CONSULTING WITH CAREGIVERS

FORMATIVE RESEARCH TO DETERMINE THE BARRIERS AND FACILITATORS TO OPTIMAL INFANT AND YOUNG CHILD FEEDING IN THREE REGIONS OF MALAWI

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IYCN USAID's Infant & Young Child Nutrition Project

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Acronyms and abbreviations

AIDS	acquired immune deficiency syndrome
HIV	human immunodeficiency virus
HSA	health surveillance assistant
IYCN	Infant & Young Child Nutrition Project (USAID's flagship project)
MDHS	Malawi Demographic and Health Survey
MICAH	Micronutrient and Health Program (World Vision)
PATH	Program for Appropriate Technology in Health
*Pro*PAN	Process for the Promotion of Child Feeding
RE	retinol equivalent
SD	standard deviation
TBA	traditional birth attendant
TIPs	trials of improved practices
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

Executive summary

The prevalence of malnutrition is high in Malawi, and the rate of chronic malnutrition (stunting) is among the highest in the world. Using the 2006 World Health Organization (WHO) Child Growth Standards as the reference, according to the 2004 Malawi Demographic and Health Survey (MDHS), 53 percent of Malawian children younger than 5 years of age were chronically malnourished (stunted), 18 percent were underweight, and 6 percent were acutely malnourished or wasted. Acute and chronic illnesses, as well as inadequate feeding practices, are among the principal causes of poor growth in Malawian children. Illness leads to weight loss in most children because they reduce food intake or stop eating. In most cases, illness does not have to result in stunting if caregivers feed children well before and after illness. Suboptimal feeding practices have many causes, from poor access to needed foods to lack of information and skills to optimally prepare and serve food to young children, whose requirements change almost monthly during their first two years of life. Knowing the status of infant and young child feeding practices in a country is essential for designing and improving programs to address stunting in children.

The United States Agency for International Development's Infant & Young Child Nutrition (IYCN) Project, Bunda College of Agriculture, and the World Bank carried out a joint research project in Malawi to provide the information necessary to design effective activities to improve infant and young child feeding and nutrition within new or existing programs. This study achieved that objective: It (1) increased understanding of feeding practices among rural families with children less than 2 years of age, and of the social, cultural, and economic context influencing them; (2) identified problems that impede adequate dietary intake in these children, and with mothers, explored changes in feeding practices to find those most feasible and critical to improving dietary intake; and most importantly, (3) demonstrated that it is feasible for mothers to improve their feeding practices—using available resources—in ways that have the potential to positively impact their children's health and nutrition. The study showed that mothers and families can not only adopt but also continue improved infant and young child feeding practices. The study also pinpointed the areas in which families are vulnerable and need additional support to meet the needs of their growing children.

Study methods

This study employed consultative research methods to collect qualitative information from different types of people involved in providing or influencing the care of infants and young children 0–23 months of age. The study was conducted in two phases: an exploratory phase with mothers and key informants and a phase that involved potential program participants in trying new infant and young child feeding practices. Field activities were carried out by a research team from Bunda College of Agriculture, Lilongwe, Malawi, with technical assistance from an experienced qualitative researcher from the IYCN Project. To ensure the representation of different infant and young child feeding practices in the country, the study was conducted in three major regions (Northern, Central, and Southern), four major climatic zones (coastal, highland, lowland, and plateau), and among major tribal groups. Sixty mothers and their children younger than 24 months and 18 key informants participated in Phase 1, and 100 mothers and their children younger than 24 months participated in Phase 2.

Prior to conducting the field work, the study protocol and instruments were reviewed and approved by both the Malawi National Health Sciences Research Committee and the PATH* Research Ethics Committee. Each village chief was consulted to obtain permission to work in his village, and mothers were selected based on their willingness to participate and the age and nutritional status of their children. Participants signed a consent form. The research team was trained in the classroom on basic concepts prior to each research phase and then offered ample time to practice to ensure an appropriate level of standardization in the dietary recalls and to resolve questions concerning different areas of inquiry.

For Phase 1, the team weighed and measured the children to ensure the inclusion of families with both well-nourished and malnourished children. They interviewed mothers about how they feed their children in general and about other factors related to infant and young child feeding, such as their perceptions of child health and growth. To obtain more specific information on the types and amounts of foods children were consuming, a 24-hour dietary recall methodology was used to ask mothers in detail about what they had fed their children in the previous 24 hours. The research team also observed a lunchtime meal fed to children (as well as breakfast and snacks given throughout the day, in some cases) to understand the consistency of the food being fed, how the food was prepared, how responsive to the child the feeding was, and general cooking practices and hygiene in the home. Qualitative data were analyzed manually (in matrices) and with a word processor. *Pro*PAN (Process for the Promotion of Child Feeding) software was used for the 24-hour dietary recalls, and Anthro 2005 was used to analyze the anthropometric data.

Based on the major child feeding issues, and the available resources in the home and community as determined in Phase 1, a guide was developed for Phase 2 counseling on potential improved child feeding practices (see the attached appendix). Phase 2 entailed three interviews with each of the families involved; the first to explore the current feeding pattern and carry out a dietary food recall for the previous 24 hours, the second to offer counseling and to negotiate from one to three improvements in practices that the mother would try for about a week, and the third to find out the results of the trials of improved practices (TIPs) and conduct a follow-up 24-hour food recall. Initially, the information was tallied and summarized by hand in the field. Later, the data were translated and entered into a word processor, and organized in matrices, looking for similar patterns and characteristics that explained differing practices. The food recall information was analyzed using *Pro*PAN software.

Samples and contextual information

All children in both phases of the research were cared for primarily by their mothers. Mothers were young, and about one-third were non-literate. The sample of children was picked purposefully to include both stunted and non-stunted children. Among children in both phases, 47.5 percent exhibited moderate or severe stunting, 15 percent moderate or severe underweight, and 3.8 percent moderate or severe wasting. In Phase 1, about one-fifth of the children were sick at the time of the research, while in Phase 2, less than one-tenth of the children were ill. The extent to which the children had received specific nutrition services varied: 82 percent of those eligible had received a vitamin A supplement in the past six months; 41 percent of those eligible had received deworming medication. The families in both phases had access to radio and television, although mothers had more exposure to

* Program for Appropriate Technology in Health (PATH) is the US-based nongovernmental organization that leads the IYCN Project.

information through radio than through television. The great majority of mothers cited health services as the place where they received information on child health and feeding. This study was conducted during the time of year when food availability is best in Malawi, but families were also asked about food security at other times of year and how this affected the feeding of their children. Families reported that maize was readily available at the time of the study, as were other staples such as sweet potatoes and cassava. Many kinds of fruit were also readily available, and inexpensive. Animal-source foods and beans were considered to be scarce and/or very expensive in some areas. Most districts reported at least four different types of food or foods from food groups (e.g., staples, animal products, fruits, vegetables, legumes, and nuts) that are available year-round. There were also additional foods that were affordable and could be used to diversify the diets of children.

Current feeding practices and opportunities for improvements, by age group

Infants 0–5 months: Breastfeeding practices

While all children in Malawi are breastfed and most continue to breastfeed through the child's second year of life, practices need to be supported and protected. There are areas in which improvements can be made to ensure that infants and young children receive the optimal intake of breastmilk.

Exclusive breastfeeding is the optimal practice for infants 0–5 months. Infants in Malawi are breastfed frequently and on demand, so breastfeeding is often reported as exclusive, but too often infants also receive small amounts of water or watery porridge. During the Phase 1 interviews, only one-tenth of mothers recalled that they did not exclusively breastfeed; however, during the initial TIPs Phase 2 visits, only half of mothers said they exclusively breastfed (current or recent practice). This latter finding is consistent with the 2004 MDHS finding that only 53 percent of mothers reported exclusively breastfeeding infants 6 months or younger.

The baby crying after being breastfed is a trigger for the mother or family to give other foods and liquids. The mother or other family member assumes that the crying is from hunger or thirst and assumes that the mother is not producing enough milk or milk of adequate quality to satisfy the baby. Three key points that can inform programs emerged: Mothers and family members must be convinced that (1) breastmilk does provide enough water and fluid when babies are fed on demand with full feeds; (2) crying is not always caused by hunger; and (3) when crying is caused because babies are not getting enough breastmilk during the feed, mothers can increase breastmilk supply by allowing their babies to breastfeed for a longer duration, and more frequently. Giving water or food is counterproductive to satisfying the baby's nutritional needs because this decreases breastmilk production. Introducing water and food also increases risk of infection. This message may be particularly important during the hottest time of the year, when mothers increase the amount of water they give to babies.

Observations of breastfeeding point to two related weaknesses in breastfeeding style: breastfeeds of extremely short duration, and from just one breast, which appeared to be a way to pacify the child. During TIPs, all mothers who tried the recommendation to stop giving their babies water or porridge were successful, and said they would continue to exclusively breastfeed. Mothers indicated that they had no idea that breastmilk only was acceptable, and they reported that although they were told stopping water would be a challenge, they had no problem and the child seemed to suffer no ill-effects. The recommendation to stop foods and liquids was and should be coupled with the recommendation to improve breastfeeding style:

offering longer breastfeeds and emptying both breasts each time. Mothers mentioned many factors that reinforced this practice: babies cried less and slept better, giving the mother more time to do chores; babies appeared to take more milk; and they did not have an upset stomach. Another facilitator was the support of other family members who identified longer breastfeeding with showing more love for the child. Promoting the "how-tos" of breastfeeding should be a key tenet of the operational strategy of the Malawi Infant and Young Child Feeding Policy and Strategic Plan (for which the IYCN Project is giving technical assistance)—part of health care providers' training, media promotion, and counseling in facilities and communities, particularly during the first months of an infant's life. Addressing women's heavy workloads as they are asked to take more time to breastfeed is critical as well, as is reaching out to other family members to help.

Continued breastfeeding until 2 years of age or more is widely practiced in Malawi. This practice should be commended and supported. The few mothers who had weaned their infants before 2 years of age gave two reasons: (1) fear of transmitting their HIV infection, and (2) another pregnancy. Both of these situations need to be addressed. For the HIV-positive mother, there is a need to ensure that she has proper infant feeding advice, per WHO.[†1] The pregnancy issue points to the need to integrate family planning and postpartum well-child visits to ensure that women are getting the information they need to delay their next pregnancy, and to the need to emphasize that a pregnant girl/woman can safely continue to breastfeed. The study found that a motivation for continuing to breastfeed for 24 months or more was to prevent another pregnancy. Mothers need counseling on how to fulfill lactational amenorrhea method criteria[‡] during the first six months, and on use of a modern method of contraception beginning at five to six months after they give birth, if they desire to delay another pregnancy.

Complementary feeding

This study highlights the significant gap that exists in Malawi between the recommended nutritional content of children's complementary foods/meals and what those meals actually contain. However, the study, through TIPs, also points out that much of this gap can be closed by families with foods to which they already have access and often are preparing for other family members. There are, though, certain nutrients such as iron, zinc, and calcium that are deficient even in diets during the time when food availability is at its highest and for which special programming and supplements or foods may be needed to correct deficient intakes.

Infants 6–8 months old

The most common practice hindering adequate dietary intake for these infants is the use of starchy, thin/watery porridges, which families think is the only food infants can swallow and digest. The focus of program efforts for this age group should center on maintaining breastfeeding of sufficient duration at each feeding and offering a good-quality food—mixed

[†] WHO recommends that in countries where formula feeding is not recommended, HIV-infected mothers who are eligible should receive highly active antiretroviral therapy, and all other HIV-infected mothers or their infants should receive antiretroviral prophylaxis while breastfeeding, which should continue through at least 12 months, with introduction of adequate complementary foods starting at 6 months. After 12 months, WHO recommends that HIV-positive mothers stop breastfeeding only when they can provide a safe and nutritious diet without the benefits of breastfeeding.

[‡] Absence of a return to menses, infant less than 6 months of age, and full or nearly full breastfeeding (recently, this last criterion was changed to exclusive breastfeeding to promote the mortality-reducing and nutrition benefits of exclusive breastfeeding).

and soft/mashed, but thick—in adequate amounts to complement the energy provided in breastmilk. A porridge using whole maize with *nsinjiro* (groundnut flour) and two tablespoons of the family vegetable should be promoted as the basic complementary food for children 6–8 months of age. Caregivers should be encouraged to add, everyday, a food of animal origin, such as an egg, fish, or fish powder (the most commonly available and used animal-source foods). A local name should be given to the basic soft, mixed food that always has an animal-source food added. From interviews with key informants and mothers, fresh fish and small dried, whole fish (an excellent source of the limiting micronutrients calcium, iron, and zinc) are the most commonly available animal-source food. Programs should offer demonstrations to mothers on how to prepare this basic food with a wide variety of foods added and allow the mother to feed the child. Mothers must be convinced that the baby can swallow the new food and that it will not create digestive problems. Mothers participating in the TIPs indicated a preference for this new, mixed food because it was teaching their child to eat Malawian foods, and their child ate all the food, was satisfied, and was less fussy.

While frequency of feeding was not a problem, just more than half of the mothers were not offering enough food at each "meal." All mothers attempted to reach the quantity of food appropriate for their infant's age, but in the end, they were able to increase the amount they were offering by only two to three tablespoons per meal. Mothers reported having no problem increasing the amount of food by at least a few tablespoons. Mothers reported positive effects for their children who were eating better and finished their food. Babies also seemed more content, healthy, and strong when receiving more food. However, mothers had trouble offering more than a few additional tablespoons because they were fearful of stomach upset, especially in the youngest children.

Even in this young age group, some babies in Malawi are being offered sugary biscuits and drinks, often tea with sugar, particularly in the Southern region. The substitution of fruit for sugary snacks and tea was successful. Mothers remarked that when they gave fruit, their babies did not cry for tea. Mothers liked giving fruit because it satisfied their babies and because they could drink their tea "in peace."

Infants 9–11 months old

This is the period during which to accustom the child to the family diet and transition from a diet dominated by porridge to solid family foods. As with the younger age group, the focus should be on consistency and quality, although these have different implications. Almost all children are receiving *nsima* (maize porridge) by this age for at least one meal, but *nsima* should be encouraged at other meals over less energy-dense types of porridge. The emphasis on quality means incorporating everything from the family "pot," particularly animal-source foods and a vegetable mixture, instead of giving only the liquid in which vegetables, fish, or meat are cooked. The mothers in the study who were asked to try adding animal products to their children's diets preferred to give fish and an egg on occasion. Some families could not provide these foods every day, but tried instead to give them several times a week. No one had a problem offering the vegetable sauce daily. Education and counseling should focus on helping mothers think through how they are going to enhance the diversity of their child's diet on a daily basis, in a very specific way, and reach out to fathers as providers of the animal-source foods and energy- and nutrient-rich foods, including groundnuts and/or oil. Although some of these recommendations seem basic, an overwhelming number of mothers (with children of all ages) seemed not to know about them, but wanted information about how to feed a young child.

At 9–11 months, the use of sugary drinks and biscuits increases, and about half of the children in the study received these foods. In the trials, mothers were able to substitute fruit, milk, or snacks like a small sweet potato. Many mothers said that it was a relief not to have to buy the extra foods and that they would continue the practice because their child seemed to like the fruit.

Similar to the younger age group, food frequency was not a problem, but food quantity per meal was low for about a third of these children. Regardless of how much the mother should have added to reach the goal of about one-half cup of food per "meal," no mother could increase the quantity by more than three tablespoons (45 ml). It was common for mothers to increase food quantities gradually, until they could see that their children would eat and tolerate the larger quantities. Mothers who did increase the amount their children were served, even by a couple of tablespoons, expressed pleasure that their children were finishing the greater quantities, and several noted that their children were sleeping better. It was not clear the extent to which mothers sat with their children and helped them through a meal. But those who did had good results; one mother said that she had not realized that she could keep feeding even when the child spit back the food, and others noted that it helped the child to eat more and showed love for the child.

Although breastfeeding continues for virtually all infants in Malawi, at least a third of the mothers in the study exhibited poor breastfeeding style, offering short feeds and predominantly using only one breast. Mothers were successful at prolonging their breastfeeds, finding time to sit while breastfeeding so that they could empty their breasts. Mothers were pleased with this recommendation because they felt they were producing more milk, and they noted that their children were more sated and happier, which allowed them to finish their work.

Children 12–23 months old

During the second year of life, the emphasis must be split between the amounts of food children eat and dietary quality. Although dietary diversity in the 12–23-month age group was better than in younger children, there is still room for improvement, particularly for increased animal-source foods and amount of food, other than the main staple. For some children, if the foods being offered were given in slightly larger quantities, the diet would be much better, but for others, diversity was extremely low. For almost all children, the overall quantity of food must be addressed: a combination of frequency and amount per meal plus encouragement to finish what is served. Meal frequency was relatively good, although some mothers should be encouraged to offer healthy snacks. The emphasis needs to be on the amount of food offered per meal. All but one mother was well below the recommended amount of about one cup of food (240 ml) per meal (on average, children received about five tablespoons [75 ml]). As with the younger age group, the greatest increase was by two to four tablespoons per meal. On a positive note, no adverse reactions were reported from children eating more; in fact, mothers said they were happy to see that their children were not hungry, did not beg for tea, and had improved appetites. A variety of tools to help mothers visualize appropriate quantities for the child's age would be useful. The child feeding bowl, such as those found useful in other countries, could be tested and modified for Malawi. Only a few mothers (primarily in the Southern region) were asked to sit with their child and encourage the child to finish the food provided, which seemed to be effective in increasing the amount their children ate. Mothers liked the practice, considering it a demonstration of love for their children.

Adding more diversity to the diet, primarily by adding an animal-source food (three tablespoons) and the cooked vegetables prepared for the family (three tablespoons), was frequently recommended but not easy for families to do. The primary challenge to providing animal-source foods was the cost of fish and eggs (virtually no one in the sample had meat or poultry). The focus should be on the use of all family foods everyday for young children, including fish. Distinguishing a category of "special foods" (eggs, milk, small dried or fresh fish, *nsinjiro*, avocado pears, oil), with illustrations of how these foods can be combined and in what amounts, could facilitate children getting these foods at least four to five times a week.

Priority must also be given for recommending that young children do not consume sugary or salty snacks and drinks. This practice is most prevalent in the second year of life. The use of fruit (Southern and Central regions), porridge with *nsinjiro* (Northern region), and boiled sweet potatoes were all acceptable substitutes. Mothers and other household members said they were glad to know that they could buy less-expensive foods and that young children should not receive tea.

Sick children

Although there were no TIPs carried out with sick children, which could have allowed for insight into what mothers are willing and not willing to do when their children are sick, guidance on feeding during and following illness should be considered within any strategy to improve infant and young child feeding. Based on what was learned about current practices related to feeding sick children, there are concepts and practices that require special program emphasis and reinforcement within programming for integrated management of childhood illness. Among others, these concepts include: (1) maintaining the child's normal diet for as long as possible, feeding small portions more frequently if the child is fussy or lethargic; (2) altering the diet if the child is extremely ill—breastfeeding more frequently and offering soft, but thick, porridge with patience; and (3) during recovery (for two weeks after the illness is over), returning the child to the regular diet, but offering special foods (the foods specified for a child 12–23 months old (eggs, milk, fish, *nsinjiro*, oil, etc.) everyday, at each meal if possible.

Description of dietary intakes and feeding frequencies of children 6–23 months in the previous 24 hours pre- and post-TIPs

This study had three dietary recalls to analyze; one from Phase 1 and two from Phase 2—the first before TIPs and the second after TIPs. A review of the Phase 1 and pre-TIPs Phase 2 recalls showed the usual dietary pattern of young children and highlighted the deficient contribution of complementary foods to the nutrient intake of these children. Since most mothers breastfeed their babies through 2 years of age, it should be noted that breastmilk is an important source of calories and nutrients through those years.

In the usual diet, maize foods accounted for more than half of the foods eaten by young children. Different types of porridge made with *ufa mgaiwa* (whole maize flour) was the food most frequently fed to children in both the Phase 1 and Phase 2 study samples. The vegetables or animal products consumed by these children were usually in combination with *ufa mgaiwa* porridge or *nsima*. When biscuits and other carbohydrate foods were added to intake of porridge and *nsima*, carbohydrate foods accounted for 60 percent to 70 percent of the food consumed by children. Vegetables were the next most frequently consumed food by children in this sample. Common vegetables were usually some type of green leaf such as

pumpkins leaves, turnip greens, and mustard greens, with or without groundnuts and tomatoes and sometimes oil. Legumes, groundnuts, and fish were given almost as frequently as vegetables. Fruit, often bananas, followed. Children in the sample consumed eggs much less frequently than other foods and meat/chicken and milk rarely.

Given the dietary pattern described above, based on the United States National Research Council's standard,[§2] energy intake was low among the sample of children in Phase 1 (only 40 percent of children met 100 percent of the median recommended energy intake) and adequate among children in the initial TIPs visit sample in Phase 2 (60 percent met the median recommendation). The children's diets were inadequate for nearly all nutrients, including protein (although marginally). The nutrients for which only about half or fewer of the children were consuming 67 percent of their requirements were vitamin A, iron, zinc, and calcium. Dietary analysis also showed that most children were consuming the recommended number of meals daily, although among the few children who were no longer breastfed, the proportion receiving the recommended number of meals was much lower; it was also lower for children 12–23 months than for children 6–11 months old. About three-quarters of young children's calories came from carbohydrates, and with the addition of fats, just greater than 90 percent of their caloric intake was accounted for.

The unique part of this study was the trials, which allowed some measure of the ability of families to improve dietary intake. Only the Phase 2 recalls (pre- and post-TIPs) were compared, using the National Research Council standards mentioned above. Using these criteria, energy intake was adequate for children both pre- and post-TIPs. However, there was a marked increase in the percentage of children who met the recommended intake after the TIPs (almost 20 percentage points), with the average caloric intake improving by 160 kcal. In both the pre- and post-TIPs, almost 100 percent of children met 67 percent of their recommended protein intake. Improvement was seen in mean protein intake as well. The percentage of children who met 67 percent of recommended intakes for all other nutrients improved after TIPs: for zinc and vitamin C, improvements brought most children to 67 percent of their needed intake; three-quarters of children met 67 percent of their vitamin A requirement; and although post-TIPs, more children were receiving 67 percent of their requirement for calcium and iron, these two nutrients remained the limiting nutrients for the most children.

The percentage of children who received the recommended number of meals per day remained constant between the TIPs dietary recalls, not surprisingly, since increasing meal frequency was not a frequent recommendation. Of interest was the finding that the percentage of total calories coming from carbohydrates decreased from 74 percent pre-TIPs to 66 percent post-TIPs, accounted for in part by an increase in foods with high fat content and, generally, a wider variety of foods being consumed post-TIPs. The food frequency analysis confirmed the change in diet composition. Carbohydrates (porridges, *nsima*, and biscuits), which accounted for 61 percent of foods consumed pre-TIPs, fell to 49 percent of food consumption post-TIPs. Tea consumption also fell. What increased, by small amounts, was the consumption of vegetables, milk, eggs, beans, and groundnuts. The consumption of meat and fish remained

[§] For this analysis, we considered energy adequate for the group if at least 50 percent consumed 100 percent or more of the median recommendation for energy intake from complementary food according to age and lactation status, which was assumed to be a typical amount of breastmilk consumed by infants and young children in each age category. With regard to other nutrients, the intake of the group was considered adequate if 100 percent of the sample met at least 67 percent of the recommended intake for age and lactation status.

the same—in spite of many reports of families offering or increasing fish in their young child's diet.

Finally, this study demonstrated that there is a great deal of dietary improvement that can be realized by supporting mothers and families to improve feeding practices. Families are eager for the assistance, and will try to and can do more. However, while there can be substantial improvements in energy, protein, vitamin A, and vitamin C intakes, it is not likely that Malawian children can meet their iron, calcium, or zinc requirements through dietary improvement alone. Since the diets of Malawians are low in animal-source foods, in the near term, supplementation programs have a role in helping children meet their requirements. Fish powder, made from small, whole fish dried and pounded into a powder, is an excellent source of the limiting micronutrients calcium, iron, and zinc. Fish powder, along with fresh fish, appears to be the most readily available animal-source food and should be prioritized to children when this product is available in households. Other programs are needed to increase the availability of animal-source and other nutrient-rich foods to families so that these foods are available on a daily basis. Complementary educational programs also are needed to ensure these foods are given to children 6–23 months. The ongoing vitamin A supplementation program is critical. Malawi does not have a supplementation program for the other nutrients, despite the dramatic deficiencies. For example, 86 percent of children 6–23 months old have anemia. Although WHO does not currently recommend universal iron supplementation for children in malaria-endemic areas such as Malawi,[3] there are other measures that can address the high level of anemia, including point-of-use fortification with micronutrient powders, increasing animal-source foods consumed by children, food fortification, malaria control, water quality improvement, sanitation, and deworming.

1. Introduction

Malnutrition in Malawi

The prevalence of stunting in Malawian children less than 5 years of age is one of the highest in the world. According to the 2004 Malawi Demographic and Health Survey (MDHS), the proportion of stunting among children 0–5 years of age is 52.5 percent, with severe stunting at 27 percent. The proportion of underweight children is 18.4 percent, and 6.3 percent of children are wasted. These statistics are based on analysis of the 2004 MDHS using the 2006 World Health Organization (WHO) Child Growth Standards.[4-7] Furthermore, 74 percent of children 6–59 months and 42 percent of mothers are anemic.[4,6]

Wasting or acute malnutrition is a measure of short-term nutritional insult. In Malawi, food is most limited in the rainy season, when the incidence of diarrhea and malaria are also highest. It is during this time of year when the prevalence of wasting is highest. Stunting is often considered the best measure of malnutrition in a population and individuals not only because it does not vary by season but also because it has the most serious consequences for health and survival at any age, for grade completion in school, and for lifetime earnings for individuals and national development for countries.[8]

The 2004 MDHS showed variations in stunting by geography and socioeconomic status.[4-6] Stunting in children is higher:

- In rural areas compared to urban areas (53.9 percent in rural areas compared to 42.5 percent in urban areas).[**]
- By birth order (47.4 percent when mothers have only one child compared to 48.7 percent when mothers have 6+ children).[††]
- By birth interval (51.6 percent when mothers have a previous birth less than 24 months prior compared to 44.6 percent when mothers have a previous birth 48+ months prior).[4]
- By age of the mother (48.1 percent when mothers are 35–49 years of age and 41.6 percent when mothers are 15–19 years of age).[††]
- By the mother's educational status (53 percent when mothers have no education compared to 34 percent when mothers have at least a secondary education).[6]
- By wealth quintile (53.9 percent of mothers in the lowest wealth quintile and 32 percent of mothers in the highest wealth quintile).[6]
- By region (55.6 percent in the Central, 50.4 percent in the Southern, and 47.6 percent in the Northern).[4]

Beliefs about what causes malnutrition in Malawi continue to focus on poverty and food insecurity, even though recent studies conducted by the World Bank showed rates of malnutrition in young children were not strongly associated with either poverty or food insecurity at household or regional levels.[9] In fact, the Malawi Poverty and Vulnerability Assessment found that per-capita caloric availability was significantly higher in non-poor households (3,041 kcal) compared with poor households (1,752 kcal). Caloric availability at

[**] Percentages based on analysis using the 2006 WHO Child Growth Standards.
[††] Percentages based on analysis using the United States National Center for Health Statistics reference population.

the household level also was higher in the Central region, where food production is highest. However, there was no relationship between either stunting or wasting by income quintiles in rural areas, and stunting was actually highest in the Central region, where food production is highest.

Feeding practices for children less than 2 years of age

Acute and chronic illnesses as well as inadequate feeding practices are among the principal causes of poor growth in Malawian children. Illness results in weight loss in most children no matter where they live in the world, because children stop eating or reduce their intake during an episode of illness. Illness does not have to result in stunting if children are well-fed before and after illness. Knowing the status of infant and young child feeding practices in a country is important for designing and improving programs to address stunting in children.

The only source of national data on feeding practices in children younger than 5 years of age is the MDHS, but there also are some smaller studies that provide important information. Why mothers follow certain practices and not others is not well-documented.

A summary of infant and young child feeding practices based on these sources follows (the reference is noted when the information is not from the 2004 MDHS):

- **Birth:** The initiation of breastfeeding is delayed in about 31 percent of infants; the MDHS does not contain information regarding feeding of colostrum, but most likely infants are receiving it, since almost 100 percent start breastfeeding within one day of birth. About 5 percent of infants receive prelacteal (before breastmilk) feeds that include flour solution, water, cow's milk, soft drinks, and soups.
- **0–5 months:** Almost 100 percent of infants are breastfed frequently and on demand; the median duration of exclusive breastfeeding is 2.4 months.[4] Supplements given before 6 months include water, *nsima* (maize porridge), soup, fruits, freezes and soft drinks, cow's milk, boiled rice solution, and others. Use of bottles and nipples is rare.[10]
- **6–8 months:** Breastfeeding continues for almost 100 percent of infants; feeding of complementary foods is delayed in about 30 percent. Most infants are not fed important nutrient-rich foods, including animal-source foods (78 percent), legumes (84 percent), fruits and vegetables (89 percent), and oil/fat/butter (97 percent). Many infants are fed thin *nsima* (maize porridge) made from refined flour without added ingredients. In a Community Integrated Management of Childhood Illness survey conducted in 2000, only 27 percent of children were receiving a thick porridge at 6–8 months.[10]
- **9–11 months:** Breastfeeding continues for most infants, and most are fed complementary foods. While dietary diversity improves during this period, compared to infants 6–8 months, the majority does not receive animal-source foods (68 percent), foods with legumes (75 percent), or oil (95 percent). Fruit and vegetable intake improves during this period; only 25 percent of infants do not receive these foods at 9–11 months.
- **12–23 months:** A majority of children are still breastfed, and almost 100 percent are fed complementary foods. Some children are weaned before 23 months (8 percent). Most are not fed animal-source foods, foods prepared with legumes, or oil. The majority of children are fed fruits or vegetables rich in vitamin A.
- **Sick children (younger than 5 years):** Some children receive no fluids, and others drink less than usual during illness; some children receive non-food fluids such as soft drinks. Many mothers do not correctly prepare oral rehydration solution.

Overall, only 57 percent of children 6–23 months had an adequately diverse diet (had been fed from the appropriate number of food groups according to age and breastfeeding status), and 47 percent had been fed the minimum number of times appropriate for their age.[11] Among breastfed children, only 29 percent met minimum standards for these three important child feeding practices (breastmilk, adequate frequency, and consumption of foods from at least three food groups daily).[11] Iron, zinc, and calcium were found to be the most limiting nutrients in children's diets in southern Malawi, exacerbated by the poor bioavailability of iron and zinc, which is particularly a problem in maize-based diets such as those in Malawi. Energy intake appears adequate when expressed as kg/body weight.[12]

2. Research purpose and objectives

To address the problem of malnutrition in Malawi—in particular, high rates of stunting—more needs to be understood about what is behind the numbers reported above, particularly the motivations and constraints caregivers face when they try to follow the evidence-based best practices for infant and young child feeding. The research reported here was undertaken as a joint activity of the IYCN Project, Bunda College of Agriculture, and the World Bank to assist the Government of Malawi, donors, and other nutrition partners in filling some of the gaps in understanding on infant and young child feeding so that existing programs may be improved or new programs designed and implemented with families' realities in mind.

This research was conducted in two phases: an exploratory phase and a "trials of improved practices" (TIPs) phase (with the second phase involving two rounds of data collection). The methodology of each will be further detailed in the next section. Specifically, the objectives of the different phases were to:

Phase 1 and Phase 2 initial visits

- Identify specific dietary problems among children less than 2 years of age, including determining the energy density and nutrient density (particularly iron, zinc, and vitamin A) of common foods given to children in different age groups.
- Gain a further understanding of current feeding practices and feeding problems that impede adequate dietary intake in children less than 2 years of age.
- Describe maternal/child behaviors related to responsive feeding.
- Identify the positive and negative social, cultural, and economic factors that influence current practices, including the influence of other family and community members.

Phase 2 (TIPs phase)

- Determine acceptable/feasible ways to improve energy and nutrient densities of the diets of children younger than 2 years by testing mothers' responses to specific recommendations.
- Gain an in-depth understanding, through their own experience with trying new optimal or improved practices, of factors that constrain mothers' willingness or capability to improve feeding practices, as well as factors that enhance or motivate achieved improvements in feeding practices.

At the end of Phase 2

- Develop recommendations for policymakers, health and nutrition program managers, donors, nongovernmental organizations, and other stakeholders about how to improve current infant and young child feeding practices.

3. Methods

Study design

This study employed a consultative research design in which qualitative and quantitative data were collected from people involved in providing or influencing the care of infants and young children 0–23 months of age.[13] These research participants included mothers, health workers, community leaders, or other family/community members. While population-based surveys using quantitative methods do not allow in-depth investigation of behaviors, this study primarily used qualitative methods to investigate why people behave in certain ways and the motivations and barriers that prescribe their behaviors. This qualitative research used a purposeful sample drawn to ensure inclusion of caregivers in different geographic/climatic zones and from different ethnic backgrounds.

A team from Bunda College of Agriculture, Lilongwe, Malawi, conducted the data collection for both Phase 1 and Phase 2. Dr. Beatrice Mtimuni of Bunda College, Principal Investigator, led the local research. Two teams of researchers were formed, each consisting of one supervisor and three field researchers.[‡‡] Dr. Janet Irene Picado, Principal Investigator, provided technical assistance in the design and training for Phases 1 and 2, supervision at the beginning of Phase 2, analysis, and report writing. The study received technical oversight from an advisory committee that included members from government and donors.

Phase 1

During Phase 1, the research team interviewed mothers/caregivers about how they fed their children. To obtain more specific information on the types and amounts of foods children were consuming, mothers/caregivers were asked about what they fed their children in the previous 24 hours. They were also questioned on their perceptions of child health, nutrition, and food availability, as well as on channels of communication and their sources of nutrition information. The research team observed a meal fed to children (usually a lunchtime meal, but in some cases also breakfast and snacks given throughout the day) to understand the consistency of the food being fed, how the food was prepared, how food was fed relative to responsive feeding, and general cooking practices and hygiene in the home. Information derived from this phase was analyzed to develop the TIPs counseling guide used in Phase 2.

In addition, a group of key informants, including health workers and other community members, were interviewed about community-wide infant and young child feeding practices, child health, and other factors related to the current feeding practices of children, including the mothers'/caregivers' perceptions of child health, nutrition, and food availability and channels of communication about nutrition information.

Phase 2

The TIPs methodology was employed in Phase 2, with the purpose of testing recommendations to improve feeding practices. This methodology calls for a series of three visits to each household. On the first visit, the mother is interviewed regarding her current feeding practices, and her child's diet is assessed. The following day, the researcher visits the mother again to suggest to her how she could improve her feeding practices, and negotiates

[‡‡] One person left the team after the first phase; therefore, only five field researchers participated in the second phase.

with her one or two things that she will try during the next week or two. A follow-up visit is conducted seven to ten days later, to find out the results of the trial.

Instrument design

Using the research objectives as a framework and corresponding to the above research phases, structured data collection instruments/guides and tools were designed that drew upon existing instruments that were developed internationally and used in a number of countries.[13,14] These instruments were tailored for each source of information (e.g., mothers of 0–23-month-old children, key informants from the community), and were administered during the two phases of the research. Table 1 indicates the various guides and tools that were employed according to the study phases.

Table 1. Research instruments and tools.

Study phase	Type of respondent/ study participant	Research instruments and tools
Phase 1	Mothers/Caregivers	Oral consent form
		In-depth exploratory interview guide
		24-hour recall
		Household observations
Phase 1	Key informants	Oral consent form
		Interview guide
Phase 2	Mothers/Caregivers	Oral consent form
		Initial TIPs visit (A for infants 0–5 months, B for children 6–23 months)
		24-hour recall
		Household observations
		TIPs counseling visit
		TIPs follow-up visit

The instruments, including the consent forms, were developed in English and translated into *Chichewa* and *Chitumbuka* and then back-translated into English to ensure accuracy of the translations. Different translators performed the translation to the local language and the back-translation to English. The instruments were field-tested; changes made to the instruments were highlighted, and translations were completed.

Institutional review board approvals

The study protocol and instruments were reviewed and approved by both the Malawi National Health Sciences Research Committee and the PATH Research Ethics Committee prior to the field research. Requirements for reporting on the study by each committee were adhered to by the study team.

Study sites

The study was conducted in Malawi's three regions (Northern, Central, and Southern) and four climatic zones (coastal, highlands, lowlands, and plateau). Within these regions and climatic zones, 16 districts out of the total 28 districts in the country were sampled: four in the Northern, five in the Central, and seven in the Southern. The research team worked with the Ministry of Local Government to prepare a guide for the selection of districts that would be representative of the main geographic regions and climatic zones of the country. Table 2 presents a summary of the study regions, districts, and villages included in each research phase.

Table 2. Study regions, districts, and villages, Phases 1 and 2.

Region	District	Climatic zone	Village
Northern	**Phase 1:** Nkhata Bay	Coastal	Kamanganjulu
			Chilonga
	Phase 1: Mzimba	Highland	Kabindula Khonje
			David Lungu
	Phase 2: Rumphi	Plateau	Makanjira
			Reuben Jere
			Mwakasenjere
	Phase 2: Karonga	Coastal	Makunganma
			Undaninge
			Galimoto
			Maulughi
Central	**Phase 1:** Lilongwe	Plateau	Kambanizithe
			Chalongelera
	Phase 1: Nkhotakota	Coastal	Lipende
			Kavumbula
	Phase 1: Ntcheu	Plateau	Kakhobwe II
			Kandoma I
	Phase 2: Lilongwe	Plateau	Chimenechi
			Karonga
			Mkambisi
			Zipendo
	Phase 2: Dedza	Hilly	Kapusa
			Nkunaumbe
			Chinyezi
	Phase 2: Salima	Lakeshore	Kandeu
			Nkhwidzi
Southern	**Phase 1:** Chikwawa	Lowland, dry	Malikopo
			Masanduko
	Phase 1: Mangochi	Coastal	Chizula II
			Mpanga
	Phase 1: Thyolo	Highland	Chikumba
			Motheriwa
	Phase 1: Blantyre	Plateau	Muononga
			Kaphikamtama
	Phase 2: Neno	Arid: Hilly and dry	Ngwenyama
			Chikwekwe I
			Chikwewkwe II
			Kanselu
	Phase 2: Mangochi	Coastal	Saiti – Tiputipu
			Mbapi
	Phase 2: Mulanje	Plateau	Iuma III
			Chilemba
			Binali
			Mpombwe
	Phase 2: Nsanje	Coastal: Along Shire River in the Rift Valley	Dumba
			Ntolongo
			Chikunkitu
			Mwendothengo

Within each district, the research team identified health centers that were representative of the geographic (climatic) zones. Health center staff provided a list of all the villages in their catchment areas, and villages were randomly selected for the study from the list. The research team tried to ensure that the sample was representative of the major ethnic groups in the country.

Study subjects

Phase 1

The primary respondents for Phase 1 were mothers/caregivers of children 6–23 months and key informants from the community. A total of 60 mothers/caregivers (15 in the Northern region, 18 in the Central region, and 27 in the Southern region), and 18 key informants (four in the Northern, six in the Central, and eight in the Southern) were interviewed. The planned sample size per age category was met (Table 3a). Mothers/Caregivers were 18 years of age or older.

Table 3a. Number of children sampled by region and district according to age group, Phase 1.

	Age in months				
Region	0–5	6–8	9–11	12–23	Total
Northern	0	5	5	5	15
Central	0	6	6	6	18
Southern	0	9	9	9	27
Total	0	20	20	20	60

In addition, to provide context to the data gathered from the mothers/caregivers, 18 key informant interviews were planned with two individual opinion leaders from each of the nine districts. Planned key informants included three village chiefs, two traditional birth attendants (TBAs), two teachers, three growth monitoring volunteers, six health surveillance assistants (HSAs), and two elder women (Table 3b). One HSA was also a village chief but was counted only as an HSA here.

Table 3b. Number of key informants sampled by region, Phase 1.

Region	Total
Northern	4
Central	6
Southern	8
Total	18

Participant selection

The research team visited the village chief the day before the survey and asked if his village would be willing to participate in a study on infant and young child feeding. If he agreed, he invited all women with children 6–23 months of age to a session in which the mothers were asked if they would participate in the study and the children were weighed and measured and their names recorded. On the following day, the purpose of the study was explained to the mothers and their questions were answered. Participating mothers were asked if there were other mothers with children 6–23 months who were not attending the session, to ensure that the list of children was complete for each village. Each list was arranged according to age group (6–8 months, 9–11 months, 12–23 months) and child nutritional status (stunted or non-

stunted by length-for-age).[§§] One child from each age group was randomly selected from "draw lots." Children from each age group were selected based on stunted or non-stunted to ensure that half of the children in each group were stunted and half were not. Sampling by nutritional status ensured that a complete range of feeding practices for both malnourished and healthy children was represented.

Key informants were selected through consultation with each village chief.

Phase 2

Respondents for Phase 2 (TIPs) were 100 mothers/caregivers of children 0–23 months (24 in the Northern region, 28 in the Central region, and 48 in the Southern region). Mothers/ Caregivers were 18 years or older,[***] and the planned sample size was met per child age group (Table 3c). The mothers/caregivers interviewed for Phase 2 were different from those interviewed for Phase 1.

Table 3c. Number of children sampled by region and district according to age group, Phase 2.

Region	District	Age in months				Total
		0–5	6–8	9–11	12–23	
Northern	Karonga	3	4	3	4	14
	Riumphi	2	3	2	2	9
Central	Lilongwe	2	4	4	3	13
	Dedza	1	2	2	2	7
	Salima	2	2	1	2	7
Southern	Mangochi	2	2	2	2	8
	Neno	2	4	4	4	14
	Nsanje	2	4	4	4	14
	Mulanje	2	4	4	4	14
Total		18	29	26	27	100

Participant selection

The selection procedure for mothers/caregivers varied slightly from Phase 1 to Phase 2: First, mothers/caregivers of children 0–5 months old (not included in Phase 1) were invited to participate in Phase 2. Second, to save time, based on the experience of Phase 1, once the research had been explained to mothers/caregivers, lists of the children were drawn up according to age group, and the desired number of children per age group was randomly selected (Table 3c). Mothers/Caregivers were asked to give consent to participate, and if they did, the participant child was weighed and measured to ensure approximately equal proportions of stunted and non-stunted children in the sample.

Consent process

The first step in the consent process was to obtain permission from the village chief for the research team to work in each village. After caregivers/mothers were selected based on the age and nutritional status of their children, the research team reviewed the oral consent form with each mother and the mother signed it (or it was signed on her behalf if she could not do so). The purpose and requirements for participation in the study were reviewed again during household visits. The village chief assisted the research team by introducing them to a

[§§] Children were classified as stunted or not stunted using the 2006 WHO Child Growth Standards.

[***] The study protocol called for only mothers 18 years and older; however, one 17-year-old mother was selected in error.

possible key informant who might participate in the study. After introductions, the research team explained the study and the oral consent form to prospective key informants, who then signed the form (or it was signed on their behalf if they could not do so), if they agreed to participate.

Training

Phase 1 research team training was conducted from April 30 through May 8, 2009, excluding Sunday, May 3. Topics included formative research definition, objectives, methods; ideal feeding practices and feeding problems; in-depth interviews (theory and practice); 24-hour recall (including practice); study instruments (review and practice) and field analysis of data; and ethical procedures, informed consent, and field practice. Food laboratories were also held to prepare for the 24-hour recalls.

Training for Phase 2 was conducted on July 9, from July 13 through 17, and on July 20, 2009. Topics included TIPs (definition, objectives, methods); review of instruments and translations; the counseling guide; dietary analysis and selection of recommendations; counseling and negotiation; follow-up visit; matrix creation for summarizing TIPs information in the field; and ethical procedures, informed consent, and field practice. In addition, the research team was trained to address life-threatening problems they might observe while visiting families and to refer seriously ill children to the nearest health facility.

Data collection

The data collection for Phase 1 was conducted from May 20 through June 6, 2009, and consisted of one visit to each family, during which information was collected from mothers/caregivers about their infant and young child feeding practices, food availability, workload, and the health of their children. This information was gathered using structured open-ended questionnaires. In addition, mothers/caregivers were interviewed about what they had fed their child in the previous 24 hours (collected using the 24-hour recall method) to determine actual food intake (and amounts) by the children, and observations were made regarding actual feeding practices and food preparation. All interviews were tape recorded. Family meals were also observed to determine what foods other family members were eating and how children interacted with other family members. The research team tried as much as possible not to interfere with the normal activities in the household so that they could observe usual practices.

After the interviews, mothers were told about the findings and good practices were reinforced. In addition, the research team provided suggestions on how to improve any suboptimal infant feeding practices that were observed.

Key informant interviews were conducted by the team leaders following an introduction made by the village chief between each interviewer and interviewee. Information was gathered using structured open-ended questionnaires, and interviews were tape recorded.

Data collection for Phase 2 commenced during training on July 15 and concluded September 14, 2009. Each household was visited three times. On the first visit, an in-depth interview was conducted with the mother/caregiver, along with household observations and a 24-hour recall, for the purpose of identifying current feeding practices. This initial interview was similar to the one applied during the first phase, although a bit shorter because information was not asked on household food access and seasonality, newborn feeding, exclusive

breastfeeding, foods considered good or bad for infants, or exposure to media and health messages. The section on child health and growth and in relationship to feeding was also shorter, because the information from the first phase was considered sufficient. If possible, the mother/caregiver was observed feeding a meal to the child. Before leaving the household, an appointment was made to visit the mother again the following day. Again, all interviews were electronically recorded.

During the second household visit, conducted the day after the first, a summary of the information from the previous day regarding feeding practices (both positive practices and problems) was presented to the mother in simple terms. Mothers were asked if they agreed with the summary, and if they had any suggestions for how to improve in the specific areas requiring improvement. Recommendations were then suggested to mothers on improved practices. The mothers selected the recommendations they would be willing to try. An appointment was made to return again after seven to ten days.

On the third visit, field researchers conducted follow-up interviews with the mothers to obtain information on the practices they had agreed to try, to determine if they had been successful, to make modifications to the new practices, or to change other dietary practices. Another 24-hour dietary food recall was also taken.

Data processing and analysis

Phase 1

Data processing and analysis of the qualitative information began during the field research. After data collection was finished each day, the research team conducted initial analyses of interviews/observations/24-hour recalls. This was conducted as a group, with the support of the team leaders/supervisors. Next, field researchers worked individually to reconstruct their interviews from that day, using the tape recordings to complete the notes taken on the responses to the open-ended questions. They then completed two summary matrices with data from all sources. The first one listed the current child feeding practices (both positive and negative), and the second one identified feeding problems, motivations for current practices, and constraints to improving them.

Key informant interviews were analyzed in a similar manner. Critical information was pulled from each, summarized in a matrix, and relied on to provide the context for analysis of the primary Phase 1 respondent interviews.

Once data collection for Phase 1 was completed, a data analysis workshop with the supervisors and field researchers was held at Bunda College of Agriculture with the entire team, led by Rae Galloway of the IYCN Project. Data for each question from all children were consolidated by age group and district, on similar matrices.

In addition to standard information on feeding practices, data on the following topics were also consolidated and summarized:

- Household food access and seasonality.
- Perceptions on child health and growth and their relation to feeding.
- When do mothers introduce liquids other than breastmilk and solid foods for the first time (on a regular basis) to infants? What foods are usually introduced first? How are they prepared?

- Child's appetite during health and illness; feeding during and after illness.
- Feeding of the child when the mother is away from home.
- Food matrix (good and bad foods for children).

The Phase 1 analysis concluded with a workshop led by Dr. Janet Irene Picado for the purpose of drafting a counseling guide for use during the TIPs phase, based on insights gathered during the exploratory research on critical feeding problems and what might be done to improve them for the majority of caregivers. The development of the counseling guide was grounded in WHO's "ideal feeding recommendations."[13-16] The entire research team participated. The first step was to list the feeding problems identified for each child by age group, illness status, and nutritional status (not stunted, stunted, severely stunted), together with recommendations and motivators for each one. Recommendations were slightly adapted to the local context based on the information gathered in Phase 1.

Phase 2

Phase 2 analysis was similar, and began each day in the field after interviewing was completed. Researchers reconstructed interviews using their tape recordings, and analyzed children's diets based on all the information obtained during household visits. Over the three visits to each household, a matrix was completed for each child. Each matrix summarized the dietary information by listing feeding problems; recommendations offered to the mother; recommendations accepted for trial by the mother; and the results of the trial—that is, if the mother carried out the recommendations, her opinion of the experience, comments reported from other family members, and other relevant information. In addition, field researchers summarized the responses to open-ended questions by topic, using the tape recordings to complete their notes.

Following completion of the field work, a subgroup of the research team participated with Dr. Janet Irene Picado in consolidation of the information from both the summaries and the matrices. Matrices were organized by region and age group. The first set of matrices consolidated primarily the information obtained during the first household visit from the summaries done by topic or feeding practice. The main focus was on understanding the factors associated with critical feeding practices. The results obtained from the first household visit of Phase 2 were integrated with the results from Phase 1, because interviews were primarily exploratory in nature. The findings are presented in the following section, which includes descriptive information of current feeding practices and the factors that motivate these practices.

The second group of matrices summarized TIPs results. The results of caregiver experiences for each recommendation were tabulated, consolidated, and summarized. Analysis then consisted of a discussion of the relevance and feasibility of each recommendation tested under different household circumstances.

Analysis of the 24-hour dietary recalls was conducted during both phases of the study. The team leaders carried out initial processing of the registration forms after the field work, to prepare the forms for data entry. Analyses were performed using *Pro*PAN (Process for the Promotion of Child Feeding) software.[14] The food composition table included in the software does not include many of the local foods in Malawi; therefore, information on some of the energy and nutrient composition of local Malawian foods, provided by the Nutrition Department at Bunda College, was entered into the software (the origin of this information is

unknown). A newly compiled food composition table from Tanzania provided additional information.[17] All values contained in the table for foods available in Malawi were entered into the software.

Anthropometric data were analyzed using Anthro software.[18] Data on child's age, maternal age and education, vitamin A supplementation, and deworming, from the interview guide, was entered into an electronic database for the creation of contingency tables. Descriptive statistics, such as counts and proportions, were generated.

4. Findings: Current context and feeding practices

The findings reported in this section combine information gathered from the 60 respondents in the Phase 1 interviews with information from the 100 respondents who participated in the first household visit of Phase 2, unless otherwise noted. The results of the second and third household visits conducted during Phase 2 are reported in the next section of this report.

Sample description

Child characteristics

Tables 4a and 4b detail the demographics for the children sampled during Phase 1 and Phase 2. The two samples were similar in terms of age distribution (although there were no 0–5-month-old children in Phase 1) and male/female ratio, and in that for all children, the primary caregiver was the mother. The one difference of note between the two samples was in the number of ill children reported: In Phase 1, approximately 22 percent of children were reported by their mother as being sick on the day of the interview, with 50 percent of the sample in the Northern region reported as sick. In Phase 2, only 6 percent were reported as sick, and the Northern region did not represent a disproportionate burden of the total.

Table 4a. Characteristics of children by region, Phase 1.

Variable	All subjects[1]		Region[2]		
	n	%	Northern	Central	Southern
Total number of subjects (n)	**60**	**100**	**15**	**18**	**27**
Age (in months)[3]					
6–8	22	37	6	7	9
9–11	17	28	4	5	8
12–23	21	35	5	6	10
Sex					
Male	30	50	8	7	15
Female	30	50	7	11	12
Primary caregiver					
Mother of child	60	100	15	18	27
Other relative (grandmother, aunt, etc.)	0	0	0	0	0
Child's health status					
Currently sick (as reported by mother)	13	22	5	2	6
Not sick	47	78	10	16	21

[1] Results expressed as frequencies and percentage of group.
[2] Results expressed as frequencies.
[3] No 0–5-month-old children were sampled as part of Phase 1.

Table 4b. Characteristics of children by region, Phase 2.

Variable	All subjects[1]		Region[2]		
	n	%	Northern	Central	Southern
Total number of subjects (n)	**100**	**100**	**24**	**27**	**49**
Age (in months)					
0–5	16	16	5	5	6
6–8	28	28	5	7	16
9–11	20	20	5	5	10
12–23	36	36	9	10	17
Sex					
Male	54	54	11	15	28
Female	46	46	13	12	21
Primary caregiver					
Mother of child	100	100	24	27	49
Other relative (grandmother, aunt, etc.)	0				
Child health status					
Currently sick (as reported by mother)	6	6	2	3	1
Not sick	94	94	22	24	48

[1] Results expressed as frequencies and percentage of group.
[2] Results expressed as frequencies.

Mother/Caregiver characteristics

As noted above, all caregivers in the sample were mothers of the children; as such, the group will henceforth be referred to simply as "mothers." Mothers in both phases were young, with more than half in each sample less than 25 years old. The overall literacy rate of the women in both samples (63.3 percent in Phase 1 and 69 percent in Phase 2) was slightly less than the national literacy average of 70 percent,[19] and in both samples, there was a wide variation in years of schooling, with approximately one-fifth to one-quarter of each group having no schooling at all and another quarter having more than six years of schooling (Tables 5a and 5b). As expected, women in the Northern region were better educated as compared to the other regions.

Table 5a. Characteristics of mothers by region, Phase 1.

Variable	All subjects (n=60)	Region		
		Northern (n=14)	Central (n=17)	Southern (n=29)
Age (in years)				
18–19	7	3	1	3
20–25	31	4	10	17
26–30	12	3	2	7
31–34	7	4	3	0
>34	3	0	1	2
Literacy				
Read/write	38 (63.3%)	12 (85.7%)	12 (70.6%)	14 (48.3%)
Illiterate	22 (36.7%)	2 (14.3%)	5 (29.4%)	15 (51.7%)
Schooling (in years)				
0	18 (30%)	1 (7.1%)	5 (29.4%)	12 (41.4%)
1–3	8 (13.3%)	1 (7.1%)	2 (11.8%)	5 (17.2%)
4–6	10 (16.7%)	3 (21.4%)	4 (23.5%)	3 (10.3%)
>6	24 (40%)	9 (64.3%)	6 (35.3%)	9 (31%)

Table 5b. Characteristics of mothers/caregivers by region, Phase 2.

Variable	All subjects	Region		
		Northern	Central	Southern
Age (in years)	**n=99***	**n=24**	**n=27***	**n=48**
17**				
18–19	8	3	2	3
20–25	43	15	11	17
26–30	20	3	8	9
31–34	17	2	3	12
>34	11	1	3	7
Literacy	**n=100**	**n=24**	**n=28**	**n=48**
Read/write	69 (69%)	20 (83.3%)	17 (60.7%)	32 (66.7%)
Illiterate	31 (31%)	4 (16.7%)	11 (39.3%)	16 (33.3%)
Schooling (in years)				
0	25 (25%)	3 (12.5%)	9 (32.1%)	13 (27.1%)
1–3	12 (12%)	1 (4.2%)	5 (17.9%)	6 (12.5%)
4–6	38 (38%)	6 (25%)	10 (35.7%)	22 (45.8%)
>6	25 (25%)	14 (58.3%)	4 (14.3%)	7 (14.6%)

* One mother in Central region did not know her age.
** Location of one 17-year-old mother not disclosed to protect anonymity.

Key informants

Key informants included three village chiefs, three TBAs, two teachers, three growth monitoring volunteers, five HSAs, and two elder women. A total of 18 key informants were interviewed, two from each of the nine districts visited in Phase 1 (Table 6).

Table 6. Actual key informant participants by region and district (n=18).

Region	District	Interviewee	Number
Northern	Nkhatabay	TBA	2
	Mzimba	HSA	2
Central	Lilongwe	Village chief	1
		TBA	1
	Nkhotakota	HSA	2
	Ntcheu	Growth monitoring volunteer	1
		Elder woman	1
Southern	Blantyre	Village chief	1
		Primary school teacher	1
	Chikwawa	HSA	1
		Village chief	1
	Thyolo	Growth monitoring volunteer	1
		Elder woman	1
	Mangochi	Growth monitoring volunteer	1
		Primary school teacher	1
		Total	18

The key informants who identified themselves as being involved with community activities related to infant and young child feeding were the TBAs, HSAs, growth monitoring volunteers, and elder women.

Context

Media exposure

Access to information regarding infant and young child feeding is an important factor influencing the decision-making of mothers in terms of which foods to give their children. In rural areas in which access to basic health services is often difficult, most mothers depend on mass media and family members, friends, health workers, and others for information about health and nutrition.

Information on mass media was collected during Phase 1. While overall, only two-thirds of families reported having a radio in their home (65 percent), 82 percent of mothers said they listened to the radio. Most of these mothers (67 percent) listened on a daily basis, while another 20 percent listened two to six times a week. Radio ownership varied by region, with 80 percent of families in the Northern region owning a radio as compared to only 61 percent and 60 percent of families in the Central and Southern regions, respectively. The most popular radio station was Radio 1; more than one-third of mothers tuned in to this station. The most popular programs were religious (27 percent), news (18 percent), and music (13 percent). About half of the audience listened in the afternoon and evening, while others listened throughout the day.

Few households had television sets (3 percent), and only 17 percent of mothers reported watching television; 40 percent of those watched daily and 30 percent watched weekly. TV Malawi was the most popular station to watch, and religious and music programs the most popular programs. The majority (90 percent) of those who watched television watched only at night time.

Most mothers (75 percent) reported that they had heard a message on child feeding, both on the radio (78 percent) and/or from a person who was influential to them—most commonly health staff (81 percent) or a family member (17 percent). Eighty percent of mothers remembered the message they had heard, with the most frequently heard messages relating to the importance of frequent breastfeeding (32 percent) and frequent feeding of the child (13 percent).

Food security

Information in this section is based on interviews from Phase 1, conducted during harvest time (May through early September), a time of year when food is readily available in Malawi. Mothers also were asked about the availability of food at other times of the year. Mothers in the Northern region revealed how food availability changed throughout the year, their coping strategies, and how food availability in the different times of year—particularly the December through March period, before harvest, when food is scarce—affects how they feed their children. The availability of maize throughout the year varies by district and family. In most places, families deplete their reserves of maize before harvest. Some families, depending on the region, can eat other foods that are available throughout the year, such as sweet potatoes, Irish potatoes, cassava, bananas, groundnuts, beans, and pumpkins. Many families engage in short-term work (“piece work”) to earn money to buy maize during this period. One mother said they had access to irrigation that allowed them to farm throughout the year, while other families hunted and gathered foods during this lean period. Gathering/Hunting insects was mentioned by several families as something they did throughout the year, but only one mother reported feeding insects to her young child. When asked specifically if they changed the way and types of food they fed their children during the

December through March period, less than half said they reduced the frequency of meals given to children (to twice per day), and a little more than half said they did not change the way their children were fed because they "prioritized" young children for food and made sure they had money to purchase maize flour for porridge.

Key informants were asked about food availability in their villages (Table 7). Teachers mentioned "lack of food" as a major problem affecting the feeding of children. With regard to specific foods, there was a large variability in the responses by district. Maize, cassava, and sweet potatoes were the most frequently mentioned foods available throughout the year. Cassava and sweet potatoes were mentioned as being available throughout the year in districts in all regions; maize was available throughout the year in the Central and Southern regions. Fish, beans, vegetables, groundnuts, bananas, and sorghum were mentioned as available throughout the year in three districts each. Rice, Irish potatoes, cowpeas, and mangos were mentioned as available throughout the year in two districts. Tangerines, pigeon peas, avocado pears, and guavas were mentioned in one district each. Fish is available throughout the year in districts that border Lake Malawi. Foods most frequently mentioned as scarce were beans, soybeans, fresh fish, and rice. Irish potatoes, milk, pineapple, and sorghum were also mentioned as being scarce, but less frequently. The results show a good number of different types of food are available throughout the year and affordable in most districts. This is important for improving the diversity of what young children consume and will be discussed in greater detail in the last section.

According to key informants, the most expensive foods are big fresh fish such as *chambo*, meat (beef, goat), milk, rice, bread, wheat, beans, maize during the lean season (December through March), cassava, and sweet potatoes (only in Chikwawa). Foods that were considered affordable were small dried fish (six districts); maize and cassava (three districts); eggs, vegetables, and rice (two districts); bananas, cowpeas, sweet potatoes, sorghum, milk, beans, soybeans, groundnuts, and Irish potatoes (one district each).

Table 7. Food availability according to key informants, by district.

Region/District	Foods available throughout the year	Scarce foods	Expensive foods	Affordable foods
North/Nkhatabay	Cassava	Beans	Fresh fish	Maize
	Cassava leaves		Legumes	Rice
	Fish		Beans	Dried fish
	Sweet potatoes		Meat (beef, goat)	Cassava
Central/Ntcheu	Maize	Rice	Rice	Vegetables
	Irish potatoes		Wheat	Small dried fish
	Beans		Beans during dry season	Irish potatoes
	Bananas		Maize during lean season[1]	
	Vegetables			
Central/Lilongwe	Sweet potatoes	Rice	Meat	Eggs
	Groundnuts	Fresh fish	Big fresh fish (e.g., *chambo*)	Small dried fish
	Cassava		Rice	Vegetables
	Bambara nuts			Groundnuts
	Beans			Soybeans
	Guavas			Maize
	Bananas			
	Tangerines			

Region/District	Foods available throughout the year	Scarce foods	Expensive foods	Affordable foods
South/Blantyre	Maize	Fresh fish	Big fresh fish (e.g., *chambo*)	Small dried fish
	Sorghum	Soybeans	Beef	Beans
	Cassava	Sorghum	Rice	
	Sweet potatoes	Pineapple	Milk	
	Cowpeas	Milk		
	Pigeon peas			
	Vegetables			
	Mangos			
South/Chikwawa	Maize	Soybeans	Cassava	Rice
	Sorghum	Fish	Sweet potatoes	Sorghum
	Irish potatoes			Maize
	Fish			Milk
	Cowpeas			
	Moringa			
	Papayas			
	Beans			
	Rice			
South/Mangochi	Maize	Beans	Big fresh fish (e.g., *chambo*)	Small dried fish
	Groundnuts		Beans	Sweet potatoes
	Cassava		Meat	Cassava
	Fish			Vegetables
	Vegetables			
	Sorghum			
	Rice			
South/Thyolo	Maize	Irish potatoes	Beans	Small dried fish
	Cassava		Bread	Eggs
	Sweet potatoes		Rice	Bananas
	Groundnuts		Beef	Cassava
	Bananas		Goat meat	Cowpeas
	Pears			
	Mangos			

[1] December through March.

Health and nutritional status of the sample

As noted in Section 3, the study drew a purposeful sample to obtain equal numbers of children classified as stunted and non-stunted. In the final sample for Phases 1 and 2, slightly less than half (47.5 percent) of children in the study were stunted. Of all the children sampled, 16.9 percent were severely stunted and 30.6 percent were moderately stunted (Table 8); 15 percent were underweight and 3.8 percent were wasted (Table 9). Children in the Southern region had the poorest nutritional status, with 6.6 percent of children wasted, an unexpectedly high figure given that data were collected during and following the harvest season. Of all children, some were overweight or obese (12.5 percent); overweight/obesity percentages were higher in the Northern and Central regions (Table 9). These data are consistent with findings from the most recent national surveys.[4,8]

Table 8. Nutritional status of children 6–23 months, Phase 1, and younger than 2 years, Phase 2; measured using length-for-age and Z-scores by region for all children in Phases 1 and 2 (n=160).

Region	Percentage of stunted children[1]		
	Severely stunted (<-3 SD)	Moderately stunted (3 SD to <-2 SD)[1]	Total stunted
Northern	12.8	35.7	48.5
Central	17.8	35.5	53.3
Southern	18.4	25	43.4
All children	16.9	30.6	47.5

SD = Standard deviation.
[1] Less than the median value for sex and age based on the 2006 WHO Child Growth Standards.

Table 9. Nutritional status of all children in Phases 1 and 2 (n=160): weight-for-age and weight-for-length and Z-scores by region.[1]

Region	Percentage of underweight children		
	Severely underweight (<- 3 SD)[2]	Moderately underweight (3 SD to <-2 SD)[3]	Total underweight (<-2 SD)[4]
Northern	0	7.7	7.7
Central	0	15.6	15.6
Southern	3.9	13.2	17.1
All children	1.9	13.1	15
Region	**Percentage of wasted children**		
	Severely wasted (<-3 SD)[2]	Moderately wasted (3 SD to <-2 SD)[3]	Total wasted (<-2 SD)[4]
Northern	0	0	0
Central	0	2.2	2.2
Southern	5.3	1.3	6.6
All children	2.5	1.3	3.8
Region	**Percentage of overweight or obese children**		
	Obese (>3 SD)[5]	Overweight (>2 SD to 3 SD)[6]	Total overweight/obese (>2 SD)
Northern	2.6	15.3	17.9
Central	0	17.8	17.8
Southern	1.3	5.3	6.6
All children	1.3	11.2	12.5

SD = Standard deviation.
[1] Based on the 2006 WHO International Growth Standards.
[2] <-3 SD below the median value for sex and age.
[3] 3 SD to <-2 SD below the median value for sex and age.
[4] <-2 SD below the median value for sex and age.
[5] >3 SD below the median value for sex and age.
[6] >2 SD below 3 SD of the median value for sex and age.

A total of 26 children (16 percent) were reported as ill by their mothers during the study (Table 4), with a few more sick children in Phase 1 than Phase 2 (data not shown). The higher illness rates in the Northern region did not translate into poorer nutritional status for the children. Most of the sick children had diarrhea or a cough. Several had rashes. Mothers reported coughs, colds, diarrhea, and malaria as the most common illnesses in children.

When asked, the majority of mothers said they thought their children were growing well. Half of mothers knew they were growing well because their child appeared well and/or was "playing well," while the other half knew their child was growing well because the child was gaining weight, as noted at monthly clinic visits, when their children were weighed. Most

mothers with stunted children were unaware their children were stunted. A few mothers commented that no one had ever measured their babies in this way or told them stunting was a problem.

Among the key informants who said they counseled and provided home visits to families, several relayed advice that is not consistent with feeding recommendations currently in use by the Ministry of Health. This was particularly true of TBAs, who reported that sick children should be given watery porridge to increase the volume of water in the body and should not be given *nsima* (maize porridge), as it is not appetizing. A few TBAs also counseled mothers to wait five hours to breastfeed their newborn, and that if a baby refused to breastfeed, it meant the baby was full.

Mothers in both research phases were asked if their child had received any of the child survival and nutrition interventions available in Malawi, such as the widely available twice-yearly vitamin A supplementation for children 6–59 months. Eighty-two percent of mothers said their children 6–23 months had received vitamin A in the previous six months. Thirty-two percent of children had received vitamin A during Child Health Week campaigns, 33.8 percent from community health centers, and 15.9 percent from hospitals. Coverage was lowest in the Central region, where only 75 percent of children 6–23 months had received vitamin A in the previous six months (Table 10).

Twice-yearly deworming for children 1–5 years is also available during Child Health Week campaigns. Less than half of all mothers (41.4 percent) said their children 6–23 months had received deworming medication in the last six months; however, the sample included children 6–12 months, an age group that does not receive deworming medication. Coverage would therefore likely be higher if only children 1–2 years of age were included in the analysis (Table 10). Coverage rates varied by region; only 32.4 percent of children in the Northern region had received deworming medication, compared to 47.5 percent of children in the Central region and 42.3 percent of children in the Southern region. Deworming may be targeted to the areas where helminth infections are a problem, which may account for the different coverage rates. While not often thought of as such, deworming for children is an important nutrition intervention.

Table 10. Children 6–23 months who had received a vitamin A supplement and children 12–23 months who had received deworming medicine in the previous six months and where these interventions were obtained; all children and by region.

	All children (n=145)		Northern region (n=34)		Central region (n=40)		Southern region (n=71)	
Variable	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**
Children who had received vitamin A supplements in the previous six months	82.1	119	82.4	28	75	30	85.9	61
Where supplement was obtained								
Hospital	15.9	23	11.8	4	20	8	15.5	11
Community health center	33.8	49	44.1	15	30	12	31	22
Outreach/Campaign	32.4	47	26.5	9	25	10	39.4	28
N/A	17.9	26	17.6	6	25	10	14.1	10

Variable	All children (n=145)		Northern region (n=34)		Central region (n=40)		Southern region (n=71)	
	%	n	%	n	%	n	%	n
Children who had received deworming medicine in the previous six months	41.4	60	32.4	11	47.5	19	42.3	30
Where medicine was obtained								
Hospital	5.5	8	5.9	2	7.5	3	4.2	3
Community health center	17.2	25	20.6	7	22.5	9	12.7	9
Outreach/Campaign	18.6	27	5.9	2	20	8	24	17
Other	0.7	1	0	0	0	0	1.4	1
N/A	58	84	67.6	23	50	20	57.7	41

Current feeding practices

On the day of the Phase 1 interviews, mothers were asked if there had been a celebration in their family or the village the day before the interview that might have affected the types of foods children had received. No mother in any of the three regions reported that such an event had occurred, so it is probable that the infant and young child feeding practices related by mothers represented normal feeding of children. Also of note is the time of year that feeding practices were being examined. Both phases of this research were conducted during the harvest season (May through September), when families typically have more food than during the December through March period, which is known as the lean season. While more food was available during the period of study, questions were asked about food availability and infant and young child feeding practices throughout the year.

Breastfeeding

Breastfeeding is almost universally practiced in Malawi. Only seven mothers among the 160 respondents reported that they had stopped breastfeeding their children. The practices reported below combine recalled practices (among the 60 mothers in Phase 1, no mother had a baby younger than 6 months) and recalled and actual practices (from Phase 2 mothers with infants 0–5 months). Discrepancies between recalled and actual practices are noted.

Early breastfeeding: Initiation, use of prelacteal feeds and colostrum, and breastfeeding frequency in the first month

Overall, about two-thirds of mothers initiated breastfeeding in the first hour after their baby's birth. The most common reason mothers gave for not initiating breastfeeding early included lack of support for initiating breastfeeding immediately after birth from the person who had delivered the baby, most often a TBA. Insufficient breastmilk was the second most common reason mothers did not breastfeed immediately after birth. Families believe that offering the mother some form of liquid such as tea or cow's milk helps produce milk. Raw cassava is also considered good for stimulating milk production. In a few cases, babies were allowed to sleep or the mother or baby had complications after delivery that delayed initiation of breastfeeding. Two such instances involved a mother who was not feeling well due to blood loss and an episiotomy and breastfed after an hour, and a mother who reported that her baby was delivered by Cesarean section at the hospital and was not breastfed until the next day.

Prelacteal feeds (foods or liquids given to the infant before breastfeeding is initiated) were not given by the majority of mothers. In the few instances in which it was reported, one mother said she gave a prelacteal concoction to "prevent disease," as recommended by her

TBA, and another mother gave the baby a half-teaspoon of oil soon after birth. Colostrum, which has high nutritive value and contains important immune factors, is the "first milk" breastfed babies receive in the first three days of their lives. In some cultures, colostrum is not valued, so it is discarded because it is visibly different from breastmilk. In this study, however, the majority of women reported having given their babies colostrum. Many mothers mentioned that they had received advice from hospital staff that colostrum was "good for the baby." Some women spoke positively about colostrum, noting that it contained vitamins that are good for the baby, and "this milk is very important for the growth of the child" and "it can prevent diseases." In the case of one baby to whom colostrum was not given, the TBA had advised the mother not to give it because it was "sour milk." Instead, the TBA recommended giving a prelacteal concoction.

In the first month of life, Malawian babies are breastfed frequently and on demand. Babies are breastfed at least seven times in 24 hours during the day and night, but the majority are fed many more times, often as many as 20 times.[†††] During the observations, mothers were often observed breastfeeding for short lengths of time (less than two minutes), and breastfeeding on only one breast, which does not optimize breastmilk production or may not provide enough nutrition for the baby. Few mothers reported problems with breastfeeding in the first month. The most common problem reported was that the baby cried often, which the mother interpreted as the baby being hungry because her breastmilk production was insufficient. This was also cited as the most common reason for introducing foods before 6 months of age. Breastmilk production can be increased by feeding more frequently and for longer periods of time.

Exclusive breastfeeding (0–5 months)

Exclusive breastfeeding in the first six months of life is recommended as the most nutritious and safest way to feed infants during this period. Among the 60 women who participated in Phase 1 of the study, less than one-tenth had not exclusively breastfed their infants during their first six months of life. (This was recalled behavior. No mother in the Phase 1 sample had an infant 0–5 months of age.) Many of the mothers who exclusively breastfed reported they were advised by health staff, and in one case a TBA, to practice exclusive breastfeeding because infants "are too young to receive anything other than breastmilk" and "only breastmilk is good for babies." Mothers were enthusiastic about their exclusive breastfeeding experience because babies were healthy, rarely ill, and grew well. Some mothers noticed that non-exclusively breastfed infants were sick more frequently than their babies. Many mothers reported that they breastfed exclusively because their child's intestines were not ready for any other food.

Among key informants, village chiefs and elder women mentioned giving breastmilk as the only way to feed infants less than 6 months of age. Others, such as teachers, TBAs, and HSAs, mentioned porridge as the desirable way to feed infants.

Mothers (less than one-tenth) who did not practice exclusive breastfeeding introduced other foods and liquids at 0–5 months. Warm water (one to two teaspoons per day) or sometimes tea were given by spoon (or hand), or plain watery porridge made from refined maize flour (*ufa woyera*) was given. Solid food was rarely mentioned as being fed to infants 0–5 months.

[†††] Infants should be breastfed eight to ten times in 24 hours in the first month of life. Higher daily frequency of breastfeeding does not mean that breastfeeding practices are optimal and may in fact indicate that breastfeeding episodes are too brief.

Exploration of exclusive breastfeeding practices during Phase 2, when more actual practices were reported, showed a different pattern. Among the 14 mothers with infants aged 0–5 months (all of whom were reported by the mother to be healthy), only six were exclusively breastfeeding at the time of the interview, or in other words, more than half the mothers were giving other liquids or foods to their infants prior to 6 months. It appears that small amounts of water were being introduced as early as the first week of life, but more commonly by month two or three. The two mothers who had introduced watery porridge did so when their infants were 3 and 4 months old. Among the mothers who were exclusively breastfeeding were the two with stunted infants, which suggests that while breastfeeding was exclusive, breastfeeding practices may not have been ideal. One infant was severely stunted after being born very prematurely. The team did not learn from the interviews if mothers were consciously avoiding the feeding of other foods or liquids or if it was their custom.

The majority of women in both samples who had introduced other foods or liquids before 6 months of age had done so because they believed they did not have enough breastmilk to satisfy their child. As mentioned previously, when the infant cried too much, particularly after a mother had breastfed, mothers believed the child was hungry or thirsty. Giving the baby water often increased during hot and humid times of year. If the mother perceived she did not have enough food at home or was hungry herself, this added to her belief that she did not produce enough breastmilk. In addition to the feeling that they were not producing enough milk, mothers might have been influenced by someone or have encountered problems breastfeeding, causing them to abandon exclusive breastfeeding. One mother introduced water, as advised by her TBA (who was also her grandmother), because “the baby can’t grow well without it.” Several women reported having sore nipples, although one woman said she treated herself and continued to exclusively breastfeed until 6 months. Women who did not exclusively breastfeed were asked if they would exclusively breastfeed their next baby, and most said they would try, but their success would depend on their ability to produce enough milk to satisfy their babies.

Mothers did not associate their breastmilk supply with demand from the infant. None of them mentioned that increasing the frequency and length of breastfeeding and breastfeeding equally from both breasts as the optimal and recommended practices for increasing breastmilk production and supply. However, as mentioned previously, a frequently reported belief among families is that eating raw cassava will increase milk production.

Among the sample in Phase 2, breastfeeding frequency was high among this age group. Several mothers breastfed about nine times day and night, but many breastfed many more times, from 15 to well more than 25 times within a 24-hour period. All mothers reported that infants were fed on demand. Cues for breastfeeding included the infants’ cries or a touch to the breast. Although breastfeeding was frequent, researchers observed that many mothers breastfed for short periods, sometimes for only one to two minutes at a time, and only from one breast per feeding session.

Continued breastfeeding (6–23 months)

Nearly all women continued to breastfeed their infants and young children during this period, and many seemed to rely on breastfeeding well into the second year of life as an important source of food for their children. Many reasons were expressed for continuing to breastfeed. Most frequently, women mentioned that they wanted their children to grow strong, healthy, and happy, or they wanted to prevent illness and malnutrition. Other frequent responses included: child was “still young” or “not grown-up enough,” or the child’s intestines were not

ready for food. Some women mentioned breastmilk was an important source of food because they lacked money to buy food, while others hoped breastfeeding would help them to avoid another pregnancy. A few mothers stated that it is “our nature” or “the Law of God” to breastfeed. Several mothers mentioned they had been advised by health personnel to continue to breastfeed.

The range of the frequency of breastfeeding during this period was large (seven to 25 times in a 24-hour period). The majority of mothers said they often breastfed when the child cried, or in the case of older children, when they gestured that they wanted to nurse. Mothers also used their judgment, and if “it seemed like the right time” because there had been a long interval since the last breastfeed or their breasts were full, they would nurse their babies. The majority of mothers said they stopped a feeding episode when their baby wanted to stop, although some mothers said they stopped the baby’s feeding themselves. Only one mother said that she stopped when her breasts felt empty. The field team observed frequent, but short feedings that ended when the child seemed content.

Although the combined sample of 160 mothers from both phases had few children who were close to completing two years of life, six mothers in the sample had weaned their babies. Of the six children in the sample who had been weaned, two were stunted. Only one was less than a year old, and the child had been weaned because the mother was HIV positive. This mother admitted she had stopped breastfeeding because she was HIV positive, and reported that her infant (9 months old at the time of the study) was also HIV positive. Whether or not she had stopped breastfeeding before she found out the baby was HIV positive is not known, but the research team suspected the child became malnourished after the mother stopped breastfeeding at 6 months and the baby was then tested for HIV. Three children between 12 and 18 months had stopped breastfeeding; two because the mother was pregnant again and one because the mother had developed sore nipples. Two children had been weaned at 21 months; one mother had breast sores and was advised at the hospital to stop breastfeeding “to avoid transmission,” and the other mother said she had stopped because the child was refusing the breast.

Looking at breastfeeding practices by age group and by stunted/non-stunted or sick/not sick yielded few differences in practices by these categorizations. For example, there did not seem to be a tendency toward over- or under-reliance on breastmilk by any group. Even with sick children, breastfeeding practices seemed to remain unchanged, perhaps because breastfeeding is a nearly universal practice and done with such high frequency in Malawi.

When mothers were asked at what age they planned to wean their children from the breast, the majority of women responded anywhere from 2 years up until 4 years of age. Only one mother responded that she would wean at 18 months because “the baby has teeth and will bite.”

Complementary feeding

The recommended practice is for infants to be exclusively breastfed in the first six months of life and introduced to solid foods starting at 6 months. At 6 months, babies need mashed, semi-soft foods, with new foods being tried on a daily basis. In the first year of life, babies need to be assisted with eating, and depending on the baby, parental assistance and supervision is needed to ensure the baby is eating the amounts and types of foods it needs. In Malawi, because nearly all infants and young children from 6–23 months are breastfed, any other foods added to the child’s diet can accurately be classified as complementary to the

nutrients in breastmilk. As seen above, the vast majority of children are being breastfed through their second year of life; and therefore, food is complementary to breastmilk. This study explored whether or not complementary feeding is adequate in Malawi and what influences feeding during this period.

Mothers are the most important decision-maker when it comes to what the child is fed, although in some households, primarily in parts of the Northern and Central regions, the father makes the decisions about what the child is fed; in other areas, both parents participate. All mothers reported that principally they fed the child and stayed with the child during mealtimes, although one mother reported letting her younger sister feed the baby when the baby refused to eat. During the observations, two grandmothers and one father took charge of feeding children, and sometimes children participating in the study were observed sharing the same plate of food with an older sibling.

Overall, most mothers believed that thin, watery foods were best for young children (especially younger than 10 months) and that thick foods, specifically, were not good for younger children because they might cause stomach aches or be difficult to swallow before teeth arrive. Mothers in general seemed very concerned with the digestion of foods, food consistency, and when certain foods should be fed based on how the child's intestines would react. Most mothers thought that thick foods were good for older children because they are more satisfying ("stay in the stomach longer") and give the child energy to grow. Only a few mothers did not think thin foods were good for any child and that thick foods should be given to younger children.

Introduction of liquids and solid foods (6–8 months)

The pattern seen in this study was of near exclusive breastfeeding for most infants, with the exception to exclusive breastfeeding being small amounts of water given to at least half the infants before 6 months of age. Some infants were started on a watery porridge (see above) before 6 months, but the norm was to begin at about 6 months.

Most infants in the sample, regardless of whether they were sick or stunted, were fed a watery porridge at 6–8 months. The porridge was prepared separately from the family's meal and made out of either *ufa woyera* (refined maize flour) or *ufa mgaiwa* (whole maize flour) that had been diluted. Porridge was seen as the most appropriate food for young children, although a thicker version was often eaten by other family members as a morning meal. At around 8 months, some infants were receiving *nsima* (a stiff preparation made from *ufa woyera* or *ufa mgaiwa* and water) made for the entire family but diluted with broth for the baby. There was a strong belief among mothers that small babies need only watery foods or liquids because they are easy to swallow and easier for babies to digest. Mothers feared thick food would be difficult for a baby to swallow and cause the child to vomit and have stomach pain or constipation. For this reason, dietary diversity at this age was extremely poor. Only a very few infants received foods other than maize. Primarily, the additional foods were bananas and biscuits. Two or three infants received oranges, groundnut flour, beans, milk added to tea, and Orange Squash (a sugary local drink).

The majority of mothers fed the first complementary foods to their infants two times a day, but at some point in the 6–8-month age period, at least half the infants were fed three times a day. Many mothers of children in this age group expressed concern about feeding children too early in the morning, when the intestines are "coiled" or "not awake," or too late in the

day, when the child is sleepy. Overall, the infants were eating about one-third cup, or four to six tablespoons of food, at each meal; quantities varied but never exceeded eight tablespoons.

It was difficult to determine differences in feeding for stunted and sick children in this age group. All diets seemed dilute and to lack diversity, but were offered correctly at two to three times a day. The only exception may have been the quantity of food offered. Sick and stunted children seemed to receive on average of about one-third cup per "meal."

Much of the advice that mothers received on the introduction of foods came from the hospital and health clinic staff or family members, such as grandmothers, but in some cases women said their husbands or they themselves decided what and when to feed their babies. When key informants were asked about the foods given to infants older than 6 months, HSAs mentioned porridge (*ufa woyera*, soy with milk, *ufa mgaiwa)*, fruit (bananas and papayas), *nsima*, cowpeas, *moringa*, and goat meat gravy. TBAs, teachers, village chiefs, and elder women mentioned fewer foods, mainly porridge and *nsima*, vegetables, groundnuts, and beans.

Transition to the family diet (9–11 months)

By about 9 months, children in Malawi start receiving a combination of porridge (perhaps one time a day) and *nsima.* Porridge for children of this age varies in thickness from very watery to moderately thick, and may have salt, sugar, or both salt and sugar added to it. Much of the porridge is made from whole maize meal (*ufa mgaiwa*), and in the best case, it has *nsinjiro* (groundnut flour), soy flour, or oil added. Children also receive thicker porridge made from whole maize. *Nsima* is often taken from the family pot at lunchtime and diluted with cooking water from vegetables or fish. Children in this age group are fed by both spoon and the mother's hands (usually the *nsima*). Observations indicated that hand-washing was not practiced frequently or thoroughly enough.

Foods other than maize that were eaten by children in this age range included groundnut flour, beans, fish, milk, fruit (bananas, oranges, avocado pears, and papayas), and some vegetables. Only a small number of infants received these foods, and usually in very small amounts. A distinguishing characteristic between the diets of stunted and non-stunted children in this age group was the variety in the diet (i.e, the dietary diversity was greater for non-stunted children than for stunted children). A higher percentage of non-stunted children consumed fruits and vegetables and a bean/fish and/or source of oil than stunted infants. Sugary biscuits, puffs, tea with sugar (and occasionally milk), and soft drinks were frequently consumed by infants in this age group regardless of their illness or nutritional status.

The majority of children in this age group were fed three times a day. Some of them received a snack once or twice a day. Snacks included biscuits, scones, and fruit. Quantities of food given at each feeding were often difficult to measure precisely, but they seemed to be at the lower end of an acceptable range. Non-stunted children appeared to receive about 125 ml to 180 ml per meal, while stunted children received about 90 ml to 120 ml per meal.

More children in this age group were experiencing episodes of illness than their younger counterparts. During illness, it appeared that mothers tended to change the consistency of the porridge they fed their infants, making it more dilute. Mothers also reported that they often gave tea, Orange Squash, or Fanta to sick children.

Feeding children in the second year of life (12–23 months)

During the second year of life, the children's diets continued the pattern started earlier, in which the principal foods included a combination of porridge (perhaps one time a day) and *nsima.* Porridge for children this age tended to be moderately thick, but not the thickness served to adults. In some instances, *nsinjiro* (groundnut flour) was added to the porridge or vegetables given to children. *Nsima* was consistently offered to children 12–23 months twice a day, and although it was often diluted with the cooking water from vegetables or fish, it more frequently contained the vegetables or fish. Children in this age group were fed by both spoon and the mother's hands, or they fed themselves (usually the *nsima*). Observations of hand-washing indicated that it was not practiced frequently or thoroughly enough.

In addition to the basic staples of porridge and *nsima*, children of this age received more foods from the family diet than their younger counterparts. Diet quality, as determined by the number of different foods served, seemed only slightly better for non-stunted, healthy children. Fish, sweet potatoes, rice, cowpeas, beans, groundnuts, and on occasion, eggs and meat were part of the diet. Fruit (bananas, oranges, mangos, and papayas) and snacks such as sweet biscuits, scones, chips, and puffs were present in the diets even of children whose mothers reported financial constraints. Mothers did not appear to have any understanding of the lack of nutritional quality of these foods. Other liquids offered at this age, in addition to breastmilk, included tea, sometimes with milk and sugar (a prestige drink); Orange Squash; and Coca Cola. Milk was given by only a few mothers, usually in the Northern region. Oil and fat were not common ingredients in the children's diets, except when *nsinjiro* (groundnut flour) was added to porridge or vegetables. *Likuni phala*, a fortified complementary food produced in Malawi and obtained from a nongovernmental organization, was mentioned as a food for the one stunted, sick child in this group. This mother reported she was HIV positive and had stopped breastfeeding when her infant was 6 months of age.

Observations of child feeding revealed that often foods consumed by the rest of the family were not offered to children 12–23 months. One mother said the foods served to her child were the same foods the entire family ate, but during observations, the child ate only porridge, while the mother ate chicken. In another household, potatoes were prepared for the household but not offered to the child, who did not finish his food.

Virtually all children in this age group were fed three times a day (a combination of porridge and *nsima*-based meals), and about half received snacks as well. In fact, snacks were more common in the Northern and part of the Central regions, where they were almost uniformly part of the feeding pattern of non-stunted, healthy children. Snack consumption fell off for children who were sick or stunted. The amount of food fed per meal varied tremendously in this age group, even independent of age. It seemed to range from about 90 ml to 240 ml. Often, mothers reported offering about a full cup of food (240 ml), but then said that the child ate only about half. Researchers also observed children not finishing the food that was offered. Leftover food was sometimes offered later, or it was consumed by either an older child or the mother. Amounts of food offered seemed to be consistently higher in the group of children who were not stunted and not sick.

The mothers of sick children said they tried to vary the diet a bit to make it more appetizing, but, with only a few exceptions, the diets of sick children did not look more diverse. Two mothers said they added margarine or oil to porridge to encourage the sick child to eat, and one mother gave fried fish to her baby.

When mothers were asked what children of this age should not eat, they gave a variety of answers. Children were not allowed to have mice, pork, or catfish in some households, although these foods are probably not consumed, on religious grounds, by any member of the household. Eggs were withheld from boys in several cases because they were seen to negatively affect physical development and cause disease; and withheld from both boys and girls because they were seen to cause hair loss. Raw cassava, sweet potatoes, and sugar cane were mentioned as foods young children should not be fed, because these foods are hard and difficult to chew and/or swallow and digest. Dry roasted maize was also reported as a food to avoid for children.

Feeding frequency and when to feed (6–23 months)
As stated above, most mothers reported feeding their babies complementary foods three times a day; however, feeding frequency varied from one to four times per day depending on age. Frequencies of one to two meals per day were found among infants 6–11 months, whereas all children 12–23 months were given at least three meals per day. The mother of a baby 6-8 months old who was fed only once a day explained that her child could become constipated if fed more. Another mother said she fed her infant twice a day because he "refused to eat in the evening."

Mothers seemed evenly divided on whether children should be fed on demand or on a schedule. Some mothers fed their children when they cried, or when they thought the children needed food (looked "weak and hungry") or enough time had passed since a previous meal. Other mothers seemed to adhere to a schedule, with children eating around family mealtimes—fed either right before the family meal or with the family.

When asked when it was **not** a good time to feed children, many mothers said in the early morning and in the evening. There was a common belief that the intestines are "coiled" when babies wake up, due to the cold, and feeding too early would cause a stomach ache. Other mothers said the body was not "free" in the early morning, or children had no appetite at that time, could vomit, or were sleepy. One mother said children could become constipated if fed in the morning, before passing stools, and another mentioned that it was not good to feed in the early morning because children would get used to eating all day. Some mothers reported that the evening was not a good time to feed children because they are sleepy or could get stomach pains, or because they have no appetite. Another group of mothers said any time was a good time to feed children: "Any time you can feed the child is a good time to feed."

Feeding of children of mothers who work outside the home
Most mothers worked outside the home several hours each day, in the field or at the market. Most of the mothers with younger babies (6–11 months) took their infants with them to work. Most relied on breastmilk while away from home, especially when they were away for short periods. Others fed their children porridge before leaving home, or cooked food in the field, especially when they were gone long hours. In some cases, infants were fed only upon returning home.

Mothers with children 12–23 months often did not feed children breakfast before leaving home, just breastfed, or gave children tea, and took snacks or bought snacks wherever they were. There were several cases of the child, usually older, sometimes being left at home in the care of an older sibling, grandmother, or other relative. These children were in a precarious situation, since they were usually fed only porridge and water. Other foods mentioned as given to children when their mothers were away were tea with milk and sugar,

Orange Squash, biscuits, puffs, and fizzy drinks. Only a couple of mothers, in the Northern region, mentioned that they took milk or left some at home for their babies while they were away. The practice of leaving breastmilk at home for children was completely unknown.

Among the key informants, HSAs and village chiefs mentioned that a major feeding problem was food not being left for the child when the mother left home for field work. Teachers mentioned that "mothers are busy with their income-generating activities at the expense of feeding their children."

Appetite and feeding during illness

Mothers recognized that appetite is an important determinant of overall food intake. Most mothers said that when the child is healthy, the appetite is good, and the "baby eats well and all the time" or "finishes everything on his plate." But some said their babies did not have good appetites, and "spit out" their food. Most mothers believed that when children refuse to take more food, they are full. When asked what they do when a healthy child does not finish or refuses food, some mothers said they first tried to encourage the child to finish the food, and if that did not work, they let it be. A few said they gave tea with milk, or fed more diluted porridge, or changed from a plate to a cup. A couple of mothers mentioned they forced their children to eat (although this was not observed). A few mothers blamed not eating on a poorly prepared or bland, monotonous diet, and said sugar and salt should be added to porridge to make it more appealing. Some mothers said they changed the food when their baby would not eat what was offered. When asked what makes a picky or fussy eater, a few mothers said "children are just born that way," but others said that it was due to illness or a poorly prepared or monotonous diet.

All mothers answered that illness is the most important factor affecting appetite. All but one mother with a child with a particularly robust appetite reported their children stopped eating during sickness or ate less. However, no sick child in the study had stopped eating complementary foods. Some mothers reported that they tried to vary the foods given to their children, or that they gave a special food during illness, often fruit, but also porridge, rice, biscuits, Orange Squash, and bread. However, the diet recalls showed that sick children ate less-varied diets and that, for younger children, the consistency of their food was more liquid. Mothers reported breastfeeding sick children more often, but breastfeeding frequency was so high normally that this was difficult to detect. Mothers avoided giving sick children cassava leaves with sodium bicarbonate, raw cassava and sweet potatoes, roasted maize, eggs, and cold foods. Some mothers mentioned taking children to the hospital to treat the illness as an important way to improve appetite when children are ill.

When asked if they fed their children more, less, or the same amounts during recovery from an illness, about one-quarter of mothers said they fed more or more frequently during recovery, and about one-quarter said they fed the same amounts and types of food. A few mothers reduced the amounts of foods given to children after illness and then gradually increased the amounts. Other mothers fed special foods or increased the energy density of the foods usually given to children. Some mothers said the reason they fed more or more frequently was so their babies would "gain weight."

Another important determinant of children's food intake is the way in which food is served or fed to them. Children typically need to be encouraged to eat because they can be easily distracted, they are sick, or they just do not "feel like eating—they are fussy." When the mothers were asked how they knew their children had had enough to eat, most responded that

the “child leaves food on the plate” or “eats well and then refuses.” During the observations, many mothers tried to make mealtimes a pleasant experience for their children, and used smiles, songs, and games to encourage children to eat. However, a few children were left to eat by themselves, without much supervision. During one observation, a baby was competing with an older sibling for legumes, and the mother did not intervene. In several households, older siblings asked for the baby’s food, but the mother made sure to feed the baby first. In some households, the baby’s leftover food was given to older siblings, and in some cases, it was eaten by the mother or discarded. During the observations, many children ate all the food on their plates, and were not offered more after they had finished. Some children did not finish their food and were not encouraged to eat more or offered other foods. Force-feeding was mentioned by a few mothers as a way to get children to eat, but typical force-feeding was not seen during the observations in homes. Force-feeding in this case seemed to be strong insistence, not physical force.

Dietary intake and food frequency of children 6–23 months

Assessment of the dietary intakes of children using the 24-hour recall method evaluates whether energy and nutrient requirements are being met for children at each age. Recalls were conducted during both phases of this study and included mothers of children 6–23 months. (Mothers of 0–5-month-old infants were not administered a 24-hour recall because their children should have been receiving only breastmilk and because they were questioned extensively about early introduction of foods.) A total of 60 recalls were conducted during Phase 1. During Phase 2 (TIPs), 24-hour recalls were conducted for each child 6–23 months of age at the initial visit and again at the follow-up visit. In other words, Phase 2 included two recalls per participant, one before the TIPs and one after. Below are the results of the first recall in Phase 2 (prior to the TIPs), which included 85 children. It is presented in combination with the results of Phase 1 to draw conclusions about the normal intake of children from the largest sample possible, and to compare children from the two samples. The *Pro*PAN software used for analysis of the dietary information uses the recommended nutrient intakes from WHO and the United Nations Children’s Fund (UNICEF) to evaluate the adequacy of intake.[14,20]

Frequently consumed foods

As Figures 1 and 2 demonstrate, different types of porridge made with *ufa mgaiwa* (whole maize flour) was the food most frequently fed to children in both the Phase 1 and Phase 2 study samples, although it was listed with more frequency in the Phase 1 sample. The most common preparation was whole maize flour with salt, but variations included porridge with sugar and salt; porridge with *nsinjiro* (groundnut flour); porridge with other flours, such as soy, rice, or bean; porridge with added fish or vegetables; or porridge with milk or oil. Children usually consumed vegetables or animal products in combination with *ufa mgaiwa* porridge or *nsima*. When “other types of porridge” (usually watery porridge made with *ufa woyera* [refined maize flour], but also rice, soy, sorghum, and cassava porridge) were added to *nsima* for young children, it was clear that maize foods accounted for more than half of the foods eaten by young children. When biscuits and other carbohydrate foods were added to maize-based porridge and *nsima*, the intake of carbohydrate foods accounted for 60 percent to 70 percent of the food consumed by children.

After accounting for maize (or other staple)-based porridges and *nsima*, vegetables were the next most frequently consumed food by children in this sample. Vegetables usually included some type of green leaf, such as pumpkin leaves, turnip greens, and mustard greens, with or

without groundnuts and tomatoes and sometimes with oil. Frequently, they were prepared with salt only. Legumes and groundnuts and fish were given almost as frequently as vegetables. Fruits followed, with the main fruit consumed being bananas; other fruits in season were tangerines, oranges, sugar cane, and papayas. Eggs were much less frequently given, and meat/chicken and milk were rarely consumed by the children in the sample. Of note: The consumption of fish and meat seemed to be higher in the Phase 2 sample. Although it was not counted in the analysis above, breastmilk was an important source of calories and nutrients, since most mothers breastfed their babies through 2 years of age.

Figure 1. Foods most frequently consumed by children 6–23 months, Phase 1.

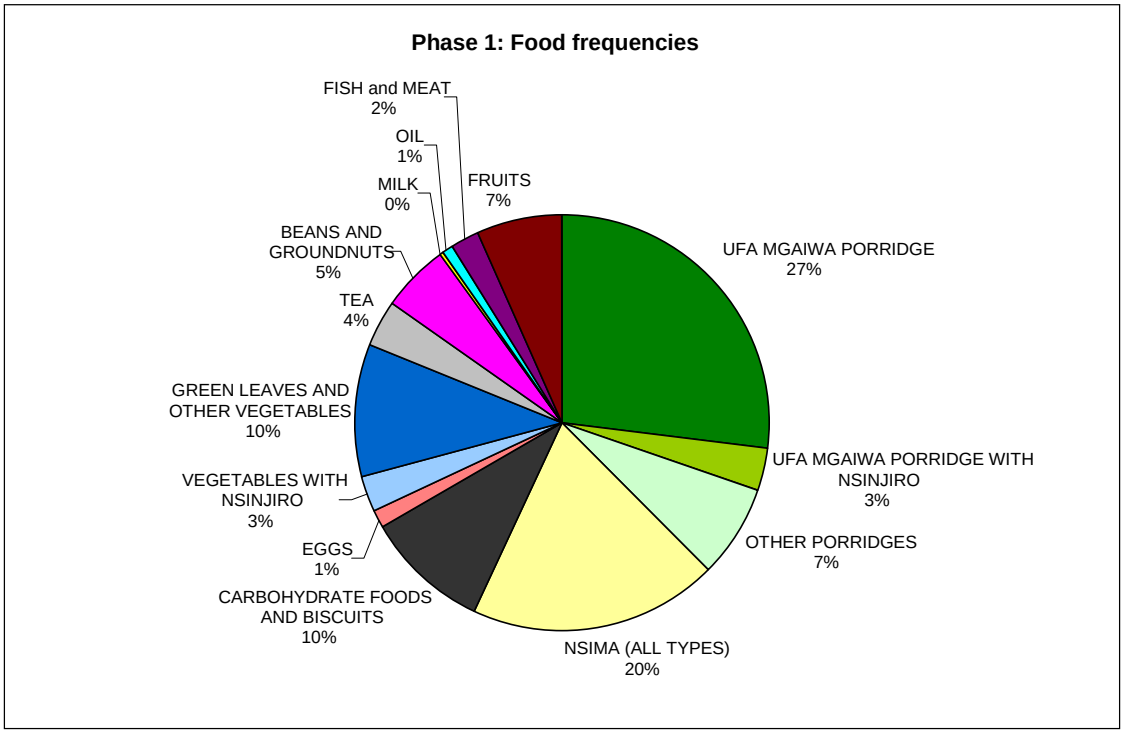
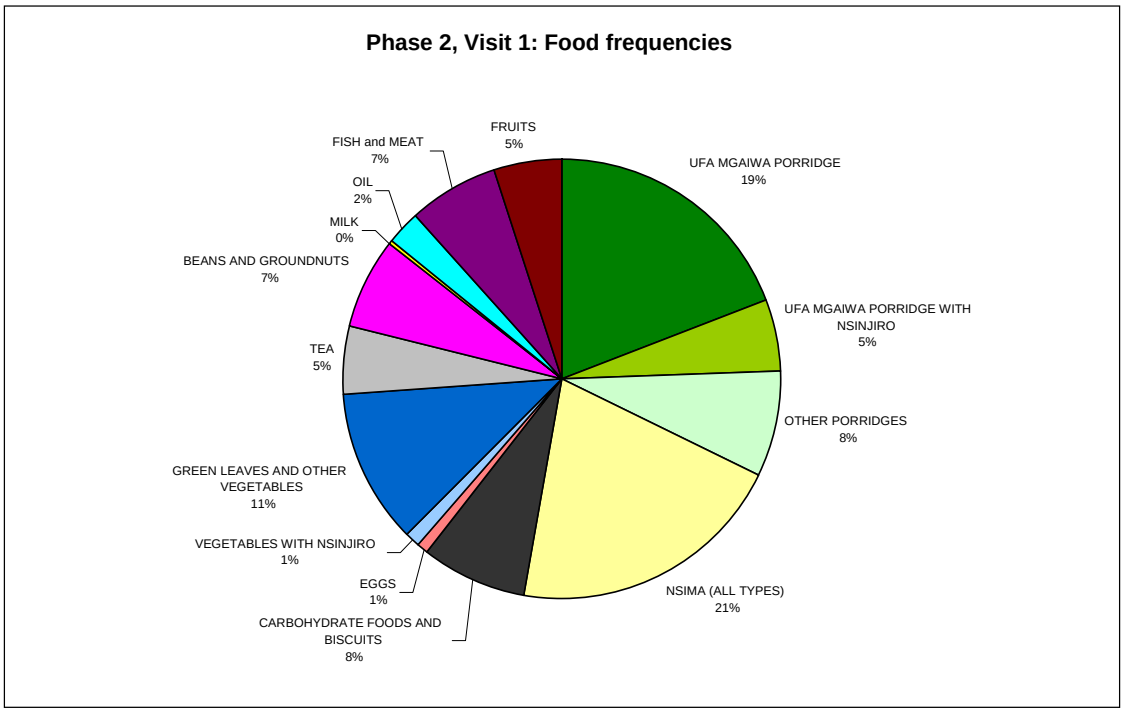


Figure 2. Foods most frequently consumed by children 6–23 months; Phase 2, first visit.



Description of nutrient intakes of children 6–23 months in the previous 24 hours

Table 11 below shows the nutrient intakes of the two samples of children. We considered energy adequate for the group if at least 50 percent of children consumed 100 percent of the median energy recommendation for age and lactation status, which was assumed to be an average amount of breastmilk being consumed by infants and young children at different ages. With regard to other nutrients, the intake of the group was considered adequate if 100 percent of the sample met at least 67 percent of the recommended intake for age and lactation status.[2]

Based on this standard, energy intake was low among the sample of children in Phase 1 (40 percent of children met 100 percent or more of the median recommended energy intake), and adequate among children in the TIPs initial visit sample in Phase 2 (60 percent met the recommended intake or more). This difference was unexpected, as the children were from similar villages and selected in the same manner; it may have been due to the difference in sample size, or because field researchers had less practice with the 24-hour recalls during the first phase. This difference may also be due to the different time of year when, for some reason, children were being fed a more energy-rich diet. The food frequency information shows a slight increase in the proportion of children receiving *ufa mgaiwa* porridge with *nsinjiro* (groundnuts), fish, and meat, and groundnuts and beans. The 24-hour recall results show higher intake of protein, iron, and zinc, which could be associated with sources of more energy-dense foods. There was also a difference in reported illnesses, with fewer sick children reported in Phase 2.

The children's diets in both phases were inadequate for all nutrients, including protein (although marginally), iron, zinc, vitamin A, vitamin C, and calcium, although it is important to note that *Pro*PAN does not adjust requirements based on the quality of protein or bioavailability of nutrients so adequacy is probably lower because protein quality and the

bioavailability of iron and zinc, for example, are more limited from plant-source foods. The nutrients for which only about half or fewer of the children were consuming 67 percent of their requirements in Phase 1 were vitamin A, iron, zinc, and calcium. Eighty-five percent of children in Phase 1 were consuming 67 percent of their requirement for vitamin C. There was a small increase in the proportion of children in Phase 2 meeting 67 percent of their requirements for all nutrients except vitamins A and C. Results also showed that 60 percent of Phase 1 children and 81 percent of TIPs children consumed the recommended number of meals daily. Among the few children who were no longer breastfeeding, the proportion fulfilling the required number of meals was much lower; it was also lower for children 12–23 months as compared to children 6–11 months old. About three-quarters of the energy (caloric) intake of these young children came from carbohydrates, and when fat was added, just greater than 90 percent of their energy (caloric) intake from food was from carbohydrates and fat.

Table 11. Results of the 24-hour recall analysis: Children who met recommended nutrient intakes and number of daily meals and mean intakes, Phase 1 and Phase 2 (TIPs) initial visits.

	Phase 1 (n=60)		Phase 2 (TIPs) initial visit (n=84)	
	Percentage of children who met 100% or more of median energy recommendation[1]	Mean intake (SD)	Percentage of children who met 100% or more of median energy recommendation[1]	Mean intake (SD)
Energy (kcal)	40	361.4 (250.7)	60	445 (258.6)
	Percentage of children who met at least 67% of recommended intake[2]	Mean intake (SD)	Percentage of children who met at least 67% of recommended intake[2]	Mean intake (SD)
Protein (g)	88	9.9 (7.2)	98	12.4 (7.9)
Iron (mg)	30	3.5 (2.4)	37	4.5 (3.5)
Zinc (mg)	47	1.6 (1.1)	58	2 (1.2)
Vitamin A (μg RE)	50	181.7 (312.9)	45	122.4 (220.6)
Vitamin C (mg)	85	14.8 (26.7)	83	13.5 (22.3)
Calcium (mg)	15	66.8 (79.7)	16	94.8 (152.9)
	Percentage of children who met recommended daily frequency of meals		Percentage of children who met recommended daily frequency of meals	
Meals/day	60	-	81	-
	Percentage of calories from carbohydrates	Mean intake (SD)	Percentage of calories from carbohydrates	Mean intake (SD)
Carbohydrates (g)	76.9	67.3 (46.1)	74	81.4 (46.6)
	Percentage of calories from fat[3]	Mean intake (SD)	Percentage of calories from fat[3]	Mean intake (SD)
Fat (g)	14.6	6.6 (7.7)	17	8.6 (8.6)

RE = Retinol equivalent.

SD = Standard deviation.

[1] If at least 50 percent of the children consumed 100 percent or more of the median energy requirement, it was considered that energy requirements were met at a group level.[2]

[2] Consumption of a nutrient by the group was considered adequate if at least 67 percent of the requirement of that nutrient was consumed by 100 percent of the group.[2]

[3] The recommendation for percentage of total calories from fat is: 34 percent, 6–8 months; 38 percent, 9–11 months; 42 percent, 12–23 months.[21]

Feasibility of obtaining "problem" nutrients from locally available complementary foods

Children's iron requirements cannot be easily fulfilled with local Malawian foods. The animal-source foods that were reported by the districts as available and affordable all year are fresh fish and/or small, dried whole fish. While the iron content of fresh fish is low, whole, dried fish, if eaten whole or ground into a fish powder, contains high amounts of iron and the iron has good bioavailability because of the presence of fish organs and gills in this food. Many green leaves are available, and while green leaves have good amounts of iron, the iron is not bioavailable unless small amounts of animal flesh—or in the Malawi case, dried, whole fish—are consumed with green vegetables. Iron requirements are set based on a mixed diet with at least 10 percent of the iron from a bioavailable source of iron (meat; organs; dried, whole fish). Zinc requirements could be satisfied by consuming more dried fish, but the amounts needed, at least for infants 6–8 months, are much higher than what is usually consumed. It is more feasible for the older age groups.

Among the problem nutrients, vitamin A appears to be the nutrient that is easiest to consume in the recommended amount from the local diet. This is because almost all children are breastfed, and there is a high content of vitamin A in breastmilk. For example, vitamin A requirements can be filled with small amounts of pumpkin leaves; dried, whole fish; or eggs (children 12–23 months must eat an entire egg). However, the fact that children have a very small amount of fat in their diets, which is needed for vitamin A absorption, must also be considered. Promotion of more fat-containing foods for small children, such as *nsinjiro* or vegetable relish prepared with oil, should not be overlooked. Calcium needs of infants could easily be fulfilled with dried, whole fish, because these fish contain bones and are very rich sources of calcium.

Summary of ideal feeding practices and the problems identified among sample children

At the end of the analysis of Phase 1, the feeding practices for each age group were reviewed and a summary of the key feeding problems compiled. Based on this review, a counseling guide was developed for use in Phase 2 to provide recommendations to mothers for their trials. After the TIPs initial interview in Phase 2, the feeding issues for each child were compared with the list and the counseling guide recommendations. If they coincided, researchers moved forward with the advice in the counseling guide. If not, the new issue was added to the list and a new recommendation formulated. Below is a summary of the feeding issues by age group. The counseling guide is included in the appendix.

The summary below is categorized by age group, with the ideal feeding practices followed by a summary of the feeding problems determined from analysis of the data collected during Phase 1 and the initial interview of Phase 2. Many feeding problems, especially those related to feeding a variety of nutrient- and energy-dense foods, are repeated across age groups.

Infants 0–5 months

Ideal feeding practices: Practice exclusive breastfeeding from birth; breastmilk without any other liquids or foods, on demand (whenever the child wants to), eight or more times, day and night. Use both breasts and empty them at each breastfeeding session.

Principal feeding problems

1. Early introduction of liquids such as water, tea, or watery porridge (although amounts were very small and not given frequently), which reduced breastmilk production, and the liquids were sources of pathogens that can lead to infection, particularly diarrhea.
2. Short duration of each breastfeeding, heightened because mothers did not use both breasts at each feeding, thus reducing the amount of hindmilk (last milk, which has a different nutritional composition than foremilk) received by their infants and lowering breastmilk production because breasts were not emptied.
3. Linked with the practices above, mothers believed they had insufficient milk when their babies cried after breastfeeding; mothers did not know to breastfeed for longer periods and more frequently to increase breastmilk production, or just believed that babies need water or other liquids or foods.
4. Some babies were not positioned correctly at breast.

Infants 6–8 months

Ideal feeding practices: Continue breastfeeding on demand, six to eight times per day (and night). Gradually introduce nutritious, mashed and semi-solid complementary foods at 6 months with the energy (caloric) density of breastmilk. Feed two meals per day (frequency for non-breastfed infants is four meals per day). Feed infants a variety of energy- and nutrient-dense foods (vegetables and fruits, sources of vitamin A, and foods prepared with fat). Add an animal-source food or beans (groundnuts, peas, soybeans). Increase the amount of food gradually, feeding the child about eight tablespoons (one-half cup or 120 ml) of food per meal by 8 months. Total calories required from complementary foods is 202, with average breastmilk intake (required intake for non-breastfed infants is 615 kcal). Practice responsive, patient feeding. Feed infants directly and encourage eating.

Principal feeding problems

1. Breastfeeding was for a short time and mothers did not empty both breasts at each feeding.
2. Initial complementary food was liquid or a very watery, starchy porridge, which did not have the desired energy (caloric) density.
3. Linked to the above, mothers had a strong opinion that foods with a thick consistency were not good for their babies' digestion, or that babies cannot swallow thick foods.
4. Porridge was seldom enriched with oil, vegetables, or animal-source foods, and only occasionally with groundnut flour or beans.
5. Quantities of food were not increased and were less than eight tablespoons (one-half cup or 120 ml) of food at each meal at 8 months of age.
6. Fruit was not provided daily.
7. Non-nutritive liquids (Orange Squash or fizzy beverages) and foods such as sugary biscuits were introduced.
8. Mothers did not encourage children to eat.

Infants 9–11 months

Ideal feeding practices: Continue frequent breastfeeding on demand, day and night (at least six times). Feed nutritious meals with a variety of foods, including *nsima* with pounded,

mashed/chopped foods. Feed three meals per day (frequency for non-breastfed infants is four meals per day). Feed infants a variety of energy- and nutrient-dense foods (vegetables and fruits, sources of vitamin A, and foods prepared with fat). Feed infants an animal-source food or beans, groundnuts, peas, or soybeans daily. Serve about eight tablespoons (one-half cup or 120 ml) to 12 tablespoons (three-quarters cup or 180 ml) per day when a child is approaching 1 year of age. Total kcal required from complementary foods is 307, with average breastmilk intake (required intake for non-breastfed infants is 686 kcal). Practice responsive feeding, encouraging children to learn to eat. Feed infants directly and assist older children to eat from their own plate.

Principal feeding problems

1. Breastfeeding was frequent, but for a short duration at each feeding, so mothers did not empty their breasts.
2. Food was not of proper energy (caloric) density; it was too watery, and oil or another source of fat or energy was not included.
3. Mothers offered "thin" staple foods based on the belief that solid foods are difficult to swallow and digest and cause constipation.
4. Food was offered less than three times per day. Children were not fed a meal at breakfast, just tea or a snack or breastmilk because mothers had to get to work in the fields early and took their children with them, and because mothers believed that children cannot take food early in the morning.
5. Less than eight tablespoons (one-half cup or 120 ml) of food was offered at each meal.
6. No animal-source food was offered to children, with the exception of fish on occasion.
7. Vegetable intake was low even though available (babies often received only the cooking water from vegetables).
8. Non-nutritive liquids and foods (Orange Squash or fizzy beverages, puffs) were given as snacks.
9. Feeding styles were poor. Mothers did not stay with children during meals, so food was wasted or eaten by older children, especially when the feeding bowl was shared between two or more children.
10. Mothers did not encourage children to eat all their food, or children finished their food and still looked hungry but were not given more.
11. Mothers did not wash their hands or their children's hands before a meal.
12. Children were not fed fruit daily.

Children 12–23 months

Ideal feeding practices: Continue frequent breastfeeding on demand, day and night. Feed family foods with an adequate texture for age. Feeding frequency per day: three meals and two snacks (frequency for non-breastfed children is four to five meals per day). Feed children a variety of energy- and nutrient-dense foods (vegetables and fruits, sources of vitamin A, and foods prepared with fat). Feed children meat, poultry, fish, or eggs daily (or beans, groundnuts, peas, soybeans). Serve children about one cup (16 tablespoons or 240 ml) of food per meal. Total calories required from complementary foods is 550, with average breastmilk intake (required intake for non-breastfed infants is 900 kcal). Practice patient,

responsive feeding, encouraging children to eat. Feed infants directly and assist older children to eat from their own plate.

Principal feeding problems

1. Starchy staples were a dietary mainstay and lacked a source of oil or fat or other energy-dense nutrient.
2. Less than one cup (16 tablespoons or 240 ml) of food was offered at each meal.
3. An animal-source food such as meat, fish, eggs, or milk was not offered daily. Children were given fish water or sauce but not the fish, or fed less than three tablespoons of meat or fish.
4. Vegetables, although available, were not offered daily or were given in small amounts (less than three tablespoons).
5. Breastfeeding was frequent but for very short periods, and from one breast while the mother worked.
6. Less than three meals were given per day because the morning meal was often just a snack or tea because mothers left for the field early and took their children with them.
7. Snacks were not provided during the day (or children were not fed two snacks).
8. Fruit was not provided daily.
9. Non-nutritive liquids or foods such as tea with milk and sugar, Orange Squash or fizzy beverages, puffs, and chips were offered, particularly as snacks.
10. Feeding styles were poor. Mothers did not stay with children during the meals and did not react when children did not finish their food or when a sibling ate the child's portion. There was little encouragement for children to eat.
11. More food was not offered when the child finished the food served.
12. Eating with hands was common, but hygiene regarding hand-washing was not uniformly observed for mothers or children.

Sick children 6–23 months

Ideal feeding practices: During illness, continue with the regular diet to the extent possible. If not possible, offer breastmilk more frequently; if not breastfeeding, offer other liquids more frequently, especially when children have diarrhea. Change the food to something soft or a favorite food. Offer food more frequently, but expect less to be eaten per meal. Patiently encourage children to eat. After illness, feed children extra food until they are growing well. Offer recovering children special food that is nutrient dense and will help recuperate lost nutrients.

Principal feeding problems

1. Child's food was immediately changed to a liquid.
2. Concern for feeding during illness and encouraging feeding was not high; it was understood and accepted that children do not eat well during illness.
3. More frequent feeding and feeding a greater amount of food did not occur after illness.
4. The concept of special foods was acceptable, but these foods were not offered.

5. Findings: Trials of improved practices

Results by age and specific recommendation

This section describes the results of the TIPs conducted in Phase 2. Results are presented by age group and describe the recommendations offered to mothers as well as mothers' experience with attempting to follow them. Recommendations were selected based on information gathered in the first home visit and the assessment of the major feeding problems for each child. The initial recommendations offered to mothers came from the counseling guide that was developed after the information on current practices for each mother was summarized and analyzed (see Section 4). The process of giving the recommendations was one of negotiation; each mother was given the opportunity to accept or refuse to try what was suggested or to offer modifications of her own to what she would be willing to try. Most mothers tried more than one recommendation, although they usually did not try more than two distinct recommendations. More than two recommendations were offered if they were linked, like giving green leaves made with *nsinjiro* or stopping the use of soda and offering fruit instead. During the follow-up visit, about a week or ten days after the trial period began, each mother was interviewed again to find out whether or not she tried and was successful with the new practice, or if she modified the recommendation in any way to make it more feasible, or if she abandoned the practice. Within the section for each age group, the recommendations and their results are summarized in a table format and then discussed in detail. In the summary, the trials from all regions are grouped together because there were few differences by region. Where any differences were found, they are noted in the detailed discussion.

Infants 0–5 months

A total of 15 mothers with infants 0–5 months participated in the trials (five in the Northern region, five in the Central region, and five in the Southern region). Breastfeeding practices did not vary much by region. The three main feeding challenges for mothers with infants 0–5 months were: (1) They generally started feeding their infants water and/or porridge before they had reached 6 months, abandoning exclusive breastfeeding; (2) each breastfeeding was of very short duration, not long enough to fully satiate the baby; and (3) they did not use both breasts and the baby was frequently positioned incorrectly at the breast. Based on this information, the three recommendations presented in the summary table and discussed in detail below were developed and given to each mother based on her specific feeding challenges. Fourteen mothers out of 15 completed their TIPs; that is, they received all three TIPs visits.

Table 12. Summary of TIPs recommendations and outcomes for infants 0–5 months of age.

Recommendation	Offered	Accepted	Tried	Succeeded*	Modified
1. Refrain from giving liquids and foods other than breastmilk to your baby; breastfeed when baby cries.	10	10	10	10	0
2. Take more time to breastfeed at each feeding; use both breasts at each feeding and feed until the breasts are soft and empty.	9	9	9	9	0
3. Support the breast in c-shaped form so that the baby gets more milk; hold the baby and be relaxed while breastfeeding.	4	4	4	4	0

* Indicates adoption with complete success, without modification.

Detailed description of trials

Recommendation 1: Refrain from giving liquids and foods other than breastmilk to your baby 0–5 months old; breastfeed when baby cries.

A total of ten mothers of the 14 who completed the trials needed to return to exclusive breastfeeding and so were given this recommendation. All of them accepted, tried, and succeeded in adopting it. The recommendation was tailored to each mother; seven mothers were counseled to refrain from giving their babies water, and three were told to refrain from giving porridge. In both instances, mothers reported similar motivations for stopping their current practice; therefore, reported findings do not distinguish between water and porridge.

The only concern several mothers stated prior to the trial to return to exclusive breastfeeding was if their children would be able to take medicine in the hospital, should they become ill. This concern was addressed by the researcher (if medicine was indicated, the child could take the syrup or other liquid).

Mothers reported that they liked having the knowledge that breastmilk is sufficient and contains enough water for babies, noting that they did not realize previously that babies do not need additional water. They reported that their babies cried less, appeared to take more milk, and did not seem to suffer from stomach pains or diarrhea as frequently. Mothers also noted that their infants seemed to be happier and sleep longer, that feeding was easier, and that their babies did not show any ill effects after withdrawal of water, such as becoming sick or appearing thirsty. Some mothers also reported appreciating the time that they saved not having to prepare porridge for their infants.

None of the participants reported modifying the recommendation. They indicated a high level of support for adopting the recommendation from other family members in general (mothers-in-law, husbands, grandparents, friends), but a few indicated that some of their friends told them it would be a challenge.

All mothers stated that they would continue with the practice until their children reached 6 months of age and would recommend it to others. They indicated that the example of their sated, healthier children would be the most powerful method of convincing others that babies do not need additional liquids or foods before 6 months.

Recommendation 2: Take time to breastfeed for longer each time to fully fill up the baby (use both breasts at each feeding and feed until the breasts are soft and empty).
A total of nine of the 14 mothers who completed the trials were given this recommendation. All nine agreed to try it, did in fact try it, and were successful without any modifications.

Most of the mothers who tried this recommendation reported that their milk production increased and they were better able to satisfy their children. They noted that their children cried less often, slept better, did not have colic, and seemed happy. They noted that they did not previously know they should use both breasts at each feeding and that it seemed to help the children "fill up."

Some women indicated that it was challenging to feed for long periods of time, especially when they worked and were required to attend to customers, but even these women were able to complete the trial successfully.

All the women said they would continue the practice, mostly as a means of ensuring that their babies continue to grow well. They also said they would recommend the practice to others, including family members, noting that their own babies would provide powerful incentives. They also noted they would pass along their new knowledge of emptying both breasts, as it was not seen as something widely known.

Recommendation 3: Support the breast in c-shaped form so that the baby gets more milk; hold the baby and be relaxed while breastfeeding.
Four of the 14 mothers who completed the trials needed to improve their breastfeeding style and were offered this advice. All four mothers given this recommendation agreed to try it, tried it, and were successful in adopting it without modification.

Mothers reported that their infants were able to stay at the breast longer and feed without choking using this position. They also reported that their babies did not cry as much as before and slept better/longer. They said they felt children got more milk using the new position, and while perhaps they fed less frequently, each time was longer in duration.

The social support for this recommendation was also strong; the women in the sample reported that others in the village validated this position as the right one for breastfeeding. They also indicated that their husbands were supportive and encouraging of finding the best way to help their babies grow well.

The mothers said that they would continue the practice, noting that they appreciated the fact that their babies were getting more milk and sleeping better as primary motivations. They also noted that they would recommend the practice to others through showing them how helpful it is.

Conclusions
The trials to improve mothers' practice of exclusive breastfeeding were successful; there were no major impediments, and the women indicated that lack of information and perhaps demonstration were the major barriers to more optimal breastfeeding. However, it was hinted that women's need to attend to chores or to their work might need to be addressed directly in any future program. In general, the social support for all three recommendations was high. These recommendations, therefore, are feasible for mothers to adopt and sustain and were reinforced because infants seemed to be happier, healthier, and to cry less and sleep longer

because of the new feeding practices. Mothers also found that their babies did not show any ill effects from these new feeding practices. Further, peer groups should be leveraged to capitalize on social support for the recommendations when scaling up widespread implementation in communities.

Infants 6–8 months

A total of 28 mothers with infants 6–8 months participated in the trials (five in the Northern region, seven in the Central region, and 16 in the Southern region). The main feeding challenges for mothers with infants 6–8 months were: (1) Breastfeeding was for a short time and mothers did not empty both breasts per feeding; (2) initial complementary foods were liquid or very watery, starchy porridge, which lacked the necessary energy (caloric) density and was seldom enriched with oil, vegetables, or animal-source food and only occasionally with groundnut flour or beans; (3) quantities of food were less than eight tablespoons (one-half cup or 120 ml) at each meal at 8 months of age; (4) fruit was not provided daily; (5) non-nutritive liquids (Orange Squash or fizzy beverages) were introduced; and (6) mothers did not encourage their children to eat. The recommendations below are reported in order by the number of mothers being offered the advice in order to provide an idea of the priority for different pieces of advice.

Table 13. Summary of TIPs recommendations and outcomes for infants 6–8 months of age.

Recommendation	Offered	Accepted	Tried	Succeeded*	Modified
1. Give your baby a portion of fish or meat (at least two tablespoons) instead of the broth, daily.	21	21	18	17	See discussion
2. Add mashed vegetables (at least two tablespoons) from those cooked for the family (pumpkin or leaves, dried vegetables, tomatoes) to your baby's porridge or soft *nsima.*	13	13	13	12	0
3. Increase the amount of food you give your baby at each meal (goal of eight tablespoons).	13	13	13	13	10
4. Feed your baby a "combined" thick, mashed food: thick porridge with *nsinjiro* or an egg or sweet potato, or cowpeas. Do not give watery porridge or porridge made from cassava flour.	12	12	10	10	0
5. Offer a piece of fruit, mashed, daily.	12	12	9	9	4
6. Take more time to breastfeed at each feeding; use both breasts at each feeding and feed until the breasts are soft and empty.	11	11	11	11	0
7. Stop giving your baby sugary drinks and foods and offer fruit or potatoes or an egg instead.	7	7	7	7	0
8. Add *nsinjiro* or avocado pear to your baby's porridge everyday.	6	6	6	6	0
9. Stop using a feeding bottle; use a cup instead.	1	1	0		

* Indicates adoption with complete success, without modification.

Detailed description of trials

Recommendation 1: Give your baby 6–8 months a portion of fish or meat (at least two tablespoons) instead of the broth, daily.

A total of 21 mothers of the 28 with children 6–8 months of age completed the trials needed to enrich their infants' first foods with fish or meat (not just the broth they were cooked in) and so were given this recommendation. All of them accepted the trial, although as part of the initial negotiation, a modification was offered and accepted that eggs could be used. Of the mothers who agreed to try, 18 tried and 17 succeeded in adopting this new practice, although it was not clear that they all followed the practice on a daily basis. Although not recorded precisely, it seemed that because of the modification to the recommendation and mothers' reasons why they wanted to make the modification, the practice could be done by some only several times a week, not daily.

Of three mothers who accepted the new recommendation but did not try it, two found that they did not have the money for fish or eggs and the other said she did not feed the fish she had because she could not be sure that even after pounding the fish, all the bones were gone. Of the 18 mothers who tried the practice, one did not complete the trial successfully and stopped because her child started to vomit. She believed the vomiting was likely due to overeating and not to the "fish flour" (ground, dried, whole small fish) in the porridge, but she stopped the practice anyway, although said she would try the recommendation again.

The mothers who were successful in adding these animal-source foods to their children's diets during the trial period reported that they were pleased because their children ate their food extremely well and learned how to eat new foods, and it gave them a new way to prepare food. They said their children did not vomit (with one exception), become constipated, or show any stomach pain. The only complaint mothers had was that fish and eggs can be expensive, and therefore, difficult to offer more than about three times a week. Meat seemed to be the food used least of the choice of fish, meat, or eggs.

Most people with whom the recommendation was discussed were supportive, especially fathers. Fish was the food of choice because many people recognized that since fish was readily available, it was not expensive. Several people said they would fry the fish first and then pound it, and even though it did not look right to them, they agreed to feed it. The mothers said they would continue to follow the recommendation because their children tolerated receiving animal-source foods. Another facilitating factor for following the practice was that children ate better, which mothers related to their children being healthy and growing well. However, many said they could not follow the practice more than three or four times a week.

Mothers said they would tell others about the practice, noting that children would finish all the porridge and grow strong and healthy, and that even if children vomited the first time, they would adjust to the new food. Several mothers said that they would demonstrate the new practice for their friends.

Recommendation 2: Add mashed vegetables (at least two tablespoons) from those cooked for the family (pumpkin or leaves, dried vegetables, tomatoes) to your baby's (6–8 months) porridge or soft nsima.

A total of 13 mothers out of 28 with children 6–8 months of age needed to enrich their infants' first foods with a vegetable, and were given this recommendation. All 13 mothers accepted and tried the new practice, and 12 mothers succeeded in adopting it.

The one mother who did not continue the practice of giving vegetables said she did not understand how to prepare them, and she found it difficult so she stopped. A few other mothers said that although they continued the practice, they did not always have enough vegetables for the entire family to increase the amount they fed to their infants.

The majority opinion was that giving young children vegetables was easy, since vegetables are readily available and babies liked and finished their porridge when vegetables were added, without having any stomach problems. Mothers were able to follow the advice to give two tablespoons of vegetables, although the precise amount was not confirmed in all cases. What was overwhelmingly apparent was that parents were anxious to do anything to help their children eat and grow healthy.

Mothers said they would continue to offer vegetables with porridge for the health of their children and for "good blood." Several mothers were already recommending the practice to others, and said that people do not know about giving vegetables. Other mothers said they would recommend the practice without hesitation.

Recommendation 3: Increase the amount of food you give your baby 6–8 months at each meal (goal of eight tablespoons).

A total of 13 mothers out of 28 with children 6–8 months of age needed to increase the amount of food they were offering their children at each meal, and so they were given this recommendation. All 13 mothers agreed to try the new practice and all of the mothers who accepted, tried and succeeded in increasing the amount they fed, although there were modifications to the recommended amount they were able to feed their children.

Amount of additional food	1 tablespoon	2 tablespoons	3 tablespoons	4 tablespoons
Proposed	0 mothers	6 mothers	5 mothers	2 mothers
Actual	6 mothers	4 mothers	2 mothers	0 mothers

Original goals set for the mothers: six mothers were to try to increase the amount fed by two tablespoons, five mothers to increase the amount by three tablespoons, and two mothers to increase the amount by four tablespoons. Increases reported by the mothers after the trial: six mothers increased by one tablespoon, four mothers increased by two tablespoons, and two mothers increased by three tablespoons. Only three mothers with goals of increasing by either two or three tablespoons were able to offer the amount of additional food recommended. The rest of the mothers gave less than the goal that was set for them, but more than they had been giving.

The mothers reported having no problem increasing by at least a few tablespoons the amount of food they fed and that their children seemed satisfied and to be eating better and finishing their food. Several reported already seeing a change in their child's behavior, including babies being more content, healthy, and stronger. The mothers all reported that they would encourage other mothers to do as they were doing and said they would show other mothers how much food to give. Several mothers claimed that this was new information for them.

There was much family support for this recommendation from both grandmothers and fathers. Friends who heard the advice were also positive about the new practice, saying that children need to be encouraged to eat and need to receive the amounts of food necessary to be satisfied and to grow.

Recommendation 4: Feed your baby 6–8 months a "combined" thick, mashed food: thick porridge with nsinjiro or eggs or sweet potatoes, or cowpeas. Do not give watery porridge or porridge made from cassava flour.
A total of 12 mothers out of 28 with children 6–8 months of age offered only a watery porridge, sometimes made from cassava flour (in the north), and needed to offer a maize porridge or *nsima* that was thick and not watery and included a soft, mashed food. All 12 mothers accepted the trial, but only ten mothers who accepted tried the recommendation. All ten who tried the practice succeeded in offering more energy-dense foods.

Both mothers who were unable to implement the recommendation lived in the Central region. One mother said that when she tried to add beans to the porridge, they would not mix in and her child refused the food. The other mother reported that she could not get groundnut flour to make her child's porridge thicker.

The mothers who succeeded in offering thicker foods did so most frequently by adding beans, *nsinjiro*, an egg, dried vegetables, or cowpeas to the porridge. One mother started giving *mgaiwa* porridge and another gave *nsima*. In the north, mothers reported they needed more money to buy maize instead of cassava flour. Mothers were unanimously positive about the new practice, saying that their children were energetic, satisfied, and full, and slept longer because they did not feel hungry. A few mothers said that they had been worried at first about switching to *nsima*, but that their children had eaten it well; the mothers were happy with the result. One mother reported that her child who had diarrhea got better once he started eating the thicker food with *nsinjiro*.

There was a strong social response to this recommendation, with many people agreeing that thick foods would stay longer in a child's stomach and prevent hunger. One woman reported that she had seen people in the city feed their children with thick food and so she wanted to try it because city babies are healthy. Mothers said they would continue the practice they had begun with the thicker food and adding beans or *nsinjiro* because their children were less demanding of other food and they played for longer periods. Mothers also said that children did not refuse the food as they had expected. Several mothers mentioned that they had already started talking with other mothers about this recommendation and those other mothers were showing interest in trying the new practice. One mother said she would demonstrate to other mothers how to mash the beans.

Recommendation 5: Offer a piece of fruit, mashed, daily, to your baby 6–8 months.
A total of 12 mothers out of 28 with children 6–8 months of age were not offering fruit regularly and so were asked to give their babies a piece of fruit everyday. All 12 mothers accepted the trial, but only nine mothers who accepted tried the recommendation. All nine succeeded in offering fruit. The main fruits offered were bananas, tangerines, and papayas. Four mothers modified the recommendation to frequent but not daily offerings of fruit due to availability issues. They were able to offer fruit two or three times a week.

The three mothers who were not able to practice the recommendation (two were in the Central region) said that they could not do so because they did not have money to buy fruit, and one mother said the bananas she was growing were not ripe. One of the mothers seemed resistant to all suggestions about improving her child's diet because she also refused other trials.

The mothers who successfully gave fruit reported that the children took the fruit well and often cried for more. Grandmothers and fathers were supportive of the practice, and at least three fathers gave the mothers money to purchase fruit. The mothers said that they would continue to give fruit, especially when it is in season, because fruit helps with constipation and will "increase the blood level." There was unanimous agreement that this was an important practice to spread among other mothers because fruit is important to the health of children.

Recommendation 6: Take more time to breastfeed your baby 6–8 months at each feeding; use both breasts and feed until the breasts are soft and empty.

A total of 11 mothers out of 28 with children 6–8 months of age were not breastfeeding for long enough at each feeding, so were asked to breastfeed longer, using both breasts until soft and empty. All 11 mothers accepted the trial and all completed it.

The reaction to the trial was overwhelmingly positive. Several mothers said they just did not know how long they should breastfeed or to breastfeed from both breasts. They reported positive outcomes, including their child slept longer, they could do their work without disturbance, they produced more breastmilk for the baby, and their child did not fuss and cry.

The mothers said they received good support from family and friends to try the new practice and that they were going to continue the practice because they could see that it was good for their children. At least four mothers said they had already started talking with other mothers about their experience with longer breastfeeding, and the reception was positive because the mothers were anxious to find a way that they could have more time to do chores without the baby crying.

Recommendation 7: Stop giving your baby 6–8 months sugary drinks and foods and offer fruit or potatoes or an egg instead.

A total of seven mothers out of 28 with children 6–8 months of age were offering their babies soft drinks or sweet biscuits instead of more nutritive foods like fruit, eggs, or porridge with *nsinjiro*, so were asked to stop giving the fizzy drinks and biscuits in favor of more nutritious foods. The majority of the mothers who received this recommendation lived in the Southern region. All seven mothers agreed to and actually tried the recommendation, and they were successful.

Overall, mothers agreed that sugary foods can introduce disease, so they liked the idea of offering other foods. A few mothers said that they were hesitant to introduce fruit because they believed fruit causes digestive problems, but giving fruit was accepted well by the babies, especially when mothers mashed the fruit instead of giving it in pieces. One mother noted that when her child had a banana, she did not cry for tea; this mother reported she stopped giving her child tea entirely.

The mothers received strong support from family members for trying the new practice, and they all agreed to continue the practice. There was strong support for using the money saved by not buying biscuits and Orange Squash to buy fruit. Mothers reported they were already telling their friends that tea does not have any vitamins, and fruit is better for babies. Mothers also were telling their friends that Orange Squash is more expensive than oranges. A few people with whom the mothers spoke about the new practice said that even though biscuits are less nutritious, they would continue to give them to their children to keep them happy.

Recommendation 8: Add nsinjiro or avocado pear to your baby's (6–8 months) porridge everyday.
A total of six mothers out of 28 with children 6–8 months of age needed to add a source of energy (calories) (fat) to their child's food and were asked to added *nsinjiro* either directly to or mixed with vegetables or a piece of avocado pear. All six mothers accepted the trial, and all completed it using *nsinjiro,* but not avocado pear.

The mothers reported that their children were eating well and more than before they added the *nsinjiro*. They got support for the practice at home from some of the grandmothers, who said that they would prepare the groundnuts as flour. One modification was made by a few mothers: they said they could not follow the practice everyday because they did not have enough groundnuts. The mothers said the most important thing to tell other mothers is that following this practice is a good way to avoid malnutrition and have a child who grows well.

Recommendation 9: Stop using a feeding bottle to feed your baby 6–8 months; use a cup instead.
One mother of 28 was offered this advice because she left a bottle to feed her child when she was out of the house. However, although the mother agreed to try to use a cup, she did not try because during the period of the trials, she did not leave her baby at home.

Conclusions
The almost universal success with the trials demonstrates that it is possible to improve the diets, and therefore the nutrient intake, of babies 6–8 months of age as they start to eat soft complementary foods. Many of the recommendations touched on the need to thicken food for children in this age group, and to ensure that *phala* (porridge) is enriched. The results showed that it is possible for mothers to offer a thicker porridge and to add vegetables with *nsinjiro* (groundnut flour). A program goal should be to include this mixture as a staple food for young children. Emphasis should be placed on adding an animal-source food to this staple food made out of maize porridge and thickened with groundnut flour. This practice needs reinforcement and follow-up to help mothers and other family members plan how they can achieve this at least several times a week. Eggs and fish were the most common animal-source foods that could be added. Adding dried, whole fish powder (a good source of protein, calcium, zinc, and iron) to porridge, which seems to be available in most districts, is the preferred kind of fish to add. In addition, most mothers need to be encouraged to add an additional two tablespoons of food at each meal and to breastfeed more fully, using both breasts at each feeding. Feeding children a piece of fruit and not feeding sugary drinks and biscuits and substituting a piece of fruit instead are important messages to begin at this age, particularly in the Southern region.

Infants 9–11 months

A total of 20 mothers with children 9–11 months of age participated in the trials (five in the Northern region, five in the Central region, and ten in the Southern region). The main feeding challenges for mothers with infants in this age group were: (1) Breastfeeding was for a short time, and mothers did not empty both breasts at each feeding; (2) food was not sufficiently energy (calorie) dense—it was watery, and oil or another source of fat was not included (a practice fueled by mothers' belief that solid foods are difficult to swallow and digest and cause constipation); (3) feeding frequency was not adequate—food was offered less than three times per day; (4) quantities of food were less than eight tablespoons (one-half cup or 120 ml) at each meal at 9 months of age; (5) the quality of foods was not adequate (no animal-source food was offered on a regular basis, vegetable intake was low even though

available, non-nutritive liquids and foods were offered as snacks, and fruit was not offered daily); (6) feeding style was poor (mothers did not stay with their children during meals and did not encourage them to eat); and (7) mothers did not wash their children's hands before they ate. The recommendations provided to mothers to address these challenges are reported in order by the number of mothers being offered the advice. This ordering provides an idea of the priority for different pieces of advice.

Table 14. Summary of TIPs recommendations and outcomes for young children 9–11 months of age.

Recommendation	Offered	Accepted	Tried	Succeeded*	Modified
1. Give your baby a portion of fish, meat, eggs, or insects (at least two tablespoons) instead of just broth, daily.	22**	22	17	16	See notes
2. Give your baby the same vegetables you cook for your family (mashed); do not give the cooking water.	14	14	13	13	0
3. Stop giving tea, soda, biscuits, or puffs as snacks; instead, give fruit, milk, or vegetables.	14	14	14	14	0
4. Take more time to breastfeed at each feeding; use both breasts at each feeding and feed until the breasts are soft and empty.	9	8	8	8	0
5. Offer a piece of fruit daily.	8	8	6	6	0
6. Increase the amount of food you give your baby at each meal until you feed at least eight tablespoons.	7	7	7	7	0
7. Add eggs, cooking oil, or groundnut/soy flour to your baby's porridge and/or *nsinjiro* to your baby's vegetables.	6	6	5	5	See notes
8. Feed your baby at least three times per day.	2	2	2	2	0
9. Encourage your baby to eat more, and stay with your baby during meals.	2	2	2	2	0
10. Give your baby *nsima* with the vegetable relish prepared for the family.	1	1	1	1	0
11. Stop giving your child only milk for meals; give porridge enriched with milk.	1	1	1	1	0

* Indicates adoption with complete success, without modification.
** Although there were only 20 children in this age group, during the field work, several children were misclassified by age; therefore, the recommendation was given 22 times.

Detailed description of trials

Recommendation 1: Give your baby 9–11 months a portion of fish, meat, eggs, or insects (at least two tablespoons) instead of just broth, daily.

A total of 22 mothers with children 9–11 months of age needed to provide their infants with an animal-source food (rather than just broth) daily, so were given this recommendation. All 22 offered the recommendation accepted the trial, but only 17 tried it. Of those, 16 reported success in following the recommendation.

As with mothers of younger children, those mothers who agreed to try the practice, but then did not actually try it, reported that they did not have money to purchase eggs, meat, or fish, or that there was no market available from which to purchase fish. Other women said that they did not know how to prepare fish adequately for a baby. The mother who was not successful in her trial said that meat and eggs were too expensive but that she tried to give her child fish; the child refused the fish, and the mother stopped trying.

The mothers who were successful in offering these animal-source foods to their children mostly reported using fish more often than meat or eggs because fish was easier to find and less expensive to buy. Most also said their children were eager to eat the fish and there were no problems with feeding it. As a result of receiving these foods, children seemed happier overall, and in general, ate more than before. Mothers did not report extensive modifications to the recommendations besides offering fish more frequently than other meat or eggs. Many reported different ways of preparing food to test if their children liked it or not (e.g., offering fish with *nsima*, fresh versus pounded fish, etc.).

Most people in the mothers' support circles were encouraging of the recommendation, including grandmothers and fathers, who were excited that the practice would help the babies continue to grow well. Friends were also supportive, but noted that it would not be easy to purchase the animal-source foods because they are expensive. Many friends also said that they would try the recommendation as well. Mothers said they would use the examples of their own children and how well they were growing, how much more blood they have, and how to mash up fish to help children to eat it, to convince people to try this practice.

Most of the mothers indicated a willingness and intention to continue the practice, at least three to four times a week, noting that their children are already doing well and they want to help them continue to eat well. The only thing that could present a barrier would be lack of money to purchase the necessary foods.

Recommendation 2: Give your baby 9–11 months the same vegetables you cook for your family (mashed); do not give the cooking water.

A total of 14 mothers out of 20 with children 9–11 months of age were given the recommendation to mash the same vegetables they give to the rest of their family and feed them to their babies, as opposed to giving the babies the cooking water alone. All 14 accepted this recommendation; 13 tried it, and all 13 were successful.

The one mother who was not able to complete the trial said that she had no money to buy vegetables. The 13 who completed the trial were in agreement that the recommendation was easy to follow. They said that their children were happy eating the vegetables, which were easy to prepare, and their children were getting strength and growing well from eating them. Several mothers reported that babies did not seem to enjoy vegetables the first time, but accepted them more as they became accustomed to them. Mothers did not report any modification to this recommendation.

Family members were supportive and encouraging, even fathers, some of whom were reported to have been glad their children were able to eat vegetables. Friends agreed that it was important, and mothers reported that their friends were glad to learn about the importance of the practice. They all expressed an intention to continue the practice of giving their infants vegetables, noting that they want their children to continue to grow well and to get the necessary vitamins, and that vegetables are inexpensive, making the practice

sustainable. They also overwhelmingly indicated that they would urge their friends to give their infants vegetables, and teach them how to mash and feed them. They would tell their friends that babies need vegetables to grow well and that the water in which vegetables are cooked is not nutritious.

Recommendation 3: Stop giving tea, soda, biscuits, or puffs as snacks to your baby 9–11 months; instead, give fruit, milk, or vegetables.
A total of 14 mothers out of the 20 with children 9–11 months of age were giving their infants snacks of tea, soda, biscuits, or puffs. These mothers were given the advice to stop giving these non-nutritive foods and to replace them with a serving of fruit, milk, or vegetables, like bananas, tangerines, oranges, mandasi, avocado pears, sweet potatoes, or porridge with *nsinjiro*. All 14 of the mothers accepted the trial, and all 14 were able to complete it successfully.

The mothers noted that it was a relief to stop spending so much money on packaged foods and that their children seemed healthier and to be eating better. The mothers were convinced their children would begin to grow better. They did not report any negative effects from or challenges with the practice. They did not report any modification to the practice.

Family and friends seemed universally supportive, agreeing that tea or biscuits do not have any nutrition and that it is better to give fruit, milk, or vegetables. Mothers said they would continue the practice because fruits especially are widely available, relatively inexpensive, and their children like them. They would use the example of their own children to help convince their friends to adopt the practice. Only one woman indicated that she would wait to recommend the practice to her friends until she saw more impact on her own child.

Recommendation 4: Take more time to breastfeed at each feeding; use both breasts at each feeding and feed until the breasts are soft and empty.
A total of nine mothers out of the 20 with children 9–11 months of age were having trouble with continuing to breastfeed their babies; specifically, not feeding long enough at each feeding. As such, these nine mothers were recommended to take more time at each feeding, using both breasts and fully emptying them. Eight of these nine accepted the trial, and all eight were able to successfully carry it out.

All of the eight mothers reported liking this recommendation, noting that they were producing much more milk as compared with before, that their infants seemed more sated and happier, with longer periods of time between feedings, allowing time for work to get done. There was no information gathered from the mother who did not accept this trial. Those who tried it did not report any negative effects or challenges, and no modifications were reported.

Mothers were encouraged to follow the recommendation by their families and friends, with their husbands especially encouraging them to follow the practice. Many said they will recommend the practice to their friends; some had already started. Several said they would support their friends in carrying out the advice by finding positions (sitting not standing) so that their infants cannot bite them.

The mothers completing the trial overwhelmingly emphasized their intention to continue the practice, as they saw immediate results (babies who were full and playing better, allowing the mothers time to work) and it is free.

Recommendation 5: Offer your baby 9–11 months a piece of fruit daily.
A total of eight mothers out of the 20 with children 9–11 months of age were not offering fruit regularly and so were asked to give their babies a piece of fruit everyday. All eight mothers accepted the trial, but only six mothers were able to actually try it. Of those six, all were successful. The two mothers who were unable to complete the trial (one in the Central region and one in the Southern region) noted that fruit was not available for purchase. (In reality, tangerines, bananas, and other fruit were plentiful and inexpensive at the time of the study; therefore, the unwillingness of these mothers was likely due to a different barrier.)

Of those who tried the recommendation, all reported satisfaction, saying that their babies did not complain, did not have any problems such as constipation or stomach pains, and seemed to enjoy the portions they were given. They even frequently wanted more. No modifications were reported.

Social support for this recommendation, like many of the others for this age group, was high, with some mothers reporting that fathers even bought various fruits for their child to try. Friends noted that fruits help prevent disease, although several noted that there is a belief that giving a young child bananas can cause tooth decay.

The mothers all said they would continue the practice at least two to three times a week (due to the resource constraint of giving fruit everyday). They would give whatever fruits are available whenever possible so the baby stays as healthy as possible. Many noted that the belief that bananas can cause tooth decay is not a reason they would not give their infants fruits, as infants are given tea with more sugar than is in bananas all the time. They said they would also use this argument to convince/motivate their friends to adopt the practice of giving fruit to their infants whenever possible.

Recommendation 6: Increase the amount of food you give your baby 9–11 months at each meal until you feed at least eight tablespoons.
A total of seven mothers out of 20 with children 9–11 months of age needed to increase the amount of food that they were offering their children at each meal, so were given this recommendation. All seven mothers accepted the trial, all tried, and all were successful in increasing the amount they fed at each meal, although there were considerable modifications to what they were able to do.

The original goals set for the mothers were: one mother tried to increase the amount fed by five tablespoons, two mothers to increase the amount by four tablespoons, one mother to increase the amount by three tablespoons, and three mothers to increase the amount by two tablespoons. All three of those with the goal of increasing the amount by two tablespoons were able to successfully complete the recommendation; of the others, two were able to increase their amount by two tablespoons, and two were able to increase it by three tablespoons.

Amount of additional food	1 tablespoon	2 tablespoons	3 tablespoons	4 tablespoons	5 tablespoons
Proposed	0 mothers	3 mothers	1 mother	2 mothers	1 mother
Actual	0 mothers	5 mothers	2 mothers	0 mothers	0 mothers

Even among those mothers who were not able to give the full recommended amount, acceptance of this recommendation was very high, with mothers noting that it was interesting to see how much their babies were actually eating; that the babies were happier, eating well, and even sleeping better. Mothers seemed empowered by having some specific knowledge on how much food their children need.

The mothers also noted that family support for this recommendation was high; fathers encouraged the practice. One father even noted that he learned something. Some mothers said that their friends were actually envious of their new knowledge.

Mothers said that they would continue the recommendation; they saw the advantages: babies ate better and would grow better as a result. They also said they would pass along the recommendation to friends, going door to door to convey their new knowledge.

Recommendation 7: Add eggs, cooking oil, or groundnut/soy flour to your baby's (9–11 months) porridge and/or nsinjiro to your baby's vegetables.
A total of six mothers out of 20 with children 9–11 months of age were not giving their babies an adequate source of fat. These mothers were counseled to add eggs, *nsinjiro* to their baby's porridge, or vegetables. Six out of the six accepted the trial, with four of the six living in the Southern region. Five of these six were able to actually try the recommendation, and all five were successful.

Three of the five mothers added *nsinjiro* to their baby's porridge and two added oil. The one mother who did not accept to try the recommendation said that she was unable to buy groundnuts.

All of the mothers who completed the trial were happy with the outcome, noting that their children ate happily, ate more, and were able to play. The only modification made was that many of the mothers added cooking oil to the porridge they gave to their babies as opposed to the vegetables.

Social support was high for this recommendation; friends saw children changing for the better after eating the enriched porridge, and extended family members expressed excitement that mothers had received the advice. Overall, mothers agreed that they would try to continue the practice at least several times a week so their children would grow healthily. Some mothers said that as long as they were able to obtain the appropriate ingredients, they would continue preparing porridge using them. They had already started to spread the advice to their friends, and all indicated that they would continue.

Recommendation 8: Feed your baby 9–11 months at least three times per day.
A total of two mothers out of 20 with children 9–11 months of age needed to increase the frequency of feeding their infants. Both of these women (in the Southern region) accepted the trial and were able to successfully complete it, feeding their infants three times a day, up from twice.

The two mothers said they thought the recommendation was reasonable to follow. Both said their infants ate better three times per day and did not complain of hunger. One of the mothers said that she was giving only four to five tablespoons of food at each meal; however, only because her child had just started eating and needed to get accustomed to the amount.

Both of the mothers said the fathers were supportive of following this practice, one saying that before, the baby was "just left hungry." They also said they would continue to share the information with their friends and encourage them to follow the same advice.

Recommendation 9: Encourage your baby 9–11 months to eat more, and stay with your baby during meals.
Two mothers out of the 20 were offered this recommendation, one in the Central region and one in the Southern region. Both accepted to try it and were able to successfully carry out the trial. No modifications were made.

Both mothers said that they felt good about the recommendation; encouraging their children helped facilitate their children eating well and enough. Fathers were encouraging of the practice, reinforcing the importance of this kind of care for infants. Mothers noted that they had no trouble following the recommendation and so would continue to do it, as well as to tell their friends how important it is to spend time helping children to eat. One mother noted in particular that she would tell her friends that even if the child is spitting up food, it does not necessarily mean the child has had enough.

Recommendation 10: Give your baby 9–11 months nsima with the vegetable relish prepared for the family.
One woman in the Central region, out of the 20 total women, was given this recommendation. She accepted the trial and was able to complete it successfully. She noted that she had not previously given her child *nsima* and that she had "been denying the right of the child to have" it. Her child ate happily, and the mother said that she would continue feeding her child the family foods, including vegetables, so the child would grow well. She also indicated that she would make sure to tell her friends and social circle of the importance of starting feeding real food to children at 6 months, not just cooking water.

Recommendation 11: Stop giving your child 9–11 months only milk for meals; give porridge enriched with milk.
One woman in the Central region, out of the 20 total women, was given this recommendation. She accepted the trial and was able to complete it successfully. She said that she had no trouble preparing the porridge with milk and that the child liked the porridge, finishing it without any problems. She said that she saw improvements in her child, who was not crawling prior to this but who soon started to crawl, and would try to continue the practice. She also said she would relay the recommendation to her friends, but that it is sometimes difficult to get milk, and that her friends would likely modify the recommendation to eggs instead.

Conclusions
The overwhelming conclusion from the trials to improve the diets of babies 9–11 months of age is that women are unsure of what and how to feed babies, and are eager for advice and are willing to try new practices. The high success rate among those agreeing to try new practices demonstrates the feasibility of working with mothers to make concrete improvements in their feeding practices. It is clear from the trials that the specific need for this age group is to improve diet quality, moving toward an adult, mixed diet. The mothers were eager for the information necessary to make this transition properly, and this should be the major focus in an infant and young child feeding strategy for this age group. The focus should be on offering the family diet on a daily basis, with the addition of animal-source foods highlighted and dealt with separately, since in cases with potentially expensive food

like meat or eggs, some mothers expressed a slight hesitation about being able to sustain the practice—but in almost all cases, indicated they would at least be able to improve on what they had been doing by offering these foods several times a week, if not daily. In addition to a focus on diet quality with recommendations about family foods, programs should actively work with mothers to create appropriate recipes for enriching porridge with additional fat, such as from cooking oil and/or *nsinjiro*.

Second to an emphasis on diet quality is quantity. Mothers were excited about knowing exactly how much to feed their children, and it is likely that a tool to help facilitate putting this knowledge into practice, such as a child feeding bowl, would be well-received, although the mothers seemed to be able to count tablespoons of food and liked keeping track.

In cases in which the recommendation did not involve any purchases, such as spending increased time breastfeeding and/or sitting with the child while eating, mothers universally indicated they would continue the practice. This is an age at which the feeding style should be modeled and the concept introduced as it becomes a more important practice for optimal feeding in the second year of life.

It is important to note the high level of family support for all of the recommendations, and the fact that mothers seemed to genuinely notice differences in the behavior of their children by the end of the trials, noting that they were more satisfied, played better, and did not cry as much. These are important motivators.

Children 12–23 months

A total of 36 of mothers with infants 12–23 months participated in the trials (nine in the Northern region, ten in the Central region, and 17 in the Southern region). The main feeding challenges for mothers with children 12–23 months were: (1) A starchy staple was the dietary mainstay without a source of oil or fat; (2) less than one cup (240 ml) of food was offered at each meal; (3) an animal-source food such as meat, fish, eggs, or milk was not offered daily (children were given the fish water or sauce but not the fish, or were fed a portion of meat or fish less than three tablespoons); (4) vegetables, although available, were not offered daily or were given in small amounts (less than three tablespoons); (5) breastfeeding was frequent but for very short periods and from one breast while the mother worked; (6) less than three meals were given per day because the morning meal was often just a snack or tea because mothers left for the field early and took their children along; (7) snacks such as fruit were not provided during the day (or children were not fed two snacks); (8) non-nutritive liquids or foods such as tea with milk and sugar, Orange Squash, or fizzy beverages, puffs, and chips were offered, particularly as snacks; (9) feeding style was poor—mothers did not stay with children during meals and did not react when children did not finish the food or when siblings ate the children's portion, there was little encouragement for children to eat, and more food was not served when children finished; (10) eating with hands was common, but hygiene regarding hand-washing was not uniformly observed for mothers or children.

The recommendations are reported in order by the number of mothers offered the advice to provide an idea of the priority need for different pieces of advice.

Table 15. Summary of TIPs recommendations and outcomes for children 12–23 months of age.

Recommendation	Offered	Accepted	Tried	Succeeded*	Modified
1. Increase the amount of food you give your child at each meal (goal of 16 tablespoons).	26	26	26	25	22
2. Give your child a portion (at least three tablespoons) of the fish or meat you prepare for the family, or an egg, each day.	22	22	15	15	several
3. Stop giving biscuits, tea, fizzy drinks, Orange Squash, and puffs; instead, give a snack such as fruit, porridge with *nsinjiro*, soybeans, or sweet potatoes.	19	19	18	18	0
4. Offer a piece of fruit daily.	13	13	11	11	0
5. Feed your child vegetables (at least three tablespoons) from those cooked for the family (pumpkin or leaves, dried vegetables, tomatoes).	9	9	7	7	0
6. Take more time to breastfeed at each feeding; use both breasts at each feeding and feed until the breasts are soft and empty.	9	9	9	9	0
7. Offer your child two snacks a day between meals, such as a banana, mango, scone, *chikonda moyo*, or avocado pear.	8	8	5	5	0
8. Add some groundnut flour to the porridge, or fat to the vegetables, or offer a portion of avocado pear to your child each day.	6	6	4	4	0
9. Stay with your child during meals and help and encourage your child to finish meals; be patient.	4	4	4	4	0
10. Feed your child the same foods that you give to the rest of the family; chop the foods and moisten with relish.	2	2	2	1	0
11. Feed your child at least three times a day (increase the frequency by one or two times).	2	2	2	2	0
12. Take some food for your child when you go out with the child.	1	1	0		
13. Give your child food on a separate plate so you can see how much the child is eating.	1	1	1	1	0

* Indicates adoption with complete success, without modification.

Detailed description of trials

Recommendation 1: Increase the amount of food you give your child 12–23 months at each meal (goal of 16 tablespoons).

A total of 26 mothers out of 36 with children 12–23 months of age needed to increase the amount of food that they were offering their children at each meal, so were given this recommendation. All 26 mothers accepted the trial, and all of the mothers who accepted, tried. With the exception of one mother, all were able to increase the amount of food they fed their children, although there were considerable modifications to how much they were able to increase.

Original goals set for the mothers in order for them to feed their children 16 tablespoons (240 ml) per meal: one mother tried to increase the amount fed by two tablespoons, five by three tablespoons, ten by four tablespoons, six by six tablespoons, and two by ten tablespoons.

After the trial, one mother was unable to increase the amount of food she served because her child refused to eat any more than 12 tablespoons (180 ml). The increases reported by the mothers after the trial were predominantly between two and four tablespoons more than they had been giving. It seemed that only two or three mothers were able to achieve the goal of giving 16 tablespoons (240 ml) of food per meal.

Amount of additional food	0 tbsp.	2 tbsp.	3 tbsp.	4 tbsp.	5 tbsp.	6 tbsp.	10 tbsp.
Proposed		1 mother	5 mothers	10 mothers	0 mothers	6 mothers	2 mothers
Actual	1 mother	5 mothers	10 mothers	6 mothers	2 mothers	0 mothers	0 mothers

Mothers reported that they were extremely happy to know how much their children should eat and with the results when they gave their children more food. They found that their children ate with no problems, went longer before asking for food, had improved appetites, played longer, and did not beg for tea, and one child had an improved health outcome. There was strong family support for feeding more to children in this age group, with most people encouraged to have their children growing better and not hungry. One mother reported that her friend was envious of the advice that she was getting, but the friend wanted to see how the trial turned out before trying with her child.

The mothers reported that they were going to continue to feed their children more to ensure healthy growth and their children's happiness. However, one mother said that she would only feed more as long as the child continued to eat the food. If the child did not finish, she would cut back on the amount served. Mothers said they had no problem sharing this advice with other mothers, and several said they were proud to talk about the number of tablespoons necessary; others mentioned a particular blue cup used to educate on the amount of food.

Recommendation 2: Give your child 12–23 months a portion (at least three tablespoons) of the fish or meat you prepare for the family, or an egg, each day.

A total of 22 mothers out of 36 with children 12–23 months of age needed to give an animal-source food to their children daily, so were given this recommendation. All 22 mothers accepted the trial, but just 15 tried to follow it. Among those who tried the advice, there were numerous modifications, primarily in the number of times per week the advice could be followed.

The mothers who did not try the advice said it was because they did not have the money to buy the fish, eggs, or meat. One mother reported that she could not do it when her husband was with his other wife.

The mothers who were successful seemed to favor fish and eggs over meat. One mother prepared mouse. Another mother remarked that this was the first time she had given her child eggs. They all reported that their children liked the food very much and were (surprisingly to some) eating without problems. The modifications made by the mothers came in the frequency per week that they could offer these foods. Primarily in the south, mothers limited their use of these foods to two or three times a week.

Overall, the mothers said they would continue to offer their children these special foods, but both they and other family members stated financial constraints to following the advice everyday. They said they would tell others about offering eggs, fish, and meat, because of the health benefits.

Recommendation 3: Stop giving biscuits, tea, fizzy drinks, Orange Squash, and puffs to your child 12–23 months; instead, give a snack such as fruit, porridge with nsinjiro, soybeans, and sweet potatoes.

A total of 19 mothers out of 36 with children 12–23 months of age needed to stop the use of non-nutritious foods and substitute foods like fruit and sweet potatoes, and so they were given this recommendation. All 19 mothers accepted the trial, and 18 tried it and were successful. There were some regional differences related to the foods that were recommended as substitutes. In the north, mothers chose enriched porridge over fruit, while in the Central and Southern regions, bananas and papayas were used much more often than porridge.

The mother who did not try the recommendation said that she did not because she did not have the money to buy fruit or anything else. (In fact, she stopped buying biscuits, too.) The mothers who were successful said that this was an easy thing to do, and several said that they were happy to learn that they could stop giving their children tea. They reported that children were happy to have food like bananas and that they "looked better" after not drinking tea. The only reservation expressed was a worry that fruit is not always in season; mothers did not know what to do when they could not get fruit.

The mothers received much support for following this advice. Other family members agreed that fizzy drinks are not good for young children and others observed that tea does not take a child's hunger away. The only concern of other family members was the cost of buying fruits and groundnut flour for porridge. Mothers said they were going to continue to substitute other foods for non-nutritious drinks and snacks, citing many of the reasons that other family members gave and the same reservation about money. Several mothers said that they had already recommended the advice to their friends, in particular, the advice to stop giving tea to young children and to offer fruit instead.

Recommendation 4: Offer your child 12–23 months a piece of fruit daily.

A total of 13 mothers out of 36 with children 12–23 months of age were offered the advice to give their children fruit daily. This was in addition to those above who were asked to use fruit as a substitute for non-nutritious foods. All 13 mothers accepted the trial, and 11 tried it and were successful. There were some regional differences related to the fruits that were recommended. Selection was greatest in the north, but did not include papaya, while in the Central and Southern regions, the options were bananas, papayas, oranges, mangos if available, and *masau*.

The two mothers who did not try the recommendation lived in the Southern region. One said she could not find any fruit, and the other said she did not have the money to buy fruit. The rest of the mothers who tried to give a fruit each day expressed how happy they were that their children were eating fruit, that they seemed to like it, and that often, fruit is inexpensive or available "wild," without purchase.

Mothers received unanimous support from family members, with everyone recognizing that fruit is good for health. The mothers said they would continue with the practice of giving fruit because they knew it was good for the health and growth of their children. The only

modification came in the frequency of offering fruit. Some mothers said they did not think they could continue to do it daily; they thought they would have to cut back to three to four times a week.

Recommendation 5: Feed your child 12–23 months vegetables (at least three tablespoons) from those cooked for the family (pumpkin or leaves, dried vegetables, or tomatoes).
A total of nine mothers out of 36 with children 12–23 months of age were offered the advice to give their children three tablespoons of the same vegetables prepared for the family. All nine mothers accepted the trial, and seven tried it and were successful. There were some regional differences: no mother tried the recommendation in the north. There was virtually no variation in the green vegetable recommended by region. Both pumpkin leaves and mustard greens were recommended in the Central and Southern regions.

The two mothers who did not try the recommendation said it was for access reasons: in Karonga, vegetables are difficult to find, money is limited, and there is no garden availability. The mothers who were successful said their children liked the vegetables, except for one child. The mothers were pleased that their children showed an appetite for the vegetables and had not vomited.

There was much family support, particularly from fathers, because they said vegetables are easily available. Mothers said they would continue the practice, and many confirmed they would continue to do it daily since getting vegetables is not a problem. They were also telling other mothers to feed the family vegetables to their young children because it was good for the blood, to prevent illness, and to increase appetite.

Recommendation 6: Take more time to breastfeed your child 12–23 months at each feeding; use both breasts and feed until the breasts are soft and empty.
A total of nine mothers out of 36 with children 12–23 months of age were offered the advice to take more time each time they breastfed. All nine accepted the trial, tried it, and were successful. The recommendation was given more often in the Central and Southern regions than in the north.

Many mothers said they were happy with "this way of breastfeeding," and thought their children were getting much more milk and were much happier to play for longer as a result. There was good family support for longer breastfeeding, with several fathers and grandmothers saying that this was good because it showed love for the child. Mothers said they would continue to breastfeed for more time to improve their children's health. They would tell other mothers that "when breastfeeding, it is important to take time, to breastfeed quietly, until you feel the breasts are empty and that way you can do your work better."

Recommendation 7: Stop giving biscuits, tea, fizzy drinks, Sobo (orange squash), and puffs. Instead, give snacks such as a fruit, porridge with *nsinjiro*, porridge with milk, or soya, sweet potatoes, potatoes, banana, and paw paw.

A total of eight mothers out of 36 with children 12–23 months of age were offered the advice to give their children nutritious snacks instead of non-nutritive foods such as tea and biscuits. All eight mothers accepted the trial, and five tried it and were successful. The types of foods recommended for snacks included porridge with *nsinjiro*, sweet potatoes, Irish potatoes, bananas, and paw paw.

The mothers who did not try the recommendation said that they did not have the money to buy any snacks or food for snacks for their children. The mothers who were giving snacks said their children were happy and not suffering from hunger. They gave sweet potatoes, bananas, and porridge with *nsinjiro* most consistently. The modification that was made was that one mother gave a snack just once a day.

There was good family support for this recommendation, with several fathers saying they would ensure that the mothers have the money to buy the snacks or to purchase the food needed for snacks. Mothers agreed that they would continue to offer snacks so their children would be healthy and that they could do this as long as they have the resources. Several mothers said that they had already told their friends about the need to offer older children snacks for good health.

Recommendation 8: Add some groundnut flour to the porridge, or fat to the vegetables, or offer a portion of avocado pear to your child 12–23 months each day.

A total of six mothers out of 36 with children 12–23 months of age were offered the advice to increase the amount of fat in their child's diet. All six mothers accepted the trial, and four tried it and were successful. The only food used to "add fat" or a concentrated source of calories was *nsinjiro* (groundnut flour). The mothers who did not try to add a source of fat said that they did not have the money to buy groundnuts. All of the mothers who were successful in adding *nsinjiro* to their children's food said that their children were eating much better than before and had grown to really like their *nsima* with *nsinjiro*. In fact, one mother reported that her child was demanding more vegetables with *nsinjiro.* There was no resistance in the family to offering *nsinjiro*, and the mothers all said they were going to continue to use it and they would demonstrate how to use it to their friends.

Recommendation 9: Stay with your child 12–23 months during meals and help and encourage your child to finish meals; be patient.

A total of four mothers out of 36 with children 12–23 months of age were offered the advice to sit with their children during meals and to help their children finish their food. All four mothers accepted the trial, tried it, and were successful. Three of the mothers lived in the Southern region. All of the mothers recognized that their children were eating much better and more than before, since the mothers were sitting and working with them to finish their food. Family members encouraged this practice because they felt it showed that the child is loved. All of the mothers said they would continue to help their children with their food because they had seen in a short period of time what a big difference it makes in the amount of food children eat. Mothers said they would tell other friends about showing love for their children by helping them to eat until children are full and satisfied.

Recommendation 10: Feed your child 12–23 months the same foods that you give to the rest of the family; chop the foods and moisten with relish.

Two mothers out of 36 with children 12–23 months of age were offered the advice to give their children family foods. Both mothers tried, and one was successful. The mother who was not successful had a severely stunted child. She reported that her child refused family food and would eat only thin, watery porridge. The mother who was successful switched her child from porridge to *nsima* with *nsinjiro*. She reported that her child ate well and seemed not to be hungry all the time. In both families, the fathers were supportive of the change in the children's meals to family foods in order for the children to be healthy. The one mother said she would continue to feed her child family foods.

Recommendation 11: Feed your child 12–23 months at least three times a day (increase the frequency by one or two times).
Two mothers out of 36 with children 12–23 months of age were offered the advice to feed their children three times a day. Both mothers lived in the Central region. Both mothers accepted the trial, and both were successful in giving meals three times a day. They indicated that their children had missed meals when they were in the fields, which was overcome by being more conscious of the need for children to eat three times a day. The mothers had much support at home for this advice, with fathers claiming their children looked much better since getting an additional meal. Both mothers said they would continue, and one mother said she would try to feed her child four times a day.

Recommendation 12: Take some food for your child 12–23 months when you go out with the child.
One mother out of 36 mothers with children 12–23 months of age was offered this advice. She was willing to try to carry food for her child with her when she went out of the house with the child, but she failed to try it because she said that she did not go out with her child during the period of the trial.

Recommendation 13: Give your child 12–23 months food on a separate plate so you can see how much the child is eating.
One mother out of 36 mothers with children 12–23 months of age was offered this advice. The child had been eating from a bowl that served several children. The mother tried the recommendation and said she was successful in its implementation. She noted that her child seemed to be eating very little. She was amazed and said that she had been completely unaware of how little her child was eating and just assumed that he was eating much more. She would continue to use the separate bowl, but hoped that her child would soon eat much more, as she thought he was doing before separating his food.

Conclusions
The almost universal success with the trials demonstrates that it is possible to improve the diets, and therefore, the nutrient intake of these young children as they complete their second year of life. Although many of the recommendations touched on the need to improve diet quality, almost all of the children needed to be offered more food. It is often the case that in the second year of life, quantity does not keep pace with need. Here, quantity needs to be handled by increasing the amount at each meal, since overall, mothers were feeding frequently enough. Particularly for the second year of life, a uniformly available measure should be found and used to convey quantities. Mothers seemed unaware of how much their children should eat. Although only one mother was asked to separate her child's food in a dish, from all accounts, children sharing plates and the young ones not getting enough may be a prevalent problem. Linking the two messages—quantity with a separate portion—would be helpful. Likewise, offering snacks, not a prevalent issue, could be part of the options offered to improve quantity and not offered as a separate topic.

Diet quality remains a problem in the second year of life. The options for addressing it are greater because children in this age group should be eating all foods eaten in the family. Concerns about digestion issues should be less.

Dietary intake and food frequency of children 6–23 months

During Phase 2 (TIPs), recalls were conducted for each child older than 6 months during the initial visit and again at the follow-up visit. That is, in Phase 2, there were two recalls for

each of the 85 children 6–23 months, one before the TIPs and one after. There should have been 170 Phase 2 recalls, but during the analysis, it was discovered that one of the recalls was conducted with an infant less than 6 months, so it was not included. Two more recalls were excluded from the analysis of the TIPs follow-up visits; in one case because the foods were recorded but not the amounts served or consumed, and in the second case because the quantities of foods recorded were not credible (too large). The *Pro*PAN software uses the recommended nutrient intakes from WHO/UNICEF to evaluate adequacy of intake.[14,19]

Description of dietary intakes of children 6–23 months in the previous 24 hours

Table 16 compares the results of the two recalls to allow another view of whether the trials were providing children with improved intakes and where the greatest gains were found. Energy consumption was considered adequate for the group if at least 50 percent consumed 100 percent or more of the median energy recommendation for age and lactation status (the average expected amount of breastmilk consumed at different ages). With regard to other nutrients, the intake of the group was adequate if 100 percent of the sample met at least 67 percent of the recommended intake for age and lactation status.[2]

Using these criteria, energy intake was adequate for children both pre- and post-TIPs. However, there was a marked increase in the percentage of children who met their recommended intake after the TIPs (almost 20 percentage points more), with the difference in mean energy (caloric) intake improved by 171 kcal. Both pre- and post-TIPs, the percentage of children who met 67 percent of their recommended protein intake was almost 100 percent. Improvement was seen in the mean protein intake by 9 grams.

The children's diets were inadequate for all other nutrients. However, for all nutrients, the percentage of children who met 67 percent of their recommended intake improved after the TIPs. Improvements in zinc and vitamin C intakes brought most children to 67 percent of their needed intake (83 percent of children for zinc; 93 percent of children for vitamin C). After TIPs, about three-quarters of the children met two-thirds of their vitamin A requirement. Although more children were receiving 67 percent of their requirement for calcium and iron, these two nutrients remained the most limiting nutrients for the most children.

The percentage of children who received the recommended number of meals per day remained constant between the TIPs dietary recalls. This is not surprising, since increasing meal frequency was not a frequent recommendation. Of interest is the finding that although the total energy (caloric) intake increased following the TIPs, the percentage of total calories coming from carbohydrates decreased from 74 percent pre-TIPs to 66 percent post-TIPs, indicating a wider variety of foods being consumed post-TIPs. An increase in the percentage of energy (calories) coming from a fat source (from 17 to 22.2 percent), a TIPs recommendation for many children in the second year of life, likely accounted for some of this shift in the source of the energy (calories).

Table 16. Results of the 24-hour recall analysis: Children 6–23 months who met recommended nutrient intakes and number of daily meals and mean intakes, TIPs follow-up visit.

	TIPs initial visit (n=84)		TIPs follow-up visit (n=82)	
	Percentage of children who met 100% or more of median energy recommendation[1]	Mean intake (SD)	Percentage of children who met 100% or more of median energy recommendation[1]	Mean intake (SD)
Energy (kcal)	60	445 (258.6)	79	616.4 (339.8)
	Percentage of children who met at least 67% of recommended intake[2]	Mean intake (SD)	Percentage of children who met at least 67% of recommended intake[2]	Mean intake (SD)
Protein (g)	98	12.4 (7.9)	98	20 (12.2)
Iron (mg)	37	4.5 (3.5)	49	7 (5.9)
Zinc (mg)	58	2 (1.2)	83	3.1 (1.8)
Vitamin A (µg RE)	45	122.4 (220.6)	74	208 (255.9)
Vitamin C	83	13.5 (22.3)	93	22.9 (30.6)
Calcium	16	94.8 (152.9)	23	126.1 (132.9)
	Percentage of children who met recommended daily frequency of meals		Percentage of children who met recommended daily frequency of meals	
Meals/day	81	-	82	-
	Percentage of calories from carbohydrates	Mean intake (SD)	Percentage of calories from carbohydrates	Mean intake (SD)
Carbohydrates (g)	74	81.4 (46.6)	66	105.3 (63.6)
	Percentage of calories from fat[3]	Mean intake (SD)	Percentage of calories from fat[3]	Mean intake (SD)
Fat (g)	17	8.6 (8.6)	22.2	14.7 (10.6)

RE = Retinol equivalent.
SD = Standard deviation.
[1] If at least 50 percent of the children consumed 100 percent or more of the median energy requirement, it was considered that energy requirements were met at a group level.[2]
[2] Consumption of a nutrient by the group was considered adequate if at least 67 percent of the requirement of that nutrient was consumed by the study group.[2]
[3] The recommendation for percentage of total calories from fat is: 34 percent, 6–8 months; 38 percent, 9–11 months; 42 percent, 12–23 months.[21]

Frequently consumed foods

Figure 3 (from Section 4) and Figure 4 depict the change in frequencies of foods consumed between the first Phase 2 visit and the second. The role of carbohydrates (porridges, *nsima*, and biscuits) fell from accounting for 61 percent to 49 percent of food consumption by the study children. Also, tea consumption fell. Consumption of vegetables, milk, eggs, beans, and groundnuts increased by small amounts. The consumption of meat and fish remained the same, in spite of many reports of families offering or increasing fish in their young child's diet.

Figure 3. Foods most frequently consumed by children 6–23 months; Phase 2, Visit 1.

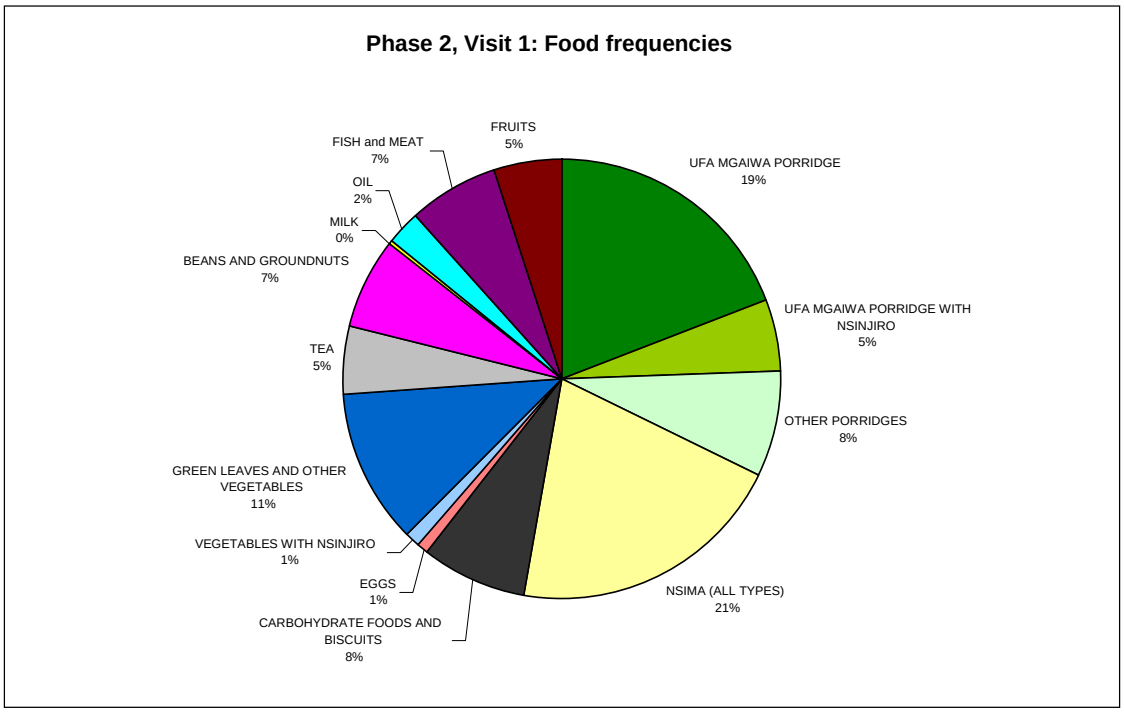
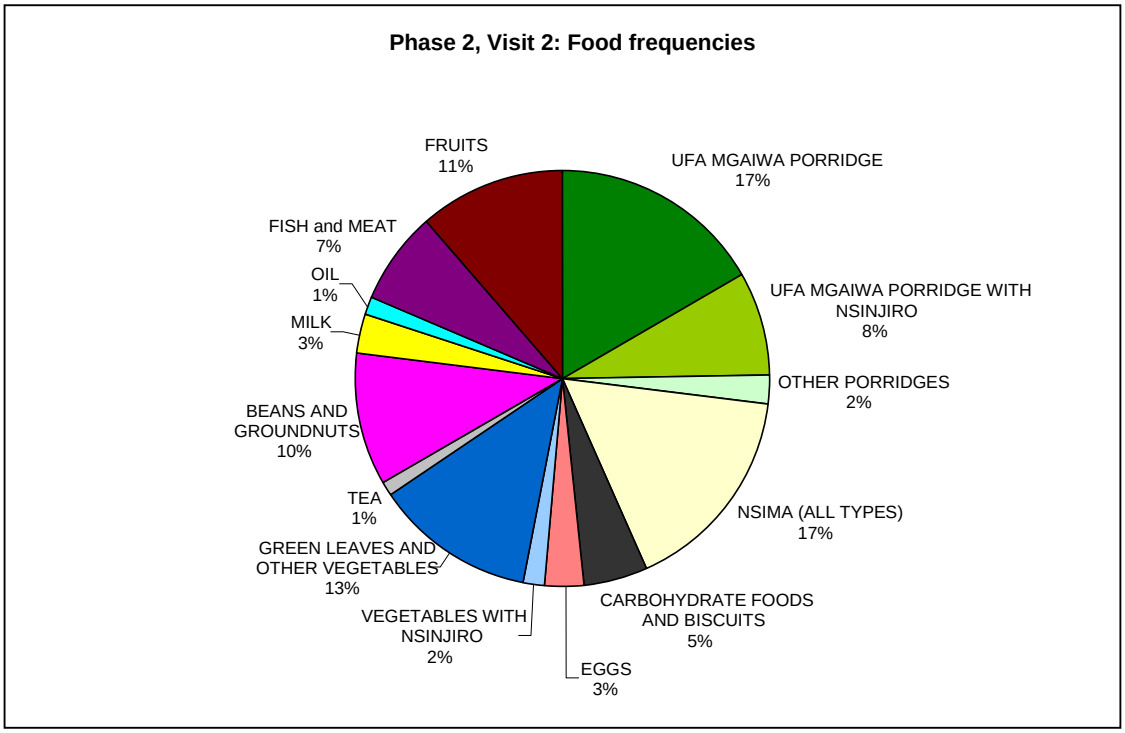


Figure 4. Foods most frequently consumed by children 6–23 months; Phase 2, Visit 2.



6. Discussion and recommendations

The overall purpose of this research was to provide information for the design of activities to improve infant and young child feeding and nutrition in new or existing programs in Malawi. This study has increased our understanding of current feeding practices among families with children less than 2 years of age and the social, cultural, and economic context influencing them. Problems that impeded adequate dietary intake in these children were identified and changes in feeding practices were proposed and tried by mothers to determine those most feasible and critical to improving dietary intake. Finally, and most importantly, this study demonstrated that it is feasible for mothers to improve their feeding practices using their available resources in ways that have the potential to positively impact their children's health and nutrition. The study also showed that there are facilitating factors for mothers and their families to not only adopt but also to continue new infant and young child feeding practices. The study also pinpointed the vulnerable areas in which families will need support to meet the needs of their growing children. The following discussion integrates information from different parts of this study and other studies done in Malawi, and points the way for future programs.

Breastfeeding practices

Superficially, breastfeeding practices appear to be near ideal. That is, the majority of mothers initiate and continue breastfeeding through the child's second year of life. However, closer examination showed three areas in which improvement can be made to ensure that the infant and young child receives an optimal intake of breastmilk. This is important because suboptimal breastfeeding in the first six months increases all-cause mortality by a factor of three, and not breastfeeding at all increases mortality by a factor of 14.[22] A recent study in Ghana found that early initiation of breastfeeding alone could reduce neonatal deaths by 22 percent.[23]

1. **Breastfeeding initiation:** This study found that only two-thirds of mothers initiated breastfeeding in the first hour after birth. This is similar to findings from the 2004 MDHS, in which 70 percent of mothers reported breastfeeding in the first hour after delivery. Although breastfeeding initiation rates are relatively high in Malawi, more can be done to ensure that breastfeeding gets off to a successful start. Initiation of breastfeeding should begin within one hour of birth, but it is often delayed irrespective of where a mother delivers. In institutions, hospitals, and health centers, health personnel do not place the mother and baby together. Policies and enhanced training of health care providers as part of clinical updates can correct the problem in the institutional setting.

   At the community level, delayed attachment is generally due to lack of support for immediate contact between mother and newborn from TBAs, and the belief that the mother is tired and does not have enough milk at first. An outreach program to TBAs along with an education/demand-creation program for pregnant women and their families during the prenatal period and for the community more broadly could change this practice. The concept that the more a woman breastfeeds, the more milk she will produce is a critical piece of information to overcome the idea of waiting for the milk. Also, to overcome the notion of a woman not having enough milk, the local belief that drinking certain liquids helps mothers to breastfeed after birth could help facilitate this practice. Although no trials were done on immediate initiation, experience from other countries

shows that immediate initiation is a practice that most women are willing to try when health care providers are supportive.

2. **Exclusive breastfeeding** is the optimal practice for infants 0–5 months. Infants in Malawi are breastfed frequently and on demand so it is often reported as exclusive, but too often, infants receive small amounts of water or watery porridge. During the interviews in Phase 1, only one-tenth of mothers recalled that they did not exclusively breastfeed; however, during the initial TIPs visits, only half of mothers said they exclusively breastfed (current or recent practice). This is consistent with MDHS findings, in which the median duration of exclusive breastfeeding is 2.4 months. The MDHS reported that by 4–5 months, 33 percent of babies received water or water-based liquids and juice, 2 percent received other milk, and 37 percent received food.

   A baby crying after being breastfed is a trigger for the mother or family to give other foods and liquids. The mother or family member assumes that the crying is from hunger or thirst and assumes that the mother is not producing enough milk to satisfy the baby. There are two key critical program points to take away here: (1) Caregivers must be convinced that crying is not always caused by hunger; and (2) mothers and family members must be confident that mothers can increase breastmilk supply by feeding longer and more frequently, and therefore, giving water or food is counterproductive to satisfying the baby. This may be particularly important during the hottest time of the year. This survey coincided with the cooler time of year in some parts of Malawi. It is likely that water intake increases in babies during hotter times. The notion that babies can get enough fluid from breastmilk needs emphasis. Caregivers need to know that giving water, other fluids, and foods decreases breastmilk production and increases the risk of diarrhea.

   Observations of breastfeeding pointed to two related weakness in breastfeeding style: breastfeeds of extremely short duration to pacify the child, and from just one breast per feed. During TIPs, all mothers who tried the recommendation to stop giving their babies water or porridge were successful and said they would continue to exclusively breastfeed. Mothers indicated that they had no idea that breastmilk only was acceptable, and they reported that although they were told stopping water would be a challenge, they had no problem and the children seemed to suffer no ill-effects. The recommendation to stop foods and liquids was and should be coupled with the recommendation to improve breastfeeding style: offering longer breastfeeds, emptying both breasts each time. Mothers mentioned many factors that served as positive reinforcement to this practice: babies cried less and slept better, giving the mother more time to do chores; appeared to take more milk; and did not have any stomach upset. Another facilitator was the support of other family members who identified longer breastfeeding with showing more love for the child.

   Unlike some countries, Malawi does not need reinforcement on breastfeeding *per se* because the practice is nearly universal, but rather on how to breastfeed; i.e., longer feeds to ensure that children get the fat and energy-rich hindmilk characteristic later in a feeding, and the mother's breasts are emptied to enhance breastmilk production. (Also, although not an outstanding issue in the research, the management of breast health problems needs to be addressed, because HIV prevalence is high in the country.) Promoting the "how-tos" of breastfeeding should be a key tenet of national infant and young child feeding promotion programs, as part of health care providers' training, media promotion, and in counseling at the facility and community levels, particularly during the first months of an infant's life. Addressing women's heavy workloads as they are asked to

take more time to breastfeed is critical, as well as reaching out to other family members to help with chores since study families seemed very supportive of improved breastfeeding.

3. **Continued breastfeeding** until 2 years of age or more is widely practiced in Malawi. This practice should be commended and supported. Among the few mothers who weaned their infants before 2 years of age, there were two reasons that explained their practice: their HIV infection and fear of transmission, and another pregnancy. Both of these situations need to be addressed.

   There is a need to ensure that HIV-positive mothers have proper infant feeding advice. In countries that decide that breastfeeding with antiretroviral interventions provides the greatest advantage for HIV-free survival, WHO recommends that all HIV-positive mothers take antiretroviral drugs while breastfeeding, which should continue through 12 months, with introduction of adequate complementary foods starting at 6 months. HIV-infected mothers who are eligible for antiretroviral therapy should receive a lifelong regimen of treatment, and when HIV-infected mothers are not eligible for treatment, either they or their infant should receive antiretroviral prophylaxis so long as breastfeeding continues. Regardless of whether antiretrovirals are available for HIV-infected mothers, WHO recommends that HIV-positive mothers stop breastfeeding only when they can provide a safe and nutritious diet without the benefits of breastmilk.[1] In practice this requires increased meal frequency, increased feeding of animal-source foods, including milk and dairy products, to meet protein and micronutrient requirements. Grain-legume mixes may be an acceptable substitute for meeting protein requirements, and micronutrient fortified foods or micronutrient supplements may be an acceptable substitute for meeting micronutrient requirements.[24]

   The pregnancy issue points to the need to integrate family planning and postpartum early well-child visits to ensure that women are getting the protection they need to space their pregnancies. The study found that a motivation for continuing to breastfeed until 24 months or after was to prevent another pregnancy. Mothers need counseling on how to fulfill lactational amenorrhea method criteria[‡‡‡] in the first six months and to start to use a modern method of contraception at five to six months after they give birth, if preventing another pregnancy is what they desire.

Complementary feeding

This study highlights the significant gap that exists in Malawi between the actual nutritional content of infants' and young children's diets and their requirements. However, what the study also points out is that much of this gap can be closed by families with foods to which they have access and are often preparing for other members of the household. There are, though, certain nutrients such as iron, zinc, and calcium for which special programming and supplements or foods may be needed to specifically address deficient intakes.

The food recall analysis for this study on two separate samples of young children showed that the energy requirements of children 6–23 months are being met at a group level, but that many individual children are not receiving sufficient energy (as measured by calories). Other researchers have found that energy intake is adequate among rural children in southern Malawi, when taking weight into account.[12] As a group, recommended protein intake in

[‡‡‡] Absence of a return to menses, infant less than 6 months of age, and full or nearly full breastfeeding (recently, this latter criterion was changed to exclusive breastfeeding to make it consistent with the mortality-reducing and nutrition benefits of breastfeeding).

children is marginally not being met. The nutrients for which only about half or fewer of the children were consuming 67 percent of their requirement were vitamin A, iron, zinc, and calcium. Other studies have also found these nutrients to be limited in Malawian children's diets.[12] Although low, the real intakes of these nutrients may be lower due to the poor bioavailability and quality of the foods consumed.

These nutrient intake results are not surprising when feeding practices are examined closely. As stated above, what is important to note is that some of this dietary gap can be made up by removing barriers and facilitating the improvement of household practices. That is, individual intakes improved and the percentage of children who met minimum requirements increased after families, primarily mothers, tried new, nutrition-promoting practices. From the TIPs results, it seems reasonable to expect that at least 15 percent more children will have diets that fulfill all their nutrient requirements, and that for some nutrients (e.g., vitamin A), recommended intake could be met for 50 percent more children through changes in household practices. There are some important notes about what families could do and under what circumstances. While only a few mothers reported that they could not do anything to change their current practices because of financial constraints or lack of access to food, this study was conducted during the harvest season, when food is more plentiful than at other times of the year. Also, it is noteworthy that some mothers could not make changes on a daily basis, but instead, only two to three times a week due to access constraints. The fact that after the TIPs, mean energy (caloric) intake improved by 171 calories on average, when, in other countries, energy intake has reached 250-300 calories using TIPs research, may be another indication of the limitations in some households for optimally feeding their children. A combination of strategies will be required to reach more optimal child feeding, particularly during the lean season (December through March). World Vision's Micronutrient and Health (MICAH) Program implemented in Malawi over a ten-year period took the approach of using multiple interventions, ranging from community-based food supplementation targeted to poor areas to fortifying and diversifying the food base through animal husbandry, vegetable gardens, and fruit tree cultivation. The MICAH Program decreased anemia prevalence in children from 86 percent to 60 percent and stunting from 56 percent to 40 percent.[25]

In this study, mothers reported prioritizing the nutrition of their children and keeping practices about the same during the lean season, while others said they reduce the number of times they themselves eat and feed their children per day. Overall, families in the Northern region seemed to have no problem with the recommendations, while sometimes families in the Central and Southern regions could not follow through in successfully trying all the new practices and needed to modify the practices. Key informants reported that a staple food (e.g., maize, cassava, potatoes), beans (e.g., cowpeas, other beans), groundnuts, some type of vegetables, some type of fruit, animal-source foods (usually fish and dried, whole fish) were available year-round or affordable. This suggests that there may be adequate diversity available in most districts to meet the minimum dietary diversity recommended by WHO—that children 6–23 months consume foods from at least four out of seven recommended food groups.[26] Some households may not be able to provide this minimum dietary diversity daily but may be able to provide adequate diversity several days of the week. Complementary programs to improve dietary diversity in Malawi through food production and animal husbandry efforts are needed.

Below is a discussion of the most promising changes that can be made to improve dietary intakes. The results are reported by age group. Even though there is considerable similarity

among age groups, many of the specifics vary, making reporting by age useful to program design efforts.

Infants 6–8 months old

The most common practice hindering adequate dietary intakes for these infants is the use of starchy, thin/watery porridges thought to be the only food infants can digest and swallow. The focus of program efforts for this age group should center on maintaining breastfeeding of sufficient duration at each feeding and offering a quality food—mixed, soft/mashed, but thick—and a porridge using whole maize instead of cassava flour. This porridge should have *nsinjiro* (groundnut flour) or mashed beans added to it, and two tablespoons of the family vegetable should be promoted as the basic complementary food for children of this age. Although feeding frequency is not a problem (two times a day for breastfed infants, four times for non-breastfed infants), caregivers should be encouraged to add, everyday, a food of animal origin, such as an egg, fish, or fish powder (the most commonly available and used animal-source foods). Different types of vegetables and animal products, when available, should be introduced and offered to infants of this age to increase the diversity of the child's diet. Fish powder, made from dried, whole fish, is rich in iron, zinc, and calcium, the most limiting nutrients in children's diets. Providing 15 grams of fish powder in the child's daily diet provides more than the child's requirement for calcium, 30 percent of the child's requirement for zinc, and 12 percent of the child's requirement for iron.[21,27] Providing just 12 percent of the child's iron from this bioavailable source of iron (heme-iron) will improve the absorption of plant sources of iron (non-heme iron).

A local name should be given to the basic soft, mixed food that always has an animal-source food added. Community programs should look for ways to offer demonstrations to mothers on how to prepare this basic food with a wide variety of additions. Critical to the demonstrations must be the feeding of the child. Mothers must be convinced that it will not create digestion problems and that the baby can swallow the food. Mothers participating in the TIPs indicated a preference for this new, mixed food because it was teaching their children to eat Malawian foods and their children ate all the food offered, and were satisfied and less fussy, allowing mothers to get their work done.

While frequency of feeding was not a problem, just more than half of the mothers were not offering enough food at each "meal" (these infants need between one-fourth and one-half cup of porridge). All mothers attempted to reach the quantity of food appropriate for their infant's age, but in the end, they were able to increase the amount they were offering by only two to three tablespoons. Communications concerning quantity need to be expressed in two ways: (1) The quantity goal mothers are striving for when they feed their children, and (2) the specific amount mothers should increase, recognizing that mothers will reject the recommendation to feed their children more than a couple of additional tablespoons more than they are currently offering and so it may take a gradual shift if the gap in quantity is great. Many mothers were fearful of stomach upset, especially in the youngest children.

Finally, even in this young age group, some babies were being offered sugary biscuits and drinks, often tea with sugar, and few mothers were using fruit in their babies' diets. This pattern was particularly prominent in the Southern region. The substitution of fruit for sugary snacks and tea was successful, and this practice should be discussed even for these young babies. Mothers remarked that when they gave fruit, the baby did not cry for tea. They liked giving fruit because it satisfied their babies and because they could drink their tea "in peace."

Infants 9–11 months old

This age is the time to accustom children to the family diet and transition from what has been a diet dominated by porridge to solid family foods. Similar to the younger age group, the focus on consistency and quality should remain the same, although it has different implications. Almost all children are receiving *nsima* by this age at at least one meal, but *nsima* is worth encouraging at other meals over less energy-dense types of porridge. The emphasis on quality means incorporating everything from the family "pot," particularly adding an animal-source food and a vegetable mixture preferably made with some oil or groundnut powder. Mothers in the study preferred fish and eggs (on occasion) as animal-source foods. Some families could not provide animal-source foods every day, but tried to give it several times a week. No one had a problem offering vegetable sauce daily. The design of education and counseling schemes should be focused on helping mothers think through how they are going to add to the diversity of their child's diet on a daily basis, in a very specific way, and reach out to fathers as providers of the animal-source foods and of groundnuts and/or oil. Community efforts should focus on making eggs more available and possibly on fish-drying so fish is available on a daily basis. Similar to the recommendation for younger infants, if there can be food/cooking demonstrations so mothers can see how to mix available foods for young children, and the child and mother could sample the food, it might increase the chances of trial of new combinations. Although some of these recommendations seem basic, they overwhelmed a number of mothers (with children of all ages), who seemed not to know, but desirous, of information on how to feed a young child.

At this age, the use of sugary drinks and biscuits increases and about half of children receive these foods. In the trials, mothers were able to substitute fruit, milk, or snacks like a small sweet potato. Many mothers said that it was a relief not to have to buy the extra foods and that they would continue the practice because their child seemed to like the fruit. Eliminating sugary, purchased foods was welcome advice and followed by all who tried it. Even if not a substitute for sugary, purchased foods, fruit was readily accepted and offered because it was viewed as healthy and adding to "strong blood." Eliminating sugary, purchased foods should be addressed directly, and offering fruit such as bananas, tangerines, mangos, or papayas should be encouraged at least when available.

Similar to the younger age group, food frequency was not a problem, but food quantity per meal was low for about one-third of these children. Regardless of how much the mother should have added to reach the goal of about one-half cup of food per "meal," no mother could increase the quantity more than three tablespoons (45 ml). It is common that food quantities are only increased gradually, as mothers see that their children will eat and tolerate the larger quantities. Mothers who did increase the amount their children were served even by a couple of tablespoons expressed pleasure that their children were finishing the greater quantities offered, and several noted that their children were sleeping better.

Although breastfeeding continues for virtually all infants at this age, at least one-third of mothers exhibited poor breastfeeding style, offering short feeds and predominantly using only one breast. Mothers were successful at prolonging their breastfeeds, finding time to sit while breastfeeding so that they could empty their breasts. Mothers were pleased with this recommendation because they felt they were producing more milk, and they definitely noted that their children were more sated and happier, allowing them to finish their work. Coupled with this recommendation should be messages to family members that mothers be supported in their daily chores to allow them the time to breastfeed.

Only a couple of mothers were offered the recommendation to sit with their children during meals and encourage them to eat more. It was unclear whether most mothers were doing this or whether the cases of these two mothers were illustrative of a more widespread practice. For example, one of the mothers noted that she was just learning that when a child spits up, it is not a sign that the child is finished with the food, and that it is important to be patient and help the child to eat. Although not frequently offered recommendations, the practices of encouraging a child to eat and finish all food and sitting with the child throughout the meal is important enough that it should be a reminder added to the educational component and perhaps made a key practice for grandmothers and fathers as well.

Children 12–23 months old

During the second year of life, the emphasis must be split between the amounts of food children are eating and diet quality. Although dietary diversity was better in this age group than in younger children, the MDHS showed that 85–89 percent of children 12–23 months received fruits and vegetables, compared with only 38 percent of children at 6–7 months, there is still room for improvement, particularly related to the inclusion of animal-source foods in the daily diet and the amounts of the foods, other than the main staple, that are fed. For some children, if the foods being offered were just given in slightly larger quantities, the diet would be much better, but for others, the diet lacks any diversity beyond about three foods.

First, the overall quantity of food that young children are eating must be addressed: a combination of frequency and amount per meal, plus encouragement to finish what is served. Meal frequency was good, although some mothers should be encouraged to offer healthy snacks, since this was one practice that seemed to be different between stunted and non-stunted children: having at least one snack in addition to meals. For all children, the main emphasis needs to be on the amount of food offered per meal. All but one mother was well below the recommended amount for their child of about one cup of food (240 ml) per meal; on average, children received about five tablespoons (75 ml). Similar to the younger ages, the maximum amount that a mother could increase was two to four tablespoons more food in a meal. On a positive note, there were no adverse reactions reported from children eating more; in fact, mothers said that they were happy to see that their children were not hungry, they did not beg for tea, and their appetites improved. A variety of tools to help mothers visualize appropriate quantities for a child's age would be useful. The child feeding bowl that has been found to be useful in other countries could be tested and modified for Malawi. Only a few mothers (primarily in the Southern region) were asked to sit with their children and encourage them to finish the food provided, which seemed to be effective in increasing the amount their children ate, and positive for the mothers, who viewed it as a demonstration of their love for their children.

Linked to improving the amount young children receive in a day were two recommendations offered to a few mothers with young children that suggest that these practices should be considered for part of a comprehensive strategy: (1) Mothers should carry food for their children when they leave the house with them; and (2) the food for the child should be offered on a separate plate from the other children in order to assess how much the child is eating and to ensure that older children do not eat the younger child's portion. Both of these suggestions were well-received, and mothers were impressed with how easy they were to accomplish. One mother was truly amazed at how little her child had been eating when she saw what the child ate from a separate plate.

Adding more diversity to the diet (and giving more non-staple foods), primarily adding an animal-source food (three tablespoons) and the cooked vegetables prepared for the family (three tablespoons), were frequent recommendations and require program support to facilitate the practice. The primary resistance to animal-source foods was the cost of buying fish and eggs (virtually no one in the sample had meat or poultry). The focus should be on the use of all family foods everyday for the young child, including fish. Naming a category "special foods," plus illustrating how foods can be combined and in what amounts could mean whether or not children get these foods occasionally or at least four to five times a week. Foods in this category include eggs, milk, small dried or fresh fish, *nsinjiro*, avocado pear, and oil. With the adequate intake of green leafy vegetables and yellow fruits, if children can get enough fat in their diets, their vitamin A intake could approach adequacy. And with an increase in the consumption of small dried fish, the calcium intake can be substantially improved.

The third highest priority for young children is that they not consume sugary or salty snacks and drinks. This practice is much more prevalent in the second year of life than earlier, and reducing the consumption of these beverages and foods should be an emphasis of educational efforts. The use of fruit (Southern and Central regions), porridge with *nsinjiro* (Northern region), and boiled sweet potato were all acceptable substitutes. Mothers and other household members said they were glad to know that they could buy less-expensive foods and that young children should not receive tea. Making sure children are not consuming tea is particularly important because tea interferes with the absorption of iron and zinc, the intakes of which are low in the diets of these young children.

The practice of longer breastfeeds on each breast should be reinforced throughout the second year of life. Even with parents of older children, this met no resistance and was well-accepted as a way to show love to the children.

Feeding sick children

Although there were no TIPs carried out with sick children, which could have allowed for insights into what mothers are willing and not willing to do, it is important to note that guidance on feeding during and following illness should be considered within any strategy to improve infant and young child feeding. Based on what was learned about current practices related to feeding sick children, the following concepts and practices require reinforcement: (1) Although sick children are known as fussy eaters, it does not mean they do not need to eat; (2) they need strength like the growing child to fight the illness, and therefore, should eat normally for as long as possible, eating small portions more frequently, if necessary; (3) extremely ill children need to be breastfed more frequently and with patience and be offered soft, but thick porridge, which may be a change from their normal diet of more solid food; (4) many children become anorexic during an illness but will continue to breastfeed, so mothers should breastfeed more frequently when children are sick; (5) during recovery (for two weeks after the illness is over), children need to return to their regular diet and receive special foods (use the same special foods as those specified for the child 12–23 months old—eggs, milk, fish, *nsinjiro*, oil, etc.) everyday and in each meal if possible.

Finally, there is a great deal of dietary improvement that can be realized by helping mothers and families to improve feeding practices. While there can be substantial improvements in energy, protein, vitamin A, and vitamin C intakes, it is not likely that Malawian children can meet their iron, calcium, or zinc requirements through dietary improvement alone, and in the case of vitamin A, the improvement would depend on the form in which the child receives

the vitamin A (vitamin A consumed in green leafy vegetables, for example, is much less available than vitamin A in food sources like liver).

Since the diets of Malawian children are low in animal-source foods, in the near term, supplementation programs like the vitamin A supplementation program need to play a role in helping children meet their requirements. According to the 2004 MDHS, only 65 percent of children younger than 5 years (73 percent for children 6–23 months) had received vitamin A capsules in the previous six months. However, the 2006 *Malawi Multiple Indicator Cluster Survey* reported 95 percent coverage.[8] Current recommendations are that coverage of vitamin A supplementation needs to be at least 80 percent among children in order to obtain the mortality-lowering benefits of vitamin A.

Malawi does not have an iron supplementation program for young children, despite the fact that 73 percent of children 6–59 months (86 percent of children 6–23 months) have anemia. WHO does not currently recommend universal iron supplementation for children in malaria-endemic areas such as Malawi, advising that iron and folic acid supplementation to infants/children should be targeted to individuals known to be anemic and at risk of iron deficiency, and these individuals should receive concurrent protection from malaria and other infectious diseases through prevention and effective case management.[28] Considering the lifelong damage that iron deficiency causes (weakness, reduced resistance to illness, delayed psychomotor development, shortened memory and attention spans, and impaired cognitive performance), it is important and relevant for nutrition experts and government authorities to study current scientific evidence and decide on a policy and an action plan to address the high level of anemia. This could include point-of-use fortification with micronutrient powders (WHO notes that conclusions about malaria risk and iron supplementation should not be extrapolated to fortification or food-based approaches for delivering iron), or a multipronged strategy like the one employed in the MICAH Program, which reduced anemia in children younger than 5 years from 86 percent to 60 percent over ten years through a combination of actions, including iron supplements, animal husbandry and increasing animal-source food consumed by children, food fortification, malaria control, water quality improvement, sanitation, and deworming.[25]

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Appendix. Trials of improved practices counseling guide

The following is the counseling guide used during the trials of improved practices research phase (Phase 2). These recommendations need to be modified using the findings of the research if they are to guide program implementation.

The guide is organized in the following groups:

- Aged 0–5 months.
- Aged 6–8 months.
- Aged 9–11 months.
- Aged 12–23 months.
- Sick children aged 6–23 months.

Age group: 0–5 months

Ideal feeding practices: Practice exclusive breastfeeding from birth; breastmilk without any other liquids or foods, on demand (whenever the child wants to), eight or more times, day and night. Use both breasts and empty them at each breastfeeding session.

Feeding problem	Recommendation	Motivation
Mother has stopped breastfeeding (recently, within the last month).	• Restart breastfeeding. Place your baby at the breast every two hours. Offer both breasts at each feeding. • Reduce feeding of other liquids.	• If you are pregnant, it is okay to continue breastfeeding. It will not harm your baby. Your milk is fine for your baby. • Even if you have stopped breastfeeding for a few days, your breastmilk is not bad or sour; it will not cause diarrhea in your baby. Your breastmilk is still fine. • If you breastfeed frequently and empty your breasts, you will start to produce lots of milk again.
Breastfeeding is not exclusive; mother has introduced non-nutritive liquids or foods such as water, tea, watery maize porridge, rice water, or soft drinks, etc. (Mother believes she has insufficient milk because her baby cries, or she just believes the baby needs water or other liquids or foods.)	• Stop giving your baby other liquids or foods (name the particular foods or liquids the mother is giving her baby). • If the mother says she cannot stop all at once, suggest that she reduce the number of liquid feeds and increase breastfeeding. • If the baby cries, breastfeed more. Use both breasts and be sure the baby leaves them soft and empty. • Increase the number of times you breastfeed your baby from __ to __ times (at least eight times day and night). • Drink more fluids to increase your milk production, such as *thobwa* (sweet beer), Orange Squash, and water.	• All mothers are able to produce enough milk for their babies; the more the baby sucks, the more milk you will produce. • Babies who have only breastmilk grow much better and get sick less often. • Babies need only breastmilk to grow well. They do not need water because the breastmilk calms their thirst. • Your baby will cry less if you breastfeed him more often.
Baby is not positioned correctly at the breast.	• Demonstrate to the mother the correct position of her baby at her breast.	• This will be more comfortable for you, and it will enable your baby to empty your breasts and you will produce more milk.
Mother does not use both breasts at each feeding.	• Be sure to use both breasts at each feeding. Breastfeed until both breasts feel soft and empty.	• Your baby will get more milk and will be satisfied and will cry less often. • Your baby will grow better.
Mother breastfeeds for a short time only and does not empty both breasts.	• Be sure to use both breasts at each feeding. Breastfeed until both breasts feel soft and empty.	

Age group: 6–8 months

Ideal feeding practices:

- Continue breastfeeding on demand, six to eight times a day (and night).
- Gradually introduce nutritious, mashed and semi-solid complementary food at 6 months.
- Frequency of meals per day: two. Frequency for non-breastfed babies is four.
- Feed baby a variety of energy- and nutrient-dense foods (vegetables/fruits, sources of vitamin A, and foods prepared with fat).
- Feed baby meat, poultry, fish, or eggs daily (or beans, groundnuts, peas, soybeans).
- Serve baby about eight tablespoons (one-half cup or 120 ml) of food per meal.
- Total kcal required from complementary foods: 202 (with average breastmilk intake). Required intake for non-breastfed babies is 615 kcal.
- Practice responsive feeding. Feed baby directly and encourage baby to eat. Feed patiently.

Feeding problem	Recommendation	Motivation
Mother breastfeeds for a short time only and does not empty both breasts.	• Be sure to use both breasts at each feeding. Breastfeed long enough so that both breasts feel soft and empty.	• You will produce more milk. • Your baby will get more milk and will be satisfied and will not cry as often. • Your baby will grow better and be healthier.
Baby is still not fed solid foods.	• Start feeding baby soft, mashed foods two times per day. Food should be thick, not watery; for example, thick porridge with groundnut flour and mashed vegetables (pumpkin, mustard, or sweet potato leaves; pumpkin, sweet potato, tomato, potato).	• By 6 months, your baby has an appetite for food, and he needs the food to continue to grow. His throat can swallow well by now. • He needs more food now, not just breastmilk.
Baby is fed only watery porridge.	• Feed your baby a combination of thick, mashed foods; for example, thick porridge with groundnut flour and mashed vegetables (pumpkin, mustard, or sweet potato leaves; pumpkin, sweet potato, tomato, potato). Or give soft *nsima* with mashed beans or any other relish (according to what the mother has).	• It is okay to give thick foods; these foods are not just for older children. Your baby can swallow them well, and they will not cause a stomach ache. • Watery foods will not nourish your baby. • Your baby will be happier with thick foods, and you can do your housework with less interruption. • Your baby is small for his age. He needs more food to grow better.
Baby is fed less than eight tablespoons (one-half cup or 120 ml) of food at each meal.	• Increase the amount of food you give your baby at each meal, until you feed him eight tablespoons (from __ tablespoons to eight tablespoons).	• Your baby is small for his age. He needs more food to grow better. • Your baby will be happier and you can do your housework with less interruption.

Feeding problem	Recommendation	Motivation
Baby is fed less than two times per day.	• Feed your baby at least two times a day (increase number of feeds from one to two times per day).	• Your baby needs to eat more now so he can grow and play. • Your baby will not become constipated.
Baby is not fed meat or fish daily (baby gets only cooking water).	• Give your baby a portion of fish, meat (chicken, mouse, goat, beef, pork, bird, rabbit), or insects once per day (at least two heaping tablespoons). Do not give just the broth. Pound or mince the meat or fish (be careful to remove bones from fish if necessary). • For example, fry/roast small dried fish and grind with maize. Make thick porridge with the combined flour. • Prepare fresh fish with vegetables such as tomato. Mash very well for baby. • When you prepare meat, pound the baby's portion and then cook it. • When you kill a chicken, keep and prepare the liver for your baby. • If the mother does not have a source of meat/fish daily: Give your baby preparations made with beans or groundnuts daily; for example, thick porridge with mashed beans or groundnuts.	• The broth does not help your baby grow and will not fill him up. The meat or fish will help your baby be strong and healthy. He will be happier and playful. • Your baby needs fish and meat to improve his blood.
Baby is not fed eggs.	• Mix an egg with your baby's porridge everyday (instead of meat or fish). • Feed your baby a boiled or fried egg at any meal.	• Eggs are good for your baby. They will help him grow well. They will not make your baby sick. They do not cause seizures. • Eggs will improve your baby's appetite.
Baby is not fed vegetables daily (baby gets only cooking water).	• Give your baby the same vegetables you cook for the family, mashed. • Mix the vegetables with the porridge (at least two tablespoons). • Give, for example, cassava, sweet potato, pumpkin, *therere*, *moringa*, *chisoso*, or amarantha leaves; mashed pumpkin, okra, tomato, potato (mention any vegetables that are available to the mother). • Add two tablespoons of dried vegetable powder to porridge.	• Your baby needs vegetables, not the cooking water. They will improve his appetite and growth and prevent illness. • The cooking water does not nourish your baby, but the vegetables will help prevent illness.

Feeding problem	Recommendation	Motivation
Baby is not fed fruit daily.	• Feed your baby a piece of fruit at least one time per day; for example, half a banana, a piece of ripe mango, a piece of avocado pear, orange, tangerine, etc. • Mix in half a mashed banana with your baby's porridge.	• Fruit will improve your baby's appetite and growth. • Your baby will like the sweetness of the fruit. • Fruit helps prevent illness.
Baby is given food prepared without a source of fat.	• Add some groundnut flour to your baby's porridge. • Prepare the family vegetables with some fat. Give these vegetables to your baby. • Give your baby a portion of avocado pear daily.	• Eating foods containing fat will improve your baby's appetite and growth. • Your baby will feel full and happy.
Baby is not fed on a separate plate.	• Feed your baby from his own plate; he should not share a plate with siblings.	• This way, you can see how much your baby eats. • Older siblings will take too much food and leave too little for your baby. • Your baby will eat more.
Baby is fed non-nutritive liquids or foods (Orange Squash or fizzy beverages and puffs or similar junk foods).	• Stop giving __ (mention what the mother is using). Instead, give a snack such as half a banana, a piece of sweet potato, a piece of avocado pear, or __ (mention any fruit the mother may have).	• The __ is not nutritious for your baby, and does not help him grow. • __ is very expensive. It is cheaper and better to buy an egg or some fruit.
Mother does not encourage the baby to eat.	• Help and encourage your baby to eat all his food. Be patient.	• Your baby will cry less often because he will be full. • He will sleep more.

Age group: 9–11 months

Ideal feeding practices:

- Continue frequent breastfeeding on demand, day and night (at least six times).
- Feed baby nutritious meals, such as thick porridge, *nsima*, and pounded, mashed/chopped foods.
- Frequency of meals per day: three. Frequency for non-breastfed babies is four.
- Feed baby a variety of energy- and nutrient-dense foods (vegetables/fruits, sources of vitamin A, and foods prepared with fat).
- Feed baby meat, poultry, fish, or eggs daily (or beans, groundnuts, peas, soybeans).
- Serve baby about eight tablespoons (one-half cup or 120 ml) of food per meal.
- Total kcal required from complementary foods: 307 (with average breastmilk intake). Required intake for non-breastfed babies is 686 kcal.
- Practice responsive feeding. Feed baby directly and assist older children to eat from their own plate. Encourage baby to eat. Feed patiently.

Feeding problem	Recommendation	Motivation
Mother breastfeeds for a short time only and does not empty both breasts.	• Be sure to use both breasts at each feeding. Breastfeed long enough so both breasts feel soft and empty. Be patient and take time to breastfeed your baby.	• Your baby will get more milk and will be satisfied and will not cry as often. • Your baby will grow better and be healthier.
Baby is fed watery porridge.	• Feed your baby the same foods you prepare for the family. Foods should be thick and mashed; for example, *nsima* with groundnut flour and mashed vegetables (pumpkin, mustard, or sweet potato leaves; pumpkin, sweet potato, tomato, potato).	• Your baby is older now, and needs the same foods you prepare for the rest of the family. • Your baby is small for his age. He needs more food to grow better. • It is okay to give thick foods; your baby can swallow them well, and they will not cause a stomach ache. • Watery foods will not nourish your baby. • Your baby will be happier with thick foods, and you will be able to do your housework with less interruption.
Baby is fed less than eight tablespoons (one-half cup or 120 ml) of food at each meal.	• Increase the amount of food you give your baby at each meal until you feed him __ tablespoons.	• Your baby is small for his age. He needs more food to grow and be taller. • Your baby will be happier, and you will be able to do your housework with less interruption.
Baby is fed less than three times per day. (Baby is not fed a meal at breakfast, just tea, a snack, or breastmilk, mostly because the mother leaves for the field early and takes the baby with her.)	• Feed your baby at least three times per day (increase the number of feeds from one or two to three times per day). • Feed thick *phala* (porridge) made from *ufa mgaiwa* and groundnut or soy flour or *futali* in the morning. Your	• Your baby needs to eat more now so he can grow and play. • Your baby is small for his age. He needs more food to grow taller. • At this age, your baby needs to start the day with a meal.

Feeding problem	Recommendation	Motivation
	baby needs at least three meals per day. • When you take your baby with you to the field, bring some food to feed the baby breakfast: a banana, some *chikonda moyo*.	• Babies are not like adults; they need to have a meal in the morning.
Baby is not fed meat or fish daily (baby gets only cooking water).	• Give your baby a portion of fish, meat (chicken, mouse, goat, beef, pork, rabbit), or insects once per day (at least two tablespoons). Do not give just the broth. Pound or mince the meat or fish (be careful to remove bones from fish if necessary). • For example, fry/roast small dried fish and grind with maize. Make thick porridge with the combined flour. • Prepare fresh fish with vegetables such as tomato. Mash very well for baby. • When you prepare meat, pound the baby's portion and then cook it. • When you kill a chicken, keep and prepare the liver for your baby. • If the mother does not have a source of meat/fish daily: Give your baby preparations made with beans or groundnuts daily; for example, thick porridge with mashed beans or groundnuts.	• The broth does not help your baby grow, and does not fill him up. • The meat or fish will help your baby be strong and healthy. He will be happier and playful. • Your baby needs fish and meat to improve his blood.
Baby is not fed eggs.	• Feed your baby a boiled or fried egg at any meal.	• Eggs are good for your baby. They will help him grow well. They will not make your baby sick. They do not cause seizures. • Eggs will improve your baby's appetite.
Baby is not fed vegetables daily (baby gets only cooking water or sauce).	• Give your baby the same vegetables you cook for the family, at least three tablespoons at lunch and supper. Give cassava, sweet potato, pumpkin, *therere*, *moringa*, *chisoso*, or amarantha leaves; mashed pumpkin, tomato, potato (mention any vegetables that are available to the mother).	• Your baby needs the vegetables, not the cooking water. • Vegetables will improve your baby's appetite and growth. • Cooking water does not nourish your baby. • Vegetables help prevent illness.

Feeding problem	Recommendation	Motivation
Baby is not fed fruit daily.	• Feed your baby a piece of fruit at least one time per day; for example, a banana, a piece of ripe mango, a piece of avocado pear, orange, tangerine, etc.	• Fruit will improve your baby's appetite and growth. • Your baby will like the sweetness of the fruit and the fruit helps prevent illness.
Baby is given food prepared without a source of fat.	• Add some groundnut flour to your baby's porridge. • Prepare the family vegetables with some fat. Give these vegetables to your baby. • Give your baby a portion of avocado pear daily.	• Eating foods containing fat will improve your baby's appetite and growth. • Your baby will feel full and happy.
Baby is fed non-nutritive liquids or foods (Orange Squash or fizzy beverages and puffs or similar junk foods).	• Stop giving __ (mention what the mother is using). Instead, give a snack such as a banana, a piece of sweet potato, a piece of avocado pear, or other (mention any fruit that the mother may have).	• The __ is not nutritious for your baby, and will not help him grow. • __ is very expensive. It is cheaper and better to buy an egg or some fruit or some powdered milk to add to the porridge.
Mother does not stay with baby during meals. Sometimes siblings take the baby's food. Or the mother does not encourage the baby to eat.	• Stay with your baby during meals. Help and encourage him to eat.	• Your baby is still small and needs help to eat. He will eat better when you are there and you encourage him.
Baby finishes food and still looks hungry. Mother does not serve more food.	• Make sure you feed your baby before other family members. When he finishes and still looks hungry, give him a bit more food.	• Your baby will grow more with the extra food.
Mother does not wash baby's hands before meals.	• Wash your baby's hands with soap and water before feeding him.	• This will help prevent illness in your baby.

Age group: 12–23 months

Ideal feeding practices:

- Continue frequent breastfeeding on demand, day and night.
- Feed child family foods (with an adequate texture for age, avoiding foods that are too dry or hard to swallow).
- Frequency of feedings per day: three meals, two snacks. Frequency for non-breastfed children is four to five meals.
- Feed child a variety of energy- and nutrient-dense foods (vegetables/fruits, sources of vitamin A, and foods prepared with fat).
- Feed child meat, poultry, fish, or eggs daily (or beans, groundnuts, peas, soybeans).
- Serve child about one cup (16 tablespoons or 240 ml) of food per meal.
- Total kcal required from complementary foods: 548 (with average breastmilk intake). Required intake for non-breastfed children is 894 kcal.
- Practice responsive feeding. Feed child directly and assist older children to eat from their own plate. Encourage child to eat. Feed patiently.

Feeding problem	Recommendation	Motivation
Mother breastfeeds frequently but for very short periods and from only one breast.	• Sit down with your child and breastfeed quietly, at least four times during the day and night. Use both breasts at each feeding and breastfeed until your breasts feel soft and empty.	• Your child still needs the breastmilk to grow well and be healthy.
Child is fed watery porridge or other watery preparations.	• Feed your child the same foods you feed the rest of the family. Foods should be chopped and moistened with relish.	• Your child is older now, and needs the same foods you give the rest of the family so he can continue to grow. • Your child is small for his age. He needs more food to grow taller. • Watery foods will not nourish your child, and he will be hungry.
Child is fed less than one cup (16 tablespoons or 240 ml) of food at each meal.	• Increase the amount of food you give your child at each meal, until you feed him __ tablespoons.	• Your child is small for his age. He needs more food to grow taller. • Your child will grow faster and better and will be stronger. • Your child will be happier, and you will be able to do your housework with less interruption.
Child is fed less than three times per day. (Child is not fed a meal at breakfast, just tea, a snack, or breastmilk, many times because the mother leaves for the field early and takes the child with her.)	• Feed your child at least three times per day (increase the number of feeds from one or two to three times per day). • Feed thick *phala* (porridge) made from *ufa mgaiwa* and other flours (groundnut or soy), or *futali* mixed with groundnut flour in the morning.	• Your child needs to eat more now so he can grow and play. • Your child is small for his age. He needs more food to grow taller. • Your child needs to start the day with a meal at this age.

Feeding problem	Recommendation	Motivation
	• When you take your child with you to the field, bring some food with you to feed the child breakfast: a banana, some *chikonda moyo*.	
Child is not fed snacks during the day (or not fed two snacks).	• Feed your child two snacks between meals. • Feed your child one additional snack per day so that he gets at least two per day. • Give a banana, piece of mango, piece of avocado pear, an orange, some scone, *chikonda moyo*, *chitumbuwa* (suggest other local snacks).	• Your child is bigger now, and he needs extra food during the day to keep him strong and healthy and growing. He will play better and be happier.
Child is not fed meat or fish daily. Child is given the fish water or sauce but not the fish. Child is fed a portion of meat or fish that is less than three tablespoons.	• Give your child a portion of the fish or meat you prepare for the family each day. Give at least three tablespoons. (Remove the bones from the fish if necessary.) • Give, for example, chicken, mouse, goat, beef, pork, rabbit, or insects once per day. Do not give just the broth. • Increase the portion of meat, fish, or eggs you give your child from one to three tablespoons. • When you kill a chicken, keep and prepare the liver for your child. • If the mother does not have a source of meat/fish daily: Give your child preparations made with beans or groundnuts daily; for example, *nsima* with beans or groundnuts and rice.	• Your child needs the fish, not the fish water. The fish water does not nourish your child. • Your child needs fish and meat to improve his blood. • Your child needs meat and fish to grow and stay healthy.
Child is not fed eggs.	• Feed your child a boiled or fried egg at any meal.	• Eggs are good for your child. They will help him grow well. Eggs will not make your child sick. They do not cause seizures. • Eggs will improve your child's appetite.
Child is not fed vegetables daily or is fed a small portion of vegetables (less than three tablespoons).	• Give your child the same vegetables you cook for the rest of the family, at least three tablespoons per meal, daily. • Increase the amount of vegetables you serve your child from __ to __ tablespoons.	• Vegetables will improve your child's appetite and growth.

Feeding problem	Recommendation	Motivation
	• Give cassava, sweet potato, pumpkin, *therere*, *moringa*, *chisoso*, or amarantha leaves; mashed pumpkin, okra, tomato, potato (mention any vegetables that are available to the mother).	
Child is not fed fruit daily.	• Feed your child a piece of fruit at least one time per day; for example, a banana, a piece of ripe mango, a piece of avocado pear, orange, tangerine, etc.	• Fruit will improve your child's appetite and growth. • Your child will like the sweetness of the fruit. • Fruit helps prevent illness.
Child is given food prepared without a source of fat.	• Add some groundnut flour to your child's porridge. • Prepare the family vegetables with some fat. Give these vegetables to your child. • Give your child a portion of avocado pear daily.	• Foods made with fat will improve your child's appetite and growth. • Your child will feel full and happy.
Child is fed non-nutritive liquids or foods such as tea with milk and sugar, Orange Squash or fizzy beverages, puffs or similar junk foods.	• Stop giving __ (mention what the mother is using). Instead, give a snack such as a banana, a piece of sweet potato, a piece of avocado pear, or other (mention any foods the mother may have).	• The __ is not nutritious for your child, and does not help him grow. • __ is very expensive. It is cheaper and better to buy an egg or some fruit.
Mother does not stay with the child during meals. Sometimes child not does finish food or siblings take the food.	• Stay with your child during meals. Help and encourage your child to eat and finish his food. Be patient.	• Your child is still small and needs help to eat. He will eat better when you are there.
Child finishes food and still looks hungry. Mother does not serve more food.	• Make sure you feed your child before others in the family. When he finishes and still looks hungry, give him some more food.	• Your child will grow more with the extra food.
Mother does not wash child's hands before a meal.	• Wash your child's hands with soap and water before feeding him.	• This will help prevent illness in your child.

Sick children 6–23 months

Ideal feeding practices:

- During illness:
  - Offer breastmilk more frequently.
  - Offer other liquids more frequently.
  - Patiently encourage child to eat soft foods.
  - Encourage child to eat favorite foods.
- After illness:
  - Feed extra food until child is growing well again.
  - Encourage child to eat more.

Feeding problem	Recommendation	Motivation
Child receives no other foods but breastmilk during illness.	• Offer other liquids in addition to breastmilk; for example, homemade fruit juice (orange, tangerine, *malambe*, guava, tamarind). • Offer child small amounts of food more frequently. • Offer child his favorite foods.	• Your child needs food and liquids to get better.
Child stops eating during illness (child has no appetite).	• Offer child his favorite foods. • Offer fruits such as mango, papaya, and orange. • Add a few drops of lemon to child's food.	• This will stimulate your child's appetite, and he will be able to eat more and get better.
Mother does not feed more/ more frequently after the illness.	• Now that your child is better, feed an extra meal each day, or offer more food at each meal (two tablespoons).	• Your child needs extra food to gain weight and recuperate.