

# Costing of Febrile Illness among Under Five Children, A Study in a Tertiary Care Teaching Hospital in Odisha, India

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## Abstract

**Objective:** The objective of this study was to determine the cost of treatment, both direct and indirect costs, of febrile illness among under-five children in Odisha, India. **Methods:** This was a cross-sectional study of thirty under-five children with febrile illness reporting to the pediatric outpatient (OP) department and thirty more under-five children admitted to the pediatric ward who were included in the study during January–April 2018. The parents/caretakers of the ailing children were interviewed using the WHO questionnaire contextualized to the local situation. Both direct (medicine, diagnostics, registration/doctor's fees, bed charges, and cost of personal medical appliances) and indirect (transportation, food, loss of income, and lodging) costs of febrile illness and pre-, during, and posthospital visit cost were estimated. **Results:** The median direct and indirect costs for OP cases were Rs. 1201.00 and Rs. 1375.00, respectively. For the hospitalization (indoor patients), direct and indirect costs were Rs. 7015.00 and Rs. 5190.00, respectively. People also spent money in pre-, during, and posthospital visits for the same episode of febrile illness. Only four OP cases had some kind of medical insurance. **Conclusion:** High expenditure on both OP and indoor patients calls for appropriate policy for provision of financial protection while seeking health-care services. Health facilities should be tuned to do cost analysis enabling comparison among health facilities.

**Keywords:** Direct cost, febrile illness, health-care expenditure, indirect cost

## INTRODUCTION

Fever, the most common symptom associated with most childhood diseases, accounts for 70% of presenting complaints to the pediatric and general medicine outpatient departments (OPDs).<sup>[1]</sup> As per available evidence, under-five children in low- and middle-income countries had 2–9 febrile episodes in a year, with an average of 5.88 episodes.<sup>[2]</sup> As per the National Family Health Survey round 4 (2015–2016), in India, the prevalence of fever was 12.8% among under-five children during the past 2 weeks preceding the date of the enumeration.<sup>[3]</sup> Reported studies indicate that 50%–75% of febrile episodes in children under 5 years of age reporting to the OPD were on account of acute respiratory infection (ARI). Gastroenteritis constituted 10%–25% of febrile illness. Other infections such as meningitis, skin, or soft-tissue infection accounted for less than 5%. Urinary tract infection accounted for 1%–6%.<sup>[4]</sup> Children aged 0–4 years constitute 9.7% of the India population,<sup>[5]</sup> indicating high disease burden of febrile illness among this group.

More than 70% (79% in urban and 72% in rural) of ailments were treated in private health facilities in India, thus indicating people's preference for private sector.<sup>[6]</sup> Out-of-pocket expenditure (OOPE) in India also reported to be around 65% of total health expenditure.<sup>[7]</sup> Some of the causes of high OOPE in India are low public health financing and inadequate medical insurance coverage. As per the study published in 2015 by Kumar *et al.*, an estimated 8% of the India population had been pushed below the poverty line by high OOPE for health care.<sup>[8]</sup>

Very little information is available on the costing of febrile illness in Indian children under 5 years of age including Odisha state, although such studies are vital for informing policy and

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allowing comparison. The present study was undertaken with an aim to determine the cost of treatment, both direct and indirect costs, of febrile illness among under-five children in inpatient and OP care facilities in a private not-for-profit tertiary care teaching hospital in Odisha, India.

## METHODS

A cross-sectional cost-consequence analysis study was conducted between January and April 2018 in a tertiary care not-for-profit teaching hospital of Odisha. Children aged 0–59 months with fever reporting to the pediatric OPD and admitted in the indoor were included in the study. Febrile illness among under-five cases was defined as rectal temperature above 100.4°F (38°C) or oral temperature above 100° F (37.8°C) or axillary (armpit) temperature above 99°F (37.2°C).<sup>[9]</sup> The preferred value was axillary temperature.

Thirty cases of under under-five children with febrile illness attending paediatrics OPD and 30 thirty cases of admitted with febrile illness in paediatrics indoor of PBMH were selected randomly for the study. The cases meeting the definition of fever presenting at either the OPD or the inpatient department (IPD) and whose parents/caretakers given consent to participate in the study were included. Patients with chronic diseases and whose parents/caretakers were not willing to participate in the study were excluded. The parents/caretakers of the patients were interviewed by administering the WHO questionnaire adapted to the local context for the costing of febrile illness. The questionnaire was validated by a pilot study conducted at Christian Medical College (CMC) and a secondary care hospital at Vellore, India. Both direct and indirect costs of febrile illness were estimated. Direct medical costs included the cost of medicine, diagnostic tests, registration fees/doctor's fees, and cost of personal medical appliances (e.g., bedpan, thermometers, etc.). The indirect cost includes the cost of transportation, lodging, food, and income loss because of taking care of the child during hospital visit/stay and expenditure on other nonmedical expenses such as jar, plate, glass, and mosquito coil. Income loss of the parents/caretakers was estimated based on the self-reported daily income. Data were collected while the patients were in OPD or in the ward, and they were also recontacted on the 7<sup>th</sup> day for OP cases and on 7<sup>th</sup> and 14<sup>th</sup> day for IP cases to know if any additional expenditure incurred posthospital visit. In addition, patient case records for IP cases were referred for extracting relevant case-related information.

The data were collected by a trained researcher. The same was entered and analyzed using R software version 3.6.0, Mac and Linux, University of Virginia, USA. The cost of treatment (one episode) of febrile illness was presented both for OP and IP cases in the form of mean and median with ranges. The cost of one episode of febrile illness is valued as per Indian rupees and converted to the United States dollar (USD), 1 USD = 69.6667 rupees.

## RESULTS

Of thirty OP study cases, 67% were male and 33% were female. Of these, 13% were from rural and the remaining 87% were from urban areas. Among thirty indoor study cases, 57% were male and 43% were female and 63% belong to rural area and the remaining 37% were from urban areas.

The overall median cost of febrile illness among under-five children in OPD and indoor included prehospital, during hospital, and posthospital visit cost. The median cost of one episode of febrile illness in OP cases was Rs. 2600.00 (approximately USD 37) ranging from Rs. 1,057.00 (approximately USD 15) to Rs. 10,312.00 (approximately USD 145). Of the total cost, the direct and indirect costs were 38% and 62%, respectively. Within the direct cost in OPD, the major cost was due to expenditure on medicine (49%), followed by registration/doctor's fee (21%). Among the items of indirect cost, the major cost was on account of transportation (44%) followed by income loss of accompanying parents/caretakers (42%) due to their loss of work hours [Table 1]. On an average, parents spent 5 days in hospital to accompany their children for the episode of febrile illness for IP cases.

The median cost of one episode of febrile illness in IP cases was Rs. 12,220.00 (approximately USD 172) ranged from Rs. 2,773.00 (approximately USD 39)–Rs. 31,149.00 (approximately USD 438). Of the total cost, the direct and indirect costs were 59% and 41%, respectively. Within direct cost for IP cases, the major cost was due to expenditure on diagnostic procedures (36%), followed by medicine cost (27%). Among the items of indirect cost, the major cost was on account of transportation (32%), followed by food (31%) and income loss of accompanying parents/caretakers (31%) [Table 2].

It was found that people spent even before visiting hospital, during hospital, and posthospital visit for the same episode of febrile illness both for OP and indoor cases [Table 3].

Of the study cases in OPD, only four had some kind of health insurance, but none of the indoor cases had any kind of health insurance.

## DISCUSSION

Febrile illness is a major presenting symptom among less than five children in India at pediatric OPD and indoor admissions. People were spending a high amount of IP as well as OP cases. As would be expected, the cost of indoor febrile cases was more in comparison to OP febrile cases. This wide range of expenditure may be on account of different underlying diseases manifesting with fever. Whether this amount is more or less is difficult to comment on account of: (1) limited cost analysis study on febrile illnesses, (2) different objectives and methods adopted in different studies and different types of health facilities, (3) cost studies of single underlying disease with manifestation of fever such as typhoid fever and acute

**Table 1: Summary of direct and indirect costs in the outpatient department (in Rs. to the nearest rupee) per episode of febrile illness**

Summary statistics	Direct					Indirect					Total cost for episode
	Medicine	Diagnostic tests	Registration/doctor's fees	Others	Total direct	Transport	Food	Income lost	Others	Total indirect	
Mean	655	196	280	194	1325	931	105	901	188	2125	3453
Median (minimum, maximum)	632 (237, 1861)	0 (0, 1180)	300 (100, 500)	195 (0,400)	1201 (527, 2512)	255 (60, 7000)	80 (20, 330)	600 (100, 4200)	160 (0, 540)	1375 (270, 8300)	2600 (1057, 10312)
Percentage of mean	49	15	21	15	38	44	5	42	9	62	

Percentage has been calculated on the basis of the mean value

**Table 2: Summary of direct and indirect costs in the inpatient department (in Rs. to the nearest rupee) per episode of febrile illness**

Summary statistics	Direct							Indirect				Total cost for episode	
	Medicine	Diagnostic tests	Bed charges	Consultation	Cost of any personal medical appliances	Other medical expenses	Total direct	Transport	Food	Income lost	Others		Total indirect
Mean	2088	2818	1936	153	79	804	7878	1720	1686	1667	334	5407	13285
Median	1836	3075	700	175	0	120	7015	1225	1740	1400	150	5190	12220
Range (minimum, maximum)	(503, 4795)	(150, 10050)	(200, 11000)	(0, 500)	(0, 1500)	(0, 6820)	(163, 21837)	(60, 5000)	(360, 2840)	(0, 6000)	(0, 1600)	(1140, 12213)	(2773, 31149)
Percentage of mean	27	36	24	2	1	10	59	32	31	31	6	41	

Percentage has been calculated on the basis of the mean value

**Table 3: Pre-, during, and posthospital visit expenditure due to febrile illness (in Rs. to the nearest rupee)**

	Cost of treatment, mean, median (range)			Total expenditure
	Prehospital visit expenditure	During hospital visit expenditure	Posthospital visit expenditure	
Outpatient case	714, 700 (350, 1390)	2391, 1834 (578, 7375)	357, 147 (30, 2500)	3453, 2600 (1057, 10312)
Inpatient case	784, 675 (0, 2200)	12175, 11195 (2473, 29881)	227, 0 (0, 4020)	13285, 12220 (2773, 31149)

respiratory illness, and (4) health facilities are not tuned to undertake this type of studies.<sup>[10-12]</sup>

The comparative figures are not available; however, a study from Sri Lanka in two teaching hospitals has reported a mean out-of-pocket expenditure of Rs. 5432 (approximately USD 76) for the treatment of febrile illness among the children admitted to these hospitals.<sup>[10]</sup> A cost analysis study of illness due to typhoid fever in five Asian countries reported that the treatment cost for hospitalized cases ranged from USD 129 in Kolkata to USD 432 in North Jakarta.<sup>[11]</sup> The median cost of treatment for one episode of febrile ARI among under-five children attending health facilities in Ballabgarh, Haryana, India (in the year 2017) in OPD and IPD was Rs. 447.00 (approximately USD 6) and Rs. 7506.00 (approximately USD 106), respectively.<sup>[12]</sup>

In the present study, the major expenditure of OP cases was due to medicine cost, whereas in door cases, the major expenditure was diagnostic cost. The breakup of indirect cost indicates the scope for reduction in the cost through improving accessibility and availability of the services. It was apparent that people spend the same episode of febrile illness before, during, and after hospital visit, which should be taken into consideration in all cost analysis studies.

In this study, patients were followed up to 1 and 2 weeks for OP and IP cases, respectively, so that there was no loss to attrition while calculating the cost for each episode. Further, we had taken the work loss of caregivers into account and included in indirect cost as income loss to know the total financial loss per febrile illness. It was found that on an average, loss of income of the parents was INR 901 and 1667 per episode of febrile illness in OP and IP cases, respectively, which is a major chunk of their family saving.

The authors did collect the information on the status of health insurance coverage in the study cases, but it was only 4 (6.66%). It was found that approximately 90% of their expenditure was born by the insurance company. Insurance coverage by Indians is very less as compared to other countries.<sup>[8]</sup> Hence, policy-makers should think about providing health insurance for poor people in order to minimize their vulnerability to health and economic shocks.

As the study protocol was designed by CMC, Vellore, and the Indian Council of Medical Research, New Delhi, it is believed that this single study can be a sufficient source of clinical effectiveness data.

### Limitation

The major limitation of the study is that, being a single-site

study in a tertiary care private teaching hospital, cost per fever cases may vary as compared to government setting. A number of cases are also less to generalize for cost estimation of fever cases of state/country. However, we believe that due to changing health-seeking behavior of public toward private sector (accounting >70% of health care), it will provide good information toward health-care expenditure per fever cases in children.

### CONCLUSION

It is important to monitor health-care cost in different types of health facilities. The high cost of treatment calls for adequate financial protection for all as envisaged in universal health coverage. There is a scope for reduction in the indirect cost through appropriate policy decision for enhancing the accessibility and availability of health-care services.

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### Conflicts of interest

There are no conflicts of interest.

### REFERENCES

1. Thota S, Ladiwala N, Sharma PK, Ganguly E. Fever awareness, management practices and their correlates among parents of under five children in Urban India. *Int J Contemp Pediatrics* 2018;5:1368-76.
2. Herlihy JM, D'Acremont V, Hay Burgess DC, Davidson HH. *Diagnosis and Treatment of the Febrile Child*. In: Black, R., Laxminarayan, R., Temmerman, M. and Walker, N. editors. *Reproductive, Maternal, Newborn, and Child Health: Disease Control Priorities, Third Edition*. Ch. 8. Vol. 2. Washington (DC): The International Bank for Reconstruction and Development, the World Bank; 5 April 2016. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK361919/>. [Last accessed on 2019 Jan 29].
3. National Family Health Survey (NFHS-4), India; 2015. Available from: <http://rchiips.org/nfhs/NFHS-4Reports/India.pdf>. [Last accessed on 2019 Jan 29].
4. World Health Organization. WHO Informal Consultation on Fever Management in Peripheral Health care Settings: A Global Review of Evidence and Practice. World Health Organization; 2016. Available from: <https://www.who.int/malaria/publications/atoz/9789241506489/en>. [Last accessed on 2019 Jan 29].
5. Chandramouli C, General R. Census of India 2011. Provisional

- Population Totals. New Delhi: Government of India; 2011.
6. Key Indicators of Social Consumption in India Health. Government of India; 2014. Available from: <http://www.icsrdataservice.in/datarepository/index.php/catalog/107>. [Last accessed 2019 Jan 29].
  7. Out-of-Pocket Expenditure (% of Current Health Expenditure) India Data. Available from: <https://data.worldbank.org/indicator/SH.XPD.OOPC.CH.ZS?end=2015&locations=IN&start=2000> and view=chart. [Last accessed 2019 Jan 29].
  8. Kumar K, Singh A, Kumar S, Ram F, Singh A, Ram U, *et al.* Socio-economic differentials in impoverishment effects of out-of-pocket health expenditure in China and India: Evidence from WHO SAGE. *PLoS One* 2015;10:e0135051.
  9. Ogoina D. Fever, fever patterns and diseases called fever – A review. *J Infect Public Health* 2011;4:108-24.
  10. Mudiyanse RM, Waduga RN, Bowala N, Dharani K, Dassanayake DL. Out of pocket spending for febrile illnesses among children admitted to two teaching hospitals in Sri Lanka. *Glob J Med Res* 2014;14:16-30.
  11. Poulos C, Riewpaiboon A, Stewart JF, Clemens J, Guh S, Agtini M, *et al.* Cost of illness due to typhoid fever in five Asian countries. *Trop Med Int Health* 2011;16:314-23.
  12. Purakayastha DR, Rai SK, Broor S, Krishnan A. Cost of treatment of febrile acute respiratory infection (FARI) among under-five children attending health facilities of Ballabgarh, Haryana. *Indian J Pediatr* 2017;84:902-7.