A Game-changer that can scale TB care internationally

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**Tuberculosis (TB)** is a Global pandemic
- *fully curable infectious* disease
- 8 million *new* TB patients worldwide.
- 1.4 million people die of TB every year.
- TB has caused 10 million orphans
- Drug resistant TB – a new epidemic (MDR, XDR, TDR)

**Horrifying Predictions:**
- By 2015: 1.3 million drug resistant cases, needing $16 billion to treat
- “We are on the brink of another epidemic and it has no treatment. If TDR spreads, we go back to the dark ages”. – TIME Magazine, March 4, 2013
Evidence of tubercular decay found in the skulls and spines of Egyptian mummies

TB has been plaguing humans for at least 4,000 years.

Hippocrates noted that "phthisis" (consumption) was the most widespread and fatal disease of his time.

In the two centuries from 1700 to 1900, one billion human beings died of tuberculosis

(200,000 died in Hiroshima and Nagasaki)
"If the importance of a disease for mankind is measured by the number of fatalities it causes, then tuberculosis must be considered much more important than those most feared infectious diseases, plague, cholera and the like.”

Tuberculosis (TB) is the number one single infectious disease killer, taking nearly 3 million lives per year (National Foundation of Infectious Disease)
In past 200 years:

- 1,000 million men, women and children have died of TB.
- Only half as many (490 million) died because of all other major pandemics (AIDS, Small Pox, Black Death, Spanish Flu & Cholera) put together.
India’s TB burden is more than double that of second-ranked China.

### New Tuberculosis (TB) Cases, 22 High-Burden Countries (HBCs), 2011

<table>
<thead>
<tr>
<th>Country</th>
<th>TB Cases (2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>2,200,000</td>
</tr>
<tr>
<td>China</td>
<td>1,000,000</td>
</tr>
<tr>
<td>South Africa</td>
<td>500,000</td>
</tr>
<tr>
<td>Indonesia</td>
<td>450,000</td>
</tr>
<tr>
<td>Pakistan</td>
<td>410,000</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>340,000</td>
</tr>
<tr>
<td>Philippines</td>
<td>260,000</td>
</tr>
<tr>
<td>Congo (Dem. Republic of)</td>
<td>220,000</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>220,000</td>
</tr>
<tr>
<td>Nigeria</td>
<td>190,000</td>
</tr>
<tr>
<td>Myanmar</td>
<td>180,000</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>180,000</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>140,000</td>
</tr>
<tr>
<td>Mozambique</td>
<td>130,000</td>
</tr>
<tr>
<td>Kenya</td>
<td>120,000</td>
</tr>
<tr>
<td>Thailand</td>
<td>86,000</td>
</tr>
<tr>
<td>Brazil</td>
<td>83,000</td>
</tr>
<tr>
<td>Tanzania (United Rep. of)</td>
<td>78,000</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>77,000</td>
</tr>
<tr>
<td>Uganda</td>
<td>67,000</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>61,000</td>
</tr>
<tr>
<td>Cambodia</td>
<td>61,000</td>
</tr>
</tbody>
</table>

Total New TB Cases in the 22 High-Burden Countries = 7,100,000

Drug Resistant TB in India

More than **100,000 estimated** cases of drug resistant TB in India, less than 3,000 identified.

12 cases of extremely drug resistant TB (XXDR or TDR) recently found in India.

- **India has 3.5 million TB patients, 25% of the world’s total burden.**
- **2 persons die of disease every 3 minutes in India.**
- **Lost wages: $300 million/year; Total loss to Indian economy: $23 billion/year.** *
- **100,000 infected women are thrown out by families to die of disease and starvation.**
- **300,000 children drop out of school because they, or a parent, have TB.**

* TB India 2007, Government Of India, Mar 2007
Geometric Progression of Patients of all types of TB – Normal/DST, MDR, XDR & TDR
1. **Inaccessible Centers**: Existing public infrastructure lacks the last mile connectivity
   - Wages or TB medication? Where is the bus fare coming from?

2. **Social Stigma**: Patients go into denial or hide symptoms
   - Loss of jobs
   - Loss of families/isolation
   - TB Patients thrown out of homes

3. **Limited/Ineffective Education or Counseling**

4. **The Quacks**: Incomplete, irregular, inadequate treatment

5. **Negligible Follow-up** of defaulting patients

6. **High Cost of Implementation** for most other NGOs: PSI spent $567 per patient in Karnataka, India in 2010-11

7. **Program Level** – Lack of electronic data, inaccuracy, human errors, data-fudging to meet targets

**RESULT**: High default rate - leading to drug resistance
“...The data was being fudged.”

– Ghulam Nabi Azad, Union Health Minister (Times of India, Oct 31, 2011)

Independent evaluation by a WHO consultant found default rate of 36%, 6 times higher than reported.
The problem of informal providers

“In a recent study, only 3 out of 106 practitioners could issue an appropriate prescription for drug resistant TB”

Who are informal providers?
- Quacks
- Ayurveda, homeopathy, Unani System of Medicine
- RMPs

What do they do?
- Incomplete, irregular, inadequate treatment
- No follow-up
- No counseling, destigmatization, nothing to prevent MDR-TB

Our Solution:
- Integration of informal providers within OpASHA’s program by making them Community partners
- Establish DOTS centers in their clinics
- Upgrading their knowledge and skills
- Camouflage Dots centers by providing free OTC medicines
- Ensure that they do not ‘lose’ patients and livelihood
- Increased respect from the community
TB Control program: The DOTS model - Lacks Access and Availability

The DOTS* model: network of three types of facilities

**TB Hospitals:** Adequate
- Government facilities providing comprehensive diagnostics and treatment recommendation
- Warehouse for medicine supplies, provided free by government & donors

**Diagnostic Centers:** Adequate
- Sputum tests for initial diagnosis

**Treatment Centers:** Inadequate in slums & villages
- Local “last mile” centers, distributing medication and ensuring compliance
- Few TCs, with limited hours
- Scarcity of TCs results in high default rates, relapse & drug-resistance

* “Directly Observed Therapy - Short Course”
Operation ASHA’s Solution: Fill the Gaps in the Government Program: Community Empowerment

**Strategically located TB Centers**
- Partner with local micro-entrepreneurs, priests, home-makers based in convenient, high-traffic areas
- Centers open at convenient hours, up to 18 hours a day
- No patient needs to miss work/wages or pay for bus fare to access treatment

**Local Community Members Hired as Providers & Facilitators**
- Work to detect new patients, provide treatment, track patients who miss doses
- Familiarity with local customs, geography, and informal address systems
- Performance-based salaries for field workers & supervisors
- Much more cost efficient than MD doctors

**Specialized Training**
- For active case finding
- Conduct health awareness programs
- Provide counseling to ensure adherence and prevent MDR
- To destigmatize TB

**eCompliance Biometric Technology**
What makes OpASHA a game-changer?

The Outreach

CAMBODIA – Expansion/ Replication of the entire model by Operation ASHA since 2010
- Serving 6% of the population and 8% of the patients
- Working in 5 Operational Districts, in 2 provinces
- Detection rate increased by 70%
- 65 full-time local staff, except country director.

INDIA – Replication across states
- Started with one center in 2006, one field worker
- Now serving 6 million
- 260 centers
- Working in 8 States, 17 cities, and 14 villages, >3000 disadvantaged areas
- Working in tribal area in MP of 500,000 population
- Working in Dharavi Mumbai of 160,000 population
- 58 full-time and 248 part-time staff in India
OpASHA : a game-changer

Replication in other countries

Third party replication by Columbia University/Millennium Villages

1. UGANDA in June 2012
   • Outstanding results: Death + Default rate down to zero from > 16% in the preceding year

2. Caribbean Island of Dominican Republic: May 2013
Expansion in India & Cambodia

[Bar chart showing expansion of treatment centers in various regions over time.]

Operation ASHA
Fighting Tuberculosis Worldwide

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Replication in other countries (contd.)
OpASHA: a game-changer

- Easy replicability (8 hours training remotely for Uganda)
- Cost effective, high impact model
- Believes in measuring impact & outcome
- “What gets measured, gets done”-Goals matter!
- Local people and communities extensively involved
- Training manual in place, modifiable according to local customs and food habits
Cost Benefit Analysis proves game-changing potential

Our cost to detect & treat one TB patient = $80
"Operation ASHA’s cost for treating each patient in India is approximately 19 times lower than the nearest other provider" - Joan Yao, of LGT Venture Philanthropy, Switzerland

Our cost of detection alone = $27 per patient
32x lower than programs funded by TB-REACH (average cost per detection = $852)
Will lead to $2.5 billion Saving in cost of detecting 3 million undetected patient

Our SROI: 3217%
$100 invested by a donor provides benefits worth $3217 to disadvantaged communities

Cost of preventing 1 MDR case by using Operation ASHA’s methodology = $200:
14-50x lower than cost of treating 1 MDR patient, which is $2,800-10,000.
“DOTS alone is not sufficient to curb the TB epidemic in countries with high rates of MDR-TB.”

- Stop TB Working Group

“Electronic datasets are needed to facilitate accuracy and analysis of data.”

- World Health Organization (2011)
eCompliance: Innovative, low cost technology

- Operation ASHA developed eCompliance with Microsoft Research
- Aim: to track and ensure each dose taken
- Runs on commercially available, ‘off-the-shelf’ components
- Minimal initial and operating costs

Netbook Computer
Fingerprint Reader
SMS Modem
eCompliance on Android
eCompliance: Indisputable evidence for each dose taken

**PRIMARY OBJECTIVE - To ensure accuracy and adherence**

**PROBLEMS**
1. Unsupervised doses being given
   - Missed doses and default
   - Patients not tracked
   - Inaccurate record keeping
   - Data fudged
   - Inadequate follow-up
   - Time lag for follow-up
   - Absenteeism among field staff

2. Limited knowledge of providers

**SOLUTIONS**
1. Taking fingerprint every time confirms a TB patient’s presence
   - This creates indisputable evidence
   - One cannot ‘fudge’ a fingerprint!

2. The entire DOTS regimen including reminders for follow up tests are built in eCompliance
Color coding shows that a patient has been successfully logged in

- Minimal text
- Easily translatable into other languages

Counselors can quickly identify which patients have
- Visited the center
- Not come into the center
- Missed their dose
eCompliance: Workflow

**Front End for semi-literate providers**
- eCompliance Terminal

**Back End for Managers**
- Web-based Reporting System
- SQL database
- Online SMS Server

**The Back End**
- SMS Gateway
- Central Reporting System
- Messages are downloaded from the SMS server and imported into a centralized online database

**Health Worker & Program Manager**
- Dose missed
- SMS
Results
• Default <3%
• Over 2,200 patients cured
• 1600 patients undergoing treatment at present
• Over 225,000 visits logged
• Over 3300 visits logged every month

Lessons Learned
• Patients are not hesitant to give their fingerprints
• Patients perceive technology as a sign of high quality of treatment

Terminals used in South Delhi since 2010

Terminals installed in Bhiwandi, Jaipur and other Delhi centers in 2012

Terminals installed in 5 cities in MP in Feb 2013 (Bhopal, Jabalpur, Gwalior, Indore, Sagar)

Terminals installed in 4 cities in Chattisgarh in Mar 2013 (Raipur, Bilaspur, Durg, Bhilai)

Total no. of terminals by the end of Mar 2013 153
eCompliance: Key Benefits

PATIENT AND COMMUNITY LEVEL
• Positive impact on the psyche, seen as dedication towards quality treatment

AT LEVEL OF PROVIDERS AND COMMUNITY PARTNERS
• Ensures integrity of DOTS: eliminates frequent unsupervised doses
• Eliminates human error
• Improves skill set
• Enhances prestige in community
• Accurate reporting and up-to-date intelligence
eCompliance: Key Benefits (contd.)

**MANAGEMENT LEVEL**
- Comprehensive Electronic Medical Record System.
- Web based reporting system, Multi-level accountability and transparency
- Transparent treatment supervision
- Ensures accuracy of incentive payment

**THE PUBLIC HEALTH PERSPECTIVE**
- Turns the tap off on Drug-Resistance

**CAN BE UPGRADED FOR**
- HIV treatment
- To prove presence of patients for payment to hospitals by insurance companies
- Diabetes and hypertension
- Attendance in schools and vocational training centers
- Mid-day Meal schemes
The total cost of each eCompliance terminal = $434

Cost per patient = $2.90, which is more than offset by increased productivity (each unit treats 150 patients over three years)
Saves time that was otherwise spent in going through paper records
- Target counseling to patients who frequently miss doses saving on time required for counseling
- Reduces provider costs by 30%
- This more than pays for hardware costs, and
- Reduces recurring costs substantially
**Operation ASHA’s Results**: Higher detection, much less default

### Performance Chart – Madhya Pradesh

<table>
<thead>
<tr>
<th>Quarter</th>
<th>% Population Served by Operation ASHA</th>
<th>% Detections Done by Operation ASHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q. 1 2010</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>Q. 2 2010</td>
<td>15%</td>
<td>20%</td>
</tr>
<tr>
<td>Q. 3 2010</td>
<td>15%</td>
<td>25%</td>
</tr>
<tr>
<td>Q. 4 2010</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>Q. 1 2011</td>
<td>15%</td>
<td>20%</td>
</tr>
<tr>
<td>Q. 2 2011</td>
<td>15%</td>
<td>20%</td>
</tr>
<tr>
<td>Q. 3 2011</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>Q. 4 2011</td>
<td>25%</td>
<td>30%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results</th>
<th>Operation ASHA</th>
<th>Other Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default Rate</td>
<td>3%</td>
<td>Up to 60%</td>
</tr>
</tbody>
</table>
Impact – to date

- 30,000 Patients cured
- 1,800,000 Infections averted
- 89% Treatment success rate
- <3% Default rate
- $4,000 Cost of creating a job
- 175 Micro-entrepreneurs/community partners who earn additional income in disadvantaged communities that serve as locations for Operation ASHA treatment centers
- 190 Full-time jobs created for Semi-literate youth

SROI 3,217%
Versatile pipeline: Services provided by Operation ASHA

1. Economic benefits

2. Jobs to semi-literate youths who work as providers:
   80% of Operation ASHA’s expenses generate livelihood

3. Over-the-counter drugs for ailments like acidity, dizziness and headache

4. Oral Rehydration Salt (ORS) to prevent diarrhea, dehydration and deaths

5. Contraceptives

6. Distribution of food and nutrition supplements given by TB Association, Indian Government, religious groups, etc. for poor children/youths/elderly living in slums

7. Micro-health insurance, micro-accident insurance, safe water, solar lamps
OpASHA: Awards, Partners and Media Coverage

and many more...