

SYSTEMATIC REVIEW OPEN ACCESS

Integrated HIV and TB Services for the Management of Coinfection in West Africa: A Scoping Review of Strategies, Outcomes, Barriers and Enablers

Chris Mensah Nartey¹  | Adwoa Kumiwa Asare Afrane²  | Benjamin Tagoe¹  | Awo Afi Kwabong³  | Seth Kwabena Amponsah¹ 

¹Department of Medical Pharmacology, University of Ghana Medical School, Accra, Ghana | ²Department of Child Health, University of Ghana Medical School, Accra, Ghana | ³Department of Pharmaceutics and Microbiology, School of Pharmacy, University of Ghana, Accra, Ghana

Correspondence: Adwoa Kumiwa Asare Afrane (akafrane@ug.edu.gh)

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ABSTRACT

Background and Aim: There is a concern about treatment outcomes for human immunodeficiency virus and tuberculosis infections in West Africa. This has led to a focus on the development of strategies for integrated care; however, data on the barriers and enablers of these strategies are limited. The scoping review aimed to map strategies for the integrated management of HIV and TB services in West Africa and identify barriers and enablers influencing implementation.

Methods: The Arksey and O'Malley scoping review design was used for the study. The PRISMA extension for scoping review guidelines were followed meticulously. Four data sources (Scopus, PubMed, MEDLINE and CINAHL) were searched for strategies of integrated management for HIV and TB co-infection in West Africa, from January 1, 2000 to March 31, 2022. Of the 813 records screened, 22 studies met the inclusion criteria.

Results: Seven key components were identified: anti-TB therapy (for active co-infection), isoniazid preventive therapy (IPT), tuberculosis infection control (TBIC), antiretroviral therapy (ART) initiation, TB testing, co-trimoxazole preventive therapy (prophylaxis), and patient education/counseling. ART initiation and TB testing showed moderate-to-high success (75%–98% testing rates), while isoniazid preventive therapy (IPT) and TBIC had poor implementation (median IPT score: 0 in Ghana; 0%–42% TBIC adherence). The treatment success rates of the integrated management of HIV and TB co-infection reached 77% in settings with robust integration although mortality remained high (15%–19.5%). Barriers included staff shortages, stigma, inadequate financing, drug shortages, infrastructure gaps and fear of adverse drug interactions. The enablers were patient education, healthcare worker training, optimized logistics and strengthened health information systems.

Abbreviations: ACF, active case finding; aOR, adjusted odds ratio; ART, antiretroviral therapy; CINAHL, cumulative index to nursing and allied health; CPT, co-trimoxazole preventive therapy; DDIs, drug–drug interactions; DOTS, directly observed treatment, short-course; HAART, highly active antiretroviral therapy; HIV, human immunodeficiency virus; HIV/AIDS, human immunodeficiency virus/acquired immunodeficiency syndrome; HIV/TB, human immunodeficiency virus and tuberculosis; INSTIs, integrase strand transfer inhibitors; IPC, infection prevention and control; IPT, isoniazid preventive therapy; NNRTIs, non-nucleoside reverse transcriptase inhibitors; PEP, post-exposure prophylaxis; PIs, protease inhibitors; PLHIV, people living with HIV; PPE, personal protective equipment; PRISMA, preferred reporting items for systematic reviews and meta-analysis; PRISMA-ScR, PRISMA extension for scoping reviews; SDGs, sustainable development goals; TB, tuberculosis; TBIC, tuberculosis infection control; TPT, TB preventive therapy; UNAIDS, Joint United Nations Program on HIV/AIDS; UVGI, ultraviolet germicidal irradiation; WHO, World Health Organization.

*Co-first authors:

Chris Mensah Nartey & Seth Kwabena Amponsah.

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Conclusion: Integration of TB and HIV services was found to be possible in West Africa, with different degrees of effectiveness due to differences in law and local settings. Scaling up requires addressing health system barriers, enhancing training, and leveraging enablers such as patient empowerment and data-driven logistics.

1 | Introduction

Tuberculosis (TB) remains a leading cause of death worldwide, with 1.6 million deaths in 2017 alone [1]. Despite substantial progress from 2000 to 2017 that prevented 54 million deaths [2], HIV/TB coinfection continues to pose serious public health challenges, particularly in developing countries where TB is the main cause of death among HIV-positive patients, including those on antiretroviral therapy (ART) [3].

An estimated 1.3 million people live with HIV/TB coinfection globally [4]. In 2017, 32% of AIDS-related deaths were attributed to TB, and 920,000 HIV-positive individuals developed TB [5]. In West and Central Africa, approximately 65% of HIV-positive patients are unaware of their status, increasing TB susceptibility [6]. SDG Target 3 aims to end HIV, TB, and malaria by 2030, supported by the 95-95-95 targets: 95% of PLHIV knowing their status, 95% on ART, and 95% virally suppressed [7].

HIV/TB coinfection significantly increases morbidity and mortality. Effective management requires integrated, patient-centered care within strengthened health systems. For patients diagnosed with active HIV and TB co-infection, WHO guidelines recommend prompt initiation of anti-tuberculosis therapy (ATT) and antiretroviral therapy (ART), with the timing of ART initiation guided by CD4 cell count: within 2 weeks of starting TB treatment for $CD4 < 50$ cells/mm³, and within 8 weeks for $CD4 \geq 50$ cells/mm³ [8]. Regimen choice must account for drug-drug interactions with rifamycin, with integrase strand transfer inhibitors (e.g., dolutegravir) preferred due to fewer interactions [9].

For prevention of TB among PLHIV without active disease, WHO recommends isoniazid preventive therapy (IPT) [7, 10, 11]. Tuberculosis infection control (TBIC) measures are critical for preventing transmission in healthcare settings and include administrative controls (early identification, isolation, triage), environmental controls (ventilation, UVGI, HEPA filtration), and personal protective equipment (N95 respirators) [12, 13] (CDC, 2019). Co-trimoxazole preventive therapy (CPT) provides prophylaxis against opportunistic infections for PLHIV with advanced disease ($CD4 < 350$ cells/mm³) [8]. Routine TB testing and screening are essential for early detection, with WHO recommending HIV testing for all TB patients and TB screening for PLHIV at every encounter using a standardized symptom screen (cough ≥ 2 weeks, fever, night sweats, weight loss) [7, 14]. Patient education and counseling support adherence to complex regimens (Salomon et al., 2022 [15]).

All TB patients should receive immediate HIV testing [7]. PLHIV should be screened for TB at every encounter using a standardized symptom screen (cough ≥ 2 weeks, fever, night

sweats, weight loss) [14]. UNAIDS estimates this could avert 1.3 million TB deaths among PLHIV by 2030 [16]. CPT provides prophylaxis against opportunistic infections (Pneumocystis jirovecii pneumonia, toxoplasmosis, bacterial infections) and is recommended for PLHIV with advanced disease ($CD4 < 350$ cells/mm³) [7]. Adherence support is critical due to complex regimens, overlapping toxicities, and high pill burden. Strategies include structured education, calendars, pillboxes, and pictorial schedules (Salomon et al., 2022 [15]).

Despite WHO advocacy for integrated strategies, evidence on effective implementation, context-specific barriers, and scalable enablers in West Africa remains fragmented. This scoping review mapped treatment outcomes, strategies, barriers, and enablers of integrated HIV/TB management in West Africa to guide policymakers, program managers, and researchers.

2 | Methods

2.1 | Study Design

This scoping review sought to evaluate the literature on integrated HIV and TB services in West Africa.

2.2 | Search Strategy

Four (4) bibliographic databases were searched: PubMed, Cumulative Index to Nursing and Allied Health (CINAHL), Medline, and Scopus, for full-text articles published between January 1, 2000 and March 31, 2022. Published studies with recommendations for HIV/TB management were also considered. The following keyword combinations were used to search electronic databases for relevant studies: “tuberculosis,” “TB,” “HIV,” “coinfection,” “HIV/TB co-infection,” “treatment outcomes,” “antiretroviral therapy,” “management,” “therapy,” “integration,” “barriers,” and “facilitators.” The complete search strategy with Boolean operators is provided in Supporting Information Table S1. Data were extracted using the Mendeley program and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) framework. All abstracts and titles of the studies were selected. The screening was performed for research articles, abstracts, editorials, and reviews, after which they were assessed to determine their eligibility for inclusion. This was carried out to ensure that the included studies were relevant to the objectives of the review. The PRISMA extension for scoping reviews (PRISMA-ScR) checklist (Supporting Information Table S2) was mapped using the PRISMA-P chart, which served as the basis for the selection process. A summary of the entire process is presented in the PRISMA flow chart in Figure 1.

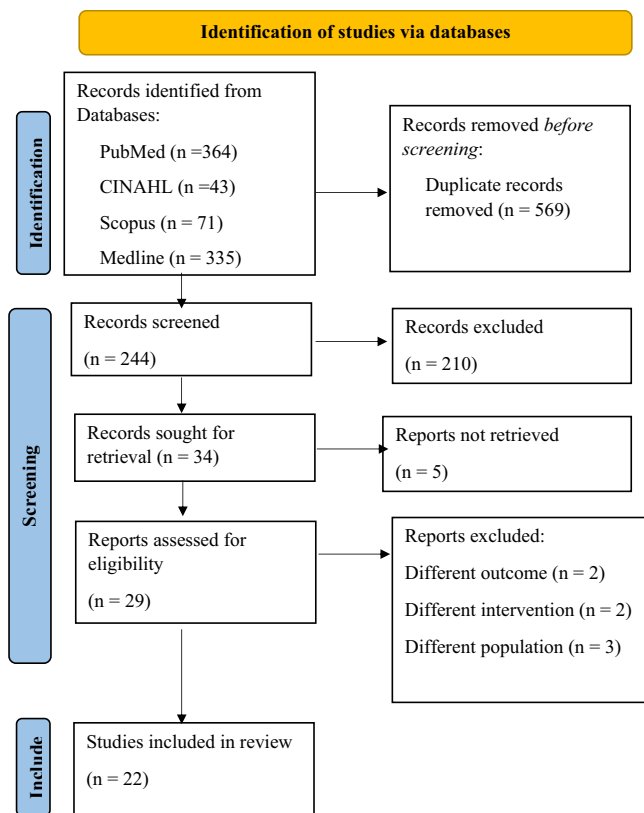


FIGURE 1 | PRISMA flow diagram of study selection process for the scoping review of integrated HIV and TB services in West Africa. The diagram shows the number of records identified from four databases (PubMed $n = 364$, CINAHL $n = 43$, Scopus $n = 71$, MEDLINE $n = 335$; total $n = 813$). After removal of duplicates ($n = 569$), 244 records were screened at title/abstract level, with 210 excluded as not meeting eligibility criteria. Full-text articles sought for retrieval ($n = 34$); 5 were not retrieved. Full-text articles assessed for eligibility ($n = 29$); 7 were excluded (different outcome $n = 2$, different intervention $n = 2$, different population $n = 3$). Final number of studies included in the scoping review: $n = 22$. Search dates: January 1, 2000 to March 31, 2022.

2.3 | Eligibility Criteria

Studies reporting integrated HIV and TB services in West Africa published between January 1, 2000 and March 31, 2022, published in English only and relevant to the overall objectives of the review were included. Studies conducted in high-income countries, articles that were not fully textual, those that did not describe the target population, and those that described outcomes that were not related to the management of HIV and TB coinfection were excluded.

2.4 | Data Collation, Statistics, and Quality Control

Two (CMN, BT) authors were involved in the abstract review of articles and data extraction processes. Duplicate records identified across databases were systematically removed using EndNote's deduplication feature prior to screening. Disagreements were resolved by discussion with a third author (SKA). Inter-reviewer agreement was 94%. Each pertinent publication included in the review was captured electronically using a

charting form provided by the authors. The form included details of the study authors, country of study, year of publication, objectives/purposes of the study, sample size, study population, methods used, research findings and conclusions.

To extract relevant information, thematic analysis was performed, as described elsewhere (Tricco et al., 2016). The included publications were evaluated for information on the treatment outcomes of HIV and TB co-infection in West Africa. The content of the included studies was examined using Microsoft Excel 2016. Subsequently, PRISMA-ScR was used to present the results of this study (PRISMA-ScR). Data are presented as ranges and narrative summaries. No meta-analysis was performed due to the scoping nature of this review and heterogeneity of study designs. For data extracted from included studies, we report measures of uncertainty (95% confidence intervals, standard deviations, or interquartile ranges) exactly as presented in the original sources. No recalculation of confidence intervals was performed for studies that did not originally report them. Consistent with scoping review methodology, formal risk of bias assessment was not performed; however, methodological limitations of included studies are noted in the narrative synthesis. Statistical definitions: For the descriptive summarization of published data, we follow the SAMPL (Statistical Analyzes and Methods in the Published Literature) guidelines for reporting where applicable to scoping reviews. Operational definitions used in the review are summarized in Table 1.

2.4.1 | Ethics Statement

As this is a scoping review of published literature, no ethical approval was required.

3 | Results

3.1 | Outcomes of Integrated Management of HIV and TB Coinfection

3.1.1 | Treatment Success Rates

Treatment success for co-infected patients ranged from 69% to 77%. Ansa et al. [17] reported improvement from 50% pre-integration to 69% post-integration. Avoka and Osei [18] found 94.8% (344/363) of HIV patients screened for TB; among co-infected patients, cure rate was 53.5%. Hayibor et al. [19] reported overall success of 88.1% (668/758) for all TB patients: 77.0% (134/174) in co-infected versus 91.4% (534/584) in TB-only. Ferroussier et al., [20] reported 77% success in Benin. For context, among TB-only patients in included studies, treatment success rates ranged from 85% to 91.4% [19, 21], while HIV-only patients receiving integrated HIV care showed improved retention and viral suppression [17].

3.1.2 | Treatment Failure Rates

Ansa et al. [17] observed TB treatment failure reduction from 14.3% to 1.4% post-integration (OR 0.09, 95% CI: 0.04–0.22). Adamu et al., [22] found rural patients had 2.74 times higher odds of poor TB treatment outcomes (95% CI: 2.27–3.29).

TABLE 1 | Operational definitions.

Term	Operational definition (for this review)
Integrated management	Coordinated delivery of HIV and TB services within same facility/program
Treatment outcome	WHO-defined TB treatment endpoints: cured, completed, died, failed, lost to follow-up (applies to TB treatment only)
Strategy	Specific intervention or approach (e.g., IPT, TB testing, ART initiation, and anti-TB therapy)
Barrier	Factor hindering implementation or uptake
Enabler	Factor facilitating implementation or uptake

TABLE 2 | Treatment outcome of integrated management of HIV/TB co-infection in West Africa.

Treatment outcome	Percentage %	References
Treatment success	77.0%	[20]
	69.0%	[17]
	77.0%	[19]
Death	15.0%	[21]
	17.5%	[17]
	10.0%	[19]
Failure	1.0%	[20]
	2.3%	[17]
	1.2%	[19]

Hayibor et al. [19] reported TB treatment failure in 0.9% (7/758), with no significant difference by HIV status.

3.1.3 | Mortality Rates

Mortality ranged from 15% to 17.5%. Ansa et al. [17] found 25% in HIV-positive versus 9.8% in HIV-negative TB patients. Hayibor et al. [19] reported 23.0% mortality in co-infected versus 8.6% in TB-only. Ferroussier et al. [20] found 15% versus 7% nationally. Table 2 highlights the treatment outcomes of integrated management of HIV and TB co-infected in West Africa.

3.2 | Service Components for Integrated HIV/TB Care

Seven components identified (Table 3). IPT and CPT are preventive (not treatment for active co-infection) but included per WHO guidelines.

3.3 | Outcomes of Each Service Component Used in the Integrated Management of HIV and TB Coinfection

3.3.1 | Treatment Strategies for Active Co-Infection

3.3.1.1 | Antiretroviral Therapy (ART) Initiation

ART initiation among co-infected patients was reported with coverage ranging from 35% to 75% across studies. Abdullahi et al. [29] found that among HIV/TB co-infected patients identified through integrated Active Case Finding (ACF) programs, 874 (representing 52.3% of 1671 HIV-positive TB patients

identified) were initiated on ART following the intervention. However, delays in ART initiation were noted in rural areas where HIV-positive TB patients faced higher mortality rates compared to urban counterparts [22]. Adamu et al. [22] reported that rural residents had a 2.74 times higher risk of poor treatment outcomes including death, underscoring disparities in healthcare access. Adepoju et al. [23] In Ghana, Avoka and Osei [18] reported high TB screening rates (94.8%) among HIV patients, but ART coverage for co-infected individuals was suboptimal, with only 50% of HIV-positive TB patients receiving anti-TB treatment. Ansa et al. [17] observed that ART uptake among HIV/TB co-infected patients in Ghana was associated with improved treatment outcomes (75% with ART vs. 61% without) although mortality remained high (25% in HIV-positive vs. 9.8% in HIV-negative TB cases). This suggests that while ART initiation is beneficial, although additional interventions are needed to address co-infection-related mortality [17].

In Nigeria, Boyd et al. [24] reported that integrating TB preventive therapy (IPT) with ART significantly improved treatment outcomes: with 45% of PLHIV initiating IPT by the end of the study period. However, delays in ART initiation were noted, particularly in high-volume ART sites where systemic barriers such as supply chain gaps and clinician hesitancy were prevalent [24].

In Benin, Ferroussier et al. [20] found that only 35% of ART-eligible HIV/TB co-infected patients started treatment per guidelines: with delays attributed to logistical challenges and CD4 testing shortages. Despite these barriers, early ART initiation during TB treatment was associated with reduced mortality (15% vs. 7% nationally), emphasizing the importance of integrated care [21]. Narh-Bana et al. [25] found that while program readiness for TB screening in HIV clinics was high (median adherence score: 62.1%), gaps in provider training and workload imbalances hindered optimal ART initiation and monitoring [25]. Pharmacokinetic interactions between TB and HIV medications further complicated ART initiation. Kwara et al. [31] identified that the CYP2B6 c.516TT genotype, prevalent in Ghana, was associated with elevated efavirenz exposure, necessitating personalized dosing to avoid toxicity while maintaining efficacy [31].

3.3.1.2 | Anti-Tuberculosis Therapy

Among HIV/TB co-infected patients, initiation of antituberculosis therapy was documented in several studies. Avoka and Osei [18], only 50% (14/28) of HIV-positive TB patients received anti-TB

TABLE 3 | Strategies for integrated management of HIV/TB coinfection in eligible studies.

Category	Service component	References
Preventive	Isoniazid preventive therapy	Adepoju et al. [23]; Ansa et al. [17]; Avoka and Osei [18]; Boyd et al. [24]; Narh-Bana et al. [25]; Akamike et al. [26]
Preventive	Tuberculosis infection control	Abugu et al. [27]; Ogbonnaya et al. [28]; Narh-Bana et al. [25]
Treatment	Anti-TB therapy	Avoka and Osei [18]; Abdullahi et al., [17, 29]; Hayibor et al., [19]; Ferroussier et al. [20, 30]; Adamu et al. [22]
Treatment	Antiretroviral therapy initiation	Abdullahi et al. [29]; Adamu et al. [22]; Adepoju et al. [23]; Avoka and Osei [18]; Ansa et al. [17]; Boyd et al. [24]; Ferroussier et al. [20]; Narh-Bana et al. [25]; Kwara et al. [31]; Lartey et al., 2011 [19];
Diagnostic	Tuberculosis testing	Narh Bana et al., (2021); Amo Adjei et al. 2014; Ferroussier et al. [20]; Boyd et al. [24]; Avoka and Osei [18]; Abdullahi et al. [29]
Preventive	Co-trimoxazole preventive therapy	Adepoju et al. [23]; Avoka and Osei [18]; Ferroussier et al. [20]; Boyd et al. [24]; Narh-Bana et al. [25]; Ogbonnaya et al. [28, 32]; Amo Adjei et al. 2014
Supportive	Patient education and counseling.	Akamike et al. [26]; Adepoju et al. [23]; Boyd et al. [24]; Narh-Bana et al. [25]; Méda et al. [33]

Note: Having established that integrated management significantly improves treatment outcomes, we examined which specific strategies contributed most to these successes. IPT and CPT are preventive interventions for PLHIV without active TB or for prophylaxis. They are not treatments for active HIV/TB co-infection. They are included because WHO guidelines mandate TB prevention and OI prophylaxis as part of integrated HIV/TB programs.

treatment indicating significant gaps in treatment access despite high HIV screening rates (93.1%) among TB patients. Similarly, Abdullahi et al., [29] reported that among internally displaced populations, 1419 TB patients were linked to treatment through an active case-finding intervention though the proportion among HIV-co-infected was not separately specified for anti-TB initiation.

Treatment success which is defined as cured plus treatment completed varied across studies. Ansa et al. [17] reported that overall TB treatment success increased from 50% pre-integration to 69% post-integration of TB/HIV services. Among HIV-positive TB patients, treatment success was 64% compared to 72% in HIV-negative TB patients. Hayibor et al., [19] found that 77.0% (134/174) of TB/HIV co-infected patients achieved treatment success which was significantly lower than the 91.4% success rate in TB-only patients. Osei et al., [30] reported treatment success in 77% of co-infected patients versus 90% in TB-only patients. Ferroussier et al. [20] reported an overall TB treatment success of 77% among TB-HIV co-infected patients, compared to 85% for all TB patients nationally.

Specific cure rates were reported by Avoka and Osei [18], where the TB cure rate was 53.5% (38/71) among all TB patients, though the cure rate specifically for co-infected patients was not separately provided. Michael et al., [34] reported cure rates of 90.3% in TB-only patients but only 61.3% in TB-HIV co-infected patients indicating a substantially worse prognosis with co-infection. Mortality among HIV-positive TB patients remained high post-integration at 25%, compared to 9.8% in HIV-negative TB patients and death rates did not significantly decrease post-integration (18.8% before vs. 17.5% after) [17].

Further, 15% of TB-HIV patients died during TB treatment (vs. 7% nationally) with deaths occurring at a median of 34 days after TB treatment start and deceased patients had severe immunosuppression (median CD4: 96 cells/mm³) [21]. Adverse treatment outcomes (death, default, failure) occurred in 23.0% of co-infected patients versus 8.6% in TB-only patients and HIV co-infection was associated with a 4.5× higher risk of adverse outcomes [19].

Co-infected patients were three times more likely to die before completing treatment than TB-only patients [30]. Among rural TB patients, 46.0% mortality was observed versus 8.9% in urban residents with HIV-positive patients having 1.4× higher risk of poor outcomes [22]. 5.2% of TB patients experienced treatment failure, with rural residence and HIV infection as key predictors [22]. Treatment failure occurred in 0.9% (7/758) of all TB patients, with no significant difference by HIV status reported [19].

3.3.2 | Diagnostic Strategies

3.3.2.1 | TB Testing and Screening

Several studies reported high TB testing rates among PLHIV. Ferroussier et al. [20] found that 93% of TB patients in Benin were tested for HIV with 16% testing positive, demonstrating effective integration of HIV/TB screening. Similarly, Boyd et al. [24] noted that standardized tools such as the “TPT Clinical Site Readiness Tool” improved TB screening rates in Nigeria: with 89,847 PLHIV screened for TB during the study period. However, only 35% of ART-eligible patients initiated treatment promptly, indicating systemic delays in linkage to care [21]. Screening rates for TB among HIV patients were high (94.8%), while HIV screening among TB patients was slightly lower (93.1%) [18]. However, only 50% of HIV-positive TB patients received anti-TB treatment, highlighting gaps in linkage to care [18]. Active case-finding (ACF) programs significantly increased TB detection, with a 45.1% rise in bacteriologically confirmed cases in Nigeria [29].

3.3.3 | Preventive Strategies (Not Treatment for Active Co-Infection)

3.3.3.1 | Isoniazid Preventive Therapy (IPT)

IPT is a preventive intervention for PLHIV without active TB. It is not recommended for patients with diagnosed HIV/TB co-infection, who instead require full anti-TB treatment regimens that include isoniazid as a component of combination therapy.

Six (6) studies reported using IPT among patients with HIV and TB coinfection. All six studies demonstrated that the initiation of IPT was poorly implemented despite evidence that IPT reduces the risk of TB and death among PLHIV. Adherence to IPT and its effectiveness varied significantly across studies, with completion rates ranging from 40% to 86% [17, 23]. Early discontinuation was common, with 17.2% stopping within the first month, 44.9% by the second month, and 22.9% by the third month [23]. Avoka and Osei [18] reported no records of IPT utilization among TB/HIV co-infected patients in Ghana, which is consistent with WHO guidelines that do not recommend IPT for patients with active TB co-infection. This finding should not be interpreted as poor adherence to guidelines but rather as appropriate clinical practice. Boyd et al. [24] evaluated the implementation of IPT among PLHIV in Nigeria and reported that 45% of patients on ART initiated IPT. Adherence to IPT was 0% in HIV clinics, primarily due to limited national policy support and training for healthcare workers [25]. Pharmacist-led initiation of IPT were reported to be strongly associated with higher completion rates (aOR: 23.7; 95% CI: 16.5–33.9), whereas frequent TB screenings during IPT were reported to reduce adherence (aOR: 0.58; 95% CI: 0.43–0.78) [23]. Akamike et al. [26] surveyed PLHIV in Nigeria and found low IPT knowledge among them. Only 11% knew about isoniazid, 25% understood the eligibility criteria, and 42% were aware of the treatment duration.

3.3.3.2 | TB Infection Control (TBIC)

Abugu et al. [27] assessed TBIC implementation across nine ART-providing facilities in Enugu State, Nigeria. Only 44% of the facilities met all five WHO minimum TBIC standards, with rural facilities demonstrating higher compliance (50%) than urban facilities (33%) [27]. Administrative controls, such as cough screening and fast-tracking, were the most consistently implemented measures (100% compliance), while personal protective equipment (PPE) was largely unavailable, with only 11% of facilities providing respirators and staff training [27].

A study in Nigeria found that only 8.3% of health facilities had documented TBIC policies, and 16.7% had established Infection Control Committees [28]. Ventilation in waiting areas and consulting rooms was suboptimal, with 25% of facilities reporting overcrowding, increasing the risk of TB transmission [28]. Similarly in Ghana, adherence to TB screening guidelines among HIV clinics was moderate (median score: 62.1%), with significant disparities in the availability of screening tools and infection control materials [25].

3.3.3.3 | Co-Trimoxazole Preventive Therapy (CPT)

CPT provides prophylaxis against opportunistic infections (Pneumocystis jirovecii pneumonia, toxoplasmosis, bacterial infections) and is recommended for all PLHIV with advanced disease ($CD4 < 350$ cells/mm³), regardless of TB status [8]. While CPT is not a TB-specific intervention, it is an important component of comprehensive HIV care that benefits co-infected patients by reducing morbidity and mortality from opportunistic infections. CPT was evaluated in several studies as a critical component of integrated HIV/TB management in West Africa. The findings revealed significant gaps in CPT utilization despite

its proven benefits in reducing morbidity and mortality among co-infected patients. In a study conducted in Nigeria, only 60% (6/10) of HIV/TB co-infected patients received CPT highlighting suboptimal adherence to prophylaxis guidelines [23]. Similarly, research in Ghana reported that CPT coverage among co-infected patients was inconsistent, with some facilities failing to maintain records of CPT administration [18]. This lack of documentation underscores systemic challenges in monitoring and implementing CPT protocols. Ferroussier et al. [20] reported a high CPT coverage rate of 95% among HIV/TB co-infected patients in Benin, demonstrating its widespread adoption [21]. The high coverage was associated with improved treatment outcomes, particularly in reducing opportunistic infections and mortality rates among co-infected individuals. Similarly, Boyd et al. [24] highlighted the role of CPT in their large-scale implementation study in Nigeria, where it was part of a comprehensive package of care for PLHIV and receiving ART [24]. The study emphasized that CPT, alongside other interventions, contributed to sustained improvements in patient outcomes, including reduced morbidity and mortality.

However, challenges in CPT adherence and implementation were noted. Narh-Bana et al. [25] found that while CPT was generally well-adhered to in Ghana, gaps existed in its integration with other TB screening and treatment guidelines, particularly in resource-limited settings [25]. The study revealed that health facilities with high workloads and limited resources often struggled to maintain consistent CPT provision, which occasionally led to suboptimal adherence rates. Additionally, Ogbonnaya et al. [28] identified systemic barriers, such as inadequate training for healthcare workers and insufficient supply chain management, which occasionally hindered CPT delivery in Nigerian health facilities [28]. The variable implementation of these strategies across settings was influenced by several key factors.

3.3.4 | Supportive Strategies

3.3.4.1 | Patient Education and Counseling

Patient education was associated with improved adherence. Patient education and counseling emerged as critical components in the integrated management of HIV/TB co-infection across the studies reviewed. Several studies highlighted the importance of educating patients about their conditions, treatment regimens, and adherence strategies. For instance, Akamike et al. [26] found that only 11% of patients knew about isoniazid, and just 25% understood the eligibility criteria for IPT, underscoring significant gaps in patient knowledge. Counseling efforts were insufficient to bridge these gaps, leading to suboptimal IPT uptake (17.5%) and adherence [26].

Adherence to treatment was notably high among patients who received structured counseling and education. In the study by Adepoju et al. [23], pharmacist-led initiation of IPT was strongly associated with higher completion rates emphasizing the role of healthcare providers in patient education. Similarly, self-reported adherence to IPT was excellent (91.4%) among patients who received counseling, suggesting that consistent education efforts can significantly enhance treatment compliance [26].

Boyd et al. [24] emphasized the role of community education seminars and patient management strategies in addressing barriers to IPT uptake among PLHIV in Nigeria. Their study reported that tailored educational interventions significantly improved adherence and integration of IPT with ART refills [24]. Similarly, Narh-Bana et al. [25] assessed adherence to TB screening guidelines in Ghana and found that facilities with higher adherence scores often provided patient education materials and had standardized protocols for counseling. However, gaps were noted in the availability of TB screening questionnaires and guidelines, which hindered consistent patient education efforts [25].

Méda et al. [33] demonstrated that decentralized HIV/TB services, coupled with community engagement and volunteer involvement, improved patient knowledge and satisfaction. The study reported that patients in rural areas benefited from localized education efforts, which reduced delays in diagnosis and treatment initiation [33].

3.4 | Factors Explaining Implementation Variability

3.4.1 | Barriers to Integrated Management of HIV/TB Coinfection in West Africa

3.4.1.1 | Socioeconomic and Individual Factors

Among the articles reviewed, the most prevalent challenges under socioeconomic and individual level themes were stigma ($n = 2$), poverty/low income ($n = 2$), education ($n = 2$), gender ($n = 3$), and marital status ($n = 1$). The juggling act between income and fundamental requirements like transportation and education is prevalent throughout literature reviewed. Anku et al. reported stigma (gossip and verbal insults) and privacy challenges as factors hindering service integration in most of the facilities offering TB and HIV delivery in Ghana [35]. The stigma involved in the co-morbidity of HIV/TB discourages individuals from seeking medical care [36]. Stigma associated with both HIV and TB deterred individuals from seeking timely diagnosis and treatment. Fear of social isolation and discrimination were a recurring barrier [32]. A study in Nigeria found that living in a rural area was an independent risk factor for suboptimal TB treatment outcomes in people who both had HIV and TB [22]. This could be due to lack of transportation and inaccessible roads. Especially in rural areas, decisions must be made on how to spend scarce resources [22]. Low income also served as a barrier in achieving successful outcomes in TB and HIV co-infection management [37].

Lack of education also resulted in poor treatment outcomes in women [37]. Adamu et al. also reported low level of education affecting treatment outcomes of HIV/TB co-infected in Nigeria. Compared to married respondents, single respondents were two times more likely to have a good understanding of IPT (AOR = 2.11, CI = 1.10–4.06) [26]. The success of treatment for men and women undergoing integrated management was 70.2% and 29.8%, respectively, due to underutilization of Directly Observed Treatment, Short-course (DOTS) services by women in the hospital [19]. Additionally, limited knowledge of IPT and its benefits contributed to poor adherence, with only 11% of

patients being aware of the drug name (isoniazid), and 42% not knowing its treatment duration [26]. In another study, limited knowledge about HIV/TB coinfection and its management contributed to poor health-seeking behaviors and adherence to treatment [25].

3.4.1.2 | Health System

Among the article reviewed, the predominant subthemes under health system were human resources ($n = 4$), health personnel training ($n = 3$), health financing for the provision of medical supplies and infrastructure for integrated services ($n = 5$), motivation ($n = 1$), health service delivery ($n = 3$), leadership and governance ($n = 1$) and barriers to the health information system ($n = 3$). Shortage of staff was found to increase workload, which was a challenge to the integration of services [35]. Two studies conducted in Ghana revealed that integration will increase front-line workload due to limited staff (Avoka et al., 2020 and [36]). Institutions with a strong program adherence had lower HIV-healthcare-provider to HIV-client ratios and considerably fewer PLHIV attending the HIV clinic each month than facilities with low program adherence [25]. Poor outcomes were caused by insufficient training and retraining of healthcare personnel in TB infection control practices (Abugu et al., 2020). Training TB staff to perform rapid HIV testing eliminated the need to refer patients and the consequent risk of delay in HIV/TB therapy, which improves results [21].

Shortages in medical supplies such as protective clothing were also reported in a study conducted in Nigeria [27]. The availability of TB screening guidelines and questionnaires were substantially related to the level of adherence. HIV clinics with available TB screening guidelines (76.2%) and questionnaires (80.0%) had high adherence [25]. The physical distance between the HIV unit and the chest clinic/TB unit was a barrier affecting the integrated management of HIV and TB co-infection in Ghana [35]. Funding issues also emerged as challenges to the integration of services [35]. There were difficulties in procuring rapid HIV test kits due to delays in Global Fund grant disbursements in Benin [21]. Indeed, most funds for treatment, diagnosis and other operational costs for TB and HIV are provided by the Global Fund [36]. Another barrier that served as a challenge to integrated management was scrapping of the food package, which served as motivation for HIV/TB clients (Avoka et al., 2020).

Health information systems in data management was a barrier in a study conducted in Ghana. (Anku,2020). Inefficient record-keeping further exacerbated delays in diagnosis and treatment, particularly in rural areas where health infrastructure was underdeveloped [18]. Poor coordination in data sharing was also established in another study conducted in Ghana [36]. One of the challenges in carrying out successful HIV/TB collaborative activities in a hospital located in Ghana was manual data collection and record keeping (Avoka et al., 2020).

3.4.1.3 | Clinical Barriers

Among the articles reviewed, clinical challenges identified were essentially drug-drug interactions and adverse effects of anti-retroviral and anti-TB drugs ($n = 4$) and fear of adverse

reactions ($n = 1$). Adverse effects were driven by drug interactions between antiretroviral medications and rifampicin [19]. Serious adverse events occurred in 8/31 (25.8%) of the study subjects who had HIV/TB co-infection [34]. In a trial conducted in Ghana, there was evidence of drug interaction between several antiretroviral medications and rifamycins [30]. A study in Ghana revealed that in managing HIV and TB coinfection, initiating efavirenz-based highly active antiretroviral therapy (HAART) within 1 month after beginning anti-TB therapy did not seem to alter the effectiveness of HIV treatment (Lartey et al., 2011). Poor treatment outcomes in HIV/TB co-infected patients receiving rifampin are strongly associated with CYP2B6 c.516TT genotype [31]. Fear of adverse drug reactions and worse outcomes with the introduction of ART during anti-TB treatment were also reported in a study conducted in Benin [21]. Barriers to integrated management of HIV/TB coinfection are summarized in Table 4.

3.4.2 | Enablers of Integrative Management of HIV/TB Coinfection in West Africa

3.4.2.1 | Socioeconomic and Individual Factors

Socioeconomic support such as food packages to mitigate treatment side effects medications during the intensive phase of TB treatment and transportation assistance was associated with better treatment adherence. TB/HIV testing and treatment were bundled with incentives such as multivitamins and dewormers as well as transportation assistance to boost integrated management of HIV and TB [29]. Women appeared to have appropriate reach to HIV services through TB services and were more likely to accept testing and receive treatment than male counterparts [21].

3.4.2.2 | Health System

Monitoring and the local use of routine data to evaluate performance were critical to the achievement of integrated management of TB and HIV (Ferrousieur, 2013). Education and sensitization of healthcare workers via direct mentorship on the

advantages of IPT, ART adherence, and counseling were examples of health system enablers under health staff training. To provide an effective health information system, training and dissemination of IPT evaluation and monitoring forms were used [24].

Higher remuneration and incentives can boost the spirits of medical workers, especially those who work with contagious and communicable diseases like HIV and TB (Avoka et al., 2020). Using a decentralized strategy to health care delivery revealed an increase in TB diagnosis and improved HIV detection among TB cases (Meda et al., 2014). Pharmacist-led initiation of IPT significantly improved completion rates [23], while synchronized HIV/TB service delivery reduced duplication and enhanced efficiency [17]. The use of active case-finding (ACF) strategies in high-burden settings increased TB detection rates by 45.1% and improved linkage to care [29].

3.4.2.3 | Clinical Enablers

Periodic audits of the clinical data of PLHIV to determine IPT eligibility were identified as enhancers of integrated HIV and TB treatment [24]. Implementation of a checklist to determine adverse events and IPT eligibility also improves treatment outcomes [24]. Early ART initiation in coinfectd patients improved TB treatment success rates [17]. Furthermore, regular TB screening in HIV clinics and vice versa enhanced early detection [18]. The availability of rapid diagnostic tools and integrated treatment protocols streamlined care, though gaps in PPE and staff training on TB infection control remained barriers [27]. Indeed, integrated service delivery and pharmacogenomic considerations enhanced treatment outcomes. Co-located HIV/TB services improved ART initiation and TB treatment success rates in Benin, though delays in ART initiation for coinfectd patients remained a concern [21]. Pharmacogenetic studies in Ghana revealed that CYP2B6 genetic variants influenced efavirenz metabolism, suggesting the need for personalized dosing in HIV/TB coinfectd patients [31]. Furthermore, the use of standardized monitoring tools and rapid ART initiation protocols reduced mortality and improved viral suppression rates

TABLE 4 | Barriers to integrated management of HIV and TB co-infection in West Africa.

Theme	Barrier	References
Socioeconomic and individual level	Stigma	[35, 36]
		[22, 37]
Health system level	Poverty, low income education, gender disparities, marital status	[19, 25, 26]; Adepoju, 2020.
	Lack of human resources for health, Lack of health personnel training, Inadequate health financing for the provision of medical supplies and infrastructure for integrated services	[18, 25, 35, 36]; Abugu et al., 2020 [20, 23, 27, 28, 32]
	Lack of motivation	
	Poor health service delivery	
	Poor leadership and governance	
Clinical level	Inadequate health information system	
	Drug-drug interactions and adverse side effects of antiretroviral and anti-TB drugs.	[19, 21, 30, 31, 34]
	Fear adverse drug reactions	

(Lartey et al., 2011). Enablers of integrative management of HIV/TB co-infection in West Africa are summarized in Table 5.

4 | Discussion

This review aimed to identify strategies for integrated HIV/TB management in West Africa and examine barriers and enablers influencing treatment outcomes. Implementation was consistently low and highly variable across regions, revealing substantial gaps between policy and practice.

4.1 | Implementation Rates of Key Strategies

Coverage of IPT and TBIC was consistently low across West Africa, despite strong evidence supporting their effectiveness in preventing TB (Ansa and Sifa, 2015). Conversely, ART initiation and TB testing demonstrated relatively high uptake [17, 19, 21]. CPT and patient education initiatives showed measurable improvements, though CPT faced disruptions from drug shortages and workforce gaps [23]. Patient education emerged as a cross-cutting enabler enhancing adherence across strategies [24, 26, 33].

Poor IPT uptake in low- and middle-income countries reflects concerns about resistance and adherence [38, 39]. While TB screening was well adopted, consistent follow-up and linkage to care remain inconsistent [18, 21].

4.2 | Enablers and Barriers

Effective enablers included decentralized service models [33], pharmacist-led interventions [23], synchronized HIV/TB protocols [17], and active case-finding [29]. Healthcare worker training and routine monitoring improved operational capacity [24]. Socio-economic incentives—food support, transportation, community education—boosted patient engagement (Avoka et al., 2020). Rapid diagnostic tools and standardized ART protocols also contributed to improved outcomes [21] (Lartey et al., 2011).

Despite treatment success rates up to 77%, mortality among co-infected patients remained high (15%–19.5%) compared to HIV-negative TB patients (7%–9%) [17, 19, 21]. This persistent mortality gap warrants examination. Late diagnosis is critical—many co-infected patients present at advanced stages, limiting intervention effectiveness regardless of quality [21, 22]. Immunocompromise creates additional vulnerabilities to treatment failure and opportunistic infections.

Access disparities compound challenges. Rural populations face geographic barriers, limited infrastructure, and reduced specialized services [22], resulting in delayed treatment initiation and inconsistent follow-up.

Comorbidities and complex medication regimens further complicate management. HIV-TB drug interactions increase adverse events and treatment discontinuation [19, 34]. Socioeconomic burdens—stigma, poverty, education gaps—continue to influence health-seeking behavior even after care initiation.

4.3 | Strategic Implications

Context-sensitive care models, strengthened health systems, and focus on equity and patient-centered strategies are needed. Early detection mechanisms, improved rural access, and comprehensive support systems addressing clinical and socioeconomic barriers are essential for achieving 95-95-95 targets and SDG health goals [7, 16].

4.4 | Limitations

This scoping review has several limitations. The search was conducted up to March 31, 2022; more recent studies are not included. Only English-language publications were included, potentially missing relevant studies from Francophone West Africa. As a scoping review, formal quality assessment was not performed. Limitations of included studies include predominance of cross-sectional and single-site designs, which limits generalizability across West Africa. Heterogeneity of study designs and outcome measures limited direct comparisons. Importantly, some included studies reported on preventive services (IPT, CPT) delivered to PLHIV without active TB; we have clearly distinguished between treatment and prevention throughout. Another notable limitation of this review is the predominant focus of the available literature on HIV/TB co-infected patients with comparatively less attention to HIV-only and TB-only patients receiving integrated services. This imbalance reflects the historical emphasis of HIV/TB collaborative activities on co-infection outcomes [40]. However, integrated services must address all three populations to achieve optimal population health outcomes. For TB-only patients, integration means ensuring routine HIV testing and appropriate referral for those who test positive [21]. For HIV-only patients, integration involves routine TB screening and timely initiation of IPT for eligible individuals [18, 24]. The limited data on outcomes for HIV-only and TB-only patients in the context of

TABLE 5 | Enablers of integrated management of HIV/TB co-infection in West Africa.

Theme	Enabler	References
Socioeconomic and individual level	Patient incentives, community education, gender-sensitive approaches	[18, 20, 24, 29]
Health system level	Health information systems, health care worker training, motivation, decentralized service delivery, health financing for the provision of medical supplies and infrastructure for integrated services	Ferrousieur, 2013; [18, 23, 24]; Meda et al., 2014 [29]
Clinical level	Documentation and implementation of checklist	[24]

integrated services highlight a significant gap in the literature and an important area for future research.

5 | Conclusion

This scoping review confirms that integrated management of HIV/TB co-infection is both feasible and beneficial in West Africa, though implementation remains inconsistent across settings. Strategies such as ART initiation, TB screening, CPT, and patient education were associated with improved treatment outcomes, while IPT and TBIC faced substantial challenges in uptake and adherence. The limited data on HIV-only and TB-only patients in integrated settings represents a significant gap in the literature. Systemic barriers including staff shortages, stigma, inadequate financing, drug-drug interactions, and weak health systems continue to impede progress and must be addressed through comprehensive, context-sensitive interventions.

Author Contributions

Chris Mensah Nartey: conceptualization, methodology, formal analysis, investigation, resources, writing – original draft, writing – review and editing, visualization, funding acquisition. **Adwoa Kumiwa Asare Afrane:** conceptualization, formal analysis, writing – original draft, writing – review and editing, supervision, methodology. **Benjamin Tagoe:** formal analysis, investigation, project administration, writing – review and editing, writing – original draft, methodology. **Awo Afi Kwapong:** project administration, formal analysis, writing – original draft, writing – review and editing. **Seth Kwabena Amponsah:** conceptualization, formal analysis, investigation, writing – original draft, writing – review and editing, supervision, methodology, resources, visualization, funding acquisition.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

All data generated or analyzed during this study are included in this published article [and its [supplementary information files](#)].

All the data generated or analyzed during this study are included in this published article.

Transparency Statement

Seth Kwabena Amponsah (co-first author and manuscript guarantor) affirms that this manuscript is an honest, accurate and transparent account of the scoping review being reported; that no important aspects of the study have been omitted; and that any discrepancies from the

study as planned (no formal registration was undertaken for this scoping review) have been explained.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.

Supporting File 1: hsr273072-sup-0001-Supplementary_Table_1.docx.

Supporting File 2: hsr273072-sup-0002-Supplementary_Table_2.docx.