Recent national TB prevalence surveys in Asia and Africa:

Key results and policy, programmatic and funding implications

Katherine Floyd, Philippe Glaziou, Irwin Law, Ikushi Onozaki, Babis Sismanidis

STAG-TB meeting, 15 June 2015 (updated 1 April 2016)
Background & Broader Context
WHO Global Task Force on TB Impact Measurement

Mandate

To produce a robust, rigorous and widely-endorsed assessment of whether 2015 global targets for reductions in TB incidence, prevalence and mortality are achieved at global, regional and country levels

Three strategic areas of work

1. National TB prevalence surveys in 22 global focus countries
2. Strengthening surveillance of TB cases and deaths, all countries
3. Periodic review of methods to produce disease burden estimates
22 Global Focus Countries

**Africa:** Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Nigeria, Rwanda, Sierra Leone, South Africa, Tanzania, Uganda, Zambia

**Asia:** Bangladesh, Cambodia, China, Indonesia, Myanmar, Pakistan, Philippines, Thailand, Viet Nam
## Surveys 1990–2017

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- **Completed (18*)** *since Task Force subgroup active*
- **Field operations completed, analysis ongoing (1)**
- **Field operations ongoing (4)**
- **Planned (5)**

### 28 surveys between 2009 and 2016/17
- **20/22 global focus countries** (not Mali or Sierra Leone)
  - + 7 more: Lao PDR, Gambia, Sudan, Zimbabwe, Mongolia, DPR Korea, Nepal
Publications from individual surveys
Publications from individual surveys

Tuberculosis prevalence in China, 1990–2010; a longitudinal analysis of national survey data
Lixia Wang*, Hui Zhang*, Yunzhou Ruan*, Daniel P Chin†, Yirin Xia, Shining Cheng, Mingting Chen, Yarin Zhao, Shiwen Jiang, Xin Du, Guangxue He, Jun Li, Shengfen Wang, Wei Chen, Caibong Xu, Fei Huang, Xiaopu Liu, Yu Wang

The first population-based national tuberculosis prevalence survey in Ethiopia, 2010-2011

The first national tuberculosis prevalence survey of Lao PDR (2010–2011)
Irwin Law1, Phannasinh Sylvanh2, Soth Bounmala1, Fulgence Nzabintwali3, Phimpha Paboriboune3, Vibol Ilem4, Silaphet Somphavong5, Sang Jae Kim5, Charalambos Sismanidis4, Ikushi Onozaki1 and Jacques Sebert6

Cross-sectional studies of tuberculosis prevalence in Cambodia between 2002 and 2011
Tan Eang Mao,† Kosuke Okada,§ Norio Yamada,∥ Satha Peou,∥ Masaki Ota,∥ Saly Saint,∥ Pichenda Kouet,∥ Manith Chea,∥ Sokonth Keo,∥ Sok Heng Pheng,∥ Sivanna Tieng,∥ Kim Eam Khun,∥ Tetsuhiro Sugamoto,∥ Hiroto Matsumoto,∥ Takashi Yoshiyama,∥ Kunihiko Ito∥ & Ikushi Onozaki∥

National survey of tuberculosis prevalence in Viet Nam
Nguyen Binh Hoa,* Dinh Ngoc Sy,∗ Nguyen Viet Nhung,* Edine W Tiemersma,‡ Martien W Borgdorff∥ & Frank GJ Cobelens§

RESEARCH ARTICLE
Nathan Kapata1,14*, Pascalina Chanda-Kapata2,14, William Ngosa1, Mine Metiliri1, Eveline Klinkenberg3,4, Nico Kalisvaart1, Veronica Sunkutu1, Aaron Shibemba1, Chishala Chabala1, Gershom Chongwe1, Mathias Tembo1, Lutinala Mulonga1, Grace Mbulu1, Patrick Katemangwe1, Sandra Sakala1, Elizabeth Chizema-Kawesha1, Felix Masiye1, George Sinyangwe1, Ikushi Onozaki1, Peter Mwaba12, Davy Chikamata1, Alimuddin Zumla13, Martin P. Grobusch14

Significant decline in the tuberculosis burden in the Philippines ten years after initiating DOTS

National tuberculosis prevalence surveys in Asia, 1990–2012: an overview of results and lessons learned
Ikushi Onozaki, Irwin Law, Charalambos Sismanidis, Matteo Zignol, Philippe Glaziou and Katherine Floyd
Results
Surveys 2009-2015
Consistent screening and diagnostic methods since 2009

15+ years old

Not children

Symptom screening
Chest X-ray screening

Symptom screen negative and normal chest X-ray
No further investigations

Symptoms and/or abnormal chest X-ray

Smear microscopy*
Culture

HIV test offered in most African surveys
Not extra-pulmonary TB

Lab positive \(\rightarrow\) panel review to certify study cases

*Since 2013: + rapid molecular test for at least:
1. All smear-positive specimens;
2. Smear-negative specimens if culture failed
1. TB prevalence

- Considerable variation among countries, highest in Asia
- High proportion of cases that are bact-confirmed but smear-negative
2. Estimates pre- and post-survey

All forms, all ages

Prevalence per 1000 population (log scale)

Pre-survey prevalence (range of uncertainty)

Post-survey prevalence (range of uncertainty)
3. Repeat surveys show TB prevalence can be halved in a decade.
4. TB prevalence systematically higher in men, esp. in Asia
5a. Ageing epidemic in Asia, mixed picture in Africa
5b. Absolute number of cases also highest in older age groups in some countries

![Graph showing percentage of cases by age group in Asia and Africa]

- **Asia**
  - China
  - Thailand
  - Cambodia
  - Lao PDR
  - Pakistan
  - Myanmar

- **Africa**
  - Tanzania
  - Ghana
  - Malawi
  - The Gambia
  - Zimbabwe
  - Rwanda
  - Nigeria
  - Sudan
  - Zambia
  - Ethiopia
  - Uganda

- 

- **Weighted average** line on the graph representing the trend across different countries.
6a. Prevalence:Notification ratio (S+) 
Illustrates detection and/or reporting gaps

- P:N should ideally be <0.5
- P:N ratio highly variable  
  - from 0.6-5
- Two examples  
  - Nigeria: Detection and (to lesser extent) under-reporting  
  - Indonesia: considerable under-reporting of detected cases
6b. Detection and reporting gaps systematically higher for men
6c. Prevalence:Notification ratio by age

Selected examples
6d. Better detection of TB among people living with HIV

HIV prevalence much higher in notified cases compared with prevalent survey cases
7. Many cases don’t report symptoms meeting criteria for presumptive TB

Typically 30–50% for both S+ and bact-confirmed; up to 70–80%

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<th>Bacteriologically–positive</th>
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Proportion symptom screening negative and chest X–Ray positive

African countries are marked in red, and Asian countries in blue.
8. Many symptomatic TB cases had sought care prior to detection by survey.
9. High proportion of TB patients being treated in private/NGO sector in several countries*

*Those currently on TB treatment at the time of the survey (excluding unknown location)
10. High proportion of S+ participants unlikely to have TB*

*Surveys with systematic use of rapid molecular tests
Implications
Implications
programmatic and policy

1. Most countries can do better with available interventions
   (variable burden, P:N ratio, high proportion of cases symptomatic in some countries)
   - Investigate reasons for detection and reporting gaps (esp. among men) e.g. access barriers, quality of clinical and diagnostic services; engage all TB care providers
     - Survey team may be able to suggest possible reasons/hypotheses based on field operations (esp. household visits) and KAP studies

2. Ensure mandatory notification policy is implemented and enforced

3. Improve diagnostics
   - Introduce/expand use of tests that are better (more sensitive) than smear microscopy
   - Do not rely only on smear microscopy in the context of active case finding unless smear microscopy proven to have high PPV

4. Re-visit screening and diagnostic algorithms used in routine clinical care and active case finding, including role of chest X-ray
Implications
funding, impact

1. Substantial increase in funding needed, esp. in countries with higher burden than previously recognised
2. Surveys can demonstrate reductions in disease burden
3. Surveys can provide evidence about intervention impact and service access
4. Surveys (age curves) illustrate transmission dynamics
Question for STAG-TB

Does STAG-TB have any modifications or additions to the draft list of policy, programmatic and funding implications to suggest?
End