



Component 1 : 2 Blogs

- Blog 1 : Video-Observed Therapy for Tuberculosis Treatment
- Blog 2 : CoughGuard, a Designed Digital Health Promotion Intervention

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Blog 1: Video-Observed Therapy for Tuberculosis Treatment: A Critical Reflection

The Problem: Sustaining TB Treatment in Underserved Communities

Diagnosis of TB is the first step; next, the patient has to stick to taking their cocktail of drugs for a full six months, meaning not missing a dose, or other members of the community could contract the disease and may develop drug resistance. In the townships of South Africa, without the presence of HIV, the prevalence of TB is approx. four times higher than the national average and about 31 times higher in patients with HIV in the area (Holtgrewe et al., 2024). Directly Observed Therapy, where a member of health staff watches the patient take the drugs, has traditionally been the means to help with adherence, but in poor places which are spread out due to being difficult to get to, such as informal settlements in South Africa.

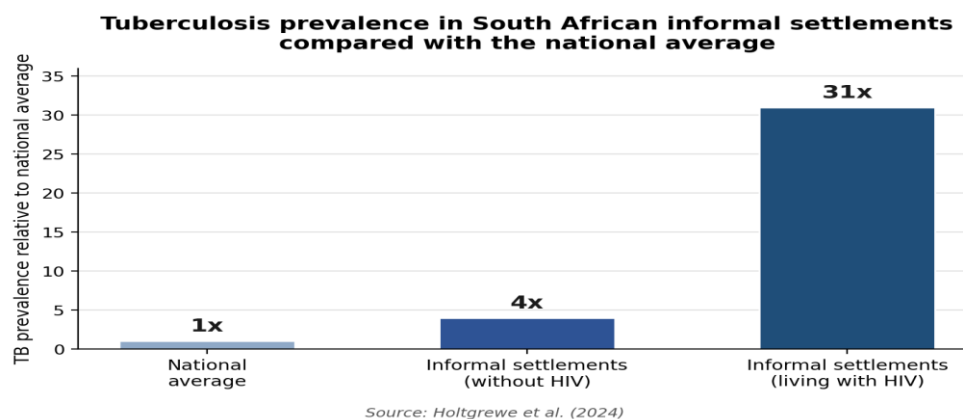


Figure 1: TB prevalence in South African informal settlements relative to the national average (Holtgrewe et al., 2024).

How Telehealth Is Being Used

Video-observed therapy replaces those in-person visits with a smartphone recording of the patient taking their medication, reviewed remotely by a health worker. The Ministry of Public Health, in Thailand, developed an asynchronous version (TH VOT) because COVID-19 disrupted community-based directly observed therapy and threatened treatment's continuity (Kumwichar, Chongsuvivatwong and Prappre, 2022). Patients take a short record of each dose and observers check it back when they please instead of needing a live call, making the system forgiving for patchy connectivity.

Evidence of Impact

Randomised controlled trial which tested the TH VOT with directly observed therapy, in Southern Thailand and they showed gains. Monitors on the video recorded a median of 21.2 more treatment compliance days than observers carrying out visits in person and patients a median of 15.2 days more than DIDOT patients (Kumwichar, Prappre and Chongsuvivatwong, 2024). Sputum conversion, an early indicator of treatment response was higher with 73% vs 61.5% with the video system but this difference was not statistically significant as the trial was too small in design for this to be confirmed reliably. Similar results found in a larger review of 29 studies across a range of countries indicate that TH VOT is associated with greater compliance (Sundaram et al., 2024).

Study	Setting	Key finding	Main limitation
Kumwichar, Prappre and Chongsuvivatwong (2024)	Southern Thailand, cluster RCT, video-observed vs in-person therapy	Observer compliance +21.2 days (p<.001), patient compliance +15.2 days (p=.005)	Underpowered to confirm the sputum conversion difference
Sundaram et al. (2024)	29 studies, multiple countries	Adherence consistently higher under video-observed therapy than in-person visits	High heterogeneity in study design and outcome measures

Table 1: Summary of key evidence on video-observed therapy for TB treatment.

See: www.telehealth-tbscreening-example.org/case-studies (illustrative link to a video-observed therapy case study repository)

Critical Discussion: Advantages and Shortfalls

This shows the basic promise of remote treatment monitoring work- less travel for patients and observers and record of working even through in-person visits would have not been possible. However, the same reliance on a smart phone and mobile data makes this more difficult for the poorest patients. The need of a reliable broadband and the correct device that a bulk of the lower income homes do not have makes it that an even playing field cannot be created (Cortelyou-Ward et al., 2020). The US

data on medically underserved areas show that only 74.7% of homes had a fast broadband connection as compared to the 85.2% elsewhere (Bell, Lopez De Fede and Adams, 2023), and the gap widens when the speeds sufficient enough for recording fluid video is compared. Moreover, these apps would also be least accessed by the older age groups and least educated, and the racial and ethical minorities are also among them as the load of TB rests heavily on them (Price-Haywood et al., 2023).

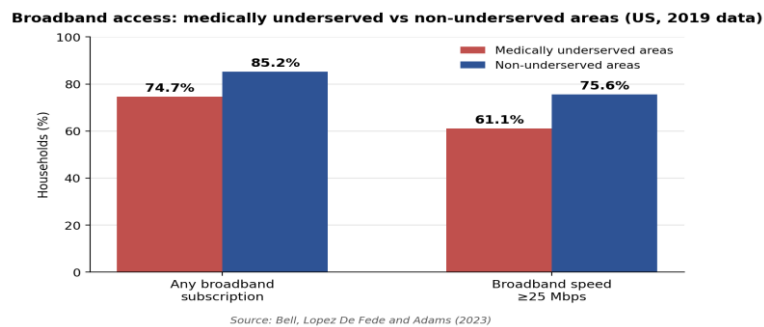


Figure 2: Broadband access gap between medically underserved and non-underserved areas (Bell, Lopez De Fede and Adams, 2023).

Addressing the Shortfalls

Access points at community centres where patients attend remotely in a shared local venue with staff supports as opposed to private broadband network and their own device may have some promising results (Price-Haywood et al., 2023). A community-based participatory research with active involvement of underserved patients in adapting a remote health intervention to their own circumstances improved the acceptability of remote healthcare amongst low-income patients who suffer from chronic respiratory diseases (Pekmezaris et al., 2020), but it will not happen without the basic infrastructures supporting this, and rolling out video-based treatment monitoring has to be in combination with the broadband investment and digital literacy support.

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Blog 2: CoughGuard, A Wearable Digital Health Promotion Intervention for Community Tuberculosis Detection

The Problem, Reframed for Design

Blog 1 looked at video observed therapy as one way that technology steps in to support continued TB (tuberculosis) treatment, but that video only worked if there was enough connectivity. This connectivity gap was cited as the main drawback by many people looking at using remote diagnosis devices. Blog 2 is looking much earlier in the patient care pathway for detecting TB. The traditional diagnosis methods, which are microscopy and the more sensitive molecular test, require trained staff and lab resources that are in short supply in some of the areas with the highest burden of disease. About 1.3 million TB cases still kill around 1.3 million people across the world per annum, and a significant number go undiagnosed (World Health Organisation, 2023).

CoughGuard is a light microphone and vibration sensor that is clipped to the clothing during the day. It listens for coughing passively. Using a smart phone application on TB patients has been successfully tried of monitoring coughing in community. The median decrease was from 11 in the first week of treatment to 3.5 at the end of the Intensive phase, as measured by cough count per hour (Huddart et al., 2023). This is significant decrease. CoughGuard however applies this logic to screening and not treatment specifically. Its on-board model detects suspicious patterns and sends a message through the Bluetooth low bandwidth radio link to a community health worker in the shared device. The patient does not require his own broadband.

CoughGuard system pathway: from passive listening to community health worker referral

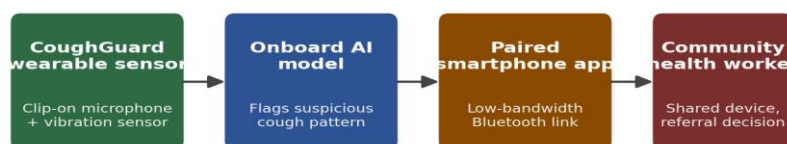


Figure 1: Schematic of the CoughGuard system pathway, from wearable sensor to community health worker referral.

How It Promotes Health

The underpinning acoustical element now has considerable supporting evidence. Seven studies were pooled for a 2026 systematic literature review and meta-analysis, which evaluated AI-based analysis of cough sounds for TB detection. It was found to detect TB with 91% sensitivity and 89% specificity rivaling that of laboratory-based evaluation in certain cases, the authors did not fail to highlight the high risk of bias across the studies they pooled, highlighting the need for external validation (Sahoo et al., 2026). Router alerts being shared to community member devices also overcomes perhaps the biggest obstacle in reaching the target demographic due to location, by overcoming lack of personal internet (Price-Haywood et al., 2023).

See: www.coughguard-project-example.org/pilot-data (illustrative link to pilot feasibility data)

Critical Discussion: Advantages and Shortfalls

Real benefits. Passive monitoring eradicates the need for a patient to notice an early symptom brushed off as nothing much (Cortelyou-Ward et al., 2020), and community routing bypasses the broadband limitation of most telehealth. No real shortfalls. 91% pooled sensitivity still represents almost 1 in 10 TB cases that could be missed, while the risk-of-bias concerns made by Sahoo et al. (2026) means that reported accuracy may not be translatable to a new population. A continuously worn device means questions still lie around comfort as well as stigma caused and battery power when electricity may not be reliable.

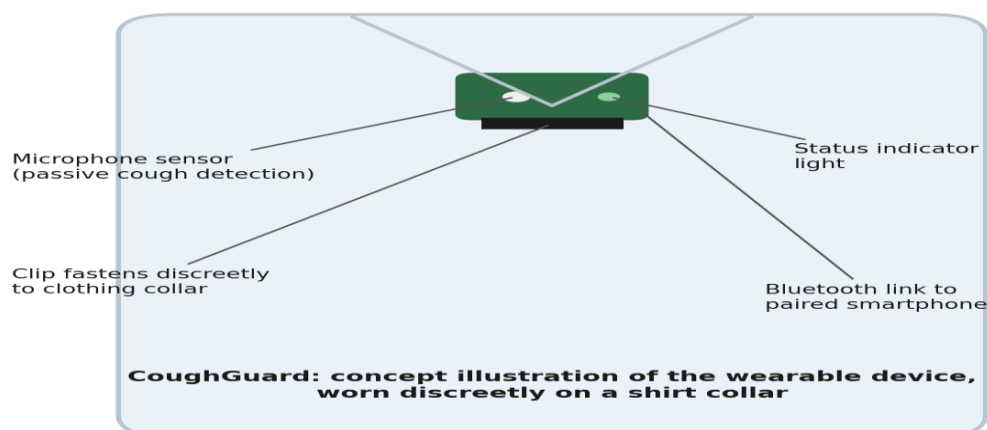


Figure 2: Concept illustration of the CoughGuard wearable, worn discreetly on clothing.

Addressing the Shortfalls

Keeping trained community health workers as the last mile decision instead of treating AI flags as diagnosis helps with accuracy concerns. Low-power solar charging helps with electricity constraints. With the involvement of co-design, used in the DECENT framework to change mHealth engagement in a similar context, working with the community would help in overcoming resistance from the community about wearing visible equipment due to stigma (Ikwunne, Hederman and Wall, 2023).

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