

Health and social burdens of TB-HIV co-infection in Indonesian risk populations

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ABSTRACT

This systematic literature review aims to examine the health and social burdens of TB-HIV co-infection among at-risk populations in Indonesia. The review analyzed four quantitative primary studies published between 2021 and 2024, including three from Indonesia and one from Ethiopia as a comparative reference. Literature was identified from electronic databases using defined inclusion criteria and screened through PRISMA guidelines. Data were extracted on sample characteristics, quantitative instruments, and statistical findings relevant to TB-HIV prevalence, risk factors, treatment challenges, and public health interventions. Results showed that TB-HIV co-infection poses significant burdens, especially among populations with low socio-economic status and limited access to healthcare. Key challenges include poor treatment adherence, stigma, psychological distress, and fragmented health services. Although some interventions have been implemented, they remain inconsistent and unequally distributed. This review highlights the need for integrated, community-based, and multi-sectoral approaches to address TB-HIV co-infection in Indonesia's vulnerable populations effectively.

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INTRODUCTION

Tuberculosis (TB) and Human Immunodeficiency Virus (HIV) remain significant global public health challenges, particularly in low- and middle-income countries. The synergistic interaction between these two infectious diseases accelerates disease progression and significantly increases morbidity and mortality. HIV infection compromises the immune system, facilitating the reactivation of latent TB, while TB further elevates the risk of complications and death among people living with HIV/AIDS (PLWHA) (Bruchfeld et al., 2015) (Houben, 2010). Globally, TB continues to be one of the leading causes of death from infectious diseases, with an estimated 10.6

million new TB cases and 1.6 million TB-related deaths in 2021, including approximately 187,000 deaths among individuals living with HIV (Organization, 2022).

Indonesia is among the countries with the highest TB burden worldwide, ranking third after India and China (Indonesia, 2023). National data indicate that TB-HIV co-infection remains a persistent public health problem, with suboptimal coverage of HIV testing among TB patients and low antiretroviral therapy (ART) uptake among TB-HIV cases (Kementrian Kesehatan Republik Indonesia, 2023). These gaps hinder effective disease control and contribute to ongoing transmission, particularly in resource-limited settings (WHO, 2021).

The burden of TB-HIV co-infection is disproportionately borne by vulnerable and marginalized populations, including individuals experiencing homelessness, people who use drugs, incarcerated populations, and sex workers (WHO, 2022). Structural determinants such as poverty, overcrowded living conditions, malnutrition, limited access to healthcare services, and stigma increase susceptibility to infection and delay diagnosis and treatment (Gioseffi et al., 2022)(Nevendorff et al., 2016). Evidence suggests that these populations experience higher rates of co-infection, poorer treatment adherence, and worse health outcomes compared to the general population (Wahyunitisari & Rusli, 2025)(Tama & Ambarwati, 2021).

Beyond clinical consequences, TB-HIV co-infection imposes substantial social, economic, and psychological burdens (WHO, 2023). Patients frequently experience double stigma, social exclusion, financial hardship, anxiety, and depression, all of which undermine treatment continuity and quality of life (A Fuady et al., 2022)(Permata Sari et al., 2022). Weak integration between TB and HIV services, along with insufficient psychosocial support, further limits the effectiveness of existing interventions (Nevendorff et al., 2016)(Sitorus & Antara, 2024).

Despite the growing burden, quantitative evidence examining TB-HIV co-infection among risk populations in Indonesia remains limited and fragmented (Eyawo et al., 2025). Most studies focus on facility-based populations, with insufficient attention to highly vulnerable groups and community-level contexts (Mabene et al., 2025a). Given the rising trend of TB-HIV co-infection in East Asia and the Pacific region (Indonesia, 2023) There is an urgent need to synthesize available quantitative evidence.

Therefore, this systematic literature review aims to compile and analyze quantitative studies on TB-HIV co-infection among risk populations in Indonesia. The article's key novelty is that it repositions TB-HIV in Indonesia from a hospital-based co-infection problem to a multidimensional, structurally embedded vulnerability issue affecting marginalized populations, requiring integrated, community-based, and cross-sectoral responses. Specifically, this review seeks to examine prevalence patterns, identify key socio-economic and environmental vulnerability factors, explore diagnostic and treatment challenges, and evaluate the effectiveness of public health interventions. Quantitative synthesis clarifies the relationship between socioeconomic, psychosocial, and TB-HIV treatment adherence factors by converting social determinants into measurable, statistically tested pathways.

It demonstrates that socioeconomic disadvantage increases psychological and financial burden, lowers quality of life, and ultimately undermines sustained treatment adherence, providing an evidence-based structural explanation for adherence disparities. The findings are expected to inform evidence-based, integrated, and inclusive strategies to strengthen TB-HIV control programs and reduce health inequalities in Indonesia.

RESEARCH METHOD

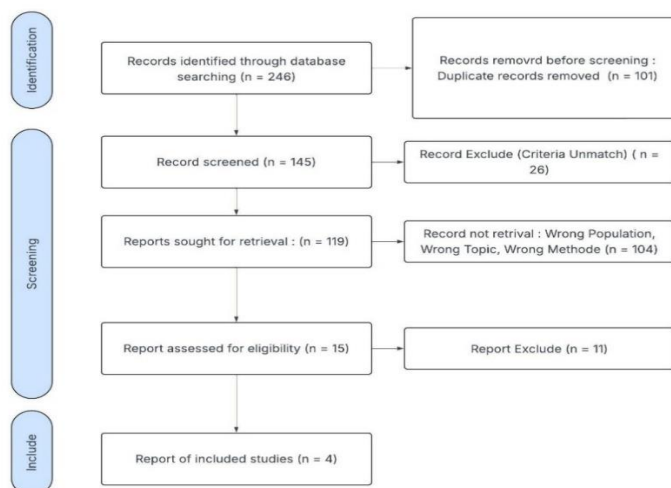


Figure 1. Procedure review flowchart (PRISMA)

The data collected from the four selected studies included information on sample size, respondents' sociodemographic characteristics, the quantitative instruments used to measure health and social outcomes, and key findings on the impact of TB-HIV co-infection on quality of life, treatment adherence, and the psychosocial conditions of patients in risk populations. The analysis was conducted descriptively to develop a thematic mapping based on each study's focus, providing a comprehensive overview of the health and social burdens caused by TB-HIV in Indonesia. This approach enabled researchers to evaluate factors that exacerbate patient vulnerability and to identify potential evidence-based interventions that could be applied contextually in high-risk areas.

Limiting references to 2015–2025 ensures that the review reflects current epidemiological trends, treatment protocols, and integrated TB-HIV service frameworks. Given recent advances in diagnostics, antiretroviral therapy, and health system integration, earlier studies may not represent present clinical and policy contexts. This timeframe therefore strengthens the relevance and applicability of the review's findings to current TB-HIV control efforts.

The initial literature search was conducted using two electronic databases, PubMed and Google Scholar, to identify relevant studies comprehensively. The search strategy employed the following combination of keywords and MeSH terms: ("Tuberculosis"[MeSH] AND "HIV Infections"[MeSH]) AND ("Social Determinants of Health"[MeSH] OR "Socioeconomic Factors"[MeSH]) AND (Indonesia). The search was limited to articles published between 2015 and 2025 and focused on quantitative primary research.

The inclusion criteria for study selection were as follows: (1) primary quantitative studies examining the impact of TB-HIV co-infection within the Indonesian population; (2) studies assessing health outcomes, psychosocial impacts, or socioeconomic factors related to TB-HIV; (3) articles published between 2015 and 2025; (4) studies published in English or Bahasa Indonesia; and (5) studies with full-text availability (Hatiya et al., 2025).

Exclusion criteria included: (1) studies using qualitative methodologies; (2) systematic reviews, meta-analyses, commentaries, or editorials; (3) studies focusing solely on either TB or HIV without examining the intersection of both; (4) studies targeting populations outside of Indonesia or not within TB-HIV risk groups; (5) duplicate publications; and (6) articles without accessible full-text versions.

All articles that met the inclusion criteria underwent critical appraisal using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Quantitative Studies (George et al., 2025). This appraisal focused on assessing the clarity of research objectives, the appropriateness of the research design, the adequacy of sample recruitment methods, the adequacy of sample size, the reliability of data collection and measurement instruments, the appropriateness of statistical analysis, ethical considerations, and the identification and discussion of study limitations.

The search process identified 246 unique references relevant to the preliminary inclusion criteria (see Figure 1). After removing duplicates, 145 articles were screened at the first stage by reviewing titles and abstracts. At this stage, 26 articles were excluded for failing to meet the inclusion criteria, including those that employed qualitative methods, were non-primary research publications, or were not relevant to the focus on TB-HIV.

A total of 119 articles proceeded to the secondary selection stage; however, 104 were excluded due to being outside the topical scope, employing unsuitable methodologies, or focusing on populations irrelevant to TB-HIV risk groups in Indonesia. Only 15 articles advanced to the full-text eligibility assessment phase.

Of these 15 articles, 11 were excluded after further evaluation for failing to meet methodological rigor or relevance, leaving four studies for inclusion in this systematic review. A critical appraisal of these four studies indicated that all were primary quantitative research with adequate methodological quality and relevance to the research questions. Nevertheless, some studies exhibited limitations in population coverage and variation in measurement approaches, which are noted in the interpretation of the review findings (see Table 1).

RESULTS AND DISCUSSIONS

Table 1. Critical appraisal of included studies

| First Author (Year) | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 |
|-----------------------------|----|----|----|----|----|----|----|----|----|-----|
| Idrus et al. (2024) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| CAPITA (Fuady et al., 2022) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Tama & Ambarwati (2021) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Rashid et al. (2024) | Y | Y | Y | Y | Y | Y | Y | Y | Y | N |

JBI Criteria:

Q1: Is the research objective clearly and specifically stated?

Q2: Is the research design appropriate to answer the research question?

Q3: Are participants recruited using a transparent and representative method?

Q4: Is the sample size adequate for the statistical analysis conducted?

Q5: Are the interventions or key variables described in detail and replicable?

Q6: Are the data collection methods clearly described and validated?

Q7: Are the measurement instruments used reliable and relevant to the study objectives?

Q8: Is the statistical analysis conducted appropriately and reported transparently?

Q9: Are ethical considerations (e.g., participant consent) addressed?

Q10: Are the study limitations identified and critically discussed?

Table 2. Characteristics of included studies

| First Author (Year) | Study Design | Methodology | Technique | Phenomenon of Interest | Population | Data Analysis |
|------------------------|-----------------|--------------|------------------------------|-------------------------------------------------------|---------------------------------------------------------|-----------------------------------------|
| (Idrus, 2024) | Cross-sectional | Quantitative | HRQoL & Cost Questionnaire | Quality of life and cost burden among TB-HIV patients | HIV, TB, and TB-HIV patients at Bekasi General Hospital | Tobit regression, Bland-Altman analysis |
| (A Fuady et al., 2022) | Cross-sectional | Quantitative | Structured survey, interview | Psychosocial impacts of TB (CAPITA) | TB patients in urban communities in | Descriptive and inferential |

| First Author (Year) | Study Design | Methodology | Technique | Phenomenon of Interest | Population | Data Analysis |
|--------------------------|----------------------|--------------|---------------------------|-----------------------------------------------------|------------------------------------------------------------|------------------------------------------------------------------|
| (Tama & Ambarwati, 2021) | Retrospective cohort | Quantitative | Medical record data | Loss to follow-up among HIV patients with TB | Indonesia HIV patients at Saiful Anwar Hospital, Malang | analysis Descriptive analysis, regression statistical testing |
| (Rashid, 2024) | Cross-sectional | Quantitative | Morisky Scale, HELM, DSSS | Hypertension treatment adherence and social factors | Hypertension patients in Oromia, Ethiopia | Bivariate and multivariate logistic regression |

This study aims to synthesize empirical findings on the prevalence of TB-HIV co-infection, socio-economic and environmental factors that influence population vulnerability, challenges in diagnosis and treatment, and the effectiveness of implemented public health interventions. Among the four reviewed journals, three were primary quantitative studies conducted in Indonesia. In contrast, one study originated from Ethiopia and was used as a cross-country comparison within the context of developing nations.

The journals analyzed included the study by (Idrus, 2024), which evaluated quality of life and financial burdens among TB-HIV patients in Bekasi; the CAPITA study by (A Fuady et al., 2022), which highlighted the psychosocial impacts of tuberculosis and the necessity of community-based approaches, and the research by (Tama & Ambarwati, 2021), focusing on loss to follow-up incidents among HIV patients with TB in Malang. Meanwhile, the study by (Rashid, 2024) from Ethiopia strengthened the global perspective, particularly by comparing social factors and treatment adherence in chronic disease management in countries with similar socio-economic conditions (Wahyuningsih et al., 2023).

Although these four journals contribute significantly to understanding TB-HIV co-infection, this review also acknowledges certain limitations (Nsengiyumva et al., 2024). One major constraint is the limited number of primary quantitative studies in Indonesia that specifically target high-risk populations such as the homeless, injection drug users, or sex workers (Dlatu et al., 2025). Additionally, most of the data were derived from urban healthcare institutions, which may not fully represent the conditions of vulnerable populations in areas with limited access to services. The international comparative study did not directly address TB-HIV but instead focused on hypertension treatment adherence, thus serving only as a contextual reflection.

The four primary quantitative studies were analyzed to identify statistical findings relevant to TB-HIV co-infection among at-risk populations. These studies demonstrated variation in prevalence rates, socioeconomic risk factors, treatment challenges, and public health service factors that influence patient outcomes.

The study by (Idrus, 2024) conducted at Bekasi City General Hospital involved 460 patients diagnosed with HIV, TB, and TB-HIV. Of these, 39 patients (8.5%) were identified with TB-HIV co-infection. The study also found that TB-HIV patients reported lower quality of life scores compared to patients with only TB or HIV, based on EQ-5D-5L and EQ-VAS scores (Lemma Tirore et al., 2024). Economically, TB-HIV patients incurred the highest direct and indirect treatment costs. Tobit regression analysis showed that employment status, residential location (urban versus rural), and insurance status significantly influenced patients' quality of life (Harahap et al., 2024).

Furthermore, the CAPITA study by (A Fuady et al., 2022) revealed that approximately 65% of TB patients experienced moderate to severe depressive symptoms based on the DASS-21 scale (Plans-Rubió et al., 2024). The research noted that TB patients from lower socio-economic groups were more likely to suffer from psychological distress and stigma (Olowoyo et al., 2025). Although not a TB-HIV-specific study, these findings suggest that the psychosocial burden of TB substantially impacts patients' ability to adhere to treatment and engage with healthcare services,

indicating the need for integrating mental health services into TB and TB-HIV programs (Kurniawan et al., 2025).

(Tama & Ambarwati, 2021) conducted a retrospective study among HIV patients at Saiful Anwar Hospital, noting that 27.5% of HIV patients developed TB, predominantly among those with CD4 counts below 200 and poor nutritional status. Moreover, the loss to follow-up (LTFU) rate reached 23.9%, highlighting significant challenges in treatment continuity. These findings underscore the importance of strengthening patient monitoring systems and providing sustained social support for TB-HIV cases (Ratnasari et al., 2024).

As a comparative study, (Rashid, 2024) in Ethiopia investigated antihypertensive treatment adherence among 402 patients (Akhmedullin et al., 2025). Although not focused on TB-HIV, the study found an adherence rate of only 63.4%, with higher adherence observed among patients living in urban areas (AOR = 3.9; 95% CI: 1.48-10.95), those who were married, and those at middle-income levels (Lolong et al., 2023). These findings reinforce the notion that socio-economic factors such as residential location, marital status, and income level significantly influence treatment adherence, a phenomenon also observed in the TB-HIV context in Indonesia (Martini et al., 2024).

Overall, the four studies indicate that TB-HIV patients face multidimensional challenges encompassing medical, social, economic, and psychological aspects (Bonsa et al., 2024). Although only one study explicitly reported TB-HIV prevalence, the others significantly contributed to explaining risk factors and their influence on treatment outcomes. This highlights the necessity for healthcare provision for TB-HIV patients to adopt an integrative approach, balancing both medical and non-medical dimensions (Kebede & Mamo, 2024).

Prevalence of tuberculosis (TB) and HIV co-infection among the risk population in Indonesia. The prevalence of TB-HIV co-infection serves as a critical indicator in understanding the dual burden of infectious diseases in Indonesia, particularly among at-risk populations (Ahmad Fuady et al., 2022). Among the four journals reviewed, only one study explicitly reported prevalence rates based on primary data: the survey by (Mabene et al., 2025b). In this research, out of a total of 460 TB, HIV, and TB-HIV patients at Bekasi City General Hospital, 39 patients (8.5%) were recorded as having TB-HIV co-infection. This finding provides an intense quantitative depiction of the presence of TB-HIV within a city-level referral healthcare facility (Prasetyo et al., 2024).

This study also reinforces the (Organization, 2022) data, which estimates that approximately 10% of TB cases in Indonesia occur concurrently with HIV infection. However, it is essential to note that the data obtained remains localized and centered in urban areas. This introduces the potential for bias, as it does not fully reflect conditions in rural areas or among populations with limited access to healthcare services. Other studies, such as (Tama & Ambarwati, 2021), did not explicitly present national TB-HIV prevalence rates but reported that 27.5% of HIV patients experienced secondary TB infections, indicating a significant trend of co-infection prevalence within a referral hospital setting in Malang. Although national figures were not provided, these findings still contribute to the understanding of the proportion of TB among HIV patients (Islam et al., 2024).

The other two studies, (A Fuady et al., 2022) and (Rashid, 2024), did not report prevalence rates because their focus was not on calculating TB-HIV incidence or prevalence but rather on psychosocial factors and treatment adherence. Nevertheless, the study by Rashid et al. provides a contextual comparison, illustrating that in other chronic diseases in developing countries (in this case, hypertension in Ethiopia), socioeconomic conditions may contribute to low rates of early detection and treatment adherence, thereby indirectly affecting the accuracy of prevalence data.

Based on this synthesis, it can be concluded that although local prevalence data from Indonesia are available, there remains a systematic gap in national-level data concerning TB-HIV prevalence, particularly among high-risk populations such as the homeless, sex workers, injection

drug users, and incarcerated individuals. Limitations in active screening, case recording, and integrated reporting between TB and HIV services present significant obstacles to obtaining a comprehensive prevalence picture.

Therefore, it is necessary to enhance surveillance systems and promote cross-program data integration to more accurately monitor TB-HIV co-infection prevalence and to inform evidence-based intervention planning. The Key Socio-Economic and Environmental Factors Contributing to the Increased Vulnerability of Risk Population to TB-HIV Co-Infection in Indonesia. Socio-economic and environmental factors play a crucial role in exacerbating population vulnerability to TB-HIV co-infection. A review of four journals found that factors such as low income, employment status, residential location, education level, and access to healthcare services are the main determinants influencing population vulnerability to TB-HIV in Indonesia.

The study by (Idrus, 2024) identified that employment status and residential location (urban vs. rural) significantly affect the quality of life among TB-HIV patients. Patients without stable employment or living in impoverished environments reported lower quality-of-life scores and higher treatment costs. The study also emphasized the importance of social protection and health insurance, noting that patients without insurance coverage experienced a heavier economic burden. Furthermore, the CAPITA study by (A Fuady et al., 2022) highlighted that their socio-economic background strongly influenced social stigma and psychological pressure experienced by TB patients. Patients from lower social classes were more vulnerable to discrimination, job loss, and social exclusion. These conditions not only worsened patients' mental health but also hindered their timely access to healthcare services.

Similarly, they found that HIV patients co-infected with TB generally had poor nutritional status and lacked supportive social conditions, such as family or community support. These factors indirectly worsened treatment adherence and increased the risk of loss to follow-up (Tama & Ambarwati, 2021). Although (Rashid, 2024) did not focus specifically on TB-HIV, their findings remain relevant. The study showed that residential location (urban vs. rural), marital status, and income significantly influenced treatment adherence among patients with hypertension in Ethiopia. This phenomenon suggests that socio-economic factors in developing countries exhibit similar patterns of influence across chronic diseases, including potential co-infections such as TB-HIV.

Overall, the four journals demonstrate that vulnerability to TB-HIV is not merely a biological or medical issue but is deeply influenced by social structures and economic conditions. Populations with lower socio-economic status are not only at greater risk of infection but also face more difficulties in obtaining accurate diagnosis and appropriate treatment, thereby worsening their clinical outcomes. These findings reinforce the importance of public health interventions that extend beyond medical aspects and integrate socio-economic approaches, such as treatment subsidies, community-based support programs, and inclusive employment policies for TB-HIV patients. Diagnostic and Treatment Challenges Faced by the Risk Population With TB-HIV Co-Infection in Indonesia.

Challenges in the diagnosis and treatment of TB-HIV co-infection among at-risk populations in Indonesia are reflected in the various clinical, economic, psychological, and systemic barriers identified across the four reviewed journals. The study by (Idrus, 2024) demonstrated that TB-HIV patients face a substantial economic burden, encompassing both direct costs, such as transportation and medical expenses, and indirect costs, such as income loss due to the inability to work. These conditions directly affect treatment continuity and patients' quality of life, particularly for those without health insurance. Furthermore, TB-HIV patients in the study reported lower quality of life scores compared to patients with only TB or HIV, indicating a complex interaction between medical conditions and socio-economic pressures that worsen treatment adherence.

The CAPITA study by (A Fuady et al., 2022) further revealed that treatment challenges also stem from psychosocial aspects. In this study, the majority of TB patients experienced psychological distress, including anxiety and depression, which statistically occurred more frequently among patients from lower socio-economic groups. Although the study did not directly investigate TB-HIV patients, the implications are highly relevant, as individuals with co-infection undoubtedly face compounded burdens from both social stigma and disease-related stress. The lack of systemic psychological support and the absence of integrated mental health services within TB-HIV programs present significant barriers that urgently need to be addressed.

Moreover, treatment challenges were clearly evident in the study by (Tama & Ambarwati, 2021), which found that 23.9% of HIV patients experienced loss to follow-up (LTFU) after being diagnosed with secondary TB. Contributing factors included limited patient understanding of the importance of therapy, the absence of robust patient monitoring systems, and weak social support. Patients who dropped out of treatment faced a drastically higher risk of health deterioration and premature death due to incomplete therapy. These findings underscore the critical need to strengthen community-based patient monitoring systems and to implement effective patient education strategies from the initiation of therapy.

In an international comparison, (Rashid, 2024) found that residential location, marital status, and income level significantly influenced long-term treatment adherence in Ethiopia. Although not directly focused on TB-HIV, the study's findings illustrate that socio-structural factors play a crucial role in sustaining chronic disease management in developing countries. This context reinforces the argument that without a holistic support system encompassing healthcare, economic, and social dimensions, TB-HIV patients in Indonesia will continue to face substantial challenges in diagnosis and treatment. Thus, the barriers to TB-HIV diagnosis and treatment in Indonesia are not merely technical or medical issues, but rather reflect more profound structural inequalities and the urgent need for a multidisciplinary approach. Health service systems must be optimized to provide therapy and build integrated psychosocial support, establish sustainable community-based approaches, and strengthen health literacy among high-risk populations.

Public Health Interventions that Have Been Implemented to Address TB-HIV Co-Infection Among the Risk Population in Indonesia, and How Effective Have They Been. Public health interventions aimed at addressing TB-HIV co-infection in Indonesia have been implemented in various forms; however, their effectiveness remains variable, particularly among at-risk populations. Based on the review of the analyzed journals, integrated service delivery, community education, and patient monitoring systems have emerged as key focuses. However, their implementation has been inconsistent across regions and has not yet fully reached the most vulnerable groups. The study by (Idrus, 2024) indicated that integrating TB and HIV services within public healthcare facilities is operational in several major cities, such as Bekasi. Patients in the study received free integrated services, including access to ART (antiretroviral therapy) and ATT (anti-tuberculosis therapy). Nevertheless, despite the availability of these services, patients' quality of life remained low, and indirect treatment costs were still high. This finding suggests that the effectiveness of integrated services depends not only on the availability of therapy but also on the social and economic support that enables patients to sustain long-term treatment.

In the context of community interventions, the CAPITA study by (A Fuady et al., 2022) emphasized the importance of community-based approaches to mitigate the psychosocial impacts of TB. The study recommended integrating mental health support into the national TB program. It proposed a community mentoring model as a strategy to reach patients facing stigma and social isolation. Although this study did not specifically address TB-HIV programs, its recommendations are highly relevant and applicable to TB-HIV populations, who bear dual social and psychological burdens. Conversely, the study by (Tama & Ambarwati, 2021) highlighted weaknesses in long-term patient monitoring, evidenced by the high loss-to-follow-up rates among HIV patients who developed secondary TB. There was no strong evidence of active community support or

intervention systems in this study, indicating that in some areas, TB-HIV programs remain fragmented and are not fully integrated with cross-sectoral or risk-population-based approaches. This reinforces the argument that gaps in the implementation of public interventions remain a significant barrier to controlling TB-HIV in Indonesia.

In an international context, (Rashid, 2024) found that the effectiveness of chronic disease treatment interventions in Ethiopia was similarly influenced by the healthcare system's ability to understand patients' social contexts. Although focused on hypertension, the findings that geographic location, economic status, and social structures affect treatment adherence are highly relevant when discussing the effectiveness of TB-HIV interventions, particularly in reaching groups with limited access and high vulnerability.

Thus, the effectiveness of public interventions in managing TB-HIV in Indonesia heavily depends on the healthcare system's capacity to move beyond a purely curative approach and to integrate social, economic, and psychological dimensions into service delivery. To effectively reach at-risk populations, future interventions must involve greater participation by non-medical actors, such as community health workers and social workers, and the implementation of cross-sectoral policies that support social inclusion and stigma reduction. Psychosocial factors such as stigma, depression, and economic pressure significantly affect the effectiveness of TB-HIV medical therapy. Stigma and psychological distress reduce care engagement and adherence, while financial strain disrupts sustained treatment participation despite free medication availability. These findings indicate that therapeutic success depends not only on pharmacological efficacy but also on addressing psychosocial and socioeconomic barriers through integrated support strategies.

Across the included studies, a consistent pattern links socioeconomic disadvantage to poorer quality of life and weaker treatment adherence. Idrus demonstrates that unemployment, lack of insurance, and residential disparities significantly lowered QoL among TB-HIV patients and increased financial burden. Similarly, the CAPITA study by Ahmad Fuady (2022) shows that lower socioeconomic groups experienced greater stigma and depressive symptoms, factors likely to disrupt sustained care engagement. Tama & Ambarwati (2021) further reports high loss to follow-up among HIV patients with TB, linked to weak social and nutritional support, while Rashid (2024) confirms that higher income and urban residence are associated with better adherence in chronic disease management. Collectively, these findings suggest a recurring pathway in which socioeconomic constraints reduce quality of life and increase psychosocial burden, ultimately undermining treatment continuity.

CONCLUSION

This systematic literature review demonstrates that TB-HIV co-infection among at-risk populations in Indonesia is a complex health issue, influenced by a range of medical, social, and structural factors. The analyzed studies revealed that the prevalence of TB-HIV is notably significant, with patients facing high economic burdens, stigma, and challenges in maintaining treatment continuity. The most urgent research agenda is to conduct large-scale, community-based quantitative studies targeting marginalized populations—such as the homeless, people who use drugs, sex workers, and incarcerated individuals—while strengthening integrated TB-HIV surveillance systems to generate nationally representative data on prevalence, adherence, and structural vulnerability factors. Socio-economic factors such as unemployment, poverty, and limited access to healthcare services further exacerbate vulnerability to co-infection. In addition, the lack of fully integrated healthcare services, insufficient psychosocial support, and weak patient monitoring systems have emerged as significant barriers to effective TB-HIV control. Although several interventions have been implemented, their effectiveness remains uneven and has yet to reach the most vulnerable groups fully. Therefore, a stronger multidisciplinary and community-based approach, along with enhanced integration of TB-HIV services, is urgently needed to better respond to the needs of high-risk populations. The findings suggest that strengthening integrated

TB-HIV monitoring systems, expanding community-based follow-up and mental health services, and implementing targeted social protection measures—including insurance coverage, transportation assistance, and stigma reduction initiatives—are critical strategies for improving sustained treatment adherence among vulnerable populations.

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