Current WHO methods used for the estimation of TB prevalence:
strengths and limitations

Prepared by:
Laura Anderson, Katherine Floyd, Philippe Glaziou, Babis Sismanidis
For TB prevalence, the reference standard data source is a national TB prevalence survey that measures the prevalence of bacteriologically-positive pulmonary TB in adults. In countries with an expected prevalence of less than 100 cases per 100 000 population, a prevalence survey is not practical (due to the large sample sizes required, and associated impact on costs and logistics). In countries without a national TB prevalence survey indirect estimation is used instead. This is generally of limited practical value, since there is considerable uncertainty about output values.

This document summarizes the two methods that are currently used to produce estimates of TB prevalence (see Table 7.1), with a focus on their main strengths and limitations. A more complete description of methods is provided in background document 2b. Web appendix on methods.

The countries for which each method presented in Table 7.1 is used are listed in Table 7.2.
Table 7.1. Current WHO methods used to estimate TB prevalence, and their main strengths and limitations.

<table>
<thead>
<tr>
<th>Method</th>
<th>Brief description of method</th>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| 1. National population-based prevalence surveys | TB prevalence all forms and all ages \( (P) \) is measured as: bacteriologically-confirmed TB prevalence among those aged \( \geq 15 \) measured from national survey \( (p_{adult}) \), adjusted for pulmonary TB in children \( (p_{child}) \) and extra-pulmonary TB all ages \( (p_{ep}) \): \[
p_{putm} = cp_{child} + (1 - c)p_{adult} \tag{1}
\]
\[
p = \frac{p_{putm}}{1 - p_{ep}} \tag{2}
\] | Direct measurement of adult, bacteriologically-confirmed TB prevalence. | Surveys are logistically demanding, therefore suboptimal quality of prevalence survey data (e.g. low participation rate, missing lab results) may result in biases of estimates. Sampling uncertainty (relative precision is typically about 20%), most surveys are not powered to compute subpopulation estimates with precision. Questionable quality of routine surveillance data to inform levels of pulmonary TB in children and extra-pulmonary TB for all ages. |
| 2. Derived from estimated incidence and disease duration | TB prevalence \( (P) \) is calculated as the product of TB incidence \( (I) \) and average disease duration \( (d) \): \[
p = \sum_{i,j=1}^{2} I_{ij} d_{ij}
\] | | Scarce empirical data on disease duration (of note, a typically large proportion of bacteriologically confirmed cases detected during prevalence surveys did not report symptoms suggestive of TB at the time of survey investigations). Disease duration is considered constant within case categories for all settings and over time. |

\( c = \) proportion of children among the total country population; \( d_{ij} = \) TB disease duration, \( i \in \{\text{treated, not treated}\}, j \in \{\text{HIV+, HIV-}\} \); \( I_{ij} = \) TB incidence, \( i \in \{\text{treated, not treated}\}, j \in \{\text{HIV+, HIV-}\} \).
Table 7.2. List of countries for which each method is used (22 High TB Burden Countries with completed, ongoing or planned surveys are shown in green while HBCs not planning a survey are shown in red. All other non-HBC with completed, ongoing or planned surveys are shown in blue).

<table>
<thead>
<tr>
<th>Group</th>
<th>List of countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cambodia, China, Ethiopia, Ghana, Gambia, Indonesia, Republic of Korea, Lao People's Democratic Republic, Myanmar, Nigeria, Pakistan, Philippines, Rwanda, Thailand, Viet Nam (n=15)</td>
</tr>
<tr>
<td>2</td>
<td>Afghanistan, Albania, Algeria, American Samoa, Andorra, Angola, Anguilla, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia (Plurinational State of), Bonaire, Saint Eustatius and Saba, Bosnia and Herzegovina, Botswana, Brazil, British Virgin Islands, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cameroon, Canada, Cayman Islands, Central African Republic, Chad, Chile, China, Hong Kong SAR, China, Macao SAR, Colombia, Comoros, Congo, Cook Islands, Costa Rica, Croatia, Cuba, Curaçao, Cyprus, Czech Republic, Côte d'Ivoire, Democratic People's Republic of Korea, Democratic Republic of the Congo, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Estonia, Fiji, Finland, France, French Polynesia, Gabon, Georgia, Germany, Greece, Greenland, Grenada, Guam, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Iran (Islamic Republic of), Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands, Mauritania, Mauritius, Mexico, Micronesia (Federated States of), Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Nepal, Netherlands, Netherlands Antilles, New Caledonia, New Zealand, Nicaragua, Niger, Niue, Northern Mariana Islands, Norway, Oman, Palau, Panama, Papua New Guinea, Paraguay, Peru, Poland, Portugal, Puerto Rico, Qatar, Republic of Moldova, Romania, Russian Federation, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Serbia &amp; Montenegro, Seychelles, Sierra Leone, Singapore, Sint Maarten (Dutch part), Slovakia, Slovenia, Solomon Islands, Somalia, South Africa, South Sudan, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syrian Arab Republic, Tajikistan, The Former Yugoslav Republic of Macedonia, Timor-Leste, Togo, Tokelau, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Turks and Caicos Islands, Tuvalu, US Virgin Islands, Uganda, Ukraine, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, Uruguay, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic of), Wallis and Futuna Islands, West Bank and Gaza Strip, Yemen, Zambia, Zimbabwe (n=204)</td>
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