Economic impact of pulmonary tuberculosis on patients and their families of Dharan municipality, Nepal

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ABSTRACT

Tuberculosis (TB) affects mostly economically active population in underdeveloped and developing countries, therefore TB can have far reaching economic and social consequences among infected people and their household members. The objectives of this study were to estimate the household expenditure before and during the course of disease, to explore the direct and indirect cost burden of tuberculosis in terms of annual family income and to compare the total cost burden in a family of case treated with directly observed treatment shortcourse (DOTS) and without DOTS. A total of 160 treatment completed, pulmonary tuberculosis (PTB) cases fulfilling the inclusion criteria were interviewed. The median patients income before and during illness was US$1.95 and US$0.9 respectively. Similarly, household expenditure before illness was US$3.24 and during illness was US$4.28. Direct cost burden in terms of annual family income was higher (15.2%) than indirect cost burden (8.2%). But, free distribution of anti tuberculosis therapy (ATT) through DOTS reduced the total cost burden of patient by more than 8%. In conclusion, overall cost burden of pulmonary tuberculosis is high even though the treatment is free of cost.

Keywords: Direct and indirect cost, DOTS, household expenditure, PTB.

INTRODUCTION

Tuberculosis (TB) is one of the most serious infectious threats in the world.[1] It affects mostly economically active population in developing and underdeveloped countries like Nepal and therefore it can have far reaching economic and social consequences for those infected and for their households and communities.[2] Even though the national tuberculosis programme provides free diagnostic and treatment services to all the registered patients, TB affects the most productive age group resulting high economic burden for a society, with the patients incurring other direct and indirect costs like transportation, hospital stay, and reduced working hours. The WHO calculates that an average TB patient loses three to four months of work-time, and up to 30% of annual household earnings. Income loss due to TB is approximately US$12 billion in the poorest communities of the world. The World Bank estimated that the loss of productivity attributable to TB is 4-7% of some countries gross domestic product.[3,4] There is growing evidence of households being pushed into poverty or forced into deeper poverty when faced with substantial medical expenses, particularly when combined with a loss of household income due to ill health.[5] If the cost burden of TB is greater than 10% of annual household income, it will be catastrophic for the household.[6]

Though, Nepal carries huge burden of TB, there is paucity of information on economic brunt of this disease and hardly any studies have focused on this aspect. The present study was therefore conducted to assess the overall economic impact of household by calculating incomes and expenditures, by comparing cost burden in terms of annual family income.

METHODS

A community based descriptive cross-sectional study was conducted with 160 treatment completed pulmonary tuberculosis (PTB) cases of Dharan municipality, Eastern Nepal from October 2008 to September 2009. Semi structured questionnaire were pretested and prepared and face to face interview method was applied to collect the data. Participants willing to give consent and information were included in the study.

Primary data were collected through interview schedule with the respondents either by one attempt or multiple attempts. Secondary data were collected from directly observed treatment shortcourse (DOTS) centers and sub centers. Cost of prescribed drugs was calculated as given in Current Index of Medical Specialties (CIMS)[7] and that of sputum test was considered as per unit cost charged at B.P. Koirala Institute of Health Sciences. Obtained data were coded and entered in excel sheet and then validity test was done. Chi Square test was carried out in categorical variables and Wilcoxson rank sum test for non-parametric distribution to find out the significant association. For this statistical software SPSS version 11 was used. For non-normally distributed data median and inter quartile range were calculated.

Cost calculation: Direct cost estimates were calculated as the product of the patient-reported cost parameter (e.g. consultations, investigations, other drugs, travel cost, lodging, special food and expenditure incurred for persons accompanying of patient while visiting health facility.) Indirect costs were estimated only for loss of wages due to illness of employed respondents. It was calculated by multiplying the median number of work days lost (60days) by median income of patient before illness US$1.95. Total costs are projected for the entire 6 months of treatment. All costs are reported according to the US$ value of 1st October 2009, (1US$=NRs77)

Ethical consideration: Informed consent was obtained from the Dharan municipality as well as DOTS center and sub-centers of Dharan. Utmost care and importance was given while maintaining confidentiality and privacy of the patient throughout the study period.

RESULTS

Of the total 160 enrolled participants, males comprised the majority (59.4%) with median age of 42 years (IQR 24.5-55.0) and most (54.3%) were of economically active age group (15-59). Patients who worked as daily wage earner (33.8%) are mostly found as respondent followed by dependents (30.6%) (Table-1)

Patient's income and household expenditure before and during illness was calculated excluding dependent patients (N=111). A significant reduction in patients' income was observed during illness than before and household expenditure noticeably increased during illness (Table-2).

The direct cost burden of disease was higher (15.2%) than indirect cost burden (8.2%) in terms of annual family income. When compared the total cost burden, between patients enrolled for treatment with DOTS programme and without DOTS, it was found to be 8% higher in the later group, who were purchasing the drugs from private pharmacy whereas treatment was provided free of cost through DOTS programme.

In this study, financial status in terms of income has been found to bear the burden of illness significantly, i.e. less earning household had to propel by alternative strategies like selling assets, taking loan or transfer payment.

Table-1: Demographic characteristics of treatment completed PTB patient (n=160)

Variable (N=160)	N (%)
Age groups (years)	
<15	6(3.8)
15-29	41(25.5)
30-44	46(28.8)
45-59	39(24.4)
>60	28(17.5)
Median age = 42 (IQR 24.5 -55.0)	
Sex	
Female	65 (40.6)
Male	95 (59.4)
Patient occupation	
Labour/Daily wages	54 (33.8)
Dependents	49 (30.6)
Services	25 (15.7)
Business	16(10.0)
Others	16(10.0)

DISCUSSION

TB diagnosis and treatment creates a staggering economic burden on patient and their families. TB overwhelmingly affects the poor and it infects people in their most productive years. Drug-susceptible TB treatment is often free but patients have to incur other direct and indirect costs.[8]

The present study has documented the overall total cost burden to the patient and family, incurred by patients with PTB. This study is comparable with other studies.[9-11] In the matter of productive age group affected from tuberculosis, it is well known that they are economically active on whom the survival and development of children depends, consequently, hampers the development of both individual and society.[12]

In terms of sex ratio of patients, this study is compatible with similar studies, although some studies documented higher numbers of male and almost even numbers of both sexes.[13-17]

The findings of a study conducted by Rajeswori R[15] in India was almost similar to the finding of present study where almost one third respondents were non earning before illness. This number has been increased during illness when more than half (57.1%) were non earning, which is approximately 15% higher than the findings of a study in India.[18] This shows that tuberculosis has capacity to reduce work ability resulting economic burden on family.

In this study patient's income before illness was observed to be less than a study conducted in India[15] and Zambia.[19]

In the present study, median household expenditure before illness was found to be US$3.24/day, and during illness it was US$3.89/day. In contrast to this finding Kamolratankul *et al*[20] reported that US$ 5.01/day before illness and US$1.10/day after diagnosis or during illness. This reduction in expenditure might be attributable to cut off of expenses in clothing and alcohol/tobacco and diverted on treatment rather than household necessities. Regarding the direct and indirect cost burden, our study shows that direct cost is 7% higher than indirect cost.

Table-2: Household expenditure before and during illness

Variables	Median (IQR) (US$)/day	P.value*
Household expenditure (N=160)		
Before illness	3.24 (2.40 - 4.09)	<0.001
During illness	3.89 (3.37- 6.49)	
Patients' income (N=111)		
Before illness	1.94 (1.29-2.59)	0.001
During illness	0.90 (0-1.56)	

*p value based on wilcoxon ranksum test

However, the study conducted in Thailand[20] and Zambia[21] and correspond our study that the indirect cost of TB was found to be higher than direct cost by 3.5% and 6.3% respectively. Surprisingly the study in Tanzania[13] and India[15] documented indirect cost higher than direct cost of TB by 70.7% and 12% respectively.

Median total cost incurred by patient in this study was US$326.62 which comprised 22.9% of annual household income. It seems to be catastrophic for household, as mentioned by Russell.[6] These findings are well-matched with a study in India[22] and almost double in another study of India.[17] It was reported almost four times greater in a study in Tanzania.[13] Different studies documented total cost burden for the family was lower than our study.[20,21]

On the issue of providers' perspective, the total cost burden of family of this study would be 31.3% of annual income, if the treatment was not provided free of cost.

As reviewed by Russell S.[6] the household financial burden would be catastrophic in developing countries if the total incurred cost of TB is more than 10% of annual household income. It is obvious that patients and families coping with TB encompass a great financial burden, which required taking alternative financial solution.

WHO, in 2000[2] reported that the poor people have more limited set of coping strategies because, often the only asset they have to sell is their physical labour. The poor do not have a buffer to make use of them through the period of reduced income and they have little access to borrowing. In contrast to this report, present study demonstrated that significant numbers of patient, who had less income were found to be have more coping strategy. This reveals, higher the income, lower the cost burden, signifying that poor become poorer due to hidden cost of TB on family. This finding was compatible with the finding of P. Kamolratanakul *et al*[20] that particularly lower income group reported the sale of household assets and the use of bank loan. Present study is comparable with a study in Zambia[19] in the matter of higher total cost burden.

From this study, it can be concluded that the cost burden of PTB is high even though the treatment is free of cost. It may require unusual interventions beyond the traditional scope of medical services to address the disease successfully. Tuberculosis affects not only the productivity of an individual, but also accelerates the total cost which compels the family to manage alternatively.

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