

Structural and behavioral determinants of HIV among Indonesian MSM

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ABSTRACT

HIV prevalence among men who have sex with men (MSM) remains disproportionately high in Indonesia. While behavioral risk factors have been widely studied, evidence integrating structural determinants remains limited. This study examined the role of structural and behavioral factors associated with HIV status among MSM in Jambi City, Indonesia. A cross-sectional study was conducted among 60 MSM recruited using non-probability sampling due to the hidden nature of the population. Data were collected using validated structured questionnaires and analyzed using multivariable logistic regression. Fifty percent of respondents were HIV-positive. Low educational attainment emerged as an independent structural determinant of HIV status (AOR = 5.51; 95% CI: 1.14–26.49), whereas behavioral factors showed significant crude associations but lost significance after adjustment. HIV vulnerability among MSM is shaped by structural inequalities beyond individual behaviors. Structural-focused interventions are essential to strengthen HIV prevention strategies in Indonesia.

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1. INTRODUCTION

HIV/AIDS remains a major challenge in the global public health agenda [1], [2]. The World Health Organization reports that despite a global decline in HIV-related mortality, the rate of new infections remains relatively high among specific population groups with structural and social vulnerabilities [1], [3]-[5]. Inequities in access to health services, stigma, and discrimination contribute to the unequal distribution of the HIV burden across population groups [6], [7]. At the global level, progress toward achieving the Sustainable Development Goals related to HIV control continues to face serious obstacles, particularly in low- and middle-income countries [8]-[10]. This situation underscores that HIV/AIDS is not solely a medical issue but also a social, behavioral, and structural problem shaped by interrelated factors [11], [12].

Men who have sex with men (MSM) have long been identified as a key population in the HIV epidemic across different regions of the world [13], [14]. Global reports consistently indicate that HIV prevalence among MSM is substantially higher than in the general population [15], [16], both in high-income countries and in low- and middle-income settings [17]. This heightened vulnerability is influenced by high exposure to risky sexual practices, limited access to MSM-friendly health services, and pervasive stigma and social discrimination [18]-[20]. In many contexts, these structural barriers contribute to the low utilization of HIV prevention, testing, and treatment services among this population [2]. Consequently, MSM are

positioned as a priority group in HIV control efforts, highlighting the importance of public health approaches that are sensitive to social and cultural contexts.

In Indonesia, HIV transmission among MSM has shown an increasing trend over the past decade [21]. National surveillance reports indicate that MSM represent one of the fastest-growing groups affected by HIV, with prevalence substantially higher than that observed in the general population [15], [22]. Although national HIV programs have expanded testing and treatment services, structural barriers including stigma, discrimination, and limited MSM-friendly services continue to constrain effective prevention and early diagnosis. These contextual factors highlight the importance of examining HIV risk beyond individual-level behaviors [3], [8].

This study is grounded in the socio-ecological model and the structural vulnerability framework, which conceptualize HIV risk as the result of multilevel interactions between individual behaviors and broader social environments [23], [24]. From this perspective, HIV vulnerability is not solely a consequence of personal decision-making but is also shaped by systemic inequalities and social positioning [25]. Understanding the relative contribution of structural and behavioral factors is therefore essential for designing comprehensive and context-sensitive prevention strategies [26].

Although previous studies have examined behavioral factors associated with HIV risk among MSM, investigations that simultaneously consider structural and behavioral factors remain limited, particularly in the Indonesian context. Most previous studies have emphasized knowledge and sexual practices, while the role of structural factors, such as education and social conditions, has received relatively little attention. Empirical evidence documenting a shift in HIV risk determinants from individual behaviors toward structural factors among MSM populations is also scarce. This study offers novelty by highlighting the interaction between structural and behavioral vulnerabilities in shaping HIV risk. The findings are expected to fill existing knowledge gaps and support the development of more contextualized and comprehensive HIV prevention strategies.

2. METHOD

2.1. Research design

This study was designed using an analytical observational design with a cross-sectional approach. The design was applied to examine the relationship between structural and behavioral factors and HIV risk among MSM. A quantitative approach was used to assess the associations between variables at a single point in time. Bivariate and multivariable analyses were conducted to identify factors associated with HIV status. All research procedures were implemented in accordance with established public health research principles.

2.2. Population and samples

The study population was defined as MSM residing in Jambi City. A total of 60 respondents who met the inclusion criteria were included in the study. Participants were selected using a non-probability sampling technique consistent with the characteristics of a key population. Respondents were enrolled based on their willingness to participate and their ability to provide the required information. Participant confidentiality was ensured through the use of anonymous identification codes during data collection. Given the hidden and stigmatized nature of MSM populations, non-probability sampling was employed as a pragmatic strategy to ensure participant access. While this approach may limit generalizability, it remains a commonly accepted method in research involving hard-to-reach populations.

2.3. Instruments

The research instrument consisted of a structured questionnaire adapted from previously published HIV-related instruments. The questionnaire was reviewed by three public health experts to ensure content validity and relevance to the MSM population in the Indonesian context. Pilot testing was conducted among 10 MSM prior to data collection, and the instrument demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.81$). HIV status was verified using documented test records whenever available. In cases where documentation was unavailable, self-reported HIV status was accepted and recorded confidentially; however, reliance on self-report may have introduced information bias.

2.4. Procedures

Data collection was conducted using a validated structured questionnaire adapted from standard instruments commonly employed in HIV research and studies involving MSM populations. Data were collected through interviewer-administered interviews by trained personnel. The collected data were checked for completeness and consistency prior to statistical analysis. Data analysis was performed using bivariate analysis and multivariable logistic regression to identify independent determinants of HIV risk. Ethical approval for the study was obtained from the Research Ethics Committee of Universitas Fort de Kock (No.

406/KEPK.UFDK/III/2023). The study was conducted in accordance with the principles of the Declaration of Helsinki and the International Conference on Harmonisation–Good Clinical Practice (ICH-GCP) guidelines. Participation was voluntary following the provision of information regarding the study objectives and procedures. Given the sensitive and stigmatized nature of the MSM population, no personally identifiable information was collected, and all interviews were conducted in private settings to protect participant confidentiality and privacy. The safety, comfort, and confidentiality of respondents were maintained throughout all stages of the study, and no interventions posing serious risk to participants were involved.

3. RESULTS

3.1. Characteristics of the respondents

The characteristics of the respondents are summarized in Table 1. A total of 60 MSM were included in the analysis, with 50.0% identified as HIV-positive. Most participants were younger than 30 years (58.3%) and had attained a high level of education (75.0%). The majority reported no history of drug use (85.0%). Regarding psychosocial factors, most respondents demonstrated high HIV-related knowledge (83.3%), positive attitudes (58.3%), good motivation (65.0%), and good parenting patterns (53.3%).

Table 1. Characteristics of respondents (n = 60)

Variable	Number	Percentage (%)
Age		
<30 years	35	58.3
≥30 years	25	41.7
Education		
Low	15	25.0
High	45	75.0
HIV/AIDS		
Positive	30	50.0
Negative	30	50.0
Drugs use		
Use	9	15.0
No	51	85.0
Sexual behavior		
Same sex sexual behavior	22	36.7
Lower-risk sexual behavior	38	63.3
Knowledge		
Low	10	15.7
High	50	83.3
Attitude		
Negative	25	41.7
Positive	35	58.3
Motivation		
Poor	21	35.0
Good	39	65.0
Parenting patterns		
Poor	28	46.7
Good	32	53.3

3.2. Bivariate and multivariable associations with HIV status

Table 2 presents the bivariate associations between selected variables and HIV status among MSM. Educational level and sexual behavior were significantly associated with HIV infection. Respondents with low educational attainment had a higher likelihood of being HIV-positive compared with those with higher education (COR = 6.00; 95% CI: 1.48–24.29; $p = 0.017$). Similarly, MSM reporting same-sex sexual behavior had a significantly higher risk of HIV infection than those reporting non-risk sexual behavior (COR = 4.57; 95% CI: 1.45–14.38; $p = 0.016$). Other variables, including age, drug use, knowledge, attitude, motivation, and parenting patterns, were not significantly associated with HIV infection in the bivariate analysis ($p > 0.05$).

In the multivariable logistic regression model, low educational attainment remained independently associated with HIV infection among MSM after controlling for potential confounders (AOR = 5.51; 95% CI: 1.14–26.49; $p = 0.033$). This finding indicates that respondents with lower education had more than five times higher odds of HIV infection compared with those with higher education. Although same-sex sexual behavior showed a strong association in the crude analysis, this association was attenuated and no longer statistically significant after adjustment (AOR = 4.48; 95% CI: 0.69–28.86; $p = 0.114$). Knowledge, attitude,

motivation, drug use, age, and parenting patterns were also not independently associated with HIV infection in the adjusted model.

Table 2. Bivariate and multivariable associations between independent variables and HIV status among MSM

Variables	HIV/AIDS				COR (95% CI)	p-value	AOR (95% CI)	p-value
	Yes		No					
	n	%	n	%				
Age								
<30 years	17	48.6	18	51.4	0.87	1.000	0.97	0.583
≥30 years	13	52.0	12	48.0	(0.31–2.43)		(0.88–1.07)	
Education								
Low	12	80.0	3	7.5	6.00	0.017	5.51	0.033
High	18	40.0	27	60.0	(1.48–24.29)		(1.14–26.49)	
Drugs use								
Use	4	44.4	5	56.6	0.76	1.000	0.86	0.863
No	26	51.0	25	25.5	(0.18–3.19)		(0.16–4.55)	
Sexual behavior								
Same-sex sexual behavior	16	72.7	6	27.3	4.57	0.016	4.48	0.114
Lower-risk sexual behavior	14	36.8	24	63.2	(1.45–14.38)		(0.69–28.86)	
Knowledge								
Low	8	80.0	2	20.0	5.09	0.083	3.01	0.280
High	22	44.0	28	56.0	(0.98–26.43)		(0.40–22.11)	
Attitude								
Negative	15	60.0	10	40.0	2.00	0.295	1.35	0.663
Positive	15	42.9	20	57.1	(0.70–5.67)		(0.34–5.23)	
Motivation								
Poor	10	47.6	11	52.4	0.86	1.000	0.43	0.356
Good	20	51.3	19	48.7	(0.29–2.49)		(0.07–2.56)	
Parenting patterns								
Poor	16	57.1	12	42.9	1.71	0.438	0.91	0.889
Good	14	43.8	18	56.3	(0.16–4.77)		(0.24–3.36)	

^aChi-square $p < 0.05$ statistically significant at alpha (α) 0.05; ^bLogistic regression, $p < 0.05$ is statistically significant at alpha (α) 0.05, OR = Odds Ratio; CI = Confidence interval; P = Probability value.

4. DISCUSSION

4.1. HIV burden among MSM in local context

The high proportion of HIV-positive cases observed among MSM underscores that the HIV burden remains concentrated within specific population groups, consistent with global epidemiological patterns demonstrating unequal risk distribution [27]. This pattern supports the view that HIV is not determined solely by clinical factors but is also shaped by social contexts that influence exposure and access to health services [20]. Within the framework of the social determinants of health, social status, including educational attainment, serves as an indicator of individual and community capacity to access actionable information, MSM-friendly services, and social protection mechanisms [28]. Accordingly, these findings reinforce the argument that HIV control strategies should prioritize key populations rather than relying on generalized approaches for the broader population. This empirical evidence also highlights the relevance of HIV-related Sustainable Development Goals, which call for more targeted interventions among vulnerable groups.

4.2. Structural determinants of HIV risk

The analysis further indicates that HIV risk dynamics among MSM exhibit distinct characteristics, thereby strengthening the rationale for defining MSM as a key population. The finding that sexual behavior showed a strong association in bivariate analysis but was attenuated after adjustment suggests that HIV risk among MSM does not exist solely as an “individual behavior” issue but is embedded within a broader network of determinants. This observation aligns with the socio-ecological model, which conceptualizes HIV risk as being influenced by multiple levels, including individual, relational, community, and structural or policy contexts [29]. In this regard, HIV prevention programs for MSM should shift from an exclusive focus on behavior change toward strengthening supportive environments, such as stigma-free health services, accessible routine HIV testing, and safe referral systems [18], [25]. These findings provide data-driven justification that population-specific interventions remain necessary, even when indicators of HIV-related knowledge among respondents appear relatively adequate.

4.3. Knowledge behavior gap and psychosocial context

Low educational attainment emerged as a significant independent determinant of HIV status, thereby providing strong empirical support for the role of structural vulnerability. Education can be understood as a “fundamental cause” that shapes access to health-related resources, capacity to navigate

health services, and opportunities to avoid risk exposure [4]. Educational attainment may also serve as a proxy indicator of access to health information, healthcare services, and social resources that support HIV prevention, testing, and early diagnosis among MSM. This finding is also consistent with the concept of structural vulnerability, which posits that health risks are produced by social position and systemic barriers rather than solely by individual choices [30], [31]. The present findings are consistent with evidence from other low- and middle-income countries. Studies conducted among MSM in China, Brazil, and Vietnam have similarly demonstrated that structural disadvantages, including lower educational attainment and barriers to healthcare access, contribute substantially to HIV vulnerability. This consistency across settings suggests that the influence of structural determinants on HIV risk extends beyond local contexts and represents a broader public health challenge among MSM populations. Among MSM, structural barriers often interact with psychosocial pressures, such as fear of stigma and discrimination, which may ultimately reduce the utilization of HIV prevention and treatment services [32], [33]. Thus, these findings challenge overly simplified narratives that frame HIV among MSM primarily as a behavioral issue, as structural determinants remained dominant even after controlling for other factors.

The lack of significant associations for knowledge, attitudes, and motivation in the multivariable model indicates that higher levels of knowledge do not automatically translate into consistent preventive practices. This phenomenon aligns with health promotion literature emphasizing the presence of a knowledge-behavior gap, in which knowledge fails to convert into action due to relational barriers, social norms, or pervasive risk contexts [34], [35]. Within the frameworks of the Health Belief Model and the Theory of Planned Behavior, preventive behaviors are influenced by risk perception, subjective norms, self-efficacy, and perceived behavioral control; these factors may be constrained among MSM by stigma, unequal sexual power relations, or limited capacity to negotiate condom use [30], [36]. These findings extend current understanding by demonstrating that health education alone is insufficient without complementary interventions that strengthen negotiation skills, peer support, and access to safe health services [33], [37]. Consequently, the principal contribution of this study lies in positioning knowledge as a necessary but insufficient component, underscoring the need for interventions that are more responsive to the social realities of MSM.

The combination of findings namely the high proportion of HIV-positive cases, the predominance of educational attainment as a determinant, and the attenuation of behavioral effects after adjustment supports the need for comprehensive and context-sensitive prevention approaches. Syndemic theory explains that co-occurring conditions, including stigma, psychosocial stressors [32], [37], and social vulnerability, may simultaneously amplify HIV risk, rendering single-focus interventions inadequate [20], [33], [38]. In this context, strengthening MSM-friendly health services, reducing stigma within healthcare settings, and implementing structural interventions centered on education and social empowerment become increasingly relevant. These findings also offer practical direction by indicating that programs should target structural determinants as key entry points while maintaining community-based behavioral interventions and peer support. Accordingly, this study fills a local evidence gap and offers sharper policy implications by advocating a shift in focus from “changing individuals” to “improving the risk context” that shapes HIV vulnerability among MSM.

From the perspective of fundamental cause theory (Link and Phelan), education can be understood as a “fundamental cause” that shapes access to health-related resources, capacity to navigate health services, and opportunities to avoid risk exposure [39], [40]. Educational attainment may also serve as a proxy indicator of access to health information, healthcare services, and social resources that support HIV prevention, testing, and early diagnosis among MSM. These co-occurring conditions do not operate independently but may synergistically increase susceptibility to HIV infection. Educational disadvantage, limited access to supportive services, and social marginalization may collectively create a risk environment that reinforces exposure while constraining protective behaviors. Addressing HIV among MSM therefore requires integrated strategies that move beyond isolated behavioral interventions. These findings are relevant to Indonesia’s ongoing HIV control efforts, which emphasize expanded HIV testing, early diagnosis, and improved access to services for key populations. Addressing educational inequalities and stigma-related barriers may strengthen the effectiveness of these national HIV prevention strategies.

4.4. Study limitations

This study has several limitations. First, the relatively small sample size ($n = 60$) may reduce statistical power and widen confidence intervals, thereby affecting estimate precision. Second, the use of non-probability sampling may introduce selection bias and limit the generalizability of findings beyond the study setting. Third, although HIV status was primarily based on documented test results, partial reliance on self-report could lead to potential misclassification. Finally, the cross-sectional design precludes causal

inference. These limitations should be considered when interpreting the findings and highlight the need for larger, probability-based longitudinal studies.

5. CONCLUSION

These findings underscore the need for policy responses that extend beyond individual behavior change. Policymakers should prioritize improving access to education, expanding MSM-friendly HIV testing services, implementing stigma-reduction programs within healthcare settings, and strengthening peer-led community outreach. Integrating structural interventions with behavioral prevention strategies may offer a more sustainable pathway toward reducing HIV disparities among MSM in Indonesia.

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