
[15.232 Global Health in Frontier Markets] Assignment 1: Tuberculosis

Definition of Tuberculosis: Tuberculosis (TB) is an infectious bacterial disease caused by *Mycobacterium tuberculosis*, which most commonly affects the lungs.

Progression of TB (adapted from WHO Fact Sheet 2013 and WHO Global Tuberculosis Report 2012):

- TB is transmitted through the air from person to person via droplets from the throat and lungs of people with the active respiratory disease. TB has strong infectivity and a person needs to inhale only a few of the bacteria to become infected.
- About one-third of the world's population has latent TB, which means people have been infected by TB but are not yet ill with disease and cannot transmit the disease. Healthy people who are infected by TB often show no symptoms, since the person's immune system acts to "wall off" the bacteria.
- When a person even develops active TB (disease), the symptoms (e.g. cough, fever) may be mild for many months. This can lead to delays in seeking care, and results in transmission of the bacteria to others. Without proper treatment, up to two thirds of people ill with TB will die.
- People infected with TB bacteria have a lifetime risk of falling ill with TB of 10%. However, persons with compromised immune systems, such as people living with HIV, malnutrition or diabetes, or people who use tobacco, have a much higher risk of falling ill.

Symptoms and diagnosis:

- The symptoms of active TB of the lung are coughing, sometimes with sputum or blood, chest pains, weakness, weight loss, fever and night sweats. (WHO 2013)
- To diagnose TB, many countries still rely on sputum smear microscopy developed more than 100 years. Trained laboratory technicians look at sputum samples under a microscope to see if TB bacteria are present. With three such tests, diagnosis can be made within a day, but this test does not detect numerous cases of less infectious forms of TB. (WHO2013)
- Diagnosing Multidrug-resistant TB (MDR-TB) and HIV-associated TB can be more complex. A new two-hour test that has proven highly effective in diagnosing TB and the presence of drug resistance is now being rolled-out in many countries. Tuberculosis is particularly difficult to diagnose in children. (WHO 2012)

Affected Population:

- 8.7 million people fell ill with TB in 2011 and India and China account for 40% of the world's TB cases and The African Region has approximately 25%. (WHO2013)
- 1.42 million people died from TB in 2011 and over 95% of TB deaths occur in low- and middle-income countries. People living with HIV and infected with TB are 21 to 34 times more likely to develop active TB disease than people without HIV. 990,000 deaths occur in HIV-negative people and 430,000 HIV-associated. Tobacco use also greatly increases the risk of TB disease and death. More than 20% of TB cases worldwide are attributable to smoking. (WHO2012)
- It is among the top three causes of death for women aged 15 to 44. About half a million children aged 0 to 14 years fell ill and 64,000 children died from the disease in 2011 (WHO2013)

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Prevention and Treatment Options

- TB is an airborne disease and transmission essentially can be prevented through adequate ventilation and limited contact with patients. In those parts of the world where the disease is common, it is recommended that infants receive a vaccine called BCG (Bacille Calmette-Guérin). (NIH2009)
- The medications used to treat latent TB infection include: isoniazid (INH), rifampin (RIF) and rifapentine (RPT). Because there are less bacteria in a person with latent TB infection, treatment is much easier. (CDC2012)
- There are 10 drugs currently approved by the U.S. Food and Drug Administration (FDA) for treating TB. Of the approved drugs, the first-line anti-TB agents that form the core of treatment regimens include: INH, RIF, ethambutol (EMB) and pyrazinamide (PZA). (CDC2012)
- Incorrect use of anti-TB drugs, or use of poor quality medicines, can cause drug resistance. Treatment for multi-drug resistant TB (MDR-TB), defined as resistance to isoniazid and rifampicin (the two most powerful anti-TB drugs) is longer, and requires more expensive and toxic drugs. (WHO2013)

Differences in Patient Care:

- The TB death rate dropped 41% between 1990 and 2011 and 51 million people were successfully treated and 20 million lives were saved by WHO strategy. The vast majority of TB cases can be cured when medicines are provided and taken properly. Thus, TB is no longer life threatening disease in richer countries. (WHO2013)
- Despite this progress, TB remains one of the leading causes of death especially in low income countries, such as India and Africa due to lack of proper diagnostics or treatment (WHO2012)

Important Inputs

- There are critical funding gaps for TB care and control. Between 2013 and 2015 up to US\$ 8 billion per year is needed in low- and middle-income countries, with a funding gap of up to US\$ 3 billion per year. International donor funding is especially critical to sustain recent gains and make further progress in 35 low-income countries (25 in Africa). (WHO2012)
- The development of new drugs and new vaccines is also progressing. New or re-purposed TB drugs and novel TB regimens to treat drug-sensitive or drug resistant TB are advancing in clinical trials and regulatory review. Eleven vaccines to prevent TB are moving through development stages. (WHO2012)

Conclusion

- With all of the efforts led by WHO, new cases of TB have been falling for several years and fell at a rate of 2.2% between 2010 and 2011. The TB mortality rate has also decreased 41% since. However, due to lack of funding and proper treatment especially in low income countries, TB is still life-threatening disease. Moreover, there remain big challenges such as effective diagnosis of child TB, treatment of people co-infected with HIV, treatment for multi-drug resistant TB.
- In order to further reduce TB, it is important for public and private sectors collaboratively to:
 - 1) secure political commitment, with adequate and sustained financing, 2) ensure early case detection, and diagnosis through quality-assured bacteriology, 3) provide standardized treatment with supervision and patient support, 4) ensure effective drug supply and management, 5) monitor and evaluate performance and impact, 6) engage all care providers, 7) empower people with TB, and communities through partnership and 8) enable and promote research.

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