Biometric Tracking and Tuberculosis Treatment in India

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Sector(s): Health, Political Economy and Governance

Location: Madhya Pradesh, Punjab, Delhi, Uttar Pradesh; Chattisgarh; Orissa (Bhubanshwar)

Sample: 141 healthcare workers

Target group: Health care providers

Outcome of interest: Tuberculosis Health outcomes Service provider performance

Intervention type: Health care delivery Community monitoring

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Partner organization(s): Australian Government Overseas Aid Program (Australian Aid), Gates Foundation, International Initiative for Impact Evaluation (3ie), United States Agency for International Development (USAID)

Biometric identification is a potential solution to improve the delivery of social services and the reliability of administrative data. In health care, biometric tracking could help providers ensure that their patients are adhering to treatment, especially where regimens may be lengthy or complex. In India, researchers evaluated the impact of biometric tracking devices in tuberculosis (TB) care centers on patient adherence to treatment, provider performance, and data quality. Biometric devices increased patient adherence to TB treatment and provider performance.

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Stopping the spread of Tuberculosis (TB), the leading infectious disease killer in the world [1], and ensuring patient survival requires detecting infection early and ensuring patients complete the rigid six-month course of treatment. Yet, adherence to treatment is particularly challenging, as it entails consuming multiple drugs at once, over a long duration, and often in the face of strong side effects even after symptoms may have disappeared. Delivering effective and efficient care can be challenging in contexts where data quality, internet connectivity, and monitoring capacity are limited. Without proper monitoring, healthcare worker compensation schemes may also incentivize over reporting of TB cases.

A biometric identification system that tracks both patient and health workers could help patients adhere to their treatment and enable managers to monitor health worker performance to improve provider performance and patient outcomes. A past evaluation found that biometric monitoring in primary health care centers increased attendance among medical staff and health outcomes. Could using biometric tracking technology of both providers and patients improve provider performance, tracking accuracy, patient adherence to treatment and ultimately health outcomes?

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India, where this evaluation took place, accounts for over 27 percent of global TB cases, with almost 2.7 million cases diagnosed in 2018 [1]. Ninety-seven percent of all new TB cases can be effectively treated with first-line antibiotics, which in India are available at no cost to the patient. However, poor access to care, fear of social stigma, low levels of knowledge about the disease, and a stringent medication regimen make early detection and treatment adherence challenging.

The Government of India implements the World Health Organization's protocol, Directly Observe Therapy, Short Course (DOTS). Following DOTS, patients ingest their TB treatment under direct observation of trained providers based at local care centers. The Indian Government also has decentralized public-private partnerships with local NGOs. Operation ASHA (OpASHA) is the largest NGO delivering primary care to TB patients in India and operates DOTS centers in several states. One TB provider often serves one catchment area, which covers nearly 40,000 individuals. They are tasked with detecting cases, directly observing patients taking their medication at DOTS centers, and rapidly following up with patients who miss a treatment dose. Patient information is all recorded using a paper-based system which is both time-consuming and error prone. Providers receive an average salary of INR 5,600 (US$90 at the time of the evaluation) per month as well as financial bonuses based on the number of new TB cases they identify.



A healthcare worker in India.

Photo Credit: Thomas Chupein

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Researchers partnered with OpASHA to evaluate the impact of biometric tracking devices for TB treatment on service delivery and data quality. OpASHA's biometric tracking technology, eCompliance, consisted of a tablet attached to a fingerprint scanner and was designed to be user friendly and suitable for environments with limited internet connectivity. It aimed to: 1) ensure patients

themselves received medication from health workers, 2) alert providers to follow up with patients who missed their appointment, 3) enabled program managers to monitor health worker performance, and 4) reduce opportunities for misreporting patient data.

From a sample of 65 catchment areas, researchers randomly assigned 34 catchment areas to receive biometric devices while 31 catchment areas did not receive the intervention and served as a comparison group. In centers that received the biometric tracking intervention, health workers and patients identified themselves via eCompliance when they arrived at the center. Data was sent daily via SMS to OpASHA's server in Delhi, and alerts and reminders were sent to health workers when patients failed to take their doses.

Over the period of twelve to fourteen months, researchers collected data on patience adherence to treatment, healthcare worker attendance and data quality. They collected surveys given to all patients enrolled in OpASHA treatment centers, administrative data (e.g., official TB registers, treatment cards, OpASHA registers), and interviews with health workers and patients.

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Biometric tracking increased the likelihood that patients adhered to recommended treatment, improved health worker attendance, and reduced misreporting of patient data by health workers.

Patient health and adherence to treatment: Patients seeking treatment in a center with biometric tracking were 1.8 percentage points (25 percent) less likely to default compared to 7.3 percent of patients in the comparison group [2]. Biometric tracking increased compliance with DOTS requirements; in-person pill intake increased by 13.9 percentage points (26 percent) and patients were 21.8 percentage points (60 percent) less likely to send another person to pick up medication on their behalf. Biometric tracking did not, however, impact other dimensions of patient health. There was no difference in cure rates, symptoms, mental health, or emotional health between centers with and without biometric tracking.

Health worker attendance: Greater health worker effort was a major factor in increased adherence to TB treatment. Provider attendance increased by up to 12 percent at centers (about 7 percentage points) and time spent at centers increased by 19 percent (about 22 minutes per day). The frequency of home visits to patients who missed their dosages increased by 32 percent (about 4 percentage points). This may be explained by more stringent oversight from OpASHA management. There was no evidence that health workers strategically avoided patients with a perceived higher risk of defaulting or reduced patient detection efforts. Health worker and patient satisfaction did not decrease despite biometric technology imposing additional constraints.

Data quality: Biometric devices also improved the accuracy of NGO health records and official government health registers. The devices reduced overreporting of new cases by 20 percent and underreporting of treatment interruptions by 25 percent.

Use of results: As a next step, researchers are interested in exploring the impact of biometric data systems on service delivery and state capacity beyond TB treatment.

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1. Global Tuberculosis Report. 2019. Geneva: World Health Organization
2. defined as missing medication doses for two months or more or not completing four months of treatment