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Prevalence of pulmonary tuberculosis in Wardha district of Maharashtra, Central India

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Abstract A house based survey was conducted during 2007–2009 in a representative sample of population in Wardha district implementing Directly Observed Treatment Short Course strategy for tuberculosis (TB) control since 2001. The objective was to estimate prevalence of bacillary pulmonary TB (PTB) in individuals aged 15 years or above, and to estimate trends in prevalence when compared to a previous survey carried out in mid 1980's. Two sputum samples (one spot, one early morning) collected from individuals having symptoms suggestive of PTB, history of previous anti-TB treatment (ATT) or abnormal pulmonary shadow on Mass Miniature Radiography (MMR) consistent with possibly or probably active tuberculosis were subjected to Ziehl–Neelsen microscopy and culture on Lowenstein–Jensen medium.

Of 55,096 individuals registered into the survey, 50,332 (91.4%) were screened by interview for symptoms and history of ATT and/or by MMR. Of them, 4805 were

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eligible for sputum collection; both specimens were collected in 4285 (89.2%) and only one specimen in 27 (0.6%).

A total of 86 bacillary cases were detected during the survey. Prevalence of bacillary PTB was estimated at 188.7 (140.3–236.9) per 100,000 populations. There was a decline of 61% in the prevalence of PTB over a period of 22 years.

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1. Introduction

Tuberculosis continues to be a major public health problem in India with an estimated 2.1 million incidence cases and about 2,40,000 TB deaths annually [1]. A nation-wide survey carried out during 1955–1958 revealed a prevalence of bacillary pulmonary TB (PTB) at 400 per 100,000 population [2]. Consequently, the National TB Programme (NTP) was implemented all over the country from 1962. Serial surveys carried out thereafter in selected geographically defined areas revealed no significant change in prevalence [3–5]. Following the review of NTP in 1992, the Revised National Tuberculosis Control Program (RNTCP) adopting the Directly Observed Treatment Short Course (DOTS) strategy was introduced from 1997 and expanded in a phased manner to all the districts in the country by 2006 [6]. Three rounds of surveys in a rural area of Tamil Nadu state implementing RNTCP from 1999 revealed a decline of 50% in the prevalence of PTB from 1999 to 2006 [7]. Since, this observation pertained to a single geographical site, Government of India identified six institutions to undertake independent surveys in seven other sites (districts/sub-districts) using a generic protocol, with the objective to find out the point prevalence of bacillary PTB among adults, which would provide baseline data to measure trends of prevalence in future. The district level survey in Wardha, Maharashtra state, had the additional advantage of comparing the trends from a previous survey carried out in 1982–88 [8].

2. Material and methods

Prior approval of the Institutional Research Ethics Committee of Mahatma Gandhi Institute of Medical Sciences, Sevagram, Wardha was obtained. Each family was counseled by field staff and explained about their participation in the survey. Required written consent for participation (printed in local language) was obtained from each individual after counseling.

All smear positive or culture confirmed TB cases detected during the survey were referred to the

nearest RNTCP center for anti-TB treatment (ATT); details of the patients referred were sent to the District TB Officer for further necessary action. Individuals with symptoms but not having TB were advised to seek treatment at the local health center.

2.1. Setting

The survey in Wardha district, having a population of 1.3 million in 2007 was carried out during 2007–2009. About 70% of the district population resided in rural areas and was engaged in agrarian occupations. This district located in central India has a warm climate with maximum temperatures between 46 and 48 °C during summer and 15–30 °C in winter, with limited rainfall. RNTCP is being implemented from 2002. Between 2002 and 2006, notification rate of new smear positive cases (NSP) and all TB cases per 100,000 population increased from 25 to 58 and 45–143 respectively; and thereafter gradually decreased to 38 and 106 by 2009 [6]. Treatment success rate in NSP cases registered during 2002–2008 varied between 86% and 89%. For cases registered in 2009, 7% were HIV reactive; treatment success was 83% in NSP and 62% in previously treated cases [6].

2.2. Sampling

Sample size was calculated at 47,828 to estimate the prevalence within 20% of true value at 5% significance level with a design effect of 2 to account for cluster sampling while arbitrarily considering expected prevalence of bacillary PTB (positive for AFB on microscopy and/or culture) at 400 per 100,000 populations.

This sample size was allocated to urban and rural strata in ratio of population size. The villages were grouped into three sub-strata depending upon village population (<1000, 1000–1999 and ≥2000). Within each sub-stratum, 5% of the clusters (villages) were selected by Population Proportional to Size (PPS) sampling method. Thus 45 clusters were selected for the survey out of 1004 villages in the district. In the urban stratum, 9 clusters

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