Prevalence Survey -Global Overview-

Background, Survey results since 2007, Lessons and Implications to the program

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WHO HQ STB TME

The Global Task Force on TB Impact Measurement

World Health Organization
Tuberculosis (TB)

WHO Global Task Force on TB Impact Measurement

The Task Force was established in June 2006 and includes experts in TB epidemiology, representatives from major technical and financial partners, and representatives from countries with a high burden of TB.

MANDATE

The goal of the Global Task Force on TB Impact Measurement is to:

- produce a robust, rigorous and widely-endorsed assessment of whether the 2015 targets for reductions in TB incidence, prevalence and mortality are achieved at global level, for each WHO Region and in individual countries
WHO Global Task Force on TB Impact Measurement

3 strategic areas of work (2nd Global Meeting, Dec ‘07)

- **Strengthening surveillance** of cases and deaths in all countries, with ultimate goal of direct measurement from notification and vital registration data

- **National TB prevalence surveys** in ≥ 21 global focus countries

- **Periodic review and revision of methods** used to translate surveillance and survey data into estimates of disease burden
TB Prevalence Survey: Back Ground

- Promoted in 1950s in Asia and Africa
- WHO guidelines with MMR and culture in 1958
- Forgotten globally except for East Asia
  - Shift from Active Case Detection to Passive Case Detection
  - Shift for Bacteriological based diagnosis (smear) rather than CXR
    (1974 recommendation to abandon TB screening by MMR)
- Technical knowhow of the nation-wide survey with CXR screening was sustained in East Asia (Japan, Korea, China followed by Philippines)
TB Prevalence Survey: Back Ground

• Identified as one of three strategic areas of the WHO Global Task Force in the 2nd Global meeting, December, 2007

• 21 countries (12 Africa, 9 Asia) were selected as global focus countries to carry a national survey by 2015

• The 1st edition of the WHO survey handbook (RED book) was published in 2007 followed by the revision in 2011 (LIME book)
Why Prevalence Survey?

- Countries’ desire to know real TB situation
- MDG related indicator by STOP TB Partnership – Is our investment working to give impact on TB epidemiology?
- TB Incidence/prevalence estimate by Tuberculin survey (Annual Risk of Infection) is no longer recommended → underestimation of the TB burden: necessity to revise historical 1990 estimate by WHO and WB
- Prevalence is a measurable indicator by a scientific study (compared with Incidence and mortality)
Case Notification – ALL TB
HBCs in Asia

Met 70/85 % Global Target
Why we can’t observe any significant decline?

Met 70/85 % Global Target
What we measure and what we learn

Size of the burden (prevalence) and its change

- Incident Cases
- TB Cases in the Community
- Self Cure
- Cure by Treatment
- Death
Typical Survey

- Sample size: 40000-70000, Cluster Sampling: 500-800 aged 15y or older/cluster

- 50-80 clusters by Multistage Population Proportionate Probability Sampling

- Weekly cycle operation for 6-10 months by 3-5 Central survey teams (2-3 teams operation at one time) with 12-15 staff per team

- Screening and Diagnosis: Symptoms and Chest X-ray on spot decision to collect sputum specimens; Smear and Culture at central reference labs
How survey is operated

- Preparation: National Consensus, Design, Secure Funding (USD 2-4 million), Procurement, Pre-assessment and operational plan, and training

- Field Data Collection: Survey Census; Screening and Diagnostic test; Data management

- Post data collection: Data management, Analysis, Interpretation, re-estimation of the TB burden and Dissemination
Progress since 2008

- All surveys since 2009 have been designed along the TF recommendations and the protocols were reviewed by two or more TF member institutes/consultants (WHO, US-CDC, KNCV, RIT, LSHTM)

- Publication of 2\textsuperscript{nd} edition of the Survey Handbook (Lime Book)

- Preparatory and Follow up workshops with survey countries and open seminars and lectures in/around Union conferences and in WHO regions
Enormous progress since the TF started activities in 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>Cambodia</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>Malaysia</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>Eritrea</td>
<td>Completed survey with CXR on-spot screening and culture</td>
</tr>
<tr>
<td>2005</td>
<td>Indonesia</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2006</td>
<td>Thailand</td>
<td>Draft Protocol submitted to the Global TF</td>
</tr>
<tr>
<td>2007</td>
<td>Viet Nam</td>
<td></td>
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<tr>
<td>2008</td>
<td>Bangladesh</td>
<td></td>
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<tr>
<td>2009</td>
<td>Myanmar</td>
<td></td>
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<tr>
<td>2010</td>
<td>China</td>
<td></td>
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<tr>
<td>2011</td>
<td>Ethiopia</td>
<td></td>
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<tr>
<td>2012</td>
<td>Gambia</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>Indonesia</td>
<td></td>
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</table>

2014+: Bangladesh, Zimbabwe, DPRK; 2nd Round (2015-) Viet Nam, Philippines, Myanmar
Enormous progress since the TF started activities in 2008

It’s time to help each other to share experiences

<table>
<thead>
<tr>
<th>Year</th>
<th>Country</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>Cambodia</td>
<td></td>
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</tr>
<tr>
<td>2007</td>
<td>Viet Nam, Philippines</td>
<td></td>
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<tr>
<td>2008</td>
<td>Bangladesh</td>
<td></td>
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<tr>
<td>2009</td>
<td>Myanmar</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>China</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>Ethiopia, Cambodia, Lao PDR, Pakistan</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>Gambia, Tanzania, Nigeria, Rwanda, Thailand</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>Ghana, Indonesia, Malawi, Zambia, S. Africa, Kenya, Uganda, Mongolia, Nepal, Sudan</td>
<td></td>
</tr>
</tbody>
</table>

2014-: Bangladesh, Zimbabwe, DPRK............. ....; 2nd Round (2015-) Viet Nam, Philippines, Myanmar
Achievement and Lessons learnt from recent surveys (by 2011)

Direct Digital CXR car for Thai survey

Portable equipment in Cambodia
<table>
<thead>
<tr>
<th>Country</th>
<th>Year (* Provisional)</th>
<th>Smear Positive</th>
<th>Bact. Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philippines</td>
<td>2007</td>
<td>260 (170-360)</td>
<td>660 (510-880)</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>2007</td>
<td>197 (149 -254)</td>
<td>307 (248 -367)**</td>
</tr>
<tr>
<td>Myanmar</td>
<td>2009</td>
<td>242 (186 - 315)</td>
<td>613 (502-748)</td>
</tr>
<tr>
<td>China</td>
<td>2010</td>
<td>66 (53-79)</td>
<td>119 (103-135)</td>
</tr>
<tr>
<td>Cambodia</td>
<td>2011*</td>
<td>251 (194-354)</td>
<td>829 (704 – 975)</td>
</tr>
<tr>
<td>Lao</td>
<td>2010/11*</td>
<td>276(197-354)</td>
<td>610(466-755)</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>2011</td>
<td>108 (73-143)</td>
<td>277 (208-347)**</td>
</tr>
</tbody>
</table>

**1 culture**
### 5th National Survey - China 2010

253,000 participants in 176 sites

<table>
<thead>
<tr>
<th>Region</th>
<th>Smear positive TB</th>
<th></th>
<th>Bacteriological positive</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prevalence (1/100000)</td>
<td>Change (%)</td>
<td>Prevalence (1/100000)</td>
<td>Change (%)</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>2010</td>
<td>2000</td>
<td>2010</td>
</tr>
<tr>
<td>Urban</td>
<td>131 (91, 172)</td>
<td>49 (25, 74)</td>
<td>-62.6</td>
<td>164 (120, 208)</td>
</tr>
<tr>
<td>Rural</td>
<td>181 (160, 202)</td>
<td>78 (64, 93)</td>
<td>-56.9</td>
<td>232 (211, 254)</td>
</tr>
<tr>
<td>Eastern</td>
<td>124 (102, 147)</td>
<td>44 (30, 58)</td>
<td>-64.5</td>
<td>163 (138, 187)</td>
</tr>
<tr>
<td>Middle</td>
<td>217 (176, 259)</td>
<td>60 (30, 91)</td>
<td>-72.4</td>
<td>251 (207, 294)</td>
</tr>
<tr>
<td>Western</td>
<td>198 (160, 236)</td>
<td>105 (80, 130)</td>
<td>-47.0</td>
<td>278 (240, 316)</td>
</tr>
</tbody>
</table>

(China CDC 2011)
Early effects of DOTS
Bacteriologically confirmed PTB in China

From partial DOTS to DOTS with strengthened surveillance

- 45% (35-53%)
- 87%
- 18%

Prevalence /100,000 age 15 or older

2000
22 -> 7/100,000
2010

132
84
11
108

Known
Undetected

MDR

China CDC (modified)
Myanmar 2009/10 (51000 participants in 70 sites)
prevalence of different condition and notification

Gaps:
B+ and S+;
Young and old;
S+ and S+ with chronic cough; and
Prevalence and Notification

(NTP Myanmar)
## Change of the estimates of TB burden in Myanmar

<table>
<thead>
<tr>
<th></th>
<th>Incidence</th>
<th>Prevalence</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 Global Report</td>
<td>171</td>
<td>162</td>
<td>13</td>
</tr>
<tr>
<td>2011 Global Report</td>
<td>384 (329-443)</td>
<td>525 (381-643)</td>
<td>41 (25-64)</td>
</tr>
<tr>
<td>ratio</td>
<td>2.2</td>
<td>3.2</td>
<td>3.2</td>
</tr>
</tbody>
</table>

No country has experienced such a drastic upward revision in a decade
It might be still underestimated – limitation of culture
Cambodia (2011)

- First repeat survey in the world under 100% DOTS program
- 37,413 participants of aged 15 y.o. or older in 62 cluster sites;
- Participation rate: 92.7%
Effect (& Limitation) of DOTS

From “100% DOTS but in hospital” to “Decentralized DOTS”

Fig. 5. Comparison of smear-positive tuberculosis prevalence rate by symptom (2002 vs. 2011)
Gap between young and old (Prevalence survey: Cambodia 2011)

Younger: Shorter duration of S+: more likely to detected

S+ MALE

Notification M
### LAO PDR (August 2010 – Dec 2011)

**Screening and Laboratory defined results**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>CXR</th>
<th>N</th>
<th>Sputum tested</th>
<th>S+C+</th>
<th>%</th>
<th>S-C+</th>
<th>%</th>
<th>All MTB</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>1926</td>
<td>1885</td>
<td>3</td>
<td>0.16</td>
<td>4</td>
<td>0.21</td>
<td>7</td>
<td>0.37</td>
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<tr>
<td>Yes</td>
<td>Yes</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>107</td>
<td>8.16</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>112</td>
<td>3.63</td>
</tr>
<tr>
<td>Yes</td>
<td>NA</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>32714</td>
<td>9</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>NA</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>39060</td>
<td>6299</td>
<td>94</td>
<td>1.49</td>
<td>132</td>
<td>2.10</td>
<td>226</td>
<td>3.59</td>
</tr>
</tbody>
</table>

**Comments:**
- Most TB cases detected by CXR and not just by symptom screening.
- Most TB cases are smear negative culture positive.
CXR abnormality by age (Lao PDR)

11.3% of those interviewed
Ethiopia 2010/11
First survey in Africa in 50 years following WHO guidelines

<table>
<thead>
<tr>
<th></th>
<th>Sm+ (per 100,000)</th>
<th>Bacteriologically+ (per 100,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥15 years</td>
<td>108 (73–143)</td>
<td>277 (208–347)</td>
</tr>
</tbody>
</table>

- 46700 participants in 85 sites
- Observed prevalence much less than previously estimated
- DOTS by Community extension health workers is working at least to detect and treat S+ patients
- Laboratory and radiology capacity (staff and infrastructure) insufficient to detect cases early
Prevalence was much lower than previously thought, however ....

Age & Sex proportion of prevalent S+ cases

Cambodia vs Ethiopia
## Culture confirmed MTB

### Systematic review of sensitivity and specificity of screening tools

<table>
<thead>
<tr>
<th>Screening tool</th>
<th>Pooled sensitivity (95% CI)</th>
<th>Pooled specificity (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chest radiography</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CXR – Any abnormality</td>
<td>98% (95-100%)</td>
<td>75% (72-79%)</td>
</tr>
<tr>
<td>CXR – TB suggestive abnormalities</td>
<td>87% (79-95%)</td>
<td>89% (87-92%)</td>
</tr>
<tr>
<td><strong>Symptom screening</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prolonged cough (&gt;2-3 weeks)</td>
<td>35% (24-46%)</td>
<td>95% (93-97%)</td>
</tr>
<tr>
<td>Any cough</td>
<td>57% (40-74%)</td>
<td>80% (69-90%)</td>
</tr>
<tr>
<td>Any symptom*</td>
<td>77% (68-86%)</td>
<td>68% (50-85%)</td>
</tr>
</tbody>
</table>

*Cough of any duration, haemoptysis, weight loss, fever or night sweats

*(From the Guidelines on systematic screening for active TB: to be published)*
## Gap between Notification and Prevalence

Are we detecting enough?

<table>
<thead>
<tr>
<th></th>
<th>Prevalence*</th>
<th>Notification**</th>
<th>P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philippines 2007</td>
<td>200*</td>
<td>98**</td>
<td>2.0</td>
</tr>
<tr>
<td>Viet Nam 2007</td>
<td>197</td>
<td>85</td>
<td>2.3</td>
</tr>
<tr>
<td>Myanmar 2009</td>
<td>242</td>
<td>116</td>
<td>2.1</td>
</tr>
<tr>
<td>China 2010</td>
<td>66</td>
<td>39</td>
<td>1.7</td>
</tr>
<tr>
<td>Cambodia 2011</td>
<td>251</td>
<td>180</td>
<td>1.4</td>
</tr>
</tbody>
</table>

*Point estimate of Smear positive TB prevalence in aged 15y or older observed by a survey except for Philippines (all age);
**Notification rate of S+ TB in age 15 or older in the survey year except for Philippines (all age); Source: Global TB database, WHO
Survey Results by Stage of TB service expansion

- Poor program: High prevalence with known cases due to poor treatment (on Tx, defaulters, chronic cases etc)
- Early Impact of DOTS: Decline of Prevalence especially among known cases owing to good treatment
- DOTS not penetrated enough: Still high prevalence of S+ with chronic cough than expected
- Limitation of current case detection strategy or weakness of capacity of health system to diagnose TB promptly: most smear positive prevalent cases don’t report chronic cough; many have visited health service in vain
Major Challenges in preparation

- **Procurement**
  - Lack of understandings of specification requirement in each level – what you really wants and what you should specify, international rule of bidding etc

- **Confirmation and development of lab capacity including transportation network of specimen**
  - Requirement capacity for a survey is a part of national requirement in most TB HBC
  - However, MDR program expansion under serious delay of national lab network development give pressure to survey lab work

- **Funding/Budgeting – Does a Survey really cost USD 4 million?**
  - Justification with a Long term plan beyond the survey
  - Do all central staff really work 100% time?
  - Can service charge same as clinical specimen/image
Survey Design (sample size)

- The budget and capacity allows one precise estimate of one national prevalence ($d=0.2-0.25$).

- However, appropriate designing may allow acceptable level of estimate ($d=0.3$) in two or three strata (i.e. two or three geographical areas) with a slight increase of sample size, i.e. Indonesia, South Africa.
CXR selection

- Conventional portable: Still have advantage in price, supply, handling and maintenance (~ USD 30 000/unit)

However

- Quality improve and significant price down of Direct Digital Detector (Flat Panel) change situation
  - Easier logistics, no chemical, no water, no waste, no image processor, less human power, lower running cost, less radiation exposure, easier data management
  - Required a long term plan to use
Portable DDR in Indonesia Survey
No single part exceeds 20kg
Eligibility/Participation
Common challenges

- Fewer involvement of young male, and urban and mobile population either for study eligibility or participation or both could be a potential bias:
  - Male: higher prevalence than female
  - Young: much lower prevalence than elders in Asia, however, it is not always true in Africa
  - Urban: lower prevalence due to better access or higher prevalence due to congestion
  - Mobile population: lower prevalence as they are healthier to move or higher prevalence due to poverty and poorer access to the service

How to Improve and how to analyze
CXR screening and QC/QA

- Physicians often can’t categorize “Abnormal finding not necessary to collect specimen” as “Normal”: Emphysema, a single calcification nodule, anomaly etc

- Delay of Central Reading:
  - Quick 2\textsuperscript{nd} reading for all v.s. Sampled reading of by two
Smear+ does not always mean TB

- Low positive predictive value in every survey setting of “10-15% participants are eligible for exam and Only 1-3% have smear positive TB (100-500/100 000 of participants)

- Good microscopy with higher sensitivity may have lower specificity
  - Mycobacteriosis other than TB as disease
  - NTM (MOTT) colonizing in airway (more in old TB, ectatic lesions)
  - NTM in environment (i.e. local water)
  - Poor reagent
### Clinical

<table>
<thead>
<tr>
<th></th>
<th>C+ TB</th>
<th>Not C+ TB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smear +</td>
<td>1000</td>
<td>85</td>
</tr>
<tr>
<td>Smear -</td>
<td>500</td>
<td>8415</td>
</tr>
<tr>
<td></td>
<td>1500</td>
<td>8500</td>
</tr>
</tbody>
</table>

**Sensitivity 67%, Specificity 99%**

**Prevalence of C+ TB: 15%**

**PV = 92%**

### Survey

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<tr>
<th></th>
<th>C+ TB</th>
<th>Not C+ TB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smear +</td>
<td>160</td>
<td>96</td>
</tr>
<tr>
<td>Smear -</td>
<td>240</td>
<td>9504</td>
</tr>
<tr>
<td></td>
<td>400</td>
<td>9600</td>
</tr>
</tbody>
</table>

**Sensitivity 40% and specificity 99%**

**Prevalence of C+ TB among examined: 4%**

**PV = 63%**

**Even when specificity is 99.5%, PV are 96% and 77% respectively**

### Interim Recommendations:

**S+ Prevalence:** Adopt a method that a country is using widely or planning to expand

**Every S+ should be tested with Xpert (or other rapid molecular test)**
Culture

- Still no MGIT base national prevalence data
- Challenges in transportation and timely inoculation
- Higher yields in TB prevalence survey/Active case detection under DOTS program than clinical samples (not because of poor microscopy)
- Difficult to adopt two cultures in some countries though the yields by the 2\textsuperscript{nd} culture is large as 20-30%
- Lab should understand nature of specimens (low volume, saliva like..) well in advance
- Over decontamination leads poor recovery/yields by culture (so far direct simple method is competitive with concentrated method in prevalence survey)
- Contamination by basic technical errors should be excluded
- Cross contamination exists even in SRLs
  - Level of significance (10 or 5 colonies cut off)
Identification of MTB

Why not immunological or molecular testing?

- Avoid loss during the sub-culture
- Detect mixed (double infection) of MTB and NTM
- Lowering cost
Study Case Definition

- With Xpert and a level of significance in culture
- Principles with informal consensus by lab experts in the Lab WG
- Test it to re-categorize the cases in existing survey data in collaboration with countries
Confident with field data collection, at a loss in data management
Data Management (1)

- More attention should be paid from planning/preparation stage.

- Discrepancy between clinical data and lab data is mostly by data management error (i.e. S+C+ TB with normal CXR) – original data of every lab positive subject should be reviewed both for study and case management purposes.

- Most errors can be prevented or minimized by appropriate design of the data management tools.
Data Management (2)

- Participant-wise data collection has been recommended both in the Red Book and the Lime book. We still strongly recommend it unless a study aims a specific purpose to compare tools and there is strong data management supporting system (i.e. barcode, run/network at the survey site).
  - When a participation-wise data collection is applied, the provisional results were shared within 4-6 months with partners and the implications to the program were discussed timely in every national survey. However such a dissemination has not been observed in surveys that applied blind data collection. There are always challenges in checking consistency in the field and merging different data sets.
Involvement of Children

- No established screening and diagnostic methodologies for under 10y

- Difficult to test/pilot any methodology in a nation-wide survey where an appropriate referral facility to confirm TB diagnosis among children is not always available

- Children 10-14y: Evidence required to justify a risk of >>1000 radiation exposures to detect one case

- Budget implication: necessity to inflate sample size as we can’t expect more than a few cases in this age group
Targets and variation between clusters

- Cluster situations vary:
  - Participation rate
  - CXR abnormality: age structure of community (2-3% in young; 30-50% in very old) and historical access to health system
  - TB prevalence:
    Past: mode=median=mean
    Now: mode<median<mean

“overall survey target and assumption” is not a cluster target
Summary: Major findings/Lessons

- Higher TB burden than previously estimated
- Impact of DOTS: earlier impact and impact of penetration of DOTS
- Difference of TB epidemic between Asia and Africa
- Impact of ageing population in Asia
- Revisit role of CXR as a screening test and diagnostics beyond smear exams (S+ is not always TB)
- Implications to Active Case Detection
Major Constraints

- **Funding/ Financial Management/Cost**
  - Higher cost in Africa (Contract and Salary)
  - A suspension of other activities by GF suspends M/E and surveys
  - Lack of flexibility to support field activities

- **Procurement**

- **Culture Lab Network**

**External factors**

- Political instability (Elections, Terrors …), Natural Disaster (Flood, Draught ….)
Challenges in on-going surveys

- Culture: S+C- (TB or not), Transportation and coordination
- Data management: Timely data entry and cleaning; merging lab, CXR and field data
- Lower participation in urban community
- Feedback of the results

Timely feedback

Maximum Efforts to Avoid False positive
New technologies

- **GeneXpert**: Earlier confirmation of S+ TB & Partial back up of culture

- **Digital CXR**: Easier logistics and Remote reading (e-medicine/telemedicine)

- **Mobile Phone**: for personal identification and feedback of results
Ghana launched e-Survey
Real time monitoring with bar code and internet
Coming events

- UNION Regional Conference in Kigali (20-22 June)
- AFRO NTP manager’s meeting (15-17 Sept TBA)
- Survey WS on Recent Survey Results and Analysis (AM) and Seminar for New Country (PM) (31 Oct, Paris)
- Joint review on on-going surveys: Ghana: early/mid July; Indonesia: the end of August or September

Note: WHO new policy: There will be no multi-country activity in the 1st week of every month from July 2013
Thank you

Tanzania 2012