EVALUATION OF THE WFP ASSISTED WHEAT-SOYA BLENDED (WSB) FOOD SUPPLEMENTATION ON NUTRITIONAL STATUS

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Executive summary

Wheat soya blended (WSB) food was distributed among 74,000 'poorest of the poor' households in 5 highly flood-affected districts in Bangladesh under an agreement signed in May 1999 between BRAC and World Food Programme. Each selected household received 10 kg WSB per month, and only under-5 children and pregnant/lactating mothers were entitled to consume the food for a period of five months.

The objective of the study was to evaluate the impact of WSB supplementation programme with special emphasis on nutritional status of under-5 children. Other aspects of the programme such as efficacy of targeting, quality of the WSB food distributed, acceptability and consumption of WSB food were also evaluated.

The study followed a pre-post design with a comparison group. Kamarkhond *thana* (sub-district) in Sirajganj district was selected as the intervention area (n=760 under-5 children), while Dhunot *thana* in Bogra district was selected as the comparison area (n=764 under-5 children). Data were collected at baseline and after 5 months intervention in both the areas. In addition, monthly data were also collected on some selected indicators. The Salter scale was used to collect weight data to nearest 100 g and TALC MUAC tape was used to collect mid-upper-arm circumference (MUAC) to nearest 1 mm. Age of children was recalled by mothers with the help of a local calendar of events specifically developed for this study. Gomez classification was used to define severity of malnutrition and underweight was defined according to criterion set by WHO (weight-for-age <80% NCHS median). Severe malnutrition was defined as MUAC <125 mm.

The results indicate that selection of the households according to the set socio-economic criteria was quite accurate. All the selected households belonged to the poorest of the poor as indicated by household landholding, occupation of household head, sanitation and literacy. As high as 98% of the selected households did not have BRAC RDP membership. The quality of WSB food at the point of distribution was not acceptable since 85% of the children received the food infested with insects during first month.

Although the situation improved over time, 64% of the children received WSB food either infested (11%) or damp/clustered (53%) during the last round of the distribution. Most women (88%) could prepare the WSB as per instruction given prior to distribution by BRAC staff. On average, 1.5 children shared WSB food per households. Consumption of WSB food by pregnant/lactating mothers was at minimum level. About 98% of the children liked the taste of WSB food. Median consumption of WSB in 24 hours was 300 g per child during the first month, which went down to 200 g during second and third month, and finally to 100 g during the last month. The reason for such downward trend of WSB food consumption was probably sharing of the food by other family members, which often remained unreported. The 5-month WSB food supplementation showed a significant impact on reducing the prevalence of malnutrition. The intervention was also found effective in treating underweight as well as severe malnutrition. The reduction of the prevalence of underweight was 9% in supplemented children compared to 6% in non-supplemented children (p=0.00). In regression analysis, the intervention showed significant effect on increasing mean MUAC (p=0.00) and mean weight-for-age (p=0.03) after controlling for important confounding factors, such as sex and age of the children, total duration of diarrhoea in days during the five months supplementation period and nutritional status at baseline. A subset of children was analysed to study the effectiveness of the intervention in treating underweight and severe malnutrition. Children who were found underweight and severely malnourished at baseline were included. A significantly higher reduction of the prevalence of underweight was observed among children in the intervention area compared to the non-intervention area (68% vs. 76%; p=0.007). Similarly, the prevalence of severe malnutrition reduced to 28% from the baseline figure of 100% in the intervention area compared to its reduction to 43% in the non-intervention area (p=0.02).

Conclusion

- The programme successfully targeted/selected the 'poorest of the poor' households who had at least one young child. Households with BRAC membership were intentionally excluded as agreed upon with WFP.
- Although the nutritional quality of WSB food was not studied, the physical and biological quality of the food was not satisfactory at the distribution level. This may be partly attributed to the poor packaging and storage of the product.
- Mothers invented an appropriate technique to purify the spoiled WSB food, which included separation of the spoiled portion followed by sun drying. However, the nutritional and microbiological quality of such re-processed WSB food was not studied.
- Most mothers knew the proper preparation techniques of WSB food and the taste was highly acceptable to children.
- Sharing of WSB food by an adult family member including pregnant and lactating mother was at minimum level.
- Distribution of WSB food among under-5 children in poor households had significant impact to increase nutritional status. The intervention was found very effective in treating moderate and severe underweight as well as severe malnutrition among them.

Recommendation

- More precaution should be taken in maintaining quality of WSB food during production, packaging and distribution.
- If possible the product may be produced in Bangladesh maintaining a strict quality control.
- Distribution of WSB food may be continued in Bangladesh to the targeted households in flood and other natural disaster affected areas.
- It is not realistic to allocate WSB food only to under-5 children since an older sibling would naturally like to have a share. Inclusion of school-aged children may also be considered since they are also at risk of malnutrition.

- Cautions may be taken so that the children do not get used to only WSB food. Mothers should also encourage children to consume other food regularly eaten at home. This issue may be tackled carefully during the nutrition education session prior to WSB distribution.
- WSB food may be introduced at BRAC and other primary schools as a mid-day snack, which are mainly attended by poor students.
- Nutrition education should be strengthened to encourage mothers maintaining normal diet of the children and use the WSB food as a supplementary feeding. Preparation of low cost weaning food with locally available ingredients may be taught to the mothers.
- BRAC may consider including the poorest households in its Rural Development Programme who had been selected to receive WSB food.

Introduction

Like many other developing countries, malnutrition continues to be a major public health problem in Bangladesh. It reduces human potential as well as economic productivity. In Bangladesh, about 50% of the children reported to born with low birth weight (birth weight <2500 g) (ACC/SCN 2000) and more than 90% of the under-5 children suffer from some degrees of malnutrition, of which about 5% are being severely affected (Jahan & Hossain 1998). Thus, improving nutritional status particularly of children and women has been a major challenge of a number of national and international agencies working in Bangladesh including BRAC (BRAC 1999).

Causes of malnutrition are multiple, linking with one another forming a vicious cycle (ACC/SCN 2000). Among others, natural disasters including seasonal floods push thousands of rural poor households in acute food shortage and other crises every year, which further aggravate the malnutrition situation. Usually, young children and pregnant/lactating mothers are the worst sufferers of such crises due to their obvious physical vulnerability as well as a number of social norms and values.

Background

An agreement was signed between the World Food Programme (WFP) and BRAC in May 1999 to distribute a special preparation of blended food (known as Wheat Soya Blend or WSB) in some selected districts, which were highly affected by floods (Annex I). The districts included Kurigram, Sirajganj, Gaibandha, Madaripur and Shariatpur and the total population agreed to cover was 74,000. According to the agreement, BRAC received 3,449 Metric Tons of WSB food, which was distributed among the flood-affected "poorest of the poor" households, preferably women headed and were not involved in the BRAC Rural Development Programme (RDP) or other NGO activities.

The WSB food contained 65% wheat, 25% soybean and 10% sugar in powdered form. The nutritional value per 100 g of the dry product was 400 kcal, 14 g protein and 6 g fat.

The food (per 100 g) was also fortified with the daily requirements of vitamins and minerals as follows:

Vitamins	Content/100 g of WSB food
Vitamin A	1300 µg
Vitamin B1	0.1 mg
Vitamin B2	0.4 mg
Vitamin B12	1.0 mg
Vitamin C	30 mg
Niacin	5.0 mg
Folic Acid	5.0 mg
Minerals	
Calcium	100.0 mg
Zinc	5.0 mg
Ferrous fumerate	8.0 mg

BRAC was responsible for selection of the poor households. Children aged less than 5 years and pregnant and lactating mothers were eligible to have WSB food. Each target household expected to receive one packet of WSB food weighing 10 kg per month for 5 months. One woman from each selected household received orientation on preparation, storage and use of WSB food at the nearest BRAC/Union Parishad office before distribution. BRAC staff were responsible for orientation, which also included a session of nutrition and health education. It was emphasised during the orientation that only under-5 children and pregnant/lactating mothers could consume the food.

BRAC was responsible for the transportation and storage of the WSB food for distribution. However, field staff of WFP monitored the activities down at the BRAC area office level.

Objective of the study

The study aimed to evaluate the impact of WSB food supplementation on nutritional status of under-5 children in rural poor households as a post-flood emergency rehabilitation programme.

Specific objectives

- To evaluate the efficacy of targeting.
- To evaluate the quality of WSB food at distribution level.
- To evaluate the perception of the food recipients on quality, and usefulness of WSB food in improving nutritional status of their children.
- To evaluate the acceptability and consumption of WSB food by the children.
- To assess impact of WSB food on nutritional status of under-5 children.

Hypothesis

The distribution of WSB food is an effective emergency post-flood intervention to sustain and improve nutritional status of under-5 children among the "poorest of the poor" households in rural Bangladesh.

Methodology

Study design

This study followed a pre-post design with a comparison group. Data were collected at baseline and at the end of intervention in both intervention and comparison areas.

Study area

Kamarkhand *thana* of Sirajganj district was selected as the intervention area due to the availability of highest number of households receiving WSB food within a smaller geographic area. Dhunat *thana* in Bogra district, a neighbouring *thana* of Kamarkhand, but did not receive any intervention, was selected as the comparison area. Discussions were held with local BRAC workers as well as WFP field monitors to select the comparison *thana*. The idea was to select an area, which was similar to Kamarkhond in terms of level of disaster, i.e., flood and overall socioeconomic status.

Study population

Households who received WSB food and had at least one child aged 6-59 months in Kamarkhand *thana* comprised the intervention population. While households with at least one child of the same age group, did not receive WSB food and had similar socioeconomic status in Dhunat *thana* comprised the comparison population.

Sample size

PC-SIZE software package, version 1.02 (Dallal 1990) was used to calculate the sample size based on the following assumptions:

- Level of confidence = 95%
- Power of the sample size = 80%
- Pre-intervention prevalence of moderate and severe underweight = 54%
- Minimum expected reduction in underweight =10%

The minimum number of children required for each group was 288, assuming a simple random sampling. For cluster sampling the minimum number is 288 x 2 = 576 for each group. After giving a 30% allowance for likely dropouts, the final required sample size was 750 for each group. Thus, a total of 1500 children in two groups were required for the study.

Sampling procedure

A multistage cluster sampling strategy (Bennett 1991) was followed in the study area with 1003 households in 4 unions of Kamarkhand *thana* as primary sampling unit. Kamarkhand was one of the 35 *thanas* of 5 selected districts, where blended food was distributed.

For comparison, another *thana* (Dhunat of Bogra district) was selected which was similar to Kamarkhand in terms of being affected by flood and socioeconomic status.

Villages were considered as the secondary sampling units. Twenty-five villages from each of the two *thanas* were selected randomly.

Ultimate Sampling Unit (USU): For selecting ultimate sampling units (i.e., the study children), a list of all target households in each selected village was given to the interviewers. From this list, 30 children aged from 6-59 months were selected by a systematic random process. In case the required number of children were not available in the sampled villages, the interviewers moved to the closest one to get a total number of 30 children per cluster.

Method of data collection

Twelve male graduate interviewers were recruited. They were divided into 6 groups, 2 in each group. Interviewers were given both classroom and field training for 3 days. Questionnaire was prepared in Bangla and tested in the field before finalization.

Anthropometric measurements included MUAC (Mid-upper-arm circumference) and weight. MUAC-TALC tapes and Salter scales were used to measure MUAC and weight respectively. MUAC was measured to nearest 1 mm and weight to 100 g. Age was calculated based on mother's response. Mothers were assisted by local calendar of events prepared by the interviewers for this study.

Baseline information were collected in July 1999 before starting to distribute the WSB food. The same questionnaire was used to collect data after 5 months of supplementation in December 1999. Monthly data were also collected for some selected variables such as storage and quality of WSB food, WSB food feeding practices and morbidity.

Focus group discussions (**FGD**) were conducted with mothers, elderly family members and village leaders regarding their opinion and attitude towards WSB food at the end of the supplementation.

Major indicators

Good sanitation practice was defined as using a safe latrine as well as use of soap or ash to wash hands after defecation. Only tube well water used for both drinking and washing utensils was defined as safe water use. Each mother was asked about her opinion of last year's household economic status. A household was defined as deficit if the answer was always or occasional deficit. Both homestead and cultivable land expressed as decimals were combined to have a measure of household landholding. Weight and age data were expressed as percentages of National Centre for Health Statistics (NCHS) median weight-for-age and Gomez classification was used to define the severity of malnutrition. Underweight was defined according to WHO. MUAC less than 125 mm was considered as an indication of severe malnutrition.

Sub-sets of the children who were underweight and severely malnourished at baseline were analysed to assess the effectiveness of WSB food supplementation on treating malnutrition.

Quality control

A three-day training was arranged for all the interviewers. In addition to classroom, practical training was also given at field. Emphasis was given on the MUAC and weight measurements, recall of child's age, amount of WSB food consumed and general interview techniques. A full-time field supervisor with more than 11 years experience in nutrition data collection stayed with the interviewers at the field location. The supervisor re-interviewed/measured 10% of the questionnaires and shared the experiences with the interviewers at field office. All questionnaires were examined for errors and inconsistencies by the supervisor and crosschecked by the interviewers.

Data analysis

Data were entered, cleaned and analysed using SPSSWIN, version 7.5.1. Student *t*-test was used to test difference between two independent groups. Mann-Whitney U test was used in case the variables had skewed distribution (age of weaning, landholding). Chi-

square test was used to study the association between two categorical variables. Multiple linear regression analysis was done to study the effect of intervention on nutritional status.

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Finding and discussion

Efficacy of targeting

Baseline characteristics of the children and their households are given in Table 1. Inclusion of male children was higher than female in the intervention group. On average, the sampled children aged little less than 3 years. Median age of weaning and mean family size and mothers' age were higher in intervention group. Illiteracy was extremely high in both the groups. Sanitation practice was better in non-intervention group, while safe water use for drinking and washing was better in intervention group. All selected households were extremely poor as indicated by perceived economic status and household landholding. On average each household had only 3 decimals of land in both the groups. Inclusion of BRAC member households was very low in the intervention group (2%), but somewhat higher in the non-intervention group (16%).

Table 1. Baseline characteristics of the children and their households by area

Characteristics	Area		p-value
	Intervention (n=760)	Non-intervention (n=764)	
Sex (%)			
Male	56	51	
Female	44	49	0.03[2]
Age (m)[1]	34±18	33±17	0.29[3]
Age of weaning (m)[4]	5.0	3.0	0.00[5]
Point prevalence of diarrhoea (%)	26	27	0.31[2]
Family size[1]	4.7±1.6	4.2±1.2	0.00[3]
Mother's age (y)[1]	28±5	26±5	0.00[3]
Illiterate mothers (%)	89	91	0.35[2]
Illiterate fathers (%)	84	88	0.07[2]
Good sanitation practice (%)	12	19	0.00[2]
Used safe water for all purpose (%)	97	89	0.00
Economically deficit (%)	81	85	0.05[2]
Household landholding (decimal)[4]	3.0	3.0	0.55[5]
Without NGO membership (%)	98	84	0.00[3]

[1] *Mean±SD*
[2] *Chi-square test*
[3] *t-test*
[4] *Median*
[5] *Mann-Whitney test*

Quality of WSB food

The quality of WSB food as reported by the women was not acceptable during the first round of distribution (Table 2). However, it showed an improving trend over time.

To check the validity of the information given by the women with respect to food quality, spot checks were done at one of the BRAC area offices and discussions were held with the concerned staff. During the visit, a number of bags containing WSB food were found infested with insects and even more were found with poor quality, i.e., damp and clustered, loosing normal sweet taste. Many women complained about the delivery of poor quality WSB food and expressed their concern about children's health when the discussions were made during FGDs at the end of the intervention. One mother receiving poor quality WSB food complained, *"Despite having no other option, we should not feed our children with food having insects in it."* However, it was revealed from the discussion that no mother threw the food away due to poor quality. Rather, they developed some techniques, such as, removing the insects and clustered portion and sun drying to make the food *edible (?)*. However, nutritional as well as biological quality of such re-processed food need further investigation.

Table 2. Reported quality of WSB food as received from BRAC office by month (n=760)

Quality	Month (%)			
	1st	2nd	3rd	4th
Acceptable	13	88	65	36
Damp and clustered	2	4	20	53
With growth of insects	85	7	15	11

Women were instructed on how to cook WSB food for consumption and other aspects of maintaining its safety during the orientation sessions prior to distribution. Majority of them were reported to follow the correct technique of preparing the WSB food, i.e., mix ~~two~~ shares of WSB food in one share of boiled and hot tubewell water forming a paste like substance (Table 3). The preparation practice was defined as partially correct if WSB food was mixed with pure but not hot water in right proportion.

Table 3. Reportedly practice of preparation of WSB food at home

Preparation practices	% (n=760)
Correct	72
Partially correct	16
Not correct	12

Consumption

About three-fourth of the children did not consume WSB food everyday throughout the intervention (Table 4). As revealed from the FGDs, many mothers sometimes hesitated to feed WSB food to children because of its low quality, which they thought might cause loose motion or other gastrointestinal problems. However, many mothers had to continue the feeding since they did not have any alternative due to poverty and, moreover the children liked the taste of WSB food. As revealed from FDGs, many mothers did not have to worry about feeding the children due to the availability of WSB food at home because they went through severe economic crisis right after the flood.

Table 4. Proportion of children consumed WSB everyday

Consumed everyday	% (n=760)
Yes	27
No	73

In more than half of the instances, only one child per household consumed WSB (Table 5). On average 1.5 children shared the WSB food per household.

Table 5. Number of under-5 children shared WSB food everyday in the same household

Number of children	% (n=760)
1	54
2	42
3+	4

Mean±SD, 1.5±0.6 per 24 hours per household

Children liked the taste of WSB food much as indicated in Table 6. About 98% of the children seemed to like the taste to some extent. This finding tallies well to the discussions during the FGDs. The children kept on asking for the food even after

completion of the 5-month intervention. Some mothers reported, *"Children still look for the pot where the WSB food was stored and often cry to have it again."* Some mothers reported that they had to prepare a similar mixture with roasted rice and lentil to satisfy their children's demand after withdrawal of the programme.

Table 6. Children's acceptability of WSB food as reported by mothers

Level of acceptability	% (n=760)
Very high	49
High	45
Moderate	4
Low	2

Mean days of WSB food consumption went down by month of distribution (Table 7). The mean frequency of WSB food consumption went down from 24 days in the first month to 19 days in the fifth month by each child. The reason of such downward trend was that a sizable portion of WSB food had to be thrown away in the process of purification, such as sun drying and so on, to make the product consumable (FGD finding).

Table 7. Mean frequency (in days) of WSB food consumption by the children (n=760)

Month	Days (mean+SD)
First	24±5
Second	24±5
Third	23±6
Fourth	22±8
Fifth	19±11

Frequency of WSB food consumption in 48 hours did not show any clear trend (Table 8). On average, each child consumed 300 g WSB food in the first month, 200 g in the second and third months and 100 g in the fourth month. One of the reasons for decreasing consumption per capita, as understood during FGDs, was that older children at the same

household started to get some share as they also realised the good/sweet taste of the product.

Table 8. Frequency of WSB food consumption by the children in 48 hours by month

Frequency	Month (%)			
	1st	2nd	3rd	4th
0	29	19	28	49
1-2	9	2	3	6
3-4	39	11	12	11
5+	23	68	57	34
Median[1]	300	200	200	100

[1] *Consumption in g per child in 24 hours*

Most mothers thought that WSB food was somewhat beneficial for the child's health. Only 2% thought that WSB food was not that beneficial (Table 9). However, during FGDs, many mothers expressed their concern about the negative health consequences of WSB food especially when it was infested with insects.

Table 9. Mothers' perception on the benefits of WSB food on children's health

Level of health benefits	% (n=760)
Highly beneficial	17
Moderately beneficial	74
Beneficial	7
Not beneficial	2

Nutritional status

At baseline, nutritional status was significantly better among children in the intervention group (Table 10). Although improvement in mean weight-for-age was somewhat higher in intervention group, no significant impact of the intervention was observed when Gomez classification was used to define malnutrition. The intervention, however, showed significant impact in reducing the prevalence of underweight compared to the baseline as well as non-intervention group. The prevalence of underweight reduced by 9% in the

intervention group as opposed to 6% in non-intervention group ($p<0.00$). The reduction observed in the non-intervention group may be partly accounted for the seasonal fluctuation in malnutrition. Similarly, a significant improvement was also observed in the improvement of mean MUAC among children in the intervention group compared to the baseline and non-intervention group, which is an indicator of increasing lean cell and body fat mass (Table 10).

Table 10. Baseline nutritional status and changes after 5-month supplementation

Nutritional status	Area		*p*-value
	Intervention (n=760)	Non-interv. (n=764)	
Weight-for-age[1]			
Mean±SD	79.2±12.8	75.8±11.1	0.00[2]
Δ	+1.7	+0.7	0.23[2]
Severe (<60% NCHS median)[3]	6.2	6.5	0.47[4]
Δ[3]	-0.7	-0.8	0.95[4]
Moderate (60-74% NCHS median)[3]	30.8	40.4	0.00[4]
Δ[3]	-0.3	+0.5	0.24[4]
Mild (75-89% NCHS median)[3]	45.3	44.6	0.80[4]
Δ[3]	-3.1	-1.9	0.22[4]
Under-weight (<80% NCHS median)[3]	53.6	65.6	0.00[4]
Δ[3]	-9.1	-6.0	0.00[4]
MUAC (mm)			
Mean±SD	139±13	137±11	0.00[2]
Δ	+3.0	+0.8	0.00[2]

[1] *Percent of NCHS median*
[2] *t-test;* [3] *%;* [4] *Chi-square test*

The effect of the intervention on improving MUAC after controlling for important confounding factors was studied by regression analysis. Mean MUAC, collected at the end of 5-month supplementation, was modeled against functions of presence of intervention, sex and age of children, total duration of diarrhoea in days and MUAC at baseline (Table 11). The regression analysis shows that the intervention had significant effects in increasing MUAC of the under-5 children after 5 months. The effect was also controlled for household socioeconomic status. A similar analysis was carried-out to study the effect of the intervention on mean weight-for-age. As shown in the case of

MUAC, the WSB food intervention had a significant effect in increasing mean weight-for-age of the under-5 children (Table 12).

Table 11. Regression analyses showing the effect of WSB food supplementation on mean MUAC after 5 months intervention (n=760)

Predictors	Beta coefficient	*p*-value
Dependent variable: MUAC (mm); R square: 0.47		
Intervention (1=Yes; 2=No)	-0.11	0.00
Sex of children (1=Male; 2=Female)	-0.03	0.10
Age of children (m)	0.13	0.00
Duration of diarrhoea (d)	-0.11	0.00
Initial MUAC (mm)	0.57	0.00

Table 12. Regression analyses showing the effect of WSB food supplementation on mean weight-for-age (% of NCHS median) after 5 months intervention (n=760)

Predictors	Beta coefficient	*p*-value
Dependent variable: Wt-for-age; R square: 0.27		
Intervention (1=Yes; 2=No)	-0.05	0.03
Sex of children (1=Male; 2=Female)	-0.02	0.54
Age of children (m)	-0.09	0.00
Duration of diarrhoea (d)	-0.07	0.00
Initial wt-for-age	0.49	0.00

A sub-set of children (n=656) who were underweight (weight-for-age <80% NCHS median) at baseline were analysed to study the effectiveness of intervention on treating malnutrition (Figure 1). After 5-month supplementation, the prevalence reduced in both the groups, which came down to 68% in the intervention and 76% in the non-intervention groups (p=0.007). The findings indicate that WSB food could effectively treat underweight in under-5 children. Similarly, another subset of population who was severely malnourished (MUAC<125 mm) at baseline was selected to study the effect of the intervention on treating severe malnutrition (Figure 2). There was a significant higher reduction of severe malnutrition in the intervention group than non-intervention group

(p=0.02). At the end of 5-month supplementation, the prevalence of severe malnutrition came down to 28% in the intervention and 43% in non-intervention groups. Mean MUAC of severely malnourished children increased consistently over time and the trend was significantly higher among intervention than non-intervention children (Figure 3).

Figure 1. Effectiveness of 5-month WSB food supplementation to treat underweight among under-5 children

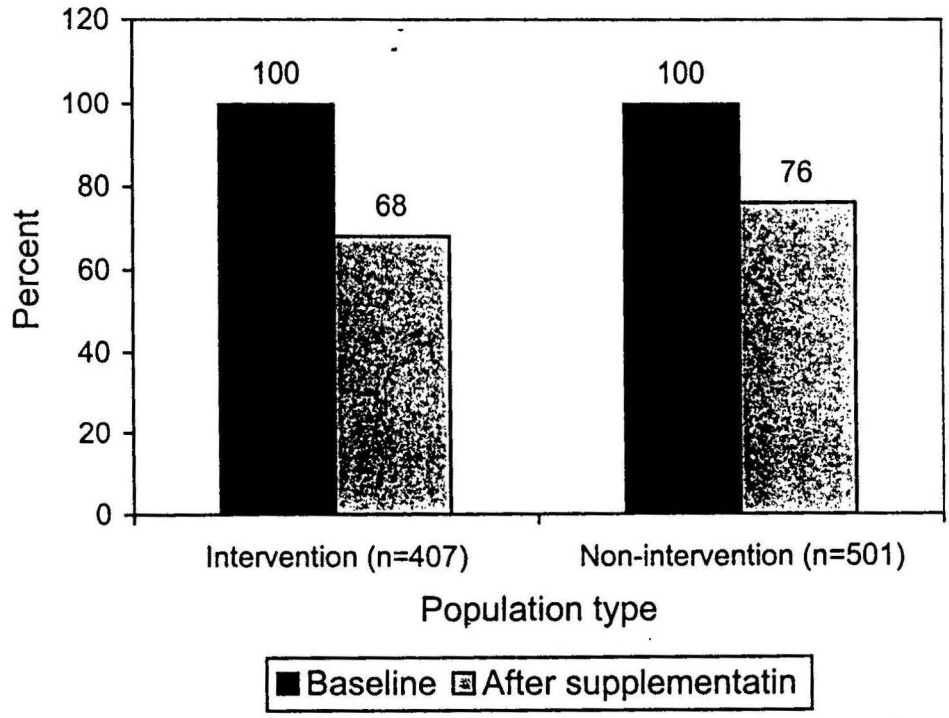


Figure 2. Effectiveness of 5-month WSB food supplementation to treat severe malnutrition among under-5 children

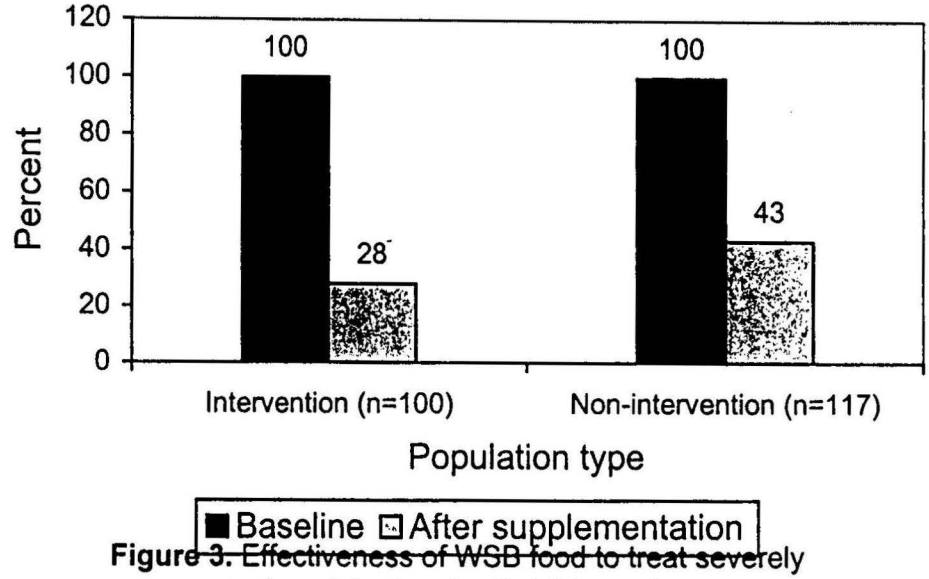
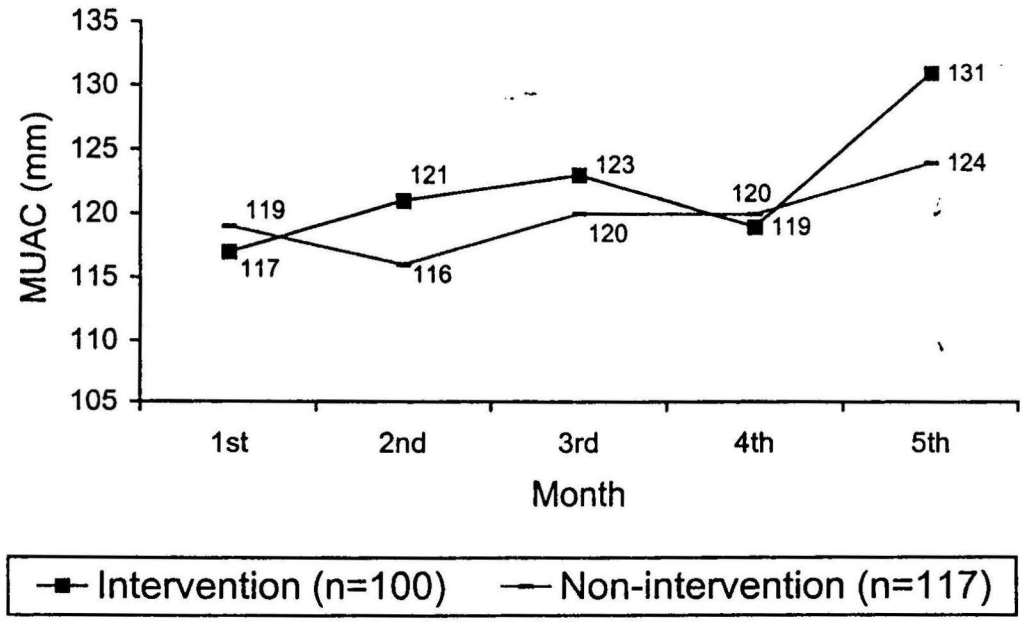


Figure 3. Effectiveness of WSB food to treat severely malnourished under-5 children after 5-month supplementation



Conclusion

- The programme successfully targeted/selected the 'poorest of the poor' households who had at least one young child. Households with BRAC membership were intentionally excluded as agreed upon with WFP.

- Although the nutritional quality of WSB food was not studied, the physical and biological quality of the food was not satisfactory at the distribution level. This may be partly attributed to the poor packaging and storage of the product.

- Mothers invented an appropriate technique to purify the spoiled WSB food, which included separation of the spoiled portion followed by sun drying. However, the nutritional and microbiological quality of such re-processed WSB food was not studied.

- Most mothers knew the proper preparation techniques of WSB food and the taste was highly acceptable to children.

- Sharing of WSB food by an adult family member including pregnant and lactating mother was at minimum level.

- Distribution of WSB food among under-5 children in poor households had significant impact to increase nutritional status. The intervention was found very effective in treating moderate and severe underweight as well as severe malnutrition among them.

Recommendation

- More precaution should be taken in maintaining quality of WSB food during production, packaging and distribution.

- If possible the product may be produced in Bangladesh maintaining a strict quality control.

- Distribution of WSB food may be continued in Bangladesh to the targeted households in flood and other natural disaster affected areas.

- It is not realistic to allocate WSB food only to under-5 children since an older sibling would naturally like to have a share. Inclusion of school-aged children may also be considered since they are also at risk of malnutrition.

- Cautions may be taken so that the children do not get used to only WSB food. Mothers should also encourage children to consume other food regularly eaten at home. This issue may be tackled carefully during the nutrition education session prior to WSB distribution.

- WSB food may be introduced at BRAC and other primary schools as a mid-day snack, which are mainly attended by poor students.

- Nutrition education should be strengthened to encourage mothers maintaining normal diet of the children and use the WSB food as a supplementary feeding. Preparation of low cost weaning food with locally available ingredients may be taught to the mothers.

- BRAC may consider including the poorest households in its Rural Development Programme who had been selected to receive WSB food.

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