ONLINE ISSN :3007-309X
PRINT ISSN :3007-3081

Journal of Medical & Health Sciences Review

PREVALENCE OF SYPHILIS AMONG HEALTHY BLOOD DONORS IN DISTRICT FAISALABAD

Shafaq Ashraf[1], Hafiz Muhammad Siddique[2a], Komal Arooj[2b], Sohail Sajid*[3], Aqsa Khalid[4], Sajjad Ahmad[5], Talha Moeez[6], Muhammad Sarwar Hayat[7], Areej Naveed[2c], Muhammad Rashid[2d],

[1]Department of Biochemistry, The University of Agriculture, Faisalabad, Pakistan
[2]RCRAHS, Riphah International University, Faisalabad Campus, Pakistan
[3]The University of Haripur, Haripur, Pakistan, **Email:** sohailsajid2016@gmail.com
[4]Department of Medical Laboratory Technology, Government College University Faisalabad, Pakistan
[5]PMAS Arid Agriculture University, GIMS Gujrat Campus, Pakistan
[6]College of International Skills Development, Lahore, Pakistan
[7]Department of Allied Health Sciences, The Superior University Lahore, Faisalabad Campus, Pakistan

ARTICLE INFO:

Keywords: Syphilis; Blood Donors; Transfusion-Transmissible Infections (TTIs); Seroprevalence; Faisalabad; Screening Protocols.

Corresponding Author: Sohail Sajid, The University of Haripur, Haripur, Pakistan, **Email:** sohailsajid2016@gmail.com

Article History:
Published on 06 July 2025

ABSTRACT

Blood transfusion is a cornerstone of modern medical care, critical for surgeries, trauma management, chronic illnesses, and maternal health. However, the safety of transfused blood relies heavily on effective screening protocols to prevent transfusion-transmissible infections (TTIs), including syphilis—a chronic, systemic, and often asymptomatic disease caused by Treponema pallidum. Given its potential to cause serious complications such as neurosyphilis, cardiovascular involvement, and congenital transmission, syphilis remains a significant global public health concern. This study was conducted to assess the prevalence of syphilis among healthy blood donors at Allied Hospital, Faisalabad, and to evaluate the effectiveness of current blood screening practices. Conducted from December 2023 to January 2024, the study included 16,206 blood donors, predominantly male (99.59%), mostly aged 18–30, and largely replacement donors from rural and suburban areas. Systematic sampling was employed, and blood samples were screened using immuno-chromatographic testing (ICT) and ELISA for confirmation. The seroprevalence of syphilis was found to be 0.9935%, a notable increase compared to earlier local findings. These results suggest a potential underestimation of syphilis burden in the community and indicate the need for routine donor screening, particularly in regions with limited healthcare access and awareness. The findings also reflect socio-economic challenges, insufficient sexual health education, and barriers to preventive care in underserved populations. Addressing these gaps through targeted public health campaigns, enhanced access to diagnostics, and continuous surveillance is essential to mitigate the transmission risk. This study contributes valuable epidemiological insight into syphilis prevalence in Pakistan and calls for stronger, equity-focused health strategies to ensure both the safety of blood transfusions and broader disease control efforts.

INTRODUCTION:

Blood donation is essential for medical treatments, surgeries, and emergency care. It provides a lifeline for patients suffering from a variety of conditions, including accident victims, surgical patients, individuals with chronic illnesses, and those undergoing cancer treatments. During natural disasters, accidents, or mass casualty events, a readily available supply of donated blood is vital for immediate medical response (Mueller et al., 2019). Without an adequate blood supply, the chances of survival for many patients in critical condition are greatly diminished. Individuals with chronic illnesses, such as sickle cell anemia or thalassemia, often require regular blood transfusions to manage their conditions and improve their quality of life. Regular blood donations help sustain the health of these patients (Alsalmi, Almalki, Alghamdi, & Aljasir, 2019).

Cancer patients, particularly those undergoing chemotherapy, may experience a decrease in their blood cell counts. Blood transfusions are often necessary to help manage the side effects of cancer treatments (Wu et al., 2018). Blood donations are essential in providing safe childbirth and neonatal care. Complications during pregnancy and childbirth can lead to excessive bleeding and donated blood can be a critical part of maternal and neonatal healthcare (Adewale, Taiwo, Ibrahim, & Hauwa, 2020). Many surgical procedures, both routine and complex, require blood transfusions to replace blood lost during surgery (Muñoz et al., 2018).

Understanding the prevalence of syphilis among healthy blood donors is crucial for ensuring the safety of blood transfusions and for monitoring the overall burden of the disease within the population (Liu et al., 2019). As syphilis can be asymptomatic in its early stages, infected individuals may unknowingly donate blood, putting recipients at risk of acquiring the infection through transfusion (Patel, Oussedik, Landis, & Strowd, 2018). Given the potential for syphilis to cause serious health complications, including neurological and cardiovascular manifestations, as well as adverse outcomes in pregnant women and their infants, accurate surveillance and monitoring of syphilis prevalence among healthy donors are essential for guiding public health interventions and ensuring the safety of blood transfusions (Attie et al., 2021). Syphilis is a sexually transmitted infection (STI) caused by the bacterium Treponema pallidum. It is a chronic, systemic disease that can affect multiple organ systems and cause a wide range of symptoms, making it a significant public health concern worldwide. Syphilis can be transmitted through sexual contact (including oral, vaginal, and anal sex), as well as from mother to child during pregnancy or childbirth (Çakmak, Tamer, Karadağ, & Waugh, 2019).

The course of syphilis infection typically progresses through several stages, each characterized by distinct clinical manifestations. These stages are primary, secondary, latent, and tertiary syphilis. This initial stage usually begins with the appearance of a painless sore, known as a chancre, at the site of infection. Chancres can develop on the genitals, anus, lips, or mouth. They are highly infectious, and if left untreated, they can spontaneously resolve within a few weeks. However, the bacteria remain in the body and continue to cause damage if not treated (Rocha, Araújo, Barros, Américo, & Silva Júnior, 2021).

If the infection is not treated during the primary stage, the disease progresses to the secondary stage. This stage is characterized by a variety of symptoms, including skin rash (typically on the palms of the hands and soles of the feet), fever, sore throat, swollen lymph nodes, fatigue, headaches, and muscle aches. These symptoms may come and go over several weeks or months. If syphilis remains untreated after the secondary stage, it enters a latent period where there are no visible symptoms, but the infection persists. Latent syphilis can last for years, and during this time, the infection can still be transmitted to others, especially during the early part of the latent

period. In some cases, if syphilis remains untreated for many years, it can progress to the tertiary stage, which is characterized by severecomplications that can affect the heart, brain, nerves, eyes, blood vessels, liver, bones, and joints. Tertiary syphilis can lead to devastating health problems, including neurosyphilis (infection of the nervous system), cardiovascular syphilis (affecting the heart and blood vessels), and gummatous syphilis (formation of destructive granulomas) (Gomes et al., 2017). Syphilis can be diagnosed through various laboratory tests, including blood tests that detect antibodies to the bacteria or direct detection methods such as dark-field microscopy or polymerase chain reaction (PCR). Treatment for syphilis typically involves antibiotics, primarily penicillin. Early detection and treatment are crucial to prevent the progression of the disease and reduce the risk of complications. Additionally, it's essential for sexual partners of individuals diagnosed with syphilis to seek testing and treatment to prevent further spread of the infection. Prevention of syphilis involves practicing safe sex, including consistent and correct use of condoms, reducing the number of sexual partners, and avoiding sexual contact with individuals known to have syphilis or other STIs. Screening for syphilis is recommended for individuals at increased risk of infection, including sexually active individuals, pregnant women, and people living with HIV. Public health efforts to increase awareness, promote testing, and ensure access to treatment are crucial in controlling the spread of syphilis and reducing its impact on individuals and communities (Nawaz et al., 2025).

Socioeconomic factors such as poverty, lack of access to healthcare, inadequate education about sexual health, and stigma surrounding STIs can influence the prevalence and impact of syphilis. Individuals from marginalized communities or those facing social exclusion may have limited access to preventive services, testing, and treatment, which can exacerbate the spread of syphilis. Access to quality healthcare services, including STI testing, treatment, and prevention, is essential for controlling the spread of syphilis. Disparities in healthcare access, particularly among underserved populations, can contribute to delayed diagnosis and treatment of syphilis, leading to increased transmission and complications. Increased mobility and travel facilitate the spread of syphilis across geographic regions. International travel, migration, and population movements can introduce new strains of syphilis into communities and contribute to the emergence of drug-resistant strains. Efforts to monitor and control syphilis transmission on a global scale are essential to prevent outbreaks and address emerging challenges (Nazir et al., 2025).

Substance use, including injection drug use, can increase the risk of syphilis transmission through shared needles and syringes. Additionally, drug use may impair judgment and lead to risky sexual behaviors, further increasing the likelihood of acquiring or transmitting syphilis. Individuals living with HIV are at increased risk of acquiring syphilis due to immunosuppression and higher levels of sexual risk behavior. HIV infection can also complicate the clinical course of syphilis, leading to more severe manifestations and increased risk of transmission to sexual partners. Addressing these factors requires a comprehensive approach that includes promoting sexual health education, increasing access to STI testing and treatment services, reducing stigma associated with syphilis and other STIs, implementing evidence-based prevention strategies, and addressing social determinants of health such as poverty and inequality. Public health efforts should be tailored to the specific needs of affected populations and communities to effectively control the spread of syphilis and mitigate its impact on individuals and public health systems (Arooj et al., 2025).

Healthy blood donors are essential for maintaining a safe and sufficient blood supply for various medical purposes,

including emergencies, surgeries, and ongoing medical treatments. Donors who are in good health and meet the eligibility criteria provide blood that is less likely to transmit infections or diseases. This ensures the safety of the blood supply and reduces the risk of transmitting blood-borne illnesses to recipients. Healthy donors provide high-quality blood and blood products. Blood from individuals who are free from certain medical conditions or infections is more likely to be effective in treating patients and can be used for a wider range of medical procedures (Spicknall, Kreisel, & Weinstock, 2021).

RESEARCH METHODOLOGY:

This research was designed as a systematic study to assess the prevalence of syphilis among voluntary blood donors. It was carried out at Allied Hospital, a tertiary care teaching hospital located in Faisalabad, Pakistan. The study was conducted over a defined period of two months, starting from December 2023 and concluding in January 2024, following the approval of the research synopsis by the relevant academic and ethical review committees. A total of 16,206 blood samples were collected from donors who visited the hospital's blood bank during this period. The target population for this study consisted of apparently healthy individuals who were donating blood, referred to as Group A. A systematic sampling technique was utilized to ensure a representative sample and reduce selection bias. This approach involved the selection of participants who consented to participate and were considered eligible based on predefined criteria. The inclusion criteria were strictly limited to donor samples that were intact and of good quality. In contrast, samples that were hemolyzed, clotted, or collected in broken vials were excluded to preserve the integrity and reliability of the testing process. Baseline data were collected from each participant, which included demographic details and relevant medical history. All personal information was kept confidential, and donor identity remained anonymous throughout the research process.

For the detection of syphilis, two diagnostic procedures were employed: immuno-chromatographic testing (ICT) and enzyme-linked immunosorbent assay (ELISA).

The immuno-chromatographic test, often used as a rapid diagnostic method, operates through lateral flow technology. In this method, a small amount of the blood sample is placed on a test strip that contains immobilized antigens specific to Treponema pallidum, the bacterium responsible for syphilis. If antibodies against T. pallidum are present, they bind to these antigens, forming antigen-antibody complexes. These complexes then interact with a labeled detection system, such as colloidal gold particles, producing a visible signal—usually a colored line. The simplicity, speed, and minimal equipment requirements make this test especially useful in clinical and field settings. However, it may lack sensitivity and specificity, particularly during early stages of infection or in asymptomatic individuals. To support and confirm the findings of ICT, the ELISA method was also used. ELISA is a more sensitive and specific laboratory-based test that can accurately detect the presence of antibodies generated in response to T. pallidum infection. The assay employed treponemal antigens, which are known to produce a strong immune response. Specific tests under this category, such as Treponema pallidum Particle Agglutination (TPPA) and Fluorescent Treponemal Antibody Absorption (FTA-ABS), provide highly specific results. However, it is important to note that antibodies detected through ELISA may persist even after the infection has been treated, making it unsuitable for assessing treatment response or distinguishing between active and past infections. Data collected through these diagnostic techniques were compiled and subjected to statistical analysis. The analysis focused on descriptive statistics, with results presented in terms of frequency and percentage distributions to identify trends in syphilis prevalence among the donor population (Amin et al., 2019).

RESULTS:

Understanding the prevalence of syphilis among healthy blood donors is crucial for safeguarding public health and ensuring the safety of blood transfusions. As a transfusion-transmissible infection, syphilis poses a significant risk to recipients if not detected and treated appropriately. By assessing the prevalence of syphilis in healthy donors, healthcare authorities can implement effective screening protocols to minimize the risk of transmission during blood transfusions. Moreover, tracking syphilis prevalence among blood donors provides valuable epidemiological insights into the spread of the disease within the population, enabling targeted interventions and public health strategies to control its transmission.

Furthermore, the prevalence of syphilis among healthy donors serves as an important indicator of disease burden within the community. High prevalence rates among blood donors may signal a broader issue of syphilis prevalence in the general population, necessitating intensified public health efforts for prevention, detection, and treatment. Early detection of syphilis cases among donors enables prompt intervention, including treatment and counseling, to prevent disease progression and reduce the risk of further transmission. Additionally, evaluating syphilis prevalence among healthy donors helps assess the effectiveness of existing screening programs, guiding improvements in blood donor selection and screening protocols to enhance blood safety and quality.

A total of 16,206 blood donors were screened; 16,140 were males and 66 were females with a mean age of 30.1±2 years (range 19 to 57 years), of which 95% were replacement blood donors.

Table 1: Detail description of donor blood groups

Donor registered	**Donor Bleed**								
Blood group	A+ve	B+ve	AB+ve	O+ve	A-ve	B-ve	AB-ve	O-ve	Total
August	1037	1372	810	1280	257	316	142	227	5441
September	1037	1372	810	1280	251	322	162	227	5461
October	1047	1472	761	1275	184	321	64	180	5304
Total	**3121**	**4216**	**2381**	**3835**	**692**	**959**	**368**	**634**	**16206**

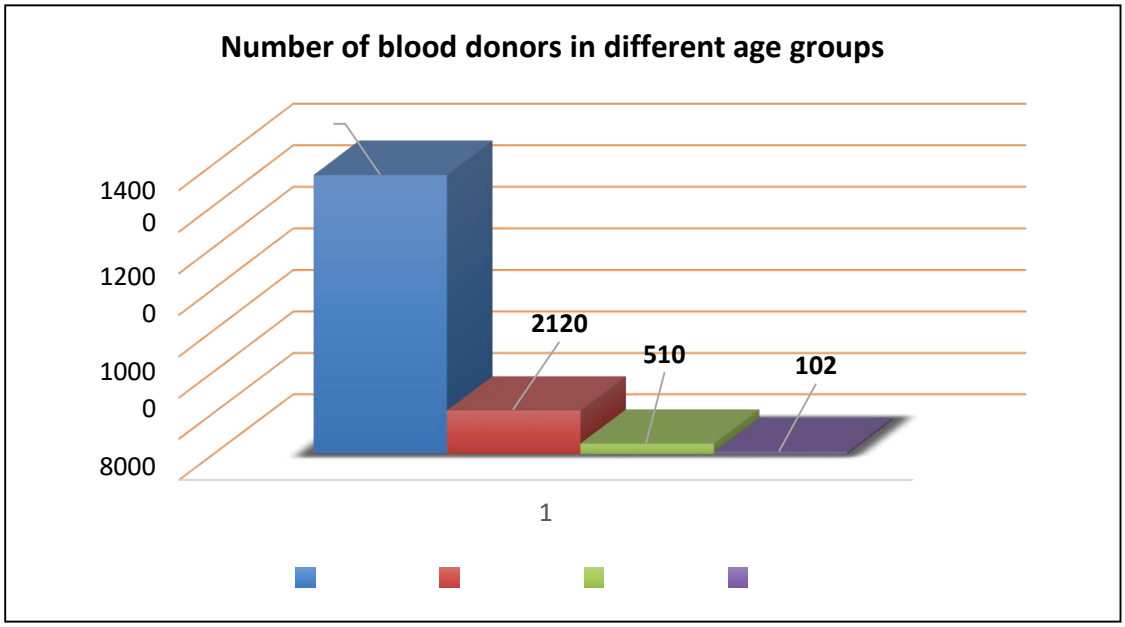

Figure 1: Number of blood donors in different age groups

Table 2: Number of male and female in blood donors

Sr#	Total	Male	Female
Quantity (Number)	16206	16140	66
Percentage (%)	100	99.59	0.40

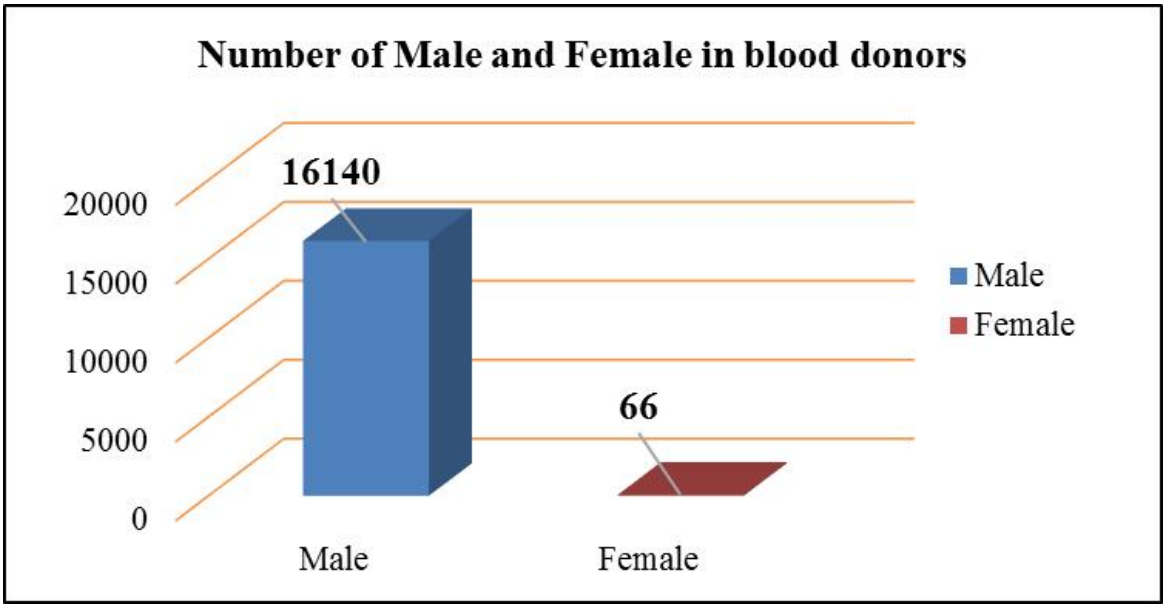

Figure 1: Number of male and female in blood donors

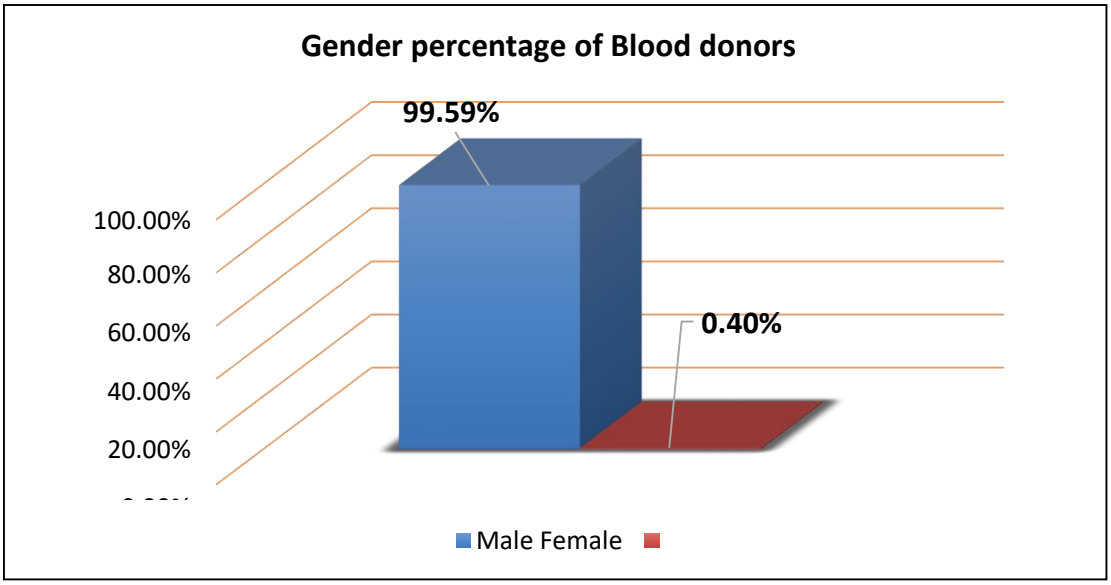

Figure 2: Gender percentage of blood donors

Table 3: Details description of blood screening

Donor registered	Screening				
Blood Test	HIV	HBsAg	HCV	MP	TP
Male	16140	16140	16140	16140	16140
Female	66	66	66	66	66
Total	**16206**	**16206**	**16206**	**16206**	**16206**

Table 4: Details description of reactive results

Donor registered	Reactive results				
Blood Test	HIV	HBsAg	HCV	MP	TP
Male	-	201	362	-	158
Female	-	12	08	-	3
Total	**-**	**213**	**370**	**-**	**161**

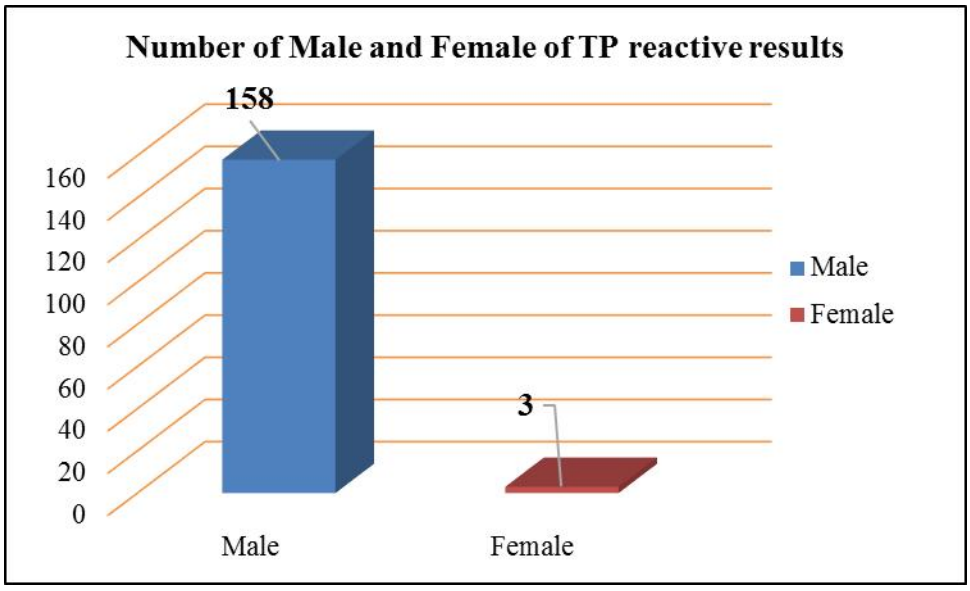

Figure 3: Number of male and female of TP reactive results

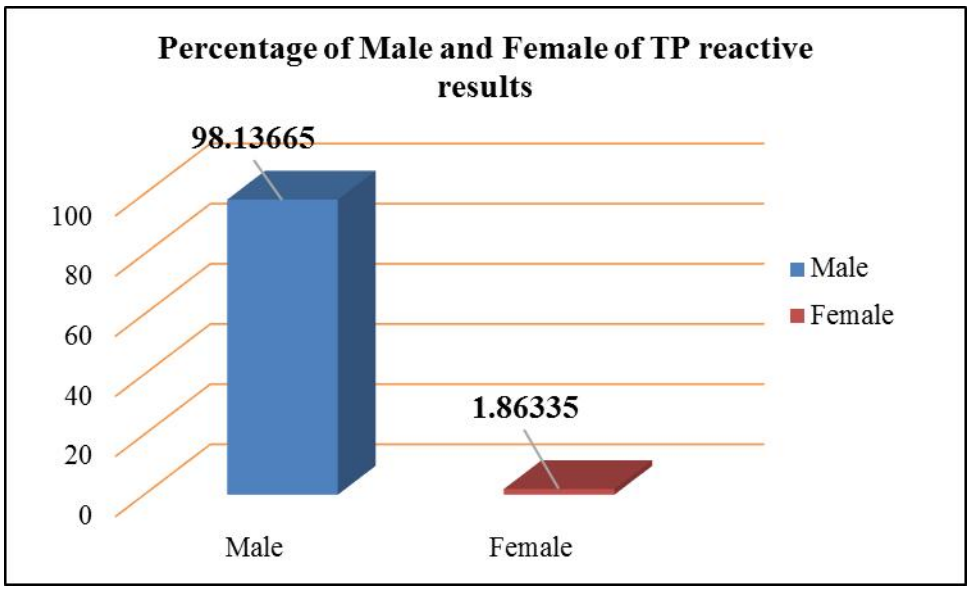

Figure 4: Percentage of male and female of TP reactive results

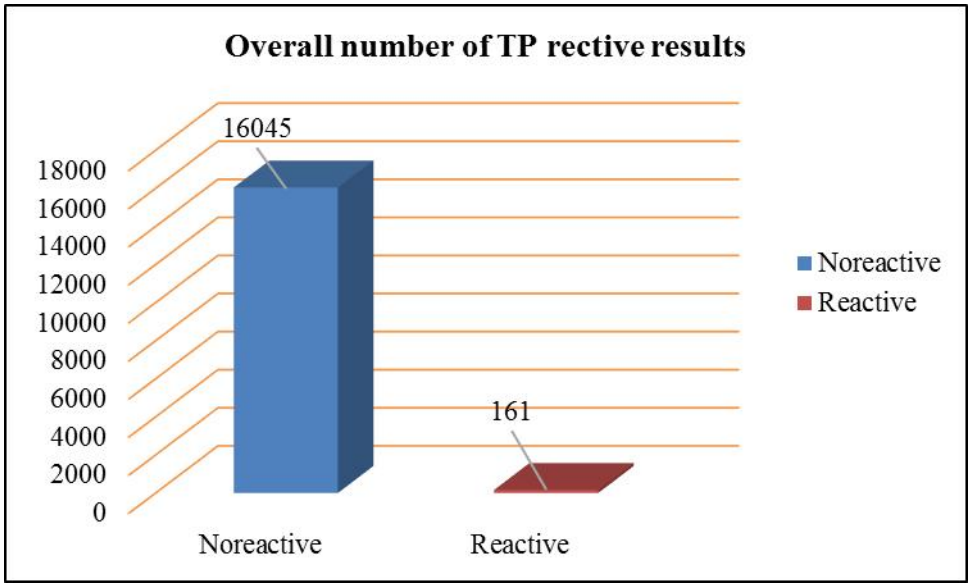

Figure 5: Overall number of TP reactive and unreactive results

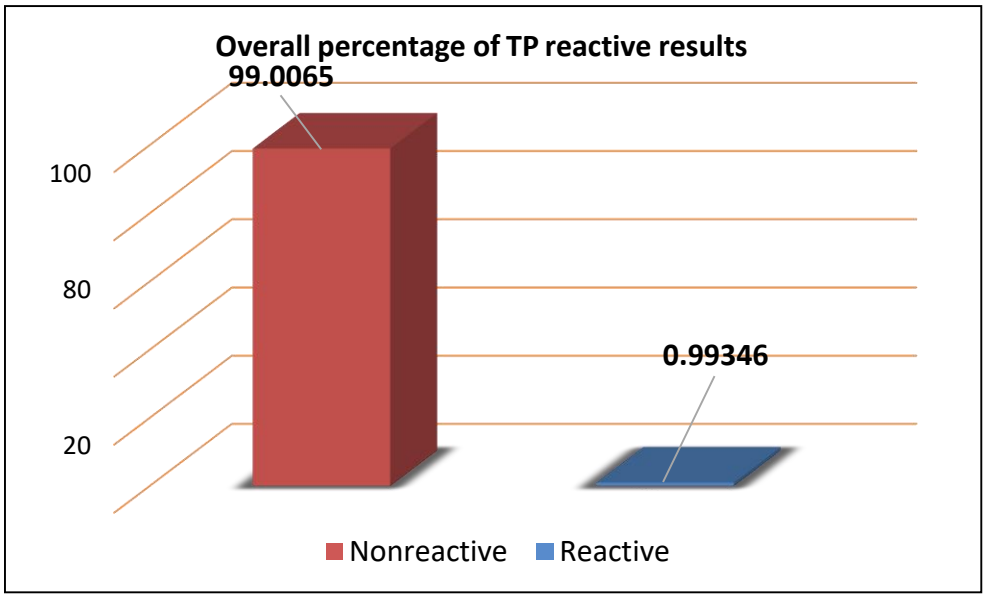

Figure 6: Overall Percentage of TP reactive and unreactive results

DISCUSSION:

Blood transfusion remains a critical medical practice, necessitating strict screening to ensure safety and track the prevalence of transfusion-transmissible infections (TTIs). Our study highlights a notable rise in syphilis seroprevalence among healthy blood donors in Faisalabad, reaching 0.9935%. This rate is higher than previously reported local figures and aligns with international findings from countries like Iran and Israel, suggesting an upward trend that demands attention. Most donors in this study were replacement donors, primarily aged 18–30 years, a pattern observed in similar regional studies. Female participation remained low, indicating a need for greater gender inclusivity in blood donation drives. The demographic profile largely rural and suburban points to possible disparities in health awareness and access to sexual health services. The increased seroprevalence of syphilis in this population underlines the need for routine screening, especially given the often asymptomatic nature of early-stage infection. Public health interventions tailored to rural settings, including education, accessible diagnostics,

and timely treatment, are crucial. In addition, continuous monitoring through longitudinal studies is recommended to evaluate intervention outcomes and better understand transmission dynamics. Strengthening community engagement and promoting safe sexual practices can further help in reducing disease transmission. Collaborative efforts between healthcare institutions and local stakeholders are essential to improve early diagnosis and control of syphilis in vulnerable populations. The study reveals a concerning syphilis burden among blood donors in suburban Faisalabad, calling for strengthened screening protocols and community-based awareness efforts to combat its spread effectively.

CONCLUSION:

A notable proportion of blood donors were found to be carriers of transfusion-transmissible infections (TTIs), emphasizing the urgent need for improved preventive measures. Strengthening donor selection criteria, encouraging voluntary donations, and ensuring robust screening for infections such as HCV, HBV, HIV, syphilis, and malaria are essential for safeguarding blood recipients. The rising trend of syphilis in Pakistan, as demonstrated by the 0.9935% seroprevalence observed in this study, highlights the need for targeted public health interventions, especially among high-risk donor populations. Future studies will explore the knowledge, attitudes, and behaviors of blood donors to further enhance blood safety and support evidence-based policy development. Our findings offer valuable insights into the burden of syphilis among healthy blood donors, particularly in suburban and rural regions of Faisalabad, underscoring the importance of routine screening, awareness programs, and accessible healthcare services. This growing prevalence indicates the need for ongoing surveillance and long-term monitoring to track trends and evaluate the effectiveness of interventions. Additionally, addressing socio-economic and healthcare access disparities is critical to breaking transmission chains and improving outcomes. In conclusion, prioritizing syphilis prevention in rural and suburban areas through equitable healthcare access and targeted education campaigns is vital to mitigating this emerging public health threat.

REFERENCES:

vale, O. A., Taiwo, G. A., Ibrahim, H. U., & Hauwa, U. (2020). Antenatal blood donation: Perception of pregnant women in a rural community northwest Nigeria. Nigerian Journal of Medicine, 29(1), 142-146.

mi, M. A., Almalki, H. M., Alghamdi, A. A., & Aljasir, B. A. (2019). Knowledge, attitude and practice of blood donation among health professions students in Saudi Arabia; A cross-sectional study. Journal of family medicine and primary care, 8(7), 2322-2327.

ı, H., Jafar, H. S., Sadiq, F., Bhatti, S., Ahmad, N., Gul, S., & Lodhi, Y. (2019). Prevalence of syphilis among the healthy blood donors-A hospital based retrospective study. Pjmhs, 13(3), 647-650.

j, K., Hayat, M. S., Asghar, S., Jabran, M., Ahmad, S., Kiran, R., & Ashraf, Z. (2025). IDENTIFICATION AND ASSOCIATION OF RISK FACTORS FOR HEPATITIS B AND C IN FAISALABAD, PAKISTAN.

, A., de Almeida-Neto, C., S Witkin, S., Derriga, J., Nishiya, A. S., Ferreira, J. E., . . . Levi, J. E. (2021). Detection and analysis of blood donors seropositive for syphilis. Transfusion Medicine, 31(2), 121-128.

ıak, S. K., Tamer, E., Karadağ, A. S., & Waugh, M. (2019). Syphilis: a great imitator. Clinics in dermatology, 37(3), 182-191.

es, N. C. R. C., Meier, D. A. P., Pieri, F. M., Alves, E., Albanese, S. P. R., Lentine, E. C., . . . Dessunti, E. M. (2017). Prevalence and factors associated with syphilis in a Reference Center. Revista da Sociedade Brasileira de Medicina Tropical, 50, 27-34.

S., Luo, L., Xi, G., Wan, L., Zhong, L., Chen, X., . . . Li, N. (2019). Seroprevalence and risk factors on Syphilis among blood donors in Chengdu, China, from 2005 to 2017. BMC infectious diseases, 19, 1-8.

ler, M. M., Van Remoortel, H., Meybohm, P., Aranko, K., Aubron, C., Burger, R., . . . Devine, D. (2019). Patient blood management: recommendations from the

2018 Frankfurt Consensus Conference. Jama, 321(10), 983-997.

Muñoz, M., Acheson, A., Bisbe, E., Butcher, A., Gómez-Ramírez, S., Khalafallah, A., . . . Meybohm, P. (2018). An international consensus statement on the management of postoperative anaemia after major surgical procedures. Anaesthesia, 73(11), 1418-1431.

Nawaz, I., Kalsoom, F., Naz, B., Hayat, M. S., Imtiaz, H., Kiran, R., . . . Sohail, S. (2025). Evaluation of Antibacterial Efficacy of Clove Oil Against Multidrug-Resistant Clinical Isolates. Journal of Medical & Health Sciences Review, 2(2).

Nazir, Q., Awais, M., Naeem, J., Zahid, A., Saleem, R., Adeel, M., . . . Hayat, M. S. (2025). PREVALENCE AND RISK FACTORS OF HEPATITIS B VIRUS AND HEPATITIS C VIRUS AMONG PREGNANT WOMEN OF FAISALABAD, PUNJAB, PAKISTAN. Journal of Medical & Health Sciences Review, 2(2).

Patel, N. U., Oussedik, E., Landis, E. T., & Strowd, L. C. (2018). Early congenital syphilis: recognising symptoms of an increasingly prevalent disease. Journal of Cutaneous Medicine and Surgery, 22(1), 97-99.

Rocha, A. F. B., Araújo, M. A. L., Barros, V. L. d., Américo, C. F., & Silva Júnior, G. B. d. (2021). Complications, clinical manifestations of congenital syphilis, and aspects related to its prevention: an integrative review. Revista Brasileira de Enfermagem, 74, e20190318.

Spicknall, I. H., Kreisel, K. M., & Weinstock, H. S. (2021). Estimates of the prevalence and incidence of syphilis in the United States, 2018. Sexually Transmitted Diseases, 48(4), 247-252.

Wu, H.-L., Tai, Y.-H., Lin, S.-P., Chan, M.-Y., Chen, H.-H., & Chang, K.-Y. (2018). The impact of blood transfusion on recurrence and mortality following colorectal cancer resection: a propensity score analysis of 4,030 patients. Scientific reports, 8(1), 1-8.