Nutritional status of pre-school children among BRAC member and eligible non-member households

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Abstract

The study aimed at describing determinants of nutritional status of the pre-school children in BRAC member and eligible non-member households. The data were obtained from 9,840 children aged less than 5 years from April 1994 through December 1996 residing in 100 villages of 3 rural *thanas* (sub-districts) namely Saturia, Santhia and Mirzapur. The findings showed that overall prevalence of stunting and wasting was 62% and 18% respectively. ' Significantly lower proportion of female compared to male children were stunted ($p<0.001$). There was no significant sex difference in the proportion of wasting. The prevalence of stunting was lower among children in BRAC member compared to non-member eligible households (62% vs. 66%) ($p<0.05$). The prevalence of stunting and wasting was significantly associated with point prevalence of diarrhoea and acute respiratory infection (ARI) ($p<0.01$). Prevalence of wasting was significantly associated with vitamin A capsule coverage and place of defecation ($p<0.01$). Children (45%) who belonged to female headed households were less stunted compared to male headed households (64%). Prevalence of stunting was significantly associated with family size and parent's literacy ($p<0.01$). In case of families, whose main earners were non-labour, prevalence of stunting was lower compared to manual labour households. Prevalence of stunting and wasting was significantly associated with seasonality ($p<0.01$). Prevalence of stunting and wasting was significantly higher among non-member eligible households compare to BRAC member households. It is necessary to create awareness about nutrition all over the country, especially focused on rural community. More emphasis should be given on nutrition, health and hygiene among rural population for nutritional well-being

Introduction

Bangladesh is one of the worst victims of malnutrition, which has alarming and frightening implications on the growth, and development of children. Morbidity and mortality in children and women in Bangladesh is extremely high (1). About 40-50% newborns are of low birth weight, (<2500 g) (2). According to the Gomez classification, about 94% of the children aged 5 years and below suffer from various degrees of malnutrition, of which 54% suffer from severe and moderate (3). Micronutrient malnutrition particularly of vitamin A, iodine and iron is also highly prevalent in the country (4).

Nutritional status of the young children has been recognised as a sensitive indicator of changes in food supply and health care which in turn is positively associated with socioeconomic status of a household (5). Indicators based on anthropometric measurements particularly of young children provide realistic information about nutritional status of a community where the problem of malnutrition is severe and extensive (6-8). It is popularly used as an impact indicator of economic and social development of a community.

BRAC has been implementing a number of rural development, health and education programmes in Bangladesh with the aim of poverty alleviation and empowering the poor since its inception in 1972. The rural development and education programmes are focused on the poor households, referred to as "eligible households", i.e., households who own less than 50 decimals of land and the principal earners sell at least 100 days of manual labour per year. However, benefits of the BRAC health programmes are directed to the entire community. Basic package of BRAC's poverty alleviation programmes include social mobilization, formation of village organizations (VOs), institution building, basic awareness development, micro-credit, income generating activities, home gardening and production of small farm animals, para-legal and non-formal education, and provision of basic health care services. It is assumed that all the interactive development activities of BRAC would enhance purchasing capacity, home-based food production and basic sanitation of a participating household, which would eventually lead

to improved nutritional status, and finally to improved human resource development. As a part of these programmes, the Research and Evaluation Division (RED) of BRAC has been implementing a Nutritional Surveillance Project (NSP) in 100 villages of four rural *thanas* (sub-district) of Bangladesh in collaboration with Helen Keller International (HKI), Bangladesh since 1990. The main focus of the NSP, at the national level, was to assess the impact of natural and other disasters and, at the community level, to measure impact of the development interventions on nutritional status of children aged less than 5 years. Data on anthropometric and health indicators of the children and the corresponding household's socioeconomic information were collected every two months. Households who were not BRAC member were also studied for comparison. HKI was responsible for quality control of the data through regular field monitoring and providing training supports to the interviewers. The present analysis is based on nutritional status of the children who belonged to BRAC member compared to eligible non-member households.

Objectives

General objective

One of the aims of the NSP was to make use of the regularly collected data to assess impact of development interventions on nutritional status and other development indicators implemented by the collaborating agencies. This report aims to describe the nutritional status of children aged less than 5 years of BRAC member households and eligible non-member households and also to assess impact of parent's involvement in BRAC's rural development programme on nutritional status.

Specific objectives of this report are:

- to describe nutritional status of children under 5 years among BRAC member and non-member eligible households;
- to describe the correlates of nutritional status of children among BRAC member and non-member eligible households; and
- to find differences, if any, in these correlates.

Methodology

Study area and sampling

As one of the partners of the NSP, BRAC was responsible for collecting data from 4 rural *thanas* namely Saturia (in the district of Manikganj), Santhia (in the district of Shirajgonj), Sakhipur and Mirzapur (in the district of Tangail). Of these 4 thanas, data collected from 3 namely, Mirzapur, Saturia and Santhia were analyzed. Sakhipur thana was excluded since BRAC did not operate any development interventions there. BRAC's rural development programmes have been in operation in the above 3 study thanas for more than 10 years. From each thana, 25 villages were randomly selected. Data were collected every two months on of 20 children selected randomly from each selected village. During each time of data collection, a random list of all households of a village was used to select a cluster of 20 eligible children. Thus, a total of 500 children aged 6-59 months were included during each time of data collection, in each *thana*. Some children were common in two or more consecutive visits. The present analysis is mainly based on the data obtained from 8,940 children, i.e., 2141 BRAC member and 6,799 eligible non-member. The data included both weight and height measurements in addition to socioeconomic information and these were collected from April 1994 to December 1996.

Data collection

Socioeconomic data were collected using a structured questionnaire while weight and height data were collected using a Salter scale and a wooden height board respectively. A team of two female interviewers went to a sampled village, identified a cluster of households and collected data through house-to-house visits. Anthropometric data were collected for children whose parents gave informed consent and were found cooperative. Children were weighed to the nearest 0.1 kg on a Salter scale. The Salter spring balance measured up to a maximum of 25 kg with increments of 100 g. This instrument included a specially designed pant (bag) which was used to measure the child hanging from the bottom of the scale. Length of children aged less than 2 years (6-24 month) was measured to the nearest 0.1 cm on a locally made wooden platform with a sliding wooden board. A measuring tape was attached to the board from which the interviewer recorded the actual

height or length in cm (9). The dates of birth of the children were determined by reference to the important local events and Bengali calendar.

Indicators used

Two indicators of nutritional status, stunting and wasting were used. Stunting reflects long-term nutritional deprivation meaning short in stature compared to age of a child. Children with height-for-age less than 90% of the NCHS (National Centre for Health Statistics, Atlanta, USA) reference median were classified as stunted. Wasting reflects (acute) short-term nutritional deprivation meaning inadequate body weight compared to height. Children with weight-for-height less than 80% of the NCHS reference median were classified as wasted.

Three indicators of health status, such as, point prevalence of acute respiratory infections (ARI), point prevalence of diarrhoea, and vitamin A capsule (VAC) coverage within the preceding 6 months, were used in this study. ARI was measured as body temperature >37^{0}C, breath rate >50 and presence of wheeze. Diarrhoea was defined as onset of watery stool with or without the presence of blood at least 3 times in 24 hours during the time of interview.

Sex of the household head was determined as perceived by the respondents. Individuals who could not read and write were categorized as illiterate. Labour intensive occupations such as farming with or without land, agriculture labourer and day labourer were categorised as manual labourer. Loan for food was defined as received of loan for purchasing food items in the preceding one month of interview. Total food expenditure per month was divided by family size irrespective of age and sex composition to calculate per capita monthly food expenditure. Any of the parents involved in BRAC village organization irrespective of their length of membership was categorized as BRAC member households.

Quality control

During each time of data collection, a monitoring team visited the study area to monitor the quality of data collected. The team selected 5-10 percent sub-samples of the previously measured children and repeated the measurements within one week of last measurements. The data collected by the quality control team were compared with those collected by the interviewers, and the difference in observations were registered. During the refresher training sessions held in Dhaka HKI head office at the end of each round data collection, the results from the monitoring data were presented and any problems associated with the data quality were discussed and finally resolved through checking and re-checking.

Findings

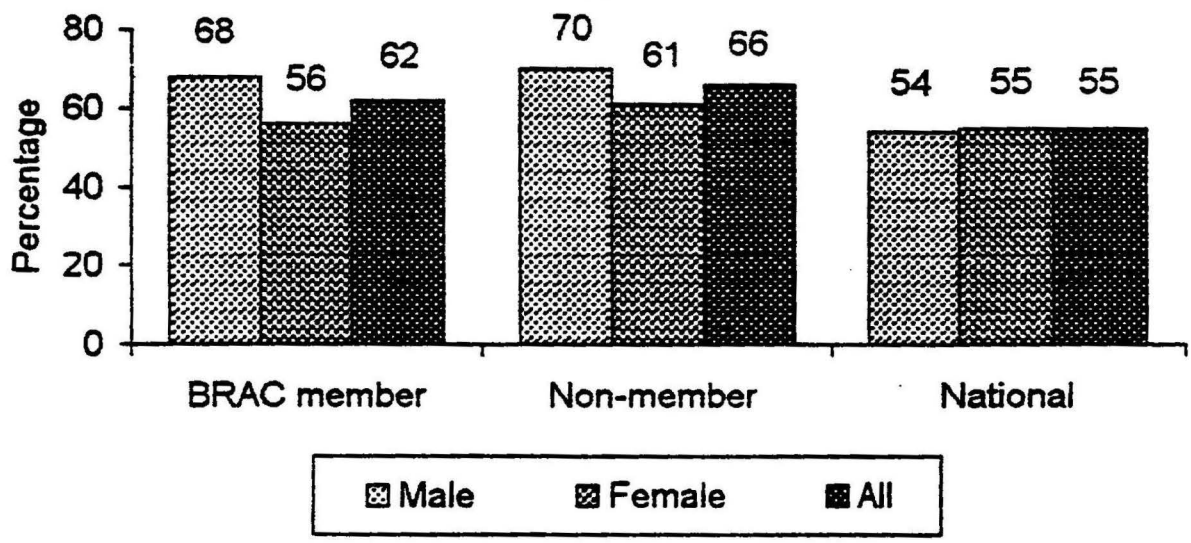
Table 1 shows the distribution of study children by sex and age. A total of 8,940 children, 2,141 from BRAC member households and 6,799 from eligible non-member households were studied. Of the total children, 49% were males and the rest were female. The mean age of the children was 37 months (range: 6-59 months). There was no sex difference in mean age within BRAC member and eligible non-member households.

Table 1. Distribution of the study children by sex, age and membership status.

Sex of children	BRAC member %	Non-BRAC %	All
Male	47	49	49
N	(1011)	(3346)	(4357)
Female	53	51	51
N	(1130)	(3453)	(4583)
Age in month			
6-24	23	21	21
	(456)	(1306)	(762)
25-48	47	49	49
	(935)	(3154)	(4089)
49-59	30	30	30
	(594)	(1886)	(2480)
Total	2141	6799	8940

Figures 1 and 2 show the prevalence of stunting and wasting respectively by BRAC membership status and sex of the children. The overall prevalence of stunting was 65%, which is higher than the national average of 42%. The prevalence of stunting was somewhat lower among BRAC member children compared to non-member children (62 % vs. 66 %) ($p<0.05$). Among both BRAC member and non-member eligible households, prevalence of stunting was significantly higher in males compared to female children ($p<0.001$) (Figure 1).

Figure 1: Prevalence of stunting by membership status and sex



About 18% of the children among both BRAC member and eligible non-member households were wasted compared to the national average of 15%. There was no significant difference in the prevalence of wasting between BRAC member and eligible non-member households. Among BRAC member households, there was no sex

About 18% of the children among both BRAC member and eligible non-member households were wasted compared to the national average of 15%. There was no significant difference in the prevalence of wasting between BRAC member and eligible non-member households. Among BRAC member households, there was no sex difference in the prevalence of wasting, but interestingly among non-member households, the prevalence was higher in male (20%) than female (16%) children ($p<0.05$) (Figure 2).

Figure 2 : Prevalence of wasting by sex and BRAC membership status

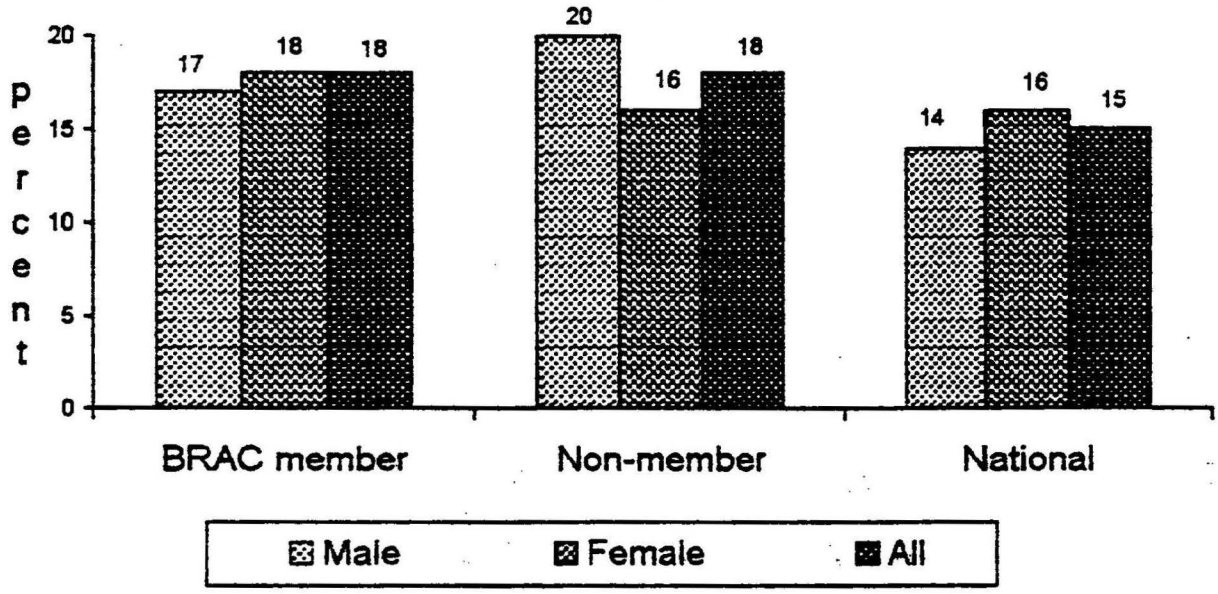


Figure 3 shows the prevalence of wasting by season and BRAC membership status. Both the groups of households showed a similar trend in prevalence except during the month of August-September. During this period, the prevalence of wasting was 16% among BRAC members but as high as 37% among eligible non-member households. The lowest prevalence of wasting (about 10%) was documented during December-January among both BRAC member and eligible non-member households.

Figure 3. Prevalence of wasting by seasonality and BRAC membership status.

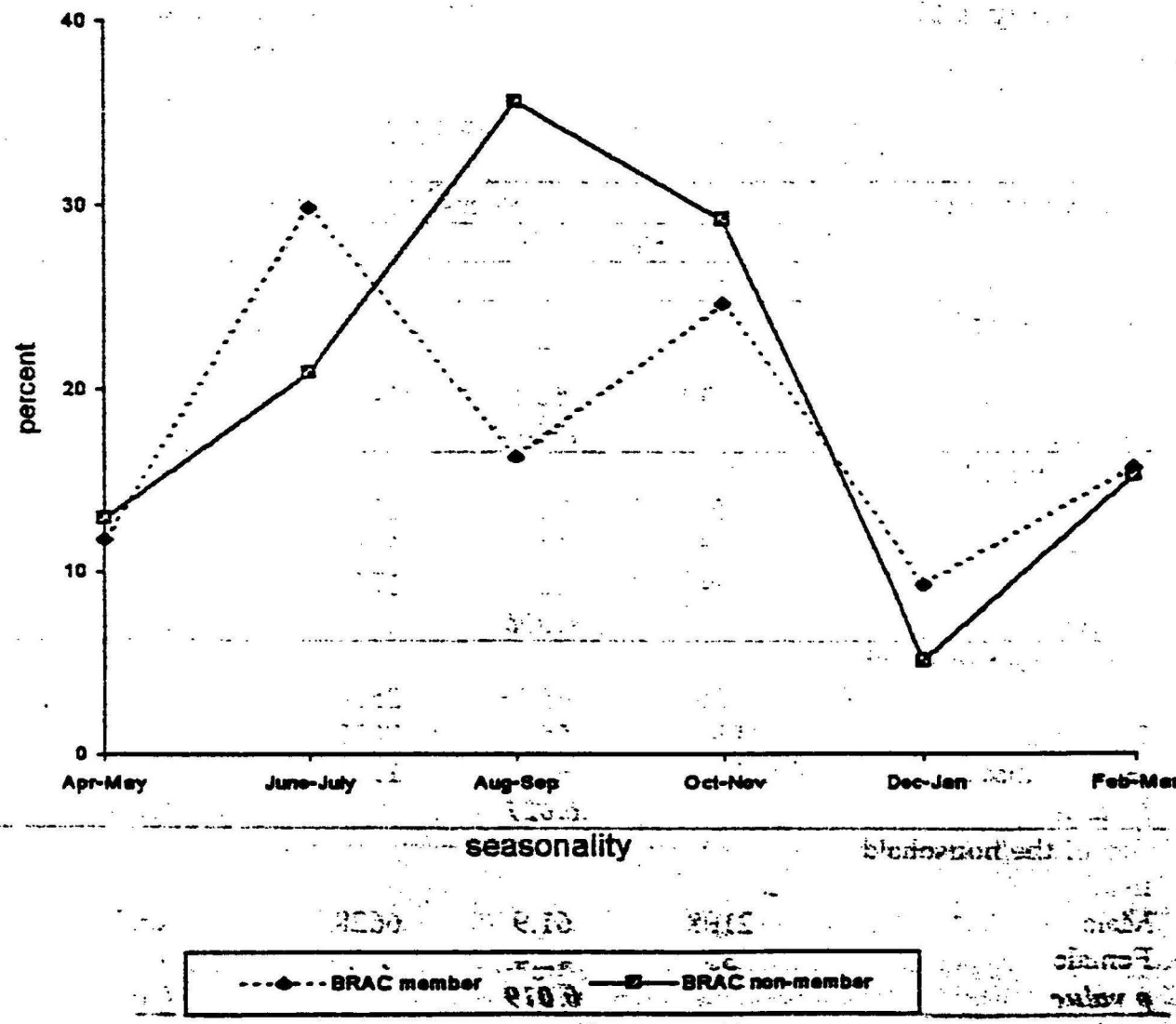


Table 2 presents the association between prevalence of stunting and biological characteristics in both BRAC member and eligible non-member households. Sex, age and birth order of the children and sex of the household head were significantly associated with prevalence of stunting in both the group of households ($p<0.01$). In all groups, the prevalence of malnutrition was higher in males than in females and it decreased significantly with age ($p<0.001$). Birth order had significant association with prevalence of stunting among children in BRAC member and non-member households ($p<0.05$). Interestingly, the prevalence of stunting was higher was higher among households headed by males ($p<0.02$).

Table 2. Prevalence of stunting by biological characteristics.

Characteristics	Membership status			
	BRAC		Non-BRAC	
	n	%	n	%
Sex of the child				
Male	1011	67.7	3346	70.0
Female	1130	56.1	3453	61.1
p value		***0.000***		***0.000***
Age in months				
6 - 24	456	72.8	1306	70.1
25 - 48	935	54.4	3154	66.2
49 – 59	594	62.1	1886	56.7
p value		***0.000***		***0.000***
Birth order of the child				
Ist	958	65.1	3586	67.1
2nd - 3rd	830	55.1	2032	62.0
4th and above	350	69.4	1181	66.7
p value		***0.021***		***0.000***
Sex of the household head				
Male	2108	61.9	6628	66.7
Female	33	42.4	171	49.9
p value		***0.019***		***0.000***

Table 3 presents the association between prevalence of stunting and socioeconomic characteristics among children of BRAC member and eligible non-member households. While among both BRAC member and eligible non-member households, the prevalence was associated with family size, mother's literacy, and occupation of the household head

($p<0.01$). The prevalence was not associated with loan on food during last month, and monthly per capita food expenditure in the member households but it was significantly so in the eligible non-member households ($p<0.01$). It indicates a possible long-term positive effect of BRAC interventions on household food security among rural poor households. Among households with illiterate parents, manual labourers and food loan received during the preceding one month, the prevalence of stunting was lower in BRAC member than eligible non-member households ($p<0.001$).

Table 3. Prevalence of stunting by socioeconomic characteristics.

Characteristics	Membership status			
	BRAC		Non-BRAC	
	n	%	n	%
Family Size				
2 - 4	383	62.9	3586	65.4
5 - 6	178	50.0	2032	64.9
7 – 9	59	45.8	1181	48.9
p value		***0.002***		***0.005***
Mother's literacy				
Illiterate	1419	64.2	4834	70.1
Literate	722	56.4	1965	54.1
p value		***0.001***		***0.000***
Father's literacy				
Illiterate	1368	61.9	4931	69.1
Literate	768	60.7	1868	55.8
p value		***0.302***		***0.000***
Occupation of household head				
Manual labour	1788	63.3	6008	67.4
Non-manual labour	353	53.0	791	50.9
p value		***0.000***		***0.000***
Loan on food during last month				
No	1921	60.0	5906	70.9
Yes	220	61.7	893	64.7
p value		***0.333***		***0.000***
Monthly per capita food expenditure (Tk.)				
<1000	2002	63.4	62.91	66.0
>1000	139	61.3	508	59.4
p value		***0.366***		***0.002***

With regard to some health characteristics, the prevalence of stunting among children was associated with point prevalence of ARI, diarrhoea and place of defecation in both BRAC member and eligible non-member households ($p<0.05$). The prevalence of stunting was higher among children who had suffered from ARI and diarrhoea during the time of survey and also was higher in households with open type of latrine irrespective of BRAC membership (Table 4).

Table 4. Prevalence of stunting by health related characteristics.

Characteristics	Membership status			
	BRAC		Non-BRAC	
	n	%	n	%
ARI				
Present	1292	63.2	2410	69.8
Absent	849	59.0	4389	57.6
p value		*0.028*		*0.000*
Diarrhoea				
Present	119	78.2	565	88.1
Absent	2022	60.6	6234	63.4
p value		*0.000*		*0.000*
Place of defecation				
Close	256	46.5	395	52.2
Open	1885	63.6	6404	66.3
p value		*0.000*		*0.000*

Almost similar associations were observed for wasting as for stunting between BRAC membership status and biological, socioeconomic and health-related characteristics (Table 5-7), with however, some important exceptions. For example in BRAC member households, birth order of the child, sex of the household head, family size, mother's literacy, occupation of the household head and monthly per capita food expenditure, but not age and sex of the child, were significantly associated with wasting ($p<0.05$). In non-member households, age and sex of the children were also strongly associated with wasting, implying again the seemingly significant protection of growing children, both male and female, from wasting by BRAC membership privileges. It is also interesting to

note that while birth order was inconclusively associated with stunting, it was a strong determinant of wasting in both BRAC member and non-member households (Table 5).

Table 5. Prevalence of wasting by biological characteristics.

Characteristics	Membership status			
	BRAC		Non-BRAC	
	n	%	n	%
Sex of the child				
Male	1011	16.7	3346	19.5
Female	1127	18.4	3453	16.4
p value		*0.173*		*0.001*
Age in months				
6 - 24	456	14.5	1306	16.9
25 - 48	935	18.3	3154	19.1
49 – 59	594	16.5	1886	14.0
p value		*0.185*		*0.000*
Birth order of the child				
Ist	958	16.8	3586	18.6
2nd - 3rd	830	18.2	2032	16.0
4th and above	350	24.5	1181	28.8
p value		*0.005*		*0.000*
Sex of the household head				
Male	2105	17.3	6628	18.4
Female	33	17.1	171	16.0
p value		*0.021*		*0.000*

Table 6. Prevalence of wasting by socioeconomic characteristics.

Characteristics	Membership status			
	BRAC		Non- BRAC	
	n	%	n	%
Family Size				
2 - 4	383	15.4	3586	13.6
5 - 6	178	11.2	2032	10.4
7 – 9	59	12.0	1180	14.7
p value		*0.003*		*0.004*
Mother's literacy				
Illiterate	1419	18.8	4834	19.9
Literate	722	12.8	1965	13.1
p value		*0.000*		*0.000*
Father's literacy				
Illiterate	1368	17.6	4931	19.3
Literate	768	17.0	1868	14.3
p value		*0.382*		*0.000*
Occupation of household head				
Manual labour	1788	19.9	6008	18.0
Non-manual labour	353	13.7	791	17.6
p value		*0.000*		*0.417*
Loan on food during last month				
Yes	1921	17.5	893	14.3
No	220	18.6	5906	18.5
p value		*0.362*		*0.001*
Monthly per capita food expenditure (Tk.)				
<1000	1999	18.2	6291	18.0
>1000	139	8.6	508	16.3
p value		*0.002*		*0.184*

Table 7. Prevalence of wasting by health related characteristics.

Characteristics	Membership status			
	BRAC		Non-BRAC	
	n	%	n	%
ARI				
Present	1289	20.6	4389	21.8
Absent	849	13.0	2410	10.8
p value		*0.000*		*0.000*
Diarrhoea				
Present	119	18.4	565	19.2
Absent	2019	17.8	6234	17.8
p value		*0.000*		*0.000*
VAC Coverage				
Yes	1759	16.7	5508	16.0
No	379	21.6	1291	25.9
p value		*0.015*		*0.000*
Place of defecation				
Close latrine	1882	17.1	6404	17.0
Open latrine	256	21.5	395	18.0
p value		*0.051*		*0.333*

Logistic regression analysis was performed to identify the effect of BRAC membership on the prevalence of stunting. A total of nine explanatory variables, which had significant association with prevalence of stunting, were included in the regression analysis. The variables are: BRAC membership status; sex, age and birth order of the child; food loan in the preceding month; per capita monthly food expenditure; point prevalence of diarrhoea and ARI, and place of defecation. A total of three regression models were constructed to assess the individual effect of BRAC membership on the prevalence of stunting. In the first model, BRAC membership had significant effect in reducing the prevalence of stunting (odds ratio=0.86, p-value=0.00) controlling for individual level confounding factors such as child's sex, age and birth order; and household level characteristics such as food loan received in the preceding month and per capita monthly food expenditure. In the second model, individual level health-related variables such as point prevalence of diarrhoea and ARI was added and still the BRAC membership showed significant effect on reducing the prevalence of stunting (odds ratio=0.88, p-

value=0.02). In addition to the variables included in the first and second models, one household level variable in relation to hygiene and environmental sanitation such as place of defecation was added in the third model and, surprisingly, the effect of BRAC membership on prevalence of stunting became insignificant (p=0.12) (Table 8).

Table 8. Effect of BRAC membership on the prevalence of stunting.

Indicators	n	Model 1		Model 2		Model 3	
		OR	p-value	OR	p-value	OR	p-value
BRAC membership							
No	6799	RC		RC		RC	
Yes	2141	0.86	0.00	0.88	0.02	0.92	0.12
Child's sex							
Female	4583	RC		RC		RC	
Male	4357	1.62	0.00	1.59	0.00	1.58	0.00
Child's age (month)	8930	1.00	0.93	1.00	0.11	1.00	0.06
Birth order	8930	1.09	0.00	1.09	0.00	1.14	0.00
Food loan in last month							
No	6126	RC		RC		RC	
Yes	2814	1.28	0.00	1.09	0.21	1.04	0.58
Per capita monthly food expenditure (Tk)							
1000+	647	RC		RC		RC	
<1000	8293	1.18	0.05	1.10	0.26	1.14	0.14
Diarrhoea							
No	8256			RC		RC	
Yes	684			3.24	0.00	3.15	0.00
ARI							
No	5238			RC		RC	
Yes	3702			1.59	0.00	1.61	0.00
Place of defecation							
Close	651					RC	
Open	8289					2.07	0.00

Discussion

The main focus of this study was to describe the nutritional status of under-5 children and to examine the health and socioeconomic status determinants of stunting and wasting among BRAC member and eligible non-member households. In addition, the study also attempted to assess the effect of BRAC membership on nutritional status. Incidentally, it was found that nutritional indicators like stunting and wasting were much worse in the study villages compared to the national average.

This study reveals that the rural development programmes of BRAC reached the target population and helped improve their socioeconomic condition and nutritional status. There are indications that BRAC's programmes reduced the prevalence of mild and moderate degrees of malnutrition (height-for-age and weight-for-height) among children aged 6-59 months (11). Small improvements in child care practices; health and sanitation reaped much higher improvements in nutritional status than income (3).

The results of bi-variate and multivariate analyses indicated determinants of nutritional status among BRAC member and non-member eligible households, sex, birth order and age of the child, sex, literacy and occupation of the household, point prevalence of diarrhoea and acute respiratory infection, food loan received in the preceding month, place of defecation and seasonality were the main determinants of stunting and wasting for children less than 5 years. However, indications were obtained that prevalence of stunting was higher among male children compared to female children but there was no significant association between male and female in terms of wasting. It is observed that children aged 6-24 months were more stunted compared to other age groups and wasting was more prevalent among children aged 25-48 months.

It was also observed that the prevalence of malnutrition was higher among children who suffered from point prevalence of diarrhoea and acute respiratory infection (ARI) among the children who belonged to non-member eligible households compared to BRAC member households. Malnutrition was found to be a cause as well as an effect of ARI

(12). A joint WHO and UNICEF statement emphasises that acute respiratory infection, diarrhoea and malnutrition are the principal causes of illness and death in children in the developing countries (13). Among BRAC member and non-member eligible households, more than 50% children received vitamin A capsule during the preceding six months. Vitamin A capsule coverage has significant association with stunting and wasting. Vitamin A is needed for many functions of the body including sight and to fight against infection (14). It is also revealed that prevalence of stunting and wasting was slightly lower among children who used close latrine for defecation.

The present study suggests that among BRAC members and non-member eligible households, the prevalence of stunting was lower among children who belonged to female headed households compared to male headed households. This corresponds to the notion (15) that mothers are better managers of household funds (income money) than fathers, thus creating an opportunity of better use of resources towards child health and nutritional status.

The level of literacy among the population is very poor, particularly for females. According to the last population census (16), the overall literacy rate was only 32.4%, 38.9% for male and 25.5% for female. According to this study, nutritional status of the children was significantly associated with parent's literacy level. Literate parent's children are less stunted compared to illiterate parent's children. Nutrition education is appropriate where nutritional deficiencies are due to feeding practices rather than absolute food shortage (17).

In Bangladesh, classification of occupation is difficult, as most of the people are poor, illiterate and not engaged in any one job. To maintain their families they have to do more than one job. For this analysis, occupation was categorized into two groups: a) manual labour and b) non-manual labour. It was observed that occupation of main earner had a positive effect on child nutritional status. The nutritional status of children was much better in households in which the occupation was non-manual. Prevalence of stunting was significantly associated with occupation of main earner ($p<0.001$) among both types of

households. Monthly food expenditure had an impact on child nutritional status. Nutritional status of children from comparatively higher income group was better compared to other group. It was observed that occupation of household head and monthly food expenditure tended to reduce the prevalence of malnutrition among children in both types of households. BRAC membership privileges were found to contribute significantly in assuring household food security among the poor. For example, it was observed that children of the BRAC member households were much less wasted than the non-member children during the lean months of August and September. This may be considered as one of the best contributions that BRAC programme provides in protecting the children from wasting during crisis periods of the year.

BRAC has been implementing a credit programme along with income generating activities; being a BRAC member they could receive loan throughout the year. During the worst season the rural community faced food crisis. BRAC loan is a significant support for BRAC members during the crisis periods. The prevalence of wasting showed significant decline during December to January, the post-harvest months in rural Bangladesh.

From the multivariable analysis it was observed that BRAC membership status had significant association with the prevalence of stunting also. It was found that being a BRAC member the chances of stunting was less compared to non-member households. Sex, age and birth order of the child; point prevalence of diarrhoea and acute respiratory infection, place of defecation, food loan and per capita food expenditure of the households were the main determinants of stunting.

Conclusions

- Both chronic and acute malnutrition were markedly prevalent in BRAC eligible households compared to the national average.
- Prevalence of both stunting and wasting were lower in BRAC member households compared to non-member eligible households, indicating significant

contribution of BRAC programmes in assuring household food security in rural poor households. This is particularly true in protecting the children from wasting that occurs in Bangladesh during the lean periods (August-September) of the year.

- In BRAC and non-member households, sex, age and birth order of the child; food loan and per capita food expenditure; point prevalence of diarrhoea and acute respiratory infection and place of defecation are the main determinants of stunting in children aged less than 5 years.

- Place of defecation, an indicator of household level hygiene and environmental sanitation, came up as a significant determining factor in reducing the prevalence of stunting due to BRAC membership. Current level of sanitation should be improved to have higher nutritional impact of the rural development programme of BRAC.

Policy implications for BRAC

- There should be further emphasis in distributing slab latrines and increasing the awareness of the project participants on hygiene and sanitation.
- Nutrition education component of BARC-RDP needs to be strengthened to improve nutritional status of the target population.
- Nutritional considerations in monitoring and evaluation of the on-going poverty elevation programmes should carefully be incorporated to enhance their impact on nutritional status.

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Appendix 1. Measurement of the dependent and the explanatory variables used in logistic regression analysis.

Variables	Measurement
Dependent variable	
Height for age (HAZ2X)	<-2sd HA =stunted, >-2sd HA =not stunted
Weight for height (WHZ2X)	<-2sd WH =wasted, >-2sd WH =not wasted
Explanatory variable	
BRAC membership status	Non-member =0, BRAC member =1
Age of the child	6-59 month, continuous
Sex of the household head	Female =0, male =1
Birth order of the child	Continuous
Sex of the household head	Female =0, Male =1
Diarrhea	No =0, Yes =1
Acute respiratory infection (ARI)	No =0, Yes =1
Vitamin A capsule coverage during 6 months	Yes =0, No =1
Place of defecation	Colse=0, Open =1
Literacy level of the household head	Literate =0, Illiterate =1
Literacy level of child's mother	Literate =0, Illiterate =1
Percapita food expenditure (monthly)	>1000-2000 Tk.=0, <1000 Tk.=1
Loan received last month for food	No=0, Yes=1
Occupation of the household head	Non-manual labour =0 ,Manual labour =1
Seasonality	peak=0, Lean=1