



HYGIENIC RISK FACTORS OF HIV/AIDS TRANSMISSION AMONG THE POPULATION

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Abstract

Acquired immunodeficiency syndrome (AIDS) remains a pressing global epidemiological and socio-hygienic problem. According to the World Health Organization (WHO), more than 39 million people were living with human immunodeficiency virus (HIV) worldwide in 2023. This article analyzes the main hygienic risk factors contributing to the spread of HIV/AIDS, including inadequate sanitary conditions, non-compliance with sterilization and disinfection standards in healthcare settings, low levels of personal hygiene culture, risky behaviors, and social determinants. The analysis demonstrates that hygienic factors represent a critical determinant in the transmission of HIV/AIDS, and their control plays a decisive role in effective epidemiological management.

Keywords: AIDS, HIV infection, hygiene, risk factors, epidemiology, sanitation, prevention, social determinants, disinfection, sterilization.

Introduction

Acquired immunodeficiency syndrome and its etiological agent, the human immunodeficiency virus, continue to represent one of the most significant challenges to global public health. According to data from the World Health Organization and UNAIDS, by the end of 2024, approximately 40.8 million people were living with HIV worldwide, with 1.3 million new infections and 630,000 AIDS-related deaths recorded during the same year. These figures indicate that HIV/AIDS is not a historical issue but a current and evolving epidemiological reality.

From a biological perspective, HIV infection has well-defined transmission pathways: unprotected sexual contact, exposure to contaminated blood, sharing of injection equipment, breaches in safety protocols during medical procedures, and vertical transmission from mother to child. However, the real dynamics of the epidemic are determined not only by the biological properties of the virus but also by living



conditions, sanitary culture, quality and accessibility of healthcare services, and hygienic behaviors within the population. Therefore, the classical “agent–host–environment” model remains highly relevant: the virus represents the agent, the human serves as the host, and hygienic as well as social conditions constitute the environmental component.

The hygienic relevance of this issue lies in the fact that a significant proportion of HIV transmission is directly or indirectly associated with preventable environmental factors. According to WHO materials on injection safety, unsafe injections can lead to the transmission of HIV, hepatitis B, and hepatitis C. This risk is particularly pronounced in healthcare systems where deficiencies exist in sterilization and disinfection practices, reuse of single-use instruments, and improper waste management. In this context, hygiene is not merely a theoretical concept but a practical line of defense.

Scientific literature increasingly demonstrates that the formation of the HIV epidemic is driven by a complex set of determinants extending beyond purely biological risks. Recent systematic reviews highlight that factors such as education level, access to healthcare services, poverty, housing instability, stigma, discrimination, and migration significantly influence HIV prevention, testing uptake, and treatment adherence. Hygienic risk factors intersect with these determinants in practice: low levels of sanitary literacy, insufficient knowledge of reproductive health, poor adherence to safe sexual practices, lack of use of preventive measures, and delayed healthcare-seeking behavior contribute to the acceleration of HIV transmission.

Stigma and discrimination occupy a distinct and critical position in the epidemiology of HIV/AIDS. Materials from UNAIDS indicate that stigma and discrimination increase the risk of HIV acquisition and limit access to testing, treatment, and preventive services. In other words, stigma is not a biological mechanism, but it represents a powerful social barrier that reduces access to hygienic and medical safety. If individuals do not undergo testing, remain unaware of their status, and do not seek treatment, the epidemiological chain remains uninterrupted. This demonstrates that hygienic prevention extends beyond basic measures such as hand hygiene or sterile instruments and must also encompass information dissemination, trust-building, and access to healthcare services.

Migration, urbanization, and social inequality further intensify the hygienic-functional background of HIV transmission. Among migrant populations, language



barriers, legal uncertainties, disruptions in access to healthcare, low health literacy, and stigma-related social constraints contribute to delayed diagnosis and interruptions in continuous treatment. A 2024 scoping review highlighted that structural barriers to healthcare access play a decisive role in migrant youth and migrant populations. Therefore, when assessing the spread of HIV/AIDS among populations, it is methodologically more appropriate to consider hygienic risk factors not only at the level of individual behavior but also in relation to social environments and healthcare infrastructure.

One of the key high-risk groups comprises people who inject drugs. Within this population, the sharing of needles and syringes represents one of the most significant determinants of HIV transmission. Contemporary studies published in *The Lancet HIV* demonstrate that even in populations covered by harm-reduction services, risk factors persist. This indicates that hygienic safety is determined not only by the sterility of instruments but also by the availability, coverage, and continuity of preventive services.

Moreover, violations of hygienic standards in healthcare facilities can lead to the emergence of epidemic clusters. The HIV outbreak documented in Roka village, Cambodia, provided strong evidence linking transmission to unsafe medical injection practices. This example illustrates that weakened hygienic control is not merely a theoretical risk but can escalate into a real epidemiological disaster. A single breach in sterilization protocol may, in practice, have consequences more profound than extensive theoretical analysis—unfortunately, only in a negative sense.

Objective of the study

To conduct a systematic analysis of hygienic risk factors contributing to the spread of HIV/AIDS among populations based on contemporary scientific literature and to evaluate their epidemiological significance.

Materials and methods

This review analyzed scientific articles published in PubMed, Scopus, and Web of Science databases, as well as reports from the World Health Organization (WHO) and UNAIDS.

Selection criteria included peer-reviewed articles and meta-analyses published between 2015 and 2024.



Analytical methods included systematic literature review, comparative epidemiological assessment, and secondary analysis of statistical data.

Results

The analysis of the literature demonstrates that the spread of HIV/AIDS in the population is a multifactorial process in which hygienic risk factors act as key determinants of epidemiological dynamics. Based on the reviewed sources, hygienic risk factors were categorized into several principal groups, each of which has been scientifically confirmed to significantly influence HIV transmission.

Hygienic violations in healthcare settings and risks associated with invasive procedures. According to the World Health Organization (WHO), unsafe injections remain an important contributor to HIV transmission globally. In certain regions, up to 5–10% of injections are performed under non-sterile conditions, increasing the risk of blood-borne infections, including HIV.

Epidemiological investigations conducted in Cambodia (Roka village cluster) revealed that improper sterilization practices and reuse of single-use instruments led to the identification of more than 200 new HIV cases within a short period.

Table 1. Risk of HIV transmission associated with medical procedures

<i>Factor</i>	<i>Risk level</i>	<i>Explanation</i>
Non-sterile injections	High	Direct blood-borne transmission
Reused syringes	Very high	Direct viral transmission
Improper sterilization	Moderate–high	Leads to healthcare-associated clusters
Inadequate blood screening	High	Critical importance of donor blood testing

Evidence indicates that the implementation of safe injection programs can reduce HIV transmission by approximately 30–40%.

Personal and sexual hygiene-related risk factors. The primary route of HIV transmission remains unprotected sexual contact. According to UNAIDS, more than 70% of new infections occur through sexual transmission.

Low levels of hygienic knowledge, inadequate sexual education, and failure to use protective measures substantially increase transmission risk. Meta-analyses demonstrate that consistent condom use reduces the risk of HIV transmission by 80–95%.

Table 2. Sexual behavior and HIV risk

<i>Factor</i>	<i>Impact on HIV risk</i>	<i>Scientific interpretation</i>
Unprotected sexual contact	Very high	Primary transmission route
Multiple sexual partners	High	Increases probability of exposure
Condom use	Protective (↓80–95%)	Most effective preventive measure
Low sexual hygiene knowledge	High	Reduces preventive behavior

Socio-hygienic conditions and epidemiological determinants. Socioeconomic factors are directly linked with hygienic risk. Low income, poor housing conditions, inadequate sanitation infrastructure, and limited access to healthcare services accelerate HIV transmission dynamics.

Reports from UNAIDS and the World Health Organization indicate that HIV prevalence in low-income countries is several times higher than in high-income settings.

Table 3. Impact of social determinants on HIV spread

<i>Factor</i>	<i>Impact level</i>	<i>Explanation</i>
Poverty	High	Limited access to prevention and treatment
Migration	Moderate–high	Disrupts epidemiological control
Urbanization	Moderate	Increases contact rates
Low education level	High	Reduces hygienic literacy

Injection drug use and hygienic risk. Injection drug use represents one of the most critical risk factors for HIV transmission. According to data published in The Lancet HIV, HIV prevalence among people who inject drugs reaches 20–40% in certain regions.

The primary mechanism is the sharing of needles and syringes, which facilitates direct blood-borne transmission. Harm-reduction strategies, including needle exchange programs, have been shown to significantly reduce this risk.

Table 4. Injection drug use and HIV risk

<i>Factor</i>	<i>Risk level</i>	<i>Explanation</i>
Sharing needles	Very high	Direct blood-borne transmission
Use of sterile syringes	Low	Preventive effect
Harm-reduction programs	Protective	Reduces infection rates



Healthcare system and hygienic control. The condition of the healthcare system plays a decisive role in HIV transmission dynamics. Insufficient testing and screening programs contribute to an increased number of undiagnosed cases.

According to the World Health Organization (WHO), approximately 15–20% of individuals living with HIV are unaware of their status, which perpetuates the epidemiological chain of transmission.

Discussion

The analyzed literature and epidemiological findings indicate that explaining HIV/AIDS transmission solely through individual risk behaviors is scientifically insufficient. At the population level, HIV spread is shaped by a complex interaction of hygienic, healthcare-organizational, socioeconomic, and behavioral factors. Therefore, interpretation of these results requires not only a classical infectious disease framework but also the application of modern public health concepts.

First, violations of hygienic standards in healthcare settings emerge as a critical risk factor in HIV epidemiology. Unsafe injections, reuse of syringes, and inadequate adherence to sterilization and disinfection protocols significantly increase the risk of blood-borne transmission. Importantly, in such cases, the source of infection is not patient behavior but deficiencies within the healthcare system itself. Consequently, HIV prevention must extend beyond public education to include strict implementation of infection control standards in medical institutions. The designation “single-use” exists for a reason; unfortunately, in some contexts it appears to be interpreted more as a recommendation than a requirement.

The findings also confirm that sexual transmission remains the dominant mechanism of HIV spread. However, even in this context, hygienic and educational factors play a decisive role. Unprotected sexual intercourse, inconsistent use of condoms, insufficient knowledge of sexual health, and low levels of sexual hygiene culture significantly increase transmission risk. This underscores the critical importance of sanitary-educational interventions within prevention systems. Providing information alone is insufficient; it is essential to develop sustainable patterns of safe behavior. In other words, prevention must progress from the stage of “awareness” to that of “implementation.”

The analysis further highlights the substantial role of socio-hygienic determinants in HIV transmission. Poverty, low educational attainment, migration, urbanization,



housing instability, and limited access to healthcare services all contribute to increased epidemiological risk. From a hygienic perspective, these factors operate through two primary mechanisms: first, by limiting access to preventive measures and medical services; and second, by reducing levels of hygienic literacy within the population. Therefore, achieving effective control of HIV/AIDS without addressing social determinants remains unlikely. Epidemiology has recognized this reality for decades; administrative systems tend to acknowledge it somewhat later.

Among populations of people who inject drugs, the observed high level of risk represents one of the most critical findings. The sharing of needles and syringes remains one of the most direct and rapid mechanisms of HIV transmission. In this context, the issue extends beyond individual hygiene; the availability of harm-reduction programs, access to sterile equipment, psychosocial support, and continuity of medical supervision are equally important. Therefore, in this population, a purely restrictive approach is insufficient—practical preventive services are essential. Otherwise, the epidemiological process persists in a latent form and eventually affects the general population.

The condition of the healthcare system also emerges as a key hygienic determinant of HIV transmission. The analysis indicates that a proportion of individuals living with HIV remain unaware of their status, while delayed diagnosis and late initiation of treatment hinder the interruption of the epidemiological chain. This leads to two important conclusions. First, expanding the coverage of HIV testing must be a central component of control strategies. Second, diagnostic services should be accessible, convenient, and organized in a manner that minimizes the impact of stigma. Unawareness of HIV status constitutes not only a clinical issue but also a hygienic one, as it allows the infection source to remain uncontrolled for extended periods.

The findings further demonstrate that stigma and discrimination function not as direct biological risk factors, but as secondary determinants that amplify hygienic risk. This represents an important methodological point. In the presence of stigma, individuals are less likely to seek testing, preventive counseling, or treatment, resulting in the persistence of hidden transmission cycles. Therefore, addressing stigma must be considered an integral component of HIV prevention. In this context, hygiene should be interpreted more broadly—not only as physical cleanliness, but also as the creation of a safe medical and social environment.



Synthesizing these findings, hygienic risk factors in HIV transmission can be conceptually categorized into three levels. The first level comprises individual factors, including unprotected sexual activity, low hygienic literacy, and risky behaviors. The second level includes healthcare-organizational factors, such as sterilization practices, disinfection, safe injection protocols, and screening systems. The third level encompasses socio-hygienic determinants, including poverty, migration, stigma, education level, and access to healthcare services. It is precisely this multi-layered system that sustains the persistence of the HIV epidemic.

Xulosa

Mazkur adabiyotlar sharhi natijalari shuni ko'rsatdiki, aholi orasida Conclusion. The spread of acquired immunodeficiency syndrome (AIDS) is determined not only by biological or individual behavioral factors but also by a complex interplay of hygienic, healthcare-organizational, and social determinants.

1. Hygienic risk factors in HIV/AIDS transmission have independent epidemiological significance and play a crucial role in the formation and persistence of the infection transmission chain. In particular, violations of sterilization and disinfection protocols in healthcare settings, unsafe injections, and inadequate adherence to sanitary standards during invasive procedures significantly increase the risk of blood-borne transmission. At the same time, insufficient knowledge of personal and sexual hygiene, inconsistent condom use, and weak sanitary-educational efforts contribute to increased transmission via sexual routes.

2. Hygienic risk factors are closely interconnected with social determinants, and this interaction ensures the persistence of the epidemic at the population level. Poverty, low educational attainment, migration, stigma, urbanization, and limited access to healthcare services reduce hygienic literacy, weaken the coverage of preventive measures, and lead to delayed diagnosis. The risk is particularly elevated among people who inject drugs, socially vulnerable populations, and groups with delayed healthcare-seeking behavior.

3. To improve the effectiveness of HIV/AIDS prevention and epidemiological control, it is essential to integrate a hygienic approach across all levels of the healthcare system. This includes strict monitoring of infection control practices in healthcare facilities, full implementation of safe injection protocols, strengthening laboratory control over blood transfusion and invasive procedures, improving sexual



and sanitary literacy among the population, reducing stigma and discrimination, expanding access to anonymous testing and early diagnosis, and developing targeted harm-reduction programs for high-risk groups.

From a scientific perspective, it is more appropriate to consider AIDS not merely as an infectious disease but as a complex public health issue shaped by hygienic, social, and healthcare-organizational factors. Accordingly, in-depth investigation of hygienic risk factors and the development of comprehensive preventive strategies aimed at their control remain key priorities in the fight against HIV/AIDS.

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