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**NUTRITION EDUCATION FOR
LACTATING MOTHERS AND
WEANING-AGE INFANTS
IN BANGLADESH:**

Policy Implications of an Evaluation

prepared by the
*Social Sector Policy
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NUTRITION EDUCATION FOR LACTATING MOTHERS AND WEANING-AGE INFANTS IN BANGLADESH:

Policy Implications of an Evaluation

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Preface and Acknowledgments

This report synthesizes the results of a study evaluating nutrition education messages in rural Bangladesh and highlights their policy implications. It is intended for decision makers, nutrition planners and others who design and implement nutrition education programs.

The study, Nutrition Education to Improve the Diets of Lactating Mothers and Weaning Age Children: Evaluation of Effectiveness and Food Costs. An Experience in Bangladesh, by Laurine V. Brown and Marian F. Zeitlin, was published by the Academy for Educational Development and the U.S. Agency for International Development in May 1991. Researchers may wish to consult the full report for details.

Numerous individuals helped to produce this final product. Those deserving special recognition include Fazle Abed, Director of Bangladesh Rural Advancement Committee (BRAC), Mustaque Chodhury, Azmat Ahmad, Suaib Ahmed, Halida Khondaker, Nareen Hug, Wahed Islam, the project field workers and coders, Sobita Datta, in addition to the many village families who offered their valuable time to the project in an effort to bring better health to the women and children of Bangladesh.

Mildred A. Konan prepared this synthesis of the study and assisted with the process of clarifying important policy and planning implications. Judy Brace of the Academy for Educational Development defined the need for this synthesis of the technical report, and facilitated its production. Helen Armstrong, Bea

Rogers, Karen Peterson, Leisa Weld, Gretchen Berggren, and Stanley Gershoff provided valuable technical and editorial comments on the report. Staff of the U.S. Agency for International Development who deserve special acknowledgement for their support, include Melanie Marlett, Nancy Pielemeier, Mary Lee McIntyre, Collette Chabbott, as well as Linda Vogel of Office for International Health.

Give Me Food...

I am terribly hungry:
in the depth of my belly,
throughout the length and breadth of my body.
I feel, every moment,
fierce pangs of an all-devouring hunger.
Like summer corn-fields seared by drought
my body is ablaze with the fire of hunger.

What I ask for is little. I want food.
I feel a burning fire in the pit of my stomach.
What I want is plain and simple:
I want rice. I don't care if it is cold or hot,
or if the grains are fine or red and coarse
like the rice doled out by ration shops.
I don't care as long as I get my plate-full of rice.
If I get two square meals a day,
I tell you,
I'll give up all other demands of mine....

If you can't satisfy this demand of mine,
things will go very wrong in your kingdom.
The hungry one does not know
what is right or wrong,
what is good or bad,
he does not know rules or statutes...
This simple hunger for food,
if allowed to grow and encompass everything,
can surely bring about a disastrous end...

Give me food...

Excerpts from "Give me Food..." by Rafiq Azad,
translated by Kabir Chowdhury in "Fifty Poems from
Bangladesh", United Writers, Calcutta, 1977.

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Glossary of Terms

Anthropometric measurements:
measures of body size, used here to indicate weight and arm circumference.

BRAC:
Bangladesh Rural Advancement Committee

Chop Chop:
energy-rich complementary food developed for the weaning intervention, consisting of rice or wheat flour, sugar, oil (and milk or lentil flour if available).

Complementary foods:
foods offered to weaning-age children that supplement (complement) breastmilk.

Daily wage:
average daily income earned by an agricultural laborer. In this study the average daily wage was 25 Bangladesh taka or U.S. \$0.82.

Energy adequacy:
energy (calorie) consumption as a percent of safe requirement levels set by FAO/WHO/UNU for the individual's age, sex, and condition (e.g., lactating).

FAO/WHO/UNU:
Food and Agriculture Organization, World Health Organization, United Nations University.

International reference standard:
reference population male or female child growing along the 50th percentile (median) of WHO standards.

Low birth weight:
2,500 grams or less.

Maintenance calorie requirement:
this level would supply adequate energy for the child to maintain his/her present growth curve (percentile of WHO standards).

Nutrient adequacy:
nutrient consumption as a percent of safe requirement levels set by FAO/WHO/UNU for the individual's age, sex, and condition (e.g. lactating).

Nutritional status:
nutritional well-being of the individual, usually measured by anthropometric measurements or laboratory indicators.

Protein adequacy:
protein consumption as a percent of safe requirement levels set by FAO/WHO/UNU for the individual's age, sex, and condition (e.g. lactating).

Mild malnutrition:
child slightly underweight; i.e. child weight between 1 and 2 standard deviations below the international reference for the child's age and sex.

Misbowkow:
complementary food developed for the weaning intervention consisting of a mixture of rice or potato, vegetable, oil, and lentils (or fish, egg).

Moderate malnutrition:
child moderately underweight; i.e. child weight between 2 and 3 standard deviations below the

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international reference for the child's age and sex.

Safe energy requirement: energy (calorie) level that should be sufficient for the most healthy individuals according to FAO/WHO/UNU guidelines. For children, this requirement would also provide adequate energy for normal growth.

Safe protein requirement: protein level that should be sufficient for 95 percent of all healthy individuals, according to FAO/WHO/UNU guidelines. For children in this study, the requirement accounts for normal growth and the additional protein needed due to high levels of infections in this age group.

Severe malnutrition: child severely underweight; i.e. child weight lower than the UNICEF cutoff of 3 standard deviations below the international reference for the child's age and sex.

Tubewell: vertical underground pipe through which water is manually or mechanically pumped to the surface.

Weight adequacy: child's actual weight as a percent of that of international reference for the child's age and sex.

WHO:
World Health Organization



Nutrition Education for Lactating Mothers and Weaning-Age Infants in Bangladesh: Policy Implications of an Evaluation

Under what conditions can nutrition education reach women and children in developing countries and contribute to improvements in their nutritional status?

A recent evaluation of a nutrition education effort in rural Bangladesh suggests that improving the diets of lactating women requires both education and increases in family income. Women in the study responded to the nutrition messages and wanted to improve the quantity and quality of food in their diets, but their families were unable to make substantial increases in expenditures for food. However, families were able to make smaller expenditures to add weaning foods to children's diets and improve their nutritional status. The evaluation confirmed previous research showing that culturally-appropriate nutrition messages can change infant feeding practices, even in a conservative culture where poverty is extreme.

The major policy recommendations are:

- That **nutrition education to improve women's diets** be incorporated into programs that make these improvements affordable, such as women's saving groups, income-generating projects, agricultural production, home gardens, or subsidized or donated food programs;
- That **nutrition education to improve the diets of weaning-age children** encourage families to provide hygienic, complementary feeding of simple, low-cost, energy-rich

food to breastfed infants over four to six months of age. This education can be effective with or without other program supports.

The Nutrition Education Interventions

To improve the nutrition of mothers and infants, the Bangladesh Rural Advancement Committee (BRAC) and Tufts University conducted two nutrition education interventions in rural Bangladesh in 1987. The intervention site included five villages with a total population of approximately 12,000. The villages were without electricity, isolated from transportation networks, and had no other development programs. Eight village workers (five female and three male) and one male supervisor initiated intervention activities. They reviewed community responses to a nutritional needs assessment, brainstormed with technical staff and conducted in-home problem diagnoses and behavioral-change trials to develop persuasive and practical nutrition messages. After testing messages in their own homes, village workers trained volunteer mothers, who further refined the messages with their own children and then disseminated the messages to other village mothers.

Since Bangladeshi mothers have limited control over their food budgets and portions, the approach was family-oriented. Messages appealed to the family's desire for strong, healthy children; they were feasible, specific, motivating, and memorable. Only education was given (no food supplements).

To improve the diets of lactating women so they could adequately breastfeed, the village workers trained volunteers with infants under six months of age to disseminate messages to other families with young infants. The messages encouraged the mothers to eat an extra serving of all foods they were eating at meals, to increase fluid intake, to use good hygiene practices and to offer both breasts to the baby at each feeding. (See Figure 1.) This lactation intervention reached 48 mothers (lactation intervention treatment group).

Village workers trained other volunteers to disseminate messages aimed at encouraging families to improve the diets of children six to twelve months of age. The volunteer mothers conducted in-home demonstrations of snack-type recipes and techniques to enrich foods from the family pot. The messages stressed food hygiene and encouraged both breastfeeding and the introduction of new foods. (See Figure 2.) Through this weaning intervention, volunteers reached the children of 62 mothers (weaning intervention treatment group).

FIGURE 1. NUTRITION MESSAGES FOR LACTATING MOTHERS IN BANGLADESH

MOTIVATIONAL

1. Mother's milk is the best milk for baby. Baby should not be bottlefed because it may cause illness.
 2. If mother has much milk, baby will be very happy.
-

INCREASING FOOD AND LIQUID INTAKE

3. Eat large amounts of all kinds of foods and you will produce much milk, and your baby will receive much milk.
Eat 3 plates of rice with 5 handfuls of rice per plate, OR 3-4 ruti (flat bread) 3 times a day, WITH 2 handfuls of dark greens/vegetables, small fish or dal (lentils), and you will have much breastmilk.
 4. Daily, drink 8 or more glasses of water, and you will produce much milk.
-

SANITATION AND HYGIENE

5. Before eating, wash hands, dishes, and spoons very well with tubewell water so they will be free of dirt and germs.
-

CORRECT BREASTFEEDING TECHNIQUE

6. When baby feeds on both breasts, he drinks much milk. Let the baby, himself, stop the feeding.

Messages developed and tested by BRAC in behavioral trials in Zhitka, Manikganj District, Bangladesh, 1987. Education was done through active participation on home-visits by BRAC workers and volunteer mothers. Translated from original Bangla version.

The in-home message testing occurred over two to three months. The follow-up period lasted about eight months for the lactation intervention and five months for the weaning intervention. Baseline and monthly data were collected from mothers and infants in each treatment group and in similar control groups. (For the lactation intervention, the control group consisted of 30 mothers and their breastfed children; for the weaning intervention, the control group included the children of 55 mothers). Data collected included socioeconomic indicators, anthropometric measurements, dietary information (based on 24-hour recall), and child morbidity data (based on 30-day recall). Comparison of treatment and control groups permitted assessment of the impact of the nutrition messages. The education program and evaluation covered the hot, dry, and monsoon seasons (February to November) in which food was most scarce and morbidity was high. Local market food prices were also collected each month in order to assess the cost of meeting nutritional requirements.

FIGURE 2. COMPLEMENTARY FEEDING MESSAGES FOR INFANTS AND YOUNG CHILDREN IN BANGLADESH (abbreviated)

INTRODUCTION OF FOODS AND FREQUENCY

1. A baby should be breastfed until 2 years of age, and from 5 months should be given other food to keep him or her healthy.
2. If you want to habituate your baby to other foods, give 2-3 small spoons (small amounts), 2-3 times daily of soft food. Slowly and gradually increase the amount as the baby adjusts. Soft foods include wheat or rice flour gruels, banana, potato, sweet potato, softened biscuits, and bread. To make the food soft and keep germ free, use boiled water.
3. Just as the baby chicken pecks all day on food, so should your baby be given food - small amounts and frequently.
4. Let the baby eat as much as he/she wishes. Be attentive to him or her, and never force.

VARIETY AND ENERGY DENSITY OF FOOD

5. Make Chop Chop, Mishowkow, and other complementary foods demonstrated by village mothers. Give food 4 times daily (with a clean hand) to make your baby strong and protect from disease.
6. When fruits are in season, feed the mashed pulp or juice to your baby.
7. If you want your baby to be strong, add 1 small spoon of oil or molasses to his or her food.
8. Whatever you cook for your family, give some to your baby.

SANITATION AND HYGIENE

9. Before cooking and eating, wash your hands, utensils, and spoons with tubewell water, and soap or ash, so that they will be free of dirt and germs. If the baby does not eat all the food, cover the food to protect from bugs and dust and, a little later, again feed it to the baby.

FEEDING DURING ILLNESS

10. When baby is sick, to help him or her get better, feed him soft foods many times throughout the day.

Messages developed and tested by BRAC in behavioral trials in Zhitka, Manikganj District, Bangladesh, 1987. Education was done through demonstration on home-visits by BRAC workers and volunteer mothers. Translated and abbreviated from original Bangla.

Findings: The Lactation Intervention

The nutritional adequacy of the women's diets was strikingly poor during all seasons.

On average, over all seasons, women consumed only 56 percent of their requirement for energy (calories), 60 percent of their requirement for protein, and 29 percent of their requirement for vitamin A. Dietary iron levels appeared adequate; however, the iron may be in poorly absorbed forms. Of the calories consumed, over 80 percent came from grains--mostly rice and wheat--and only five percent were from fat (compared to over 30 percent in developed countries). Fat is considered essential for the absorption of vitamin A.

The energy adequacy of a mother's diet was significantly associated with her child's growth and nutritional status. This finding suggests that improvements in the diets of lactating mothers can be expected to produce improvements in child nutrition too.

VM with healthy daughter two years after Weaning Intervention.



Nutrition education given to lactating mothers to improve their diets had limited measurable impact on their food consumption and nutritional status.

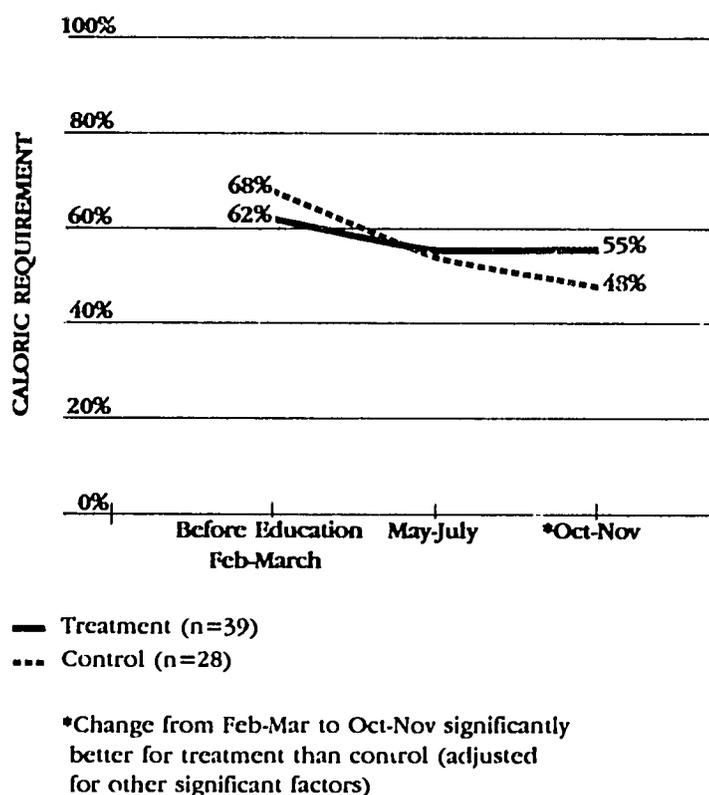
Between February (baseline) and November (end of intervention), the energy adequacy of women's diets in both the lactation treatment and control groups declined on average from 64 percent to 52 percent. (See Figure 3.) The decline was significantly less for the treatment group, but extraneous factors, for example, severe flooding which destroyed crops, may have influenced results. Certainly, the flooding interrupted food production, distribution and consumption.

For women in both the intervention and control groups, the more calories the individual mother consumed on average over the study period, the larger her final arm circumference and the greater the increase (or smaller the decrease) in her arm circumference from baseline to final measurement. The mother's years of formal education were positively correlated with the adequacy of her diet (controlling for wealth) and her arm circumference at baseline. These findings suggest that substantial improvements in diet could produce measurable changes in arm circumference.

The limited measurable impact of the intervention can be explained by both financial and cultural circumstances. The nutrition messages encouraged women to increase their own share of food, but the women realized that in order to comply, they would need

Fig 3. ENERGY ADEQUACY OF LACTATING MOTHERS' DIETS

Before and After Nutrition Education



to increase the share given to all family members. The woman's share alone would require an additional cost of 21 percent of the daily wage for an agricultural laborer; increasing food allocations to other family members would be even more costly. Family budgets were too tight to permit such increased expenditures for food.

Typically, women eat last, and are trained to be self-sacrificing. Lactating mothers felt uncomfortable about taking more food for themselves than they served to others. In many cases, the option of taking more for themselves did not even exist; there simply was no more food.

Mothers were philosophical: "When we have food, we eat it; when we don't, we don't." They realized that when they ate "good food," they had more breastmilk, but they were unable to acquire more food. The message they liked best was: "Drink eight or more glasses of water a day and you will have more milk." They could comply with this message without spending money. In fact, many women believed that good health was only attainable by the wealthy.

Their husbands were frank about the financial realities: "We are poor and cannot afford more food." In fact, in a sampling of households interviewed, weekly food expenditures were already greater than weekly income. When asked how this was possible, most men revealed they were constantly taking out loans from neighbors, and, if possible, from banks. Most of the men were very thin themselves, suggesting they too were getting less than their required level of food.

Men varied in their receptiveness to education about the nutritional needs of their wives. Some did not see nutrition as being within the scope of their responsibilities. "The father's duty is to make the income and bring the food," they said. "The mother's duty is to care for the child and inform the father of the child's needs (e.g. medicine)." Most of the men were not willing to teach other men about nutrition, except for informal discussions at the market or mosque.

Lactating mothers who received nutrition education were less likely to have children who became severely malnourished

than mothers in the control group; however there were no significant differences in overall child nutritional status or growth rates.

At baseline, there were no significant differences in nutritional status between the infants of women receiving the education and those in the control group. The average nutritional status of both groups deteriorated during the study (as measured by the infant's weight for age and arm circumference) and at the final measure there were no significant differences between the two groups. However, differences in levels of severe malnutrition did occur. In the control group, the number of infants who became severely malnourished increased significantly. In the treatment group, the number of infants becoming malnourished also increased, but the level of increase was not statistically significant. These slight differences suggest that education may have helped to prevent severe malnutrition.



Findings: The Weaning Intervention

Children in families that received education on complementary (weaning) foods grew significantly better than children in control families.

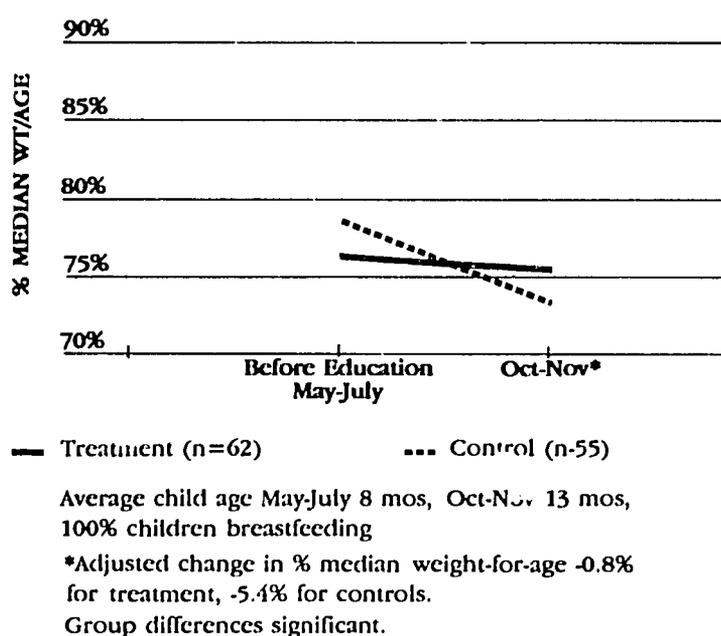
At baseline in May, the average child in both treatment and control groups was moderately malnourished. Over the five months in which the intervention took place, the average rate of weight gain was significantly greater for children in the treatment group than for children in the control group. Treatment children achieved 89 percent of the growth expected of mildly malnourished children between 8 and 13 months. Control group children achieved only 53 percent of expected growth. Adjusting for child sex, age, morbidity, family wealth, and mother's education, the differences noted between the groups were even greater.

Figure 4 illustrates how the weight adequacy of the two groups changed during the intervention period. Adjusting for other significant factors noted above, the average weight-for-age of children in the treatment group held relatively steady at 76 percent of the international reference standard, while the average for the control group declined from 78 to 72 percent. These differences are statistically significant.

Changes in arm circumference (AC) followed a similar pattern. At baseline, differences between treatment and control children were not significant (controlling for child

age, sex, wealth, and mother's education). Five months later, children in the treatment group had significantly larger AC measurements than children in the control group (with the same factors, plus baseline AC, morbidity and food intake controlled).

Fig 4. WEIGHT ADEQUACY IN CHILDREN
When Family Members receive Weaning Food Education



Did the nutrition messages prevent severe malnutrition? The data illustrated in Figure 5 suggest that they did. During the course of the intervention, the percent of severely undernourished children in the treatment group increased from 16 to 21 percent; the comparable change for the control group was from 9 to 35 percent. The increase was statistically significant for controls, but not for the treatment group.

Following the weaning intervention, children in the treatment group were eating significantly more complementary food than

children in the control group, resulting in significantly greater intakes of energy and protein.

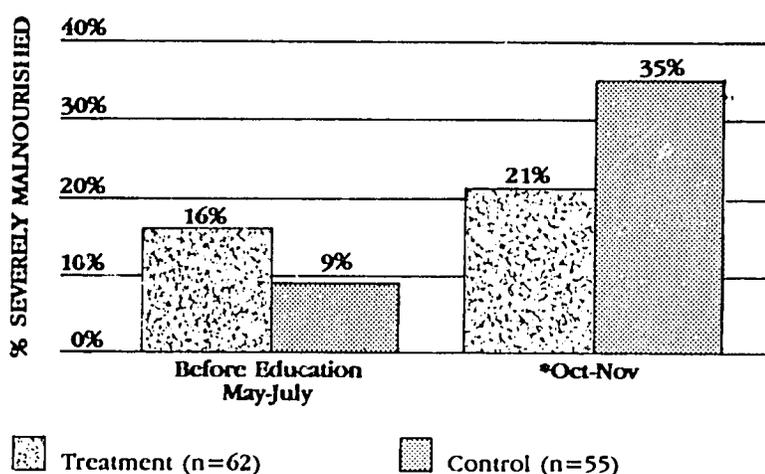
At baseline (when the average child age was 8 months), energy and protein intakes of the treatment and control groups were similar, with approximately 80 percent of calories coming from breastmilk and 20 percent from complementary foods--diluted milk, cereal porridge, pieces of soft fruit, or bites of family food.

During the five months of the intervention, all of the children in both groups continued to breastfeed, but more families in the treatment group introduced complimentary food to their children. At the end of the education program (when the average age was 13 months), 100 percent of the treatment group, but only 86 percent of the control group, were consuming complementary foods. This compares with 68 and 73 percent, respectively, at baseline. However, in both groups, diets remained inadequate to support normal growth (compared to the safe energy protein requirements set by FAO/WHO/UNU).

Since the children were growing, their energy requirement increased during the five month period. Figure 6 demonstrates that during the course of the study, children in the treatment group consumed an increasing percentage of their energy requirement from complementary food; for the control group, the percentage of their energy requirement coming from complementary foods declined. The difference between the groups was significant even

Fig 5. SEVERE MALNUTRITION

Before and After Family Members Receive Weaning Food Education

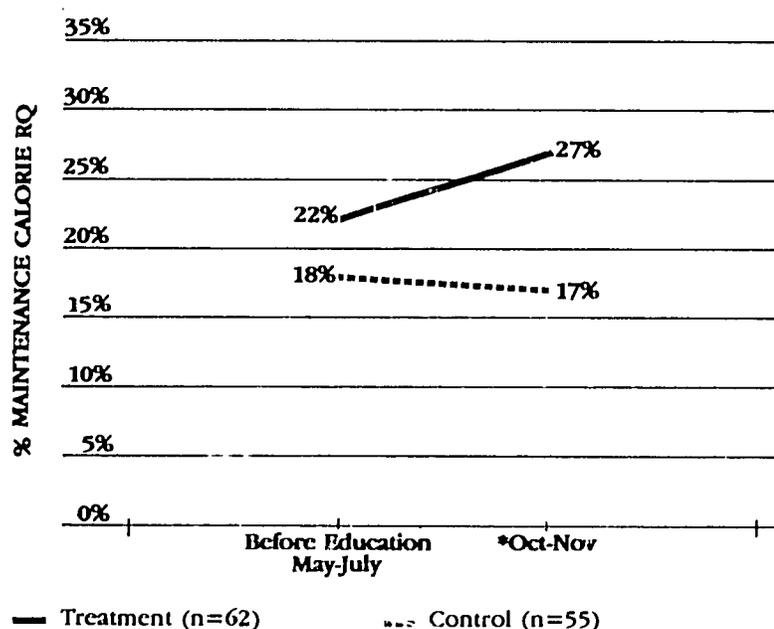


Ave age: Before-8 mos, Oct/Nov-13 mos

*Increase in number of severely malnourished children significant for controls, but not for treatment.

Fig 6. ENERGY ADEQUACY OF CHILD DIETS

When Family Members Receive Weaning Food Education



Breastmilk estimates not included

*Change in adequacy (adjusted) significantly better for treatment than control

Ave age: Before-8 mos, Oct/Nov-13 mos

after controlling for child age, morbidity, wealth, mother's education, and initial energy adequacy from complementary foods.

The extra food consumed by the children in the treatment group was insufficient to meet increasing energy requirements as the child grew older and breastmilk intake decreased. Therefore, the energy adequacy of the total diet (including estimates of the amount of breastmilk consumed by the child) decreased for both groups over the study period. The decline was much less for the treatment group than for the controls. Thinking about the differences between groups in terms of food quantity, the extra calories consumed each day by treatment children is equivalent to two small spoons of oil, one regular handful of rice, or one medium banana.

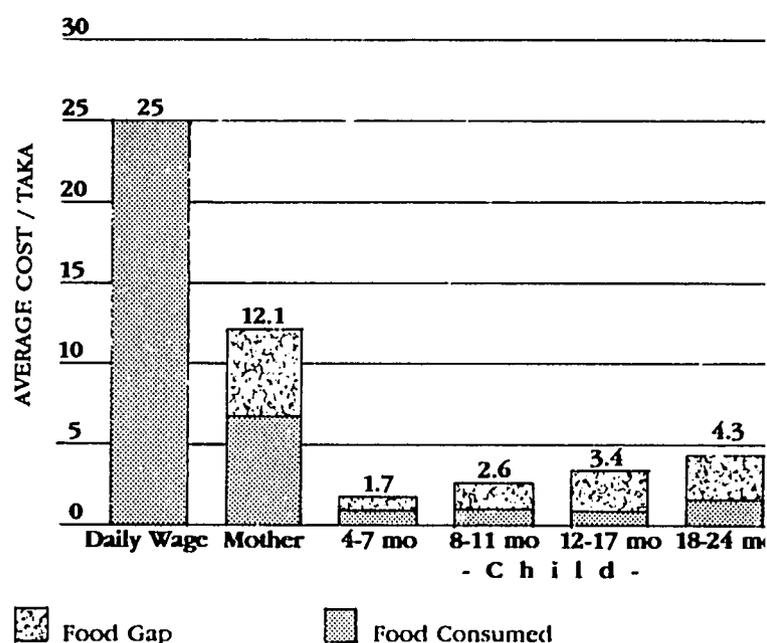
Among children in the treatment group, the percent of the child's protein requirement contributed by complementary foods increased during the course of the intervention; for the children in the control group, the protein adequacy declined. The difference between the groups was significant, and was primarily due to an increase in the amount of the weaning food offered to the treatment children. The amount of animal protein in the children's diets declined for both groups, due to a reduction in cow's or goat's milk offered as the children made the transition from a liquid diet to the grain-based family diet. However, the decline was less for the treatment group, since more of these families incorporated small amounts of animal foods (including milk and fish) into the new foods

offered to their children. At the end of the intervention, breastmilk still provided the major amount of the children's protein.

Adding complementary foods to improve the adequacy of the children's diets was affordable, even in poor families (except for expensive animal foods). The actual weight gains achieved over the five-month, critical weaning period were attained for only two percent of the daily wage. These gains were less than ideal, but the breastfeeding infant's energy gap could potentially be closed for three to ten percent of the daily wage (depending on age), considerably less than the cost of improving the lactating mother's diet. (See Figure 7.)

Fig 7. COST OF ENERGY ADEQUATE DIET

for Lactating Mothers and Breastfed Children in Bangladesh



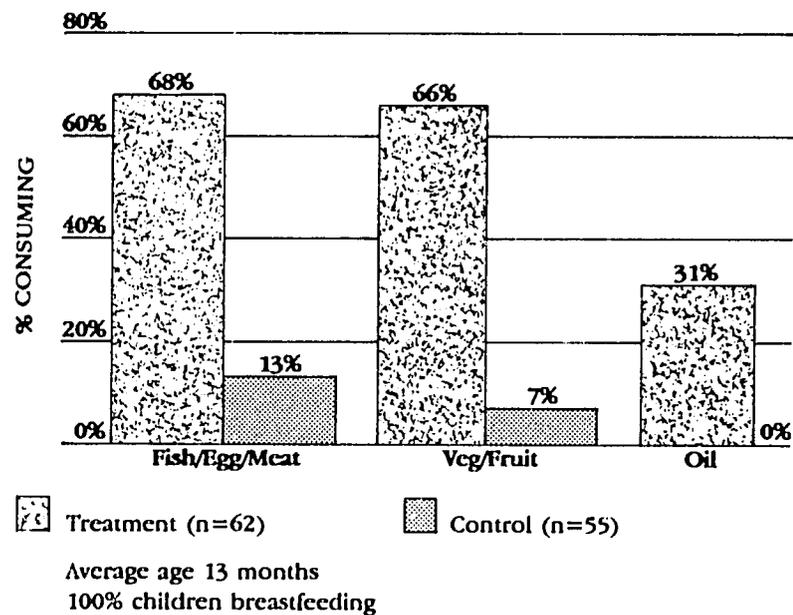
Costs based on 78 women over 8 mos & 61 control breastfed infants over 5 mos, *21-24 mo data from control site in 1986. "Cost" of breastmilk not included.

Following the weaning intervention, children in the treatment group were eating a greater variety of complementary foods than children in the control group.

Figure 8 shows that after the weaning intervention, 68 percent of treatment children, but only 13 percent of controls, were consuming fish and small amounts of solid foods providing animal protein. Traditional customs discourage feeding fish to young children, due to fear of small bones, and the belief that eating fish causes worms. The nutrition messages encouraged the addition of small amounts of hygienically prepared fish in the children's diets--and many mothers complied.

Fig 8. CONSUMPTION OF SELECTED FOODS

by Weaning-Age Children from Households
Receiving Weaning Food Education



Feeding complementary foods.

Two-thirds of the treatment children, but only seven percent of the controls, were consuming fruit or vegetables after the intervention. One-third of the treatment children, but none of the controls, were receiving oil added to their diet. Oil is commonly reported to give babies stomach problems, so it is not traditionally given. This message--to add oil to any food the baby consumes--was well received by mothers because it was easy to do, and required very little time or money.

Policy Recommendations

From the experience of this nutrition education program in rural Bangladesh, what guidance can be derived for planning and implementing other nutrition education programs? Eight major recommendations are listed and explained below.

- 1. Incorporate nutrition education for improving women's diets into programs that make these improvements affordable, such as women's savings groups, income-generating projects, agricultural production, home gardens, or subsidized or donated food programs.**

Most of the women in this study wanted to improve the quantity and quality of their diets, but felt helpless to do so. Economic constraints were paramount. In order to consume an adequate diet using low cost foods, the lactating women would need to nearly double their food budgets—an additional cost of 21 percent of the daily wage. In reality, these costs would be even greater because the women would be unable to eat more themselves without also increasing the allocation of food to other household members.

Although the study focused on lactating women, the conclusions can be generalized to all women of childbearing age, including adolescents and pregnant women. The specific nutrient needs and cultural taboos may differ slightly, but financial and cultural barriers affect the nutrition of all women.

Conditions in Bangladesh

In Bangladesh, many conditions limit opportunities to achieve good health and proper nutrition. People are very poor. Food shortages occur seasonally and few technologies exist for preserving food in the tropical climate. Overpopulation, poor sanitation, and a poorly functioning health infrastructure add further difficulties.

Women have very low status; 80 percent have never been to school, and cannot read, write or understand numbers. Widespread maternal undernutrition is reflected in the fact that more than one-quarter of all newborns are born with low birth weight. Childhood malnutrition and mortality rates are among the highest in the world. Frequent bouts of child illness restrain growth and reduce child appetite.

In rural areas, mothers breastfeed their children for two, and sometimes three, years. Breastmilk provides substantial amounts of the energy (calories), protein, vitamin A, and other nutrients for children up to age two or three, but by the time the child is six months old, the quantities are grossly insufficient. This is in part due to the poorly nourished state of the mothers. Traditionally, Bangladeshi women do not persistently encourage their infants to eat other foods until about 18 months of age. No traditional weaning mixtures exist; the first foods offered are usually diluted cow's milk or cereal gruel.

Bangladesh is one of the three countries in the world where women have a shorter life expectancy than men. The overall poor maternal nutrition status is worsened by seasonal food scarcity and frequent pregnancies. A national survey found that pregnant and lactating women consumed only 70 percent of their energy requirement and 65 percent of their estimated protein requirement.

Numerous cultural food practices work to women's disadvantage. Men and children eat first, and women eat what food remains, if any. In contrast with many other agricultural societies, women do not work in the fields. Except for collecting firewood and water, women are confined to the home and spend their days cooking, cleaning, and caring for children and elders. They have no control over the food supply budget. It is men who harvest and buy and sell food in the market.

These conditions illustrate the extent to which cultural and economic barriers make it difficult for families to meet the nutritional needs of women and weaning-age children.

Even participation in income-generating programs and women's savings groups, and acquiring access to money would not result automatically in women improving their own diets. Experience with such programs in Bangladesh suggests that many women have achieved savings, but still don't spend money on themselves. Since Bangladeshi women are taught throughout their lives to be self-sacrificing, they may need to learn to spend money on themselves.

2. Encourage families to provide hygienic, complementary feeding of simple, low-cost, energy-rich food to breastfed infants over four to six months of age.

In the Bangladesh context, the breastfeeding infant's diet could be improved with a low-cost weaning food for about one-third of the additional cost for improving a lactating woman's diet, or less than 8 percent of the daily wage. Improving the infant's diet is feasible because: 1) family members, especially mothers, have control over the child's diet; 2) investing in children is valued; 3) only small amounts of additional food are needed because breastmilk provides the bulk of the young child's diet.

This intervention has shown that, under conditions of extreme poverty and poor sanitation (such as those observed in rural Bangladesh), nutrition education alone can only prevent further deterioration in nutritional status. However, it will not be sufficient to bring the children up to the international standards unless socioeconomic conditions are

improved. Integrating nutrition education with other income-generating or food-production programs increases the potential for change.

3. Conduct village-level research to design appropriate messages for nutrition education.

Village-level research can be very helpful in designing appropriate messages. This research should be conducted before wide-scale project implementation, to ensure that messages are appropriate, affordable, and understood by the recipients. Effective nutrition education involves much more than memorization of carefully-worded messages. The words simply express a concept; the educational process must effectively promote the behavior communicated by the message. For example, village workers who helped design the messages in this study, preferred catchy, poetic phrases, considering them to be "*sbundor*" (beautiful), a valued virtue in Bangladesh culture. Initially, the workers tried to teach the mothers to repeat, verbatim, the beautiful rhythmic messages. In so doing, the focus was on memorization, not actual practice of the content of the message. After discussion, the village workers decided to ask mothers to repeat only the sense of the message, and not the poetry in totality. "The real test of the message was whether it was practiced."

The messages must be based on sound knowledge of foods consumed and local cultural beliefs and practices. A widely-held perception in this setting that children are not fed complementary

foods until well into their second year was not an accurate description of practice. Through probing and observation, village workers discovered that many families offer bits and pieces of a variety of appropriate weaning foods to infants, starting around four to six months. However, infants are not assertively fed a rice meal until around 18 months. Thus, other foods are often not reported even though they are part of the infant's diet.

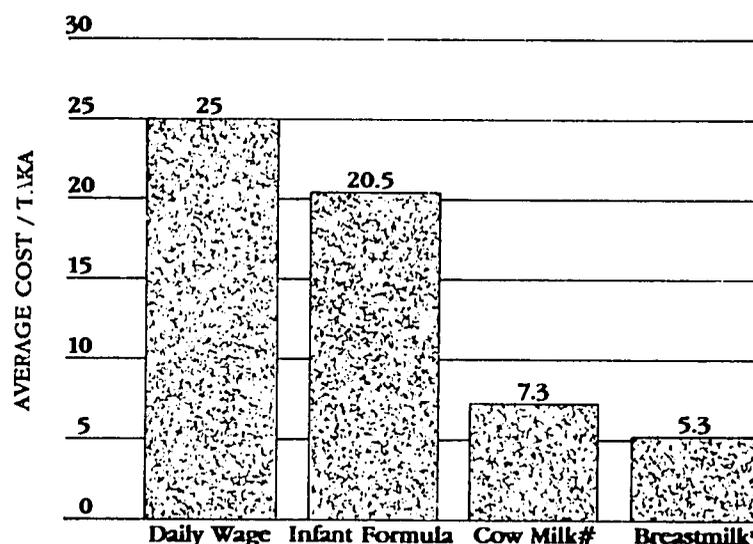
Finally, the research must provide convincing evidence that compliance with the messages will produce desired outcomes. For example, if the complementary foods promoted in the weaning intervention were highly contaminated, they would have been detrimental to the child's health. The evaluation findings implied that the introduction of greater quantities of (hygienically-prepared) complementary foods led to better child growth. Thus, compliance with the messages promoted intended results.

4. Promote snack foods--for infants and for women.

People in Bangladesh and in many Asian countries with rice-based diets, feel they have not eaten if

Providing women with the additional food necessary for lactation would provide considerable savings to the household over using a breastmilk substitute. Feeding infant formula to a child would cost a family 82 percent of a daily wage earner's income compared with 21 percent for the additional food needed for his wife to produce sufficient breastmilk. Cow's milk would cost 29 percent of the daily wage, but it is not an adequate substitute for breastmilk.

Fig 9. DAILY COST OF PROVIDING INFANT FORMULA, COW MILK#, OR BREASTMILK* Compared with Daily Wage in Bangladesh



#Cow milk, alone, is not adequate breastmilk substitute.

*Breastmilk based on additional food costs to improve lactating mother's diet
Costs computed for child 0-6 months.

they have not consumed a rice meal. By promoting snack foods that were eaten outside of a regular meal, the weaning intervention provided nutritional benefits without challenging any meal taboos. One of the most popular weaning foods was *Chop Chop*, a flour-based cooked cereal enriched with sugar, oil, and sometimes milk or lentil flour.

In contrast, the messages designed by the community for women in the lactation intervention focused on increasing foods eaten at meals. They confronted the self-sacrificing cultural taboos ingrained in the women from childhood about limiting their food intake at meals so that others in the family could eat. Encouraging women to eat

snacks might evade some cultural barriers, but cost would still be a barrier. The cost of improving women's diets is the same, whether promoted through snacks or meals.

5. Train village-level workers to demonstrate food preparation methods and to model expected behaviors.

The lactation and weaning interventions involved recipients in the development of appropriate messages. Families learned best by observing other families practicing the messages. Both interventions used the same educational approach, but the weaning food messages demanded more active participation by recipients, for example, through the preparation of special recipes. The messages of the lactation intervention encouraged "more" of what the women were already doing. The success of the weaning food messages may lie in part with the fact that they were not too time-consuming, and demanded active participation, thus were more memorable.

6. Design strategies to help caretakers deal with feeding problems in young children and prevent and control infections.

One of the most common reasons reported for not giving more complementary food was because "the child refused." One budget conscious father, impatient with the time often needed for normal child feeding development, became very angry when he purchased the ingredients for a snack food, only to have the child spit it out. A reality of child development is that no matter how nutritious, tasty, and appropriate a food, one can never guarantee that a child will eat it.

Why do children not demand and consume sufficient quantities of food to sustain normal growth? One of the many reasons appears to be illness. Children experience frequent acute infectious episodes and many have underlying chronic illnesses. Studies in a similar

What a man brings home from the market determines the family diet.



setting suggest that on sick days, children in developing countries consume at least 20-30 percent fewer calories, a deficit that is often not made up when the child recovers. Furthermore, cultural beliefs encourage the withholding of food during illness. Programs to prevent and control infections in young children are likely to create a more positive feeding environment, with better food intakes, improved growth, and more effective compliance with nutrition education.

7. Promote formal and nonformal education for women.

Investments in formal and nonformal education for women may also be seen as supporting improved nutrition. Many studies have documented the link between maternal education and child health. In this study, a woman's exposure to formal education, even after controlling for wealth, was a significant predictor of the nutritional adequacy of her diet (energy intake) and in the weaning intervention, was predictive of the child's nutritional status and weight gain.

8. Engage fathers and other family members in the issues of intrafamily food distribution.

Traditional adult diets in rural Bangladesh are already about as low cost as possible with over 80 percent of the calories from grain, and little or no animal foods. In the families participating in this study, all household members



Discussing nutrition messages with village men.

appeared to suffer from lack of adequate food. Education to change food choices for women will likely be futile unless money is available to increase nutrition for all family members. Thus, approaches must focus on all members of the family, and not just on women and children.

Man bartering bananas at village market.



Conclusions

An evaluation of two nutrition education interventions in rural Bangladesh confirms that culturally-appropriate nutrition messages can change infant feeding practices and improve the nutritional status of children. These changes can be affordable, even to poor families.

However, the evaluation raises concerns about the effectiveness of nutrition education in improving women's diets unless financial barriers are also addressed. For both women and children, existing patterns of nutrition are intricately connected to cultural beliefs and practices. Thus, designing effective programs requires attention to both cultural and economic realities.

