

Cost Burden of Dengue Fever in a Rural Ramanagara District of Karnataka State

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ABSTRACT

Introduction: Dengue fever is an arboviral disease caused by dengue virus, which is a single-stranded RNA virus and belongs to family Flaviviridae. Dengue fever (DF) has emerged as a global public health problem in recent years. The problem has become hyperendemic in many urban, peri-urban and rural areas, with frequent epidemics South-East Asia is one of the regions with highest risk of DF and accounts for 52% of the worldwide risk. In India, according to World Health Organization, 70.8% of the total health care expenditure was out-of-pocket in 2010. According to the World Bank, the percentage of out-of-pocket expenditure is as high as 86.4%. Dengue fever causes a significant economic and social burden on the population of endemic areas. This study was conducted with the objective to estimate the direct and indirect cost expenditure on families of dengue affected members and to assess the financial coping mechanisms of the families.

Materials and methods: Confirmed cases of DF with either NS-1 positive or IgM positive or positive for both and willing to participate in the study formed the sample. After taking informed consent, study subjects were interviewed using a pretested, semi-structured questionnaire. Questionnaire included demographic profile and questions related to their financial coping mechanisms. Information on the laboratory bill, hospital bill, and pharmacy bill was collected from the hospital records on the day of patient's discharge. Indirect cost, such as travel expenses, food, and beverage expenses were collected from the family members of dengue patients. Necessary permission was taken from the hospital and RajaRajeswari Medical College & Hospital, Bengaluru, Karnataka, India. Data were collected and compiled in the MS excel sheet and were analyzed using Statistical Package for the Social Sciences version 20.0. Descriptive statistics-qualitative variables were presented as frequencies and percentages, continuous variables, such as hospital stay and cost are expressed in terms of mean and standard deviation.

Results: Average direct cost per household for treatment of dengue was 5185.395 INR. Average out-of-pocket expenditure per household for treatment of dengue was 6190 INR. Most of the households used savings as a mechanism to cope up with the increased expenditure due to dengue. About 77.6% of the households diverted their savings to pay for the treatment of dengue, 18.4% of households borrowed money from friends

and relatives to pay the hospital bills, and the remaining 3% respondents used their health insurance as a financial coping mechanism to get the treatment for dengue.

Conclusion: There is a substantial financial loss to the Indian families of which a significant proportion lies below the poverty line. Government is the only agency working for the prevention of this kind of vector-borne disease. Public awareness in the community about the treatment of dengue is very scant. People use their savings which is the major method to cope up with expenditure due to DF. Significant proportion of the population uses the incurred borrowing as a method to pay for the treatment of dengue, which is a matter of concern.

Keywords: *Aedes aegypti* mosquito, Arboviral disease, Awareness, Cost burden, Dengue fever.

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INTRODUCTION

In recent decades, dengue has emerged as a notable public health problem, associated with morbidities and mortalities.¹ The disease is hyperendemic in urban, peri-urban, and rural areas, with SouthEast Asia accounting for a global risk of 52%.² Dengue is a arthropod-borne viral disease caused by the bite of the infected *Aedes aegypti* mosquito. The disease has wide spectrum of symptoms starting from fever, myalgia, joint pains, easy fatigability, etc. It is also called by "break-bone fever". The social and economic burden imposed by dengue in endemic areas is very high.³ Estimation of the disease and its economic burden is essential in formulating the policy decisions on research priorities, guiding decision makers, developing prevention programs, training for management of disease, and introduction to new technologies.³ This study was conducted with the objective to estimate the direct and indirect cost expenditure on families of dengue affected members and to assess the financial coping mechanisms of the families.

MATERIALS AND METHODS

A cross-sectional study was conducted in private hospital, Ramanagara from June to September 2015. All the confirmed cases of dengue fever with either NS-1 positive or

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IgM positive or positive for both and willing to participate in the study formed the sample. After taking informed consent, study subjects were interviewed using a pre-tested, semi-structured questionnaire. Questionnaire included demographic profile and questions related to their financial coping mechanisms. Information on the laboratory bill, hospital bill and, pharmacy bill was collected from the hospital records on the day of patients discharge. Indirect cost, such as travel expenses, food, and beverage expenses were collected from family members of dengue patients. Necessary permission was taken from the hospital and RajaRajeswari Medical College & Hospital, Bengaluru, Karnataka, India.

Data were collected and compiled in the MS excel sheet and were analyzed using Statistical Package for the Social Sciences version 20.0. Descriptive statistics-qualitative variables were presented as frequencies and percentages, continuous variables, such as hospital stay and cost are expressed in terms of mean and standard deviation.

RESULTS

Out of 408 patients tested for dengue, 76 patients were found to be positive for either NS1, IgM or both. Among them, 44 (57.9%) were males and 32 (42.1%) were females. Mean age in years is 25.17 ± 12.589 . Majority of them belonged to the age group between 10 and 20 years (Table 1).

Out of 76 patients, 44 (57.9%) of them were hospitalized and remaining seen on outpatient basis. Frequency of days spent in hospital varied from minimum 1 day

Table 1: Distribution of study participants according to demographic variables

Variables	Frequency (%)
Age	
10–20	33 (43.4)
21–30	25 (32.9)
31–40	11 (14.5)
41–50	2 (2.6)
51–60	4 (5.3)
61–70	1 (1.3)
Sex	
Female	32 (42.1)
Male	44 (57.9)
Religion	
Hindu	46 (60.5)
Muslim	28 (36.8)
Christian	2 (2.6)
Month	
June	17 (22.3)
July	28 (36.8)
August	19 (25)
September	12 (15.7)

Table 2: Distribution of patients according to the direct cost incurred for treatment

Cost (INR)	Frequency (%)
≤ 2000	20 (6.3)
2100–5000	21 (27.6)
5100–8000	21 (27.6)
8100–10000	6 (7.9)
>10100	8 (10.5)
Total	76

to maximum 13 days. Average number of days spent in hospital by 44 respondents who were hospitalized was 1.65. Maximum number, i.e., more than 70% of the patients stayed at hospital for 2 to 3 days.

Average direct cost per household for treatment of dengue was 5185.395 INR. Average out-of-pocket expenditure per household for treatment of dengue was 6190 INR (Table 2).

Most of the households used savings as a mechanism to cope up with the increased expenditure due to dengue. About 77.6% of the households diverted their savings to pay for the treatment of dengue, 18.4% of households borrowed money from friends and relatives to pay the hospital bills, and the remaining 3% respondents used their health insurance as a financial coping mechanism to get the treatment for dengue.

DISCUSSION

In this study, it was found that the mean age in years was 25.17 ± 12.589 . Majority of them belonged to the age group between 10 and 20 years. Similar results were seen in a study conducted in Haryana by Kumar et al with mean age of 24.54 years and around 52% of them were less than 18 years of age. A study conducted in Delhi by Hussain et al also showed similar results with majority, i.e., 37.7% of them were below 20 years of age.⁴ Most of the studies show that younger age groups are more affected.

Among the hospitalized, around 58% were males. This may be because most of the men are farmers and the exposure to mosquitoes is more compared to females. Also, some of the habits like sleeping outside the house and using less clothing to cover the body might have aggravated the exposure status. Similarly, study conducted in Haryana also had majority of males (64%) as sufferers, such a large increase in hospitalization might be more due to gender biases in Haryana.

The role of environmental factors in infectious diseases is obvious. In majority of countries, dengue epidemics occur during the humid, warm, and rainy seasons, where favoring of abundant mosquito growth is seen and short extrinsic incubation period is observed.⁵⁻⁷ In our study conducted in monsoon season showed large

number of cases during the month of July. This finding is in agreement with studies conducted elsewhere.^{6,8}

Frequency of days spent in hospital varied from minimum 1 day to maximum 13 days. Average number of days spent in hospital by all the 44 respondents was 1.65. Similiar findings were seen in studies conducted by Kumar et al and Suaya et al.⁹ A study from Thailand also calculated the average hospital stay to be 3.5 days.¹⁰ In this study, the average number of days of stay was found to be less, may be because in private hospital due to increased cost of health care, people were finding it difficult to afford and take a discharge.

The average cost per case in this study was 11278 INR. Average direct cost per household for treatment of dengue was 9484 INR. Average out-of-pocket expenditure per household for treatment of dengue was 1794 INR. Direct cost constituted to around 84 and 16% formed indirect cost. Similar findings were seen in a study conducted in Haryana,⁴ where the average cost per case was around 11563.50 INR, which included direct cost (10022.85 INR) and indirect cost (1540.65 INR). Out of the total expenditure, 86.67% accounted for direct cost whereas 13.33% accounted for indirect cost. A study on the economic impact of dengue in Vietnam states the average cost for a family of dengue patient is US\$ 61.3 (3720 INR), of which US\$ 32.7 (2027 INR) is direct cost and the rest US\$ 28.7 (1693 INR) is indirect cost.¹¹ Similarly, a study performed in Cambodia also reveals the average direct cost was US\$ 32(1887 INR) for a dengue patient.¹²

Table 3: Cost distribution among study subjects

Study subjects	Frequency	Direct cost (INR)	Indirect cost (INR)
Hospitalized	44 (57.9%)	7548 ± 3664	1578 ± 1080
OPD	32 (42.1%)	1936 ± 620	216 ± 105

In our study, majority of the households diverted their savings to pay for the treatment of dengue, 18.4% of households borrowed money from friends and relatives to pay the hospital bills and the remaining 3% respondents used their health insurance as a financial coping mechanism to get the treatment for dengue. Similar findings were seen in studies conducted elsewhere. It is

clearly seen that in India the percentage of people getting benefited from one or other kind of insurance schemes is very less. This could be due to lack of awareness in most of the cases and also due to many complicated schemes in frame recently. A thought process on advertising the schemes in a different way from the present should evolve and studies to be done on why the insurance schemes, though many in number, are less used by the people who need them more.

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