

Introduction to Public Health

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1. Introduction

Tuberculosis (TB): This is a respiratory illness caused by the *Mycobacterium TB* bacillus, a rod-shaped, non-sulphur-forming and non-fastidious bacterium.

Tuberculosis (TB) is a transmittable disease that is caused by the bacteria *Mycobacterium tuberculosis*, and is mainly transmitted in the lungs, but may be transmitted to other areas including kidneys, spine, and brain (Centers for Disease Control and Prevention, 2025). The disease is transmitted to other individuals via the air as a result of coughing, sneezing, or talking done by an infected individual.

Signs and Symptoms: Some of the common symptoms of TB are persistent cough of three weeks or more, loss of weight, night sweats, fever and fatigue. Blood might be coughed up in the severe stages and chest pain might be experienced (NHS, 2023).

The World Health Organisation (2020) estimates that as at 2020, 10 million new TB cases were reported worldwide. The social health impact of TB is still evident as the figure is among the 10 leading causes of death across all countries worldwide.

2. Strategies, Management Interventions, and Social effects of Tuberculosis

2.1. Tuberculosis Measurement and Monitoring Approaches.

Global Monitoring Systems:

The World Health Organization (WHO) monitor TB and the global tuberculosis report published yearly presents the number of cases, deaths and treatment outcomes. The National TB Surveys are conducted by health ministries of countries to obtain essential data in order to trace the

prevalence of the disease in the countries. The use of National TB Registers complements these surveys and tracks every case of TB diagnosed and allows calculating the trends and identifying points of concern. Surveillance systems such as Global TB Database are assembled to present the information on more than 200 countries providing a complete image of the disease burden (Nishikori and Morishita, 2013).

Screening and Diagnostics:

Diagnosis techniques are necessary to detect cases of TB at an early stage. Tuberculin Skin Test (TST) is a common screening tool and especially in people who are considered to be at the high risk (de Lima Corvino, Shrestha and Kosmin, 2021). But Chest X-rays could be used to determine pulmonary abnormalities, which are related to TB and are more accurate and timely diagnosed. One such diagnostic tool is the GeneXpert MTB/RIF, which is a rapid diagnostic tool detecting *Mycobacterium tuberculosis*, as well as, resistance to Rifampicin, the most essential TB medication. The test has notably enhanced the diagnosis in low resource environments as the test results are made available within two hours.

Indicators and Metrics:

The development of TB control activities is monitored by several important indicators, among them the incidences of TB that are the new and relapse cases of TB per 100,000 (Woodruff, 2024). The success rate of the treatment is a measure of the effectiveness of patients to complete their treatment regimen. Moreover, the patterns of responses to drugs are also thoroughly observed, especially multidrug-resistant (MDR) and extensively drug-resistant (XDR) TB, and the treatment plans are changed to address this.

2.2. Measures of Tuberculosis Control

Prevention Strategies:

One of the important components of the TB control is prevention, and it has a couple of strategies. BCG vaccine is an effective vaccine to prevent TB used widely in any high burden country especially in the prevention of childhood TB including the severe form of TB meningitis (Okafor, Rewane and Momodu, 2023). Its ability, however, in humans is not very effective particularly in the prevention of pulmonary TB. Education in the sphere of the prevention of TB is crucial to increase awareness of its transmission, symptoms, and the need to seek treatment. Stigma of TB needs to be minimised in order to allow individuals to seek assistance and respond to treatment plans.

Another preventive measure is to improve sanitation since anonymity and poor hygiene are contributing factors to the development of TB. The improved infection control in the healthcare

facilities is important in preventing infection transmission. This involves quarantining of patients who have active TB, proper ventilation of patients, as well as health care personnel using personal protective equipment (PPE).

Treatment Approaches:

Common medication of TB implies a combination of the first-line drugs, which comprise of Rifampicin, Isoniazid, Pyrazinamide, and Ethambutol. The medications are administered within a period of six months so as to ascertain efficient elimination of the bacterium. Directly Observed Treatment (DOT) is a popular technique in order to guarantee the effectiveness of taking treatment when medical personnel monitor patients during their taking medication. Nevertheless, TB that meets drug resistance is an emerging problem. The resistance of MDRTB to Isoniazid and Rifampicin will lead to the extended and more toxic second-line therapies

(Seung, Keshavjee and Rich, 2015). XDR-TB that is a disease that does not respond to further intake of drugs requires further complicated treatment plans and poses a challenge to managing TB.

The global and national control programs:

Stop TB Partnership is an international body that endeavours to eradicate TB by 2035 by financing them, lobbying and by offering technical support to nations (Martini et al., 2020). National strategies (including the National TB Strategy of the UK) are concerned with incidence and the capacity to diagnose the disease. The plan involves the enhanced incorporation of TB care with other health services and reduction in the social determinants of health which make one vulnerable to TB. Through organisations such as the Global Fund, international funding has assisted the delivery of free TB diagnostics and medications to enhance the accessibility of the vulnerable population.

2.3. Effects of Tuberculosis in Societies

Social and Economic Impact:

The social and the economic impact of TB is far-reaching especially in countries where it is a burden. Social exclusion frequently accompanies the stigma related to the TB disease because people with it are either afraid or rejected. Such stigma makes individuals reluctant to seek medical treatment further accelerating the disease spread. TB is a huge financial burden to individuals and families as they lose earnings through the long-term illness. The immediate expenses of treatment and indirect expenses of care-taking overwhelm many families in the low-income neighbourhoods thus trapping victims in poverty. Communities also suffer economic

losses because of loss of productivity in cases of illnesses particularly in nations that have high TB rates.

Healthcare System Impact:

TB is a burden to the health care systems, especially in the resource-starved contexts, where the health infrastructures are already minimal. The emergence of drug-resistant TB demands more sophisticated diagnostic equipment, special medication, and an increased course of treatment, which imposes an extra burden on medical care (Prasad et al., 2017). In regions with a high burden of TB, quality TB care is often not availed, resulting in late diagnosis and more deaths. In some instances, TB may also overpower hospitals necessitating specific isolation units and specialised staff which may only attend to TB cases, shifting other health facilities resources.

Psychological Effects:

The psychological consequence of TB may be immense. Depression and anxiety can also result both to an individual and their families due to the fear of stigma and social isolation of patients. Long- term treatment of TB, and the side effects of the medication may cause mental conditions, particularly in case the patient feels hopeless or is convinced that he/she will not recover. There is also a heavy load on caregivers and family members tend to get emotionally stressed and anxious in the process of assisting the patient through the treatment.

2.4. Tuberculosis Health and Social Care Support Services

Healthcare Support:

TB specialists, nurses and community health workers are just some of the healthcare representatives who offer essential service to TB patients, including diagnosis and compliance to treatment. Frequent screening, treatment follow up and educating patients play an important role in both preventing further transmission and succeeding in the treatment. The use of public health campaigns is also critical in enlightening the masses on the need to detect and treat in good time.

Social Services:

The social services can be used in assisting the TB patients through giving financial assistance, psychological support and community outreach. Interventions designed to minimise the stigma and raise awareness assist the patient in seeking treatment early and staying with it (Maynard et al., 2023).

Multidisciplinary Approach:

Comprehensive TB care (involving not only physical but also emotional health) and enhanced patient outcomes require a multidisciplinary group of medical workers, social workers, and mental health professionals.

3. CONCLUSION

Tuberculosis (TB) is a major health problem in the world and millions of new cases are reported every year. The disease is watched by the use of global projects, country survey and the latest diagnostic technologies like GeneXpert (Desalegn Addise Getahun et al., 2023). In treatment of TB, there are control measures, such as vaccination, public health education, and direct observed treatment, which are important in the management. However, TB still affects the social, economic and healthcare systems significantly especially in low-resource environments. The psychological isolation to patients and families is severe, which is alleviated by stigma and an extended course of treatment.

Final Assessment:

Enhanced foreign health campaigns and diagnostics and treatment technology innovation are critical in the transmission control of TB. Nevertheless, enhancing the social implications of the disease by providing better support services, alleviating stigma, and facilitating care provision will be a significant achievement towards success in the long term of eradicating TB.

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