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Narrative Review

Epidemiological Landscape of Human Immunodeficiency Virus in Pakistan

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Abstract

Objective: To summarize the epidemiological trends of HIV Pakistan and address the major gaps in the prevention and access to treatment among key populations of HIV.

Methodology: This narrative review was conducted between March-June 2025. PubMed, Scopus, The Lancet, Google Scholar, UNAIDS, the National AIDS Control Programme (NACP), WHO, and World Bank databases, as well as national and provincial reports were also searched to support evidence. The data were tabulated according to key populations, province, and chronology to identify the trends and treatment gaps. Pakistan focused sources that addressed prevalence, epidemiology, and access to care of interest to Pakistan were taken into considerations.

Results: The HIV prevalence in Pakistan is approximately 0.1% with the estimated number of PLHIV being 260,000 though very high prevalence rates of HIV are reported among key populations of individuals at high risk, including transgender people and sex workers. The healthcare system is skewed towards metropolitan sites, and the antiretroviral therapy (ART) is more easily accessible there than in rural areas. The progress towards UNAIDS goals is insufficient and there is a significant gap in diagnosis, initiation of ART, and viral suppression, especially among vulnerable groups.

Conclusion: The HIV epidemic in Pakistan is a high public health challenge and disproportionately affects key populations, and it rapidly affects marginalized populations despite the country having a low national prevalence. The persistence stigmatization, uneven access to ART, and health system limitations need to be addressed with decentralized rights-based HIV care and targeted preventive strategies to prevent further expansion of the epidemics.

Keywords: Epidemiology, Public Health, HIV, UNAIDS, Health disparities, Pakistan

Introduction

Human Immunodeficiency Virus (HIV) remains one of the most pressing global health challenges, with an estimated 38 million people living with HIV (PLHIV) worldwide in 2021. Despite substantial advances in Antiretroviral therapy (ART), prevention strategies, and global control initiatives, HIV continues to disproportionately affect certain regions and key populations, resulting in millions of deaths globally.[1] Sub-Saharan Africa remains the most severely affected region; however, South Asia including Pakistan, has experienced a steadily increasing burden, driven by complex social, economic, and healthcare-related factors.[2]

Across South Asia, the HIV epidemic continues to contribute significantly to morbidity and mortality.[2] India bears the highest burden in the region, with approximately 2.1 million PLHIV. Within India, states such as Tamil Nadu, Maharashtra, and Karnataka report particularly high prevalence among key populations, with infection rates among men who have sex with men (MSM) reaching up to 9.6% in major urban centers such as Mumbai and Chennai.[3] In Nepal, an estimated 11,000 individuals are living with HIV.[4] Sri Lanka has maintained a low national prevalence of less than 0.1%.[5] Bangladesh reports a general population prevalence of around 0.1%, with approximately 12,000 PLHIV.[6] Afghanistan has an estimated 1,000–2,000 PLHIV, predominantly among injecting drug users (IDUs), where prevalence reaches nearly 3% in Kabul.[7]

This regional concentration of HIV within key populations reflects patterns similar to those observed in Pakistan, where cross-border migration, drug routes, and refugee movements play an important role in shaping the country's HIV epidemiology.

HIV is an emerging health issue in Pakistan particularly among key populations such as people who inject drugs (PWID), MSM, transgender individuals, and sex workers, who experience disproportionately high infection rates. Socio-cultural stigma, poor healthcare infrastructure, and poor access to prevention and treatment services, especially in rural and under-serviced areas, contribute to the spread of HIV in Pakistan. Such difficulties make the fight against the epidemic and global targets such as the UNAIDS goals quite challenging.[8]

Despite the overall low prevalence of HIV in Pakistan, it is clear that there are significant regional and demographic

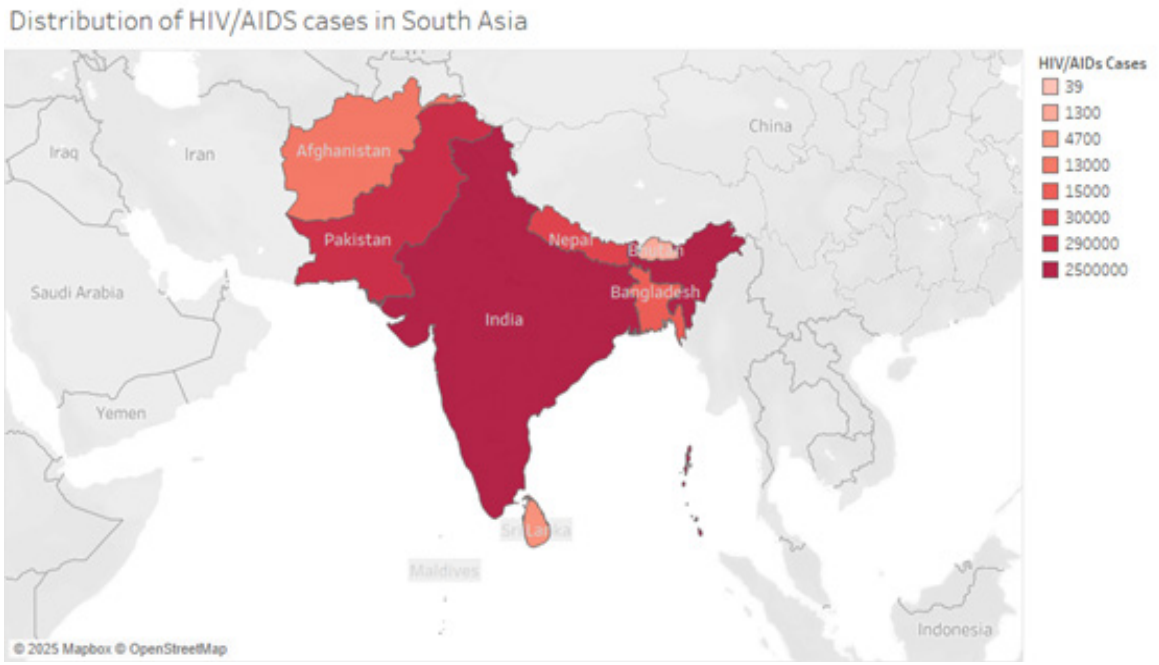

Figure 1: Distribution of cases of PLHIV in South Asian countries as per UNAIDS 2023 Global AIDS updates.

variations in the country, which are concealed by the national averages. The HIV prevalence rates are much higher in high-risk populations, including PWIDs and MSM, transgender people, and sex workers. For example, high-risk behavior and poor access to HIV prevention and care services have led to a high prevalence of HIV among PWID in Pakistan, estimated to be 28.94%,[9] whereas MSM and transgender individuals have an increased risk of developing the disease, and rural areas such as Balochistan and Khyber Pakhtunkhwa continue to experience poorer outcomes of accessing HIV prevention and care services. Major outbreaks in the regions of Sindh including Larkana has been highlighted by the vulnerability of certain communities, further underlining the urgency of addressing HIV in these high-risk groups. Despite the national efforts, treatment access is still uneven with urban centers like Lahore, Karachi, and Faisalabad showing better availability of ART services compared to rural provinces like Balochistan and Khyber Pakhtunkhwa.[10]

Although other studies have addressed a number of issues concerning HIV epidemic in Pakistan, the country still has a huge gap in terms of reviews that can be used to analyse not only the nature of the epidemiological processes but also the problem in accessing treatment. Despite the establishment of National AIDS control program in 1987, Pakistan continues to face substantial barriers in controlling this epidemic.[11] These barriers include persistent stigma, underreporting, social exclusion, and inequities in healthcare access. Additionally, the UNAIDS targets remain unmet, and the country struggles with regional and demographic disparities that hinder the effectiveness of HIV programs.

Multiple studies have examined individual components of the epidemic so there remains no consolidated, updated review synthesizing epidemiological trends alongside structural barriers to treatment access. This review addresses this gap by providing a comprehensive, narrative synthesis of Pakistan HIV landscape by highlighting current epidemiological patterns, treatment inequities and public health priorities.

Methodology

This narrative review was conducted between March and June 2025. The data was obtained through a wide range of credible international and national sources. As a narrative review, search strategy was not structured, the screening framework was not present, therefore, sources were selected according to relevance, credibility and contribution to understanding epidemiological trends, access to treatment, and barriers to health in Pakistan. The information sources included PubMed, Scopus, The Lancet, and Google Scholar, as well as the reports of the Joint United Nations Programme on HIV and data of the National AIDS Control Programme (NACP) in Pakistan that has been managing national HIV prevention and treatment programs since 1987. Additional data was obtained through the World Health Organization (WHO), the World Bank and provincial health authorities across Pakistan.

Literature and reports were reviewed to extract information about epidemiological patterns, access to treatment, and inequity related to healthcare in Pakistan as far as HIV is concerned. The data was well-organized in chronological position, by province and by the populations that are most important to identify major trends, treatment gap and geographical differences. No systematic search strategy/ method, and as the review aimed to provide a descriptive and contextual synthesis rather than a meta-analysis.

Inclusion criteria involved peer-reviewed articles, official reports, and datasets that studied HIV prevalence and epidemiological trends in Pakistan and treatment accessibility were included as the inclusion criteria. The selection of the data sources was made according to their credibility, relevance, and timeliness i.e., they had to be sources that offer current information regarding the state of HIV management and health concerns of the population in the country. The exclusion criterion included the research that focused only on the other countries other than South Asian

region, which did not have a direct relevance in Pakistan, and those that assessed the effect of HIV treatment in the absence of epidemiological background.

All the derived data were categorized into thematic matters in order to explain the development of the HIV epidemic in Pakistan, regional variations, and the state of high-risk groups, which formed the basis of the later findings and discussion.

Results

HIV Trends in Pakistan (1987-2025)

The national prevalence of HIV in Pakistan is estimated to be 0.1% of the adult population, which is approximately 260,000 PLHIV.[12] The first HIV case was reported in 1987, marking the beginning of the epidemic initiative of AIDS in Pakistan.[13] The NACP was established in 1988 in response to the cases and to establish the preventive measures of AIDS in the country. The first official case of AIDS was reported soon thereafter, signaling the onset of AIDS-related mortality in the country.[14]

The 2001, Antenatal Clinic (ANC) was the first study to present the evidence on HIV prevalence among pregnant women.[15] In 2003, an outbreak among intravenous drug users in Larkana, Sindh, drew the national attention to the growing epidemic. The Enhanced AIDS Control Programme (EACP), initiated in 2004, sought to improve data collection, enhance awareness, and strengthen intervention measures through the launch of the HIV/AIDS Surveillance Project (HASP).[16] In 2005, ART centers were established to provide treatment for individuals living with HIV, while NACP and other agencies expanded monitoring efforts between 2006 and 2007, focusing on key populations such as IDUs, male sex workers (MSWs), and MSM.[15]

HIV incidences in Pakistan have been on the rise since 2010 particularly among the high-risk groups. By 2015, there were more than 45,000 people who are HIV-positive, which was accompanied by AIDS-related deaths.[17] In the first part of this decade, it was 38.4% among PWIDs, 7.2% among transgender individuals, and 5.6% among MSM. With these alarming statistics, it was still only 54% of HIV-affected individuals who enrolled on ART treatment.[18] Twenty-five studies conducted during this period described seven localized HIV outbreaks across Pakistan.[19] Studies conducted in this period had reported seven localized epidemics of HIV in Pakistan, the highest being 1.3% prevalence in Kot Imrana, Sargodha, in 2018.[20]

The Larkana outbreak was investigated along with the United Nations and local health officials, and the problem of hazardous injection methods and inadequate measures to control the infection were found to be the primary methods of transmission.[14] The current estimates show that there are approximately 350,000 HIV-infected people in Pakistan, which has led to 14,000 AIDS-related deaths. However, only 16% of PLHIV are under ART, which also indicates that there is a disparity in the availability of treatment and healthcare facilities. It is estimated that about 7% of these people have achieved a number of viral loads.[21] December 2024 statistics indicate that there are about 0.33 million people with HIV of which 74,619 know about their status, and only 51,821 (15.7) are currently under ART care as of 94 treatment sites across Punjab.[22]

Current Burden and Key Populations

The epidemic in Pakistan remains relatively localized in specific significant areas of demography. The affected PWIDs and show a prevalence rate of 28.94%,[23] which is the indicator of high vulnerability among this group of people. Moreover, MSM also demonstrated the prevalence of 18.3% driven by stigma.[24] Female sex workers (FSWs) and transgender also remain vulnerable due to the nature of their work and limited access to the protection and health care. A recent study showed a prevalence rate of 3.3% among FSWs.[25] Prison populations represent a high-risk population with a prevalence rate of 2.28% compared to a national average. The most commonly reported risk behaviors in prisons are extra-marital sex (43.7%), homosexual (22.7%), and needle sharing (21.42%). Hepatitis B, C and TB co-infections are a common occurrence that complicates the management of HIV. Transgender population is highly vulnerable, with a prevalence rate of 4.4%.[26]

Mother-to-child transmission accounts for approximately 1% of new infections.[27] Migrant workers remain an emerging high-risk group due to unsafe sexual practices, lack of access to healthcare in host countries, and inadequate testing services during migration. The surge in the incidence has especially affected the children that could jeopardize the future of Pakistan. In several outbreaks, 80% of detected cases involved children.[28] Children are increasingly being affected. New cases among those aged 0-14 years surged from 530 cases in 2010 to 1800 in 2023.[21]

Treatment gaps

High-risk populations in Pakistan face disproportionately higher HIV prevalence than in the general population. This disparity is increased by factors such as poverty, unemployment, and lack of access to healthcare. The actions and marginalization of these individuals in society often stop their pursuit of therapy, exacerbating the current trend of disease increment of HIV. Being a notably troubling trend, the incidence among PWIDs has hit a record high of 25.4%, that is an alarming trend.[29]

Similarly, MSM continue to experience high infection rates of about 18.3% along with stigma serving as a major barrier to treatment uptake.[24] FSWs face additional challenges like low literacy, poor awareness of transmission risks and limited healthcare access. Prison populations usually require policy-based interventions to ensure regular screening and treatment while transgender individuals face obstacles related to lack of identification documents and social discrimination both of which restrict access to HIV prevention services. Migrant workers face similar vulnerabilities due to inconsistent access to HIV testing and delayed diagnosis during or after migration. Co-infections with hepatitis B, hepatitis C, and tuberculosis are also common among HIV positive individuals, further complicating treatment outcomes and long-term disease management.[30]

Regional disparities

Geographical discrepancies are high in Pakistan either in terms of diagnosis, accessibility to treatment and access to ART. The provinces with the most amount of ART centers are Punjab (45), followed by Sindh (24), Khyber Pakhtunkhwa (13), and Balochistan (5). The Islamabad Capital Territory with a population of more than a million operates only three ART centers. Although there is a high growth rate, the imbalance in services remains a big challenge in the management of the epidemic with the number of ART facilities approximating 90 nationally by 2024, with urban cities dominating the provision of ART leaving rural areas as underserved.[31]

Progress on UNAIDS 90-90-90 targets

Pakistan continues to struggle with the challenges of achieving the UNAIDS 90-90-90 targets that stipulate that 90% of PLHIV be aware of their HIV status, 90% of those who are diagnosed to receive ART and 90% of patients on ART achieve viral suppression. It is estimated that there are 350,000 HIV-positive people in the country.[32] Of them, only 21% are diagnosed with HIV, which is very low in comparison with the initial goal of 90, specifically in high-risk groups, including people who inject drugs, transgender people, and migrants. The third 90 target of viral suppression has been achieved in about 7% of people, but this figure is not optimal due to irregular follow-up, a delay in the initiation of treatment, and an inability to monitor viral loads in rural areas.[33]

Discussion

This study highlights a transition in the HIV epidemiology in Pakistan, which has shifted from a largely sporadic pattern to a more concentrated epidemic, predominantly affecting specific high-risk groups. This transition has unfolded alongside persistent inequities in healthcare access between urban and rural areas. Although the number of ART centres has increased to 90 by 2024, several provinces, including Balochistan, Khyber Pakhtunkhwa, and parts of Sindh remain critically under-served, with a small number of facilities covering very large populations, reflecting marked provincial disparities. The widening urban–rural divide further exacerbates these gaps, leaving many people in remote settings with limited or no access to basic HIV care and treatment.

Stigma and discrimination remain a major obstacle to effective management of HIV, particularly among marginalized populations such as PWIDs and MSM as well as transgender persons. These groups often feel discouraged to seek testing or treatment because of the social exclusion and discriminatory attitudes they face at hospitals. Such marginalization reinforces stigma and spreads the virus among these groups of people, whereas oppressive legal systems, especially banning drug use and homosexual relations, act as critical barriers to outreach and service delivery to high-risk groups.[34]

The healthcare system in Pakistan is not well developed, particularly in rural and peri-urban regions whereby access to services as far as HIV and healthcare providers and providers are limited consequently leading to a poor treatment outcome and low rates of viral suppression. The solution to these systemic barriers requires an in-depth approach that incorporates equitable access, reduction of stigma, and evidence-based policy implementation. The expansion and decentralization of the ART services to the provinces that have been neglected especially those of Balochistan, Khyber Pakhtunkhwa, and Sindh should be prioritized.[35] High-risk populations can actively participate in prevention by introducing pre-exposure prophylaxis (PrEP) and self-testing kits, which can be delivered to the community through continuous awareness-raising campaigns.

Stigma reduction activities on the community level are also essential. Training healthcare providers in non-judgmental and inclusive practices can improve treatment uptake and retention among PLHIV and retention of individuals with HIV, as decriminalization of behaviors associated with HIV transmission, such as drug use and consensual same-sex relations, would permit those with HIV to pursue medical care without fear of prosecution, allowing a rights-based approach to HIV prevention and treatment to be maintained.[36] It is also important to improve the national surveillance systems. A better surveillance of HIV will mean that the high-risk areas can be identified faster and that timely limited areas.

Some of these governance barriers also have an impact on health outcomes. The regulatory environments in Pakistan, especially the Control of Narcotic Substances Act, and lack of legal safeguards over MSM, and inconsistent access to harm reduction services, provide opportunities where critical populations avoid accessing health facilities because of their citizenship characteristics, leading to treatment deserts despite a growing documented rate.[39] There are also cases where the critical populations avoid accessing health facilities due to the fear of being imprisoned, be socially exposed or harassed by the inconsistent access to harm reduction services. These gaps highlight misalignment between public-health objectives and legal/policy environments.

Nevertheless, despite national initiatives to address the HIV epidemic, policy and governance barriers continue to exist, limiting equal access to prevention and treatment services in Pakistan,[40] among such critical populations as PWIDs,

interventions can be implemented through the acquisition of real-time data that can inform evidence-based public health strategies.[37] Migration of neighboring countries, particularly Afghanistan remains one of the unexplored areas of HIV spread in Pakistan. Transgender population is also disproportionately affected by gender-based discrimination and the lack of specialized healthcare services affect migrants most of the time, making them vulnerable. Specific studies on healthcare disparities in gender minorities are necessary to establish inclusive and equitable HIV policy frameworks. The existing inequality of HIV prevalence and treatment accessibility in the regions, especially the Balochistan and Khyber Pakhtunkhwa shows the need to employ culturally sensitive and regionally specific interventions.[38] It could be possible to implement rural models of HIV care, such as mobile clinics, community outreach, and task-sharing with local health workers, to enhance the results of diagnosis and adherence to long-term treatment. A combination of these strategies and awareness campaigns can significantly improve healthcare service and HIV literacy in the resource-

MSM and transgender people, it leads to poor healthcare seeking behavior and late diagnoses. The legal framework criminalizing drug use and same-sex relations creates fear of disclosure among key populations such as PWID, MSM, and transgender communities, leading to reduced healthcare-seeking behaviour and delayed diagnosis. Furthermore, weak inter-provincial coordination, fragmented surveillance systems, and inconsistent implementation of national HIV strategies contribute to disparities in service availability and quality across regions.

The transmission risks have been increased by the low integration of HIV services into the general public health system and imperfect regulatory oversight of medical practices especially unsafe injecting behavior and unqualified medical workers. Such policy gaps are apparent through harm reduction, migrant health provision, and the social protection of marginalized communities. All these advantages help to perpetuate stigma, reduce access to care, and slow down the progress of Pakistan in achieving its national and global HIV targets.

Strengths and Limitations

This discussion is based on the national and regional surveillance data, UNAIDS reports and the peer-reviewed literature to provide a comprehensive review of HIV epidemiology in Pakistan and its South Asian neighbors. It incorporates numerous top-end data sources such as international surveillance reports, national data sets, and peer-reviewed literature allowing it to provide a broad and uniform view of the HIV burden in Pakistan. The analysis has a focus on epidemiology and treatment services which will be integrated by integrating epidemiological trends, gaps in treatment, capacity of health systems and policy constraints to provide a comprehensive picture of the epidemic.

The limitations include a narrative, non-systematic review and a large proportion of epidemiological data in Pakistan are obtained through government surveillance systems, UNAIDS modeling and programmatic reporting. These sources are inherently biased such as under-reporting, long reporting cycles and variation in data collection methods across provinces. The surveillance mechanisms of Pakistan are notably wanting when it comes to the rural and conflict areas, informal healthcare settings, and hidden communities such as people who inject drugs, transgender, migrants, and MSM. Therefore, the true prevalence and treatment outcomes can be different than recorded estimates.

Conclusion

The HIV pandemic in Pakistan is defined by a low level of overall prevalence rate of 0.1% and this is highly concentrated among the most at risk populations indicating potential failure in their prevention, harm reduction, and equal access to treatment as opposed to medical impossibility. The continued stigma, criminalization of transmission-related behaviors, unequal access to ART and reliance on fragmented surveillance frameworks have continued to hinder progress in the HIV care continuum, especially in Balochistan, rural Sindh, Khyber Pakhtunkhwa, and among transgender people, those who inject drugs, and migrants.

Recommendations

To address such disparities, Pakistan must develop a decentralized, rights-based approach in public health with better provision of ART by communities, developing lower cost prevention programs such as PrEP and self-testing, strengthening harm-reduction initiatives, and policy changes that undermine care-seeking behavior. Improved national surveillance schemes, superior provincial data, and particular investigation of the transgender health, migratory people and rural epidemiological patterns are important in the formation of precise evidence and reaction to programming. Pakistan can take big steps towards meeting the UNAIDs goals of 95-95-95 and counteract the structural vulnerability which has sustained its concentrated epidemic by strategic investment, legal change and addressing equality.

Future progress depends on strengthening Pakistan's HIV response by ensuring equal distribution of resources, decentralization of ART centers, and inclusion of stigma-reduction efforts as part of national health efforts. By increasing the availability of PrEP and HIV self-testing, particularly in vulnerable groups, people will be able to take charge of prevention. Similar attempts to enhance national surveillance systems will allow making timely diagnoses and focused treatment. To achieve sustainable success, it is required to have data-driven, inclusive, and context-specific approaches, which would address the diverse socio-cultural context of Pakistan and support global HIV eradication priorities. To address the growing provincial inequity in regional implementation, mobile ART units in rural Balochistan, community-based outreach in Sindh, telehealth connection to care systems in Khyber Pakhtunkhwa, and growth of hub-and-spoke treatment networks in Punjab should be prioritized to provide an equal access to all provinces.

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