LEAP
Leprosy Elimination and Awareness Program

Conquering the ‘Leprosy Last Mile’: The Role Of Mobile-Phones
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Leprosy the Facts

- a chronic disease caused by a bacillus, *Mycobacterium leprae*.
- *M. leprae* multiplies slowly. Incubation period avg. 5yrs (1 – 20 years)
- mainly affects the skin, the peripheral nerves, mucosa of the upper respiratory tract, and the eyes.
- **curable** with multidrug therapy (MDT).
- Untreated, leprosy can cause progressive and permanent damage to the skin, nerves, limbs, and eyes.
Leprosy Elimination Challenges

- Poor access to MDT services in some regions
- No simple PoC diagnostic test
- Late detection leading to visible deformities
- Poor medication compliance
- Emerging drug resistance
- Fear, prejudice and stigma surrounding leprosy
- Low health system priority
Leprosy Target: Elimination of Infection

- Elimination of leprosy i.e. prevalence of less than 1 case per 10,000 population.
- Leprosy meets the demanding criteria for eradication.
  - **Hansens SmartTest**: Practical and simple PoC diagnostic tool
  - **Multidrug therapy**: the availability of an effective intervention to interrupt its transmission:
  - **Humans**: single significant reservoir of infection:

Disease control includes . . .

- **Extinction**: The specific infectious agent no longer exists in nature or in the laboratory
- **Eradication**: Termination of all transmission of infections by extermination of infectious agents
- **Elimination**: Reduction to zero of the incidence of a specified disease in a defined geographical area as a result of deliberate efforts
- **Control**: Public policy intervention that restricts the circulation of an infectious agent beyond the level that would result from spontaneous, individual behaviors to protect against infection
Trend: Plateaued

Per 100,000 population

Brazil (Block et al 2015)

Increase in new cases and prevalence during 2012-13 is attributable to NLEP strategy to carry out extensive house to house survey for new case detection.
Leprosy remains a problem in the high-endemic regions, which account for most of the cases in a country.

Ongoing transmission of *M. leprae* will make global elimination of leprosy unlikely to occur by 2020 without further control measures.

Blok et al, Parasites & Vectors (2015)
LEARNs Philippines

- Philippines’ phone-based leprosy detection system,
- Images of suspect leprosy lesions and symptoms sent via SMS to a specialist.
- Reduces delays in diagnosis and treatment.
- Screening tool with a 83% sensitivity to correctly detecting suspect lesions
- 77% specificity to exclude leprosy when a picture of the suspect lesions was included.

Goal: Mobile phone-based leprosy referral system and exploring other mobile applications to improve early detection, while also developing a simple and field-friendly diagnostic test.
Brazil: RDT = Smart Reader

- A total of 434 individuals were evaluated, and 44 (10.1%) were diagnosed with leprosy.
- The estimated sensitivity of NDO-LID antigen was 87% and the specificity was 96.1%.
- The new NDO-LID POC test represents a useful tool for MB leprosy detection/diagnosis and treatment.
- NDO LID can contribute to monitor treatment by leprosy controls programs.
- The digital and automated rapid test mobile app also represents an improvement towards more accurate results.
New Paradigm: Leap the Last Mile

- Innovative technology
- Media messages for reduction in stigma associated with leprosy
- Medication Adherence: Connecting patients with MDTs via local health system
- Rigorous global monitoring

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Smart PoC Diagnostics

Case Management Portal

MDT Drug referral and Adherence

Smart Reader
Hansen Smart Strip

Leprosy Antigens:
- Sensitivity 89% for LID-1 and 95% for LID-NDO;
- Specificity was 96% for LID-1 and 88% for LID-NDO.

Amorin et al 2016
Solution: Immediate Diagnostics and Analytics

1) Nurse or patient performs rapid testing using LFT
2) The test is scanned by IDA Reader in a mobile phone
3) IDA platform provides diagnosis and analysis of the result in real time.

IDA Health
Web Portal for Healthcare Professionals

LFT scan results + images, automatic analysis

Real Time analytics

Visualization of scan analytics results using charts and maps

Location Data and Trends
LEAP Benefits

- Global mobile-phone coverage, cloud based technical infrastructure for Diagnostics, Surveillance, Monitoring
- Support to patients to avoid poverty and destitution due to leprosy related disabilities
- ‘Hansen Smart test’ embedded in local health services
- IDA Health Infrastructure can be used for other diseases (Ebola, Dengue, Zika)
- Making Leprosy eradication a legacy of our lifetime
The biggest disease today is not leprosy or tuberculosis, but rather the feeling of being unwanted.

*Mother Teresa*