

Change in health knowledge of Bangladeshi children: five years experience

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This article explores the improvement in the level of health knowledge of Bangladeshi children over a five year period 1993–1998. Data were generated from two nationally representative sample surveys covering respectively 2520 and 3360 children aged 11–12 y. Six health knowledge items, relevant to life in Bangladesh, were considered. Analyses revealed a significant improvement in the knowledge over the period. However, significant socio-economic variations also persisted in the performance. Rural children improved much faster compared to their urban counterparts. In both the surveys, children's performance varied significantly by items. To equip children with necessary health knowledge this study suggested strengthening health education at primary level in Bangladesh. *Public Health* (2001) 115, 380–386.

Keywords: health knowledge; children; Bangladesh

Introduction

Every month nearly a million children die in the developing world and many millions more live on with ill health and poor growth.¹ A fundamental cause behind this tragedy is poverty. An important cause is the children's poor knowledge about protecting their own health. Recent statistics show that the under-five mortality rate in the world has reduced from 193 in 1960 to 86 in 1998.² However, a wide gap among the countries also exists.

Basic health knowledge and healthcare are often recognised as basic human rights.³ Many declarations and policy papers document our wish for children to grow up healthy and happy. The 10-point programme, committed by the world's leaders, to protect child rights and improve children's lives include enhancing children's health.⁴ The World Declaration on Education for All emphasised the right of all citizens to basic education, which is not only covered by an official syllabus of the '3 R's' (reading, writing and numeracy) but is also focused on learning and skills attained for the purpose of improving the quality of lives.⁵ It is argued that health content and health skills are vital to enable human beings to survive, to participate fully and to improve the quality of their lives.⁵

Children learn basic health knowledge primarily in early life through the socialisation process; firstly, at home, from parents and elders, and then from other members of the

community. A child to child approach to healthcare is practised in many traditional societies where children take care of their younger siblings.⁶ Children also learn necessary health knowledge through schooling.⁷ In some schooling systems primary health care is a part of the curriculum. The WHO initiating 'Health promoting school' is an example of conveying healthy lifestyle messages to the students.⁸

In Bangladesh, some three-quarters of the primary school-aged children enrol in schools and nearly 73% of them complete the five year cycle of primary education.⁹ The education system of the country does not put much emphasis on enriching children with knowledge on essential health and hygiene through schooling. Although there is provision of a weekly session on health education in the class routine of the State-owned primary schools,¹⁰ it rarely happens. Moreover, there is no separate textbook for this, rather a few sections are put in the social studies syllabus. On the other hand, the non-formal primary schools operated by the non-government organisations (NGOs) incorporate primary health care issues in the curricula. A recent study confirmed that the students of non-formal schools received more health knowledge than the students of formal schools.¹¹ Such initiative by NGOs is important, but could not be considered as significant in respect of the entire country, because only 8.5% of the children enrol in NGO-operated schools. The health workers of the government and NGOs provide essential health messages to the population. Programmes delivering information on health care and practices are also regularly transmitted through radio and TV.

Taking data from two national surveys conducted in 1993 and 1998, this article reports the health knowledge of

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Accepted 26 April 2001

Bangladeshi children on six selected items and examines the change in such knowledge between the two survey periods.

Methods

The data used in this paper originated from two nationally representative sample surveys on basic educational attainment of Bangladeshi children aged 11–12 y in 1993 and 1998. The assessment instrument used in the surveys was constructed based on the ideas and concepts generated in the World Conference on Education for All held in Jomtien in 1990.⁵ The life skills part of the test instrument had six basic questions on general health and public hygiene. These were considered important for children at the current development stage of the country. Assessment was made dichotomously ie, whether responses were correct or incorrect. Correct answers were defined according to the country's cultural context and primary health care system and practice. The questions and their respective correct answers are given in Table 1.

Sampling

For a precision level of 7% with 95% confidence limit, it was estimated that a sample of 196 is necessary to have a single estimate against each of the items.^{12,13} A cluster-sampling approach was followed in the surveys, thus, the sample sizes were doubled to reduce cluster effect on the estimates.¹⁴ The sample size for an estimate thus stood at 392.

The 1993 national survey contained six sub-national surveys, of which five were in the then five rural administrative divisions and one in urban areas. On the other hand, in 1998, eight sub-national surveys were carried out. Of these, six were in six rural administrative divisions (between 1993 and 1998, one division was carved out of the previous form), one in the metropolitan cities and the final one in the non-metropolitan urban areas. A three-stage sampling strategy was followed in both the surveys. At the

first stage, 30 *thanas* or sub-districts (*pourasava* for urban areas) were selected through systematic random sampling technique with probability proportional to size (PPS). At the second stage, one *union* (*ward* for urban strata) for each selected *thana/pourasava* was selected randomly (*union* is a local government administrative unit with a population of about 22 000). At the third stage, one village (*mahallah* for urban strata) was randomly selected from each selected *union/ward*. This means that 30 villages/*mahallahs* (here called a cluster) were selected for each stratum, totalling 180 for the 1993 survey and 240 for the 1998 survey. From each cluster 14 children aged 11–12 y, irrespective of schooling, were selected following a systematic random sampling procedure. Thus, each cluster contained 420 children. The sizes of the samples stood at 2520 and 3360 respectively for 1993 and 1998.

The data collection for the first survey was done in February 1993 and the second in October–November 1998. The fieldwork procedures of the surveys were similar in both and details on these are available elsewhere.^{9,15} As strata population varied substantially, appropriate weights were used to calculate the aggregate estimates.

Two methods were used to estimate the reliability of the data, namely, Test–retest method and Kuder-Richardson formula 20 (KR 20).^{16–18} The former method suggests that the reliability coefficient was 0.96 and 0.93 respectively for 1993 and 1998, and the later method shows it was 0.88 for 1993 and 0.96 for 1998. All these coefficients are much higher than the satisfactory level of 0.80.¹⁸

Results

The percentages of children correctly answering the six questions are presented in Table 2. The level of health knowledge varied significantly by item as the children did not perform equally in the questions. Children's performances in different health knowledge items are described in brief below.

What is a good and simple treatment for diarrhoea?

Nearly three-quarters of the interviewed children knew the correct answer to this question in 1993, which rose to

Table 1 Question items and respective correct answers

Question items	Correct answers
i) What is a good and simple treatment for diarrhoea?	Giving: packet saline, oral re-hydration saline, salt-molasses-water saline or home made saline.
ii) Where should one defecate?	Slab, pit or sanitary latrine.
iii) Which foods help to prevent night blindness?	Green vegetables, yellow fruits, small fish, or Vitamin A capsule.
iv) How can water be purified, or made drinkable?	Boiling, using alum, or using water purification tablet.
v) How does a child benefit from vaccination?	To prevent disease.
vi) What should be the first aid for someone with a very high temperature (fever)?	Use cool water to make body/head cool.

Table 2 Percentage of 11 to 12-y-old Bangladeshi children correctly answering health knowledge items by area of residence, sex and year

Items	1993			1998			Comparison (1993 vs 1998)		
	Girls	Boys	Both	Girls	Boys	Both	Girls	Boys	Both
<i>Treatment for diarrhoea</i>									
Rural	75.7	69.5	72.6 [†]	84.2	85.2	84.7	$P < 0.001$	$P < 0.001$	$P < 0.001$
Urban	90.4	91.0	90.7	94.5	94.5	94.5	$P < 0.05$	NS	$P < 0.05$
All	77.3	71.7	74.5 [†]	85.7	86.6	86.1	$P < 0.001$	$P < 0.001$	$P < 0.001$
<i>Place for defecation</i>									
Rural	71.4	73.0	72.2	78.5	83.0	80.8 [†]	$P < 0.001$	$P < 0.001$	$P < 0.001$
Urban	87.7	89.6	88.6	93.1	89.2	91.2 [†]	$P < 0.05$	NS	NS
All	73.1	74.6	73.8	80.7	83.9	82.3 [†]	$P < 0.001$	$P < 0.001$	$P < 0.001$
<i>Benefits from vaccination</i>									
Rural	31.3	30.6	30.9	39.2	35.9	37.5	$P < 0.001$	$P < 0.001$	$P < 0.001$
Urban	58.4	57.7	58.1	56.3	53.0	54.6	NS	NS	NS
All	34.1	33.3	33.7	41.7	38.3	40.0 [†]	$P < 0.001$	$P < 0.001$	$P < 0.001$
<i>Prevention for night blindness</i>									
Rural	32.3	32.9	32.7	44.7	44.8	44.8	$P < 0.001$	$P < 0.001$	$P < 0.001$
Urban	66.2	69.7	67.9	65.6	69.2	67.4	NS	NS	NS
All	35.9	36.5	36.2	47.7	48.3	48.0	$P < 0.001$	$P < 0.001$	$P < 0.001$
<i>Water purification</i>									
Rural	53.8	51.5	52.6	64.7	65.0	64.9	$P < 0.001$	$P < 0.001$	$P < 0.001$
Urban	71.2	73.6	72.4	83.8	86.1	85.0	$P < 0.001$	$P < 0.001$	$P < 0.001$
All	55.6	53.6	54.6	67.5	68.1	67.8	$P < 0.001$	$P < 0.001$	$P < 0.001$
<i>First aid for high fever</i>									
Rural	59.1	54.9	57.0 [†]	61.0	55.6	58.4 [†]	NS	NS	NS
Urban	71.2	73.1	72.1	72.2	73.5	72.8	NS	NS	NS
All	60.4	56.7	58.5	62.7	58.2	60.4 [†]	NS	NS	NS

The symbols indicate statistically significant difference in the comparison girls vs boys.

[†]Significant at $P < 0.01$.

[‡]Significant at $P < 0.05$.

NS = Not significant at $P = 0.05$.

86.1% in 1998 ($P < 0.001$). Although a significantly higher proportion of girls than boys knew the correct answer in 1993 ($P < 0.01$), the gap became statistically insignificant in 1998. Among rural children, 72.6% knew the correct answer to this question in 1993, which rose to 84.7% in 1998 ($P < 0.001$). Among urban children, this rate increased from 90.7% in 1993 to 94.5% in 1998 ($P < 0.05$).

Where should one defecate?

The percentage of children who knew the correct answer to this question increased from 73.8% in 1993 to 82.3% in 1998 ($P < 0.001$). Although, statistically there was no gender variation in the knowledge on this item in 1993, a significant gender gap appeared in favour of boys in 1998 ($P < 0.05$). The level of knowledge however increased among both boys and girls at national level and in rural areas, it increased only among girls in urban areas.

How does a child benefit from vaccination?

Only 33.7% of the interviewed children knew the correct answer to this question in 1993, which rose to 40% in 1998

($P < 0.001$). Although there was no difference between the performances of boys and girls in 1993, the girls showed significantly better performance in 1998 ($P < 0.05$). Over the period, the performance significantly increased among rural and all Bangladeshi children ($P < 0.001$).

Which foods help to prevent night blindness?

The level of knowledge on this item significantly increased from 36.2% in 1993 to 48% in 1998 ($P < 0.001$). No gender variation was observed in the level in any of the surveys. Although the rural children showed significantly better performance over the period ($P < 0.001$), urban children did not. Less than half of the rural children knew the correct answer to this item against over 67% of the urban children.

How can water be purified, or made drinkable?

Nearly 55% of the children surveyed in 1993 and 67.8% of the children surveyed in 1998 knew the correct answer to this question ($P < 0.001$). Statistically, no variation was observed among the performance of boys and girls in any of the surveys. The improvement over the period was

Table 3 Percentage of 11 to 12-y-old Bangladeshi children correctly answering health question items by years of schooling and year

Items	Years of schooling						
	Nil	I	II	III	IV	V	VI+
1993							
Treatment for diarrhoea	56.2	67.0	62.2	66.6	78.5	85.1	92.1
Place for defecation	52.6	64.1	64.8	73.5	81.1	83.1	86.3
Benefit from vaccination	11.5	13.3	13.9	23.0	33.2	49.0	66.6
Prevention for night blindness	13.7	22.1	19.8	26.6	38.1	49.6	63.8
Water purification	34.7	43.2	37.0	45.1	57.7	65.2	80.7
First aid for high fever	51.6	49.4	51.3	54.6	60.3	63.4	68.9
1998							
Treatment for diarrhoea	67.5	76.2	84.0	89.5	91.1	94.4	95.2
Place for defecation	65.7	73.0	80.8	80.6	88.9	90.6	93.4
Benefit from vaccination	18.4	23.0	33.1	31.7	45.7	59.9	74.3
Prevention for night blindness	20.2	31.4	43.3	41.1	56.5	69.0	76.2
Water purification	36.3	47.7	62.1	67.3	77.3	86.3	93.8
First aid for high fever	43.4	51.6	55.6	56.3	65.0	75.8	78.2

According to the increase in years of schooling, statistically significant increase in the knowledge was observed in all 12 cases ($P < 0.001$).

noticed significantly at all levels: rural, urban and national; even when the data were separately analysed for boys and girls ($P < 0.001$).

What should be the first aid for someone with a very high temperature (fever)?

The percentage of children who knew the correct answer to this question was 58.5% in 1993 and 60.4% in 1998. The increase was statistically insignificant, even when the data were separately analysed by area of residence or by sex. Although there was no gender variation in the knowledge on this item in 1993, a statistically significant gender gap was seen in 1998 in favour of girls ($P < 0.05$).

Table 3 shows that the proportion of children knowing the correct answer to the health questions increased with the increase in their years of schooling ($P < 0.001$). Some children also had correct answers without having a single

year of schooling. Comparing the performance between 1993 and 1998 it can be said that the performance proportionately increased at each grade. The level of health knowledge of children completing a five-year cycle of primary education (which is the official length of primary education in Bangladesh) could also be seen in this table. For example, after completing the primary cycle of schooling less than a half of the children knew the correct answers to 'benefits of vaccination' and 'prevention of night blindness' in 1993 which rose respectively to nearly 60% and 70% in 1998. Again, with similar years of schooling, the knowledge on 'water purification' increased by 20 percentage points.

The proportion of children who correctly answered all the six questions was 14.4% in 1993, which rose to 18.7% in 1998 ($P < 0.001$) (Table 4). Separate analysis shows that such increase happened only in rural areas, not in urban areas. Similarly, gender difference in favour of girls was

Table 4 Percentage of 11 to 12-y-old Bangladeshi children correctly answering all six items by area of residence, sex and year

Area of residence	1993			1998			Comparison (1993 vs 1998)		
	Girls	Boys	Both	Girls	Boys	Both	Girls	Boys	Both
Rural	13.0	10.5	11.7	18.1	14.3	16.2 [†]	$P < 0.001$	$P < 0.01$	$P < 0.001$
Urban	36.1	39.8	37.9	34.4	33.1	33.8	NS	NS	NS
All	15.5	13.3	14.4	20.4	17.0	18.7 [‡]	$P < 0.001$	$P < 0.001$	$P < 0.001$

The symbols indicate statistically significant difference in the comparison girls vs boys.

[†]Significant at $P < 0.01$.

[‡]Significant at $P < 0.05$.

NS = Not significant at $P = 0.05$.

observed in 1998, but not in 1993. On average, the children knew 3.3 items in 1993, which increased to 3.8 in 1998 ($P < 0.001$) (Table 5). The average number of items correctly answered increased in rural areas ($P < 0.001$), but not in urban areas.

Multivariate analysis

The above analyses showed that the level of health knowledge of the children increased over time. Logistic regression analysis¹⁹ was performed to explore the increase, controlling for socio-economic characteristics of children such as sex, area of residence, child's school-

ing, mother's education, father's education and self perceived yearly economic status of household. A total of 35 regression analyses were carried out: seven for all children, 14 for boys and girls separately, and 14 for urban and rural children separately. Table 6 shows the odds ratios of the regression coefficients against year 1998 (1993 as reference year) for each of the questions and all items, controlling for the above characteristics. The findings of the regression analyses show that the children performed significantly better in 1998 than 1993 in all items. However, when the data were analysed separately for boys and girls, no significant improvement was seen in the knowledge of 'first aid for high fever'. Again, for urban children, significant improvement was observed

Table 5 Mean and standard deviation (s.d.) of the number of question items correctly answered by the Bangladeshi children of age 11–12 y, by sex, area of residence and year

Residence/year	Girls		Boys		Both		Comparison (girls vs boys)
	Mean	s.d.	Mean	s.d.	Mean	s.d.	
<i>All</i>							
1993	3.4	1.8	3.3	1.8	3.3	1.8	NS
1998	3.9	1.7	3.8	1.7	3.8	1.7	NS
Comparison (1993 vs 1998)	$P < 0.001$		$P < 0.001$		$P < 0.001$		
<i>Rural</i>							
1993	3.2	1.8	3.1	1.8	3.2	1.8	NS
1998	3.7	1.7	3.7	1.6	3.7	1.7	NS
Comparison (1993 vs 1998)	$P < 0.001$		$P < 0.001$		$P < 0.001$		
<i>Urban</i>							
1993	4.5	1.6	4.5	1.6	4.5	1.6	NS
1998	4.7	1.3	4.7	1.3	4.7	1.3	NS
Comparison (1993 vs 1998)	NS		NS		NS		

NS = not significant at $P = 0.05$.

Table 6 Odds ratios of the regression coefficients against 1998 predicting health knowledge of 11 to 12-y-old Bangladeshi children

Health knowledge items	All	Sex		Area	
		Girls	Boys	Rural	Urban
Treatment for diarrhoea	2.40*	1.70*	3.36*	2.41*	2.44†
Place for defecation	1.84*	1.59*	2.18*	1.86*	1.57
Benefits from vaccination	1.57*	1.44*	1.75*	1.61*	1.30
Prevention for night blindness	1.97*	1.75*	2.22*	2.04*	1.41
Water purification	2.02*	1.73*	2.50*	1.93*	3.35*
First aid for high fever	1.14†	1.13	1.15	1.13†	1.25
All items	1.73*	1.58*	1.95*	1.85*	1.27

1. The estimates were calculated by controlling for sex (1 girl, 2 boy); area (1 rural, 2 urban); child's schooling (0 to 6+ years); mother's education (0 to 10+ years); father's education (0 to 14+ years); and economic status (1 always in deficit, 2 sometimes in deficit, 3 balanced, 4 surplus).

2. The reference category was the children of year 1993. The symbols indicate statistically significant difference in the comparison 1993 vs 1998.

* Significant at $P < 0.001$.

† Significant at $P < 0.01$.

‡ Significant at $P < 0.05$.

only in two items, namely, 'treatment for diarrhoea' and 'water purification'.

Three common observations can be synthesised from the findings of the surveys. Firstly, urban children performed significantly better than rural children in each item ($P < 0.001$). Secondly, children showed outstanding performance in two items, namely, 'treatment for diarrhoea' and 'place for defecation'; a moderate performance in two, namely, 'water for purification' and 'first aid for high fever'; and poor performance in the rest. Thirdly, socio-economic differentials exist in the performance of the children.

Discussion and conclusion

This paper explores the improvement in the knowledge of Bangladeshi children on some selected essential health issues. The data for this paper came from two nationally representative sample surveys carried out in 1993 and 1998 on basic educational attainment of children which included six questions on health issues. It is difficult to say how far these questions represent the basket of essential knowledge that the Bangladeshi children need to have. This is because no such basket is available. However, in preparing the assessment instrument for basic education survey, the emphasis was that the instrument covered some essential health knowledge that may help children improve the quality of their lives. Again, these six questions partially cover five of the 12 health issues contained in the communication material *Facts for Life* published jointly by UNICEF, WHO and UNESCO.¹

The findings of this study confirmed that not all Bangladeshi children aged 11–12y were equipped with the 'essential' health knowledge. Significant variation was observed in the level of knowledge by item. The health knowledge also varied according to the socio-economic status of the children. In both the surveys, the interviewed children demonstrated outstanding knowledge regarding 'treatment for diarrhoea' but worst knowledge regarding 'benefits from vaccination'. Although the expanded programme on immunisation was quite a success in Bangladesh,²⁰ children do not know adequately about its benefits. The good knowledge seen regarding 'treatment for diarrhoea' may be attributed to the door-to-door teaching programme on diarrhoeal diseases carried out for millions of mothers in the 1980s²¹ and may be another testimony to the cultural incorporation of the knowledge in Bangladesh.²² Although no gender variation was found in mean number of correct answers, the girls tended to do significantly better in some of the questions.

Children's health knowledge significantly improved over the period of five and a half years between 1993 and 1998. Although the rural children showed improved performance in all the questions, the urban children improved only in two. These are 'treatment for diarrhoea' and 'water purification'. The data for the second survey were collected

after a widespread flood, which affected about two-thirds of the country including the capital city Dhaka. Messages on these two were reinforced in both rural and urban areas through various social organisations during the flood. The improved performance shown by rural children is because they had very poor health knowledge in 1993. The performance of the rural children in 1998 is still lower than that of the urban children in 1993. This indicates that the rural children will have to do more to reach their urban counterparts. The role of schooling was found significant in raising health knowledge. Primary education has recently been made compulsory in Bangladesh, and the completion rate at primary level has also increased considerably creating potentials to deliver health knowledge through the existing school system. The experiences of NGOs, such as BRAC's (formerly known as Bangladesh Rural Advancement Committee) education programme, also corroborate this.

The main drawback of this study was that it did not elaborately assess children's knowledge on the health issues. Again, knowledge alone does not guarantee practice. A separate study covering knowledge on more issues relating health and hygiene to attitude and practice may give better understanding of the situation.

Acknowledgements

The surveys were financed by UNICEF, NOVIB of Holland, Sida, UNESCO and BRAC. The Research and Evaluation Division of BRAC shouldered the implementation of the surveys and the Campaign for Popular Education (CAMPE) provided the secretariat for the second survey. The authors are grateful to the above organisations for their help. The individuals who served on the Advisory Board and the Working Committee for the surveys deserve acknowledgement. The authors thank the field investigators and the children interviewed. Thanks are due to Mr. Hasan Shareef Ahmed for editorial assistance. However, the authors alone are responsible for any inadequacies.

References

- 1 UNICEF, WHO and UNESCO. *Facts for Life: A Communication Challenge*. P&LA: Oxfordshire, undated.
- 2 UNICEF. *The State of the World's Children 2000*. UNICEF, 2000.
- 3 WHO and UNICEF. *Alma Ata 1978: Primary Health Care*. WHO: Geneva, 1978.
- 4 World Summit for Children. *World Declaration on the Survival, Protection and Development of Children*. United Nations: New York, 1990.
- 5 Inter-Agency Commission for the World Conference on Education For All. *World Declaration on Education For All*. UNICEF: New York, 1990.
- 6 Otaala B, Myers R, Landers C. *Children Caring for Children: New Application of an Old Idea*. The Consultation Group on Early Childhood Care and Development: London, 1988.

- 7 Hawes H, Scotchmer C with Aarons A, Morley D, Young E. *Children for Health*. Child to Child Trust with UNICEF: London, 1993.
- 8 Williams P *et al*. Health Promoting Schools: Lessons from Working Intersectorally with Primary Schools in Australia. *Health Edu J* 1996; **55**: 300–310.
- 9 Chowdhury AMR, Choudhury RK, Nath SR (eds). *Hope Not Complacency—State of Primary Education in Bangladesh 1999*. Campaign for Popular Education and University Press Limited: Dhaka, 1999.
- 10 Primary and Mass Education Division. *Education for All: National Plan of Action*. Primary and Mass Education Division, Government of the Peoples' Republic of Bangladesh: Dhaka, 1995.
- 11 Nath SR. Health knowledge of rural Bangladeshi children: does BRAC's non-formal schools programme have any impact? *Health Edu J* 1999; **58**: 26–38.
- 12 Cochran WG. *Sampling Techniques*. John Wiley & Sons: Singapore, 1977.
- 13 Kalton G. *Introduction to Survey Sampling*. Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-035. Sage: Newbury Park, CA, 1983.
- 14 Henderson RH, Sundaresan T. Cluster sampling to assess immunization coverage: a review of experience with a simplified sampling method. *Bull World Health Org* 1982; **60**: 153–260.
- 15 Nath SR, Mohsin M, Chowdhury AMR. Health knowledge of children in Bangladesh: an exploratory study. *Public Health* 1997; **111**: 311–315.
- 16 Gupta SC, Kapoor VK. *Fundamentals of Applied Statistics*. Sultan Chand & Son: New Delhi, 1994.
- 17 Kuder GF, Richardson MW. The theory of the estimation of test reliability. *Psychometrika* 1937; **2**: 151–160.
- 18 Carmines EG, Zeller RA. *Reliability and Validity Assessment*. Sage University Paper Series on Quantitative Applications in the Social Sciences, 07–017. Sage: Newbury Park, CA, 1979.
- 19 Menard S. *Applied Logistic Regression Analysis*. Sage University Paper Series on Quantitative Applications in the Social Sciences, 07–106. Sage: Newbury Park, CA, 1995.
- 20 Huq M (ed). *Near Miracle in Bangladesh*. University Press Limited: Dhaka, 1991.
- 21 Chowdhury AMR, Cash RA. *A Simple Solution: Teaching Millions to Treat Diarrhoea at Home*. University Press Limited: Dhaka, 1996.
- 22 Chowdhury AMR, Cash RA. Cultural incorporation of the ORT message. *Lancet* 1993; **341**: 1591.