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HIV/AIDS in Pakistan – progress, barriers, and future directions

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Abstract

HIV was first reported in Pakistan in 1987. Initially believed to have a low HIV prevalence mainly confined to high-risk groups such as injection drug users (IDUs) and commercial sex workers. However, HIV prevalence has steadily increased, with Punjab and Sindh provinces reporting the highest rates. Heterosexual transmission is the most frequent transmission route. High-risk populations include IDUs, men having sex with men, commercial sex workers, as well as truck drivers and miners. Furthermore, HIV has spread from urban centers to rural areas. The World Health Organization has reported over 200,000 HIV cases in Pakistan, making it the second-largest HIV-positive nation in Asia after India. The proportion of undiagnosed individuals is high and antiretroviral coverage is suboptimal. Fear of societal discrimination often leads individuals with HIV to hide their status, further spreading the virus. Mother-to-child transmission is another significant concern. Challenges in patient adherence to antiretroviral therapy (ART) exist, with many patients missing follow-up appointments. ART access due to shortages is frequent stemming from the reliance on imports. To mitigate the growing burden of HIV in Pakistan, it is essential to prioritize prevention through awareness campaigns and robust screening and antiretroviral programs targeting high-risk populations.

Keywords

HIV. AIDS. Immune deficiency. Risk groups. Antiretroviral therapy.

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Introduction

HIV/AIDS presents a significant threat to the global population, given the absence of effective vaccinations and long-term antiretroviral treatment (ART). The Centers for Disease Control and Prevention documented the first case of HIV infection in 1981, with the identification of a patient exhibiting severe immune deficiency, later recognized as AIDS and HIV isolation in 1983[1]. After these early findings, extensive research has been conducted worldwide to understand and mitigate the spread of HIV. Originally referred to as human T-lymphotropic virus type III (HTLV-III), lymphadenopathy-associated virus, or AIDS-associated virus, HIV is the causative agent of AIDS[2].

In Pakistan, HIV infections are increasingly prevalent, with a rising annual death toll since 1987[3]. Official records indicate that only 15,370 individuals in Pakistan have been diagnosed with HIV/AIDS, despite an estimated 100,000 individuals currently living with the infection. Notably, Pakistan has witnessed a sharp surge in HIV infections, reporting 8,360 new cases between 2005 and 2015, compared to 45,990 worldwide, marking the highest 17.6% average growth in recorded history[4]. Furthermore, there has been an escalation in the number of fatalities. According to a study conducted by the University of Washington, the number of deaths attributable to HIV/AIDS in Pakistan increased from 1,480 between 2005 and 2015-350 annually, reflecting a 14.2% yearly average increase[5].

The prevalence of HIV in Pakistan was traditionally considered extremely low and confined to high-risk populations. However, the increasing number of new HIV infections among the general population highlights the threat posed by these concentrated populations and underscores the deficiencies within the health-care system and societal structures. These deficiencies include escalating rates of risk behaviors. In Pakistan, an Islamic state, activities such as prostitution, drug use, and homosexuality are discouraged under Islamic principles and moral values. However, the consistent observance of these values varies across society[6].

During the early 2000s, Pakistan's HIV epidemic transitioned from low prevalence and high risk to a concentrated epidemic, mirroring patterns observed in other Asian countries[7]. The most susceptible high-risk groups in Pakistan include commercial sex workers and injectable drug users[8]. In addition, a modeling team from the World Health Organization (WHO) projected that improper medical injections in the region where Pakistan is situated could account for up to 7% of all new HIV infections between 2000 and 2030[9].

Pakistan's proximity to India, a nation experiencing a rapid increase in HIV/AIDS, raises further concerns. Sexual interactions between Indians and Pakistanis, as well as individuals from other nations grappling with HIV epidemics, could serve as entry points for HIV transmission into Pakistan[10].

HIV/AIDS initial years in Pakistan

In 1987, the first HIV cases were reported in Pakistan. However, health issues related to HIV were initially neglected as they were perceived to have little social significance[11]. In addition, news emerged of the first incidence of AIDS in Pakistan, which was linked to heterosexual risk behaviors[11]. The Pakistani government chose to conceal the threat posed by AIDS[12]. Before significant attention was drawn to the issue, there were suggestions to conduct examinations within the general population. However, proposals were rejected due to concerns that individuals with cancer or those infected with malaria could produce false positive antibody detections using western blot tests[13], despite the availability of enzyme-linked immunosorbent assays for HTLV-III, which also yielded both false positive and false negative results. The first confirmed case of AIDS in Pakistan was documented in 1990[14].

Risk factors associated with the spread of HIV-determinants of HIV epidemics

Risk factors associated with the spread of HIV in Pakistan are diverse and multifaceted, with particular emphasis on two key groups: injection drug users (IDUs) and male sex workers (MSWs).

IDUs

In Pakistan, there are an estimated 80,000-145,000 IDUs and 650,000 addicted to drugs in other ways, with most data focusing on male, street-based IDUs and limited information on female or home-based users[15]. Before 2003, studies identified significant risk but no documented cases of HIV among IDUs. Since then, national HIV prevalence among IDUs has averaged around 20%, ranging from 13% to 30%, with an upward trend in the 12 surveyed cities. Younger IDUs are more

Table 1. Prevalence of HIV infection in Pakistan

Region	Patient	Population size	HIV (+) cases	HIV (%)	Duration
Karachi	Multitransfusion	888	2	0.225	1986-1987
Karachi	IDUs	40	1	2.5	1988
Lahore	STIs	465	1	0.2	1999
Rawalpindi	Healthy	94,177	4	0.004	2003-2005
Larkana	Blood donor				
Sindh	STD	4288	3	0.006	2000-2009
Faisalabad	TB	12,552	42	0.34	2008-2012
Punjab	IDUs	352	91	27.27	2013
	Spouses of HIV-positive men	1896	101	5.3	2014-2015
Larkana	Renal disorder	205	56	27.3	2016
Sargodha	Contaminated needles	251	135	1.3	2018
Kot Imrana	Contaminated syringes	26,041	739	13	2019

IDUs: injection drug users; STIs: sexually transmitted infections; STD: sexually transmitted disease; TB: tuberculosis.

likely to share syringes, often injecting in groups of three or more, with syringe-sharing rates varying from 3% to 65% across cities. While the frequency of injections averages once daily, it often increases with heroin addiction[16]. Alarmingly, only 10% of IDUs report consistent condom use, despite nearly half engaging in sexual activity with non-commercial partners and 27% with commercial sex workers, with < 20% using condoms in these encounters[17]. The rising HIV prevalence is linked to group injection practices, reliance on informal health-care providers using non-sterile equipment, and sexual transmission to the broader population. On the other hand, recent outbreaks in Punjab highlight that many infected individuals had received therapeutic injections as a source of their infections as they lacked other traditional risk factors[18], as shown in table 1. Although the WHO and UNAIDS recommend opioid substitution therapy as an effective intervention, Pakistan has yet to adopt it, despite an estimated 430,000 people injecting drugs, predominantly opiates. A 2013-2014 survey by the organization of people living with HIV/AIDS also revealed that 48.3% of respondents had been arrested or jailed for drug use, underscoring the urgent need for harm reduction strategies[19].

Sex workers

In Pakistan, sex work has evolved over the past three decades, involving diverse groups such as female sex workers (FSWs), MSWs, and transgender individuals (Hijras), with most operating in public spaces or households, while brothel-based sex work accounts for only 3%. An estimated 125,000 FSWs, 35,000 MSWs, and 35,000 Hijra sex workers exist, with concerning rates of sexually transmitted infections (STIs) among Hijras and MSWs. Studies reveal increasing HIV prevalence among Hijras (4.3%) and MSWs (1.1%), whereas FSWs remain below 1.5%. Clients of sex workers, estimated at over 3 million, engage in more than 60 million sex acts annually, often without protection, posing a significant transmission risk[20]. Truck drivers and miners also face heightened vulnerability due to prolonged absences from home, unprotected sex, and interactions with diverse partners. Among 200,000 truckers, HIV prevalence has ranged from 0.25% to 1%, whereas in mining areas, 16% reported STI symptoms, emphasizing the urgent need for targeted HIV prevention efforts[21].

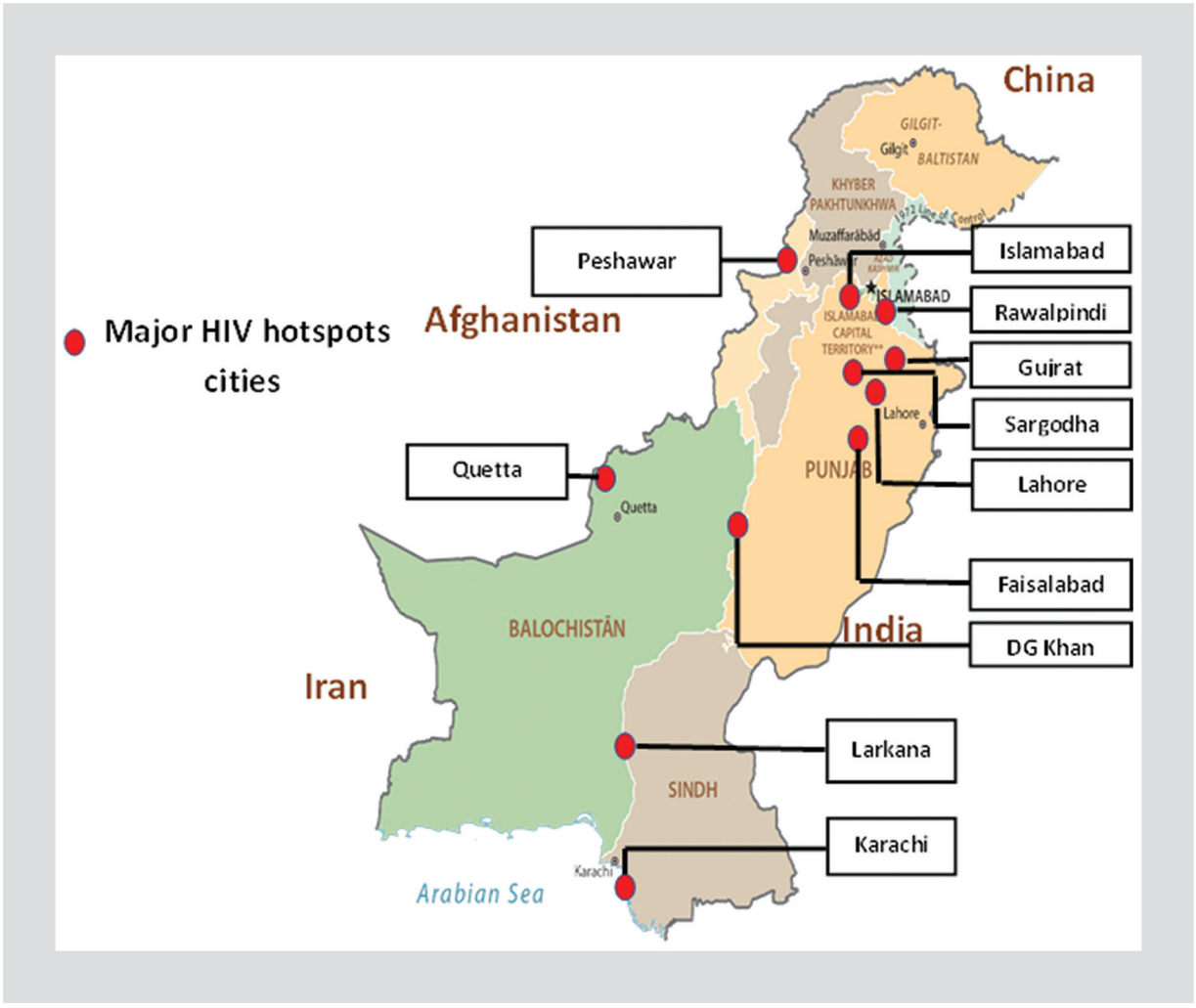

Figure 1. *Pakistan highlights cities with the highest HIV burden.*

Effect of health-care facilities

Deficiencies in hospital administration and government commitment have led to inadequate health-care services in Pakistan[22]. Low literacy rates compound the issue, as many individuals struggle to understand preventive measures, increasing the risk of HIV transmission. Contributing factors include risky sexual behaviors, unsafe blood transfusions, and the reuse of contaminated syringes. Fear of societal discrimination often leads individuals with HIV to hide their status, further spreading the virus[23].

Health-care workers face infection risks due to inadequate safety protocols. Challenges in patient adherence to antiretroviral therapy (ART) also persist, with many patients missing follow-up appointments[24]. Approximately 147,851 individuals in Pakistan lack access to ART due to shortages stemming from the reliance on imports[25].

HIV transmission dynamics in Pakistan

HIV is primarily transmitted through contaminated syringes, risky blood transfusions, and unprotected sexual activity. Societal stigma often discourages individuals from seeking testing or disclosing symptoms[26]. In 2021, WHO reported approximately 200,000 HIV cases in Pakistan, making it the second-largest HIV-positive nation in Asia after India[27]. The United Nations reported that only 13% of Pakistanis could identify three transmission routes, highlighting the need for increased public awareness[28].

Mother-to-child transmission (MTCT) is another significant concern. Pregnant women and breastfeeding

mothers in high-risk groups, such as FSWs, are particularly vulnerable. Many families avoid testing children, potentially underestimating the prevalence of MTCT[29].

Geographic and demographic trends

HIV has spread from urban centers to rural areas, with Punjab and Sindh reporting the highest infection rates (Fig. 1). Recent outbreaks in smaller towns have been linked to injectable drug use and unsafe medical practices. A 2021 factsheet revealed that 38% of IDUs in Pakistan were HIV-positive, with 8% of their spouses also testing positive[30].

Punjab recorded over 70,000 cases, whereas Sindh reported around 60,000. Pakistan's HIV epidemic mirrors trends in other Asian countries, initially concentrated among IDUs before spreading through sexual networks[31].

Current status and prevalence

Pakistan's first HIV case was reported in 1987 due to a contaminated blood transfusion. Since then, the epidemic has intensified, with concentrated outbreaks among high-risk populations such as IDUs, men who have sex with men (MSM), and sex workers. Despite a national prevalence rate below 1%, high-risk groups show alarming infection rates[32].

Heterosexual transmission accounts for most cases (52.55%), followed by contaminated blood transfusions (11.73%). Recent studies estimate that up to 3.5% of blood donors are HIV-positive. The government provides free treatment at 51 ART centers, though gaps in screening and treatment persist[33].

Preventive measures

Pakistan's National AIDS Prevention and Control Program (NACP) was established in 1989. Early efforts included the promotion of sterile syringes and disposable syringes by WHO and UNICEF in the 1980s[34]. Despite economic and political challenges, public awareness campaigns, educational workshops, and collaborations with religious leaders were launched. Non-governmental organizations play a vital role in addressing at-risk groups such as IDUs and sex workers[35]. In 2003, a 5-year initiative targeted the spread of unsafe practices. However, challenges such as stigma, especially toward MSM, persisted, reducing access to treatment such as ART. The "U=U" (Undetectable=Untransmittable) message has shown promise in reducing stigma but needs wider dissemination[36].

Comorbidities

HIV and tuberculosis (TB) co-infection are common, with 19.4% of HIV patients co-infected with TB, emphasizing the need for multidisciplinary care. Other prevalent comorbidities include diabetes (26.5%), hypertension (21.3%), and ischemic heart disease (13.2%). Effective management requires integrated care beyond ART[37].

Molecular studies and research

Molecular studies have identified HIV-1 subtype A as dominant in Pakistan, with unique recombinant forms emerging from recombination events[38]. Phylogenetic analysis suggests that subtype A1a originated from a single introduction in 1989, with CRF02 appearing in 1996[39]. Research on the CCR5- δ32 gene and HIV transmission patterns among high-risk groups provides critical insights into the epidemic. Similar to HIV-1, HIV-2, though less virulent, has spread globally, largely due to colonial conflicts and migration[40].

Interventions to control HIV in Pakistan

Efforts to control HIV in Pakistan must address the prevailing indifference toward medical conditions and limited awareness of diseases. Shifting societal attitudes through public health education is critical. Personal Resilience and Enrichment Programs can improve mental health and promote safer behaviors among high-risk groups, reducing transmission. The availability of condoms with culturally relevant messaging, distributed beyond pharmacies, is essential. Community engagement initiatives must overcome systemic challenges such as resource constraints and disunity to effectively destigmatize HIV[41].

NACP prioritizes vulnerable populations and promotes safe sexual practices through sexually transmitted disease centers[42]. Early HIV diagnosis in pregnant women and high-risk individuals is vital, with a focus on rapid, point-of-care testing. Diagnostic facilities remain limited, and early infant diagnosis uses qualitative polymerase chain reaction on dried blood spots analyzed at the National Reference Laboratory[43].

Treatment and monitoring

ART initiation follows thorough evaluation, with adherence emphasized to prevent drug resistance[44]. Pakistan's first-line ART regimen includes tenofovir, lamivudine, and dolutegravir[45]. Pre-exposure and post-exposure prophy-

laxis are essential components of prevention. Treatment monitoring involves regular viral load assessments and CD4 counts. Despite improved access to ART, gaps in resistance monitoring and research collaboration persist[46].

Challenges and bottlenecks

Cultural, religious, and legal constraints complicate HIV prevention. IDUs remain a high-risk group, particularly in conflict-affected regions such as Larkana, where the first major outbreak occurred[47]. Effective HIV/AIDS control depends on coordinated efforts between government, health care, and communities, with a strong focus on prevention. Addressing socioeconomic factors, improving healthcare access, and fostering awareness are crucial to mitigating the spread of HIV in Pakistan.

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Conflicts of interest

None.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The study does not involve patient personal data nor requires ethical approval. The SAGER guidelines do not apply.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

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