

Risk of tuberculosis in high-rise and high density dwellings

Demand for High-Rise Buildings

The scarcity of land in urban areas have introduced the high rise buildings for the following reasons:

- Increasing demand for business and residential space
- Economic growth
- Technological advancements
- Innovations in Structural Systems
- Desire for aesthetics in urban settings
- Concept of city skyline
- Cultural significance and prestige
- Human aspiration to build higher
- increasing poverty

Risk of tuberculosis in high-rise and high density dwellings

Tuberculosis (TB) is caused by *Mycobacterium tuberculosis*, a bacteria that often affects the lungs. Although TB is curable and preventable, it is highly contagious and spread from person to person through inhaling TB germs in the air.

The World Health Organization (WHO, 2012) reported that the burden of TB remains enormous and is highest in Asia and Africa, with China and India accounting for almost 40% of the world's TB occurrences

The World Health Organization (2005) considers Hong Kong as a region with good health infrastructures that bears an intermediate burden of TB

The disease has been found to have association with smoking and Areas dominated by the socially deprived, and those living in crowded areas of poor ventilation have been reported to have noticeably higher TB prevalence.

Hong Kong has a condensed urban built form comprising of high-rise and high density dwellings. This high density high-rise built form gives rise to an efficient transport infrastructure with low carbon consumption, to which, the area is described as a model of sustainable urban development.

However, the compact city configuration is also criticized for its poor air quality and unpleasant living conditions that pose environmental health risks to its residents.

Studies have shown that high-rise blocks constructed close to each other result in severe sky obstructions and poor air ventilation especially for the lower floors.

In addition poor sunlight penetration, unsatisfactory air quality and impeded ventilation prevail in many urban communities of Hong Kong closely packed with mid-rise to high-rise buildings.

It is also known that ultraviolet radiation from the sun kills bacterium in dwellings but the shading effects from surrounding buildings in many communities of Hong Kong have prevented direct sunlight to reach even pockets of small open spaces at the street level.

Furthermore, the daylight quality within housing units are determined by many factors, these are:

Window size, small windows to prevent over looking (1) and for security too.

2) Obstruction from other buildings, as building high, the amount of sun light is minimised or prevented totally from reaching inside the dwellings.

3) Distance between buildings, Because of short separation distances between buildings, windows facing neighboring blocks are always fitted with window shades and kept closed most of the time thus defeating the purpose of bringing in light and ventilation.

High density and vertical urban development will become a way of life for the expanding Asian cities because of rapid urbanization and diminishing non-renewable land resources.

In recent years, the quality of urban life or the well-being of people living in a specific place has gained increasing attention.

A study was carried out to examine the relationships between TB incidence and the neighborhood environment, with specific reference to natural daylight capacity. The sky view factor (SVF) has been used to indicate the impact of urban geometry on daylight and cities. SVF is a measure of the heat island effects in openness of the sky relative to a specific location with values ranging from 0 (no sky visible) to 1 (no foliage/obstruction visible)

The outcomes

The result is lower floors in the midst of high-rise buildings are sheltered from direct sunlight and more diseased residence on lower floors for taller buildings.

Thoughts should be given to the layout, orientation, and separation distance between built structures. For example, an increase in the vertical height of a building should command a corresponding increase in the horizontal separation to allow for penetration of natural daylight and permit better air flow