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NOTES FROM THE FIELD

Rapid TB diagnostic service and community action to FIND.TREAT.ALL#EndTB, Maputo, Mozambique, 2013–2018

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Finding and treating all tuberculosis (TB) patients is crucial for ending TB. We investigated whether rapid diagnostic turnaround time (TAT) and patient tracking could increase TB treatment initiation in Maputo, Mozambique. Among 3329 TB patients newly diagnosed by the University Eduardo Mondlane-Anti-Persoonsmijnen Ontmijnende Product Ontwikkeling/Anti-Personnel Landmines Detection Product Development (APOPO) Laboratory between 2013 and 2018, on average 61% were verifiably linked to care. This proportion increased from 54% (first half 2013) to 79% (second half 2018) after introducing a 24-hour TAT in 2015 and patient tracking conducted by a community-based partner, Associação Kenguelekezé, in 2017. Rapid, well-connected TB diagnostic services can reduce pre-treatment loss to follow-up and support the joint initiative of WHO, Stop TB and Global Fund to 'FIND.TREAT.ALL.#EndTB'.

In 2017, tuberculosis (TB) caused an estimated 10 million new TB cases worldwide, yet an estimated 3.6 million cases remained undetected.[1] To address the problem, the World Health Organization (WHO), the Stop TB Partnership, and The Global Fund launched the joint initiative 'Find. Treat. All. # End TB' to enable access to care for all.[2] In Mozambique, a high TB and TB-HIV burden country with an estimated TB incidence rate of 551 per 100 000 population, only 52%[1] to 57%[3] of TB patients receive treatment.[1] Finding and treating these missing TB cases is one of the country's strategic priorities.[4]

In collaboration with University Eduardo Mondlane (UEM), the National Research Institute (*Instituto Nacional de Saúde* [INS]) and the Mozambique National TB Control Programme (*Programa Nacional para o Controlo da Tuberculose* [PNCT]) run by the Ministry of Health (*Ministério da Saúde* [MISAU]), APOPO, a non-profit organisation, is developing and deploying TB detection rats (trained giant African pouched rats, *Cricetomys ansorgei*) as a diagnostic tool for research use.[5–8] Starting in 2013, sputum samples, tested primarily using sputum smear microscopy, were collected from eight partner health facilities with laboratories in Maputo City, Mozambique, increasing to 19 health facilities in 2018. At the UEM-APOPO laboratory, the referred samples were heat-inactivated and re-evaluated using TB detection rats (for research use), followed by light-emitting diode (LED) fluorescence microscopy as a WHO-endorsed confirmation test, that increased the detection of bacteriologically confirmed TB. In April 2018, the UEM-APOPO laboratory began operating two GeneXpert platforms with 12 operational modules, along with offering both first-line and confirmatory testing using Xpert®MTB/RIF (Cepheid, Sunnyvale, CA, USA). Any additional confirmed positive results were reported back to the respective partner health facilities.

ASPECT OF INTEREST

In order to link TB diagnostics to care, APOPO has designed and implemented service delivery systems in partnership with health facilities and community-based organisations in high TB burden settings, since enhanced case detection can only ensure public health value if patients are treated effectively. Prompted by the observation that many patients did not return to health facilities to receive their result and begin treatment, we implemented two innovative interventions during the project from 2013 to 2018 in Maputo City to see if faster result delivery and patient tracking by community health workers (CHWs) resulted in a higher linkage to care.

In October 2015, APOPO improved the diagnostic turnaround time (TAT) through a motorbike courier sample referral network, same-day TB testing and return of results to health facilities within 24 h. (Figure 1A). In June 2017 a linkage-to-care service involving CHWs from the community-based organisation Associação Kenguelekezé, was implemented (Figure 1B). During their first clinic visit, presumptive TB patients were identified when they provided sputum samples. At that time CHWs began building a relationship of trust and ensuring that patients' contact details were correctly recorded. Patients who later received a positive TB test result were contacted through mobile phone short message service (SMS), calls and home visits to advise and encourage them to return to the health facilities to begin free TB treatment. If needed, community leaders also participated in the home visits.

A daily communication platform was established between the partnering health facilities, Associação Kenguelekezé and the UEM-APOPO laboratory. TB test anonymised results were recorded in the TB laboratory's information management system database (TB-LIMS). Community patient tracking and follow-up by recognised government-approved community-based organisations are elements of Mozambique's national TB protocols.[9]

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FIGURE 1 APOPO's integrated TB diagnostic service and interventions. **A)** APOPO's integrated TB diagnostic service consists of sample referral and transport to the central TB laboratory using motorbike couriers, TB testing using TB detection rats and confirmatory light-emitting diode fluorescence microscopy (also Xpert® MTB/Rif testing since 2018) within a 24-h result turnaround time since October 2015; **B)** patient tracking service for newly diagnosed TB patients by community health workers from the Associação Kenguelekezé and linkage to TB care at health facilities since June 2017. Health workers reach out to patients using mobile phone SMS messaging and calls (left), and home visits (centre) to share information to help patients to return to health facilities to begin free TB treatment (right).

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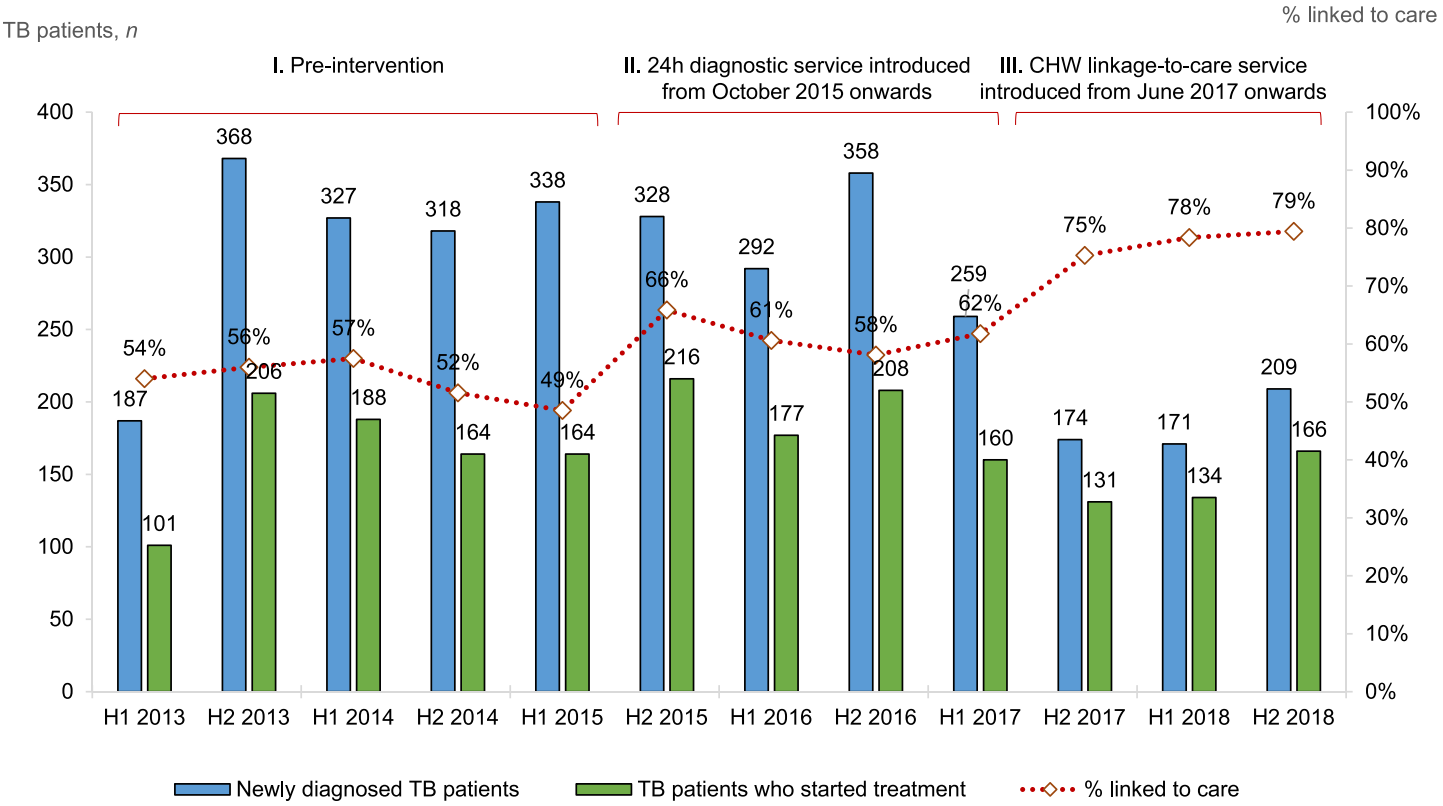

FIGURE 2 Number of TB patients newly diagnosed at the University Eduardo Mondlane-APOPO laboratory, number and the proportion of patients among these who were successfully tracked by CHWs and who started treatment in the partner health facilities, per half-year (H), Maputo City, Mozambique, 2013–2018. CHW = community health worker; TB = tuberculosis; H = half-year.

Ethical clearance for re-evaluation of samples by the UEM-APOPO laboratory was obtained by the Comité Nacional de Bioética para a Saúde, Maputo, Mozambique (CNBS; Ref. 93/CNBS/13). All results were recorded in an anonymised manner.

From 2013 to 2018, a total of 3329 new patients were bacteriologically diagnosed with TB by the UEM-APOPO laboratory. These cases represented 24% of all 14 040 bacteriologically confirmed notified TB cases that were registered in the quarterly PNCT reports of Maputo city health authorities.[10] Overall, 61% (2015/3329) of the newly diagnosed TB patients were successfully and verifiably linked to TB care in the study period. The percentage followed an increasing trend (Figure 2): at baseline (I), linkage to care among the patients newly diagnosed was 54%, 56%, 57%, 52% and 49% per half-year. Concurrent with the introduction of the sample referral network and TB diagnostic service within 24 h (II) in October 2015, the linkage to care increased significantly: 66%, 61%, 58%, and 62% per half-year from the second half of 2015 to the first half of 2017 ($P < 0.001$). After implementing systematic patient tracking (III) in June 2017, the linkage to care increased significantly ($P < 0.001$) to 75%, 78% and 79% per half-year from the second half of 2017 to the second half of 2018.

DISCUSSION

Similar increases in the proportion of TB patients linked to care were observed in a sister project in Dar es Salaam, Tanzania. In Maputo the same interventions (II and III) were introduced, however, in reverse order.[11] Both interventions were implemented with an efficient sample referral system and communication channel between the clinic, laboratory and community partners based on established guidelines.[12] Our results indicate that combining rapid diagnostic services and patient tracking was key in achieving higher treatment initiation plus lower pre-treatment loss to follow-up among TB patients. This is a model that aims to sustain and enhance support for the joint initiative to 'Find. Treat. All. # End TB'.

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Identifier et traiter tous les patients atteints de tuberculose (TB) est crucial pour mettre fin à la TB. Nous avons vérifié si un délai plus court de diagnostic (TAT) et un système de recherche des patients augmentait la mise en œuvre du traitement de la TB à Maputo, Mozambique. Parmi 3329 patients TB nouvellement diagnostiqués par le laboratoire UEM-APOPO (2013–2018), en moyenne 61% ont été réellement connectés à la prise en charge. Le pourcentage a augmenté de 54% (première moitié de 2013) à 79% (deuxième moitié de 2018) après l'introduction du TAT en 24h en 2015 et la surveillance des patients effectuée par notre partenaire l'association à base communautaire Kenguelekezé en 2017. Notre expérience suggère que des services de diagnostic de TB rapides, bien connectés peuvent réduire les abandons avant le traitement et soutenir les tentatives mondiales « FIND.TREAT.ALL.#EndTB ».

La búsqueda y el tratamiento de todos los pacientes con tuberculosis (TB) son primordiales para poner fin a esta enfermedad. Se investigó si con un lapso corto de obtención del diagnóstico y el seguimiento de los pacientes aumentaría el inicio del tratamiento antituberculoso en Maputo, Mozambique. En promedio, en 61% de los 3329 casos nuevos de TB diagnosticados en el laboratorio UEM-APOPO (2013–2018) se confirmó la vinculación de los pacientes con los servicios de atención. El porcentaje aumentó de 54% (primer semestre del 2013) a 79% (segundo semestre del 2018), después de haber introducido un plazo de obtención del diagnóstico de 24 horas en el 2015 y la localización de los pacientes por parte de la asociación comunitaria Kenguelekezé en el 2017. Esta experiencia indica que los servicios diagnósticos de la TB que son rápidos y mantienen vínculos adecuados disminuyen la pérdida durante el seguimiento antes de comenzar el tratamiento y fortalecen los esfuerzos de la iniciativa 'FIND.TREAT.ALL.#EndTB'.

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