

DIARRHEA AND ARI IN RURAL AREAS OF BANGLADESH

Helga Piechulek¹, Ahmed Al-Sabbir² and Jorge Mendoza-Aldana³

German Technical Cooperation (GTZ); ²National Institute of Population Research and Training (NIPORT), Bangladesh; ³World Health Organization

Abstract. In Bangladesh, one third of the total child death burden is due to diarrhea. Every year, a rural child suffers on average from 4.6 episodes of diarrhea, from which about 230,000 children die. In this study, information was collected from 8,287 children under five years of age and 7,082 caretakers in 120 clusters chosen by a two-stage random cluster sampling method. As compared to the baseline survey, carried out in 1996, children now are about 30% less likely to suffer from diarrhea, and the risk of dying has been reduced by 60%.

Although the 2-weeks prevalence of acute respiratory infection (ARI) has risen from 39% (1996) to 46% and that of Acute Respiratory Infections needing assessment (ANA) from 12.4% to 16.9%, now more caretakers (59.9%) than in 1996 (56.7%) are able to identify correctly danger signs for seeking care and 58.4% (1996: 46.6%) of parents seek help when danger signs are present. Similar for diarrhea and ARI, village doctors and traditional healers are most frequently sought for help by caretakers; government health centers and hospitals are sought to a much lesser degree.

Since 1996, intervention activities were implemented for four years in the study area using an IEC strategy. This strategy included raising awareness and training of health personnel, NGO personnel and village volunteers, especially women. Diarrhea issues were included in school health education with emphasis on practical exercises of diarrhea management. For all target groups (health personnel, village volunteers, NGOs, mothers and school children) specific education material was developed and deployed. In the political arena, women leaders who are part of the local government were included in an awareness-raising campaign. The results of the study undertaken over four years later show that in a relatively short time behavior of mostly poor and illiterate caretakers can be changed leading to a significant reduction of ARI mortality and diarrhea morbidity, and mortality in children.

INTRODUCTION

In 1980, diarrhea was the leading cause of child mortality around the world, accounting for about 4.6 millions deaths annually. Currently, diarrhea accounts for 15-30% of deaths in children aged less than 5 years. Efforts to control diarrhea over the past decades have been based on multiple, potentially powerful interventions, of which Oral Rehydration Therapy (ORT), introduced in 1979, has become the cornerstone of diarrhea control programs. Other interventions also had an impact on mortality caused by diarrhea, like promotion of breastfeeding, improved supplementary feeding, provision of vitamin A, immu-

nization against measles, and improvements in safe water supply and feces disposal.

In Bangladesh, one third of the total child death burden is due to diarrhea (Victoria *et al*, 1993). Every year, a rural child suffers on average from 4.6 episodes of diarrhea, from which about 230,000 children die (BBS, 1996; Mitra, 1994).

Acute Respiratory Infections (ARI) have been one of the leading causes of morbidity and especially of infant mortality in the country (Salway and Nasim, 1994). Several studies (Stewart *et al*, 1994, Attanayake *et al*, 1993), have pointed out that the primary aim of an ARI program should be to make sure that children with ARI have access to the treatment they need. Case management is of paramount importance for such a program (Chowdury *et al*, 1994; Henry *et al*, 1990). This encompasses case management at

Correspondence: Helga Piechulek, German Technical Cooperation, GTZ Team Leader, PROSIM-GTZ, PO Box 489, Managua, Nicaragua.
E-mail: prosim@cablenet.com.ini

home, which relies on the recognition of danger signs by caretakers, and, if necessary, subsequent contact with health services. This concept focuses on two key indicators: caretaker knowledge of when to seek care, and careseeking for ARI needing assessment (ANA).

The present study is a 'follow-up' of a study carried out in 1996 within the area of the Integrated Community Family Health Development Program (ICFHDP, 1996), a bilateral project between the governments of Bangladesh and Germany, implemented by the German Technical Cooperation (GTZ). The study's aim was to assess whether changes in the population's knowledge and its careseeking and treatment practices concerning ARI and diarrhea of under-five year old children have occurred since 1996.

MATERIALS AND METHODS

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 design of a combined survey on diarrhea and respiratory diseases. The study was carried out in 3 sub-districts (Bogra Sadar, Sariakandi and Kahaloo) of Bogra district with a population of 1 Mio. people, where the program's intervention had been implemented. One hundred and twenty clusters were selected by a two-stage random cluster sampling method, collecting information of children under five and their caretakers.

Personal and interpersonal variations in data collection were established and corrected through intensive training of the selected personnel. The opportunity of having direct contact with the target population (careseekers) was used, beyond study purposes, for the continuation of the education program, educating caretakers on proper home management of diarrhea and ARI in children. This was done after data collection and included the correct preparation and administration of ORS. Trained supervisors performed thorough quality control during the process of data collection and caretakers' education on treatment of dehydration.

Statistical analysis

Data analysis on diarrhea and acute respiratory infections was done following WHO recommendations, using Stata® statistical software (1997). Bivariate and multivariate analysis as well as hypothesis testing was performed, taking into consideration the cluster-design effect.

RESULTS

In total, field interviewers visited 14,344 households in order to obtain information of 8,287 children under five years of age and of 7,082 caretakers. Fifty-one percent of children were male, 0.9% were newborn.

In all households visited, 134 children under 5 years of age were reported to have died in the 12 months prior to the survey. Of those children, 39.5% were newborn and 72.4% died by the age of 6 months. Males were slightly more likely to die (51.9%) than girls (48.1%).

Diarrhea was a sign associated with 12.6% (19 children) of children who died, whereas respiratory distress was present in 21.2% and fever in 12% of children. Unfortunately, in over half of the dead children the category 'other symptoms' was reported, which makes it impossible to determine the causes of their death.

As compared to the baseline survey carried out in 1996 (with a diarrhea-associated mortality rate of 5.8 per 1,000 children under five), the current study found that the diarrhea-associated mortality rate was 2.3 per 1,000 children. Currently, the risk of dying because of diarrhea has been reduced by 60% (p -value = 0.0004) as compared to 1996. In other words, 370 children per year are being saved from death due to the program's intervention.

Diarrhea

Diarrhea prevalence. The overall 2-weeks prevalence of diarrhea is 8.1% (CI: 7.5-8.6). It is statistically significantly lower than that found in the study of 1996 (10.6%). Currently, children are about 30% less likely to suffer from diarrhea than children were in 1996 ($p < 0.0001$). The annual diarrhea prevalence is estimated to be 2.6 episodes per child per year (adjusted for seasonal variation). There is no difference in

the prevalence of diarrhea among boys and girls.

Diarrhea attacks are more likely in children between 6 and 29 months of age with the peak in the age group 1 to 1.5 years (Fig 1). This reinforces the knowledge that the risk of acquiring diarrhea increases at the time the child starts moving around the house and receiving food other than maternal milk. This risk accentuates significantly under poor sanitary conditions. Dysenteric diarrhea was present in 4.8% of children suffering from diarrhea.

Knowledge on diarrhea management. Caretakers recognize danger signs of diarrhea and know when to bring the child to the health facility (98% answered correctly). However, their knowledge on basic management of diarrhea, like fluids or food intake, which is of singular importance in preventing death, needs to be improved. The study revealed that 21% still opine that fluids intake and 45% that food intake should be restricted (Table 1). But, as compared to the survey of 1996, significantly more caretakers know now, that more fluids and more food should be given during diarrhea, and the percentage of parents thinking that food during diarrhea should be stopped has been significantly reduced.

Caretakers were also asked what is 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. Almost all caretakers (99%) knew about ORS and 97% of them manifested knowing the preparation of ORS.

Caretaker behavior during an episode of diarrhea. Appropriate case management of diarrhea at home is of capital importance, because this intervention reduces significantly the risk of dying by dehydration. The perceived seriousness of diarrhea as a life-threatening con-

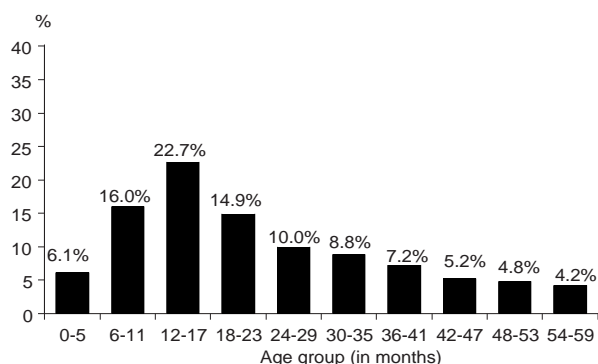


Fig 1—Age distribution among children suffering from diarrhea.

Table 1

Caretaker's knowledge and practice on fluids and food intake during diarrhea in children.

	Knowledge 1996 %	Knowledge 2000 %	Practice 1996 %	Practice 2000 %
Suspend fluids	0.3	0.3	4.4	1.9
Less fluids	24.1	21.1	30.2	25.9
Same amount	17.7	10.3	18.3	21.0
More fluids	56.4	67.0	47.1	51.2
Do not know	---	1.3		
Suspend food	7.2	2.7	38.9	7.6
Less food	52.9	42.0	43.5	41.5
Same amount	20.4	15.9	10.0	23.6
More food	18.5	38.2	7.5	27.3
Do not know	---	1.2		

dition made 60.5% of parents of children who suffered from diarrhea in the two weeks prior to the study seek care outside the house. However, only 9.3% and 17.1% of parents sought help from government and private trained providers respectively, while more than half from village doctors and traditional healers (Table 2).

There is still a gap between knowledge on diarrhea management and its practice. For the categories of suspending and giving less fluids, the percentage of parents practicing it was higher than that mentioned on a hypothetical scenario (knowledge), while for the categories of same amount and more fluid, the proportion of parents practicing it was lower than that mentioned on a hypothetical scenario (Table 1). A similar pattern can be seen concerning food intake.

In general, the management of diarrhea has improved significantly since 1996, particularly concerning food intake. Currently, about 3 times more parents give at least the same amount of food to their children suffering from diarrhea as compared to 1996 (1996: 17.5%; 2000: 50.9%).

59.4% of the children with diarrhea received ORS (Table 3). It is important to note that this finding would be much higher, if the percentage of ORS use would not have been extremely low in Sariakandi, a hard-to-reach sub-district, which accused long-term shortage and irregular supply for this.

As mentioned above, developing appropriate case management of diarrhea at home is of singular importance in diarrhea control programs, which can be successful only if they change the behavior of parents, who, in case of diarrhea, should promptly give ORS to their children. If ORS is given only after parents have been advised to do so, ORS use is increased, but this does not mean that parents have incorporated the idea of using ORS at home, whenever diarrhea occurs. To measure, with certain accuracy, behavioral change in home case management of diarrhea, parents of children suffering from diarrhea were asked about the source of advice for using ORS. In 2000, a three fold higher percentage of those who used ORS (47%) did it, because they knew about it and were not advised by anyone, than in

Table 2
Careseeking behavior of parents in case of diarrhea and ANA in children under five years old in 2000.

	Diarrhea %	ANA %
Traditional healer	21.7	12.2
Village doctor	36.5	33.3
Government services	9.3	13.4
Private services	17.1	17.3
Pharmacy/drug seller	7.1	8.5
Others	8.3	15.4

Table 3
Type of fluids given to children suffering from diarrhea.

Type of fluids	1996 %	2000 %
ORS	63.6	59.4
Salt-molasses fluid (RHF1)	29.2	20.0
Salt-sugar fluid (RHF2)	3.8	3.1
Rice-based fluid (RHF3)	2.4	1.5
Water	57.8	65.7
Fruit juice	6.8	6.7
Coconut water	5.0	5.5
Rice gruel	1.7	4.0
Other	16.4	23.0

The column total does not sum 100%, due that multiple answers were allowed.

1996 (16.4%). Eighteen percent and 11% of parents were advised by village doctors and government services respectively.

ORS was correctly prepared by 44% of parents who used ORS. Using the correct amount of water (450 to 600 ml per packet) was the main restrictive factor (only 54% of parents used the correct amount).

In both studies (1996 and 2000), the definition of ORT given by WHO after 1993, which is 'increased fluid intake and continued feeding', was used. It is necessary to note that this definition has evolved over time since its introduction in 1979. In the literature and survey reports ORT

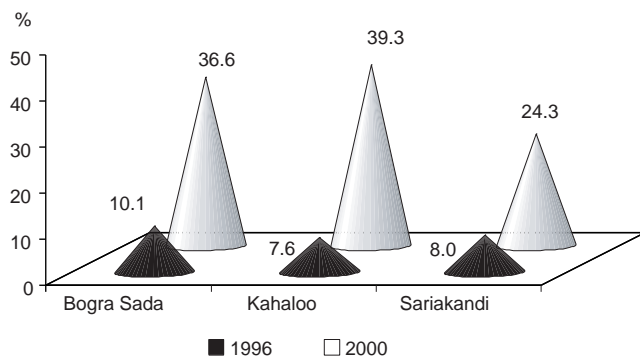


Fig 2—Percent of children suffering from diarrhea having received ORT^a, by sub-districts.

^aORT: Increased fluids plus continued feeding

is not always explicitly defined, and confusion may arise while trying to compare findings using the pre-1993 definition (treatment of diarrhea with ORS and/or Recommended Home Fluids (RHF)).

In this study, 33.2% of children with diarrhea benefited from ORT treatment. As compared to findings from the 1996 study, the current study shows a 3 to 5 fold improvement in the different sub-districts (Fig 2).

RHFs, which in this study have been grouped into three categories (RHF1 or salt-molasses fluid, RHF2 or salt-sugar fluid and RHF3 or rice-based fluid), were given to about 25% of children with diarrhea. Among RHFs, salt-molasses fluid was predominantly used in every sub-district.

Acute respiratory infections

The overall two-weeks prevalence of Acute Respiratory Infection (ARI) has increased from 39% (1996) to 46% (CI: 45.1-47.3) with a similar distribution among the sub-districts, and that of Acute Respiratory Infections needing assessment (ANA) from 12.4% to 16.9% (CI: 16.1-17.7).

A statistically significant higher prevalence of ANA in boys than in girls was found. The overall maximum likelihood estimate of the odds ratio comparing boys versus girls was 1.15 with a p-value < 0.015.

Recommendations for improving household responses to childhood illnesses include recognizing danger signs of ARI, seeking help promptly

from trained providers and implementing the prescribed care. Therefore, the success of this strategy depends not only on the availability of health services with trained personnel, but also, and above all, on family behavior. In this regard, results about knowledge of caretakers on when to seek care for children with acute respiratory infection revealed that in 1996, 56.7%, while in 2000, 59.9% of them were able to identify correctly danger signs for seeking help. In 2000, 58.4% (1996: 46.6%) of parents sought, indeed, help in presence of danger signs.

Similar as for diarrhea, village doctors and traditional healers were most frequently sought for help by the caretakers (33.3% and 12.2%, Table 2).

DISCUSSION

The 21st century started with the vision that every child should live a healthy life. The scenario set up by UN organizations for this century emphasizes the decline of the suffering of children and the fulfillment of their whole spectrum of rights (civil, political, economic, social and cultural), endorsed at the 1989 Convention on the Rights of the Children and the 1990 and 2002 World Summits for Children.

The major goals of the Summit of 1990, to be achieved by the year 2000, were one-third reduction in under-five mortality rates, halving of child malnutrition, 90% immunization coverage and control of major childhood diseases representing fundamental improvements in survival, health and nutrition for children of developing countries, including Bangladesh. Bangladesh's key strategies related to diarrhea and ARI include, among others, ensuring appropriate case management at union and urban slum level, maintaining access to ORS, maintaining high levels of ORT use, expanding the existent control program towards universal coverage and ensuring that parents know how to care for children with ARI.

The conceptual model underlying the global strategy for the control of ARI and diarrhea recognizes the need for a number of simultaneous interventions, leading to changes in family behavior such as feeding, home-based treatment and careseeking.

The improvement in the prevalence of diarrhea and the management of ARI and diarrhea, as found in the study, seem to be predominantly due to extensive awareness raising and educational activities during the intervention period. The following strategy was employed: personnel of health centers were intensively trained and sensitized on ARI and in the use of ORS and ORT. Also, NGO staff and village volunteers, especially women, were trained on how to manage ARI and how to prevent diarrhea. They were given ORS packets free of cost in order to explain their use to mothers. Diarrhea issues were included into school health education, with emphasis on practical exercises of diarrhea management. For each of the target groups (health personnel, village volunteers, NGOs, mothers and school children) specific education material was developed and deployed. In the political arena, women leaders, who are part of the local government, were included in an awareness-raising campaign.

The prevalence of ARI and ANA as conditions that cannot be easily influenced by poor people, the vast majority of the inhabitants in the three sub-districts, has increased since 1996. This might be an indicator that, although the environment (floods etc) continues to have its adverse influence on the prevalence of ARI and ANA, especially in poor people, fatal consequences can be prevented.

The study findings show that in the relatively short time of four years a significant reduction in child mortality due to ARI and diarrhea through behavior change in a mostly poor and illiterate population can be achieved, if intensive sensibilization and education strategies are deployed. They have to target different parts of society (in Bangladesh political leaders and mothers seem especially important) using for each target group different and specific approaches that are tailored to the group's characteristics.

REFERENCES

- Attanayake N, Faveau V, Chakraborty J. Cost-effectiveness of the Matlab MCH-FP project in Bangladesh. *Health Policy Plann* 1993; 8: 327-38.
- Bangladesh Bureau of Statistics (BBS), and UNICEF. Progotir Pathay: Achieving the Mid Decade Goals for Children in Bangladesh. 1996.
- Chowdury AM, Karim F, Rohde JE, Ahmed J, Abed FH. Oral rehydration therapy: a community trial comparing the acceptability of homemade sucrose and cereal-based solutions. *Bull WHO* 1991; 69: 229-34.
- Henry F, Briend A, Faveau V. Child survival: should the strategy be redesigned?. Experience from Bangladesh. *Health Policy Plann* 1990; 5: 226-34.
- ICFHDP and Ministry of Health. Report on diarrhea and acute respiratory infection in Bogra district. Dhaka, Bangladesh, 1996.
- Mitra SN, Nawab Ali M, Islam Sh, Cross AR, Saha T. Bangladesh demographic and health survey 1993-1994, 1994.
- Salway SM, Nasim SM. Levels, trends and causes of mortality in children below 5 years of age in Bangladesh: findings from a national survey. *J Diarrh Dis Res* 1994;12: 187-93.
- StataCorp. Stata Statistical Software: Release 5.0. College Station, TX, 1997.
- Stewart MK, Parker B, Chakraborty J, Begum H. Acute respiratory infections (ARI) in rural Bangladesh: perceptions and practices. *Med Anthropol* 1994;15: 377-94.
- Victora CG, Huttly SR, Fuchs SC, *et al.* International differences in clinical patterns of diarrheal deaths: a comparison of children from Brazil, Senegal, Bangladesh, and India. *J Diarrh Dis Res* 1993; 11: 25-9.
- WHO, Division for the Control of Diarrheal and Acute Respiratory Disease. Household survey manual: diarrhea and acute respiratory infections. 1994.
- World Health Organization. Division of Diarrheal and Acute Respiratory Disease Control. Interim report 1994. 1995.