

Incidence of tuberculosis

Rationale for use

Incidence (cases arising in a given time period) gives an indication of the burden of tuberculosis (TB) in a population, and of the size of the task faced by a national TB control programme. Incidence can change as the result of changes in transmission (the rate at which people become infected with *M. tuberculosis*, the bacterium which causes TB), or changes in the rate at which people infected with *M. tuberculosis* develop TB disease (e.g. as a result of changes in nutritional status or of HIV infection). Because TB can develop in people who became infected many years previously, the effect of TB control on incidence is less immediate than the effect on prevalence or mortality.

Millennium Development Goal 6, Target 8 is "have halted by 2015 and begun to reverse the incidence of" TB. WHO estimates that in 2004 the per capita incidence of TB was stable or falling in 5 out of 6 WHO regions, but growing globally at 0.6% per year. The exception was the African region, where incidence is apparently still increasing, but less rapidly each year. Implementation of the Stop TB Strategy, following the Global Plan to Stop TB 2006–2015, is expected to reverse the rise in incidence globally by 2015.

Definition

Estimated number of TB cases arising in a given time period (expressed as per capita rate). All forms of TB are included, as are cases in people with HIV.

Associated terms

All forms: pulmonary (smear-positive and smear-negative) and extrapulmonary tuberculosis.

Notification: the process of reporting diagnosed TB cases to WHO; the data collected by this process. (Here we are not referring to the systems in place in some countries to inform national authorities of cases of certain "notifiable" diseases.)

Annual **case notifications** (and other data on programme performance) are collected by WHO via an annual data collection form, distributed to national TB control programmes through WHO's regional and country offices.

Data sources

Estimates are based on annual case notifications (see "Associated terms", above), on special surveys of the prevalence of infection or disease and on information from death (vital) registration systems.

Population estimates: World Population Prospects – the 2004 revision. New York, United Nations Population Division, 2005.

Methods of estimation

Estimates of TB incidence, prevalence and mortality are based on a consultative and analytical process in WHO and are published annually (see reference 5). Estimates of incidence for each country are derived using one or more of four approaches, depending on the available data:

(1) incidence = case notifications / proportion of cases detected

(2) incidence = prevalence / duration of condition

(3) incidence = annual risk of TB infection x Stýblo coefficient

(4) incidence = deaths / proportion of incident cases that die.

The Stýblo coefficient in equation (3) is taken to be a constant, with an empirically derived value in the range 40–60, relating risk of infection (% per year) to the incidence of sputum smear-positive cases (per 100 000 per year). Given two of the quantities in any of these equations, we can calculate the third, and these formulae can be rearranged to estimate incidence, prevalence and death rates. The available data differ from country to country but include case notifications and death records (from routine surveillance and vital registration), and measures of the prevalence of infection and disease (from population-based surveys).

For each country, estimates of incidence for each year during the period 1995–2004 have been made as follows. First a reference year is selected, for which there is a best estimate of incidence; this may be the year in which a survey was carried out, or the year for which incidence was first estimated. Then the series of case notifications is used to determine how incidence changed before and after that reference year. The time series of estimated incidence rates is constructed from the notification series in one of two ways: if the rate of change of incidence is roughly constant through time, an exponential trend is fitted to the notifications; if the rate varies through time (eastern Europe, central Europe and high-HIV Africa), a three-year moving average of the notification rates is used. If the notifications for any country are considered to be an unreliable guide to trend (e.g. because reporting effort is known to have changed; or because reports are clearly erratic, changing in a way that cannot be attributed to TB epidemiology), the aggregated trend for all other countries from the same epidemiological region that have reliable data is applied. For some countries (China, Indonesia and Nepal), the assessment of the trend in incidence is based on risk of infection derived from other sources (tuberculin surveys for China and Nepal; prevalence surveys for Indonesia). For those countries that have no reliable data from which to assess trends in incidence (e.g. for countries such as Iraq, for which data are hard to interpret) and which are atypical within their own regions, incidence is assumed to be stable. Further details are available in references 3 to 5.

Disaggregation

Estimates of incidence disaggregated by type of disease (smear-positive pulmonary vs. all other forms) and by HIV-status (among adults 15–49 yrs) are published annually (see reference 5 and Global TB Database).

National TB control programmes are requested by WHO to provide case notifications disaggregated by site of disease (pulmonary/extrapulmonary), laboratory confirmation (usually sputum smear), and history of previous treatment. New smear-positive cases are broken down by age and sex. Many control programmes are also able to disaggregate cases according to the presence of drug resistance. New recommendations for recording and reporting will include disaggregation of notified cases by HIV status.

References

- The Stop TB Strategy: building on and enhancing DOTS to meet the TB-related Millennium Development Goals. Geneva, World Health Organization, 2006 (WHO/HTM/STB/2006.37).
- The Global Plan to Stop TB, 2006–2015. Geneva, World Health Organization, 2006 (WHO/HTM/STB/2006.35).

- Dye C et al. Global burden of tuberculosis: estimated incidence, prevalence and mortality by country. *Journal of the American Medical Association* 1999, 282:677–686.
- Corbett EL et al. The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. *Archives of Internal Medicine* 2003, 163:1009–1021.
- Global tuberculosis control: surveillance, planning, financing. WHO report 2006. Geneva, World Health Organization (WHO/HTM/TB/2006.362).

Database

- Global TB database: (http://www.who.int/tb/country/global_tb_database)
- United Nations Millennium Development Goals indicator database: (<http://unstats.un.org/unsd/mi>)

Comments

Routine surveillance data provide a good basis for the estimate of incidence in countries where the majority of incident cases are treated and notified to WHO. Where the proportion of cases notified is consistent over time (even if it is low), trends in incidence can be judged from trends in notified cases. Where TB control efforts change over time it is difficult to differentiate between changes in incidence and changes in the proportion of cases notified.

A national surveillance system is an integral part of good TB control, and one of the components of DOTS, which forms the core of the Stop TB Strategy. As surveillance improves in countries implementing the strategy, so will estimates of TB incidence.