

Research Article

Cost of Illness of Malaria in Coastal Karnataka, India

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A B S T R A C T

Background: Malaria is one of the major health issues in developing and underdeveloped countries. It is considered to be one of the main reasons for morbidity and mortality. This study intends to estimate the cost of illness of malaria at the household level and health service utilisation pattern for malaria treatment in coastal Karnataka.

Materials and Methods: It was a secondary data-based cross-sectional study comprising people suffering from malaria during the period from September to December 2016.

Result: The median gross total cost of illness (a single episode of malaria) was 4,000 INR, the median direct medical cost was zero, and the median direct non-medical cost was 100 INR. The majority of individuals (92.2%) took treatment from public healthcare sectors.

Conclusion: The effective implementation of anti-malarial interventions by the District Health Authority, District Vector Borne Disease Control Office, and treatment from public health sectors resulted in negligible direct medical cost which made a remarkable reduction in the cost of illness of malaria.

Keywords: Malaria, Cost of illness, Vector-borne, Treatment, Public health Sector, Health Insurance

Introduction

Malaria is a severe public health issue all around the world, especially in tropical, subtropical regions, and underdeveloped parts of the world. Malaria is one of the main reasons for deaths and morbidity in underdeveloped and developing countries.¹ It was found that around 3.2 billion people are living at a high possibility of being infected with malaria in 106 countries and union territories. Among the total global malarial cases, 13% were found in the countries of the Southeast Asia Region (SEAR). In India, nearly 539 million population are residing in high transmission zones which are defined as the area having

more than one malaria incidence per 1000 population. It has been estimated that almost 61% of malaria cases and 41% of malaria deaths among SEAR countries happens in India alone.²

India is having a national health programme for malaria control since 1953 which has been working as an umbrella programme named "National Vector Borne Disease Control Programme (NVBDCP)" since 2004. The actual incidence of malaria is higher and a substantial number of infected people may look for treatment from private healthcare sectors that don't answer to NVBDCP.³ Researchers have identified that actual malaria cases in India are 9 to 50

times higher than the government health authority data.⁴ It has been found that the reason behind underreporting is the broad Annual Blood Examination Rate (ABER). It indicates insufficient malaria surveillance by Indian states, poor quality of smear examination, and negligence in reporting the cases by the private health sector. The aggregate economic burden due to malaria fever was around 1940 million US dollars. It is assumed that each Rupee put into control of malaria fever in India produces an immediate return of 19.70 INR.⁵ Globally each instance of malaria has been appeared to cost family units in any event. Mothers and different caretakers give up an additional 2 to 4 days whenever a kid or relative suffers from malaria, which creates even more indirect expenses for households.⁶

Prior literature stated that the average total cost of treatment in India was around 475 INR for a person in 2012, whereas the loss of earnings in a day was around 213 INR. Also, the total days of work loss were found to be around 10 days. Death rates due to malaria are not a noteworthy element because 75% of the burden originates from income loss and 25% occurs from expenditures of treatment.⁷ A study in 2015 revealed that in India nearly 21.6 crore individuals are covered under health insurance, which is less than 1/5th of India's total population. However, around 67% of individuals among those 21.6 crores are covered by public sector health insurance companies.⁸ It is found that in India, the private healthcare sector is essential and it is the primary foundation in the country's healthcare system. In urban India, around 70%, and in the rural picture of the country, nearly 63% of families are depending on the private healthcare sector for their healthcare issues.⁹

Researchers have observed poor health-seeking behaviour and health insurance coverage in the case of malaria.¹⁰ If the highest malaria burden among people with low socio-economic status is taken into consideration then the malaria morbidity is expected to be doubled and also the loss of productivity due to malaria would become a considerable part of the total economic burden. Presently in India, malaria may not result in many deaths, but it puts an enormous burden through sickness and also loss of productivity which affects households' welfare. At a macro level, it affects the country's growth and income whereas at a micro-level, individual and family expenditures will be affected.^{11,12} Although the above-mentioned situations are in India, there are no studies that estimate the microeconomic cost of illness of households who suffered from malaria.

Objectives of the Study

To estimate the direct and indirect costs incurred by the malaria patients in an urban area of a district of coastal Karnataka.

To ascertain the pattern of health service utilisation among

people suffering from malaria in an urban area of a district of coastal Karnataka.

Materials and Methods

Study Design

Retrospective cross-sectional study.

Study Setting

The study was conducted in an urban area of a district of coastal Karnataka.

Study Duration

This study was carried out for 5 months starting from January 2017 to May 2017.

Inclusion Criteria

The study involves people suffering from malaria (laboratory positive smear cases) in an urban area of a district of coastal Karnataka, reported to the District Vector Borne Disease Control Office (DVBDCO) of that district during the period from September to December 2016.

Exclusion Criteria

People denying to give consent for the participation and those who were diagnosed with Rapid Diagnostic Kit alone were excluded from the study.

Study Tool

A structured questionnaire was used to collect data from the participants.

The following details were collected using the questionnaire:

- Socio-demographic details
- The health scheme/ insurance status of the respondent, type of health insurance, and insurance that is instrumental in reducing the cost
- Healthcare utilisation pattern during malaria
- Cost Information: Estimation of cost of illness has been made based on the two components:

Direct Cost: It includes direct medical cost and direct non-medical cost for both outpatient and in-patient care.

Indirect Cost: It includes indirect expenses of both ill patients and their caregivers.

Data Collection

There were 183 laboratory smear-positive cases of malaria during the period from September to December 2016. Amongst them, 128 individuals gave consent for participation in the study. The researcher approached the study participants with the questionnaire. Before giving the questionnaire to the participant, the researcher explained the purpose and procedure of the study and then obtained the written consent.

Data Analysis

The data were entered and analysed in the statistical software SPSS version 16. Descriptive statistics were expressed as frequencies and percentages. Summary statistics of direct and indirect costs were reported as a median and inter-quartile range.

Ethical Considerations

Ethical clearance for the study was obtained from the Institutional Ethics Committee (IEC No. 918/2016). Involvement in the study was voluntary. Informed consent was obtained from the participants and the reason behind the study was revealed to them using a predefined information sheet. All the study participants were guaranteed privacy and anonymity and efforts were made to make sure the concealment of the material.

Result

Socio-demographic Characteristics of the Study Participants

128 participants were included in the study. The details of the demographic profile are presented in Table 1.

Cost of Illness

The data collected for the calculation of the cost of illness was not normally distributed. This was because of the wide disparity in the data due to the presence of zero and extreme values. Therefore, median and Inter-Quartile Range (IQR) were used to compare the variables in two or more subgroups.

Direct Cost

The median of the total direct cost of illness incurred by study subjects was found to be 120 INR for a single episode of malaria (IQR-291.25). The total direct cost of illness constituted to be 12.27% of the total cost of illness. The median of the direct medical cost of illness was observed to be zero (IQR-190), whereas the median of direct non-medical cost of illness was detected to be 100 INR (IQR-140) for a single episode of malaria.

The breakdown of the direct cost for the treatment of malaria at the outpatient level is formulated in Table 2.

Indirect Cost

The breakdown of indirect cost for the treatment of malaria at the outpatient level is expressed in Table 3.

Direct Cost of Hospitalisation and Outpatient Visits

The breakdown of the direct cost for the treatment of malaria during outpatient visits and hospital stays is shown in Table 4.

Table 1. Socio-demographic Characteristics of the Study Participants

Characteristics	Number	Percentage
Gender		
Female	23	18.0
Male	105	82.0
Age (in years)		
0-15	11	8.6
16-30	58	45.3
31-50	52	40.6
Above 51	7	5.5
Religion		
Hindu	120	93.8
Muslim	7	5.5
Christian	1	0.8
Per-capita monthly income (in rupees)		
949 to 1,835	5	3.9
1,836 to 3,098	66	51.6
3,099 to 6,260	56	43.8
6,261 and above	1	0.8
Educational status of the participant		
Illiterate	7	5.5
Primary school certificate	41	32.0
Middle school certificate	29	22.7
High school certificate	39	30.5
Intermediate or post-high school diploma	11	8.6
Graduate or postgraduate	1	0.8
Occupational status of the respondent		
Unemployed/ Student	18	14.1
Unskilled worker	50	39.1
Semi-skilled worker	53	41.4
Skilled worker	5	3.9
Clerical, shop owner, farmer	2	1.6

Indirect Cost of Hospitalisation and Outpatient Visits

The breakdown of indirect costs for the treatment of malaria during hospitalisation and hospital visits is conveyed in Table 5.

Table 2. Breakdown of the Direct Cost of Illness

Direct Cost		Cost (in rupees)	Interquartile Range	Median (in rupees)
Direct medical cost	Total consultation charges	1320.00	0.00	0.0000
	Total laboratory charges	3530.00	0.00	0.0000
	Total other diagnostic procedure charges	0.00	0.00	0.0000
	Total medicinal cost	1655.00	0.00	0.0000
Direct non-medical cost	Special diet and food charge	0.00	-	0.0000
	Total traveling cost	7046.00	120.00	60.0000

Table 3. Breakdown of the Indirect Cost of Illness

Indirect Cost	Sum	Interquartile Range	Median
Lost paid working hours of the respondent due to malaria illness (in hours)	7658.00	50.50	68.0000
Lost wages of the respondent due to malaria illness (in rupees)	356198.00	2497.50	3330.0000
Lost unpaid working hours of the respondent due to malaria illness (in hours)	239.00	9.00	12.0000
Lost paid working hours of the companion due to malaria illness of respondent (in hours)	1689.00	49.50	20.0000
Lost wages of the companion due to malaria illness of respondent (in rupees)	83570.00	2280.00	950.0000
Lost unpaid working hours of the companion due to malaria illness of respondent (in hours)	0.00	-	0.0000
Total charges incurred due to appointing paid caregiver including travelling, food and service charges	0.00	-	0.0000

Table 4. Breakdown of the Direct Cost of Illness including Outpatient Visits and Hospitalisation Cost

Direct Cost		Cost (in rupees)	Interquartile Range	Median (in rupees)
Direct medical cost	Total OP consultation charges	1100.00	50.00	0.0000
	Total OP laboratory charges	1800.00	0.00	0.0000
	Total other OP diagnostic procedure charges	0.00	-	0.0000
	Total OP medicinal cost	570.00	20.00	0.0000
	Total hospital stay charges	15285.00	1200.00	20.0000
	Total IP consultation charges	13350.00	800.00	0.0000
	Total IP laboratory charges	7250.00	250.00	130.0000
	Total other IP diagnostic procedure charges	0.00	-	0.0000
	Total IP medicinal charges	3619.50	222.00	0.0000
	Other hospital procedure charges	990.00	0.00	0.0000
Direct non-medical cost	Special diet and food charge in OP visits	0.00	-	0.0000
	Total travelling cost in OP visits	1336.00	100.00	0.0000
	Special diet and food charge in IP visits	0.00	-	0.0000
	Total travelling cost in IP visits	3010.00	60.00	100.0000

Table 5. Breakdown of the Indirect Cost of Illness including Outpatient and Hospitalisation Cost

Indirect Cost	Sum	Interquartile Range	Median
Lost paid working hours of the respondent due to malaria illness (in hours)	2345.00	52.00	75.0000
Lost wages of the respondent due to malaria illness (in rupees)	120070.00	2340.00	3330.0000
Lost unpaid working hours of the respondent due to malaria illness (in hours)	80.00	20.50	15.0000
Lost paid working hours of the companion due to malaria illness of respondent (in hours)	795.00	42.25	27.0000
Lost wages of the companion due to malaria illness of respondent (in rupees)	35920.00	2845.00	1110.0000
Lost unpaid working hours of the companion due to malaria illness of respondent (in hours)	463.00	9.00	20.0000
Total charges incurred due to appointing paid caregiver including travelling, food, and service charges	0.00	-	0.0000

The study states that amongst 128 study participants, 126 participants were at the risk of out-of-pocket expenditure (OOPE) due to malaria as they were not having any health insurance coverage. But among them, 118 study subjects took anti-malarial treatment in different public healthcare facilities. Hence, they could avoid OOPE. Here one of the reasons for these individuals not visiting private healthcare sectors may be their lack of insurance, without which they could come across a huge catastrophic direct cost of expenditure for their treatment.

The study discloses that 97 respondents were treated at the outpatient level in public healthcare facilities with negligible direct medical costs. The study reveals that no respondents were treated for malaria at the outpatient level in private healthcare centres. It was observed that among the remaining 31 respondents, 21 respondents were admitted to public health sectors. All of these 21 subjects were not having any health insurance coverage. The total direct medical costs borne by them were found to be very insignificant. The median of total direct medical costs borne by them was found to be zero (IQR 186.25). Some of them paid user fees for hospital staying charge and the cost for a few blood investigations which was showing a sum of 175 INR and 1,480 INR respectively. These respondents were admitted to health facilities for a median of 3 days (IQR 0.75).

However, among the remaining 10 study participants, four each were belonging to the middle-class and upper-middle-class socioeconomic status, whereas one each was belonging to the lower-middle-class and upper-class

status. Among them, two participants were admitted to private health sectors with health insurance coverage. But they had to pay out-of-pocket of a median of 1,000 INR as hospital charges even after utilising their health insurance policy, as their health insurance policy could not cover their total illness expenditure. Hence the median of total direct medical charges was found to be 1,000 INR. These respondents were admitted to health facilities for a median of 6 days (IQR is not available as n is very small i.e. 2).

Eight study participants who were admitted to private health sectors without health insurance coverage had incurred huge direct medical charges. They incurred a median of total direct medical charges of 3,509 INR (IQR 3070.25) for a single episode of malaria. These study respondents were admitted to health facilities for a median of 8 days (IQR 3.5). It was found that all study subjects who took treatment for malaria at public health facilities were not having any health insurance coverage.

Health Service Utilisation

Public healthcare centres were utilised most commonly (60.2%) after the onset of fever and before diagnosis.

Before Diagnosis

The type of health facility visited by the respondents during the onset of fever is stated in Table 6.

After Diagnosis

The type of health facility visited by the respondents after diagnosis of malaria is specified in Table 7.

Table 6. Types of Healthcare Facilities visited before Diagnosis

Health Facility	Frequency	Percentage
Government hospital	26	20.3
Primary/ urban health centre	27	21.1
Other public sector health facility	24	18.8
NGO or Trust hospital/ clinic	1	0.8
Private hospital/ nursing home	9	7.0
Private clinic	20	15.6
Pharmacy/ drug store	16	12.5
Self-prescription/ home treatment	5	3.9
Total	128	100.0

Table 7. Types of Healthcare Facilities visited after Diagnosis

Health Facility	Frequency	Percentage
Government hospital	64	50.0
Primary/ urban health centre	25	19.5
Other public sector health facility	29	22.7
Private hospital/ nursing home	10	7.8
Total	128	100.0

Discussion

The study has observed that the majority of the study participants were male (82%). This is similar to the study conducted in the past.^{13,14} But in some studies, it was found that females were at an increased risk of malaria as they were engaged in domiciliary activities.¹⁵ The study participants aged from 16 to 30 years and 31 to 50 years were more in numbers which affected larger financial loss in these age groups. A similar study has revealed that productivity loss was found as the utmost percentage for the indirect expenses of both malaria patients and caregivers. Young and middle-aged individuals had more incidence of malaria fever which led to a huge monetary loss.¹³

Most of the study participants (92.2%) took treatment from different public healthcare facilities, where the malaria diagnosis and anti-malarial treatment is free of cost except for a few blood investigations and hospital stay which can become free of cost if the patient discloses his/ her proof of Below Poverty Line card. Hence it is evident by this study

that the direct medical cost of illness for the treatment of malaria at the in-patient level was negligible in public healthcare centres whereas it causes huge out-of-pocket expenditure in private healthcare centres if the individual is pursuing treatment without any health insurance coverage. The study states that amongst 128 study participants, 126 participants were at the risk of out-of-pocket expenditure (OOPE) due to malaria as they were not having any health insurance coverage. It was observed in this study that people preferred to visit public health sectors. The results of the previous studies show that most of the people residing in India visit public health facilities for the treatment of febrile illness.^{16,17}

The current study found that hospitalisation expenditures are higher than outpatient expenditures. The indirect cost contributes 87.72% of the total expenditure of malaria illness, while the direct cost adds to the remaining 12.27%. Hence, the current study states that indirect cost is much more than the direct cost of illness. A similar study conducted in India states that malaria requires more outpatient expenditure (175 rupees average) than hospitalisation expenditure (75 rupees average). It was also observed that the topmost burden came from the loss of income as 75% and the residual 24% came from expenses related to medications.⁹

In the present study, it was found that households that suffered from malaria had sustained 12.27% of direct expenses, 70.12% of indirect expenses, and their caregivers had to bear 17.59% of indirect cost. A similar study states that for each person who suffered from malaria and who was fully cured of it, a household on average sustained an entire expense of 7 US dollars, in which direct expense was 24%, and indirect expense was 44% for the patient, whereas the indirect expense was 32% for the household. For those who pursued treatment in the private sector, the direct expenditures were high. One of the huge sections of direct expenditures was paid on things like nutritional foods and vitamins.^{9,18}

In the current study, public healthcare centres were used most commonly (60.2%) after the onset of fever, before the diagnosis. Among 128 respondents, 88.27% of the individuals were diagnosed with malaria fever in public sector health facilities. Overall, 92.2% of the study participants made their visit to the public health sectors after being diagnosed with malaria. Similar findings were observed in a previous study.¹⁹ However, in some studies, it was found that there was a lack of the practical execution of allopathic treatment practice. The individuals who had a febrile illness were not approaching the health facilities during the onset of fever. They were either practising self-medication or they were approaching the non-healthcare sources before approaching the actual health facilities.^{10,20}

Conclusion

This study found that the individuals had to incur a heavy burden of indirect cost due to malaria. The proportion of individuals with health insurance coverage was 1.6% and about 72.7% of individuals had to face out-of-pocket expenditure. But due to the effective implementation of anti-malarial interventions by the District Health Authority and District Vector Borne Disease Control Office, the majority of individuals (92.2%) took treatment from public health sectors which resulted in negligible direct medical cost and caused a remarkable reduction in the direct cost of illness.

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