitted infections demonstrated a higher positivity rate (11.8%) compared to those without such a history. Donors belonging to the informal sector showed the highest Seroprevalence rate (7.3%) compared to the formal sector (2%).

Conclusion:

Syphilis remains a significant concern among blood donors, with seropositivity associated with certain demographic and behavioural characteristics. Strengthening donor screening, risk assessment, and targeted prevention education is essential to improve blood safety and reduce transmission.

Recommendations:

The Ministry of Health should prioritise the establishment and strengthening of STI clinics in community, district and regional referral hospitals to ensure routine screening, early detection and treatment of syphilis.

Keywords: Blood donors, Prevalence of syphilis, Behavioural determinants, Mengo Hospital, Contaminated blood products.

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Background

Syphilis is a sexually transmitted infection caused by the bacterium *Treponema pallidum* and continues to pose a significant public health challenge due to its potential for asymptomatic infections, vertical transmission, and possible spread through contaminated blood products (WHO 2024). The disease advances through four stages: primary, secondary, latent, and tertiary, with untreated cases leading to serious complications (CDC, 2021). The primary stage is characterised by the appearance of a chancre at the site of infection, while the secondary stage involves widespread symptoms like rashes and lesions. During the latent phase, patients may not show any symptoms but still harbour the infection. If untreated, syphilis can advance to tertiary syphilis, which can cause significant complications such as neurological disorders and death (World Health Organisation, 2021).

The World Health Organisation estimates approximately 12 million new cases occur each year, with a notable increase in incidence among certain demographics, particularly young adults and men who have sex with men (WHO, 2021). The prevalence of syphilis among blood donors varies across regions and populations. A study in China, an upper-middle-income country re-ported syphilis prevalence rates ranging from 0.88%-0.98% among blood donors (Liu *et al.*, 2019). Conversely, syphilis has remained endemic in low- and middle-income countries; rates can be significantly higher due to factors such as inadequate access to healthcare and lower awareness of sexual health. For example, a study in Eastern Ethiopia found syphilis prevalence rates among blood donors as high as 3.4% (Heyredin *et al.*, 2019).

In Uganda, recent facility-level reviews report that treponemal seropositivity continues to be detected among

donated blood units despite mandatory screening at blood banks, hence undermining transfusion safety and increasing the workload and cost of discarding infected units. (Cwinyaai *et al.*, 2024). A multicentered review at a tertiary hospital blood bank found syphilis to be the most frequent transfusion-transmissible infection among analysed donations, with notable persistence over six years (Kanyike *et al.*, 2025). Similarly, regionally representative data from Arua showed treponemal seroprevalence among donors and identified male sex and donor type as important correlates of TTIs (Cwinyaai *et al.*, 2024). Community and antenatal investigations in Uganda also link syphilis risk to sexual behaviour and missed testing opportunities, demonstrating that multiple partners and gaps in antenatal screening remain relevant determinants (Hakizimana *et al.*, 2023). The study aims to determine the prevalence, socio-demographic and behavioural determinants of syphilis among blood donors aged 17-65 at Mengo Hospital in Kampala District.

Methodology

Study Design

The study employed a retrospective cross-sectional design to analyse existing data and determine the prevalence, socio-demographic and behavioural determinants of syphilis among blood donors who donated blood at Mengo Hospital. This design is appropriate for providing a snapshot of syphilis prevalence and identifying associated factors using established hospital records.

Study Setting

The study was conducted at the Mengo Hospital Blood Bank, located in the Lubaga Division of Kampala, Uganda. The facility is a private, not-for-profit tertiary hospital situated on Namirembe Hill.

Study Population

The study utilised records of blood donors aged 17-65 who donated blood at Mengo Hospital from September 2025 to December 2025.

Sample Size Determination and its Justification

The sample size (n) was calculated using Yamane's formula.

$$n = \frac{N}{(1+N(e)^2)}$$

n = sample size

Where:

N= population (500)

e = margin of error (0.05)

$$n = \frac{500}{(1+500(0.05)^2)}$$

$$= 222.22$$

$$n = 222$$

Sampling Procedure

A systematic sampling technique was used to select records that meet the inclusion criteria because it is a practical,

unbiased, and time-efficient method for obtaining a representative sample from a sampling frame of medical records.

Using the study population of 500 and the calculated sample size of 222, the sampling Interval

(K) is;

$$K = \frac{N}{n}$$

n

Where N= 500 and n = 222

$$K = \frac{500}{222}$$

$$2.25$$

$$K = 2$$

$$K = 2$$

From the first K records, I set my starting point to 2, and from that point, I selected every 2nd donor from the existing records of blood donors that meet the inclusion criteria.

Inclusion and Exclusion Criteria

Inclusion criteria: Donor records of blood donors aged 17-65. Donor records of blood donors who donated from September 2025 to December 2025, with complete demographic and syphilis screening information.

Exclusion criteria: Donor records missing key information.

Study Variables

The dependent variable was syphilis prevalence among blood donors.

Independent variables were grouped into socio-demographic and behavioural determinants; Socio-demographic determinants: age, sex, residence, donor type, and occupation.

Behavioural determinants: multiple sexual partners and history of STIs.

Research Tools

A data extraction form was used to capture information on the prevalence, socio-demographic and behavioural determinants of syphilis.

Data Collection Procedure

After obtaining ethical and administrative clearance from Mildmay Institute of Health Sciences, I presented the introduction letter to the Mengo Hospital Ethical Committee to obtain an approval letter. Upon receiving approval, I collected data from archived blood donor records. The data obtained were entered into the data collection tools for analysis.

Data Management and Analysis

Collected data were checked daily for completeness before being entered into Microsoft Excel for cleaning and coding. Descriptive statistics were used to summarise socio-demographic and behavioural determinants of blood donors. Categorical variables were presented as frequencies and percentages. The prevalence of syphilis was calculated as the proportion of donors who tested positive out of the total number of donors who were screened and expressed as a percentage.

Data Presentation

Data were presented using tables, charts, and narratives to summarise the prevalence, socio- demographic and behavioural determinants of Syphilis among blood donors.

Quality Control

Only complete donor records from Mengo Hospital were used.

A structured data extraction form was used to collect data to ensure consistency. Regular supervision of extracted data was done to ensure accuracy.

Collected data were reviewed for errors, missing values, or inconsistencies.

Ethical Considerations

Ethical approval for this study was obtained from the Institutional Review Board of Mengo Hospital. Since it's a retrospective study utilising existing records, informed consent from the blood donors was impossible; however, efforts were made to maintain confidentiality and anonymity of all data. All the collected data was used solely for research purposes.

Results

Socio-demographic characteristics of blood donors aged 17-65 at Mengo Hospital.

Table 1: Socio-demographic characteristics of blood donors.

Socio-demographic	Category	Frequency	Percentage
Characteristics		(f)	(%)
Age (years)	17-25	32	14.4
	26-35	90	40.5
	36-45	83	37.4
	46-55	13	5.9
	56-65	4	1.8
Sex	Male	194	87.4
	Female	28	12.6
Occupation	Formal sector	101	45.5
	Informal sector	96	43.2
	Student	25	11.3
Residence	Urban	180	81.1
	Rural	42	18.9

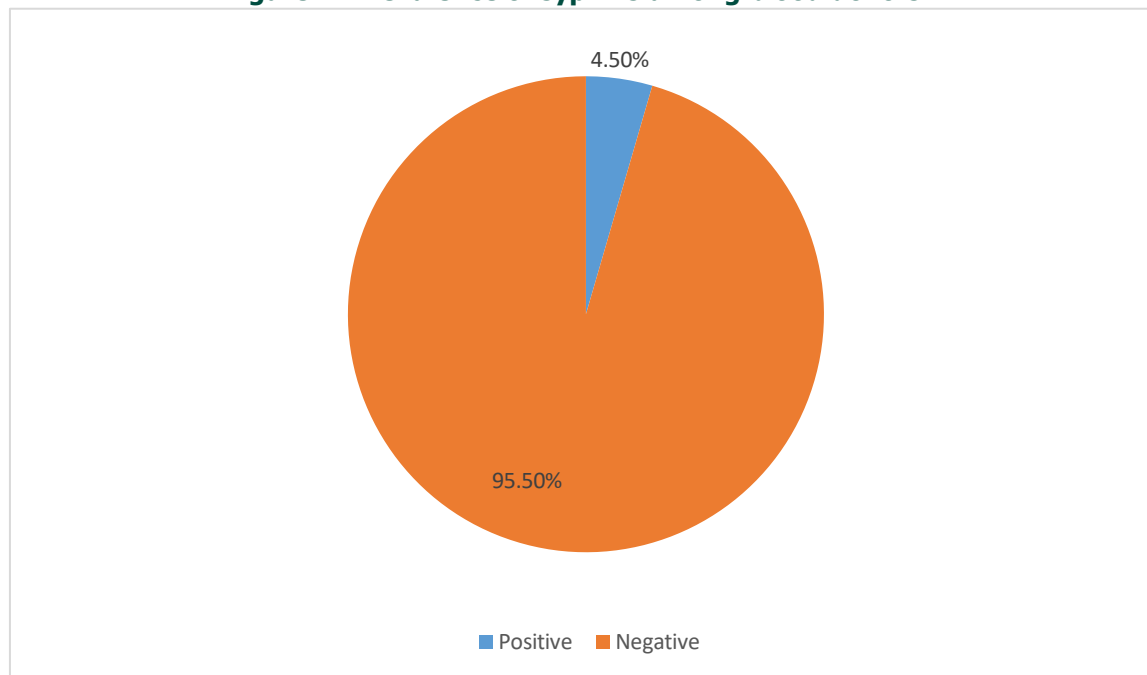
Socio-demographic characteristics of blood donors

Most of the donors, 90 (40.5%), were aged between 26-35 years, while the fewest, 4 (1.8%), were aged between 56-65 years. The majority of the donors were male, 194 (87.4%). Regarding occupation, most donors belonged to the formal sector, 101 (45.5%), followed by the informal sector, 96 (43.2%), with students being the fewest, 25 (11.3%). The majority of the donors, 180 (81.1%), resided in urban areas,

while 42 (18.9%) resided in rural settings.

Prevalence of Syphilis among blood donors aged 17-65 at Mengo Hospital.

Out of 222 donors, 10 donors were positive for syphilis (4.5%), while 212 donors were negative (95.5%). Therefore, the prevalence rate of syphilis among blood donors aged 17-65 at Mengo Hospital was 4.5%.

Figure 1: Prevalence of syphilis among blood donors.

Socio-demographic determinants of Syphilis among blood donors aged 17-65 at Mengo Hospital.

Table 2: Socio-demographic determinants of Syphilis among blood donors

Socio-demographic	Categ ory	Frequen cy	Po siti ve	Neg ative	Seropreval ence
Determinants		(%)			(%)
Sex	Male	194(87.4)	9	185	4.6
	Fema le	28(12.6)	1	27	3.6
Age(years)	17-25	32(14.4)	1	31	3.1
	26-35	90(40.5)	6	84	6.7
	36-45	83(37.4)	3	80	3.6
	46-55	13(5.9)	0	13	0.0
	56-65	4(1.8)	0	4	0.0
Donor type	New	138(62.2)	8	130	5.8
	Repeat	55(24.8)	1	54	1.8
Residence	Regular	29(13.1)	1	28	3.4
	Urban	180(81.1)	9	171	5.0
Occupation		42(18.9)	1	41	2.4
	Formal	101(45.5)	2	99	2.0
	sector				
	Informal	96(43.2)	7	89	7.3
	sector				
	Student	25(11.3)	1	24	4.0

Socio-demographic determinants of syphilis among blood donors.

According to the findings, male donors showed a higher seroprevalence rate (4.6%) than female donors (3.6%). Blood donors aged 26-35 presented the highest seroprevalence rate (6.7%) compared to other age groups; donors in the age groups 46-55 and 56-65 were all negative for syphilis, resulting in a seroprevalence rate of 0.0%. New

donors showed a higher seroprevalence rate (5.8%) than the repeat and regular donors, with repeat donors having the lowest positivity rate (1.8%). Donors from urban areas presented a higher seroprevalence rate (5.0%) than donors from rural settings (2.4%). Regarding occupation, donors belonging to the informal sector showed the highest Seroprevalence rate (7.3%) compared to the formal sector (2%) and students (4%). Behavioural determinants of Syphilis among donors aged 17-65 at Mengo Hospital.

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Table 3: Behavioural determinants of syphilis among blood donors.

Behavioral determinants	Cate gory	Frequen cy (%)	Po sit iv e	Neg ativ e	Seroprevale nce
Multiple sexual Partners	Yes	23(10.4)	3	20	13.0
	No	199(89.6)	7	192	3.5
History of STIs	Yes	17(7.7)	2	15	11.8
	No	205(92.3)	8	197	3.9

Findings on the behavioural determinants of Syphilis revealed that blood donors with multiple sexual partners showed a higher positivity rate (13.0%) than donors with no such history (3.5%). Blood donors with a history of STIs showed a higher Seroprevalence rate (11.8%).

Discussion

The prevalence of syphilis among blood donors in this study was 4.5%. This aligns with the study conducted in Uganda at a private tertiary hospital where the prevalence of syphilis among blood donors was 3.0% (Kanyike *et al.*, 2025). This underscores the necessity for routine screening and awareness campaigns specifically targeting blood donors, who may be unaware of their syphilis infection status.

The study revealed that certain socio-demographic characteristics significantly correlated with syphilis prevalence. Age was a notable determinant, with young adults exhibiting a higher positivity rate of syphilis (6.7%) compared to other age groups. This association may reflect a tendency among young individuals to engage in riskier sexual behaviours, such as multiple partners and inconsistent condom use. This finding aligns with research conducted among U.S blood donors, which also identified age as a key determinant of syphilis prevalence among young adults (Kane *et al.*, 2015). Sex differences were also observed, with males showing a higher prevalence (4.6%) than females (3.6%). This finding indicates that gender is another socio-demographic determinant of syphilis among blood donors. Regarding residence, the findings revealed that blood donors from urban settings exhibited a higher seroprevalence

of syphilis (5.0%) than those from rural settings local settings (2.4%). The difference may be attributed to greater exposure to health education and availability of STI screening facilities in urban settings. This contrasts with findings from Burkina Faso, where higher syphilis prevalence was reported among blood donors from rural areas (Bisseye *et al.*, 2013).

New donors demonstrated the highest positivity rate (5.8%) compared to regular and repeat donors. This underscores the need for enhanced STI screening facilities and improved health education about syphilis within communities to ensure individuals are aware of their syphilis status. This finding is consistent with research on U.S blood donors, which reported higher seropositivity among first-time donors compared to regular and repeat donors. (Kane *et al.*, 2015).

Key behavioural determinants identified in this study included having multiple sexual partners and a history of STIs. Blood donors with a history of STIs exhibited a higher syphilis positivity rate of 11.8% compared to those without such a history (3.9%). This elevated prevalence may be attributed to a compromised immune system, placing these individuals at greater risk for subsequent infections, including syphilis. This finding aligns with studies conducted among

U.S blood donors, where a history of STIs was identified as a significant determinant of syphilis (Kane *et al.*, 2015).

Additionally, blood donors with multiple sexual partners showed a notably higher syphilis positivity rate of 13.0%. This indicates that having multiple sexual partners is a

significant behavioural determinant of syphilis among blood donors. These findings underscore the need for educational interventions aimed at increasing awareness about syphilis, particularly focusing on safe sexual practices and the importance of regular testing. This aligns with the study that was conducted among pregnant women in China, where individuals with multiple sexual partners exhibited a higher seroprevalence rate of syphilis. (Liu *et al.*, 2019).

Conclusions

This study specifically sought to determine the prevalence, socio-demographic and behavioural determinants of syphilis among blood donors aged 17-65 at Mengo Hospital. The study established the prevalence of syphilis among blood donors as 4.5%, the socio-demographic determinants of syphilis as: age, sex, donor type and occupation, and the behavioural determinants of syphilis as: multiple sexual partners and a history of STIs. The socio-demographic and behavioural determinants identified provide critical insights into the factors contributing to syphilis transmission within this population. Addressing these issues through targeted interventions is essential for reducing syphilis rates and thereby promoting blood safety and improving overall public health outcomes.

Limitations

The reliance on the accuracy and completeness of existing medical records, potential biases in donor-reported data regarding sexual behaviour, inadequate time for data collection, and the retrospective nature of the study limited the ability to establish causality between determinants and syphilis prevalence.

Recommendations

The Ministry of Health should prioritise the establishment and strengthening of STI clinics in community, district and regional referral hospitals to ensure routine screening, early detection and treatment of syphilis.

Mengo Hospital should develop targeted educational initiatives aimed at blood donors, focusing on the importance of safe sexual practices, regular STI testing including syphilis, and awareness of syphilis symptoms.

Mengo Hospital should collaborate with local organisations to create outreach programs that provide information about Syphilis and promote testing services in high-risk communities.

Mengo Hospital should encourage longitudinal studies to monitor trends in syphilis prevalence among blood donors over time and evaluate the effectiveness of implemented interventions.

List of abbreviations and acronyms

CDC: Centers for Disease Control and Prevention

MSM: Men Who Have Sex with Men

SADC: Southern African Development Community

STIs: Sexually Transmitted Infections

TTIs: Transfusion Transmissible Infections

WHO: World Health Organisation

Source of funding

The study was not funded.

Conflict of interest

The authors did not declare any conflict of interest.

Data availability

Data are available upon request.

Author contributions

Margaret Naluswata collected data and drafted the manuscript of the study

Tonny Gambira supervised the study

Francisco Ssemuwemba supervised the study

Nansereko Hasifa supervised the study

Jane Frank Naulbega supervised the study

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