

Toll on Human Resources due to lack of Energy, Water, Sanitation and their Health Impacts in Rural North India

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Introduction

A comprehensive survey was conducted covering 10 265 rural households from 118 villages in three states of Rural North India (RNI) comprising:

- Uttar Pradesh (includes Uttaranchal) – flood plain of the Ganges
- Rajasthan – dry desert
- Himachal Pradesh – mountainous region

The survey, which aimed to address issues of energy, water, sanitation and health, included a health survey of 58 768 individuals. However, health results are presented here only for direct responses reported for adults (above age 15 years). The three states were selected to reflect the socio-economic groups and differing terrain within the region. The sample was random and representative of the villages and households of Rural Northern India.

The data were analysed and the results scaled up to gain some macro-level policy insights for Rural North India. The three sampled states cover much of this region, as shown in Table 1.

Survey design

The survey was conducted at individual, household and village level.

Individual level

- Physiological characteristics: age, sex, height, and weight and behavioural characteristics such as smoking habits and literacy.
- Occupation, time activity pattern, cooking involvement, years of cooking and other behaviour.

Household level data was collected to get a comprehensive picture of socio-economic conditions, energy use pattern, water and sanitation related facilities:

Table 1 Percentage of Rural North India represented by sample households

	%
Land area	68.50
Estimated inhabited villages	86.78
Total population (2001 census: urban + rural)	77.17
Rural population (2001 census)	82.48
Rural households (2001 estimated)	82.71
Net Domestic Product at current prices (1998-99)	62.75

Box 1 Choosing households

Stage 1: Districts from each state were selected.

Stage 2: The number of households selected in each district was based on the distribution of all rural households in these districts.

Stage 3: The villages were grouped according to size of population: fewer than 1000; 1000–3000 and 3000–5000. Villages with populations of more than 5000 were excluded from the sample because they resemble semi urban areas.

Stage 4: Households within villages were selected using systematic random sampling.

- housing characteristics, number of rooms, type of house and type of kitchen, location of kitchen, number of doors and windows in the kitchen
- cooking behaviour, environmental priorities of women, number of meals cooked using different fuels, hours of cooking, cooking involvement of different age groups and type of involvement (Figure 1)
- willingness to pay to improve water and sanitation facilities
- energy-use pattern included information on consumption of biofuels and commercial fuels for cooking, place of procurement of cooking fuel, time, distance and effort involved in procurement, progress along the energy ladder etc.
- people's willingness to reduce the impact of indoor air pollution including information on people's choice for type of intervention, reason for not using clean fuels, willingness to pay for additional clean fuel and additional demand for kerosene in the area
- water availability, source of collection, efforts required to

fetch water, problems faced in collection, quality, storage and filtering practices, etc.

- data on availability of sanitation and sewerage facilities and willingness to contribute to improve water, sanitation and sewerage facilities was also collected through the survey.

Village level surveys

- Validation of data acquired at household and individual level (Figure 3).
- Overall picture of the village.



Figure 1 Polluted kitchen environment due to cooking

Box 2 Energy in Rural North India

Biofuel

- 96.6% households use biofuel for cooking
- 56 million tonnes biofuels are gathered annually (Figure 2)
- 35 million households spend 8000 million hours annually in gathering biofuel
- Forests contribute 39% of the fuelwood needed
- 33 % of rural households are willing to contribute to the cost of reducing smoke in their kitchen

Kerosene

- 4.9% of households use kerosene for cooking
- 34% of the households that use kerosene as a cooking fuel buy it on the open market
- 97% of households procure it from fair price shops
- 1.8 million households use 1.74 million tonnes of kerosene per annum for cooking and lighting
- 49% of households are willing to pay more than the market price to purchase kerosene for cooking

LPG

- 4.95% households use LPG for cooking

Biogas

- 0.2% of households use biogas for cooking

Electrification

- 63% of households are electrified



Figure 2 35 million households spend 8000 million hours annually in gathering biofuel

Box 3 Water and sanitation in Rural North India

Water

- 62% of households do not have a water supply in their home
- 22.78 million households spend 32 billion hours per annum collecting water from outside the home

Sanitation

- 10% of households have a toilet facility inside the house
- 1% of households use community toilets
- Only 5.6 % of households have a sewerage facility

Proportion of households willing to pay for:

- Clean drinking water – 9 %
- Community based drinking water supply – 25 %
- 'In-home' toilets – 29 %
- Community toilets – 22 %
- Sewerage facilities – 27 %

Toll on human resources

Smoke-related diseases

Analysis of the prevalence of respiratory diseases shows that 24 million adults (17% of the total rural adults) show respiratory symptoms. Out of these, 15 million adults (13% of the total rural adults) have serious respiratory symptoms. These respiratory symptoms, confirmed by medical practitioners, are shown in Figure 4 and indicate that:

- 6 million adults (4.3% of the total rural adults) suffer from bronchitis
- 4 million (2.9%) suffer from pulmonary tuberculosis
- 3 million adults (2.1%) from chest infections
- 2 million (1.45%) from bronchial asthma.

Bronchitis and pulmonary tuberculosis are strongly associated with indoor pollution, and the latter two may possibly act as triggering factors.

Water-related diseases

Prevalence of water related diseases is recorded in 13 million adults. These diseases occur mainly due to unhygienic conditions and the non-availability of clean drinking water.

Health

- A questionnaire produced by the Medical Research Council (MRC) in the UK in 1986 for respiratory symptoms was followed, which included questions in six symptom categories.
- Measurement of PEF (peak expiratory flow), an indicator lung function and the extent to which it is impaired, was also conducted.
- Symptoms of diseases such as worms in stool, diarrhoea and jaundice were recorded.



Figure 3 Woman wearing air sampler to measure pollution levels

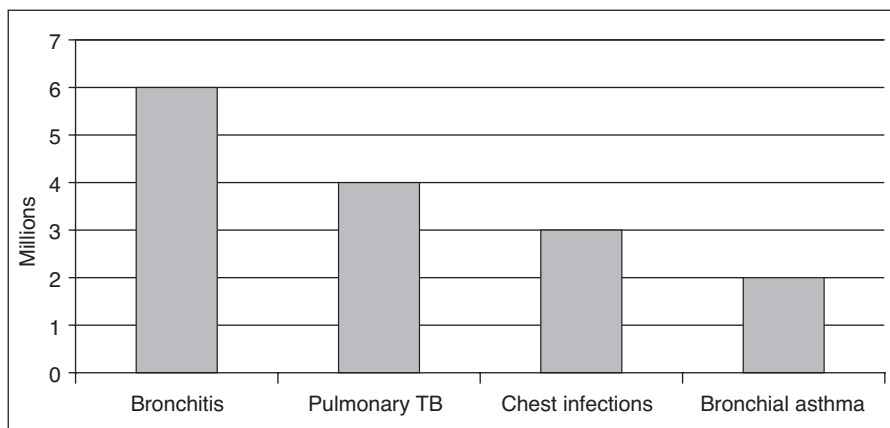


Figure 4 Prevalence of respiratory diseases

Water related diseases, measured in the previous one month showed that of the 13 million adults (9.4% of total adults):

- 5.5 million adults (3.9%) pass worms in stool
- 7.8 million adults (5.7%) suffer from diarrhoea; lasting more than 2 days
- 1.7 million adults (1.2%) suffer from jaundice in past 2 years

The cost of respiratory and water-related diseases

Despite considerable government subsidies to health centres, the rural adult

population spend considerable sums of money on healthcare, as shown in Table 2 and Figures 5, 6 and 7.

Economic burden due to energy, water, sanitation and health problems per year

The economic burden comprises the time spent in both water and fuel collection, the direct expenditure on health by adults, and the economic value of working days lost due to the health impacts of poor energy, water and sanitation provision – as shown in Table 2.

Table 2 Economic burden due to energy, water, sanitation and health problems (per year)

	Energy (a)	Water (b)	Total (a+b)
Days spent/lost (million)			
● Days ¹ spent in collection	822	3212	4034
● Days lost due to diseases	260	521	781
TOTAL	1082	3733	4815
Monetary value* of working days spent/lost (Rs billion)			
● Fuelwood gathering and water collection	49	193	242
● Due to diseases	16	31	47
Direct expenditure on health (Rs billion)	21	13	34
Total economic loss (due to improper energy and water facilities and due to health impacts of their procurement and use)	86	237	323

1 Days spent in fuelwood gathering and water collection are given in column (a) and (b) respectively

2 Respiratory and eye-related diseases are shown under energy column (a) and water and sanitation related diseases under water column (b)

* Taking 10 hours as a standard working hours per day

* Includes imputed cost per working day taken at Rs 60 per day (approx. wage rate)

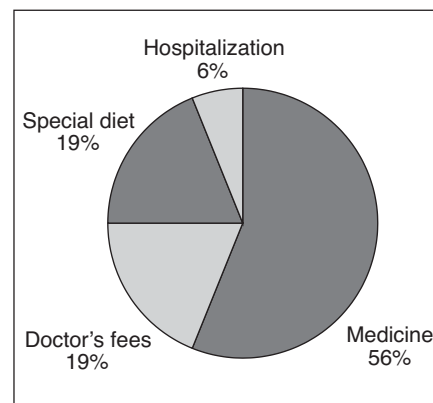


Figure 5 Respiratory disease costs

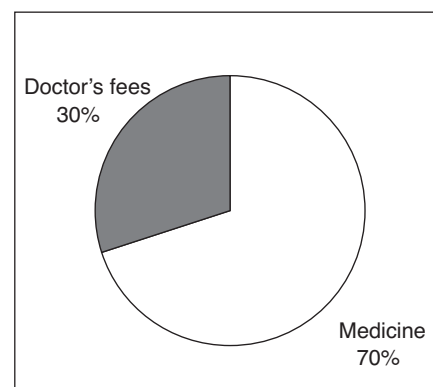


Figure 6 Costs associated with eye disease

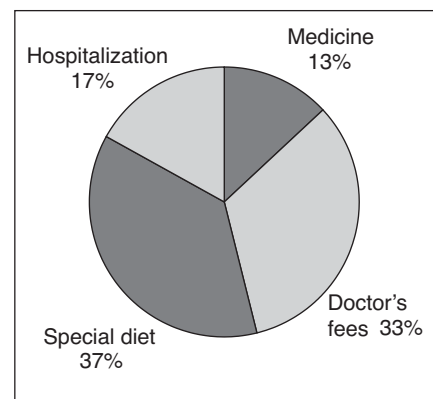


Figure 7 Costs associated with water-related disease

Conclusions

From the above table, it can be seen that a loss of 781 million working days (two to three work days per adult) per year due to respiratory and water-related diseases leads to a loss of Rs 47 billion per annum, if calculated using normal wages. The real cost, however, due to improper energy and water facilities, and health impacts of their procurement and use, amounts to a loss of more than Rs 320 billion per annum.