*Open Forum Infectious Diseases*

**PERSPECTIVES**

# Bridging programmatic gap in post-TB treatment prevention: applying the COM-B model and Behavior Change Wheel to improve the uptake of TB preventive therapy

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Uganda's National Tuberculosis and Leprosy Program (NTP) recommends tuberculosis preventive therapy (TPT) immediately after TB treatment completion (hereafter post-TB treatment TPT or PTT-TPT) for people with retreatment TB, as they are at high risk for recurrent/drug-resistant TB. However, uptake of PTT-TPT is limited. To examine determinants

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of uptake, identify program-relevant strategies, and improve implementation, we applied a behavioral framework. We used the COM-B model (Capability-Opportunity-Motivation Behavior) to conceptualize the behavioral and health system determinants and the Behavior Change Wheel (BCW) to map the determinants to potential programmatic actions. The COM-B model showed that the low uptake of PTT-TPT reflects interacting limitations in healthcare provider capability, opportunity, and motivation. Based on the BCW, interventions aligned with behavioral drivers could help the NTP and similar settings to integrate PTT-TPT prevention more effectively within routine TB care. In conclusion, addressing the behavioral determinants of PTT-TPT may strengthen uptake.

**Keywords:** Behavior Change Wheel, COM-B model, Post-Tuberculosis Disease, Tuberculosis Preventive Therapy, Uganda.

KEY POINTS

- Uptake of post-TB treatment TPT (PTT-TPT) among people with retreatment TB remains low despite national recommendations.
- Low uptake is driven by interacting deficits in healthcare provider capability, opportunity, and motivation.
- COM-B and BCW identified behaviorally informed strategies to improve integration and uptake of PTT-TPT in routine TB care.

## INTRODUCTION

Tuberculosis preventive therapy (TPT) is a core component of the global tuberculosis (TB) control strategies and aims to reduce progression from *Mycobacterium tuberculosis (MTB)* infection to TB disease (hereafter, TB), including preventing recurrent TB.[1, 2] The World Health Organization recommends TPT policies should be developed for other populations at risk, including those most likely to be exposed to TB and those at high risk of progression from infection to the disease.[3] The Uganda Ministry of Health, through the National Tuberculosis and Leprosy Program (NTP), recommends the initiation of TPT immediately after completion of TB treatment (hereafter, post-TB treatment TPT or PTT-TPT).[4] Immediate PTT-TPT targets people with retreatment TB (*i.e.,* people previously treated for TB) who remain at elevated risk for future TB. Among others, the NTLP guideline states, **"TPT should also be given to those who have previously been treated for TB immediately after completing TB treatment."**.[4]

People with retreatment TB face a higher risk of recurrent and drug-resistant TB than those newly diagnosed, with drug resistance rates ranging from 4-23.1%.[5-7] Across studies, rifampicin resistance was reported among 19/477 relapse cases[5], 3/13 relapse cases[6], and 7/41 retreatment cases (5/26 relapse and 2/24 treatment-failure cases)[7]. Therefore, strengthening strategies to prevent TB recurrence, including improving uptake of immediate PTT-TPT, is crucial. In

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Uganda, existing TPT regimens include daily isoniazid for 6 months (6H), weekly isoniazid rifapentine for 3 months (3HP) for individuals aged >2 years, daily HP for 1 month (1HP), and daily isoniazid and rifampicin (RH) for 3 months for individuals aged <15 years.[4] Despite the immediate PTT-TPT guideline, current coverage is below 25%, and yet TPT reduces TB incidence by 60-90%.[8, 9] Increasing PTT-TPT coverage to 100% could reduce TB recurrence by averting an additional **45-67.5% TB cases** among people completing treatment. However, in many TB clinics, anecdotal data show TB care ends at treatment completion, with little systematic attention given to PTT wellbeing. This gap persists even in settings where TPT coverage among people with HIV is high, suggesting a policy-to-practice gap. Commonly cited health systems-related barriers, per review of selected peer-reviewed and grey literature[10-16], complemented by 12 informal conversations with TB program focal persons, include inadequate healthcare provider (HCP) training, stockouts, competing clinical priorities, and weak supervision. These barriers have largely been considered in isolation and without a unifying conceptual framework. Responses have focused on factors such as training effectiveness and commodity supply but not behavioral and health system determinants that shape practice.

Here, we apply the Capability, Opportunity, and Motivation for Behavior (COM-B) model to identify behavioral barriers to immediate PTT-TPT initiation in Uganda. We then mapped the COM-B domains to corresponding intervention functions in the Behavior Change Wheel (BCW), highlighting illustrative actions NTP and similar sub-Saharan African settings could use to improve TPT implementation (Figure 1).

## PATIENT CONSENT STATEMENT

This study does not include factors necessitating patient consent.

## COM-B MODEL AS AN ANALYTIC LENS

COM-B model proposes that behavior results from an interaction between three essential components: capability (the individual's psychological and physical capacity to engage in the behavior), opportunity (external factors that enable or constrain behavior), and motivation (the reflective and automatic processes that energize and direct behavior). Increasingly used in implementation science[17, 18], the COM-B model, for example, shifts attention from guideline availability to whether health systems and HCPs are equipped, enabled, and motivated to act on them, including how TB survivors understand PTT-TPT and their readiness and willingness to adopt it. The COM-B model reframes the PTT-TPT health systems-related barriers from a narrow focus on logistics to a broader understanding of how knowledge, routines, norms, and health system design interact at TB treatment completion.

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From a programmatic standpoint, low PTT-TPT uptake represents a missed opportunity to reduce recurrent TB and consolidate treatment gains. Although NTPs have invested heavily in improving treatment outcomes, less attention has been given to the transition from treatment completion to PTT care and well-being, suggesting the challenge is not solely policy adoption, but how frontline practices are shaped by knowledge, routines, resource availability, and program priorities. We applied the COM-B model to examine why HCPs, particularly TB focal persons, may not routinely initiate PTT-TPT among retreatment individuals despite clear guidance. We generated a structured, theory-informed understanding of behavioral bottlenecks that NTPs can feasibly address within existing health systems (Table 1).

**Capability: knowing what to do and how to do it**

- Psychological capability is constrained by limited awareness and clarity around NTP guidance on PTT-TPT. In Uganda and perhaps other settings, TPT initiation remains strongly associated with HIV care, with less recognition that people with retreatment TB completing TB treatment are also priority subgroups. Additionally, uncertainty regarding eligibility criteria and the timing of TPT may undermine the confidence of HCPs.
- Physical capability did not appear to be a constraint among HCPs, who generally possess the physical capacity required for their roles.

**Opportunity: when the health system does not support the behavior**

- Physical opportunity is a major constraint. Inconsistent availability of TPT medications and weak integration between TB treatment registers and TPT quantification systems limit the ability of HCPs to act on policy guidance. The absence of standardized tools, documentation fields in the TB registers, and reporting indicators for immediate PTT-TPT further indicates that immediate PTT-TPT is not prioritized. Also, administrative workload that reduces time available for psychosocial support is a barrier. Others included high patient volumes, staffing shortages, and the initiation of additional interventions at the last treatment visit. Therefore, in the absence of structured workflows/prompts, TPT initiation may be overlooked by HCPs.
- Social opportunity shapes practice. Where immediate PTT-TPT is not emphasized in supervision, mentorship, or peer norms, HCPs may view treatment completion as the endpoint of responsibility rather than a transition to secondary prevention.

**Motivation: why PTT-TPT may not be prioritized**

- Reflective motivation may be weakened by doubts about the added benefits of immediate PTT-TPT, concerns about pill burden or adverse effects, and competing clinical priorities. Moreover, PTT-TPT is rarely linked to performance targets or quality indicators, hence reducing its perceived importance.
- Automatic motivation reinforces existing routines. The habitual discharge of people with retreatment TB at treatment completion without TPT is deeply embedded in many TB services and remains difficult to change without deliberate health system-level cues.

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## TRANSLATING BEHAVIORAL BARRIERS INTO PRAGMATIC ACTIONS

Identified barriers were mapped to relevant BCW intervention functions to inform evidence-based implementation strategies and modes of delivery (Table 1), ensuring strategies are theory-driven, context-specific, and optimized for implementation effectiveness.[19]

## LIMITATIONS

COM-B model and BCW are complex to apply, may not fully capture broader health system and policy determinants of PTT-TPT, rely on subjective interpretation, provide limited guidance on intervention adaptation to context, including failing to prioritize key barriers. The informal conversations were limited by subjectivity, lack of systematic sampling, and limited reproducibility.

## CONCLUSIONS AND RECOMMENDATIONS

Uganda's PTT-TPT guideline aligns with global recommendations, but the policy-practice gap extends beyond logistics and HCP training. The COM-B model suggests that limitations in capability, opportunity, and motivation constrain PTT-TPT initiation at TB treatment completion. Addressing these behavioral determinants offers a practical approach to strengthening PTT-TPT within existing systems. Embedding PTT-TPT into routine workflows, supervision, and performance expectations could position prevention as a core component of quality TB care. As NTPs pursue sustained control and elimination, greater attention to the post-treatment phase will be essential to ensure continuity from cure to prevention.

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***DATA AVAILABILITY STATEMENT :*** No new data were generated or analysed in support of this research.

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ALT TEXT

Diagram illustrating the application of the COM-B (Capability, Opportunity, Motivation–Behavior) model within the Behavior Change Wheel framework. The figure shows a stepwise process in which a target behavior is first identified, followed by an assessment of the behavioral determinants across three COM-B domains: capability (physical and psychological), opportunity (physical and social), and motivation (reflective and automatic). These determinants are then mapped to appropriate intervention functions, such as education, training, persuasion, environmental restructuring, enablement, incentivization, coercion, restriction, and modeling. The final step links the selected intervention functions to implementation strategies designed to support behavior change in implementation science.

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1 **TABLES**

2 Table 1. COM-B analysis of barriers to immediate PTT-TPT initiation in Uganda and mapped intervention strategies

| COM-B domains | Identified barriers | BCW intervention functions | Applied Behavior Change Techniques | Mode of delivery | Key actors |
|---|---|---|---|---|---|
| **Psychological capability** | Limited awareness of NTLP guidance; uncertainty about eligibility and timing | Education | Provide clear guidance on eligibility and timing of immediate PTT-TPT | Face-to-face training sessions; printed job aids | NTP (technical) and MoH (supporting), Regional and District TB Supervisors, and implementing partners. |
| | | Training | Demonstrate TPT assessment and initiation procedures | On-site mentorship; practical demonstrations during clinic sessions | Regional and District TB Supervisors, and TB focal persons. |
| **Physical capability** | No major barriers identified. | | | | |
| **Physical opportunity** | Stockouts and inconsistent supply of TPT medications | Environmental restructuring | Align TB and TPT supply chains | System-level supply chain integration; national quantification systems | NTP (Procurement and Supply Chain Management Unit) and National Medical Stores or its equivalent. |
| | Weak linkage between TB registers and TPT forecasting | Environmental restructuring | Integrate TB completion data to trigger TPT forecasting | Electronic reporting system updates; automated reporting triggers | NTP M&E/HMIS Unit, MoH, District TB Teams, and implementing partners. |
| | Absence of documentation and reporting tools | Environmental restructuring | Add TPT fields to TB registers | Revision of national TB registers and reporting tools | NTP M&E/HMIS Unit, MoH, and Regional and District TB Supervisors |
| | Lack of structured end-of-treatment processes | Environmental restructuring | Introduce standardized end-of-TB-treatment checklists | Printed checklists integrated into patient files | TB focal persons. |
| **Social opportunity** | Low prioritization within facility norms and supervision | Modelling | Peer-to-peer learning showcasing high-performing facilities | Learning collaboratives; peer exchange meetings | NTP QI Unit, Regional and District CQI focal persons, implementing partners, |



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| | | | | | Facility CQI focal persons, and TB focal persons. |
| | | Persuasion | Leadership messaging reinforcing TPT as the standard of care | Supervisory visits; formal leadership communications | NTP/MoH, and Regional and District TB Supervisors. |
| **Reflective motivation** | Doubts about benefits; concerns about pill burden and safety | Education | Share evidence on recurrence risk and prevention benefit | Clinical mentorship sessions; evidence briefs | NTP/MoH, and Regional and District TB Supervisors |
| | | Persuasion | Position TPT as secondary prevention | Case discussions during continuous medical education sessions; structured messaging scripts | Regional and District TB Supervisors, and TB focal persons. |
| **Automatic motivation** | Habitual discharge without preventive follow-up | Environmental restructuring | Reminders at treatment completion | Stamp/checklist prompts in patient charts; Electronic medical record alerts | TB focal persons and facility HMIS focal persons. |
| | | Incentivization | Include TPT uptake in performance feedback | Audit and feedback reports during quality improvement meetings | Regional and District CQI Mentors, Regional and District TB Supervisors, and facility CQI focal persons. |

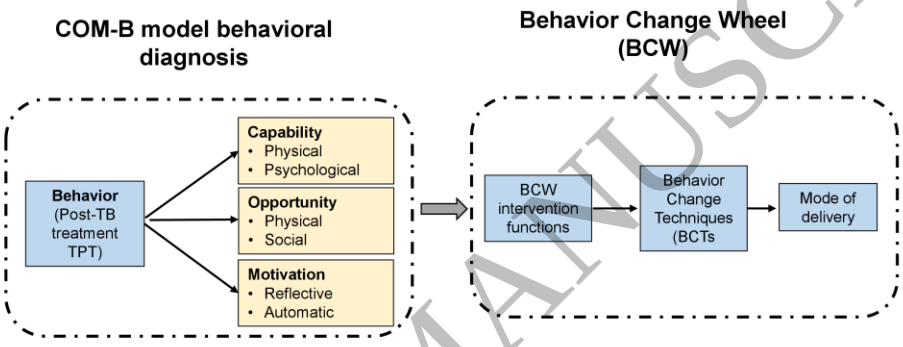
Note: CQI: Continuous Quality Improvement; HMIS: Health Management and Information Systems; M&E: Monitoring and Evaluation; MoH: Ministry of Health; NTP: National TB Program

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## FIGURE LEGENDS

Figure 1: Illustration of how the COM-B model is applied to analyze a target behavior, identify its underlying determinants, and map these determinants to intervention functions and potential implementation strategies using the Behavior Change Wheel framework in implementation science.




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