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Influence of socio-demographic factors on the diarrheal disease management approaches taken by two distinct communities of Bangladesh

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ABSTRACT: Diarrhea is one of the major determinants of childhood mortality in the world. This study was aimed to provide a demographically representative description on the influence of socio-demographic factors e.g. caretakers' education, occupation, family income and living standard on the diarrheal disease management approaches taken by the slum dwellers and middle class families of Bangladesh. We have visited 90 middle class families and 120 slum dwellers to obtain information. Children of slum dwellers are more likely to be affected by diarrhea. In both classes, significantly more females were affected by diarrhea than males. This scenario is even more prominent among slum dwellers, where 1.5 times more females were affected by diarrhea than their male counterparts. As a primary approach to manage diarrhea, 63.8% caretakers chose Oral rehydration solution (ORS) whereas 31.5% preferred the salt-molasses fluid. All caretakers knew the use of ORS and antibiotics as a preventive measure against diarrhea. However, this scenario dramatically turned when the caretakers were asked whether they know how to prepare ORS. All the caretakers (100%) in middle class families knew how to prepare ORS in contrast to only 25% caretakers among the slum dwellers. Private sectors specially pharmacies were often the first line of health care in both of these classes during diarrhea. But this is most prevalent among the middle class families (50%), compared to the slum dwellers (35%). Finally, it is apparent that the education, family income, living standard and good food help the middle class families to fight diarrhea more efficiently and scientifically than the slum dwellers.

KEYWORDS: Diarrhea management, socio-demographic factors, living standard, education, income.

INTRODUCTION

Diarrhea the second leading cause of under-five child mortality, responsible for almost 2 million worldwide deaths per year [1, 2]. Globally, up to 5 billion of diarrhea cases occur every year [3, 4, 5]. This incident is most common in developing countries, where children at their younger ages suffer from diarrhea on average three times per year [3]. High frequency of diarrheal episodes is the most common cause of malnutrition in those children [3]. Other long term side effects of frequent episodes of diarrhea include poor intellectual development and stunted growth [6].

Despite the increasing incidence of diarrhea and public concern about hygiene, there are still significant discrepancies among the caretakers about the knowledge and management of diarrhea. Socio-demographic factors such as caretaker's education, employment status, family size and income, place of residence are strongly linked to the high frequency of diarrhea and play a

crucial role on the approaches chosen by caretakers to efficiently manage diarrhea. However, majority of the death, less than one-third of children in sub-Saharan Africa and South Asia, caused by diarrhea can be prevented by proper management approaches e.g. continued feeding, timely use of oral rehydration solution (ORS) [7]. Significant reduction in childhood diarrheal death by appropriate management practices on the basis of socioeconomic status, gender and where the children live is a renewed effort in response to millennium development goal #4 which is targeted to achieve by two-thirds by the year 2015 in developing countries [8].

With the right combination of water and sanitation facilities, with behavioral characteristics of the household, diarrheal disease is almost preventable. Two terms can be used (economic/ behavioral and infrastructure) for identifying socio-demographic factors linked with the incidence and severity of diarrheal illness [9]. The economic/behavior view highlights the attention and interpretation of household behavior. The lack of awareness and insufficient knowledge of mothers about hygiene leads to frequent exposure of children to diarrhea [10-12]. The second perspective, infrastructural intervention, has very less effect in lowering diarrhea than the behavioral factors.

Our present study tried to focus on the management approaches against diarrheal diseases taken by the slum dwellers and middle class families of Bangladesh, which is a completely new aspect. It is apparent that the education, family income, living standard and good food help the middle class families to fight against diarrhea more efficiently and scientifically than the lower families living in the slums. We have identified varied patterns of practice and equity by geographic location. The survey was stratified by urban and inner-city slum and non-slum populations. Finally, we tried to provide a baseline to monitor the effectiveness of chosen practices caused by education, family income, living standard and good food throughout major cities of Bangladesh to competently fight against diarrhea.

MATERIALS AND METHODS

Study area and Sampling

About 120 slums dwellers and 90 households from the middle class families within the Dhaka and Chittagong division were interviewed. The Dhaka Metropolitan Area (DMA) was chosen for studying the slum dwellers. Four slums located in Mirpur, Mohammadpur, Tejgaog and Kamalapur were chosen to conduct the household survey. On average, each slum had 30 households. The middle class families are located both in Dhaka and Chittagong divisions. This survey was conducted from 1st May to 31st July 2018. The principal respondents to questionnaire were women because it was felt they were more aware of the children's health condition compared to the men of the household. The data were collected on household members, household status, household knowledge on diarrhea and its management, the cost of treating diarrhea, awareness of and practices relating to personal hygiene.

Measurement

The interview was conducted with the proper consent from caretakers in every household we surveyed. Our questionnaire covered socio-demographic factors and management approaches taken by the household during the episode of diarrhea. Socioeconomic status was determined by considering education, monthly income, dwelling characteristics, and other household characteristics that are related to wealth status.

Survey methodology

The authors followed the recommendations of the Division for the Control of Diarrheal and Acute Respiratory Disease of the World Health Organization (WHO, 1995) in the designing of the survey on diarrhea. The opportunity of having direct contact with the target population (care seekers) was utilized.

Ethical approval

Ethical approval for this analysis was obtained from the patients and caretaker. All participants gave informed consent and signed a consent form prior to participation in the study.

Data analysis

Data were primarily analyzed using IBM SPSS V22 and Microsoft Excel 2016, cleaned for any inconsistencies and analyzed for standard distribution measurements. P-value < 0.05 was considered significant (not shown here).

RESULTS

Prevalence of diarrhea

In total, we have visited 90 middle class families and 120 slum dwellers, who were suffered from diarrhea in recent times, both in Dhaka and Chittagong district to obtain information. Diarrhea occurrence is higher in

children and adults with age group between 1-10 and 40-60 years, respectively (Figure 1). Children of slum dwellers are more likely to be affected by diarrhea than the children of middle class families. In all households visited in the slums, 36% (30) children under 10 years of age were reported to have suffered from diarrhea compared to only 6% (4) children in middle class families (Figure 1). In both cases, significantly more females were affected by diarrhea than males. This scenario was even more prominent among slum dwellers, where 1.5 times more females were affected by diarrhea than their male counterparts (Figure 2).

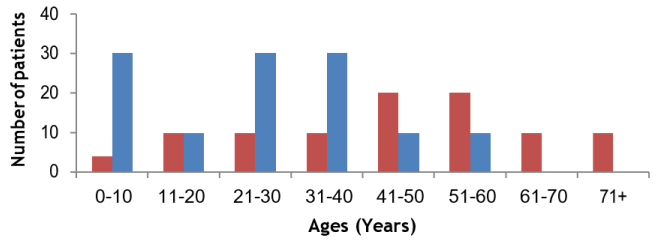

Figure 1. Comparison of the age distribution of patients among middle class families and slum dwellers. The occurrence of diarrhea is higher in children and adults with age group between 1-10 and 40-60 years.

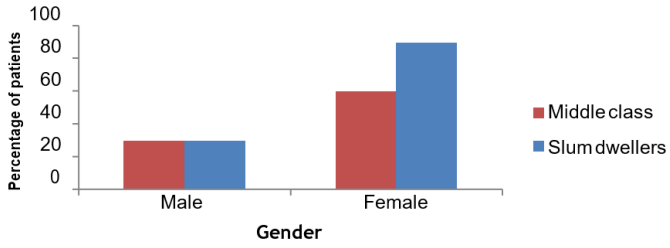

Figure 2. Comparison of the gender distribution of patients among middle class families and slum dwellers. In both types of families, significantly more females were affected by diarrhea than males, which was even more prominent among slum dwellers.

Demographic characteristics of the study population

There were positive correlations between caretaker's knowledge about diarrhea and mothers' age and education, family size and husbands' income. A caretaker with higher education and family income has better knowledge about preventing and managing diarrhea. These findings are true throughout our entire survey. The management of diarrhea is significantly better among the middle class families due to their higher family income and advanced education compared to the slum dwellers (Table 1).

Table 1. Socio-demographic factors

Socio-demographic factors	Middle class families (%)	Slum dwellers (%)
Caretaker's education		
No education	0	33
Primary	5	58
Intermediate	10	8
Advanced	80	0
Family Income		
5000-10000	0	17
11000-20000	0	83
21000-30000	20	0
30000-50000	40	0
50000+	40	0

The table illustrates that the most of the caretakers (80%) among the middle class have received advanced education, whereas, most of the caretakers (58%) among the slum dwellers studied only up to primary level. In terms of household income, the middle class family's income almost 4 times higher on an average compared to the slum dwellers.

Knowledge on diarrhea management

i) Caretaker's knowledge about the preparation and use of ORS

The most common response of the caretakers about ORS was that it mainly decreases the frequency of diarrhea while in some cases frequency may increase. Caretakers were also asked what is the best for managing diarrhea. 63.8% chose ORS and 31.5% preferred the salt-molasses fluid. The use of rice-based fluid was not well known or not preferred as only 0.2% chose this alternative (Figure 3). All caretakers (100%) knew the use of ORS and antibiotics as a preventive measure against diarrhea in both classes. However, this scenario dramatically turned when the caretakers were asked whether they know how to prepare ORS. All the caretakers (100%) in middle class families knew how to prepare ORS. In contrast, only 25% caretakers among the slum dwellers knew how to prepare ORS (Figure 4). Three-fourth of the caretakers was unable to mention all the four steps of correct preparation of ORS solution. The main reason for using an incorrect volume of water during the preparation of the ORS solution was due to the use of local uncalibrated water-measuring devices. Many caretakers among slum dwellers gave the wrong volume of ORS solution to the patients during diarrhea.

ii) Caretaker's knowledge about diarrhea and its danger signs

Most of the caretakers, in both classes, were aware of thin watery diarrhea being the most serious type of diarrhea. However, almost 90% caretakers in middle class families pointed out that thin watery stool with repeated vomiting and febrile conditions as indicative of more serious diarrhea. Among slum dwellers, only 30% of the caretakers were aware of other dangerous signs of dehydration such as sunken eyes, thirst (eagerly drinking), skin pinch receding slowly, the passage of concentrated or dark-colored urine, a drowsy child and the child not getting better after three days (Figure 5).

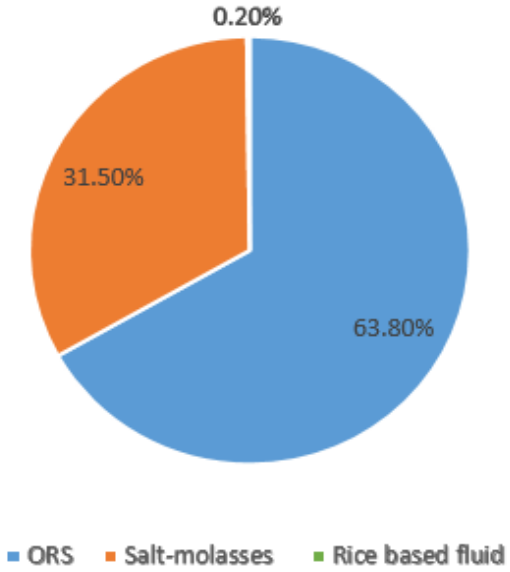

Figure 3. A combined view of the choice of fluid intake in both of these communities. Most of the caretakers from both families preferred ORS to provide proper hydration for patients during an episode of diarrhea. One-third of the respondents preferred salt-molasses, but very few knew about the rice-based fluids.

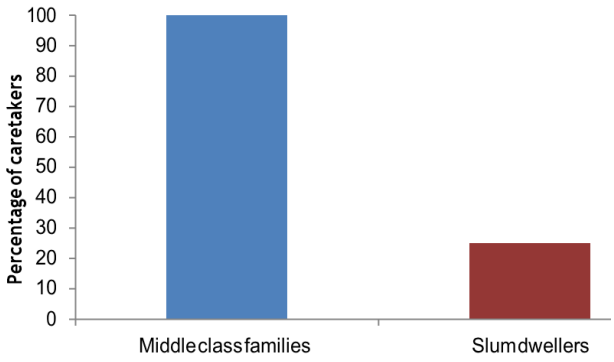

Figure 4. Comparison of the knowledge on how to prepare ORS among the middle class families and slum dwellers. All the caretakers in middle class families knew how to prepare ORS compared to the families living in slums where only one-fourth of them knew how to prepare ORS.

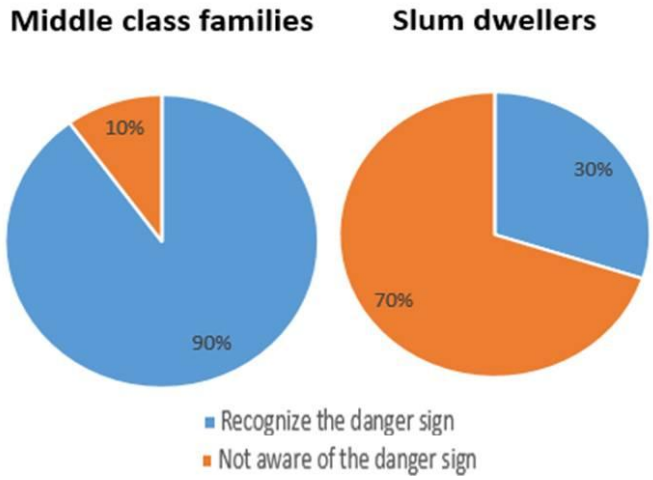

Figure 5. Comparison of the knowledge about the danger signs of diarrhea among the middle class families and slum dwellers. We investigated whether caretakers recognized danger signs of diarrhea and if they knew when to bring the patients to the health facility. We found that caretakers' knowledge on the danger sign of diarrhea almost 3 times higher among middle class families compared to the caretakers living in the slum.

Caretaker behavior during an episode of diarrhea

Appropriate case management of diarrhea at home is one of the capital importance because this intervention reduces significantly the risk of dying by dehydration. The perceived seriousness of diarrhea as a life-threatening condition made 60.5% of caretakers who suffered from diarrhea in the two weeks prior to the study seek care outside the house.

Table 2. Caretaker's knowledge and practice on fluids and food intake during diarrhea.

	Middle class families		Slum dwellers	
	Knowledge (%)	Practice (%)	Knowledge (%)	Practice (%)
Suspend fluids/ food	2.7	7.6	7.2	38.9
Less Fluids/ food	42.5	41.5	52.9	43.5
Same amount	15.9	23.6	20.42	10
More fluids/ food	38.2	17.3	18.5	7.5

Table 3. Care-seeking behavior of the patients from middle class families and slums during an episode of diarrhea.

	Middle class families %	Slum dwellers %
Traditional healer	0	5
Village doctor	10	13
Government services	30	42
Private services	10	5
Pharmacy and drug dealers	50	35

There is still a gap between knowledge of diarrhea management and its practice. For the categories of suspending and giving less fluid, the percentage of caretakers practicing it was higher among slum dwellers than the middle class families. While for the categories of the same amount and more fluid, the proportion of caretakers practicing it was higher among middle class families than the slum dwellers (Table 2). A similar pattern can be seen concerning food intake. In general, the management of diarrhea has improved significantly among middle class families, particularly concerning fluid and food intake. Currently, about 2.3 times more caretakers among middle class families give at least the same amount of food to their patients during an episode of diarrhea as compared to slum dwellers (Table 2).

Care-seeking behavior of caretakers in case of diarrhea

Disparities based on income in care seeking behavior were identified among the slum dwellers and middle class families. Surprisingly, care-seeking behavior shows strong similarities in these two classes of society. In middle class families, 50% of the patients receive their medications from pharmacy and drug dealers, whereas only 35% patients from slum receive their treatment from the pharmacy and drug dealers (Figure 6).

However, this scenario is completely opposite in case of receiving the treatment from government services, 42% slum dwellers receive government services compared to only 30% of patients from the middle class families (Figure 6). It is noteworthy that, no patients from the middle class families receive their treatment from traditional healers (Table 3). We have also investigated the pattern of antibiotic utilization in both of these communities. In this survey, we have found that 85% of the patients in middle class families consumed antibiotics compared to only 52% of the patients from slums (Figure 7).

DISCUSSION

Socio-demographic factors such as caretaker's education and occupation, caretaker's employment status, family size and income are linked with caretaker's knowledge about diarrhea and its management. Although caretakers from both middle class families and slum dwellers were aware of diarrhea and its home management, the level of awareness was insufficient among the slum dwellers. In total, 90 middle class families and 120 slum dwellers were visited to obtain information. Most of the caretakers (80%) among the middle class have received advanced education, whereas, most of the caretakers (58%) among the slum dwellers studied only up to primary level (Table 1). In terms of household income, the middle class family's income almost 4 times higher

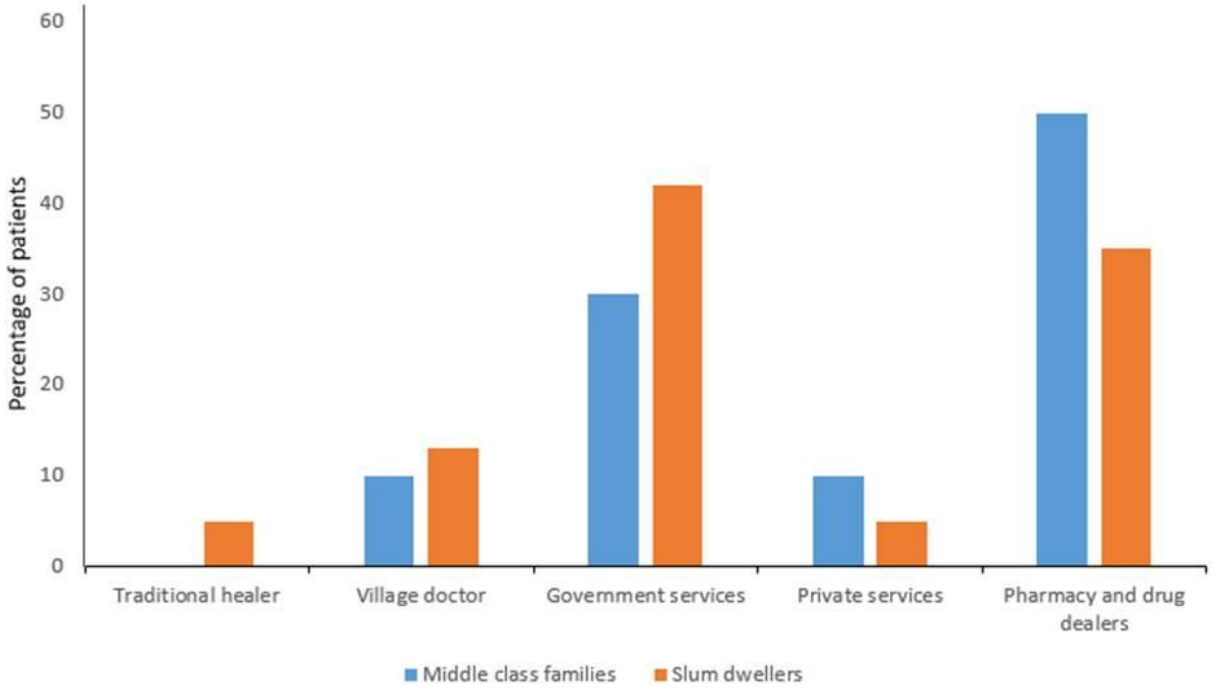

Figure 6. Comparison in the care-seeking behavior among middle class families and slum dweller. We found that most of the caretakers did not consult a licensed health provider and drug shops were often the first line of health care in both classes of the family (50% and 35% cases from middle class families and slum dwellers, respectively).

on an average compared to the slum dwellers. Children of slum dwellers are more likely to be affected by diarrhea than the children of middle class families. In all households visited in the slums, 36% of children under 10 years of age were reported to have suffered from diarrhea compared to only 6% of children in middle class families (Figure 1). In both cases, significantly more females were affected by diarrhea than males. This scenario is even more prominent among slum dwellers, where 1.5 times more females were affected by diarrhea than their male counterparts (Figure 2).

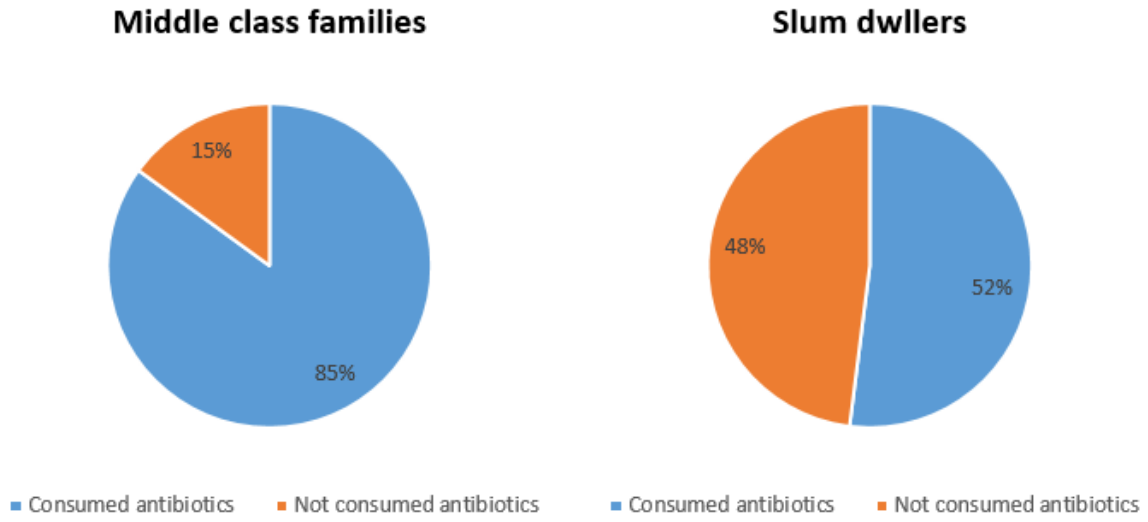

Figure 7. Comparison of the use of antibiotics among middle class families and slum dwellers. Here, almost 85% of the patients in middle class families consumed antibiotics compared to only 52% of the patients from slums.

Effective management of diseases depends on correct knowledge on causes, symptoms and treatments. The frequency of correct answers in the interviews increased with the level of education. When we asked about the management of diarrhea, most of the caretakers from the slums were unable to mention all the steps for the correct and complete preparation of ORS solution. This study found that approximately 100% caretakers from the middle class families and only 25% of the caretakers from the slums were able to prepare ORS solution correctly and completely (Figure 4). This study shows strong similarity with the studies conducted on the prior knowledge of the mothers which found approximately 20% to 50% of the mothers could prepare ORS solution correctly and completely [13-16]. This might be due to caretaker's lack of prior experience, a lack of proper education about the concerned matters and their ethnicity itself. Regarding the use of ORS, almost all the caretakers among the slum dwellers were lacking the knowledge of giving the correct volume of ORS to the patients with diarrhea which is completely different from the caretakers of the middle class families. The poor knowledge among the caretakers about the role of ORS in diarrhea is due to their poor knowledge about the concept of dehydration and rehydration.

The ability of caretakers to recognize signs and symptoms of severe illness is believed to be an important predictor of timely and appropriate care seeking in developing countries. An intervention directed at improving caretaker recognition of danger signs in their patients resulted in substantial increases the timely use of qualified providers [17, 18]. The knowledge about the danger signs of diarrhea, determined by our questionnaire, are almost 3 times higher among middle class families compared to the knowledge of caretakers living in the slum (Figure 5).

Disparities based on income in care seeking behavior were identified among the slum dwellers and middle class families [19]. This was true for any provider as well as for a licensed allopath from private sectors with significant trends favoring higher income households occurring throughout Bangladesh. This survey documents that throughout Bangladesh health-seeking behaviors for diarrhea are dominated by utilization of private sector providers (Table 3). The most crucial factor within urban households for seeing a licensed allopath was higher education of caretakers, higher income and longer duration of illness. In slums, the most important predictors were the longer duration of illness, age of the child, and caretaker's education.

Even though nearly all caretakers sought care outside the home when their patients had diarrhea, the majority did not consult a licensed health provider, a trend that is increasingly reported in Bangladesh [20] (Figure 6). Drug shops were often the first line of health care in these both classes of the family. But this is most prevalent among the middle class families (50%),

compared to the slum dwellers (35%) (Figure 6). Unexpectedly, it was found that slum when compared with middle class urban families, were twice as likely to seek services from the public sector. Surprisingly it was found that more patients among slum dwellers (42%) seek for government services than the patients from middle class families (30%) (Figure 6). The reasons behind this may be hassle associated with the government care facilities. This survey did not inquire about reasons for choosing a particular provider; however, earlier surveys have documented that the use of public services is hindered by the unavailability of health providers and unofficial payments [21]. However, these utilization patterns, in part, can be explained by the fact that private providers far outnumber the other sectors, are easily accessed, and are available at all hours of the day and late into evenings. Government clinics and hospitals, in contrast, require longer waiting, complex registration and accessible within limited daytime hours. In addition, caretakers usually seek a quick cure for their children and less interested in complex governmental settings unless a child is perceived as severely ill. Drugs are more efficiently and simply obtained through private providers as well.

Finally, the current survey found that most patients who received care from a hospital or health center were appropriately treated with ORS, and approximately half received antibiotics. These rates are compatible with other reports of antibiotics, zinc and ORS usage in rural Bangladesh [22]. Many children in the older age groups were also given antibiotics. Antibiotics are extensively used in diarrhea case management [23-24], even though they are only recommended in a few cases of diarrhea. The tendency to use antibiotics is even more serious among the caretaker from middle class families. In the present study over 85% of the caretakers from the middle class families used antibiotics together with ORS compared to 52% in case of slum dwellers (Figure 7). Antibiotics are often attained from other sources than from trained medical personnel [25]. Overuse can potentially cause harmful side effects and contributes to bacterial resistance development [26].

CONCLUSIONS

The improvement in the prevalence and management of diarrhea, as found in the study, seem to be predominantly due to extensive awareness-raising and educational activities. The present study finds that socio-economic variables such as education of the caretaker, family income, site of their residence play a crucial role in the management of diarrhea (Figure 8). The study findings show that in relatively short time a significant reduction in mortality due to diarrhea through behavior change in a mostly poor and illiterate population can be achieved if intensive sensibilization and education strategies are deployed.

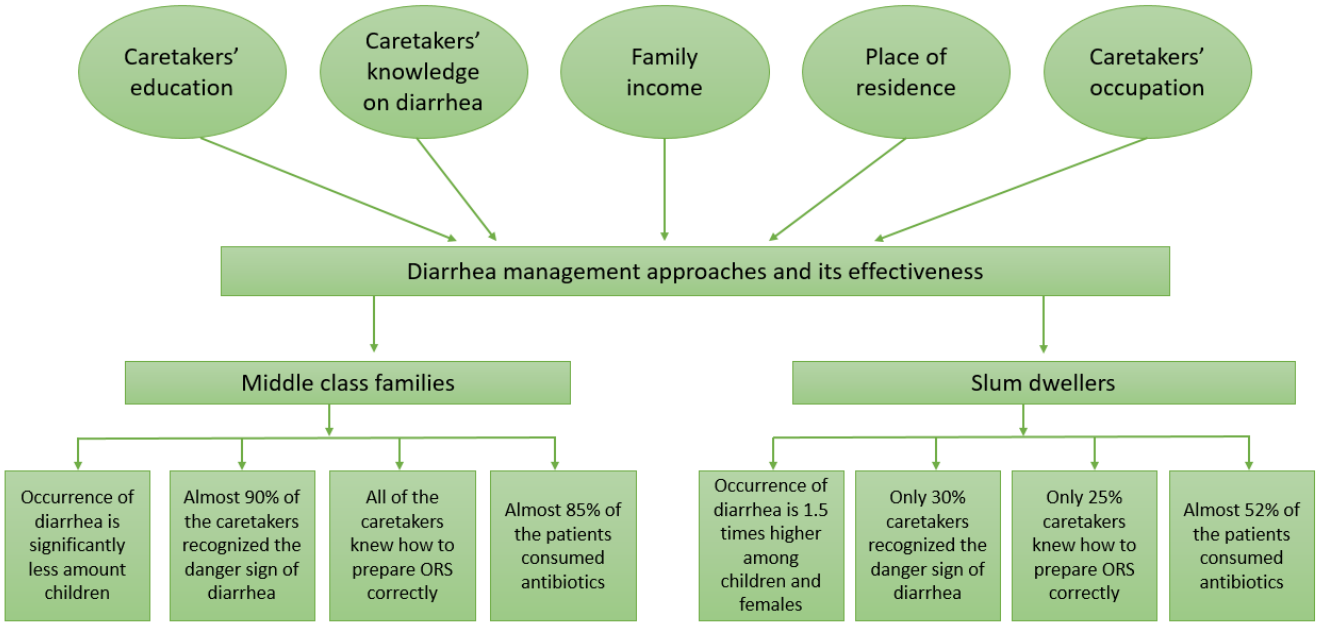

Figure 8. Schematic representation of summary. Our study suggests that knowledge about diarrhea and its management was poor among the caretakers from the slum dwellers compared to the middle class families. Although caretakers from slum dwellers were aware of diarrhea and its home management, their knowledge on vital issues such as complete and correct preparation of ORS, danger signs of dehydration and actual role of oral rehydration fluids during diarrhea was very poor due to the associated socio-demographic factors.

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AUTHOR CONTRIBUTIONS

GK and RUZ were involved in conception and design of the experiments. GK, NA and DU contributed to perform the experiments. GK and RUZ analyzed data and contributed to drafting the article. NA, DU and RUZ contributed to revising it critically for important intellectual content. RUZ made the final approval of the version to be published.

CONFLICTS OF INTEREST

The author declares that no conflict of interest exists.

REFERENCES

[1] Murray C. J. L., & Lopez A. D. Alternative projections of mortality and disability by cause 1990-2020: Global Burden of Disease Study. Lancet. 1997; 349 (9064), 1498–1504. https://doi.org/10.1016/S0140-6736(96)07492-2

[2] Jones G., Steketee R. W., Black R. E., Bhutta Z. A., & Morris S. S. How many child deaths can we prevent this year? Lancet. 2003; (03): 13811-1. https://doi.org/10.1016/S0140-6736(03)13811-1

[3] Kirk M. D., Angulo F. J., Havelaar A. H., & Black R. E. Diarrhoeal disease in children due to contaminated food. Bulletin of the World Health Organization. 2017; 95(3), 233–234. https://doi.org/10.2471/blt.16.173229

[4] Pope L. E. R., & Hobbs C. G. L. Epistaxis: An update on current management. Postgraduate Medical Journal. 2005. https://doi.org/10.1136/pgmj.2004.025007

[5] Vos T., Barber R. M., Bell B., Bertozzi-Villa A., Biryukov S., Bolliger I., Murray C. J. L. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013. The Lancet. 2015; 386 (9995), 743–800. https://doi.org/10.1016/S0140-6736(15)60692-4

[6] Liu L., Johnson H. L., Cousens S., Perin J., Scott S., Lawn J. E. et al. Global, regional, and national causes of child mortality: An updated systematic analysis for 2010 with time trends since 2000. The Lancet. 2012; 379(9832), 2151–2161. https://doi.org/10.1016/S0140-6736(12)60560-1

[7] Victora C. G., Bryce J., Fontaine O., & Monasch R. Reducing deaths from diarrhoea through oral rehydration therapy. Bulletin of the World Health Organization. 2012; 78(10), 1246–1255. ISSN: 00429686

[8] UN Millennium Project. Investing in Development. A Practical Plan to Achieve the Millennium Development Goals. UN Millennium Project. 2005; 329. https://doi.org/10.1088/1751-8113/44/8/085201

[9] Alberini A., Eskeland G. S., Krupnick A., & McGranahan G. Determinants of diarrheal disease in Jakarta. Water Resources Research. 1996; 32(7), 2259–2269. https://doi.org/10.1029/96WR01102

[10] Jalan J., & Ravallion M. Does piped water reduce diarrhea for children in rural India? Journal of Econometrics. 2003; 112(1), 153–173. https://doi.org/10.1016/S0304-4076(02)00158-6

[11] Han A. M., & Hlaing T. Prevention of diarrhoea and dysentery by hand washing. Transactions of the Royal Society of Tropical Medicine and Hygiene. 1989; 83 (1), 128–131. https://doi.org/10.1016/0035-9203(89)90737-2

[12] Hussain A., Keramat Ali S. M., & Kvåle G. Determinants of mortality among children in the urban slums of Dhaka city, Bangladesh. Tropical Medicine and International Health. 1999; 4(11), 758–764. https://doi.org/10.1046/j.1365-3156.1999.00485.x

[13] Jha N., Singh R., Baral D. Knowledge, attitude and practices of mothers regarding home management of acute diarrhea in Sunsari, Nepal. Nepal Medical College Journal. 2006; 8(1):27-30. PMID: 16827086

[14] Rasania S. K., Singh D., Pathi S., Matta S., & Singh S. Knowledge and attitude of mothers about oral rehydration solution in few urban slums of Delhi. Health and Population: Perspectives and Issues. 2005; 28(2), 100–107. ISSN: 02536803

[15] MacDonald S. E., Moralejo D. G., & Matthews M. K. Correct Preparation and Administration of Oral Rehydration Solution: Essential for Safe and Effective Home Treatment of Diarrhea in Indonesia. International Quarterly of Community Health Education. 2006; 24(3), 205–214. https://doi.org/10.2190/8prr-9qve-rquh-705u

[16] Rehan H.S., Gautam K., Gurung K. Mothers needs to know more regarding management of childhood acute diarrhea. Indian Journal of Preventive and Social Medicine. 2003; 34(1–2), 40–45.

[17] Choi Y., El Arifeen S., Mannan I., Rahman S. M., Bari S., Darmstadt G. L. et al. Can mothers recognize neonatal illness correctly? Comparison of maternal report and assessment by community health workers in rural Bangladesh. Tropical Medicine and International Health. 2010; 15(6), 743–753. https://doi.org/10.1111/j.1365-3156.2010.02532.x

[18] Bari S., Mannan I., Rahman M. A., Darmstadt G. L., Seraji M. H. R., Baqui A. H. et al. Trends in use of referral hospital services for care of sick newborns in a community-based intervention in Tangail district, Bangladesh. Journal of Health, Population and Nutrition. 2006; 24(4), 519–529.

[19] Edgeworth R., & Collins A. E. Self-care as a response to diarrhoea in rural Bangladesh: Empowered choice or enforced adoption? Social Science and Medicine. 2006;

63(10), 2686–2697. https://doi.org/10.1016/j.socscimed.2006.06.022

[20] Ahmed S. M., Adams A. M., Chowdhury M., & Bhuiya A. Changing health-seeking behaviour in Matlab, Bangladesh: Do development interventions matter? Health Policy and Planning. 2003; 18(3), 306–315. https://doi.org/10.1093/heapol/czg037

[21] Perry H.B. Health for All in Bangladesh. Dhaka, Bangladesh: The University Press Ltd. 2000; 14; 225-27.

[22] Larson C. P., Saha U. R., & Nazrul H. Impact monitoring of the national scale up of zinc treatment for childhood diarrhea in Bangladesh: Repeat ecologic surveys. PLoS Medicine. 2009; 6(11). https://doi.org/10.1371/journal.pmed.1000175

[23] Raghu M.B., Balasubramanian S., Balasubramanian G., Ramnath A. Drug therapy of acute diarrhea: in children-actual practice and recommendations. Indian Journal of Pediatrics. 1995; 62:433–437.

[24] Tomson G., & Sterky G. Self-prescribing by way of pharmacies in three Asian developing countries. The Lancet. 1986; 328(8507), 620–622. https://doi.org/10.1016/S0140-6736(86)92438-4

[25] Winch P., & FitzGerald M.F. Formative research in preparation for promotion of zinc treatment for childhood diarrhea: Cross-country comparison of diarrhea treatment practices and implications for programs. Johns Hopkins Bloomberg School of Public Health. 2004; 22–23.

[26] Okeke I. N., Laxminarayan R., Bhutta Z. A., Duse A. G., Jenkins P., O'Brien T. F. Antimicrobial resistance in developing countries. Part I: Recent trends and current status. Lancet Infectious Diseases. 2005. https://doi.org/10.1016/S1473-3099(05)70189-4.