Tuberculosis Epidemiology and Prospects for Control

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The Global Burden of Tuberculosis

Estimated number of cases

- **All forms of TB**
  - 10.4 million (140/100,000)
    - 65% male
    - 10% children

- **HIV-associated TB**
  - 1.0 million (11%)
    - 74% in SSA

- **Multidrug-resistant TB (MDR/RR)**
  - 600,000 RR
  - 490,000 MDRTB

Estimated number of deaths

- 1.3 million in HIV Neg
- 374,000

Source: WHO Global TB Report 2017
Global Trends in TB Incidence and case notification 2000-2015

Incidence/Notification Gap of 4.1 million
Countries in the three TB high-burden country lists that will be used by WHO during the period 2016–2020, and their areas of overlap.
The drivers of Tuberculosis
Poverty

The remains the major driver of TB across the world
Tuberculosis rates are closely matched with poverty rates

Source: S.R. Benatar and R. Upshur. IJTLD 2010; 14(10): 1215-1221
HIV and Tuberculosis
Regional Trends in estimated TB incidence and case notification 1990 -2008

Source: WHO Global TB Report 2009
Tuberculosis and Diabetes Mellitus

- Global prevalence of DM has increased greater than 20% in the last 30 years.
- Rates of DM are increasing rapidly in low and middle income countries.
- 80% of all DM cases will be in low and middle income countries by 2040.
- Diabetes increases risk of TB by a factor of 3.
- Data from SSA on the TB-DM- HIV interactions are scarce.

PlosMed 2008; 5: e 152
Lancet Infect Dis 2009; 9:736-746
Trop Med Int Health 2010; 15: 1300-1314
Trop Med Int Health 2017; 22(3): 261-268
Tuberculosis and Mining
Miners have X10 the rates of TB compared to the general population related to:

- Dust exposures in the mines
- Social conditions outside the mines
- Higher rates of other TB risk factors in miners: HIV, Tobacco smoking, alcohol abuse
- Poor access to health care especially for “illegal” labor migrants

On the background of weak legislation, surveillance and occupational health services

Confronting Tuberculosis
Lessons from Robert Koch: the Nobel laureate’s lecture 1905

• The need to address TB transmission
  • Focus on infectious TB (laryngeal and pulmonary TB)
  • Infection Control – managing expectoration, promoting hygienic environments (homes and clothes), well lit and aerated homes and avoiding overcrowding, rapid identification of cases and isolation

• Obligations to report cases

• Accurate diagnostics

• Dietetic –hygienic benefit of sanatoria

• Social support systems

• Creating public awareness and “keeping alive the interest of all social classes”

• Financing the response

Source: https://www.nobelprize.org/nobel_prizes/medicine/laureates/1905/koch-lecture.html
Evolution of Global Strategies for TB care and prevention

1993-2006

2006-2015

Post 2016
The End TB Strategy: Vision, Targets and Pillars

**Vision:**
A world free of TB
Zero TB deaths, Zero TB disease, and Zero TB suffering

**Goal:**
End the Global TB epidemic

**Pillars**

- **Pillar 1:** Integrated, patient-centered TB care and prevention
  - Government stewardship and accountability, with monitoring and evaluation
  - Building a strong coalition with civil society and communities
  - Protecting and promoting human rights, ethics and equity
  - Adaptation of the strategy and targets at country level, with global collaboration

- **Pillar 2:** Bold policies and supportive systems
  - Intensified research and innovation

- **Pillar 3:** Reduced number of TB deaths compared with 2015 (%)
  - 2020: 35%
  - 2025: 75%
  - SDG: 90%
  - END TB: 95%

- **Pillar 4:** Reduced TB incidence rate compared with 2015 (%)
  - 2020: 20%
  - 2025: 50%
  - SDG: 80%
  - END TB: 90%

- **Pillar 5:** TB-affected families facing catastrophic costs due to TB (%)
  - 2020: 0%
  - 2025: 0%
  - SDG: 0%
  - END TB: 0%
What are the TB care and prevention problems that need to be solved?
Problem 1: *Tuberculosis case finding not matched with estimated incidence*
Global Trends in TB Incidence and case notification 2000-2015

Incidence/Notification Gap of 4.1 million
Problem 2: The decline in TB incidence is too slow
New ways of doing things are needed to accelerate decline in TB incidence
Problem 3: *The shame of high TB deaths*
Tuberculosis deaths

• Globally, in 2016
  • 1.3 million HIV negative people died of TB
  • 0.37 million HIV positive people died of TB
  • Tuberculosis Case Fatality Ratio (CFR) was 17%

• CFR needs to fall to 10% and 6% by 2020 and 2035 for the End TB targets to be achieved.
Problem #4: Catastrophic costs experienced by TB patients and their families
Problem #5: Rising burden of drug resistance with inadequate testing
Drug Resistant TB

• Globally

• 3.5 % (95% CI 2.7-5.1 %) of new patients have DRTB

• 21% (95% CI 15-28%) of previously treated patients have DRTB

• 490,000 MDRTB incident cases

• 340,000 of all notified TB cases have MDRTB

• Trends suggest increasing proportion of MDRTB among notified cases
Problem # 6

- Weak Health Care Systems especially

- Health Financing
- Human Resources for Health
- Commodity Supply: Procurement and Supply Chain Management Systems
- Health Information Systems
- Inequities in service delivery
  - Poor rural communities
  - Slow adoption of new technologies
  - Sub-optimal use of new technologies (Xpert MTB/Rif assay)
What interventions may be applied?
The biomedical approach

- Find all cases early and rapidly initiate appropriate treatment
- Offer universal Drug Susceptibility Testing
- Prevent, find and appropriately treat co-morbidities and other risk factors: HIV, DM, tobacco smoking, mining safety and others
- Provide appropriate treatment support to ensure full adherence
- Management of latently infected persons to prevent progression to disease
Active TB Case Finding

- Increases case notification
- Finds cases earlier with less severe disease
- Treatment outcomes are similar with passive case finding
- Impact on TB incidence unclear
  - The ZAMSTAR study found no effect of community screening on TB incidence (Lancet 2013; 382 (9899): 1183-94)

IJTLD 2013: 17(4): 432 -446
But is the biomedical approach sufficient?
Wealth Creation and Distribution
The power to end TB

By 2035

- Ending extreme poverty would reduce TB incidence by 33.4% (95% CrI 15.5-44-5%)

- Expanding social protection would reduce TB incidence by 75.1% (95% CrI 45.2-89.9%)

- Doing both would reduce TB incidence by 84.3% (Crl 54.7%-94.9%)

Lancet Glob Health 2018; 6: e514–22
Overcoming poverty is not a gesture of charity, it is an act of justice.

Nelson Mandela
Tying it together

- Our best shot: A Multi Sectoral Approach combining biomedical and biosocial approaches
- Strengthening Health Systems
- Acting across borders
- Carrying communities with us – leaving no one behind.
- Remaining “hawk” eyed to rapidly identify change and act on it
- Sharpening our creativity and innovativeness: to bring new things on to the table and to overcome implementation bottlenecks though
  - Improved technical and managerial capacity and functionality
  - Operations/Health systems/Implementation research including pragmatic trials
- Committed, visionary and focused Leadership