

Effect of BRAC's Rural Development Programme on Calorie Consumption: Evidence from Matlab

**Masuma Khatun
SM Ziauddin Hyder
Abbas Bhuiya
AMR Chowdhury**

**BRAC-ICDDR, B Joint Research Project
Dhaka, Bangladesh**

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Abstract

This report describes the association between calorie consumption and household socioeconomic status and examines the effect of BRAC's Rural Development Programme (RDP) membership on calorie consumption per adult equivalent per day. The analysis was based on the data collected from 2,061 households in 14 villages of Matlab thana during April-August, 1995 as a part of the BRAC-ICDDR, B joint research project. Socioeconomic and household food in-flow and out-flow data were collected through home visits using a pre-tested structured questionnaire. Food items cooked at home were taken into consideration to calculate the household level calorie consumption. To obtain per adult equivalent daily calorie consumption, total household daily calorie consumption was divided by household food consumption unit developed by FAO. The results revealed that average per adult equivalent daily calorie consumption among the study population was 1,929 kcal (95% CI: 1,897-1,961 kcal), which is close to the national average of 1,943 kcal. Calorie consumption was significantly associated with household size and land holding; occupation and literacy status of the household head; and monthly per capita food and non-food expenditures ($p < 0.05$). The proportions of households with per adult equivalent daily calorie consumption $< 1,805$ kcal and $< 2,122$ kcal were significantly lower among BRAC eligible member households compared to eligible non-member households ($p < 0.05$). Controlling for other factors, an adult equivalent of an eligible BRAC member household had 33% less chance to consume $< 1,805$ kcal and 28% less chance to consume $< 2,122$ kcal compared to an eligible non-member household ($p < 0.01$), suggesting BRAC's RDP membership had a positive effect on household level calorie consumption. Calorie consumption per adult equivalent per day should be incorporated in BRAC-RDP as one of the monitoring indicators to evaluate the programme to maximize its effect on nutritional status of the target population.

Introduction

Poverty and malnutrition persists at an alarming level in the developing countries including Bangladesh. The World Bank estimates that South Asia contains more than 40% of the world's absolute poor surviving on less than 1 US dollar a day (1). Per adult equivalent daily calorie consumption, to a large extent, explains poverty situation of a household. It was estimated that about 45-51% of the total population in Bangladesh were poor based on their calorie consumption (2). The prevalence of poverty and resulting low calorie consumption is higher in rural than in urban areas. Many studies have recognized the existing widespread rural poverty¹ and the tendency of progressive increase in the absolute number of the poor (1-3). The socioeconomic environment characterizing the poor includes lack of access to land, wide spread prevalence of illiteracy and unemployment and low income. Given the socioeconomic condition of the poor, the mechanism for poverty alleviation would require major efforts on credit based development activities for landless poor (4).

BRAC has been implementing a series of development interventions aimed at empowering the rural poor and alleviating poverty through organising landless people for education and training, offering credit and income generating activities, essential health care, family planning and social development. This paper examines whether BRAC's development interventions could enhance the calorie consumption of the programme participating households.

The first part of this paper describes the level of calorie consumption of the study population. The second part discusses the association between different socioeconomic status indicators and the prevalence of calorie consumption less than two different cut-off levels, i.e., per capita daily calorie consumption <2,122 and <1,805 kcal. The third part looks at the effect of BRAC membership on calorie consumption.

¹ Absolute poverty is defined as per capita per day calorie consumption <2,122 kcal and hard-core poverty is defined as per capita per day calorie consumption <1,805 kcal.

Methodology

Data for this cross sectional study were collected during April-August 1995 from 2,061 households in 14 villages of Matlab thana. The villages were selected randomly from a list of 60 villages on which the baseline survey of the BRAC-ICDDR, B joint research project was performed in 1992 (5). All households in the 14 villages who had consent to participate were included in the study. In Matlab, an embankment, Meghna-Dhonagoda project was constructed to protect the area from seasonal floods, which categorized the study population in relation to the location of the villages inside or outside the embankment. Socioeconomic, anthropometry of all household members aged more than 6 months and household food in-flow and out-flow data were collected by household visits using a pre-tested structured questionnaire. Food consumption data were estimated from household food in-flow and out-flow part of the survey. Respondents, in most instances the household heads and their spouses, were asked to recall different food items that had entered the household during the preceding 7 days of the interview and how they were used, i.e., whether they were stocked, sold, given to others, stolen, or consumed. Only those food items that were consumed in the household were taken into consideration to calculate the amount of energy consumed by regular household members. Respondents were asked to recall 12 major food items. Several measures were taken to select these food items and to check for the validity and reliability of the data. Before finalizing the questionnaire, a pilot survey was done on 30 households in the study area with a questionnaire listed details food items. From the findings of this pilot study, these 12 food items were selected based on three aspects: commonly eaten, can be recalled precisely and provides more than 95% calorie per day. The food items consumed were recorded in grams and converted into calorie based on the Food Composition Tables developed by the Institute of Nutrition and Food Science (INFS), Dhaka University (6). Total household calorie consumption per day was divided by household food consumption unit² to obtain per

²The household food consumption units of a household are an expression of its age and sex composition. They are calculated by adding together the individual consumption units of household members. The consumption units developed by FAO are as follows:

adult equivalent per day calorie consumption (7). Only BRAC eligible member and non-member households were taken into consideration to measure the effect of BRAC membership on calorie consumption. The non-eligible BRAC member households were excluded from the analysis. BRAC eligible households were defined as those who had land less than 50 decimals and one of the adult household members sold manual labour more than 100 days in the preceding year. Of the 2061 study households, 1,130 were BRAC eligible and 931 were non-eligible. Among the BRAC eligible households, 189 participated in BRAC's Rural Development Programme.

Data analyses were done using SPSSWIN software package and both uni and multi-variate techniques of data analysis were performed. The chi-square test was done to examine the association between the background factors and the prevalence of low calorie consumption. Significance of the difference between means of calorie consumption by different population was calculated by ANOVA tests. P-values less than 0.05 were considered significant.

Individual consumption units		
Age (years)	Females	Males
<1	0.3	0.3
1-6	0.5	0.5
7-13	0.7	0.7
14-19	0.9	0.9
20-59	0.9	1.0
>59	0.7	0.9

Results

Level of calorie consumption

Mean calorie consumption among the study population was 1,929 kcal (95% CI: 1897-1961 kcal) per adult equivalent per day, which corresponds to the national average of 1,943 kcal per capita per day as found by the latest national nutrition survey done in 1981-1982 (8). Per day per adult equivalent calorie consumption among eligible BRAC member, eligible BRAC non-member and non-eligible non-member households were 2,014 kcal, 1,852 kcal and 2,153 kcal, respectively (Table 1). Mean per adult equivalent per day calorie consumption was significantly higher among eligible BRAC member households compared to eligible non-member households ($p<0.05$). According to the government of Bangladesh, per capita per day calorie consumption more than 2,310 kcal is defined as adequate (9). Among eligible BRAC member households, 23.6% had adequate calorie consumption compared to 18.4% and 31.8% among eligible BRAC non-member and non-eligible non-member households ($p<0.001$).

Table 1. Adequacy of calorie consumption of the study population by BRAC eligibility and membership status.

Indicator	BRAC eligible		Non-eligible
	Member (n=189)	Non-member (n=941)	Non-member (n=931)
Mean intake (Kcal)	2,014	1,852	2,153
% of adequate intake (>2310 kcal)	23.6	18.4	31.8

Socioeconomic status and calorie consumption

This section examines the association between the prevalence of low calorie consumption defined by two cut-off levels and some selected socioeconomic status

indicators such as, family size, literacy status³ and occupation of the household head, monthly per capita food and non-food expenditure and household land holding size.

Table 2. Distribution of households by socioeconomic characteristics and calorie consumption

Socioeconomic characteristics	n	Calorie consumption per adult equivalent per day		Mean per capita calorie consumption (kcal) (mean ± sd)
		<2,122 kcal (%)	<1,805 kcal (%)	
Household Size				
1 - 3	395	49.9	30.4	2448 ± 843
4 - 6	768	63.5	44.4	1993 ± 702
6+	898	75.7	53.8	1804 ± 541
<i>p-value</i>		<0.001	<0.001	<0.001
Literacy of household head				
Literate	720	60.3	38.9	2072±822
Illiterate	1140	69.8	50.2	1942±818
<i>p-value</i>		<0.001	<0.001	<0.001
Occupation of household head				
Farming with land	377	58.9	35.5	2097±733
Trading/service labour	592	71.6	50.7	1883±632
House based work	419	72.3	56.1	1841±649
Unemployed & disabled	312	59.3	37.5	2212±1141
	158	60.1	41.8	2121±1119
<i>p-value</i>		<0.01	<0.01	<0.001
Monthly food expenditure (Tk)				
<1000	691	75.3	56.2	1855±870
1000-2000	756	63.5	42.3	2018±731
>2000	405	55.6	35.1	2173±856
<i>p-value</i>		<0.001	<0.001	<0.001
Monthly non-food expenditure (Tk)				
<300	1604	68.3	47.9	1926±681
>300	440	57.8	37.1	2119±766
<i>p-value</i>		<0.001	<0.001	<0.001
Household land holding (Decimal)				
<50	1132	71.1	51.2	1908±794
50-100	370	60.3	40.8	2007±626
>100	356	53.9	33.7	2247±1016
<i>p-value</i>		<0.001	<0.001	<0.001

³Those who could read and write were categorized as literate.

Family size and calorie consumption

Family size was significantly associated with the prevalence of both the levels of low calorie consumption. As shown in Table 2, the proportion of households with per capita daily calorie consumption $<2,122$ and $<1,805$ kcal increased with family size, i.e., low calorie consumption was more prevalent among larger households compared to the smaller ones ($p<0.001$). Similar trend was observed for the mean values of calorie consumption ($p<0.001$).

Literacy of the household head and calorie consumption

Table 2 shows that the prevalence of low calorie consumption was significantly associated with literacy status of the household head ($p<0.001$). The higher prevalence of low calorie consumption was observed among the households with illiterate compared to literate household heads. Mean per adult equivalent per day calorie consumption was also higher among the literate compared to the illiterate household heads ($p<0.001$).

Occupation of the household head and calorie consumption

Welfare of a household depends on occupational and social status, which in turn is based on the nature of the work of the main household earner. The nature of employment is important in determining the level of calorie consumption, which is an indicator of poverty (10). Significant association was observed between occupation of the household head and low calorie consumption prevalence ($p<0.001$). The highest proportion of households with per adult equivalent daily calorie consumption $<1,805$ kcal was found in the labour households, followed by the households engaged in trading or service. Those engaged in farming with land showed the lowest prevalence of low calorie consumption. Similar trends were observed with regard to the prevalence of calorie consumption $<2,122$ kcal. The mean per adult equivalent calorie consumption was lowest in labour and highest in house-based work households

($p < 0.001$).

Food and non-food expenditure and calorie consumption

In regards to monthly household food and non-food expenditure, significant association observed between both food and non-food expenditures and the prevalence of low calorie consumption ($p < 0.001$). The proportion of households with low calorie consumption was found to be the highest among households with a monthly food expenditure of less than Tk. 1,000 and non-food expenditure of less than Tk. 300. The lowest prevalence of low calorie consumption was observed among households with a monthly food expenditure of more than Tk. 2,000 and non food expenditure of more than Tk. 300 respectively. The mean per adult equivalent per day calorie consumption increased with both monthly food and non-food expenditure ($p < 0.001$).

Household land holding and calorie consumption

Land is possibly the most useful factor that acts as a discriminator of a rural household's economic status more than any other socioeconomic factor. A wide socioeconomic disparity was observed when rural households were classified according to land ownership size (11). In this study, average household land size was associated with both the cut-off of low calorie consumption ($p < 0.001$). Households with higher land size had lower prevalence of per adult equivalent daily calorie consumption $< 1,805$ and $< 2,122$ kcal. Mean per adult equivalent per day calorie consumption increased with household land size ($p < 0.001$) (Table 2).

Participation in BRAC's rural development interventions and calorie consumption

The prevalence of per adult equivalent daily calorie consumption $< 2,122$ and $< 1,805$ kcal was examined in both BRAC eligible member and eligible non-member households. The prevalence of low calorie consumption below both the cut-off levels was significantly lower in eligible BRAC member households than in eligible non-member

households ($p<0.01$) (Figure 1). The prevalence of per adult equivalent daily calorie consumption $<1,805$ kcal was 45% in eligible BRAC member households compared to 56% in eligible non-member households. Similarly, prevalence of per adult equivalent daily calorie consumption $<2,212$ kcal was lower in eligible BRAC member households (68%) compared to eligible non-member households (74%).

Table 3 shows the results of a multi-variate analysis to examine the effect of BRAC membership on both the levels of low calorie consumption after controlling for the potential confounding factors. In the models, the effect of BRAC membership on per adult equivalent daily calorie consumption $<1,805$ and $<2,122$ kcal were controlled for socioeconomic status indicators which were found significantly associated with both the cut-off levels of calorie consumption in the bi-variate analyses, such as, literacy status of the household head, household size, per capita monthly food and non-food expenditure, household land holding and location of village with respect to embankment ($p<0.05$). Controlling for all these confounding factors, each person of a BRAC eligible member household had 33% less chance to consume $<1,805$ kcal and 28% less chance to consume $<2,122$ kcal compared to a person belonging to a eligible non-member household ($p<0.01$). Sex and occupation of the household head were excluded from the model, as they had no significant association with any of the two levels of low calorie consumption ($p>0.10$).

Table 3. Effect of BRAC membership on calorie consumption.

Indicator	n	Calorie consumption per adult equivalent per day			
		<1,805 kcal		<2,122 kcal	
		Odds ratio	p-value	Odds ratio	p-value
BRAC membership					
Member	189	RC		RC	
Non-member	844	1.33	0.001	1.28	0.009
Literacy of household head					
Literate	250	RC		RC	
Illiterate	783	1.13	0.11	1.17	0.07

Household size	1033	1.28	0.000	1.34	0.000
Per capita monthly food expenditure (Tk)	1033	1.00	0.0001	1.00	0.001
Per capita monthly non-food expenditure (Tk)	1033	1.00	0.09	1.00	0.13
Household land holding (Decimal)	1033	0.99	0.0005	0.99	0.001
Village location					
Inside Embankment	474	RC			
Outside Embankment	559	1.12	0.06	0.85	0.03

Discussion and conclusion

The main focus of this study was to describe the association between different socioeconomic and demographic characteristics and calorie consumption of the BRAC eligible member and non-member households. Also, the study examined the effect of BRAC membership on per adult equivalent per day calorie consumption.

As found in the earlier national nutrition survey, this study confirms an overall lower level of calorie consumption by the population in Matlab compared to the requirement. The study indicated that household size, literacy, occupation, food and non-food expenditure and household land holding were important associated factors of low calorie consumption. It was found that households with low calorie consumption tended to have a larger family size. The prevalence of low calorie consumption was the highest for households with more than six members while it was lowest for households with less than three members. This variation may partly be explained by the fact that larger households tended to have higher number of children and thus higher dependency

burden. A higher dependency led to a lower consumption when income was fixed. Thus, an increase in family size depressed the real consumption level resulting in the increased prevalence of low calorie consumption among the poor households.

The literacy rate in Bangladesh is one of the lowest in the world. According to the last population census, the overall literacy rate was only 45.1%. There are also inequalities in the availability of opportunities for education between rural and urban areas. Literacy rate in rural areas was only 39.1% compare to 57.7% in urban area (12). Wide variations among different economic groups exist with respect to the level of education. The participation profile of education indicates that the facilities for education created so far were enjoyed mostly by the well to do section of the population. This is because the poor can not afford to educate their children due to economic constraints. Poor children enrolled at schools, drop out and engage in child labour within and outside the household. A survey reported that approximately 80% of the total dropout children at the primary level of education in rural areas came from small farm households; and fell into the trap of child labour with minimum wage and thus were caught in a vicious circle of poverty and malnutrition (13). According to this study, a significant association existed between literacy and low calorie consumption. It is to be noted that without adequate development of human capital potential, poor people will not be able to get employment other than as unskilled workers with low cash earnings. Thus, poor households with no education, skills and other productive assets have no way of increasing their income and eventually suffer from acute impoverishment which is reflected in their daily calorie consumption.

The agriculture sector is the main source of survival of the millions of rural people. But this sector is stressed with multifarious problems, among which the prevalence of overwhelming small, marginal and landless farmers; inequality in land-holding distribution; stagnant growth of agriculture; low productivity, etc. are important. Because of these problems, poverty and malnutrition have become endemic in the rural society (4). This study found a positive association between land-holding size and

prevalence of low calorie consumption. The prevalence of low calorie consumption decreased with the increase in land holding size. Rural poverty defined by per capita daily calorie consumption was thus closely associated with the distribution of ownership of land.

In relation to this land-holding situation in the rural community, the analysis of occupational pattern showed that a significant portion of the rural population is engaged in seasonal labour category. Available information indicate that the rural labour force often remain unemployed or underemployed. Moreover, seasonality in employment opportunity in the agriculture sector, both in terms of employment level as well as wage rate was one of the important causes of great hardship for the rural poor. During the slack seasons, a sizable proportion of surplus rural labours try to seek employment in the informal sector, but such opportunities are limited with respect to their demand. It was observed that there was a significant association between prevalence of low calorie consumption and different occupational categories. The prevalence of low calorie consumption was more common among the labour households and those engaged in low-income pursuits of trade and services. The lowest prevalence of per adult equivalent daily calorie consumption <1,805 kcal was, however, observed among the households engaged in farming. Seasonal variation in employment of agricultural labours coupled with low wage rate were the main causes of the highest prevalence of low calorie consumption among the labour households. According to World Bank estimates, the real wage rate of agricultural labours gradually decreased between 1969-1970 to 1982-1983 and the cost of living index of this group increased from 100 to 774 over the same period. As a result, the labour households had (1900-2000 kcal) a daily consumption below the minimum requirement of 2,310 kcal prescribed by the Government of Bangladesh.

BRAC has been implementing a series of credit and development intervention along with non-formal education and essential health care. It was assumed that the interventions would lead to an improved socioeconomic and nutritional well being of the

programme participants. Different impact studies of rural development programmes have shown positive results with respect to self-employment opportunities, improvement of nutritional status and alleviation of poverty in the project areas. For instance, in case of Grameen Bank, nearly half of female members reported to having no productive occupation prior to joining the Grameen Bank. It was also revealed that the population living below the absolute poverty line, defined as per capita daily calorie consumption $<2,122$ kcal, was 50% in the project villages as compared to 71% in the control villages (14). In the present study, comparison has been made between the two groups of BRAC eligible population - one with interventions and the other without interventions. BRAC member households who were somehow included in the programme but did not fulfill the criteria of BRAC membership eligibility were purposively excluded from the analysis to reduce the selection bias. The purpose was to assess whether or not there had been any changes in their daily per adult equivalent calorie consumption eaten at home as a result of BRAC involvement.

The proportion of households consuming $<2,122$ and $<1,805$ kcal per adult equivalent per day in the BRAC eligible member households were significantly lower than that of the non-member eligible households ($p<0.05$). Similar trend was found when the effect of BRAC membership on the prevalence of low calorie intake was controlled for literacy and occupation of household head, household size and land holding, per capita monthly food and yearly non-food expenditure and location of village in relation to the embankment. Controlling for all these factors, an adult equivalent of a BRAC eligible member household had 33% less chance of consuming $<1,805$ kcal/day and 28% less chance of consuming $<2,122$ kcal per day compared to a non-member eligible household ($p<0.01$). From the above findings, it can be concluded that BRAC's development interventions had positive effect on household level calorie consumption of the programme participants. However, in-depth study should be done to examine the relative effects of BRAC's rural development interventions on individual level calorie consumption. Such individual level analysis is also important to isolate the effect of BRAC on reducing the gender gaps in calorie consumption.

Policy Implications

The study shows a positive effect of BRAC membership on household level average calorie consumption. However, per adult equivalent daily calorie consumption in the eligible BRAC member households is still lower compared to the requirement. Household level calorie consumption should be incorporated as one of the indicators to evaluate the achievements of BRAC-RDP to maximize its effect on nutritional status of the target population.

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