

Are We Contented in Achieving Universal Health Coverage in Treating Dengue Patients in Sri Lanka?

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Abstract

Background

Among infectious diseases, Dengue illness causes a major public health threat in Sri Lanka. The preventive and the curative services place a financial burden on the state health sector and household cost and out of pocket expenditure also are important cost components embedded with Dengue infection.

Objective

To estimate the household costs and out of pocket expenditure incurred due to Dengue infection among adults who received institutional care.

Methods

A longitudinal study was conducted from July to December 2018. Fifty patients each from DF and DHF categories were recruited with systematic sampling admitted to an institution in Colombo District, Sri Lanka. Adults residing in Colombo District of Sri Lanka for more than six months prior to Dengue/DHF episode, were recruited based on a systematic sampling method. Details were obtained via an interviewer administered questionnaire. They were interviewed on day of discharge from the hospital and were followed up for two weeks. Unit cost per patient was calculated. The household costs were calculated for three phases; ambulatory cost, costs incurred during hospitalization and post hospitalization costs. These components were described using mean, median, standard deviation and inter-quartile range and out of pocket expenditure were calculated

Results

The median age in DF group was 38.5 years and in DHF group was 28.5 years. Average household cost was US\$127.69 (SD=93.32) and US\$134.71 (SD=94.31) for DF and DHF patients respectively. Among DF patients 98.03% was borne using OoPE and among DHF patients it was 95.57%. In 2016, the average monthly income of a household in Colombo was US\$571.82. Therefore nearly 25% of the monthly income had been spent on a single adult with Dengue.

Conclusions and Recommendations

If an adult member is hospitalized with Dengue infection the Out of pocket expenditure is high, which is nearly 25% of a family's monthly income. Strengthening the Dengue control programme is the key towards Universal Health Coverage.

Background

Dengue is the most common arthropod borne infection among humans and it is caused by a RNA virus from the Flaviviridae family (1). The global foot print of Dengue is rapidly mounting, causing a huge public health challenge at present. With the lack of an appropriate vaccine, targeted therapeutic agents or effective vector control strategies, Dengue infection is leading to many adverse physical, psychological and economic repercussions (2). Further the global incidence of Dengue has amplified 30 fold throughout the past fifty years (3).

During the year 2018, total notifications received by the Epidemiology unit on Dengue was 51536. Out of that 10258 has been reported from Colombo District. Total confirmed as Dengue infection for the year 2018 was 32989 and out of that 21.7% (n = 7174) was reported from Colombo District. The second highest number was reported from Gampaha District which accounted for 11.5%. Majority were males (60.38%) and gender was not mentioned in 0.35% of cases (4). The total number of hospital admissions in 2015 was 29777, corresponding to 143 per 100,000 population. The case fatality rate was 0.2% which is showing a declining trend over the years (5).

Shepard et al., ⁶ highlights the importance of estimating the economic burden due to Dengue specific to the setting. According to them from 2001 to 2010, an average of 2.9 million Dengue cases per year and 5906 deaths in 12 countries in South East Asia (SEA) had been reported. According to their estimates of disease and economic burden of Dengue in 12 countries in SEA, Dengue costs 1.65 USD per person annually and the disease burden was estimated as 372 disability adjusted life years (DALYs) per million population. The DALYs are having a higher rate than several other illnesses including of upper respiratory tract infections and hepatitis B (6).

Shepard et al., ¹ report the healthcare costs associated with Dengue illness in Malaysia. In Malaysia, there is a passive surveillance system and under-reporting is a major issue. To overcome that limitation, they have calculated costing elements considering numerous methods. They have calculated the economic burden of dengue illness from a societal perspective. Using an adjusted estimate of total dengue cases, per year they have estimated an economic burden of dengue illness of US\$56 million per year, which is approximately US\$2.03 per capita. They discuss that the overall economic burden of dengue illness would be even higher if they had included costs linked with dengue prevention and control activities, dengue surveillance, and long-term consequences of dengue.(1)

Senanayake et al., ⁷ reported the findings of the first costing study on Dengue illness which was conducted in the Lady Ridgeway Hospital for children in Colombo in 2012. A descriptive cross sectional study was conducted among 43 DHF patients and 87 DF patients selected randomly. Average system cost per patient of DHF and DF was LKR 24,856 (USD 191) and LKR 10,348 (USD 80) respectively. Direct and indirect medical and non-medical costs incurred by households were LKR 4,758 (USD 36.6) for DHF and LKR 3,965 (USD 30.5) for DF. Total cost per illness for an episode of DHF was LKR 29,744 (USD 228.8). Total cost per episode of DF was LKR 14,326 (USD 110.2). Average hospital stay of DHF and DF patients was 4.8 and 3.8 days correspondingly. (7)

Thalagal et al.,⁸ assessed the public sector costs of dengue control activities and the direct costs of hospitalizations in Colombo district, during the epidemic year of 2012 from the perspective of the Ministry of Health. The total cost of dengue control and for reported hospital admissions was estimated at US\$3.45 million (US\$1.50 per capita) in Colombo district in 2012. Personnel costs accounted for the major proportion of the total costs of dengue control activities (79%) and hospitalizations (46%). A per capita cost of US\$0.42 for dengue control activities was estimated. The average costs per hospitalization fluctuated between US\$216–609 for pediatric cases and between US\$196–866 for adult cases conferring to severity of disease and treatment setting. (8)

Costing of an illness provides information at the micro- and macroeconomic levels, to decide on a suitable price of interventions in the diagnosis and management of an illness and also to estimate appropriate funds for health policies. (9) Considering the costs related to a country's health system, both the systemic costs borne by the government and the costs abided by households are both important, since it is the total costs that define the ideal provision and utilization of health services. (10)

In Sri Lanka, Dengue infection has been a major public health concern since 1960. The preventive and the curative services place a financial burden on the state health sector (8). Further the household cost, mainly as out of pocket expenditure (OOPE) is an important cost component embedded with Dengue infection. It is one costing element included in the societal perspective. The household costs, are the expenses borne by the patient and his family due to the hospitalization of the patient with Dengue illness. It is described under two broad categories; direct costs and indirect costs. The direct costs are categorized into direct medical costs and direct non-medical costs. The medical costs are the costs incurred due to patient's treatments, medications, investigations, etc. Non-medical direct costs include costs incurred for travelling, for caregiver, for special foods and for lodging. The indirect costs are based on the productivity loss by the patient or the household caregiver due to the illness (11). Non-medical costs and income losses are a larger financial burden than direct medical costs for households., Universal health coverage (UHC), incorporates the need for all individuals to receive quality health services without suffering financial hardship,. This study, focused on estimating the household costs (particularly the OOPE) incurred due to Dengue among adults who received institutional care in Sri Lanka.

Methodology

A longitudinal study was conducted to describe the direct and indirect household costs incurred to the household when an adult patient, confirmed with Dengue Fever (DF) and Dengue Haemorrhagic Fever (DHF) admitted to an institution in Colombo District, Sri Lanka. The study was carried out from July to December 2018. Only Adults aged between 18–60 years residing in Colombo District for more than six months prior to DF/DHF episode were recruited to the study. DF patients were clinically and/or serologically confirmed. DHF patients were clinically and radiologically and/or serologically confirmed. The patients who had been transferred from another hospital, those who were already diagnosed with a mental illness, pregnant mothers and patients who were unable to comprehend to an interviewer administered questionnaire in Sinhala were excluded. In recruiting participants for the study, the patients

admitted with DF/DHF were checked for the eligibility criteria. Every other day by visiting the selected wards, the eligible patients as described earlier was enrolled. Systematic sampling technique was used to recruit patients to the study. From the prepared list the first patient was selected randomly and after that every other patient in the list was selected as eligible to participate in the study. The selected patients were interviewed on day of discharge from the hospital. To capture the period after the acute infection the study participants were followed up until two weeks after the date of discharge.

An interviewer administered questionnaire was used in data collection. Household cost was centered on actual expenses and the disaggregate method was used conducting an in-depth analysis of the costs incurred among patients admitted to Infectious Diseases Hospital in Sri Lanka. The retrospective survey method and the scenario building technique were used in deciding the costing elements.

By using retrospective survey method, the details of the expenses were obtained from the patients via the interviewer administered questionnaire on the day of discharge from the hospital, pertaining to the pre-hospitalization and the hospitalization period. Post hospitalization costs were extracted from a data sheet given them to complete for a period of two weeks from the day of discharge. The data were cross checked by asking them the questions once they visited for the follow up interview at one month.

At the same time the scenario building technique was used to further identify the costing elements. First all the known costing elements were listed down, preparing the conceptual framework. Next the assumptions involved were considered in consultation with an expert in the field. Thirdly, considering all the assumptions and the cost elements, the questionnaire was prepared. Fourthly, judgemental validity and the reliability of the tool were assessed. (10) The questionnaire consisted of five sections. Section one contained the socio-demographic information. Section two consisted of four sub-sections. Section 2-A consisted of questions related to costing details during ambulatory period; whether patient had taken treatment prior to hospitalization and the costs incurred due to medical consultation, for investigations and for medicines, costs incurred for travelling and for special foods and things needed for hospital admission. Section 2-B included costing details during hospitalization period; transport cost to reach hospital, transport cost to bring food and essential items to hospital. Routing travel costs for visiting the patient was not considered. Costs incurred due to the person accompanying the patient to hospital (travelling, food, other), costs incurred due to purchasing of medicines and cost for investigations done at outside, costs due to special food items and other consumables, costs incurred due to the by-stander, costs incurred to household members if they have to stay in a lodge during this period (costs for lodging, food, etc.) was included. Section 2-C included indirect costs incurred to patient and or household members if no-pay leave was taken during ambulatory and hospitalization period. The patient was inquired whether he was employed during last six months. Even if self-employed it was recorded as an employment. Total work days lost due to illness episode was recorded with the number of no-pay days. Total monthly income was recorded. Lost income due to obtaining no-pay leave was calculated by dividing the monthly income by 30 and multiplying it by the total number of no-pay leave. Similarly the lost income due to no-pay leave was calculated for the household members and aggregated. The Sect. 2-D consisted of costs incurred during post hospitalization period up to two weeks; whether patient had

taken treatment during post hospitalization period and the costs incurred due to medical consultation, for investigations and for medicines, costs incurred for travelling home and for other consultations, costs incurred due to special food and other consumables due to illness, costs incurred due to religious rituals due to this illness episode, information regarding lost income due to no-pay leave, using of saved money due to this illness episode, obtaining of loan facilities due to this illness episode and compensation received via insurance.

The questionnaire was pretested prior to data collection. They were interviewed on the day of discharge from the hospital and were followed up for two weeks. Post hospitalization costs were extracted from a data sheet given to the same respondents to complete for a period of two weeks from the day of discharge. Data collection was done by two Nursing Graduates under the supervision of the principal investigator. The purpose of the study was explained to the patients and informed written consent was taken prior to data collection. Prior to study implementation, administrative requirements were fulfilled by taking permission from the relevant authorities. Ethical clearance was obtained from the Ethics Review Committee, Faculty of Medicine, Kelaniya.

The costs were basically categorized into two as direct and indirect household costs.

1. **a. Direct costs** - Resource use and costs associated with medical care, drug costs, costs of investigations (medical costs), costs of non-medical services, special food etc. (Non-medical costs)
2. **b. Indirect costs** - number of days lost from productive work by the patient and family members due to the illness.

Unit cost per patient was calculated. The household costs were calculated for three phases; ambulatory cost, costs incurred during hospitalization and post hospitalization costs. These components were described using mean, median, standard deviation and inter-quartile range. Costs were also compared against household income. Further the out of pocket expenditure due to Dengue among adults were calculated. All costs were calculated in LKR and converted to US\$ for presentation. The conversion rate as of 31st December 2018 is US\$ 1 = LKR 182.89.

Results

The socio-demographic characteristics are illustrated in Table 01.

Table 01
Socio-demographic Characteristics of the Study Population

Characteristic	DF		DHF	
	Number (N = 50)	Percentage (%)	Number (N = 50)	Percentage (%)
Age (in years)				
18–25	16	32	20	40
26–35	7	14	13	26
36–45	10	20	8	16
46–60	17	34	9	18
Sex of the patient				
Male	27	54	29	58
Female	23	46	21	42
Ethnicity				
Sinhala	43	86	40	80
Tamil	2	4	3	6
Moor	5	10	6	12
Burger	0	0	1	2
Religion				
Buddhism	40	80	36	72
Hindu	2	4	3	6
Catholic	3	6	5	10
Islam	5	10	6	12
Marital status				
Married	27	54	30	60
Unmarried	20	40	20	40
Divorced	1	2	0	0
Widowed	2	4	0	0

The age of participants in both groups showed a non-normal distribution. The median age in DF group was 38.5 years and in DHF group was 28.5 years. The proportion of study participants in 36–60 year age

category was 54% and 34% in DF and DHF groups respectively. Approximately 80% were Sinhala Buddhists in both categories.

Table 2
Description of socio-economic characteristics of the study population

Characteristic	DF		DHF	
	Number (N = 50)	(%)	Number (N = 50)	(%)
Highest educational level				
Not gone to school	2	4	0	0
Grade 1–5	1	2	1	2
Passed Grade 5	2	4	1	2
Passed Grade 8	4	8	1	2
G.C.E. O/L ¹ passed	21	42	21	42
G.C.E. A/L ² passed	14	28	17	34
Diploma/ Vocational training	2	4	4	8
Degree/ Post Graduate	4	8	5	10
Total monthly income				
Less than Rs. 25,000	7	14	4	8
Rs. 25,000– 50,0000	22	44	17	34
Rs. 50,001– 75,000	9	18	11	22
Rs. 75,001– 100,000	3	6	9	18
More than Rs. 100,001	9	18	9	18
Current employment status (N = 50)				
Employed	32	64	31	62
Not employed	18	36	19	38
Social class (N = 50)				
I Higher professionals & administrators	4	8	11	22
II Lesser professional occupations	6	12	3	6
III Skilled occupations	14	28	16	32
IV Semi-skilled occupations	16	32	15	30
V Unskilled & not employed	10	20	5	10

Characteristic	DF	DHF		
Socio-economic level (N = 50)				
High	24	48	12	24
Medium	14	28	25	50
Low	12	24	13	26

Among DF group, 82% (N = 41) and among DHF group, 94% (N = 47) had passed G.C.E O/L examination or attained higher educational qualifications. Total monthly income of the household was obtained and categorized in to five groups. Considering the income distribution, the median household monthly income among DF patients were US\$273.39 (IQR = 164.03–416.92) and among DHF patients were US\$328.07 (IQR = 218.71–492.10). Among DF participants 64% (N = 32) were employed and among DHF participants 62% (N = 31) were employed. Among the employed participants in DF category, 40.6% (N = 13) were doing elementary occupations and among DHF category, 29% (N = 9) were doing service and sales related occupations. Considering social class, 32% (N = 16) were engaged in semi-skilled occupations among DF participants and a similar proportion was engaged in skilled occupations among the DHF participants. Majority (52%, N = 26) were belonging to Low and Medium level in socio-economic status in DF group and in DHF group, 76% (N = 38) were in a similar socio-economic status.

The total household cost comprised of direct and indirect costs incurred to the patient and his or her household. The direct costs were described in two aspects; pertaining to the time period where the costs occurred (during pre-hospitalization, hospitalization and post hospitalization period up to two weeks) and as medical and non-medical costs.

Considering the direct household costs, 50.6% of costs in the DF group and 44.9% of costs in the DHF group had occurred during the period when the patient was hospitalized. In both categories, investigation costs were reported as zero during hospitalization period. During this period 64% of expenses in DF category and 57% of expenses in DHF category had been spent on cost for travelling to bring food and essential items to hospital and for lodging. Considering direct costs as a whole nearly 30% of direct costs were due to travelling. Considering the direct ambulatory costs, among DF category, 58% of costs were due to consultation and investigations and among DHF category it was 48.8%. During post hospitalization period, the medical consultation costs were 1.6% and 8.3% of total direct costs among DF and DHF categories respectively. With reference to the medical costs the median ambulatory cost for DF category was US\$5.54 (IQR = 0.00 – 19.6) and for DHF category it was calculated as US\$ 7.86(IQR = 3.3 – 17.3). The medical cost element accounted for 72.5% and 57.3% of expenses during ambulatory period in DF and DHF categories respectively. During hospital stay the medical costs in both categories is less than 1% of total direct household cost. During post hospitalization period, the medical costs accounted for 9.6% and 22.3% of post hospitalization costs in DF and DHF categories respectively.

The indirect household costs comprised of the lost earnings of the patient and household members (acting as care-givers). The mean indirect cost in DF group was US\$57.32 (SD = 61.77) and in the DHF category it was reported as US\$50.87 (SD = 71.45). The median indirect cost in DF category was US\$ 30.07 (IQR = 0-110.86) and in DHF category was US\$ 0 (IQR = 0-109.36). This reflects the highly left skewed distribution of indirect costs among the participants. More than 50% of expenses as indirect costs had occurred during the post hospitalization period accounting for 51.8% and 62.2% among DF and DHF categories respectively.

Among the patients who were employed, during post hospitalization period, 78.1% (n = 25) and 84% (n = 27) in DF and DHF categories had obtained leave from the routine occupation. More than 50% of patients had to take no-pay leave in both categories.

Average number of work days lost by patient due to this illness episode among DF category was 9.7 (SD = 9.7) and among DHF category was 10.5 (SD = 10.5). The average number of no-pay days was 5.7 (N = 8.3) and 6.3 (SD = 9.7) among DF and DHF categories respectively. For household member in DF category, average number of work days lost was 2.6 (SD = 6.8) and among DHF category it was 2.08 (SD = 3.6). The average number of no-pay days for household member was 2.3 (SD = 6.8) and 0.76 (2.6) among DF and DHF categories respectively.

Patients were inquired whether; they had to use their saved money and whether they needed to obtain a loan facility to cover the expenses with the illness episode. Nearly 50% (DF: n = 25 & DHF: n = 30) in both categories had to use their saved money due to the current illness episode. Ten percent in DF category and 12% in DHF category obtained loan facilities and majority out of them (60% in DF and 66.7% in DHF) were paying an interest to the loan. In both DF and DHF categories, 18% (N = 9) were having protection from an insurance scheme. Among DF category among those who were having an insurance scheme, 66.6% were based from the government and among DHF category all insurance schemes were by private sector. Among DF category, out of the nine study participants who possessed an insurance scheme, only one applied for compensation. No one was able to compensate for the whole expenses in both categories. In DF category, the median coverage of expenses was US\$ 0.0 (IQR = 0.0–0.0) except in hospital admission coverage, which was US\$ 0.0 (IQR = 0.0–20.5). In DHF category, the median hospital admission coverage was US\$ 8.2 (IQR = 0.0 – 65.6).

Table 3
Household Costs incurred by the Study Population

Description	DF		DHF	
	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)
Direct cost	US\$ 45.79 (21.67-104.76)	US\$ 70.38 (67.06)	US\$ 68.07 (37.93-126.99)	US\$ 83.84 (62.66)
Indirect cost	US\$ 30.07 (0.0-110.86)	US\$ 57.32(61.77)	US\$ 0.0 (0.0–109.36)	US\$ 50.87 (71.45)
Total household cost	US\$ 112.98 (44.54–187.45)	US\$ 127.69 (93.32)	US\$ 122.12 (64.31-180.53)	US\$ 134.71(94.31)
Out of pocket expenditure	US\$ 112.98 (44.54-177.79)	US\$ 125.18 (92.33)	US\$ 122.12 (64.31-180.53)	US\$ 128.75 (92.42)

The total household cost comprised of the total direct costs and the total indirect costs incurred on the household. The median total household cost was US\$ 112.98 (44.5–187.45) and US\$ 122.12 (64.3–180.5) among DF and DHF categories respectively. The major proportion of costs was due to direct costs in both categories. Direct costs composed of 55.1% and 62.2% of total cost among DF and DHF categories correspondingly (Table 01). Out of pocket expenditure during the illness episode was calculated by subtracting the compensations received, from the total costs. The median out of pocket expenditure was US\$ 112.98 (IQR = 44.54–177.79) and US\$100.61 (IQR = 60.4–178.7) among DF and DHF categories respectively (Table 01).

Discussion

This is the first attempt to describe the household costs and the OOPE among adults with Dengue infection in Sri Lanka. We selected the Colombo District which is reported to have 20% of the case population of Dengue. The study was conducted in the Institute of Infectious Diseases which was one of the main centers specialized in Dengue management, and data was collected within a six month period, which enabled to have uniform data. Only adults aged between 18–60 were included, since costing elements may be different from paediatric patients.

From the total household cost, direct costs composed the majority, estimated as 55.1% and 62.2% among DF and DHF categories respectively. From the direct costs nearly 30% had been spent on travelling to bring food and essential items to the patient. Travelling cost to just visiting the patient was not included

in the study. Though the meals are served in the hospitals, it is culturally based that the Sri Lankans do tend to bring food from the households and visit the patients offering them psychological support. One salient finding was that the costs for investigations during hospitalization period, was zero indicating that the costs were minimized with the involvement of the state in patient management.

The OOPE consisted of 98.03% of total costs incurred by DF patients and among DHF patients it was accounted to 95.59%. This indicates the high OOPE incurred on the households once a member is diseased with Dengue illness. According to statistics from the Department of Census and Statistics, in 2016, the average monthly income of a household in Colombo District was US\$571.82. Therefore nearly 25% of a monthly income was spent from a household if a single adult was hospitalized with Dengue illness.

Conclusions And Recommendations

The 100% investigation costs were covered by the government during hospitalization period, which indicates the positive involvement of the state in management of Dengue illness this, has reduced a major portion of costs on the households as well. Considering the total household cost, direct costs composed the majority, estimated as 55.1% and 62.2% among DF and DHF categories respectively in which a major portion was spent on travelling to bring food and essential items to hospital. Among both categories, the average number of work days lost due to illness for the patient was 10 days, which reflects the impact on the country's economy.

It was evident that the OOPE on adults infected with Dengue illness is causing a huge additional economic burden on the households. This is a very significant finding, since Sri Lanka is in the backdrop of reaching Universal Health Coverage. Therefore, Sri Lanka needs to monitor the progress that we make in the health system. One of such indicator, is the proportion of the population that spends a large amount of household income on health, which is nearly 25% of a patients' family income once they are admitted with Dengue illness, and this needs to be reduced urgently. Strengthening the Dengue control programme is the key towards UHC.

Abbreviations

DF	Dengue Fever
DHF	Dengue Haemorrhagic Fever
IDH	Infectious Diseases Hospital
OOPE	Out of Pocket Expenditure
UHC	Universal Health Coverage

Declarations

Ethics approval and consent to participate

Ethical Approval was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Kelaniya. Written informed consent was obtained from all participants. The approval number is P/78/02/2018

Consent for publication

Not applicable

Availability of data and materials

The datasets during and/or analysed during the current study available from the corresponding author on reasonable request.

Competing interests: The authors declare that there are no competing interests.

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Authors' contributions

NP, AS, SP analyzed and interpreted the data. NP and SP were the major contributors in writing the manuscript. DAW and AW mainly contributed in the manuscript towards the disease related inputs. All authors read and approved the final manuscript.

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