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Food supplementation, nutritional intake of recipients and operational aspects: an integrated pilot nutrition initiative of BRAC

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Abstract

Objectives: To explore the nutritional quality of supplementary foods and additional energy consumption by the recipients in a pilot nutrition initiative of BRAC.
Design: In-depth interviews, observations during feeding at feeding centres, and laboratory analyses of supplementary foods for nutrient contents performed at the Institute of Nutrition and Food Science, University of Dhaka, Bangladesh.
Setting: Muktagacha thana (sub-district) in Mymensingh district, a rural area of Bangladesh.
Subjects: Pregnant and lactating mothers and children below 2 years of age.
Results: Analysis revealed that supplementary food, if taken completely, could provide daily energy equivalent to 752 kcal to a mother and 212 kcal to a child below 2 years of age. Mothers consumed about 75% of the food provided ($\sim$564 kcal day^{-1}). The food was shared mostly with young children and husbands. In-depth interview with mothers also suggested that they usually skipped breakfast if the food was given in the morning. The children liked the taste of food, and unless the child was sick or had some food before coming to the centre, she/he ate all the food provided. Although the main purpose of the project was to provide nutrition education, it was observed that activities at feeding centres were limited to food distribution with little time devoted to the communication of nutritional messages.
Conclusions: Training should be given to service providers to communicate nutritional messages effectively as part of understanding the goal of the initiative. It is important to explore whether the regular diets of the recipients are replaced by the food supplementation or not.

Keywords
Food supplementation
Energy intake
Pregnant and lactating mothers
Children

Malnutrition as measured by poor anthropometric growth continues to be a public health problem in low-income countries, including Bangladesh[1]. The root causes of malnutrition are poverty and its associated problems of inadequate dietary intake, high burden of infectious diseases and illiteracy. Integrated nutrition programmes, such as nutrition education and supplementary feeding programmes, are widely used to prevent malnutrition among at-risk populations. Food supplementation implies the provision of additional food to the regular diet of a nutritionally deprived population to meet the gap between intake and requirements. Findings from East Java have shown that energy supplementation of women during the last trimester of pregnancy was effective in promoting postnatal growth and reducing malnutrition of pre-school children[2]. Such preventive effects of community-based supplementary feeding programmes have also been documented in other countries, like Guatemala[3–5], Vietnam[6] and South Africa (Northern Cape Province)[7]. In view of the widespread malnutrition situation in Bangladesh, BRAC (formerly Bangladesh Rural Advancement Committee) has since 1993 operated a Pilot Nutrition Initiative through its Women's Health and Development Programme in 158 villages in three areas of Muktagacha thana (sub-district), with the overall goal of improving the nutritional status of women, children and adolescent girls[8,9]. Food supplementation is one of the basic components of this initiative, which also includes other health and poverty alleviation programmes of BRAC. The initiative uses the distribution of supplementary food as a vehicle to communicate nutritional massages to the targeted individuals and communities.

Information on the nutritional impact of such a community-based initiative in Bangladesh has not been well documented. The Research and Evaluation Division of BRAC has planned and is conducting prospective studies in Muktagacha to assess both short-term and long-term impacts of the Pilot Nutrition Initiative on the nutritional status of the target population[10]. Besides assessing nutritional impact, it

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was considered important to evaluate the operational aspect of the initiative. The purpose of the present study was to assess how effectively the programme is operating in terms of supplementary food preparation and distribution and providing nutrition education, and to evaluate the nutritional content, acceptance and consumption of the supplementary food.

Methods and materials

Study area, supplementary food preparation and distribution to the targeted population

The pilot project of food supplementation was implemented in three areas of Muktagacha thana (sub-district) under Mymensingh district, i.e. Paratangi, Chechua and Gaptali. Mymensingh district is located about 110 km north-west of Dhaka, Bangladesh. In all these areas, three major programmes of BRAC – a poverty alleviation programme called the BRAC Development Programme (BDP), Non-Formal Primary Education (NFPE), and the Reproductive Health and Disease Control programme – had already been implemented for the targeted households. BRAC targets households owning less than 0.50 acre of land including homestead in which the main income earner sells manual labour for at least 100 days annually for a living. Three groups of the population were targeted for the food supplementation project: pregnant and lactating mothers, adolescent girls (age 11–18 years) and children below 2 years of age. In one area all primiparous mothers were provided with food supplementation. In the other two areas, food supplementation was provided to pregnant and lactating mothers who had body mass index $< 18.5\ kg\ m^{-2}$ as measured during regular monthly visits to the BRAC Antenatal Care Centre. All of the adolescent girls who were enrolled in BRAC NFPE schools were receiving food supplementation within that programme. Children below 2 years old who did not show a gain of 300 g between four successive weighing sessions and children who had low birth weight (< 2500 g) were directly enrolled in the programme from the age of 6 months.

Members of the *Gram committee* (GC) are primarily responsible for the purchase, preparation and distribution of supplementary foods to the beneficiaries, under close supervision of *Shastho Karmis* (SKs). A GC is a village committee consisting of nine to 11 female members selected from members of the BRAC Village Organisation on the basis of those who are interested in working voluntarily for the village. A total of 158 GCs in 158 villages were organised to assist the food supplementation project. SKs are village-based married woman with around 8 years of schooling. They are full-time paid health workers of BRAC, assigned to look into the health and nutrition needs of the community. Besides assisting implementation of the food supplementation programme, SKs register new pregnancies, births and deaths, and impart health and nutritional education to the community.

The process of food preparation for the target mothers involves: roasting flat rice and peanuts, then boiling molasses with a little water and mixing the roasted rice and nuts with boiled molasses. This mixture is prepared into small balls called *moa*, which are then sealed into a plastic packet containing four pieces. The GC members supply one packet of *moa* every morning, six days a week, through household visit to the mothers. In the case that the mother is absent from home during food distribution, it is given to an elderly family member of the same household.

The food preparation for the target children includes: roasting rice and pulses, and then crushing them manually into a powder. Afterwards, the ingredients are sealed into plastic packets. Each packet contains rice and pulse powder and a small piece of molasses separately. The target children receive supplementary food each morning, seven days a week, at the feeding centres (FCs) where mothers bring their children daily. The FCs are located in the community, one per centre/village, and are provided either by the community or the GC members. The GC members distribute the food to the children with close supervision of the SKs. Mothers mix the ingredients in a small bowl provided at the centre with a little water and one spoon of soybean oil and feed the children.

In the preparation of each packet with both types of food, measurements are taken (see Table 1 for the different ingredients and amounts for each type of food). The ingredients are locally available throughout the year and the GC members purchase these from the local grocery shops, which are arranged by BRAC. BRAC has selected one grocery shop per area from which GC members can purchase the ingredients at a reasonable and stable price. At the end of each week, the responsible GC members are paid by BRAC – Tk 6.00 per packet of *moa* prepared for the mothers and Tk 2.50 per packet of weaning food prepared for children.

Nutritional content and consumption of the supplementary food and delivery of nutrition education

The nutritional content of the supplementary food was analysed at the Institute of Nutrition and Food

Table 1 Amount of ingredients used in preparing foods for the mothers and children

	Ingredient	Amount per packet (g)
Mother	Roasted peanuts	50
	Roasted flat rice	50
	Molasses	75
	Total amount	175
Children	Roasted rice powder	25
	Roasted pulse powder	10
	Molasses	10
	One teaspoon of soybean oil	5
	Total amount	50

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Science, University of Dhaka, Bangladesh. Four packets, i.e. two of the mothers' and two of the children's food packets, were randomly selected from each area for analysis. Thus, a total of 12 packets of supplementary food were analysed. Supplementary food for adolescents was not analysed, because food supplementation for the adolescents had been temporarily postponed at the time this study was being conducted. Therefore, the present study reports aspects related to mothers' and children's food supplementation only.

In-depth interviews and field observations were conducted to collect information on food consumption and delivery of nutrition education. In-depth interviews were conducted with 15 pregnant or lactating mothers from each area or their elderly family members if the mother was absent. A total of 45 subjects were interviewed from the three project areas. The SKs keep list of all mothers who are currently fed by the programme and subjects for the in-depth interview were randomly selected from the list. During household visits, the subjects were interviewed with an open-ended questionnaire which queried: how often they were receiving food supplementation per week, how many *moa* they consumed per day, if they liked the food, if they replaced their regular meal with this supplementary food or not, and their overall perception of the project (e.g. if they knew about the purpose of the project, why they were enrolled but not other women, etc.). Regarding supplementary feedings for the children, a total of six FCs and six food preparation places were observed (two FCs from each area).

Results

Nutritional content of the supplementary foods

Table 2 presents the average nutrient content per pack of food prepared for mothers and children. On average, the programme provides each mother with 752 kcal energy, 16.4 g protein, 12.4 mg iron, 79.0 mg calcium and 5.2 mg zinc per day. The additional daily supply of energy, protein and iron is about 33%, 31% and 42% of the recommended daily allowance (RDA)[11] for pregnant mothers, and 29%, 23%, and 44%, respectively, for lactating mothers. Each child is provided with 212 kcal energy, 3.6 g protein, 9.0 mg iron, 44.1 mg calcium and 2.5 mg zinc per day. The supply of energy, protein and iron to each child is about 15%, 11% and 85% of their RDA.

There were very few differences between project areas in terms of the nutrient content of both types of foods. The amounts of iron and calcium were found to be a little lower in the food collected from Paratangi, but the differences were not significant.

Table 2 Average nutrient content of supplementary foods per packet for pregnant and lactating mothers and children below 2 years of age

Amount per package	Energy (kcal)	Protein (g)	Fat (g)	Iron (mg)	Calcium (mg)	Zinc (mg)	Fibre (g)	Carbohydrate (g)	Moisture (g)	Ash (g)	Copper (mg)
Mothers											
Moa: 175 g	752 ± 13	16.4 ± 0.6	22.0 ± 1.2	12.4 ± 1.6	79.0 ± 3.1	5.2 ± 0.5	1.10 ± 0.0	122.1 ± 3.0	9.7 ± 1.4	3.7 ± 0.3	0.7 ± 0.0
Children											
Package*: 45 g	167 ± 9	3.63 ± 0.9	0.9 ± 0.1	9.0 ± 1.1	44.1 ± 1.9	2.50 ± 0.2	0.29 ± 0.0	36.12 ± 1.0	2.9 ± 0.2	1.09 ± 0.1	0.3 ± 0.0
Oil: 5 g (1 teaspoon)	45		5.0								
Total	212 ± 9	3.63 ± 0.9	5.9 ± 0.1	9.0 ± 1.1	44.1 ± 1.9	2.50 ± 0.2	0.29 ± 0.0	36.12 ± 1.0	2.9 ± 0.2	1.09 ± 0.1	0.30 ± 0.0

Values are mean ± standard deviation. Average amounts were taken from the 12 samples of foods from three study areas.
* Package includes molasses, rice and pulse powder.

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Energy and nutrient consumption by pregnant and lactating mothers and children, and delivery of nutrition education

In-depth interviews with mothers or their elderly family members suggested that three *moas* (out of four) were consumed daily by each mother in all three areas, on average (i.e. 75% of the total energy that was provided by the programme). Thus, additional energy consumption was $\sim 564\,\text{kcal}\,\text{day}^{-1}$ or 22–24% of their RDA. Based on observation, about five to 10 children were being fed by the programme per centre, and the attendance of children was found to be 98%. Children who were sick (e.g. diarrhoea, cold or fever) or had eaten just prior to coming to the centre consumed 15–20% of the supplementary food ($30–40\,\text{kcal}\,\text{day}^{-1}$). The remaining children consumed all of the food, giving $212\,\text{kcal}\,\text{day}^{-1}$ or 15% of their RDA. Field observation also suggested that nutrition education was not being delivered as planned by the programme.

Discussion

The Muktagacha Pilot Nutrition Initiative of BRAC provides food supplementation to nutritionally vulnerable groups as part of a complete development package that includes credit, education and health services. The supplementary food distributed by BRAC could provide energy equivalent to 752 kcal to the mother and 212 kcal to the children. On average, mothers consumed about 75% of the food, which is $\sim 564\,\text{kcal}\,\text{day}^{-1}$ (22–24% of RDA). Findings also showed that the amount of supplementary food consumed daily by the mothers depended largely on household size and the presence of young children within the household. In areas where only primiparous mothers were the recipients, daily consumption of food was higher (more than three *moas*). Consumption of food was found to be lower (less than three *moas* per day) among women with large family size (more than five family members), and particularly those with more than three young children. It was common that the food was shared mostly with young children and partially with husbands and other household members. The food was preferred by all because of the good taste, and was highly accepted by the community. However, some men in the community denied taking such food because of the campaign that the food was meant to improve a pregnant woman's health, and thus it was not fair for a man to eat it. The good taste of the food created some demand, especially among the children in the community. Study households that were very poor restricted the mother to prepare the *moa* whenever the children demanded. As a result, the mother had to share the food whenever someone (a child in most cases) demanded a part of it. In one instance, it was found that the wife shared the supplementary food with her husband because there was not enough food for him to eat during breakfast. In-depth interviews with the supplemented mothers also suggested that they usually skipped breakfast if the *moa* was supplied in the morning. Some of the mothers, because of their poor economic status, considered *moa* complementary to regular morning meals. However, there is no doubt that the poor mothers were receiving some extra and nutritious food every day through this programme. Besides additional energy and protein, it is important to note that the supplementary food provided substantial amounts of important micronutrients such as iron, calcium and zinc (see Table 2). This result suggests that the programme could contribute to reduce not only energy and protein deficiencies but also other micronutrient deficiencies among these populations, which still remain widespread in Bangladesh, particularly iron deficiency. However, iron from plant sources (as provided by the programme) is not an effective way to reduce iron deficiency because of its poor bioavailability; rather an increase in animal-source foods in the diet is recommended[12,13]. Like in other developing countries, in Bangladesh poor people's diets are predominantly plant-based and lack animal-source foods due to poverty. However, the BRAC is quite unique for its multisectoral design. Results from a previous study have shown that, through its poverty alleviation programmes, BRAC has increased animal food consumption among targeted groups compared with comparison groups[14].

The children liked the taste of the supplementary food. Unless the child was sick or took some food right before coming to the FC, they could finish the food completely at the FC. Sick children consumed 15–20% of the food, with the mothers taking the leftovers back home to feed the same children. In some cases, the mothers showed a tendency to take the food home without the child finishing it at the centre, making the excuse that the child was sick or not hungry. The SKs allowed them to take the food home in most instances. Based on observation, the possible reason seemed to be the uncomfortable environment of the FCs. The FCs provided by GC members were dark, small and not as clean as other FCs provided by the community, which had open space. Two of those FCs were very small and the mothers could hardly sit side-by-side comfortably, making it difficult to move if the children cried. Because of this uncomfortable environment, the SKs and GC members tended to distribute the food to the children. Not much attention was paid to whether the food was consumed completely or not. Besides, for mothers who took food home, it was difficult to ensure that the food was given to the target children.

Hygiene practice, especially during food preparation and distribution at the FCs, needs to be looked at by the programme implementers at field level. Proper hygiene not only depends on the availability of facilities such as soap and water, but also largely depends on behaviour in relation to practice. The mothers were found to wash

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hands and feeding pots in the same bowl of water, without using any detergents, in the presence of the SKs or GC members. The importance of changing the water or using detergents was not felt by any of the groups concerned. Apart from this, in all the centres, the GC members kept one glass of drinking water and one spoon. The mothers used the same spoon or the same glass for all the children to drink from. The majority of the children had a running nose, which, in addition to creating an unhygienic environment, might have adverse effects on their health.

Although the purpose of this project was to use the supplementary food as a vehicle for educating the community regarding health and nutrition, it was found that activities in the FCs were limited to food distribution, and there was very little or no communication between the service providers and the beneficiaries regarding nutrition or hygiene.

It is worth mentioning that there was a change to better food habits among the community people in general, irrespective of socio-economic status. The traditional weaning food practice was to give only fried rice powder, mixed with a little water and sugar, but now they have learned to give a spoon of soybean oil and, more importantly, pulse powder in the mixture. This pulse is always available at reasonable price. According to some community people, they tried to feed children more supplements when they got sick. In addition, *moa* was a traditional and popular snack before, which they used to prepare with only puffed rice and molasses, but now they have learned to add peanuts. Based on our field experience, the community tends to believe that these two types of foods are good for health. This reflects that the project has contributed to better food habits in the community without introducing completely new food items. However, the validity of the methodology can be questioned since small samples were used to obtain the information on consumption pattern, taste and acceptability issues of the food supplements. We believe that there would not be any substantial differences in the results if we had taken a bigger sample. There are several reasons why there should not be any difference; for example, the sample is taken from the villages of one sub-district only and these villages are very close to one another. This means that the population studied is very homogeneous in terms of food habits. In addition, as mentioned above, the types of food BRAC chose for the supplementation programme were not new food items. Rather, the food items have been traditional foods and also very popular snacks around these villages. The only new things that BRAC added were other nutritious items in their familiar food (such as nuts, lentils, oil, etc.).

Conclusions

The programme was found to be working well in the study areas in terms of the acceptance and consumption of the supplementary food, as well as the availability of ingredients at reasonable and stable price. However, there are other aspects of the programme which need to be taken into further consideration with great emphasis. These are:

1. Arrangements should be made to provide better FCs with enough space and light.
2. Emphasis should be given to enhanced communication between the service providers and the beneficiaries at the FCs and at the mother's house, to impart nutrition messages. The SKs and GC members should be oriented that the goal of the programme is not only to provide the supplements but also to communicate nutrition messages to the community.
3. In future research, it is important to explore whether the regular diets of the recipients are replaced by the food supplementation or not.

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