Tuberculosis 1. Epidemiology of mycobacterium tuberculosis

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Introduction

An understanding of the epidemiology of *Mycobacterium tuberculosis* is critical for effective control. In this, the first article of a series, the global burden of tuberculosis (TB), risk factors for transmission and the epidemiology of Mycobacterium tuberculosis in South Sudan are reviewed.

Mycobacterium tuberculosis complex

Mycobacterium tuberculosis is a member of the Mycobacterium complex; the other members being *Mycobacterium africanum* and *Mycobacterium bovis.*

Mycobacterium africanum is most commonly found in West Africa; it causes up to a quarter of cases of tuberculosis in the Gambia (1). The symptoms of infection resemble those of M. tuberculosis. The infectivity is similar to M. tuberculosis, and it is an important opportunistic pathogen in the setting of advanced immunosuppression due to HIV or other causes. Management is identical to the management for disease due to *M. tuberculosis.*

Mycobacterium bovis is the main cause of tuberculosis in cattle, deer, and other mammals. The human bacillus may have arisen from *M. bovis* in the setting of animal domestication (2). Human *M. bovis* infection generally occurs in the setting of consumption of infected cow's milk products, Bacille Calmette-Guérin (BCG) vaccination for TB prevention, or intravesicular BCG installation for bladder cancer treatment.

Burden of tuberculosis

The epidemiology of tuberculosis varies substantially around the world. The highest rates (100/100,000 or higher) are observed in sub-Saharan Africa, India, China, and the islands of Southeast Asia and Micronesia (Figure 1). Estimates provided by USAID in 2007 for South Sudan were 228 cases per 100,000 population. In South Sudan, an estimated 18,500 people develop TB, and 5,300 die of TB annually (3).

Poverty, HIV and drug resistance are major contributors to the resurging global TB epidemic (4, 5). Approximately 95% of TB cases occur in developing countries. Approximately 1 in 14 new TB cases occur in individuals who are infected with HIV; 85 percent of these cases occur in Africa. An estimated half million cases of multidrug resistant (MDR)-TB also occur annually in Africans; even higher rates of drug resistant disease occur in Eastern Europe.

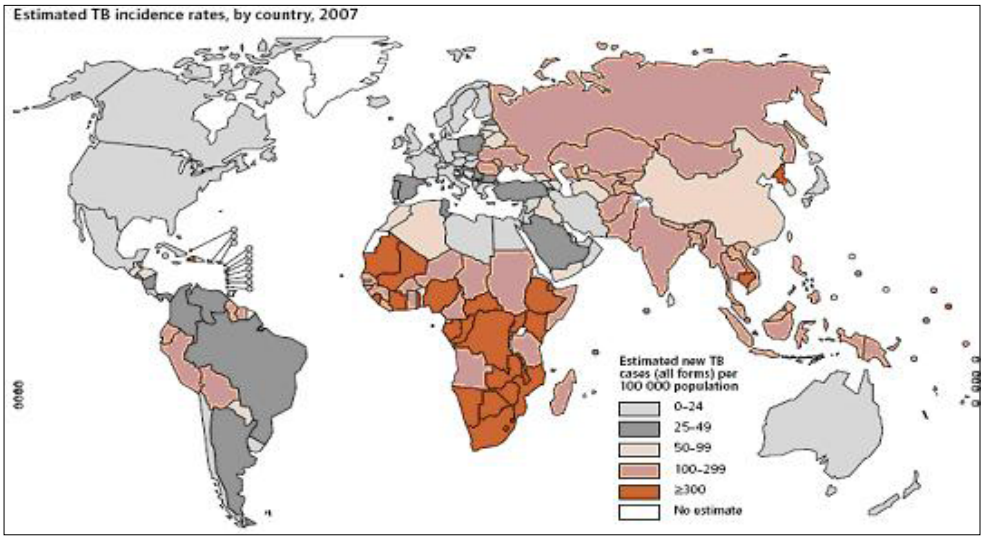

Figure 1. Estimated tuberculosis cases 2007 (Source: ©WHO http://www.health.qld.gov.au/qtbcc/images/TB2009WHO.JPG)

Risk factors

Some people develop TB disease within weeks of becoming infected before their immune system can fight the TB bacteria. Other people may get sick years later, when their immune system becomes weak for another reason (6).

Overall, about 5 to 10% of infected persons who do not receive treatment for latent TB infection will develop TB disease at some time in their lives. For persons whose immune systems are weak, especially those with HIV infection, the risk of developing TB disease is much

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higher than for those with normal immune systems.

Generally, persons at high risk for developing TB disease fall into two categories (7):

1. Persons who have been recently infected with TB bacteria.
2. Persons with medical conditions that weaken the immune system.

1. Persons who have been recently infected with TB bacteria

These include:

- Persons who have close contacts with a person with infectious TB disease.
- Persons who have immigrated from areas of the world with high rates of TB.
- Children less than 5 years of age who have a positive TB test.
- Persons from groups with high rates of TB transmission, such as homeless persons, injection drug users, and persons with HIV infection.
- Persons who work or reside with people who are at high risk of TB in facilities or institutions such as hospitals, homeless shelters, correctional facilities, nursing homes and residential homes for those with HIV.

2. Persons with medical conditions that weaken the immune system

Babies and young children often have weak immune systems. Other people can have weak immune systems especially those with any of these conditions:

- HIV infection.
- Substance abuse.
- Silicosis (8).
- Diabetes mellitus.
- Severe kidney disease.
- Low body weight.
- Organ transplants.
- Head and neck cancer.
- Medical treatments such as corticosteroids or organ transplant.
- Specialized treatment for rheumatoid arthritis or Cohn's disease.

In South Sudan although the exact incidence of HIV/AIDS among TB cases is not known, HIV prevalence appears to be on the rise. Data from limited population surveys show HIV prevalence rates range between 1 and 8 percent among the general population, with higher rates (up to 25 percent) found in border towns. Multidrug-resistant (MDR) TB cases account for around 1.9 percent of new cases and usually occurs among defaulters and relapse cases.

The TB epidemic is an outgrowth of a long-standing war, which has resulted in poverty, malnutrition, and a large number of displaced populations and refugees. Destruction of health infrastructure, lack of microscopic services, and displacement or lack of health personnel have also contributed to the epidemic (3).

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