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

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ABSTRACT

This report describes the association between calorie consumption and socioeconomic status indicators and examines the effect of BRAC's Rural Development Programme (RDP) membership on per capita daily calorie consumption. The analysis was based on data collected from 2,061 households in Matlab thana during April-August, 1995 under BRAC-ICDDR,B joint research project. Socioeconomic and food consumption data were collected through home visits using pre-tested structured questionnaires. Total household calorie consumption per day was divided by household food consumption unit to obtain per capita daily calorie consumption. The results revealed that average per capita calorie consumption among the study population was 1,929 kcal (95% CI: 1,897-1,961 kcal) which is comparable to the national average of 1,943 kcal. Calorie consumption was significantly associated with household size and land holding; occupation and literacy of the household head; and monthly food and non-food expenditure ($p<0.05$). The proportions of households with per capita daily calorie consumption <1,805 kcal and <2,122 kcal were significantly lower among BRAC eligible member compared to eligible non-member households ($p<0.05$). Controlling for some potential confounding factors, BRAC eligible member households had 33% less chance to consume <1,805 kcal and 28% less to consume <2,122 kcal compared to the eligible non-member households ($p<0.01$). In conclusion, BRAC's RDP membership had positive effect on household level calorie consumption. However, the overall mean calorie consumption of both the BRAC member and eligible non-member households is still 83% of the recommended level.

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INTRODUCTION

Poverty and malnutrition persists at an alarming level in the developing counties 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). 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. The existing widespread rural poverty and the tendency of progressive increase in the absolute number of the poor has been recognized by many studies and policy makers (1-3). The socioeconomic environment characterizing the poor consists of lack of productive assets i.e. land, illiteracy, unemployment and low income. Given the socioeconomic condition of the poor, it becomes clear that the mechanism for poverty alleviation requires major efforts such as, credit based development activities for landless poor (4). To this end, BRAC has been implementing a series of development interventions aims at empower 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 enhances calorie consumption of the programme participants.

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 calorie consumption less than two different cut-off levels, i.e., <2122 and <1805 kcal per day per person (5). The third part looks at the effect of BRAC membership on calorie consumption.

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 (6). All households in the 14 villages who had consent to participate were included in the study. In Matlab, an embankment, Meghna-Dhonagoda embankment project, was

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constructed to protect the area from seasonal flooding which categorised the study population in relation to location of the villages inside or outside the embankment. Socioeconomic, anthropometric and household food stock data were collected by household visits using pre-tested structured questionnaires. Required data for the purpose of this report were taken from household food stock part of the survey. Respondents, in most instances the household heads and their spouses, were asked what different food items had entered the household during the preceding 7 days of the interview and how it went out, i.e., whether they were stocked, sold, gifted, stolen, and consumed. Only those food items which were consumed in the household were considered to calculate calorie consumption. The food items consumed were recorded in grams and converted into calorie based on the food composition table developed by Institute of Nutrition and Food Science (INFS), Dhaka University. Daily household calorie consumption was divided by household food consumption unit[1] to obtain per adult equivalent daily calorie consumption (7). Only BRAC eligible member and non-member households were analysed to measure the effect of BRAC membership on calorie consumption. 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 total study households, 1,130 were BRAC eligible and among the BRAC eligible households, 189 participated in BRAC's Rural Development Programme. Data analysis was done using SPSSWIN software package and both uni and multivariate analyses were performed.

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[1]How to calculate household consumption units
The consumption units of a household are an expression of its age and sex composition. They are calculated by adding together the consumption units for each household member.

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

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RESULTS

Level of calorie consumption

Mean calorie consumption among the study population was 1,997 kcal (95% CI: 2043-1851 kcal) per adult equivalent per day which corresponds to the national average of 1,943 kcal as found by the latest national nutrition survey done in 1981-1982 (8). Per day per capita calorie consumption among BRAC eligible member, BRAC eligible non-member and BRAC non-eligible non-member households were 2,014 kcal, 1,852 kcal and 2,153 kcal respectively.

Table 1. **Adequacy of calorie consumption of the study population**

Adequacy of calorie consumption	BRAC eligible households (%) (n=1,130)	BRAC non-eligible households (%) (n=931)	All (%) (N=2,061)
2310 + kcal	20.4	31.8	26.2
<2310 kcal	79.6	62.8	73.8

According to the government of Bangladesh, the recommended daily calorie intake per person is 2,310 kcal (9). Adequacy of calorie consumption is defined as daily per capita calorie consumption less than the recommended level. Table 1 indicates that only 25% of the total households met the required level of calorie intake. The situation of the BRAC eligible group was even worse as only 20% of the households met the requirement compared to 32% among the non-eligible group.

Socioeconomic status indicators and calorie consumption

This section examines the association between low calorie consumption defined by two cut-offs and some selected socioeconomic status indicators such as, family size, literacy[2] and occupation of the household head, monthly per capita food expenditure, yearly per capita non-food expenditure and household land holding size.

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[2]Those ho can read and write were categorised as literate.

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

Socioeconomic characteristics	n	Average daily calorie consumption <2,122 kcal (%)	Average daily calorie consumption <1,805 kcal (%)	Mean per capita calorie consumption (kcal) (mean ± sd)
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
p-value		*<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
p-value		*<0.001*	*<0.001*	*<0.001*
Occupation of household head				
Farming with land	377	58.9	35.5	2097±733
Trading/service	592	71.6	50.7	1883±632
labour	419	72.3	56.1	1841±649
House based work	312	59.3	37.5	2212±1141
Unemployed & disabled	158	60.1	41.8	2121±1119
p-value		*<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
p-value		*<0.001*	*<0.001*	*<0.001*
Yearly non-food expenditure (Tk)				
<4000	671	70.0	52.3	1917±847
4000-8000	513	68.8	48.7	1957±781
>8000	650	60.0	37.7	2094±825
p-value		*<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
p-value		*<0.001*	*<0.001*	*<0.001*

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Family size and calorie consumption

Family size was significantly associated with both 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 households with larger compared to smaller family size (p<0.001). The similar trend of relationship was observed for the mean values of calorie consumption and family size (p<0.001).

Literacy of the household head and calorie consumption

According to Table 2, the prevalence of low calorie consumption was significantly associated with literacy of the household head (p<0.001). The higher prevalence of low calorie consumption defined by both the cut-offs was observed among the households with illiterate compared to literate heads. Mean per adult equivalent daily 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 both the categories of low calorie consumption (p<0.001). The highest proportion of households with per capita 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 prevalence of calorie consumption <2,122 kcal. The mean per capita calorie consumption was lowest in labour and highest in house-based work households (p<0.001).

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In regards to monthly household food and yearly non-food expenditure, significant association were observed between both food and non-food expenditures and low calorie consumption (p<0.001). The proportion of households with low calorie consumption was found to be the highest among with a monthly food expenditure of less than Tk. 1,000 and a yearly non-food expenditure of less than Tk. 4,000. 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. 8,000 respectively. The mean per adult equivalent daily calorie consumption increased with both monthly food and yearly 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 so 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-offs of low calorie consumption (p<0.001). Households with higher land size had lower prevalence of per capita daily calorie consumption <1,805 and <2,122 kcal. Mean per capita per day calorie consumption increased with household land size (p<0.001) (Table 2).

BRAC's rural development interventions and calorie consumption

The prevalence of per capita daily calorie consumption <2,122 and <1,805 kcal was examined in both BRAC eligible member (TG member) and eligible non-member households (TG non-member). BRAC eligible member households had significantly lower prevalence of both the categories of low calorie consumption compared to the eligible non-member households (p<0.01) as shown in Figure 1. Prevalence of per capita daily calorie consumption <1,805 kcal was 45% in BRAC eligible member households compared to 56% in non-member eligible households.

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Similarly, prevalence of per capita daily calorie consumption <2,2122 kcal was lower in BRAC eligible member (68%) compared to non-member (74%) households.

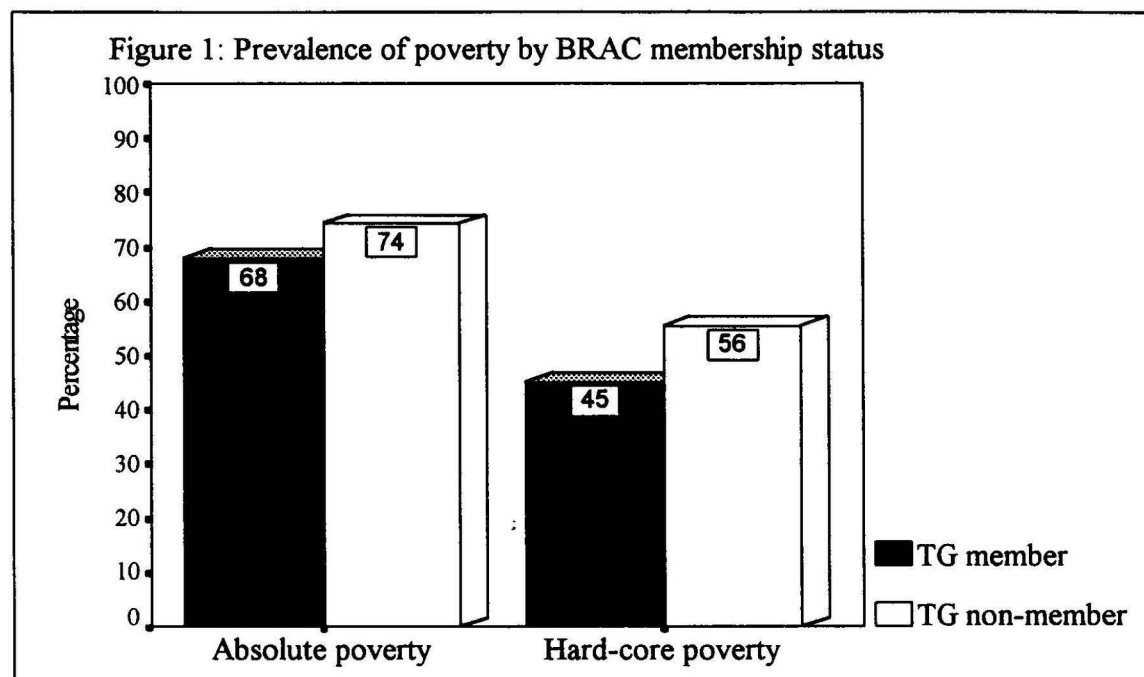Figure 1: Prevalence of poverty by BRAC membership status

Table 3 illustrates the results of a multivariate analysis to show the effect of BRAC membership on both the categories of low calorie consumption. In the models, the effect of BRAC membership on per capita daily calorie consumption <1,805 and <2,122 kcal were controlled for some socioeconomic status indicators which were found significantly associated with both the cut-off of calorie consumption, such as, literacy of the household head, household size, per capita monthly food and yearly non-food expenditure, household land holding and location of village with respect to embankment. 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 belonged to a eligible non-member household (p<0.01). Sex and occupation of the household head were excluded from the model as it had no significant association with both the categories of low calorie consumption (p>0.10).

Table 3. Effect of BRAC membership on calorie consumption.

Indicator	n	<1,805 kcal/Capt./day		<2,122 kcal/Capt./day	
		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

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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 capita daily 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 for households with more than six members was the highest 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 leaded to a higher consumption demand, particularly when income was fixed. Thus, an increase in family size depressed the real consumption level and eventually raised the 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 25%. There is also inequality in opportunity for education between rural and urban areas. Literacy rate in rural areas (21%) was only half to that of urban areas (41%) (14). The largest differentiation among various economic groups seems to exist with respect to the level of education. The participation profile of education indicated 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 for their economic reasons. Even when poor children attended schools, they dropped out and engaged 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 (12). According to this study, a significant association existed

between literacy and low calorie consumption. It is to be observed that without adequate development of human capital potential, poor people are limited to employment 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 productive asset, i.e. 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 are engaged in the labour category. Available information indicated that the rural labour force remained unemployed or underemployed throughout the year. 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 (10). During the slack seasons, surplus rural labourers 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 occupation categories. The prevalence of low calorie consumption was much more common among the labor households and those engaged in low income pursuits of trade and services. The lowest prevalence of per capita daily calorie consumption <1,805 kcal was, however, observed among the households engaged in farming. Seasonal variation in employment of agricultural labourers coupled with low wage rate were the main causes of the highest prevalence of low calorie consumption among the labour households.

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According to World Bank estimates, the real wage rate of agricultural labourers 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 2,122 kcal prescribed by FAO/WHO for the rural population (13).

BRAC has been implementing a series of credit and development intervention along with non-formal education and essential health care. It is 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 Prokolpo, nearly half of female members reported to having no productive occupation prior to joining 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 (15). In the present study, comparison has been made between two groups of BRAC eligible population - one with interventions and the other without interventions. BRAC member households who somehow were included in the programme but did not fulfill the criteria of BRAC membership eligibility were purposively excluded from the analysis. The purpose was to assess whether or not there had been any changes in their daily per adult equivalent calorie consumption because of BRAC involvement.

The proportion consumed <2,122 and <1,805 kcal in the BRAC eligible member households were significantly ($p<0.05$) lower than that of the non-member eligible households. Similar trend was found when the effect of BRAC membership on the reduction of the prevalence of low calorie intake was controlled for some potential socioeconomic status indicators such as 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 the potential confounders, BRAC eligible member households had 33% less chance to consume <1,805 kcal and 28% less chance to consume <2,122 kcal compared to the non-member

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eligible households (p<0.01). From the above findings, it can be concluded that BRAC's development interventions has improved the level of calorie consumption of the programme participants. member group was better off in terms calorie consumption compared to the non-member group. However, further in-depth analysis should be done to explore the relative effects of BRAC's different rural development interventions on calorie consumption at individual level. Individual level analysis is also important to isolate the effect of BRAC on reducing the gender gaps in calorie consumption.

Policy Implications

BRAC membership seems to have positive effect on calorie consumption at the household level. However, per capita daily calorie consumption in the eligible BRAC member households is still lower than the requirement or the national average. Continuous efforts should be made to include higher number of nutritionally vulnerable or poorer households in the BRAC's development intervention to reduce their current level of poverty and, therefore, enhance their calorie consumption to the recommended level of 2310 kcal per capita per day.

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