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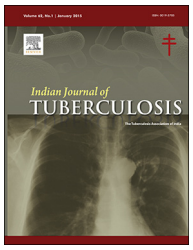

Original Article

Tuberculosis prevalence and socio-economic differentials in the slums of four metropolitan cities of India

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ABSTRACT

Aim: To understand tuberculosis (TB) prevalence among the slum dwellers of metropolitan cities of India and the factors associated with TB prevalence.
Methods: National Family Health Survey-III data for four metropolitan cities namely, Delhi, Mumbai, Kolkata and Chennai was used for this study.
Results: Prevalence of TB is significantly ($P = 0.001$) higher in the slums than non-slums of Mumbai, Chennai and Kolkata cities. As the living standard increases, TB prevalence decreases. Logistic regression analysis uncovers that lower standard of living is highly associated with TB followed by place of residence (slum or non-slum).
Conclusion: Mumbai has the highest prevalence among the four cities studied herein. Living standards, place of residence and absence of windows and electricity in the households are the factors associated with TB prevalence.
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1. Introduction

Tuberculosis (TB) continues to be a huge peril disease against the human population; WHO documents that after HIV/AIDS, TB (*Mycobacterium tuberculosis*) is a major killer of the human population. In 2014, 9.6 million people are estimated to have fallen ill with TB and 1.4 million deaths occurred among HIV-negative TB patients.[1] With the support of WHO, the Government of India's target specific approach such as RNTCP resulted in reduction of TB mortality to a great extant. TB has an important place in Millennium Development Goals; it is mentioned in the following as: in Goal 6 – to combat HIV/AIDS, malaria and other diseases; in Target 8 – to have halted by 2015 and begun to reverse the incidence of malaria and other major diseases, including TB; in Indicator 23 – between 1990 and 2015, to halve the prevalence and death rates associated with TB.[2] India has highest annual TB incidence; globally, one-fifth of TB cases are from India and it is estimated that about 40% of Indian population is infected with TB bacillus. In India, premature death due to TB is greater than 80% of the burden of disease as revealed in terms of disability-adjusted life years (DALYs) lost.[3]

TB is more common among the low socio-economic section of the population and marginalised sections of the community.[4] Factors influencing communicable diseases in slums are poverty, uncontrolled migration, overcrowding, rapidly depleting natural resources and poor water management.[5] Incessant growth of the slum population is not only posing a herculean task for civic authorities, but also for the public health personnel. Morbidity prevalence is more in the slum areas than in the rural areas. From the literatures it is well

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known that communicable diseases' prevalence is more in the slum areas; recent studies demonstrate that non-communicable diseases are also on the rise in slum areas.[6]

The health hazards of the urban slum dwellers are mainly due to poverty, malnutrition and contaminated environment where they live. In such an environment, slum dwellers are exposed to all types of communicable diseases including TB, and endless malnutrition resulted in higher rates of morbidity and mortality in the slums areas. With the available limited daily wages, slum dwellers are helpless to think of nutritional/balanced diet for their family. Small pox disease has been eradicated, and recently, polio has also been declared as eradicated from India. Slum dwellings do not have adequate sunlight exposures; no ventilation, no drainage inadequate sanitation, poor solid waste management and limited access to healthcare services are the factors that play a central role for the high disease prevalence.[7] As a result of heavy migration to the major cities, slum population growth rate is more than the India's population growth rate, and slums are rapidly growing like mushrooms. Studies on TB prevalence among slum children are available, but comparison of TB prevalence simultaneously among slum and non-slum children is seldom available. Moreover, the highest proportion of the slum population of India is dwelling in the four metropolitan cities, that is, Delhi, Mumbai, Kolkata and Chennai. Hence, in this paper, it is attempted to gauge TB prevalence among the slum and non-slum dwellers in metropolitan cities, namely Delhi, Mumbai, Kolkata and Chennai and to examine the factors associated with TB prevalence.

2. Material and methods

National Family Health Survey-III (NFHS-III) data for the four metropolitan cities namely, Delhi, Mumbai, Kolkata and Chennai was used for the analysis. These data were obtained from *MeasuresDhs, US*.[8] The households were classified as slum and non-slum by two agencies, viz., Census of India and NFHS-III, and were only considered for analysis. As per Census of India, 19,257 individuals were classified from slum households in the four cities. NFHS-III interviewing team supervisor at the time of the fieldwork had classified 19,593 individuals from slum households in these four cities. There were 15,099 individuals who were commonly identified from slum households by both census and NFHS-III agencies. Hence, these 15,099 individuals were considered for further analysis as slum samples. With the same principle, non-slum individuals (18,751) were considered for the analysis from the four cities for this study. NFHS-III included 8 mega and medium cities of India for collecting slum and non-slum data. About 1000 sample households of slums and 1000 households for non-slums were the target from each Primary Sampling Unit (wards) of city and the detailed sampling plan is available in NFHS-III slum report.[9] Standard of Living Index (SLI) is a proxy measure for determining the socio-economic condition of a household.[10] Scores are given by examining/interviewing a household in terms of ownership of household goods by adding these scores; total of SLI is obtained. SLI is classified as 0–14 low, 15–24 medium and 25+ as high categories. Few variables that are more relevant for TB prevalence are namely,

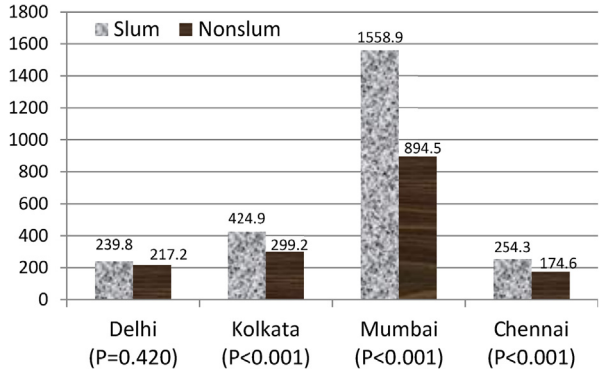

Fig. 1 – TB prevalence per 100,000 population in the four metropolitan cities by place of residence.

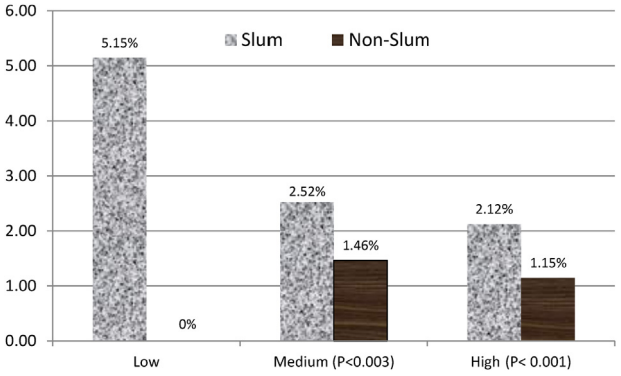

Fig. 2 – TB prevalence per 100 population in the four metropolitan cities by Standard of Living Index.

any household member suffered from TB, any treatment was done for drinking water, presence of window, electricity in the households, place of residence (slum or non-slum) and SLI, and these are considered for this study.

TB prevalence (for Figs. 1 and 2) for slum and non-slum areas was adjusted with weights for the respective areas. Weights were calculated from census data[11] for slum and non-slum populations of the four cities; weight is total number of samples covered by NFHS-III to the census population.

Chi-square test was applied to compare the proportions of SLI between slum and non-slum areas among the four cities and multivariate logistic regression analysis was performed. Data were analysed using SPSS 20.0 Statistical package.

3. Results

Among 33,850 individuals considered for analysis, 457 and 274 individuals reported that they had suffered from TB from slum and non-slum areas, respectively.

The percentage distribution of TB prevalence is depicted in Fig. 1. The difference in TB prevalence between slum and non-slum is high and it is statistically significant ($P < 0.001$) in each city, that is in Mumbai, Kolkata and Chennai and the exception is Delhi. Among the four cities, Chennai non-slum dwellings

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