Measuring progress towards the
Millennium Development Goals
Report of the third meeting of the
WHO Global Task Force on TB Impact Measurement

Background

Between 2000 and 2005, global targets for TB control were extended to include targets for reducing cases and deaths. These newer "impact" targets were set within the Millennium Development Goals (MDGs) and by the Stop TB Partnership, with target years of 2015 and 2050. The principal targets are to halt and reverse incidence by 2015, and to halve prevalence and death rates by 2015 compared to their level in 1990. Achieving the impact targets is now the focus of international and national efforts to control TB, and demonstrating whether or not they are achieved is of major strategic importance for the Stop TB Partnership as well as individual countries and a variety of technical, financial and development agencies.

To respond to the necessity of measuring progress towards the 2015 targets for reductions in TB incidence, prevalence and mortality, WHO established a Global Task Force on TB Impact Measurement (hereafter the Task Force) in June 2006. The Task Force includes experts in TB epidemiology, representatives from major technical and financial agencies, and representatives from countries with a high burden of TB. Its mandate is to advise on the best and most rigorous methodology to be used in the 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; to regularly report on progress towards these targets in the years leading up to 2015; and to strengthen national capacity in monitoring and evaluation of TB control.

Following the first two Task Force meetings (June 2006 and December 2007) and September 2008), three major strategic areas of work have been defined, all of which will need to be fully funded and implemented to ensure that the Task Force's mandate can be fulfilled. These are:

1) Strengthening routine surveillance of TB cases and deaths through TB notification and vital registration systems. This will include a systematic approach to assessment of the quality and coverage of TB notification data and promoting the development of vital registration systems as part of wider efforts to improve health information systems.

2) Implementation of population-based surveys of the prevalence of disease in 21 global focus countries (12 in Africa, 4 in South-East Asia, 4 in the Western Pacific, and Pakistan).

3) Periodic review and updating of the data, assumptions and analytical methods used to translate surveillance and survey data into estimates of TB incidence, prevalence and mortality, including evaluation of how TB control influences trends in these indicators.

The first meeting of the Task Force was held at WHO headquarters (WHO-HQ) in June 2006. This meeting focused on a review of the methods available to measure the epidemiological burden of TB (incidence, prevalence, mortality), and produced general recommendations about the use of these methods to measure incidence, prevalence and mortality in the years leading up to the MDG target year of 2015. Following this meeting, a systematic review of the methods that are available to measure TB incidence, prevalence and mortality, was published in the Lancet Infectious Disease journal in January 2008. {Dye, 2008 #19546} The second meeting of the Task Force, held 6–7 December 2007 at WHO-HQ, built on the outcomes of this meeting while giving particular attention to the role of surveys of the prevalence of disease and infection in impact measurement. It was decided that WHO via the Task Force would promote the implementation of national surveys of the prevalence of TB disease in 21 global focus countries, and would assist these countries to access the necessary technical and financial support. These surveys should be
implemented according to the WHO guidelines published in 2007, that were widely endorsed by the Task Force during the meeting. {World Health Organization (17 authors), 2007 #20153} The third meeting of the Task Force, held 23-25 September 2008 at WHO-HQ focused on the recommendations for measurement of TB incidence using routine surveillance data and on the review of the draft WHO Policy Paper "Measuring progress in global TB control: WHO policy and recommendations".

This meeting report explains the five objectives that were set for the third meeting of the Task Force. For each objective, it then summarizes the presentation and major discussion points, followed by the main outcomes, recommendations and what has been acted upon the recommendations. The annexes of the report include 1) the meeting participants, 2) the meeting agenda, 3) summary table of progress in implementation of prevalence surveys, 4) Fact sheet of the WHO Task Force on TB Impact Measurement, and 5) two boxes extracted from the 2008 Global TB report summarizing the studies done in Brazil and Egypt.

**Objectives**

1. To review progress made by the Task Force since December 2007, both overall and for each of the three major strategic tracks of work
2. To review the draft WHO Policy Paper "Measuring progress in global TB control: WHO policy and recommendations", with particular attention to (i) the advice and recommendations provided by WHO's Strategic and Technical Advisory Group for Tuberculosis (STAG-TB) and (ii) the recommendations for measurement of TB incidence using routine surveillance data
3. To discuss how to improve the direct and indirect measurement of TB incidence (its absolute value and trends), focusing on the development and implementation of a standardized approach to assessing the reliability and coverage of TB notification data that could be applied as part of a certification process and which would also help to strengthen national capacity in monitoring and evaluation
4. To discuss what is needed to improve current estimates of the epidemiological burden of HIV-related TB and MDR-TB
5. To give each of the three Task Force subgroups an opportunity to discuss their plan of work for the next 6 to 12 months and to share this with the full Task Force

**Objective 1: To review progress made by the Task Force since December 2007, both overall and for each of the three major strategic tracks of work**

An overview of the progress made during 2008 in each of the three major strategic areas of work was presented by the main coordinators of the areas:
Ana Bierrenbach (WHO-HQ, STB/TME) presented a general overview of Task Force progress, and the specific achievements of the area on strengthening routine surveillance of TB cases and deaths through TB notification and vital registration system:

- Staff at WHO with input from Jaap Broekmans (chair of the Task Force) had elaborated two important documents: 1) a concept note designed to explain the work of the Task Force, in particular for the purposes of resource mobilization, and 2) a draft of a policy paper "Measuring progress in global TB control: WHO policy and recommendations" prepared to provide in one major reference document a clear and comprehensive statement of WHO policy and recommendations on TB impact Measurement (discussed below).
- A five-day workshop attended by 15 priority countries in the Latin American region took place in Costa Rica in April 2008. The theme of the workshop was "Analysing progress towards the 2015 targets for TB control in Latin America: the role of routine surveillance". During the workshop, participants gained practical experience in a set of standards that can be used to assess the fraction of cases that are missing from routine surveillance data.
WHO-HQ had begun the development of a tool to be used in a systematic assessment of the reliability and completeness of TB notification data. The first version was piloted in the workshop in Costa Rica, and since then important improvements have been made, although it remains a work-in-progress. The next opportunity to test the tool was a mission to the Philippines (Dec 2008), in which an in-depth review of the TB data compiled by the routine surveillance and by the recently completed TB prevalence surveys led to a revision of the WHO TB burden estimates. The tool will be further tested in a workshop for the European regional priority countries to be done in Berlin in April of 2009.

A five-day workshop organized by EMRO in Cairo in July 2008 received technical support from WHO-HQ. The workshop was attended by five countries: Egypt, Djibouti, Pakistan, Syria and Yemen. These countries had recently implemented operational researches aiming of assessing the number of TB cases being identified by private providers but not notified, including the use of capture-recapture methods. The main objective was to help participants to review the data and analysis of the results, and write a preliminary report of the findings.

Ikushi Onozaki (WHO-HQ, STB/TBS) presented the status of progress in the implementation of the TB prevalence surveys in the 21 global focus countries. Ten of these countries due to implement surveys in 2009/2010 have been trained in two workshops held in WHO-HQ in 2008, and are currently developing or have developed protocols. These protocols will be reviewed by an expert meeting to be held in January 2009 in WHO-HQ. A close collaboration with the Global Fund has been established in order to have the prevalence surveys funded. The current bottlenecks for the implementation of the surveys were widely discussed.

Marieke van der Werf (KNCV), with help from Brian Williams (WHO-HQ, STB/TME), presented an overview of the achievements of the area on the methods for production of epidemiological estimates of TB. KNCV hosted a meeting to review current methods in June 2008 in The Hague. The meeting was attended by several Task Force members as well as three experts from outside. Recommendations from this meeting led to some revisions in the methodology which have already been incorporated in the 2008 WHO estimates, and to literature reviews of key assumptions used in the estimation process which are ongoing. The mission to the Philippines in December 2008 mentioned above, to review estimates based on an assessment of surveillance and survey data was the first of four country missions with the same objective which have been planned by the area coordinators (the others countries to be visited are Russia, Vietnam and Ethiopia).

Main outcomes, recommendations and actions taken in response:

**Prevalence Surveys**

1. Write a letter to be sent to all 21 global focus countries to build political commitment and secure funding. The first draft of this letter has been elaborated.

2. Write a summary table showing current status, key bottlenecks and actionable next steps in the implementation of disease prevalence surveys, so that the financial and technical partners can have a clear understanding of the current status in order to address the bottlenecks. The current version of the table is presented in Annex 1.

3. Review of final protocols by small expert group. This is the main objective of the expert meeting to be held in WHO-HQ in January 2009. The protocols of South Africa, Pakistan, Myanmar, Nigeria, Uganda and Mali will be reviewed and feedback will be provided to these countries.
4. Define the lead international agencies that will coordinate the provision of technical and financial support to each of the 21 global focus countries where the Task Force has recommended that surveys should be implemented, as well as the international agencies and/or independent consultants that will provide specialized technical support for specific components of surveys where this is needed, and to closely monitor the implementation of the surveys to guarantee full adherence to the protocols. The meeting to be held in WHO-HQ in January 2009 will also focus on mapping technical assistance and on discussing some key methodological issues concerning TB disease prevalence surveys, that were not fully covered in the book *Assessing TB prevalence through population-based surveys* or in the second meetings of the WHO Task Force on TB Impact Measurement. Four issues that need further discussion and guidance have been identified. These are: (i) X-ray quality assurance and standardized readings, (ii) data management, (iii) statistical analysis and (iv) bacteriological examination.

5. Identify how to support countries to procure X-rays. The area coordinator has been trying to establish a close collaboration with the few companies in the market. One of these companies will give a presentation in the expert meeting to be held in WHO-HQ in January.

**Methods for epidemiological estimates**

The Task Force acknowledged that there was major progress in this area of work catalyzed by the meeting in The Hague, and recognized the time pressure to meet the deadline for the Global Burden of Disease Project. The Task Force recommended the prompt schedule of the missions to the four suggested countries and to continue the review of the key assumptions used in the estimation process. A mission to review the surveillance and recent survey data from the Philippines was performed in December 2008, but the missions to the other three recommended countries - Vietnam, Russia and Ethiopia - are still to be scheduled. There was a general agreement that the update of the methodology of the estimates should be done with extensive country consultations and regional workshops aimed at building capacity and consensus.

**Objective 2: To review the draft WHO Policy Paper "Measuring progress in global TB control: WHO policy and recommendations"**

Katherine Floyd (WHO-HQ, STB/TME) presented an overview of the WHO Policy Paper "Measuring progress in global TB control: WHO policy and recommendations" (advance copies of which were distributed to Task Force members prior to the meeting), in which she explained that it was written in response to demands from the countries and regions with the purpose of having in one major reference document a clear, comprehensive statement of WHO policy and recommendations on this topic of strategic importance, and to set clear strategic directions for WHO efforts to support countries to measure progress in TB control to 2015 and beyond.

Prior to the Task Force meeting in September, the WHO Policy Paper had already benefitted from a review of a draft version provided by the WHO's Strategic and Technical Advisory Group on TB (STAG-TB) in June 2008. The STAG-TB had made several recommendations about the design and implementation of disease prevalence surveys which should be addressed in the finalization of the WHO Policy Paper. Some of the more controversial topics were recommended to be further discussed and considered by the Task Force at its meeting. A document had been prepared at WHO-HQ highlighting all of STAG-TB's comments and recommendations. During the Task Force meeting, this document was discussed alongside the WHO Policy Paper.
The policy package that summarizes the major WHO policies and recommendations for measuring TB incidence, prevalence and mortality from 2009 onwards as presented in the WHO Policy Paper is shown in Table 1.

### Table 1. The WHO policy package for measuring TB incidence, prevalence and mortality from 2008 to 2015 and beyond.

| General                                                                 | 1. Improve routine surveillance so notified TB cases record all incident TB cases, VR data record all TB deaths  
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<td></td>
<td>2. Strengthen capacity in M and E</td>
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<td>3. Periodic review and updating of methods used to produce WHO estimates</td>
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| **TB incidence**                                                        | 4. Periodic analysis of reliability and coverage of TB notification data to estimate total number of incident TB cases and trends in TB incidence  
|                                                                          | 5. Standard framework + tool for systematic analysis of TB notification data                                          |
|                                                                          | 6. Certification of TB notification data if analyses using framework/tool show country's notification data close proxy (direct measure) of TB incidence |
|                                                                          | 7. Cross-validate incidence estimates using TB mortality data from VR systems                                          |
| **TB prevalence**                                                       | 8. Disease prevalence surveys in 21 global focus countries, designed + implemented according to WHO guidelines and TF recommendations |
|                                                                          | 9. Indirect estimates of TB prevalence using estimates of TB incidence and duration of TB disease for countries not implementing DP surveys |
| **TB mortality**                                                        | 10. Development/strengthening of VR systems so all TB deaths reliably recorded                                       |
|                                                                          | 11. Sample VR as interim solution where national VR systems not available                                               |
|                                                                          | 12. Indirect estimates based on estimates of TB incidence and case fatality rate for countries without reliable national or sample VR |
| **Impact evaluation**                                                   | 13. Periodic studies to evaluate impact of TB control on TB incidence, prevalence and mortality                        |
|                                                                          | 14. Report on whether 2015 MDG targets are achieved (or not) shortly after 2015                                        |

### Main outcomes, recommendations and actions taken in response:

1. The WHO Policy Paper was strongly supported by the Task Force. There were several specific suggestions for improvement and refinement. The last version of the WHO Policy Paper benefited from such input.
2. STAG-TB recommendations about design and implementation of disease prevalence surveys are mentioned below, together with the final decisions of the Task Force on each of them:
   a) Carry out DST for all diagnosed TB cases
      - Recommendation was included in the policy paper to carry out DST for all TB cases, particularly where no DST data is available and only if diagnosed patients have access to appropriate treatment
   b) Offer HIV testing to all sampled population, suspected TB cases or confirmed cases
      - Issue fully discussed in the last TF meeting in September 2008
      - TF (including participants from HIV and UNAIDS) decided to maintain previous recommendation that HIV testing should in general be offered to confirmed cases and should only be offered to all sample or to all suspected TB cases if this will not compromise the survey participation rate, if funding is available and if HIV cases can be referred for treatment
   c) Why TB prev. surveys cannot be included in other surveys (e.g. DHS)?
      - Insufficient sample size of typical DHS to measure TB disease prev. This and other reasons included in the policy paper
   d) Which data on other diseases or risk factors could/should also be collected?
Recommendation to collect data on health-seeking behaviour included in the policy paper
Optional to collect data on risk factors (e.g. socio-economic factors)

e) Why children and extrapulmonary cases are not part of the survey sample?
Alternative ways?

More efficient ways to assess the burden of TB in children and extrapulmonary TB proposed in the policy paper

The Task Force recommended that a fact sheet summarizing its aims and work of should be prepared to be used in the STOP-TB partnership Coordinating Board that was held in Tanzania in November of 2008. The fact sheet that was distributed to the participants of the meeting in Tanzania is presented in annex 2.

An articles for the International Journal of Tuberculosis and Lung Disease should be prepared to communicate main policies and recommendations. The preparation of this article will be made easier once the WHO Policy Paper is finalized.

Objective 3. Development of a standardized approach to assessing the reliability and coverage of TB notification data

Philippe Glaziou (WHO-HQ, STB/TME), with help from Mehran Hosseini (WHO-HQ, STB/TME), presented a draft of a framework to be used in the assessment of the reliability and coverage of the TB notification data, and its various objectives which are: to improve the direct measurement of incidence (its absolute value and trends) and to certify the quality of TB data at country level, to build consensus around the estimates, to build national capacity in monitoring and evaluation, and as a means to identify where and how the TB routine notification systems need to be strengthened. As depicted in Figure 1, this approach consists of three main components: 1) The first component is an assessment of the completeness of reporting after the removal of improper duplications and misclassifications. It also includes an analysis of the spatial and temporal variability of case notification data and of if data are consistent with the current knowledge of the TB epidemiological patterns. 2) The second component refers to an analysis of the trends in notification data and how much they relate to the trends in TB incidence and the programmatic efforts performed by the NTPs (e.g. the case finding efforts). 3) The third component refers to further studies that are necessary to check whether all TB cases are captured by the notification system, or whether there are missing cases in any of the various layers of the so called "onion model".

Figure 1: Standard framework for better measurement of TB incidence using surveillance data.
Amal Bassili (WHO-EMRO) presented an overview of the methods, main findings and lessons learned from recent studies in five countries of the Eastern Mediterranean region. These studies aimed at assessing the coverage of TB notification data by investigating the number of TB cases being diagnosed but not notified by non-NTP providers, using record-linkage procedures and capture-recapture analysis. Rhida Jebeniani (WHO-Djibouti) and Said Guelle (NTP-Djibouti) complemented the presentation of this topic by providing further details about the study done in Djibouti.

Ana Bierrenbach (WHO-HQ, STB/TME) presented an example from Brazil of how TB incidence can be assessed by comparing TB notification data with vital registration data, using record linkage procedures and survival analysis.

Ibrahim Abubakar (Health Protection Agency in UK) presented a review of the capture-recapture methodology, giving particular attention to its limitations and how to overcome them.

Nibretie Gobezie (The Global Fund) presented the current initiatives at the Global Fund for assessing national M & E/Surveillance systems and data, including case studies and their provisional findings. Suman Jain (The Global Fund) presented a very useful slide in which for each of the strategic areas of work of the Task Force she showed the corresponding work which is been done or planned by the Global Fund (Table 2).

Table 2. Collaboration areas between the Task Force and the Global Fund.

<table>
<thead>
<tr>
<th>Task Force recommendations</th>
<th>Areas of collaboration</th>
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<tr>
<td>Measuring TB incidence</td>
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<tr>
<td>Strengthening routine TB surveillance</td>
<td>GF recommends 5-10% of grant for M&amp;E</td>
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<td>Measuring TB mortality</td>
<td>Funding Vital Registration systems in countries (HSS)</td>
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<tr>
<td>Evaluating impact of TB control</td>
<td>Building analytical capacity Key performance indicator for GF</td>
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</table>

Eleanor Gouws (UNAIDS/WHO Working Group on Global HIV & STI surveillance) presented the UNAIDS approach to estimating HIV incidence, prevalence and mortality and its potential relevance to TB. Similar to the work of the Task Force, their methodology is based on recommendations of the UNAIDS Reference Group on Estimates, Modeling and Projections, and incorporates the latest research findings which are implemented in a couple of in-house developed softwares. Many partners participate in the estimation process, which is done in close collaboration with the countries in training and consensus-building biannual workshops in 12 different regions across the world.
The Task Force was then separated into small groups that discussed and provided recommendations on different components of the proposed framework/plan and related methods for a standardized approach to direct and indirect measurement of TB incidence.

Main discussions, outcomes, recommendations and actions taken in response:

The framework was strongly supported by the Task Force. Above all, the Task Force recommended that the framework/tool should be further refined and tested according to a proposed timeline and that the secretariat should set targets for a number of countries with different patterns of TB/HIV epidemiology, case detection rates and overall quality of notification data to use the framework and be certified by set dates. There was also a suggestion that the set of proposed analysis that embodies the framework should be accompanied by a manual to facilitate its use by the countries. The UNAIDS approach to build consensus around the HIV/AIDS burden estimates via extensive consultation with countries and partners should be paralleled in the WHO TB department.

Data from the workshop in Costa Rica is already available for a desk analysis using the framework. Davide Manissero (ECDC) suggested the use of the disaggregated data from European countries available at ECDC and WHO-EURO, and mentioned that his institution would be keen to help in the analysis and interpretation of such data. The next opportunity to field-test the framework together with representatives from a range of countries is the workshop with priority countries in the European region which is planned for April of 2009.

There were several discussions about the indicators and analytical procedures to be used in each of the three components of the framework. The Task Force recommended that there should be a general core of analytical procedures to be used in all countries, but that it will also be necessary to tailor the data collection and analysis depending on the patterns of TB/HIV epidemiology and overall quality of notification data of the countries. The importance of issues like TB outbreaks, TB in prisons and immigration should be considered for countries with a low TB incidence. TB disease and infection screening practices and patterns of drug resistance are particularly relevant for some countries in the Eastern European region, while the influence of HIV/AIDS is most significant in Africa.

The framework intends to analyse and, as a final point, to certify the TB data of the countries. The intention is not to certify the overall surveillance system, although it is clear that information about the performance of surveillance system will be used in the analysis. What is unclear at this stage is whether a case-based system is needed for certification. This and other benchmarks should be further refined in a broad consultation process with countries and stakeholders. The term "certification" or "self-certification" or another acceptable synonym should be considered particularly when dealing with low incidence countries. The lists of data to be collected from the countries, the analytical procedures to build the indicators and the benchmarks to be used in the certification process will be reviewed and sent back to the full Task Force after the next regional workshop in Berlin.

The Task Force considered that capture-recapture studies do have an important role in estimating the number of cases that are missing from the TB notification system. These and other operational researches to be used to estimate the fraction of cases that are missing from the official notification data should be broadly promoted to the National TB authorities and research institutions, and the Policy Paper is certainly one of the means to achieve that. However, there was agreement that the Task Force should be cautious while recommending the implementation of capture-recapture studies, as they should only be carried out if certain conditions apply. These conditions include:

- data from at least three sources should be collected over a sufficiently long period, each capturing a significant proportion of cases;
the data sources should be fairly independent of one another, but there should be partial overlapping (but not complete);
the total number of cases on all sources together should be big enough (at least 400);
there must be a reliable means of identifying cases across sources, and
there is strong need for technical assistance given the complexities of the record linkage procedures and of the models.

It was agreed that the analysis of the data from the five studies in EMR would be redone by the team of researchers from the Health Protection Agency in the UK led by Dr. Abubakar. The new analysis was carried out at the end of 2008 using sophisticated procedures that allowed for adjustments for dependencies among the sources of data.

There were discussion on whether the vital registration study as performed in Brazil, which aimed at revising the estimate for TB incidence, would be suited for other countries. It was pondered that similar studies would only be suited for countries in which both the TB notification and the death registration are case-based and the latter was perceived as having a better coverage than the former. However, the Task Force acknowledge that, rather than being used to indirectly estimate TB incidence, there are several other important uses for the cross-referencing of VR and TB notification systems, and that such uses should be highlighted in the WHO Policy Paper. These are:
• reduce the proportion of TB cases for whom no outcome data is available;
• check the validity of the mortality data held in the TB notification system;
• check the diagnosis of the cause of death that is stated in the VR system;
• identify how many TB deaths occurred without medical care being accessed (diagnosis of TB done close to or after death);
• identify how many TB cases died without being notified.

Following the recommendation of the Task Force that the methods and findings of the studies presented in the meeting should be made available to a broader audience, scientific papers are being prepared, and three boxes summarizing recent studies (Brazil, Egypt and Kenya) will be part of the 2008 Global TB report (Annexes 5.1, 5.2 and 5.3).

Objective 4: To discuss what is needed to improve current estimates of the epidemiological burden of HIV-related TB and MDR-TB

In this session, the objective was to reach agreement on what needs to be done to produce better estimates of the epidemiological burden of HIV-related TB and MDR-TB using surveillance and survey data, and how and over what time period this can be done.

Brian Williams (WHO-HQ, STB/TME) explained how the estimates of TB incidence and mortality among HIV+ people are currently made, and what data are needed to improve them. The estimates are based on the latest global estimates of HIV prevalence among the general population (all ages) published by UNAIDS alongside with estimates for the prevalence of HIV in TB patients. Direct measurements of the prevalence of HIV in TB patients are lately becoming available from a much larger number of countries, and such new data has been steadily incorporated to revise current and previous estimates of the numbers of cases and deaths. Direct measurement of the incidence of TB in HIV-positive people directly and whether they are or not on anti-retroviral treatment (ARV) is also needed in order to get much better estimates not just for TB incidence and mortality in HIV-positive people, but also of the impact of control by monitoring TB in HIV-negative people.

Mateo Zignol (WHO-HQ, STB/THD) explained how the estimates of the number of MDR-TB cases and deaths are currently made, and what is needed to improve them. He also briefed the Task Force on the outcomes of the meeting on drug resistance which had been carried out on the week before the Task Force meeting.
Main discussions, outcomes, recommendations and actions taken in response:

During the discussions that followed Brian Williams' presentation, the example of the study done in Kenya in 2006 was pointed out. In this country, the availability of data on trends in HIV-positive and HIV-negative TB notifications and on trends in case-finding efforts made it possible to revise the current estimate of TB incidence and its trend over time (annex 5). The Task Force recommended that similar studies should be tested out in other countries with high HIV prevalence for which such type of data is likely to be available, such as Tanzania, Malawi and Rwanda.

The need for better collaboration and sharing of data between TB and HIV programmes at all levels was strongly commented together with the need to keep the WHO TB/HIV working group fully informed of the changes in the estimates and in the methodology to estimate TB incidence and mortality among HIV+ people, as new and better data on HIV testing among TB patients, TB incidence in those with ARV and screening for TB in those with HIV are incorporated in the process.

The Task Force supported the outcomes of the Expert Group meeting of September 15-16. One of the recommendations coming from this meeting that received strong support was the need to carry out routine testing for previously treated TB cases. It was proposed to include the use of routine drug sensitivity testing in the framework and the certification process. As for the estimates of TB incidence, prevalence and mortality, the Task Force felt that there is a strong need for the countries to buy-in to the MDR estimates, which should be done via country consultations and regional workshops.

Objective 5: To give each of the three Task Force subgroups an opportunity to discuss their plan of work for the next 6 to 12 months and to share this with the full Task Force

Clear plan for each of the Task Force's major strategic tracks of work for the next 6-12 months

The workplan:

1. Population-based surveys on the prevalence of TB disease
   - 10/21 global focus countries due to implement surveys in 2009/2010 trained and developing or have developed protocols
   - Meeting to review 7 protocols scheduled for last week January/2009 and to progress on mapping technical assistance, identify funding gaps and priorities
   - Letters to countries to build in political commitment
   - Close collaboration r.e. funding with Global Fund

2. Strengthening national surveillance of TB cases and deaths
   - Further development of prototype tool for systematic assessment of the reliability and completeness of TB notification data
   - Field-test tool in a range of countries (e.g. workshop for European "regional priority" countries April 2009)

3. Review and revision of TB estimates based on a periodic assessment and updating of the data, assumptions and analytical methods
   - Reviews of key assumptions underway
   - Some methodological reviews already incorporated into 2008 WHO TB estimates
   - 1 mission to the Philippines to review estimates based on assessment surveillance and new survey data
   - 3 more country missions planned
   - Country consultations and workshops to build capacity and consensus
Annex 1

WHO Global Task Force on TB Impact Measurement
3rd meeting, 23–25 September 2008, Geneva

Main theme: Measuring TB incidence using routine surveillance data

AGENDA

Objectives

1. To review progress made by the Task Force since December 2007, both overall and for each of the three major strategic tracks of work

2. To review the draft WHO Policy Paper "Measuring progress in global TB control: WHO policy and recommendations", with particular attention to (i) the advice and recommendations provided by WHO's Strategic and Technical Advisory Group for Tuberculosis (STAG-TB) and (ii) the recommendations for measurement of TB incidence using routine surveillance data

3. To discuss how to improve the direct and indirect measurement of TB incidence (its absolute value and trends), focusing on the development and implementation of a standardized approach to assessing the reliability and coverage of TB notification data that could be applied as part of a certification process and which would also help to strengthen national capacity in monitoring and evaluation

4. To discuss what is needed to improve current estimates of the epidemiological burden of HIV-related TB and MDR-TB

5. To give each of the three Task Force subgroups an opportunity to discuss their plan of work for the next 6 to 12 months and to share this with the full Task Force

Expected Outcomes

1. The Task Force is fully informed about progress made during 2008 and has provided input to help address current challenges and define key next steps

2. The draft WHO Policy Paper has benefited from a thorough review by the Task Force and can be finalized by end October 2008

3. Considerable progress in defining a standardized and rigorous approach to the direct and indirect measurement of TB incidence (its absolute value and trend), which could be used as part of a certification process and that would help to strengthen national capacity in monitoring and evaluation, combined with a plan for how this approach should be implemented

4. Agreement on what needs to be done to produce better estimates of the epidemiological burden of HIV-related TB and MDR-TB using surveillance and survey data, and how and over what time period this can be done

5. Clear plan for each of the Task Force's major strategic tracks of work for the next 6-12 months
Day 1

*Numbers after topics refer to relevant section of meeting folder*

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**Objective 1: To review progress made by the Task Force since December 2007, both overall and for each of the three major strategic tracks of work**

| 09:45 - 10:30         | Presentation: Overview of Task Force progress: main achievements, challenges, current priorities and next steps (2, 3) | A Bierrenbach (WHO) |
|                       | Discussion                                     |                     |
| 10:30 - 10:45         | **Break**                                      |                     |
| 10:45 - 12:00         | Presentation: Progress in implementation of disease prevalence surveys in the 21 global focus countries: main achievements, key issues/challenges, current priorities and next steps (2) | I Onozaki (WHO) |
|                       | Discussion                                     |                     |
| 12:00 - 13:00         | Presentation: Progress in review and revision of data and analytical methods used to produce estimates of incidence, prevalence and mortality from 1990 to 2015: main achievements, key issues/challenges, current priorities, and next steps (2) | M van der Werf (KNCV) |
|                       | Discussion                                     | B Williams (WHO)   |

**13.00 - 14.00 Lunch**

**Objective 2: To review the draft WHO Policy Paper "Measuring progress in global TB control: WHO policy and recommendations", with particular attention to (i) the advice and recommendations provided by WHO's Strategic and Technical Advisory Group for Tuberculosis (STAG-TB) and (ii) the recommendations for measurement of TB incidence using routine surveillance data**

| 14:00 - 15:30         | Presentation: Overview of WHO Policy Paper with particular attention to (i) advice and recommendations provided by STAG and (ii) recommended methods for measuring TB incidence (4, 5) | K Floyd (WHO) |
|                       | Discussion                                     |                     |
| 15.30 - 15.45         | **Break**                                      |                     |

**Objective 3: To discuss how to improve the direct and indirect measurement of TB incidence (its absolute value and trends), focusing on the development and implementation of a standardized approach to assessing the reliability and coverage of TB notification data that could be applied as part of a certification process and which would also help to strengthen national capacity in monitoring and evaluation**
### 15:45 - 17:30

**Presentation:** Improving the direct and indirect measurement of TB incidence while building national capacity in monitoring and evaluation: a proposed conceptual framework and implementation plan (4)

Framework to be presented is a standardized approach to assessing the reliability and coverage of TB notification data that would a) lead to a better assessment of incidence and its trend and consensus around estimates b) form the basis for certification of TB notification data in some countries c) identify how surveillance systems need to be strengthened d) build national capacity in M and E. How the framework could be applied in practice will be illustrated with data from a variety of countries.

**Discussion**

| 15:45 - 17:30 | P Glaziou  
M Hosseini | All |

### Day 2

**Numbers after topics refer to relevant section of meeting folder**

#### Wednesday 24 September

**Objective 3 (continued):** To discuss how to improve the direct and indirect measurement of TB incidence (its absolute value and trends), focusing on the development and implementation of a standardized approach to assessing the reliability and coverage of TB notification data that could be applied as part of a certification process and which would also help to strengthen national capacity in monitoring and evaluation

| 09:00 - 09:10 | Summary of main discussion/outcomes from Day 1 | J Broekmans |
| 09:10 - 09:20 | Presentation: A brief reminder about the conceptual framework and plan proposed for a standardized and rigorous approach to the direct and indirect measurement of TB incidence (4) | P Glaziou |
| 09:20 - 10:00 | Presentation: Assessing the coverage of TB notification data by investigating the number of TB cases being diagnosed but not notified by non-NTP providers: an overview of methods, main findings and lessons learned from recent studies in five countries in the Eastern Mediterranean region (6) | A Bassili |
| 09:40 - 10:00 | Presentation: Main findings and lessons learned from a study of the number of TB cases being diagnosed but not notified by non-NTP providers in Djibouti (6) | R J ebeniani  
S Guelle |
<p>| 10:00 - 10:30 | Discussion of studies from the Eastern Mediterranean | All |
| 10.30 - 10.45 | Break |  |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Presenter/Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:45 - 11:05</td>
<td>Presentation: Assessing TB incidence by comparing TB notification data with vital registration data: an example from Brazil</td>
<td>A Bierrenbach All</td>
</tr>
<tr>
<td>11:05 - 11:30</td>
<td>Presentation: Assessing the coverage of TB notification data using capture-recapture methods: an example from the UK (9)</td>
<td>I Abubakar</td>
</tr>
<tr>
<td>11:30 - 12:00</td>
<td>Discussion of VR and capture/recapture studies</td>
<td>All</td>
</tr>
<tr>
<td>12:00 - 13:00</td>
<td>Presentation: Assessing national M &amp; E/Surveillance systems and data: current initiatives at the Global Fund including case studies/provisional findings Discussion</td>
<td>N Gobezie</td>
</tr>
<tr>
<td>13:00 - 14:00</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>14:00 - 14:45</td>
<td>Presentation: The UNAIDS approach to estimating HIV incidence, prevalence and mortality and its potential relevance to TB (7) Discussion</td>
<td>Eleanor Gouws UNAIDS</td>
</tr>
<tr>
<td>14:45 - 15:30</td>
<td>Group work: Several groups of 4-5 people will be defined. Groups will discuss and provide recommendations on different components of the proposed framework/plan and related methods for a standardized approach to direct and indirect measurement of TB incidence (8)</td>
<td>All</td>
</tr>
<tr>
<td>15:45 - 16:00</td>
<td>Break</td>
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<tr>
<td>16:00 - 17:45</td>
<td>Group work (continued)</td>
<td>All</td>
</tr>
</tbody>
</table>
Day 3

Numbers after topics refer to relevant section of meeting folder

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 - 10:15</td>
<td>Feedback from groups in plenary</td>
<td>All</td>
</tr>
<tr>
<td>10:15 - 10:30</td>
<td>Summary of discussions/outcomes of Day 2</td>
<td>J Broekmans</td>
</tr>
<tr>
<td>10:30 - 10:45</td>
<td>Coffee break</td>
<td></td>
</tr>
</tbody>
</table>

**Objective 4: To discuss what is needed to improve current estimates of the epidemiological burden of HIV-related TB and MDR-TB**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:45 - 12:00</td>
<td>Presentation: How are estimates of TB incidence and mortality among HIV+ people currently made, and what data are needed to improve these estimates? (9) Discussion</td>
<td>B Williams</td>
</tr>
<tr>
<td>12:00 - 13:00</td>
<td>Presentation: How are estimates of the number of MDR-TB cases and deaths currently made, and what is needed to improve these estimates? (will include briefing from the meeting on DRS held the previous week) (9) Discussion</td>
<td>M Zignol</td>
</tr>
<tr>
<td>13.00 - 14.00</td>
<td>Lunch</td>
<td></td>
</tr>
</tbody>
</table>

**Objective 5: To give each of the three Task Force subgroups an opportunity to discuss their plan of work for the next 6 to 12 months, taking into account input provided earlier in the meeting, and to share this with the full Task Force**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00 - 15:00</td>
<td>Separate meetings of the three groups of the Task Force: prevalence surveys, routine surveillance, methods for producing estimates from 1990 to 2015</td>
<td>All in three separate groups</td>
</tr>
<tr>
<td>15:00 - 15:30</td>
<td>Report back from the leaders of each of the three subgroups, highlighting priorities and related work to be done during the next 6 months to 1 year</td>
<td>I Onozaki, M van der Werf/P Glaziou, A Bierrenbach</td>
</tr>
<tr>
<td>15:30 - 15.45</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>15:45 - 16:30</td>
<td>Meeting outcomes and concluding remarks</td>
<td>J Broekmans (Chair), K Floyd (WHO)</td>
</tr>
</tbody>
</table>
Annex 2

Measuring Progress Towards the Millennium Development Goals: Third Meeting of the WHO TB Measurement Task Force
Geneva, 23 to 25 September 2008

LIST OF PARTICIPANTS

Chair

Dr Jaap Broekmans, The Hague, Netherlands, former Executive Director, KNCV and former Chair, WHO Strategic and Technical Advisory Group on TB (STAG-TB)

National Institutes and Departments/Ministries of Health

Dr Daniel Chemtob, Department of Tuberculosis and AIDS, Public Health Services, Ministry of Health, Jerusalem, Israel

Dr Amal Galal, National Tuberculosis Programme, Cairo, Egypt

Dr P. G. Gopi, formerly of the Tuberculosis Research Centre, Chennai, India

Dr Said Guelleh, National TB and Leprosy Programme, Ministry of Health, Djibouti

Dr Eluid Wandwalo, National TB and Leprosy Programme, Ministry of Health and Social Welfare, Dar es Salaam, United Republic of Tanzania
Technical Agencies

Dr Ibrahim Abubakar, Communicable Disease Surveillance Centre, Health Protection Agency, London, United Kingdom

Dr Ted Cohen, Harvard School of Public Health, Boston, USA

Dr Chen-Yuang Chiang, Tuberculosis and Lung Disease (The Union), Taipei, Taiwan

Dr Vahur Hollo, European Centre for Disease Prevention and Control (ECDC), Stockholm, Sweden

Dr Davide Manissero, Unit of Scientific Advice, European Centre for Disease Prevention and Control (ECDC), Stockholm, Sweden

Dr Eugene McCray, Division of Tuberculosis Elimination, US Centers for Disease Control and Prevention, Atlanta, USA

Dr Marieke van der Werf, KNCV Tuberculosis Foundation, The Hague, Netherlands

Dr Norio Yamada, Research Institute of Tuberculosis, JATA, Tokyo, Japan

Funding Agencies

Dr Nibretie Gobezie, The Global Fund, Vernier, Switzerland

Dr Suman Jain, The Global Fund, Vernier, Switzerland

Dr Ryuich Komatsu, The Global Fund, Vernier, Switzerland

Ms Eline Korenromp, The Global Fund, Vernier, Switzerland

UNAIDS

Dr Eleanor Gouws, Evidence Monitoring & Policy Department (AI/EMP), Geneva, Switzerland

WHO Regional and Country Offices

Dr Amal Bassili, WHO Regional Office for the Eastern Mediterranean, Cairo, Egypt

Dr Andrei Dadu, WHO Regional Office for Europe, Copenhagen, Denmark

Dr Aime de Muynck, WHO Regional Office for South-East Asia, New Delhi, India

Dr Rhida Jebeniani, WHO Country Office, Djibouti

Dr Philip Patrobas, Office of the WHO Representative to Nigeria, Abuja, Nigeria
Dr Akihiro Seita, WHO Regional Office for the Eastern Mediterranean, Cairo, Egypt

**WHO Stop TB Department**

Dr Ana Luiza Bierrenbach, STB/TME

Dr Katherine Floyd, STB/TME

Dr Philippe Glaziou, STB/TME

Dr Christian Gunneberg, STB/THD

Dr Mehran Hosseini, STB/TME

Dr Ikushi Onozaki, STB/TBS

Dr Mario Raviglione, Director, STB

Dr Brian Williams, STB/TME

Dr Matteo Zignol, STB/THD

**WHO HIV Department**

Dr Txema Calleja, HIV/SIR

Dr Reuben Granich, HIV/ATC

**Invited but unable to attend**

Dr David Boone, MEASURE Evaluation, John Snow Inc., Arlington, V.A., USA

Dr V.K. Chadha, Directorate General of Health Services, Bangalore, India (not confirmed)

Dr Charlotte Colvin, PATH, Washington, D.C., USA

Dr Christy Hanson, USAID, Washington, D.C., USA

Dr Thabang Mosala, National TB Control and Leprosy Programme, Department of Health, Pretoria, South Africa

Dr Hans Rieder, The Union, Kirchlindach, Switzerland

Mr Joel Spicer, AFTH, World Bank

Ms Nathalie Zorzi, The Global Fund, Vernier, Switzerland
**Annex 3: Summary of progress in implementation of prevalence surveys, 21 global focus countries, as of January 2009**

### A. AFRICA: Group 1 (no country has a baseline survey between 1990 and 2008; surveys need to be implemented AS SOON AS POSSIBLE)

<table>
<thead>
<tr>
<th>Country</th>
<th>Start year of survey (planned)</th>
<th>Protocol developed?</th>
<th>Funding available?</th>
<th>Funding gap (US$ millions)</th>
<th>Technical assistance partner(s)</th>
<th>Funding for technical assistance? (Y, P, N)*</th>
<th>Next steps required</th>
</tr>
</thead>
</table>
| Tanzania | 2008                           | Y                   | P                 | ?                         | KNCV                          | Y                                           | (i) start pilot survey (Nov 08)  
(ii) mobilize funds for second half of survey (funding to be requested from USAID)  
(iii) finalize protocol based on pilot and WHO guidelines |
| Mali    | 2009                           | Y (draft)           | N                 | US$ 2 million             | KNCV                          | N                                           | (i) finalize protocol by Jan 09  
(ii) mobilize funds - applying in GF Rd 9  
(iii) need laboratory-related TA |
| Nigeria | 2009                           | Y (draft)           | P                 | US$ 2.2 million           | CDC TBCAP?                    | P (CDC) TBCAP?                              | (i) finalize protocol by Jan 09  
(ii) close funding gap e.g. via a) reprogramming existing GF grant or b) new GF proposal (but Rd 8 application Category C) or c)USAID- TBCAP |
| Malawi | 2009                           | Y (draft)           | P                 | US$ 1 million             |                               | N                                           | (i) finalize protocol by Jan 09  
(ii) identify national partner agency and external TA partner  
(iii) sign GF Rd 7 grant  
(iv) close funding gap - request made to government |
| Uganda | 2009                           | Y (draft)           | P                 | US$ 1.2 million           | FIND for lab?                 | $46,300 from GF                             | (i) finalize protocol by Jan 09  
(ii) identify national partner agency and TA |
<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Approval</th>
<th>Protocol Finalization</th>
<th>Funding Source</th>
<th>Partner(s)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghana</td>
<td>2010</td>
<td>Y (draft)</td>
<td>(iii) close funding gap e.g. via reprogramming GF Rd 6 and/or USAID/TBCAP or GF Rd 9</td>
<td>US$ 2.6 million</td>
<td>Noguchi Institute</td>
<td>N</td>
</tr>
<tr>
<td>Kenya</td>
<td>2010</td>
<td>Y (draft)</td>
<td>(iii) mobilize funds via GF Rd 9</td>
<td>US$ 2.5 million</td>
<td>KNCV, CDC, KEMRI</td>
<td>P</td>
</tr>
<tr>
<td>Rwanda</td>
<td>2010</td>
<td>Y (draft)</td>
<td>(iii) mobilize funds e.g. via GF Rd 9, TBCAP</td>
<td>US$ 1.5 million</td>
<td>University of Rwanda, CDC?</td>
<td>N</td>
</tr>
<tr>
<td>South Africa</td>
<td>2010</td>
<td>N (Re-planning)</td>
<td>(ii) mobilize funds - applying in GF Rd 9</td>
<td>US$ 2.5 million</td>
<td>KNCV WHO</td>
<td>N</td>
</tr>
<tr>
<td>Zambia</td>
<td>2010</td>
<td>Y (draft)</td>
<td>(i) finalise protocol Nov 08</td>
<td>US$ 1.2 million</td>
<td>CDC, RIT?, ZAMBAR T</td>
<td>P</td>
</tr>
</tbody>
</table>

African countries in list of 21 global focus countries that do not yet have a plan to implement a survey

- Sierra Leone: Not applicable at this time
- Mozambique: Not applicable at this time

*external technical assistance estimated to cost about US$ 200,000 per survey, over a two-year period from survey design to dissemination of results.
B. ASIA: Group 2 (countries that have conducted surveys between around 1990 and 2008 and therefore have experience of survey implementation)

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of previous surveys</th>
<th>Start year of survey (planned)</th>
<th>Protocol developed?</th>
<th>Funding available? (Y, P, N)</th>
<th>Funding gap (US$ millions)</th>
<th>Technical assistance partner(s)</th>
<th>Funding for technical assistance? (Y, P, N)</th>
<th>Next steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>2008 (being filled by USAID and JICA)</td>
<td>2008 (on going) Y</td>
<td>Y (USAID)</td>
<td>None</td>
<td>ICDDR KNCV</td>
<td>Y</td>
<td>(i) complete survey (ii) analyse data (iii) finalize results (iv) disseminate findings</td>
<td></td>
</tr>
<tr>
<td>Myanmar</td>
<td>1994 (but TBCAP)</td>
<td>April 2009 Y (Submitted to donors)</td>
<td>Y (US$350,000, from BMGF)</td>
<td>US$ 300,000 (being filled by USAID and JICA)</td>
<td>RIT WHO (PSI)</td>
<td>Y (USAID, JICA, RIT)</td>
<td>(i) procurement (ii) training and final preparation (iii) start survey</td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td>1987 (but TBCAP)</td>
<td>2009 Y</td>
<td>Y (TBCAP)</td>
<td>None</td>
<td>TBCAP (several partners)</td>
<td>Y</td>
<td>(i) finalize protocol</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>2006 (draft)</td>
<td>2011 (draft) Y (GF Rd 8 category)</td>
<td>None</td>
<td>RIT CDC</td>
<td>Y</td>
<td>(i) pilot survey in capital and large cities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>Year Range</td>
<td>Year Range 2009-2011</td>
<td>Protocol Stage</td>
<td>Funding</td>
<td>Implementing Body</td>
<td>Other Actions</td>
<td></td>
<td></td>
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<td>------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>2002</td>
<td>2010/2011</td>
<td>Early 2009, RIT/JICA</td>
<td>P (US$250,000 from GF Rd 5)</td>
<td>US$ 350,000 RIT WHO</td>
<td>RIT, official request to JICA (i) mobilize necessary funds (ii) start procurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>1990 and 2000</td>
<td>2010</td>
<td>Y (national budget: almost secured)</td>
<td>None</td>
<td>WHO</td>
<td>probably (i) develop protocol</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Countries where next survey will not be for at least 5 years**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year Range</th>
<th>Finalization Status</th>
<th>Other Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>2004</td>
<td>2014? (Not applicable at this time)</td>
<td></td>
</tr>
<tr>
<td>Viet Nam</td>
<td>2007</td>
<td>?</td>
<td>(i) Finalization of results including approval by MOH, and dissemination of findings</td>
</tr>
<tr>
<td>Philippines</td>
<td>1997 and 2007</td>
<td>?</td>
<td>(i) disseminate final results (ii) analyse socio-econ. data collected in survey</td>
</tr>
</tbody>
</table>

**Countries other than 21 focused countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Status</th>
<th>Funding</th>
<th>Implementing Body</th>
<th>Other Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laos</td>
<td>2009</td>
<td>Drafted</td>
<td>Y</td>
<td>?</td>
<td>WPRO Korea</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Dec 2009</td>
<td>Drafting</td>
<td>Y US$ 1.7 million (GF ATM, others)</td>
<td>None</td>
<td>WHO, Italian coop., USAID Discussing with donors (i) decide PI and coordinate with Labs (ii) finalize protocol</td>
</tr>
<tr>
<td>Togo</td>
<td>Rough Draft</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liberia</td>
<td>Request of TA for initial preparation</td>
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THE GLOBAL TASK FORCE ON TB IMPACT MEASUREMENT

- Achieving the 2015 TB-related Millennium Development Goals and the Stop TB Partnership targets for reduction of incidence, prevalence and mortality is a global priority.
- The global targets are to halt and reverse incidence by 2015, and to halve prevalence and death rates compared to a baseline of 1990.
- The Global Task Force on TB Impact Measurement aims to accurately evaluate whether the epidemiological burden of TB is being reduced in line with these targets.
- It aims to assess how much progress is a result of specific action by national TB control programmes and international partners.
- Increased global and national financial investment in TB control requires rigorous measurement of impact.

The challenge:
- Most countries currently have weak reporting systems for TB cases and deaths, making it difficult to measure the quality and impact of TB control.
- Accurate assessments of the quality of the available data, and improvements to weak national surveillance systems, are essential.
- Both improving surveillance systems and carrying out surveys where surveillance is weak require substantial investment in time and financial resources.

WHO’s Role: WHO is responsible for reporting progress in TB control against global targets using robust methods. WHO is convening the Global Task Force on TB Impact Measurement, with WHO officers working alongside countries and partners.

Milestones 2007:
- Publication of a consensus protocol on assessing the prevalence of TB disease through population-based surveys
- Identification of technical agencies to support survey design and survey implementation (ongoing)
2008:
- Publication of a WHO policy paper with detailed recommendations on TB impact measurement
- Publication of a review article in January edition of Lancet Infectious Diseases
- Development of a conceptual framework for assessment and possible certification of surveillance data at country level (ongoing)
- Publication of a series on methodological issues concerning the design and implementation of prevalence surveys in the International Journal of Tuberculosis and Lung Disease (ongoing)
- Two prevalence survey protocol workshops to assist 10 of the 21 global focus countries (ongoing)
2009:
- Availability of revised estimates based on updated methodology and improved data
THE GLOBAL TASK FORCE ON TB IMPACT MEASUREMENT

Creation of a Coalition of Partners:
The Task Force aims to create a ‘Coalition of Partners’, through the Stop TB Partnership, to ensure that the necessary political and financial support is provided to facilitate its work. A current major bottleneck is funding for technical assistance to the 21 global focus countries to support the implementation of their surveys.

The in-country implementation costs for each national TB prevalence survey will be between US$ 1 million and US$ 2 million, depending on the sample size and country. Most countries are including budgets for these surveys in their proposals to the Global Fund.

The Workplan:
• **Strengthening national surveillance of TB cases and deaths** through TB notification and vital registration systems. This will include a systematic approach to assessment of the quality and coverage of TB notification data and will lead to surveillance systems being approved or certified (with the first countries certified by 2010) as well as promoting the development of vital registration systems as part of wider efforts to improve health information systems.
• **Population-based surveys on the prevalence of TB disease** implemented in 21 global focus countries (12 in Africa, 4 in South-East Asia, 4 in the Western Pacific, and Pakistan).
• **Review and revision of TB estimates** based on a periodic assessment and updating of the data, assumptions and analytical methods used to translate data into estimates of TB incidence, prevalence and mortality. It will also include evaluation of how TB control influences trends.

**TB PREVALENCE, MORTALITY AND INCIDENCE**

- **Prevalence (latest estimates)**
  - 215 cases per 100,000 population
  - 2015 target: 140
  - 2010 target: 187

- **Mortality (latest estimates)**
  - 25 deaths per 100,000 population
  - 2015 target: 14
  - 2010 target: 20

- **Incidence (latest estimates)**
  - 400 cases per 100,000 population
  - Africa
  - South-East Asia
  - Western Pacific
  - Europe
  - Americas

**Global Task Force on TB Impact measurement Budget: 2008-2010**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global coordination, strategy and technical support</td>
<td>$3.2 million</td>
</tr>
<tr>
<td>Strengthening routine surveillance</td>
<td>$1.8 million</td>
</tr>
<tr>
<td>Prevalence of disease surveys (technical assistance component)</td>
<td>$5 million</td>
</tr>
<tr>
<td>Periodic review / update of data, assumptions, analytical methods</td>
<td>$0.6 million</td>
</tr>
<tr>
<td>Contingency budget</td>
<td>$0.2 million</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$10.8 million</td>
</tr>
</tbody>
</table>
Box 1. Revision of estimates of TB incidence in Kenya following in-depth analysis of surveillance and programmatic data during the period 1996–2006

The incidence of TB in Kenya was indirectly estimated from TB notification data in 1997, as part of a global effort to estimate the global epidemiological burden of TB. The estimate was based on an expert assessment that the percentage of incident smear-positive cases being notified was 57% (i.e. 57% case detection rate). Until 2006, the trend in TB incidence before and after 1997 was assumed to be the same as the trend in TB notifications (of all forms of TB case).

Kenya has experienced a generalized HIV epidemic since the early 1980s and substantial efforts to improve the quality and coverage of TB diagnosis and treatment services were made from 2001 onwards. This made it difficult to disentangle the effect of HIV (which affects TB incidence) from the effect of programme performance on TB notifications, which in turn made it difficult to estimate the trend in TB incidence. Between September 2006 and December 2007, estimates of the absolute value of TB incidence and the trend in TB incidence were jointly reviewed by WHO and the NTP. This was done in the context of new evidence and new analysis. The major new sources of evidence were (i) data on trends in HIV-positive and HIV-negative TB notifications separately (ii) a direct measure of the prevalence of HIV among TB patients (iii) a recent survey of the prevalence of HIV in the general population and (iv) evidence about how programme performance had changed during the period 1996–2006. Both (i) and (ii) became available following the introduction and rapid expansion of provider-initiated HIV testing for TB patients in 2005. Evidence about programme performance during the period 1996–2006 was compiled during 2007. The four principal indicators used were: the number of health units where TB diagnosis was available, the number of health units where TB treatment was available, the number of NTP staff at national, provincial and district level, and NTP funding. For all four of these indicators, there was a clear relationship with trends in TB notifications from 2001 to 2006, while HIV-related data suggested that the epidemic peaked around 2000 and had not caused any increase in TB incidence from 2001 to 2006. In combination, these new data provided strong evidence that the increase in TB notifications after 2001 was due to programmatic improvements (and not increases in TB incidence). This led to a downward revision in the estimate of TB incidence in 2006, an adjustment of the estimated trend in TB incidence, and an upward revision in the estimated case detection rate (to 70%). The original estimate of TB incidence (and case detection) in 1997 was left unchanged.

To allow reliable measurement of trends in TB incidence from 2007 onwards, maintaining high rates of HIV testing for TB patients is essential. This will allow trends in HIV-positive and HIV-negative TB notifications to be separated. Trends in HIV-negative TB notifications can be used to measure changes in case-finding. Comparison of trends in HIV-positive and HIV-negative TB notifications can be used to assess the impact of HIV on TB incidence. Efforts to strengthen routine surveillance, including the introduction of new recording and reporting forms and expanded use of electronic recording and reporting systems, have begun.

Box 2. Revision of estimates of TB incidence using capture-recapture methods: an example from Egypt

The NTP in Egypt compiled evidence that most TB cases have access to health-care services provided by public or private facilities as part of a multi-country operational research project in the Eastern Mediterranean. The number of TB cases experiencing symptoms and seeking care but not being diagnosed is therefore expected to be low. Nonetheless, when patients are diagnosed and treated by providers that are not linked to the NTP, it is unlikely that they are recorded in official notification data. Quantifying the proportion of cases that are diagnosed by non-NTP providers (the extent to which there is under-notification) may therefore allow a more accurate estimate of the total number of cases in the country as well as the proportion that are being detected by the NTP (the case detection rate).

To assess the extent to which cases were being missed in official notification data and in turn to update estimates of TB incidence and the case detection rate, the Ministry of Health in Egypt together with the WHO Office for the Eastern Mediterranean implemented a "capture-recapture" study in 2008. Study registers for listing TB cases were introduced in a nationally representative sample of non-NTP health facilities in the private and public sectors. The list of cases in these registers was then compared with the list of notified cases for the same period. Using capture-recapture log-linear models, the number of cases missed by all sources was estimated by comparing (i) the number of cases observed in each source of data independently with (ii) the number of common cases among all sources (that is, the overlap in cases). Analyses were undertaken for the whole sample and for sputum smear-positive cases only.

Revised estimates of TB incidence in Egypt based on capture-recapture analysis

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</thead>
<tbody>
<tr>
<td></td>
<td>All cases</td>
<td>SS+ cases</td>
<td>All cases</td>
</tr>
<tr>
<td>New TB cases</td>
<td>9459</td>
<td>4887</td>
<td>17517</td>
</tr>
<tr>
<td>Rates (per 100 000 population/year)</td>
<td>13</td>
<td>6.5</td>
<td>24</td>
</tr>
<tr>
<td>Case detection rate (%)</td>
<td>–</td>
<td>–</td>
<td>54</td>
</tr>
</tbody>
</table>

For capture-recapture estimates to be considered valid, certain conditions must be met. In particular, three or more sources of data should be available to allow adjustment for dependencies among the sources of data. This was the case in Egypt: the three available sources were the NTP registry, the study registers of private non-NTP providers and the study registers of public non-NTP providers.

Based on the study results, the case detection rate for smear-positive cases was revised upwards to 72% (from 62%). The case detection rate for all cases was revised upwards to 60% (from 54%). Similar studies in other countries where all (or almost all) cases have access to health services could also help to revise existing TB estimates.
Box 3. Estimating TB incidence using mortality data from a vital registration system: an example from Brazil

WHO estimates of TB incidence are based on notification data, surveys of the annual risk of infection, surveys of the prevalence of TB disease combined with estimates of the average duration of disease, and mortality data from vital registration systems combined with estimates of the case fatality rate. Where several sources of evidence exist, greatest weight is attached to the most reliable data. For most countries, incidence is indirectly estimated from TB case notification data and an expert assessment of the percentage of incident TB cases being notified. When case-finding efforts do not change much over time, trends in TB incidence are often assumed to mirror trends in TB case notification rates (Annex 2). Until 2005, these methods were used to estimate TB incidence and its trend in Brazil.

By 2005, the Ministry of Health of Brazil had greatly improved the TB notification system and the death registration component of the vital registration system. This included extending coverage of both systems throughout the country, validating data and systematically linking records within and between the two databases. Linkage of records within the TB notification database and implementation of procedures to distinguish between new and re-treatment or transfer-in records were used to identify duplicate records. This showed that notifications had been artificially inflated and that the cure rate had been underestimated (see table below). Removal of duplicate records increased the gap between the number of new TB cases notified and the number of new TB cases estimated by WHO, highlighting the need for a review of existing estimates.

<table>
<thead>
<tr>
<th>Duplicates removed</th>
<th>New notified cases before</th>
<th>Notification rate before</th>
<th>Change (%)</th>
<th>Cured (%) before</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 064</td>
<td>81 330</td>
<td>74 113</td>
<td>-9.7</td>
<td>60.5</td>
<td>+6.7</td>
</tr>
</tbody>
</table>

Estimates of TB incidence in Brazil are now based on an analysis of TB deaths recorded in the vital registration system. The case fatality rate was calculated by cross-linking the case-based TB notification database and the mortality database. Incidence in 2005 was then estimated as the number of TB deaths in the mortality database divided by the case fatality rate (estimated as the number of deaths in the mortality database divided by the number of cases in the notification database, with appropriate adjustments for the proportion of records in both systems that could be linked and a minor adjustment for the coverage of TB mortality records). Since the mortality information system was judged by the local authorities to have higher coverage than the TB notification system, and since it is unlikely that the case fatality rate had changed markedly in recent years, the trend in incidence over time was estimated by assuming that the trend in the TB incidence rate was the same as the trend in the TB mortality rate from 2001 to 2005. This suggested that incidence was falling at a rate of 3.3% per year. Incidence in absolute terms for years before 2005 was also based on this trend (see table below).

<table>
<thead>
<tr>
<th>Notifications</th>
<th>Original estimate of incidence</th>
<th>Revised estimate of incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>New TB cases</td>
<td>74 113</td>
<td>111 050</td>
</tr>
<tr>
<td>Incidence or notification rate (per 100 000 population/year)</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Case detection rate</td>
<td>–</td>
<td>69%</td>
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</tbody>
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