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Household Expenditure on Diarrhea Treatment among Under Five Children in Godawari Municipality of Nepal

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ABSTRACT

Background: Diarrheal disease is a global public health problem. In Nepal, diarrhea is still the leading cause of waterborne disease, which constitutes 48% among all hospitalized disease cases who come to health center for treatment. Despite low treatment cost of diarrhea, out-of-pocket expenditure required at the time of treatment is a major barrier to seek health care. This study, therefore, aims to explore household expenditure for the diarrheal treatment in under five children and its financial burden in households.

Methods: A community based cross sectional study was carried out in 14 wards of Godawari Municipality among under five children with diarrhea from June 2018 to September 2018. We conducted financial burden survey among 371 household with diarrhea cases.

Results: Prevalence rate of diarrhea was found 50% among under five children. The average out-of-pocket expenditure was NRs 568.62 (US \$5.06) per episode for diarrhea treatment. The total average direct cost for diarrheal treatment was NRs 183.58 (US \$1.63). The two major cost driver during each episode were loss of wage by parents NRs 360.97 (US \$3.21) and medicine costs NRs 114.15 (US \$1.01).

Conclusions: The Diarrheal prevalence rate in the study area was found higher than the National. The indirect cost of each diarrheal episode is more than three times of the direct cost.

Keywords: Cost of illness; diarrhea; out of pocket expenditure; under five children.

INTRODUCTION

Diarrheal diseases are a global public health problem and a leading cause of morbidity and mortality across the world.¹ In Nepal, Diarrhea is still the leading cause of waterborne disease, which constitutes 48% among all hospitalized disease cases who come to health center for treatment.² The number of people living with per capita income less than US \$1.25 per day is remarkably high³ (updated as US \$ 1.90 since 2015, World Bank). Out-of-pocket expenditure (OPE), required at the time of treatment is a major barrier to seeking health care.⁴

This kind of impact is more severe on the poor, who are driven deeper into poverty while trying to get healthcare from their own pockets.⁵ Nepal's health

financing and expenditure indicators are slightly better than those of the average low-income country, but out-of-pocket expenditure for health care is still extremely high.⁶ Hence, this study is aimed to explore household expenditure for the diarrheal treatment in under five children and its financial burden in household.

METHODS

A descriptive cross sectional study was conducted from June to September 2018 in all 14 wards of Godawari Municipality of Lalitpur district Nepal. Questionnaire survey on WASH situation and financial burden was conducted. Among 742 households, only in 371 households with under 5 children episodes of diarrhea within one month were found. So, only those households were selected for financial burden questionnaire survey.

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The questionnaire included demographic information, socio-economic status, illness-associated costs incurred prior to and after presenting at the facility. Data on direct medical costs (registration, diagnosis, medications and hospital bed), indirect non-medical costs (transportation, food and drinks, lodging, etc) and parents' time loss were collected through a retrospective structured questionnaire. The interviewers were also asked separate questions about the costs of traditional healers, homeopathic treatments, ayurvedic treatments and home remedies. Households were less willing to state their true income or may be underestimating their total income during our data collection. So we focused on expenditures, rather than their income. Similar kind of approach for calculating total household income has been found in study done in Vietnam.⁷

Validity and reliability of prepared questionnaire was ensured through pretest. For this 10% sample was taken and questionnaire survey was done in Changu Narayan Municipality, Bhaktapur. Accordingly, necessary changes were made in questionnaire such as annual income, water and sanitation section. Questionnaire were translated into Nepali and back translated to English to ensure that it was understandable to the participant. After identifying each participant and obtaining consent from their caregiver, a trained research assistant interviewed caregiver and filled questionnaire form. The OPE were measured in terms of local currency and converted to US dollars (US\$) (1US\$= NRs112.36 as per May 2019),

Cost of illness (COI) was classified into two categories: Direct and Indirect cost. In our study also, out of pocket expenditure (OPE) includes direct and indirect cost. The results of the COI analysis were used to estimate the financial burden. But, financial burden from mortality has not been taken into consideration. Therefore, the direct costs were measured as a sum of all the costs of consultation, diagnosis and medications. The indirect costs measured were transportation cost, the number of days of work missed by parents because of illness as this indicator can be considered as a good measure of productivity losses.⁸⁻¹⁰

All completed questionnaire were thoroughly checked for its completeness and consistency. Data coding and recoding was done before data entry. The data were entered in Microsoft Excel and then analyzed in SPSS (version 20) for windows. A summary of WASH score was generated as shown in Table 3. WASH score included four broad indices: drinking water score, sanitation score, hygiene score and hand washing score and had a total score of 20 points. Descriptive statistic such as

percentage, frequencies, mean with standard deviation and 95% confidence interval were used with regard to socio-demographic and other variables. Bivariate analysis, one sample T test, Independent samples T test were applied. The statistical significance was set to $P < 0.05$.

The research proposal was approved by the Institutional Review Committee (IRC), Institute of Medicine, Tribhuvan University, Kathmandu Nepal. Permission to conduct questionnaire survey in Municipality area was taken from the local authority like Godawari Municipality Office and wards office. Written consent was taken from the mother or caretaker before interview.

RESULTS

A total of 371 Diarrheal cases were found among under five children during household survey of Water, Sanitation and Hygiene situation in 14 wards of Godawari Municipality. The average age of the children was 2.6 years. The highest percentage of participants (caretaker of child) was homemakers (33.2%), self-employed (21.4%), based on agriculture (14.4%) and office employee (11.4%). Only 30.8% of the participants had higher level education whereas 11.2% had no formal education, and 31.3% had no education. Diarrheal occurrence was seen higher among households with lower parental levels of educational attainment (31% in illiterate). It was also higher among households with nuclear family (54%). The average monthly income and expenditure of the households was NRs 21837.8 (US \$194.46) and NRs 20681.48 (US \$184.16) respectively (Table 1).

Table 1. Demographic profile.

| Variable (n=371) | Variable | Value |
|---------------------|-------------------------|---------------|
| Age (year) | Mean age of child | 2.6 ± 1.04SD |
| | Mean age of respondents | 29.1 ± 7.11SD |
| Gender of Child (%) | Male | 54.6 |
| | Female | 45.4 |
| Family size (%) | Less than 2 | 1.8 |
| | 2 to 3 | 24.1 |
| | 4 to 5 | 43.3 |
| | >5 | 30.8 |
| Education (%) | Illiterate | 31.3 |
| | Read and write | 11.2 |
| | <grade 10 | 26.7 |
| | ≥ Grade10 | 30.8 |
| Occupation (%) | Farming | 14.4 |
| | Office | 11.4 |

| | | |
|---------------|--------------------------------|---------|
| Labor | 8.3 | |
| Self employed | 21.4 | |
| Housewife | 33.2 | |
| Student | 3.7 | |
| others | 8.1 | |
| Income in NRs | Mean gross income of household | 21837.8 |
| Diarrhea (%) | Prevalence | 50 |

The average total out of pocket expenditure (OPE) (sum of Direct and Indirect Cost) was NRs 568.62 (US\$5.06) for Diarrhea treatment where as 32.28 % was the direct cost and 67.72% was indirect cost. The loss of wage by parents with in the Indirect cost was NRs 360.97 (US \$3.21) which was 63.48% of OPE followed by average cost for medicine per child per episode was NRs 114.15 (US \$ 1.01) which was 20.07% of OPE. Thus, loss of wage was the highest cost driver for OPE. The average Direct Cost of treating Diarrheal case was NRs 183.58 (US \$1.63). Among the direct costs, average medicine cost per episode was NRs 114.15 (US \$1.01) and consultation fee was NRs 69.43 (US \$0.61). However, caregivers' expenditure was the critical cost component of indirect costs, which included transportation cost NRs 24.07(US \$0.21) and loss of wage NRs 360.97(US \$ 3.21) by the caregivers during the episodes of Diarrhea as shown in Table 2.

Table 2. Out of pocket expenditure. (n=371).

| Out of pocket expenditure (OPE) | Cost in NRs | % | Mean \pm SD | 95% CI |
|--|-------------|-------|----------------------|-----------------|
| Direct cost per case for consultation | 69.43 | 12.21 | 69.4 \pm 219.4 | (48.4-91.4) |
| Direct cost per case for medicine | 114.15 | 20.07 | 114.1 \pm 306.6 | (83.7-147.6) |
| Indirect cost for transport per case | 24.07 | 4.24 | 24.07 \pm 115.8 | (14.6-38.9) |
| Indirect cost as loss of wage per case | 360.97 | 63.48 | 360.97 \pm 1049.61 | (261.03-476.23) |
| Average total cost of diarrhea treatment per episode | 568.62 | 100 | | |
| Average direct cost per episode | 183.58 | 32.28 | 183.58 \pm 447.62 | (138.72-229.84) |
| Average Indirect cost per episode | 385.04 | 67.72 | 385.04 \pm 1073.73 | (276.25-502.94) |

The average out of pocket expenditure was significant among the age groups of under five children. The out of pocket expenditure (OPE) was higher in under five children and was statistically significant ($P < 0.002$). The average OPE for female child (NRs 1212.1or US\$ 10.78) was higher than that for males (NRs 816.5 or US\$7.27) and was statistically significant ($P < 0.028$). The OPE was found associated with water, sanitation and hygiene score (WASH score) and found statistically significant ($P < 0.044$). The OPE according to Income Quintile was not found statistically significant ($P = 0.207$) Furthermore, OPE was significantly ($P < 0.029$) associated with the income generating numbers in family (Table 3).

Table 3. Association between Out of Pocket Expenditure (OPE) and other variables.

| Variable | n | Mean \pm SD | 95% CI | P value |
|-------------------------------|-----|-----------------------|---------------------|---------|
| WASH score | | | | |
| Poor WASH | 113 | 11 \pm 1.13 | (10.7-11.2) | 0.044* |
| Good WASH | 258 | 14.1 \pm 0.98 | (13.9-14.2) | |
| Income Quintile | | | | |
| Poorest quintile (2000-10000) | 75 | 7282.6 \pm 2168.4 | (6783.7-7781.5) | 0.207 |
| 2nd quintile (10,001-15,000) | 76 | 12204 \pm 1356.2 | (11894.02-12513.86) | |
| 3rd quintile (15,001-19,900) | 76 | 17392.7 \pm 1428.5 | (17066.3-17719.1) | |
| 4th quintile (19,901-31,500) | 76 | 25147.5 \pm 3641.5 | (24315.4-25979.7) | |
| Upper quintile (31,500+) | 70 | 48825.2 \pm 15463.1 | (45138.1-52512.2) | |
| Age | | | | |
| 1-1.9 years | 78 | 1.3 \pm 0.28 | (1.25-1.38) | 0.002* |
| 2-2.9 years | 102 | 2.21 \pm 0.22 | (2.16-2.25) | |
| 3-3.9 years | 97 | 3.1 \pm 0.20 | (3.06-3.15) | |
| 4+ years | 92 | 4.16 \pm 0.34 | (4.09-4.23) | |
| Gender | | | | |
| Male | 190 | 816.5 \pm 1326.2 | | 0.028* |
| Female | 161 | 1212.1 \pm 2000 | (44-747.30) | |

Income generating family members 385 2.3± 1.7 (2.21-2.57) 0.029*

*statistically significant

It was observed that the most common coping strategies for financial burden due to treatment among 280 participants were savings (37.86%), cutting down other expenses (38.93%), borrowing from others (15.36%), asking help from friends and relatives (7.14%) (Figure1).

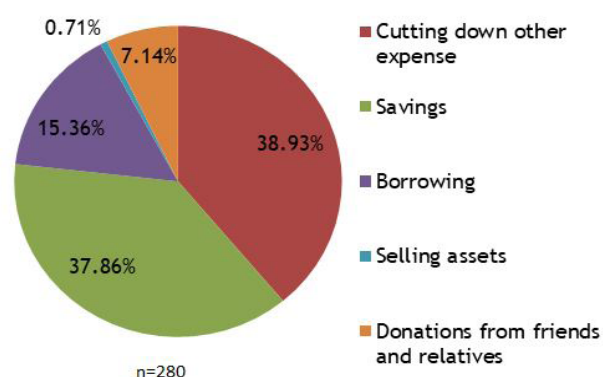


Figure 1. Percentage of Coping Mechanism during Diarrheal Treatment.

Different health facilities were utilized by parents during the episodes of diarrhea. Primary health care center (PHCC) being government service provider with minimum consultation fee, was utilized by most of the parents. The mean cost for treatment at PHCC was less comparison to others (Rs135.7±179.4 or US\$1.21±1.59). Besides PHCC, the other most utilized facilities with mean costs were hospitals (Rs663.4±1752.6 or US\$ 6±15.59), private clinics (Rs357±350 or US\$ 3.17±3.11), medical shop (Rs 420±537 or US\$ 3.73± 4.77) and traditional healers (Rs473.7±692.4or US\$ 4.21±6.16) (Table 4).

Table 4. Mean Cost for Various facilities utilized (n =361).

| Facilities Utilized | Number of cases | % | Cost in NRs Mean ± SD |
|---------------------|-----------------|-------|-----------------------|
| Traditional Healer | 22 | 6.1 | 473.7± 692.4 |
| Ayurvedic Clinic | 1 | 0.28 | - |
| Hospital | 77 | 21.33 | 663.41± 752.6 |
| Clinic | 76 | 21.05 | 357± 350 |
| Medical shop | 76 | 21.05 | 420± 537 |
| PHC | 109 | 30.19 | 135.7± 179.4 |
| Total | 361 | 100 | |

DISCUSSIONS

The prevalence of diarrhea in our study was found 371 (50%) among the household participants, whereas Sarker et al¹¹ estimated the prevalence of 57% of under five children, which constitute both outdoor and indoor patients i.e. hospitalized cases. Alam 2009¹² in his study found that 49 percent of the households were affected by diarrhea and the average duration of diarrhea in children was 3.76 days. In one of the studies done in slums of Khulna city Bangladesh, Sultana et al¹³ found that 45% patients were in the age group of 0-10 years and suffered from diarrhea on an average 4 days per episode. This shows that the prevalence of diarrhea in our study was quite high and similar to other studies conducted in Bangladesh.

Our study found that the average length of the diarrheal episode was 3 days which incurred an average cost of NRs 568.62 (US\$ 5.06) that could be saved if the diarrheal disease was prevented. Sarker et al. in 2018¹¹ found that US \$ 67.18 was the average cost for treating diarrhea for 5 days episode. This study was hospitalized based. So they found 52% of the total costs were the direct costs borne by the households and hospitals 31% and 21% respectively because the public hospitals are highly subsidized in Bangladesh. Comparing with Alam's study¹² conducted in slums of Dhaka, our study seemed quite similar in context of household selection to medical treatment, transport cost, loss of wage etc. The cost of treating a child with diarrhea in slum areas was found US \$ 4 for each episode. As diarrhea in slum areas was common, these households had to bear costs frequently throughout the year. Das et al¹⁴ in their study estimated the average diarrheal treatment cost for under 5 children in rural Bangladesh which was found US \$ 6.99 but this cost did not consider the laboratory cost in hospitals as well as the income loss of the household. That means the true OPE was not calculated in Alam's and Das et al's study. Our study expressed a more complete accounting of all the relevant costs associated with an episode of diarrhea. Sultana et al¹³ estimated in their study per day cost of diarrhea. It was found 4.5 times more than per day income of the household. The reason behind this was not seeking the healthcare facilities in time for cure and treatment. Shillcut et al.¹⁵ estimated the mean cost of diarrhea treatment among children. It was US \$6.10. This treatment cost declined to US \$2.49 after 2 years of diarrhea alleviation through zinc and oral rehydration solution (ORS) therapy(DAZT) program implementation. This study was a good example of ORS intervention program. Though, this study was not directly relevant to our study but it showed cost effective intervention

program in diarrhea which can reduce treatment cost.

In our study, the average out of pocket expenditure was significant among the age groups of under five children. In study carried out by Halim¹⁶ in Khulna Bangladesh significant association with age had been observed but the study was focused on adults only. In Sarker et al¹² adults with diarrhea consumed significantly more resources than the young that means expenditure is associated with increase in age. Sultana et al¹³ in their study showed a positive relationship between the child age (under 5 years) and diarrhea.

In our study, Gender was found to have significant effect on healthcare expenditure among under five children. Among those age group, parents tend to spend more on health services and on other kinds of health expenditure on female children. This result is unique on this perspective where no gender disparity was found among children. Conversely, in study of Sarker¹¹ the healthcare expenditures on male were higher but there was no statistical significance. In one of the studies done in Burundi¹⁷ male preference for health seeking behavior was seen more than in females. Girls experienced higher treatment delays.

It was observed that the most common coping strategies adapted for financial burden due to treatment in our study were savings followed by cutting down other expenses and borrowing from others. In Sarker's study,¹¹ the most common coping strategies were regular income, borrowing from others and savings. Tasena et al¹⁸ had explored in their study regarding coping strategy in depth. Different coping mechanism were adapted like income or savings, loan from relatives, seeking loan without interest, taking loan with interest and selling their assets.

In our study, OPE varied depending on the facility visited. Those families visiting private health facilities had more health expenditure. Type of health facility visited was the main predictor of a difference in the mean total medical expenditure. Healthcare services were not entirely free of charge at PHCC facilities. Although consultation fees were not paid at health posts, parents had to buy necessary medicines from pharmacies because of a lack of medicine stock at health posts. Similar findings were found in the study of Memirie et al done in Ethiopia¹⁹ but Sarker et al¹¹ found that in Bangladesh though most of the patients received care from formal and informal care providers, priority was given for home treatment which would always be inappropriate and finally people bear high treatment cost with increased severity.

Studies to evaluate financial costs for households' health care treatment are essential. This type of study helps in setting priorities concerning public health decision-making and providing data necessary for societal perspective.¹⁰ In this context, our study assessed out of pocket expenditure (direct and indirect costs) associated with diarrhea. Lots of studies had been done worldwide regarding financial cost of different diseases. But there are only limited studies concerning cost of Diarrheal disease treatment.

CONCLUSIONS

The diarrheal diseases in under five children was still found higher and financial burden due to this was also found higher. The indirect cost of each diarrheal episode is more than three times of the direct cost. A significant amount of diarrhea treatment expenditure could be cut off by managing and preventing diarrheal disease. Such situation is only possible when water, sanitation and hygiene (WASH) condition in community is properly maintained. This is indicating towards need for policy intervention for improving the household WASH facilities in community to reduce diarrheal cases in under five children. Compulsory child health insurance policy could also be a better strategy to cope with or minimizing financial burden of households.

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REFERENCES

1. Mokomane M, Kasvosve I, de Melo E, Pernica JM, Goldfarb DM. The global problem of childhood diarrhoeal diseases: emerging strategies in prevention and management. *Ther Adv Infect Dis.* 2018 ; 5(1):29–43 [[PubMed](#)]
2. Government of Nepal Ministry of Health, Department of Health Services Annual_Report_2073-74.pdf. [[Full text](#)]
3. Government of Nepal .Nepal Multidimensional Poverty Index. Analysis towards action 2018. National Planning Commission, Government of Nepal, Oxford Poverty and Human Development Initiative, University of Oxford [cited 2018 Dec 7]. [[Full text](#)]
4. Manzi F, Schellenberg JA, Adam T, Mshinda H, Victora CG, Bryce J. Out-of-pocket payments for under-five health care in rural southern Tanzania. *Health Policy Plan.* 20051; 20(suppl_1):i85–93. [[Full text](#)]

5. World Health Organization. Chapter 2: How well do health systems perform? In: The World Health Report 2000 Health systems: improving performance. Geneva: WHO. 2000; p. 21-46.[\[Full Text\]](#)
6. Adhikari SR. Universal Health Coverage Assessment Nepal: Global Network for Health Equity (GNHE). 2015 Dec. [\[Full Text\]](#)
7. Thuan NB, Lofgren C, ThiChuc N K, Janlert U, Lindholm L. Household out-of-pocket payments for illness: Evidence from Vietnam. *BMC Public Health*. 2006, 6:283. [\[Full Text\]](#)
8. N.K. Anand, Goel S. *Health Economics*. A.IT.B.S. publishers. 2nd edition 2010
9. Changik Jo. Cost-of-illness studies: concepts, scopes, and methods. *Clin Mol Hepatol*. 2014 Dec;20(4):327. [\[Full Text\]](#)
10. World Health Organization. WHO guide to identifying the economic consequences of disease and injury. Department of Health Systems Financing Health Systems and Services. 2009. [\[Full Text\]](#)
11. Sarker AR, Sultana M, Mahumud RA, Ali N, Huda TM, Haider S, et al. Economic costs of hospitalized diarrheal disease in Bangladesh: a societal perspective. *Global health research and policy*. 2018 Dec;3(1):1. [\[Full Text\]](#)
12. M. Jahangir Alam. Prevalence and Costs of Childhood Diarrhea in the Slums of Dhaka (SANDEE Working Papers, ISSN 1893-1891; 2009- WP 46). [\[Full Text\]](#)
13. Sultana S, Md. Ahmed S and Sk. Hossen S. Diarrheal Diseases in the Slums of Khulna City: Prevalence and Cost Analysis. *J Asian Dev. Stud*. 2013; 2(2) [\[Full Text\]](#)
14. Das J, Das SK, Ahmed S, Ferdous F, Farzana FD, Sarker MHR. Determinants of percent expenditure of household income due to childhood diarrhea in rural Bangladesh. *Epidemiol Infect*. 2015:1–7. [\[Full Text\]](#)
15. Shillcut et al. Economic costs to caregivers of diarrhea treatment among children below 5 in rural Gujarat India: findings from an external evaluation of the DAZT program. *Health Policy and Planning*, 31, 2016, 1411–1422 doi: 10.1093/heapol/czw083. Advance Access Publication Date: 31 July 2016. [\[Full Text\]](#)
16. Halim. F B, Haider M Z. Prevalence and economic costs of diarrheal illness among adult slum dwellers in Khulna City, Bangladesh. *Journal of Health and Social Sciences* 2017; 2,1:83-98. [\[Full Text\]](#)
17. Diouf K, Tabatabai P, Rudolph J, Marx M. Diarrhea prevalence in children under five years of age in rural Burundi: an assessment of social and behavioral factors at the household level, *Global Health Action*, 7:1, 24895. [\[Full Text\]](#) [\[DOI\]](#)
18. Tahsina T, Ali NB, Siddique M. AB, Ahmed S, Rahman M, Islam S, et al. Determinants of hardship financing in coping with out of pocket payment for care seeking of under five children in selected rural areas of Bangladesh. *PLoS ONE* 13(5): e0196237. 2018 [\[Full Text\]](#) [\[DOI\]](#)
19. Memirie ST, et al. Household expenditures on pneumonia and diarrhea treatment in Ethiopia: a facility-based study. *BMJ Glob Health* 2017;1:e000166. doi:10.1136/bmjgh-2016-000166. [\[Full Text\]](#)