

LETTER TO THE EDITOR

Reviewing respiratory disease burden in rural India: household environment matters

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Dear Editor

Introduction

Much of the disease burden in rural India is due to respiratory disorders, namely asthma, bronchitis, tuberculosis (TB) and pneumonia¹. In low resource settings these diseases may be attributed to exposure to indoor pollution, solid-cooking fuels, poor housing, low nutritional status and poor sanitary conditions². The association of respiratory disorders with a geographical region may be due to population density, industrial and textile pollutants and tobacco consumption. The relationships of socio-economic development with behavioral and environmental factors of these diseases are predictable³.

In India, precise studies are not available to estimate respiratory-health related disease burden in rural areas. This precludes area-specific public health interventions, accountability and spending. However, some sources such as

the Survey of Causes of Death (SCD) do reveal findings that may be used for international comparison⁴. In this short letter, I report findings from my review of the SCD (rural), Registrar General of India annual reports¹ and National Family and Health Survey reports^{5,6}. I confined my review to data from prior to 1994. More recent data on mortality requires a separate review because the tuberculosis incidence has changed due to the impact of HIV/AIDS after 1995. In addition, subsequent to 1995 some major Indian state boundaries were reclassified due to the proclamation of new states, which may have complicated comparisons. I focused on TB more than other respiratory diseases due to intensity of the problem and the availability of valid literature.

Review

Respiratory disorders are mainly due to unfavourable housing and living condition^{6,10}. In India, the National Family Health Survey (NFHS-I) 1993-1994, revealed that only



11% people live in pucca (good) houses while others live in kaccha houses (made of mud, thatch and other low-quality materials) and semi-pucca houses with mud walls and roofs^{6,10}. Regarding sanitary conditions, only 7% of households have a flushing toilet and a substantial proportion (87%) have no toilet facility. Most strikingly, one-fifth of households stable livestock inside the house, which may worsen human living conditions. A large-scale study suggests that biomass cooking fuels may be strongly associated with the risk of TB⁷. This situation leads an Indian TB prevalence of 138 per 100 000, while the world average is 59.7 per 100 000⁸. India has a 30% global TB burden; in India one person dies every minute from TB⁹.

In 1985-1986 the Indian Government introduced a universal immunisation program to vaccinate 85% of all infants by 1990, but by 1993 only 54% of rural children were vaccinated with BCG¹⁰. The prevalence of TB was high among children (10.3%) in the north zone of Indian in 2000. A high annual risk of infection (1.9%) also suggests the worth of intensification of TB control programs and immunisation coverage¹¹.

Smoking and chewing tobacco causes approximately 0.7 million deaths in India annually, mainly due to respiratory diseases¹². In rural areas, when compared with non-smokers, the risk of TB for smokers is 4.2 times higher¹². As the number of HIV/AIDS cases increases in India, TB has emerged as the most predominant opportunistic infection, with approximately 47% all infections in HIV positive individuals¹³. The risk of development of TB in HIV-infected patients in India is 6.9/100 person-years¹⁴. The prevalence of multi-drug resistant TB was high in the Indian population in 2000¹⁴. Its association with HIV disease was low, an observation contrary to published Western literature¹⁴. Higher rates of drug resistance for reserve drugs (ethionamide, kanamycin and/or ofloxacin) in-patients to whom these drugs had never been administered suggests the possibility of emerging spontaneous drug resistance¹⁵.

TB is still one of the major killers in rural India because of poverty and the lack of early detection. More than half (52.2%) the rural Indian population were below international poverty line of less \$1 per day income in 1992¹⁶. The Indian Government works through its National Tuberculosis Program and District TB Program in order to detect all TB cases and treat them effectively. State sponsored health education is an important strategy in order to educate the community, patients, children, students, and medical personnel regarding the various aspects of TB using booklets, pamphlets, TV and newspaper advertisements.

To counter the 2 million TB cases annually, anti-TB services are made available in 390 district TB centers, 17 850 rural health centers, 330 other clinics, and 17 TB demonstration and training centers¹⁷. There are approximately 47 000 beds available across the country¹⁸. Despite this infrastructure there are poor prescriptions made in communities, poor case management, lack of coordinated education and haphazard treatment research, resulting in drug resistance. Recently, to counter these problems at field level, partnerships were sought with non-governmental organizations to ensure the optimum use of existing resources¹⁸. The results are yet to be investigated in rural areas¹⁸. In this fight against TB, international assistance has been obtained from the World Health Organization, which provided consultants, fellowships, and equipment for the National TB Institute in Bangalore and the TB Research Center in Chennai¹⁷. Since 1979, the Swedish International Development Agency has also supplied X-ray units, anti-TB drugs, and vehicles¹⁷.

Asthma and bronchitis also take a major toll in India, and have been recorded as highest in Karnataka and lowest in the Punjab¹. These chronic diseases are most predominant among children and the aged population; A community-based study suggested a prevalence of 18% of rural children between 6 and 12 years suffer with symptoms suggestive of asthma¹⁹. The causes are not well understood. Major causative agents implicated are pollen grains, fungal spores, dust mites, insect debris, animal epithelia²⁰; in addition environmental factors such as poor housing conditions and bed dust allergy may be associated²¹. Labour-intensive and



otherwise unfavourable occupations are also seen as asthma-prone. The rural occupation of stone crushing is risky²², and if the labourers are children they are more prone to asthma. High asthma rates are also found among children who work in the fireworks industry²³. Certain pollens, mostly entomophilic, have also been studied as a causal factor²⁴. A study conducted to establish the possible role of cashew pollen shows that *Anacardium occidentale* may trigger an asthmatic response in allergic individuals²¹. The most common insects seen in the household, such as flies, cockroaches, mosquitoes and moths, will significantly influence the development of bronchial asthma²⁵. Therefore, poor household hygiene may predispose an individual to this condition.

The incidence of pneumonia in developing countries may reach 10% but it is approximately 16% in India²⁶. In our review, children less than 5 years of age were found to be at high risk and at exceptionally high risk in Haryana state⁴. The most frequent underlying causes of persistent pneumonia in children were post-tubercular bronchitis and asthma, or due to poor neonatal care management¹⁷. A pre-history of asthma is a useful prognosis for early action for prevention of severe pneumonia¹⁸. Another predominant cause for pneumonia is malnutrition, as the relative risk is 2.3 in the malnourished²⁷. Poor economic status (OR 4.95) and keeping animals at home (OR 6.03) were also associated with a high-risk of pneumonia after adjusting for confounders²⁸.

Children with no DPT (diphtheria, pertussis and tetanus) immunisation and no measles vaccine were at 2.7 times greater risk of exposure to pneumonia²⁷.

A case control study clearly marks that solid fuel use for cooking (OR 3.97)²⁸. It has been shown that 59% of households rely on wood for cooking fuel, 13% on crop residues and dung cakes, 17% on liquid petroleum gas, 8% on kerosene, and rest on other fuel sources⁶. Along with these unhealthy cooking sources, a mean number of 2.8 persons per room may adversely affect health and quality of life⁶. A study examined the effect of cooking smoke on

the reported prevalence of asthma in the elderly (>60 years) based on NFHS-II conducted during 1998-1999⁶. After controlling for all cofounders, the study revealed that the risk of asthma is 1.59 times (women 1.83 and men 1.32 times) among rural households that use biomass fuel for cooking²⁹. This suggests an urgent need to find a substitute for biomass fuel²⁹.

Conclusion

In summary, health and social development are inter-related. Health interventions and disease control programs depend on social development in rural India. Poverty associated symptoms such as poor housing conditions, biomass cooking fuel, low education, poor sanitation, malnutrition, irregular medical treatment and the comparative high cost of drugs seen in rural India are impediments to good health. Despite doubts about the causes of deaths in rural India, the prevalence of respiratory diseases cannot be ignored. Apart from TB, asthma and pneumonia require greater clinical attention and research.

In my view, two major implications from our findings need to be considered. First, steps should be taken to improve detection and treatment of respiratory diseases at field level, and specific programs implemented. Second, referral services should be enhanced, and comprehensive programs such as immunization, and tobacco, population and HIV/AIDS control programs should always address the issue of TB and other respiratory disorders. Globalization and internationalization of health care and redistribution of health services ought to create a new links among corporations, international organizations, government, communities, and families. Governments should make sure that benefits reach rural India. Finally, accurate reports of autopsy findings could provide systematic statistics on the causes of death and so inform on-going respiratory disease prevention programs.

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