

Review Article

Rapid Review of Community Pharmacies and Potential for Expanded Access for the Treatment of HIV Infection and/or Tuberculosis in Sub-Saharan Africa

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Abstract. Community pharmacies (private retail drug shops or pharmacies) have emerged as promising platforms for antiretroviral therapy delivery. This rapid review synthesizes findings on using pharmacies to treat HIV infection and/or tuberculosis (TB), and it identifies lessons for expanding TB service delivery. We reviewed studies published between 2015 and 2025 with adherence, retention in care, virologic suppression, prescription refill rates, and TB treatment access as outcomes. Of 314 articles screened, only 3 met the eligibility criteria (studies reporting pharmacies treating HIV infection and/or TB). Findings revealed improved CD4 cell counts; improved mean body weight; and higher rates of prescription refill (95–100%), retention (98%), and viral suppression (99%). Pharmacies have proven effective in delivering treatment for people with HIV and/or TB, highlighting their potential role in expanding TB treatment and related services in sub-Saharan Africa. However, pilot studies are needed to assess the effectiveness and implementation outcomes before broader implementation.

INTRODUCTION

About 10.8 million people developed tuberculosis (TB) globally in 2023, and 1.25 million died, including 161,000 people with HIV (PWH).¹ Tuberculosis is curable, and up to 85% of people with drug-susceptible TB can recover when treated with standard anti-TB regimens lasting 4–6 months.² Despite the availability of shortened and effective anti-TB regimens, the global treatment success rate (TSR) for people with drug-susceptible TB was 88% in 2022, whereas among PWH, it was markedly lower at 79%.² In the African region, the TSR stood at 78.9%,² consistent with 76.2% pooled TSR reported in a systematic review of 31 studies.³ These rates, although encouraging, fall short of the $\geq 90\%$ target set by the World Health Organization (WHO).

Suboptimal TSR contributes to preventable deaths, TB relapse, and the emergence of drug-resistant TB, including catastrophic costs among affected households. The widely adopted directly observed therapy short-course (DOTS) model requires frequent clinic visits to pick up TB medications, posing significant financial and logistical burdens in resource-limited settings.⁴ Evidence from Ethiopia shows high patient dissatisfaction with DOTS because of access challenges and emphasizes the use of patient-centered care models.⁵ Additionally, studies indicate that missed clinic visits under the DOTS model are common, and the studies indicate that they have led to reducing TSR by 59% and nearly tripling the mortality risk among people with TB.^{6–9} These findings emphasize the need for innovative models that

remove access barriers and support sustained treatment adherence and optimal outcomes.

The End TB Strategy promotes person-centered approaches to eliminate TB by 2035.¹⁰ Differentiated service delivery (DSD) models align with this vision by tailoring care to patient needs, expanding service reach, improving quality, and optimizing resource use.¹¹ One promising DSD model involves leveraging community pharmacies (private retail drug shops) to deliver antiretroviral therapy (ART) to PWH and/or people with TB at the community level. However, the data from community pharmacies have not been rigorously evaluated. This study synthesizes evidence from sub-Saharan Africa (SSA) on the use of community pharmacies for HIV and/or TB treatment, focusing on clinical and health system outcomes.

We also draw lessons to inform the expansion of pharmacy-based TB care and identify research priorities to advance sustainable, person-centered TB treatment aligned with the WHO End TB Strategy.

MATERIALS AND METHODS

Study design.

The study adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for rapid reviews. This approach was appropriate for summarizing existing literature to inform policy and practice regarding the treatment of HIV and/or TB in community pharmacies in SSA. We did not register the review in PROSPERO as it was optional.

Population and eligibility criteria.

Table 1 summarizes the eligibility criteria. Included studies used community pharmacies for HIV and/or TB treatment and were published between 2015 and 2025 to ensure retrieval of the most recent and relevant literature across SSA.

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TABLE 1
Eligibility criteria

Component	Inclusion Criteria	Exclusion Criteria
Population	Studies that included individuals with HIV and/or people with TB	Studies that focused on populations other than those with HIV and/or TB
Intervention	Studies reporting on the delivery of ART or TB through community pharmacies	Studies that reported on ART or TB care delivery through health facilities or noncommunity pharmacy models
Comparator	Routine care	None
Outcomes	Viral load suppression, adherence, and prescription refill rates	Studies that did not report on the relevant outcomes
Study design	Randomized trials, quasiexperimental studies, cohort studies, cross-sectional studies, and mixed-methods studies	Editorials, opinion pieces, commentaries, reviews, protocols, and reports
Setting	Studies conducted within SSA	Studies conducted outside SSA
Language	English language	Non-English language(s)
Time frame	Studies published between 2015 and May 2025	Studies published before 2015
Quality of studies	Studies with low and moderate risk of bias were included	Studies with a high risk of bias were excluded

ART = antiretroviral therapy; SSA = sub-Saharan Africa; TB = tuberculosis.

Data sources and search strategy.

PubMed and Google Scholar were searched because this was a rapid review. We hand searched the reference list of all included full-text articles for additional articles. The search strategy, which was developed based on major components of the research question, combined medical subject headings and free-text terms using Boolean operators. Two reviewers conducted the literature search between April 1, 2025 and September 30, 2025. The PubMed search string used is shown:

("Pharmacies" [MeSH] OR "Community Pharmacy Services" [MeSH] OR "Pharmacists" [MeSH] OR "Drug Shops" OR "Retail Pharmacies" OR "Private Pharmacies" OR "Pharmacy Services" OR "Drug Distribution" OR "Medicine Distribution" OR "Medication Dispensing" OR "Pharmacy-Based Distribution" OR "Community Drug Distribution Points" OR "Pharmacy-Led Care") AND ("Tuberculosis" [MeSH] OR "TB" OR "*Mycobacterium tuberculosis*" OR "Tuberculosis Treatment" OR "TB Care") AND ("HIV" [MeSH] OR "Acquired Immunodeficiency Syndrome" [MeSH] OR "HIV/AIDS" OR "Human Immunodeficiency Virus" OR "HIV Treatment" OR "Antiretroviral Therapy" OR "ART").

Screening and selection of studies and data items.

All retrieved records were imported into EndNote and deduplicated. Using the predefined eligibility criteria, two reviewers independently screened the records by titles and abstracts followed by full-text articles.

Disagreements were resolved through discussion with a third reviewer. The article selection process was reported in a PRISMA flow diagram. Relevant data items were extracted from each study using a standardized Microsoft Excel (Microsoft Corp, Redmond, WA) form, including the publication year, country, study design, study population, intervention type, sample size, study outcomes, and summary of findings.

Study quality assessment.

Two reviewers independently assessed the methodological quality of the included studies using the Joanna Briggs Institute Critical Appraisal Checklists for cohort, analytic cross-sectional, quasiexperimental, and mixed-methods studies. Disagreements were resolved through consensus.

The quality assessment results were categorized as low, moderate, and high risk of bias.

STATISTICAL ANALYSES

A narrative synthesis to summarize and integrate the findings was conducted as a meta-analysis was infeasible because of methodological heterogeneity and the few published studies on the topic. The studies were grouped based on similarities in design, population, and outcomes, allowing for the identification of patterns and meaningful synthesis. Consistent findings and discrepancies, quality of included studies based on the risk of bias assessment, and results were summarized in an evidence table.

RESULTS

Study profile.

We identified 374 articles—32 from PubMed and 342 from Google Scholar. After removing duplicates, we retained 337 articles. We screened the 337 articles for eligibility based on titles and abstracts, and we excluded 314.

We then retrieved and assessed the full text of the remaining 23 articles, excluding 21 based on predefined criteria. We identified one extra study from the reference list of the full texts. Overall, three articles were synthesized (Figure 1).

Characteristics of included studies.

Table 2 summarizes the three studies included in this rapid review, which were all published between 2018 and 2024.^{12–14} Three studies used a community pharmacy model for the treatment of HIV, and one used a community pharmacy model for the treatment of TB as well. One study assessed the effectiveness of transitioning stable PWH to community pharmacies by comparing CD4 cell count, weight, and viral load before and after the transition.¹² Another examined the feasibility of utilizing community pharmacies as a task-shifting model for differentiated ART service delivery.¹³ A third study evaluated the feasibility, acceptability, and clinical outcomes of HIV service provision through community pharmacies.¹⁴ Two studies used a retrospective cohort design,^{12,14} and one study used a quasiexperimental design.¹³ All studies were conducted in Nigeria^{12–14} and had a low risk of bias.^{12–14}

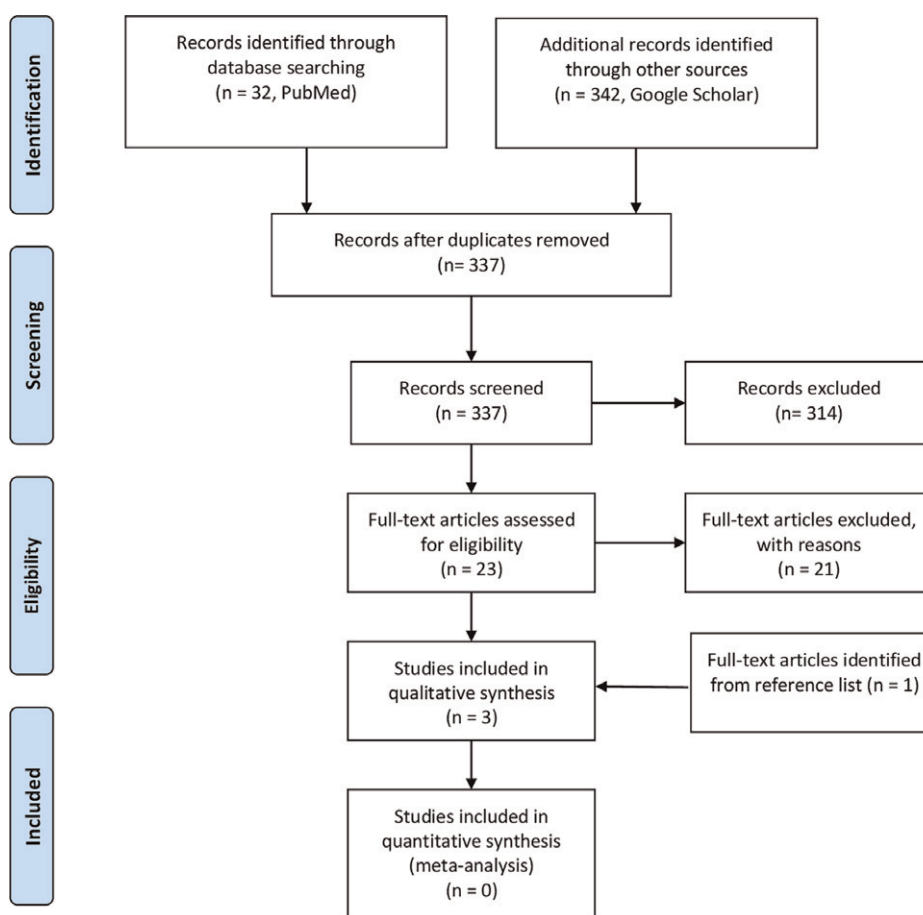


FIGURE 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses flowchart summarizing the study profile.

Clinical and health system outcomes.

We summarized the outcomes associated with community pharmacy-based ART delivery for the treatment of HIV and/or TB in two categories: health system outcomes and clinical outcomes.

Health system outcomes: High prescription refill rates.

Two Nigerian studies reported high prescription refill rates of 100%¹³ and 95%¹⁴ among stable individuals with HIV

after transitioning to continuing ART through a community pharmacy model.

Clinical outcomes.

High retention in care and optimal viral suppression rates. Two studies reported on retention in care and viral load suppression rates regarding using community pharmacies for the treatment of HIV. Both studies were conducted in Nigeria,^{13,14} and they found $\geq 98\%$ retention in care rates

TABLE 2
Characteristics of studies included in the narrative synthesis

Study	Design	Country	Sample Size	Intervention	Major Findings	Risk of Bias
Kwaghe et al. ¹²	Retrospective cohort design	Nigeria	171	Community pharmacy	1 year after transferring into community pharmacies, mean CD4 cell count ($P = 0.001$) and weight ($P = 0.006$) were higher compared with when they were at the clinic, and all maintained a suppressed viral load.	Low
Avong et al. ¹³	Quasiexperimental study	Nigeria	295	Community pharmacy	A pilot study in Abuja, Nigeria demonstrated that nearly 10% of stable ART patients successfully transitioned to community pharmacies, achieving a 100% prescription refill rate and 99.3% retention in care.	Low
Asieba et al. ¹⁴	Retrospective cohort design	Nigeria	10,015	Community pharmacy	Overall, 10,015 PWHs were devolved to 244 community pharmacies. The prescription refill rate was 95%, the retention rate was 98%, and viral suppression was 99.1%. Increasing ART duration was associated with high refill rates.	Low

ART = antiretroviral therapy; PWH = people with HIV.

1 year after individuals with HIV transitioned to community pharmacies. One of the studies showed a nearly 100% viral load suppression rate after the transition.¹⁴

Improved immunologic response and physical health.

A retrospective cohort study conducted in Nigeria found that a year after transferring ART distribution to community pharmacies, the mean CD4 cell count and body weight among individuals with HIV significantly increased, whereas viral load remained suppressed.¹²

DISCUSSION

This review identified only 3 eligible studies from 314 studies screened, which reflects the limited but growing interest in pharmacy-based HIV and/or TB care in SSA. Although the small number may constrain generalizability, the consistent positive outcomes across studies highlight an underexplored opportunity.

The scarcity of studies underscores the urgent need for high-quality implementation research to evaluate the role of pharmacies in TB treatment. Findings revealed that a community pharmacy-based HIV treatment was associated with significant improvements in clinical and health system outcomes among people with TB and/or HIV. Notably, there were improvements in the rates of prescription refill, retention in care, and viral load suppression, including enhanced immunologic recovery as indicated by elevated CD4 cell counts. Physical health also improved, which was reflected by increased body weight. These findings have important implications for TB programming, policy, and research.

Community pharmacies have been used to support ART delivery among PWH, and this experience suggests the potential for extending similar service delivery models to people with TB/HIV through the integration of TB medication refills.¹⁵ Such integration would avert stigma and discrimination as refills would be convenient and private. The health system's efficiency would also improve by saving the health care providers' time, allowing them to give extra care to severely ill individuals with TB/HIV. Studies have also shown that community pharmacies prevent inadvertent HIV status disclosure,¹⁶ including self and community stigma.^{17–21} In urbanized African countries where people with TB/HIV come from diverse areas and physical addresses frequently change,²⁰ the approach ensures that TB care is person centered. Beyond treatment delivery, community pharmacies may also serve as platforms for TB screening and provision of TB preventive therapy among PWH without TB. However, the review revealed critical evidence gaps as the approach is underutilized across HIV and TB control programs. Therefore, there is a need for targeted investment in pilot studies to assess the feasibility, acceptability, and effectiveness of pharmacy-based TB care in SSA.

The adoption and scale-up of community pharmacies for expanding TB care will require the development of protocols, standard operating procedures, and policies to ensure standardized and quality care delivery. The training of community pharmacy health care providers in TB management and basic psychosocial counseling would equally be needed to ensure comparable TB service delivery between public health facilities and community pharmacies. This will help maintain high satisfaction rates and continued care among people with TB and/or HIV.

A focus on mechanisms for continued treatment monitoring at public health facilities or community pharmacies would be essential for the successful integration of TB services into community pharmacies. Additional considerations include strengthening data capture, coordination, and communication systems between public health facilities and community pharmacies. Early engagement of relevant stakeholders, especially people with TB and/or HIV, public and private health care providers, pharmacy owners, and Ministry of Health personnel, throughout the entire integration process will be needed.

Qualitative studies on barriers and facilitators to integrating TB services into community pharmacies for people with TB and/or HIV, including developing context-specific implementation strategies, will be needed. Moreover, implementation research assessing the effectiveness and implementation outcomes (feasibility, fidelity, acceptability, cost, and sustainability) of TB services integration into community pharmacies is essential.

Study strengths.

This is the first rapid review to our knowledge focusing on community pharmacies for HIV and/or TB treatment in SSA. Strengths include its methodological and statistical rigor, a comprehensive synthesis of missed opportunities arising from the underutilization of community pharmacies for TB and/or HIV treatment, and the identification of key lessons to inform the expansion of TB treatment through community pharmacies in SSA.

Study limitations.

Limitations include the small number of studies synthesized despite the broad eligibility criteria, confirming the scarcity of studies on the topic. All included studies originated from Nigeria, a country with a differing context (pharmacy density, regulation, ART scale-up, etc.). Included studies are observational and lack TB-specific outcomes. Also, there are potential barriers to implementation, like differing regulatory frameworks, fragmented public-private partnerships, and concerns around workload shift from the public sector to the private sector among others.²² Together, these issues limit the generalizability, transferability, and transportability of the findings to other SSA settings. Findings should, thus, be considered preliminary as no robust evidence currently exists for pharmacy-based TB treatment delivery.

CONCLUSION

This review revealed that community pharmacies have successfully delivered treatment to individuals with HIV and/or TB, with improvements in clinical and health systems outcomes. The documented successes suggest a strong potential for using community pharmacies to expand access to TB treatment and related services in SSA.

However, pilot studies are needed to assess the acceptability, feasibility, and effectiveness of pharmacy-based TB care in diverse settings before broader implementation.

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REFERENCES

- Lee H, Kim J, Kim J, Park Y-J, 2025. Review of the global burden of tuberculosis in 2023: Insights from the WHO Global Tuberculosis Report 2024. *Jugan Geongang Gwa Jilbyeong 18 (11 Suppl)*: 55–69.
- World Health Organization, 2024. *Global Tuberculosis Report 2024*. Available at: <https://www.who.int/teams/global-programme-on-tuberculosis-and-lung-health/tb-reports/global-tuberculosis-report-2024>. Accessed March 26, 2026.
- Izudi J, Semakula D, Sennonno R, Tamwesigire IK, Bajunirwe F, 2019. Treatment success rate among adult pulmonary tuberculosis patients in sub-Saharan Africa: A systematic review and meta-analysis. *BMJ Open 9*: e029400.
- Zimmer AJ, Heitkamp P, Malar J, Dantas C, O'Brien K, Pandita A, Waite RC, 2021. Facility-based directly observed therapy (DOT) for tuberculosis during COVID-19: A community perspective. *J Clin Tuberc Other Mycobact Dis 24*: 100248.
- Leyto SM, Digesa LE, Lakew S, Wondmagegn H, Mare KU, Hadaro TS, Tariku EZ, Glagn M, 2024. Tuberculosis patients' satisfaction with directly observed treatment short course strategy and associated factors in Southern Ethiopia: A mixed method study. *BMC Public Health 24*: 2452.
- Nhandara RBC, Ayele BT, Sigwadhi LN, Ozougwu LU, Nyasulu PS, 2020. Determinants of adherence to clinic appointments among tuberculosis and HIV co-infected individuals attending care at Helen Joseph Hospital, Johannesburg, South Africa. *Pan Afr Med J 37*: 118.
- Srisaenpang S, et al., 2006. Missed appointments at a tuberculosis clinic increased the risk of clinical treatment failure. *Southeast Asian J Trop Med Public Health 37*: 345–350.
- Izudi J, Cattamanchi A, Bajunirwe F, 2025. Causal inference methodologies to assess the effect of missed clinic visits on treatment success rate among people with tuberculosis in rural Uganda. *BMC Med Res Methodol 25*: 104.
- Izudi J, Tamwesigire IK, Bajunirwe F, 2024. Effect of missed clinic visits on treatment outcomes among people with tuberculosis: A quasi-experimental study utilizing instrumental variable analysis. *IJID Reg 13*: 100461.
- Chakaya J, et al., 2022. The WHO global tuberculosis 2021 report—Not so good news and turning the tide back to end TB. *Int J Infect Dis 124 (Suppl 1)*: S26–S29.
- Nasasira B, et al., 2024. *Impact of Differentiated Service Delivery Models on Quality of Life among People Living with HIV in Uganda—A Quasi-Experimental Study*. Available at: <https://doi.org/10.21203/rs.3.rs-5443965/v1>. Accessed March 26, 2026.
- Kwaghe VG, Abubakar I, Kurmtong N, Rapnap L, Jamda M, 2023. Outcome of community-based antiretroviral drug refill among stable human immunodeficiency virus patients accessing care at a tertiary center in Abuja, Nigeria: A 3-year review. *West Afr J Med 40*: 67–71.
- Avong YK, Aliyu GG, Jatau B, Gurumnaan R, Danat N, Kayode GA, Adekanmbi V, Dakum P, 2018. Integrating community pharmacy into community based anti-retroviral therapy program: A pilot implementation in Abuja, Nigeria. *PLoS One 13*: e0190286.
- Asieba IO, et al., 2021. Antiretroviral therapy in community pharmacies—Implementation and outcomes of a differentiated drug delivery model in Nigeria. *Res Social Adm Pharm 17*: 842–849.
- Republic of Uganda, 2020. *Consolidated Guidelines for the Prevention and Treatment of HIV and AIDS in Uganda*. Kampala, Uganda: Ministry of Health.
- Kintu TM, Ssewanyana AM, Kyagambiddwa T, Nampijja PM, Apio PK, Kitaka J, Kabakyenga JK, 2021. Exploring drivers and barriers to the utilization of community client-led ART delivery model in South-Western Uganda: Patients' and health workers' experiences. *BMC Health Serv Res 21*: 1129.
- Reidy W, Kambale HN, Hughey AB, Nhlengethwa TT, Tailor J, Lukhele N, Mthethwa S, Hetterma A, Preko P, Rabkin M, 2022. Client and healthcare worker experiences with differentiated HIV treatment models in Eswatini. *PLoS One 17*: e0269020.
- Kasande M, Taremwa M, Tusimuirwe H, Lamulatu K, Amanyire M, Nakidde G, Kabami J, 2022. Experiences and perceptions on community client-led ART delivery (CCLADS) model of antiretroviral (ART) delivery: Patients' and providers' perspectives in south western Uganda. *HIV AIDS (Auckl)* 14: 539–551.
- Zakumumpa H, Makobu K, Ntawiha W, Maniple E, 2021. A mixed-methods evaluation of the uptake of novel differentiated ART delivery models in a national sample of health facilities in Uganda. *PLoS One 16*: e0254214.
- Zakumumpa H, Rujumba J, Kwiringira J, Katureebe C, Spicer N, 2020. Understanding implementation barriers in the national scale-up of differentiated ART delivery in Uganda. *BMC Health Serv Res 20*: 222.
- Belay YA, Yitayal M, Atnafu A, Taye FA, 2022. Barriers and facilitators to the implementation and scale up of differentiated service delivery models for HIV treatment in Africa: A scoping review. *BMC Health Serv Res 22*: 1431.
- Izudi J, Sekaggya-Wiltshire C, Cattamanchi A, 2025. Missed opportunities in engaging community pharmacies for integrated tuberculosis care in sub-Saharan Africa: A call to action. *Am J Trop Med Hyg 114*: 3–5.