

WHO analysis of trends in tuberculosis incidence and their possible determinants in 134 countries

Trends in tuberculosis incidence and their determinants in 134 countries.
http://www.who.int/tb/publications/2009/whobulletindye2009supp_final.pdf

Key results and implications:

- A WHO analysis of trends in case notifications and possible determinants in 134 countries found a significant association across countries between declining incidence and a higher human development index status, lower child mortality rate and higher measure of access to improved sanitation. It did not find a significant association of estimated TB incidence trends with TB control program intervention measures. The paper notes some reasons why such an association may not have been discernible. An association of TB incidence trends and TB control interventions has been found in previous country-specific studies and in the Region of the Americas. This analysis acknowledged other findings which show a significant association of TB control interventions and reduced TB prevalence and mortality. The methodology had some limitations, and did not enable a determination of cause and effect.
- The analysis raises important questions for further investigation, which WHO is pursuing, including further review of delay in case detection and treatment initiation, ongoing monitoring of determinants of trends in incidence given further scale up of interventions since 2006, and further analysis of the nature of social determinants of TB disease.
- The authors conclude that the WHO Stop TB Strategy must be pursued given the documented association of TB control interventions with reducing TB mortality, prevalence and with TB incidence reduction in some countries to date. Further analysis and policy development are needed to explore ways to increase and accelerate incidence reduction, including further attention on earlier TB case detection and prevention through addressing the determinants of TB.

Summary:

WHO has assessed the status of the Tuberculosis (TB) epidemic and progress in control of the disease each year since 1997. The approach includes estimation of TB incidence, prevalence and mortality from 1990 onwards; analysis of case notifications from 1995 and treatment outcomes from 1994 in around 200 of 212 countries and territories; and analysis of progress towards the global targets for

Stop TB Department Brief November, 2009

case detection and treatment success established by the World Health Assembly in 1991. Since 2006, WHO has also assessed progress towards achieving the impact targets related to incidence, prevalence and mortality that have been set for 2015 within the framework of the Millennium Development Goals. In the 2009 WHO Global TB Control Report, WHO estimated that TB prevalence and mortality rates continue to decline, and TB incidence is now stable or declining slowly in all regions.

Building on work described in the 2008 Global TB Control Report, WHO published further details of an analysis of trends in case notifications and possible determinants in 134 countries from 1997 to 2006 in an article in the Bulletin of the World Health Organization, September 2009. Regression analyses explored the association between these trends and 32 measures covering various aspects of development, the economy, the population, behavioural and biological risk factors, health services and TB control interventions. Correlation analysis cannot determine causative relationships between these factors and disease incidence trends, but the approach can reveal significant associations, and raise important questions for further exploration.

The study's authors did not find major association between TB control interventions and TB incidence trends aggregated for the range of countries studied. A significant association, however, was found for aggregated data for Latin American countries. The study did find a significant association between declining incidence and a higher human development index status, lower child mortality rate and higher measure of access to improved sanitation.

Previous research has shown a significant association of TB control interventions with increasing TB cure rates and with mortality reduction. In other studies, diagnosis and treatment measures have been associated with reduced TB transmission in Western Europe, North America, Chile, Cuba, Peru and China,

Stop TB Department Brief November, 2009

before and since the implementation of DOTS - the basic package of TB control interventions recommended by WHO since 1995.

In this study, TB control interventions were represented by two indicators: case detection and treatment, that are fundamental to the DOTS-based TB control strategy recommended by WHO from 1995 and adopted by most National TB Programmes worldwide. WHO calculates that more than 40 million people have been treated under DOTS since 1995, with a treatment success rate of over 80%.

There are number of reasons why a significant association between TB trends and the performance of DOTS programmes may not have been found in this cross-national analysis:

1. Tuberculosis case detection and initiation of treatment may often be too late to reduce transmission and subsequent incidence, although it is impacting a reduction in morbidity, TB prevalence and mortality.
2. True TB incidence decline may be obscured by better case detection, suggested by important increases in case notifications over the period, especially in some of the largest TB control programmes worldwide with the largest TB burdens.
3. There has been too little time to see the effect of DOTS interventions (i.e., full national scale-up of TB control interventions occurred too recently to yet see an effect).
4. A sizeable proportion of people with TB may be treated in the private sector, where treatment results have been shown to be poor in many countries.
5. The impact of TB control efforts may be offset by increasing prevalence of risk factors, such as HIV, smoking, diabetes, alcohol, malnutrition, economic and social disruption, crowding etc., leading to more TB infection and active disease.

Stop TB Department Brief November, 2009

6. Case detection and treatment success rates may not adequately measure epidemiological impact of TB control measures, and/or there may be quality deficiencies in reported performance data in some settings.
7. The analytic method may not reveal small effects on transmission and incidence in many countries.
8. The study could not examine the impact of more recent adoption by countries of the expanded WHO Stop TB Strategy, which includes the DOTS package, plus additional measures to address HIV-associated TB, multidrug-resistant TB, and explicit measures to enhance their implementation including health system strengthening contributions, involvement of all care providers, involvement of affected individuals and communities, and further research and development of new tools.

The analysis raises a number of important questions for further investigation, which WHO is pursuing, including:

1. Is the time of TB case detection and treatment initiation too late in some countries to significantly reduce transmission and incidence? If so, what measures are most effective in what settings to reduce diagnostic delay?
2. What is the impact on TB incidence trends of changing prevalence of TB risk factors and social determinants, and to what extent do such changes support or counteract the impact of improved case detection and treatment?
3. Are case detection, cure and TB incidence trends measured and/or estimated accurately?
4. Would repeat analysis after another 3-5 years of TB control scale-up and consolidation reveal an association with TB incidence trends?
5. Are the associations found in this study accurate suggestions of true determinants of TB incidence, or are there significant confounding variables? What is the underlying nature of the significant associations of TB incidence reductions with other development and health measures,

Stop TB Department Brief November, 2009

and what policies and interventions might enhance and expand these positive associations?

Conclusion: The WHO Stop TB Strategy should be pursued given the documented association with reducing TB mortality, prevalence and with TB incidence reduction in some countries with large TB burdens to date. Further analysis and policy development are needed to explore ways to increase and accelerate incidence reduction, including further attention to social determinants of disease.

Other key related documents:

Key facts of the Global TB Control Report 2009

http://www.who.int/tb/publications/global_report/2009/pdf/key_points_en.pdf

Implementing the Stop TB Strategy

http://whqlibdoc.who.int/publications/2008/9789241546676_eng.pdf

From DOTS to the STOP TB Strategy - Building on achievements for future planning

http://whqlibdoc.who.int/hq/2007/WHO_HTM_TB_2007.383_eng.pdf

DOTS Expansion Working Group strategic plan 2006-2015

http://whqlibdoc.who.int/hq/2006/WHO_HTM_TB_2006.370_eng.pdf

Drivers of tuberculosis epidemics: The role of risk factors and social determinants. *Soc Sci Med* 2009; 68:2240-46.