

**A SUMMARY OF PRITECH-SPONSORED
RESEARCH TO IMPROVE CHILD
FEEDING DURING DIARRHEA**

Submitted to the Nigerian
Ministry of Health and Social
Affairs: the National CDD Program
and the National Nutrition Program

A Report Prepared by PRITECH Technical Officer:
ELIZABETH HERMAN, M.D., M.P.H
and PRITECH Consultant:
NANCY KEITH, Ph.D.

Date Prepared:
JUNE 29, 1993

TECHNOLOGIES FOR PRIMARY HEALTH CARE (PRITECH) PROJECT
Supported By The:

U.S. Agency for International Development
CONTRACT NO: AID/DPE-5969-Z-00-7064-00
PROJECT NO: 936-5969

AUTHORIZATION:
AID/S&T/HEA: September 13, 1993
ASSGN NO: SUP 096-NG
& RAD 033-NG
& RAD 032-IR

BACKGROUND

In 1990 the Niger National Diarrhea Disease Control Program, in collaboration with the Technologies For Primary Health Care (PRITECH) Project, sponsored the first of a series of studies to identify ways of improving child feeding during diarrhea. The purpose of these studies was to develop specific, culturally appropriate feeding recommendations that would help to maintain nutritional intake during diarrheal episodes, and to increase nutrient intake during the important convalescent period when appetite returns. This interest in and commitment to improving the nutritional management of diarrhea emerged from the recognition of the close relationship between diarrhea and malnutrition: i.e. that multiple and persistent diarrheal episodes have an adverse effect on nutritional status and growth, and that malnutrition appears to be a risk factor for diarrheal episodes of increased severity and duration.

The CDD program sought to develop recommendations that would be consistent with the nutrition program's efforts toward and messages about infant and child feeding during periods of health. Given that some foods or additions may not be acceptable during diarrhea, it was anticipated that messages about feeding during diarrhea would be a subset of the general nutrition messages. Although they might focus on recommendations for feeding children with decreased appetite, recommendations for feeding during diarrhea would support and reinforce the general messages.

Preliminary research results and a review of existing data suggested problems with implementation of current recommendations to improve infant and child feeding. Although mothers were familiar with and had tried the recipes for bouillies (porridges) promoted by the Ministry of Health, adoption of these recipes appeared to be very low. The research sponsored by the CDD program, therefore, sought to document current feeding practices and alternative options for improving them.

Although the results presented in the following sections specifically address feeding during and after diarrhea, the recommendations are based on knowledge of existing feeding practices, on cultural beliefs about what ingredients can be mixed together, and on food availability and accessibility. Therefore, the findings and recommendations may also be helpful for developing general guidelines for infant and child feeding.

METHODS

The research was conducted in Dosso and Konni. Four villages were selected in each area, two large commercial villages with dispensaries and mother-child health education programs and two smaller villages with less trade, fewer resources, and no dispensary or mother-child education program.

The research was conducted in three phases. During Phase I (the problem identification phase) 64 mother/child pairs were selected for household observations of and in-depth interviews about feeding practices. The purpose of these interviews and observations was to identify the most important problems impeding the optimal feeding of young children (4-24 months) and to suggest potential interventions to address these problems. Information from the 64 mother/child pairs was supplemented by focus group discussions with other village women, health care providers, traditional healers, and men. The results of Phase I were used to develop a set of recommendations addressing additional ingredients to increase the nutrient density of foods given to children ("recipes"), frequency of feedings, and feeding style (active versus passive).

During Phase II, the acceptability and feasibility of these recommendations were tested in household trials conducted in the same villages as Phase I. A total of 128 mother/child pairs (including the 64 pairs from Phase I) were visited 4 times each. The first visit began with asking the mother about current or recent illness in her child and about her perception of the child's nutritional status. An assessment of the foods and resources in the household was made using a 24 hour food recall and a food frequency list. This information was later used to choose appropriate recommendations about increasing the nutrient density of the child's food and about the frequency of feedings and feeding style. The recommendations were discussed with the mother and an intervention for improving the child's intake was negotiated with her during the second visit. The third visit, made the following morning, determined how the mother and child had reacted to the intervention. The fourth visit was made several days later to record constraints and to assess the acceptability and feasibility of the intervention.

During Phase III, four interviewers visited food vendors and women in their homes to collect recipes for the traditional foods commonly fed to children. The raw ingredients and the cooked food after preparation were weighed or measured. A total of 76 samples were collected. When possible, the interviewers also weighed or measured the reported child portion size of these foods. The caloric and protein value of these foods were calculated using food composition tables. These values were then used to calculate the caloric and protein content of three of the "recipes" developed in Phases I and II.

RESULTS

Feeding Practices

The results of Phase I indicate that foods offered and feeding practices do not change during the majority of diarrheal episodes. Foods and liquids are not withheld. Although some mothers reported force feeding their children or preparing special recipes to encourage the appetite, household observations suggested that most mothers simply remove the food when a child has no appetite.

Previous research¹ suggests that these passive feeding practices are deeply rooted in cultural beliefs about the significance and process of eating. Mothers view their role as that of providing or offering food to children, but they generally do not put food into children's mouths if the children do not want to eat. Learning to eat solid foods is a socialization process in which the child learns to ask for food when hungry, feed him/herself, and become satisfied with the staple eaten by the family. The purpose of eating is to fill the stomach. If a child does not eat, it is assumed that his/her stomach is full and the mother is likely to remove the food rather than help the child to eat more. It appears, therefore, that any intervention to improve child feeding must include an emphasis on feeding style, especially when the child is sick or anorectic.

The age at which children receive first foods varies from 4 - 9 months. Information on the frequency of feeding first foods is not available.

First Foods

The in-depth interviews and 24 hour food recalls conducted during Phase I research revealed that the first foods (in addition to breast milk) offered to infants vary according to region and type of village:

TABLE 1
FIRST FOODS OFFERED TO INFANTS
BY REGION AND VILLAGE TYPE

Type of Food	Dosso Region (Djerma)	
	With dispensary	Without dispensary
<u>koko</u> ¹	58%	15%
<u>fura</u> ²	15%	58%
<u>komandie</u> ³	17%	25%
Type of Food	Konni Region (Hausa)	
	With a dispensary	Without dispensary
<u>koko</u>	74%	42%
<u>fura</u>	11%	60%
<u>tuwo</u> ⁴	7%	26%
sauce (for <u>tuwo</u>) ⁵	3%	11%
<u>bouillie legere</u> ⁶	16%	2%
beans or meat	15%	11%
N.B. More than one response accepted.		

¹ Koko is a thick porridge made by pouring boiling water into a paste of fine, fermented millet flour. It is one of many traditional bouillies that vary in the degree of fermentation and the coarseness of the flour.

² Fura is a watery drink made from mashing balls of cooked millet flour into sour skimmed milk, and diluting with water.

³ Komandie is a traditional bouillie (porridge) similar to koko but the flour is not finely ground.

⁴ Tuwo, the staple family food, is a thick paste made by adding large quantities of millet flour to boiling water, then beating the resulting mixture with a paddle to make it viscous and elastic.

⁵ The sauce for tuwo is made from a large variety of plant and tree leaves. Vegetables and meat can also be cooked in the sauce.

⁶ Bouillie legere is a recipe recommended by the Ministry of Health for children four to six months. It is a dilute mixture of grilled millet flour and sugar stirred into water.

Fura, koko, and other porridges (bouillies) are, therefore, the most common first foods for young children. Koko is more commonly given in the large, commercial, "dispensary" villages because it is often purchased from street vendors. Tuwo and beans or meat also appear to be common first foods in the Hausa region.

It is of note that, except for bouillie legere, none of the mothers reported making the bouillies recommended by the Ministry of Health (MOH). Previous ethnographic research suggests that the reasons might be both logistical and cultural. Lack of mothers' time may preclude preparation of special dishes for young children. There is also some evidence that mothers perceive the MOH bouillies as transitional foods. Mothers may make the MOH bouillie for a few days or weeks to help "open up the stomach" and prepare the child for solid foods. As soon as the child has learned to eat solid food, the child is allowed to eat the family food and the MOH bouillie is no longer prepared.

The energy and protein content of these common first foods were estimated during Phase III of the current study and are listed in Table 2. Fura and tuwo are family staples prepared at home, but koko is often purchased from vendors, especially in the larger, commercial towns. Therefore, recipes for both homemade and purchased koko are included. Although the recommended energy density of foods for older infants and toddlers who are fed three meals a day is at least 80kcal/100 gm³, a higher density would be preferable for children who are malnourished, who are recuperating from an illness, or who are fed less frequently.

Although the reported energy and protein density for fura is quite high, it should be noted that the results are for fura with milk and at the moment of preparation. The common practice is to prepare a large bowl of fura to be consumed by the entire family throughout the day. As it sits, the starch molecules swell and the fura thickens. It is progressively diluted with water throughout the day, thus decreasing the calorie and protein density. Furthermore, some families cannot afford to prepare fura with milk, but make it with only millet and water.

It is also of note that tuwo is a thick millet paste and, although practices vary among ethnic groups, is generally not consumed in significant quantities by children less than 10 months of age. When it is "fed" to younger children it is usually as a small taste given from the mother's finger.

The results of the 24 hour recalls indicate the difficulty in defining a "typical" diet. A poor family in the bush may only eat fura during part of the week. They may prepare tuwo several times per week depending on the availability of time and grain. Families with a little cash flow may purchase snacks of beans, macaroni, leaves, liver or fried cakes once or twice during the day. Young

children may sip fura throughout the day and often have bites of others' food as well as snacks handed to him/her by older siblings.

TABLE 2		
MEAN ENERGY AND PROTEIN DENSITY OF FIRST FOODS (The ranges of the values measured are in parentheses)		
Food	Kcal/100g	Protein/100g
<u>Koko</u> (as prepared by street vendors)	48 (46.3-49.7)	1.5 (1.4-1.5)
<u>Koko</u> (as prepared at home)	86 (51.3-126.9)	2.6 (1.7-3.9)
<u>Fura</u> (prepared with milk before dilution)	120 (93-147)	4.4 (3.3-5.8)
<u>Tuwo</u>	112 (77.0-174.9)	3.4 (2.3-5.3)
<u>Bouillie legere*</u>	24	0.3
* Estimated from Ministry of Health Recipes, <u>not</u> measured during Phase III.		

Efforts to Improve Feeding Style and Practices

Based on the results of Phase I, a set of messages addressing frequency of feedings and feeding style was developed. These included urging the mother to take a more active role in the feeding of her child by putting food into the mouth of the child and patiently encouraging the anorectic child to eat a little food at a time. Mothers were told that children need one or two extra meals per day during the period of recuperation. If the total quantity of family food could not be increased, mothers were encouraged to purchase two extra snacks per day.

When asked about changes in feeding style and feeding frequency during Phase II (household trials), most mothers responded favorably. Without observing the actual feeding interaction, however, it is difficult to estimate to what extent these recommendations were actually followed or how well they were accepted. It was particularly difficult for mothers to comment on the manner or frequency of feeding separately from the "recipe" itself.

Efforts to Increase Caloric Density of First Foods

Phase I research explored attitudes about adding different ingredients (that would increase the caloric density) to the

traditional first foods. The mothers interviewed indicated that fura has no acceptable additions except sugar and sour skimmed milk. Since it is difficult to obtain additional milk, and since excess sugar is considered a cause of diarrhea, it may not be acceptable or feasible to enrich fura with these ingredients during periods of diarrhea.

Koko is viewed as light and easily digested by young children and soothing for people who are ill. Sugar and skimmed milk are acceptable additions. Peanut solids (kouli-kouli), although an acceptable addition to koko, are thought to cause or aggravate diarrhea. In the population studied, it was considered unacceptable to mix flours (such as bean flour and a grain) or to add oil to a porridge (koko) or to a drink (fura). There is, however, a tradition for adults who are ill or men who want to "fill the stomach" before they go off to work, to eat koko with fried bean cakes broken up in it. This, therefore, suggested a culturally acceptable alternative way of enriching koko with oil and bean flour.

Attitudes about tuwo are that nothing can be added to the paste itself. Butter and, less often, oil can be added to the sauce.

In order to be acceptable, these enriching ingredients must be added in a certain way. Peanut solids must be dissolved in water and then cooked into the mixture so that no lumps are discernable. Fried cakes of all sorts must be shredded into tiny morsels and left for a few minutes to absorb the fluid, thereby softening and dissolving. Sugar must be dissolved completely and added one cube at a time in each serving. Fried cakes and sour milk must be added in small quantities with each serving; to add these all at once would risk souring any left-over food.

During Phase II, 4 "recipes" to increase the nutrient density of koko were tested in household trials. Different mothers agreed to try different "recipes". The decision about which variation to try was negotiated based on the child's health, the family's preference, and the foods available. Koko with peanut solids was most commonly recommended in the Dosso area because bean cakes were seldom available, and sour skimmed milk was more difficult to find than in the Konni area. The 4 recipes tested and the number of households in which each was tried are listed below:

- 1) koko + sour skimmed milk + sugar (16 households)
- 2) koko + fried bean cakes + sugar (51 households)
- 3) koko + fried millet or fried wheat cakes + sugar (21 households)
- 4) koko + peanut solids + sugar (52 households)

Unfortunately, the household trials of these "recipes" were conducted during Ramadan when mothers were particularly concerned about their children's nutrition because of a perceived decrease in their own breast-milk. They may therefore have been more motivated than usual to try the recommended recipes. As koko is a traditional food for breaking the Ramadan fast, it was also more available during this month.

The results of the household trials are summarized in Tables 3 and 4. These results should be interpreted cautiously because of the methodology used in the household trials. The "recipes" were not assigned randomly, but were chosen to meet the situation of the household and the child. Consequently, there is not a uniform number of children in the different age/illness/"recipe" cells. It is, therefore, not possible to conclude that one "recipe" was superior to the others. Several trends, however, can be noted:

- 1) The "recipe" with peanut solids and the "recipe" with fried bean cakes were most commonly chosen for trial, probably reflecting the availability of ingredients.
- 2) Although the "recipe" with sour skimmed milk and sugar was chosen less frequently, the percent of mothers who made the "recipe" at least once daily and who expressed a willingness to continue making it was relatively high.
- 3) Mothers' willingness to continue making the "recipe" with fried bean cakes was particularly low for the younger (4-11) age group. The reason for this is not known. It may be due to the thick or lumpy consistency of the mixture, to a perception that children cannot digest the bean cakes, or to some confounding variable.
- 4) Although mothers expressed concern about giving recipes with sour skimmed milk and peanut solids to children with diarrhea, this concern was not reflected in the results of the household trials. The percent of mothers of children with diarrhea who made and were willing to continue making the enriched koko was fairly good for all the "recipes".

TABLE 3

RESULTS OF RECIPE TRIALS BY AGE GROUP

Recipe	4 - 11 Month Age Group				
	No. who agreed to try	No. who tried the recipe	No. who made at least once daily	No. who will continue making	Drop outs
<u>koko</u> + sour skimmed milk + sugar	11	9	7	7	1
<u>koko</u> + fried bean cakes + sugar	21	11	7	5	2
<u>koko</u> + other cakes + sugar	5	4	4	3	0
<u>koko</u> + peanut solids + sugar	23	22	19	16	2
	12 - 24 Month Age Group				
	No. who agreed to try	No. who tried the recipe	No. who made at least once daily	No. who will continue making	Drop outs
<u>koko</u> + sour skimmed milk + sugar	6	6	6	6	0
<u>koko</u> + fried bean cakes + sugar	30	27	19	20	2
<u>koko</u> + other cakes + sugar	16	16	11	10	2
<u>koko</u> + peanut solids + sugar	29	28	20	16	0

TABLE 4
RESULTS OF RECIPE TRIALS BY HEALTH STATUS

Health Status	koko + sour skimmed milk + sugar			
	No. who tried recipe	No. who made at least once daily	No. who will continue making	Drop outs
Diarrhea today	4(2:2)*	4	4	0
Other illness today	4(4:0)	3	2	1
No acute illness**	2(0:2)	2	2	0
	koko + fried bean cakes + sugar			
	No. who tried recipe	No. who made at least once daily	No. who will continue making	Drop outs
Diarrhea today	10(2:8)	8	7	0
Other illness today	9(3:6)	6	5	1
No acute illness**	19(6:13)	12	13	1
	koko + other cakes + sugar			
	No. who tried recipe	No. who made at least once daily	No. who will continue making	Drop outs
Diarrhea today	5(1:4)	4	4	0
Other illness today	2(0:2)	2	2	0
No acute illness**	13(3:10)	9	7	2
	koko + peanut solids + sugar			
	No. who tried recipe	No. who made at least once daily	No. who will continue making	Drop outs
Diarrhea today	9(7:2)	9	9	0
Other illness today	9(3:6)	6	6	0
No acute illness**	32(12:20)	24	17	2

* First number is total number of children. The number of these aged 4-11 months and 12-24 months are noted in order in the parentheses

**This category includes 49 children who had diarrhea in the past week, 15 who had another illness in the past week, 7 children who were perceived by the mother to have lost weight recently, and 3 children who were well and did not fall into any other category.

Mothers who expressed intentions to continue making or purchasing the new "recipes" were motivated to do so because they perceived that 1) the enriched food filled their children's stomachs, 2) it decreased the children's crying and begging to nurse, 3) it increased the children's ability to play and leave their mothers alone and 4) it caused them to visibly gain weight. Of those who were not willing to continue making the "recipe" about half noted that the child did not like the taste.

DISCUSSION

Adding fats such as oil or butter to a food is the easiest way to increase its caloric density. For this reason, nutrition programs often recommend the addition of oil to porridges and other foods given to young children. Unfortunately, it appears that the addition of oil to these childhood staples is considered either too expensive or culturally unacceptable in many parts of Africa.

This study sought to identify affordable and acceptable ways of introducing ingredients with a high caloric density into the diet of Nigerian children. The results show that Nigerian mothers are willing and able to add milk, sugar and peanut solids to children's foods. Unfortunately, none of these increases the caloric density by a significant amount. The milk that is used is skimmed, and the peanut solids are only the fibrous remains after the peanut oil has been extracted.

The identification of fried bean cakes or other fried cakes as an acceptable addition to koko is an innovative approach to resolving this dilemma. Since koko is considered a soothing food that is good during illness, the recommendation to feed fried-cake-enriched koko during diarrhea may be appropriate in villages where koko and fried cakes are available. Unfortunately, the data suggest that this recommendation may not be as acceptable for children under 1 year of age and that koko and fried cakes are not readily available in many areas. Given the variety of cultures and food products throughout the country, however, it is only reasonable to expect that no single recommendation will address all situations.

Ninety-one percent of the 116 mothers interviewed on the fourth visit of the household trials said they were willing to continue to make or buy the "recipe" after the Ramadan fast. This high trial and adoption rate is most likely attributable to a number of factors. First, since mothers were themselves fasting, they were particularly concerned about providing adequate intake to breast-fed children. Second, the methodology selected children who were acutely or recently ill or who had reportedly lost weight. Mothers may have been more motivated to prepare something special for these children. Third, the counselling process used was personalized. After obtaining information on the child's current diet and on the availability of different ingredients in the household, the counsellor suggested different options for improving the child's intake. The final recipe or intervention was negotiated with the mother, rather than dictated to her. This negotiation process assured that the recommendations were feasible and acceptable, and also served as an important motivator to continue the recommended practice.

Because the Phase II household trials were conducted during Ramadan, the resulting data are limited. The trials do, however, provide good information about culturally acceptable modifications of koko, a common first food in the study population. It is hoped that similar modifications might be acceptable for other traditional bouillies as they are prepared in different parts of the country. This, however, remains to be documented. Although the household trials did not address modifications of fura or tuwo, Phases I and III provided information on these foods.

The household trials also provided important information on what motivates mothers to change current feeding practices. The results suggest that it may be more effective to promote desired changes as "filling the stomach", or "making the child content" rather than emphasizing the benefits to growth and nutrition.

OPTIONS FOR IMPROVING NUTRIENT INTAKE

Although millet is the staple grain throughout all of Niger, it is clear from the results of these and other studies that the form in which it is given to young children and the other ingredients available to mix with it varies within the country.³ Therefore, recommendations to improve child feeding during and after diarrhea must include options that reflect seasonal, geographic and cultural differences. It is unlikely that the development of a single recipe or recommendation for each age group would be relevant or effective.

Guidelines for nutrition counselling, therefore, must be designed to encourage consideration of the child's current diet and the feasibility and acceptability of different options for improving it. Counselling must focus not only on the food or "recipe" but on

feeding practices (amount of food, frequency of feeding, and active feeding). In children who are anorectic due to illness or other reasons, it is important to stress the importance of actively encouraging the child to eat.

Options for Increasing the Intake of Children 4-12 Months

Studies conducted in The Gambia indicate the children of this age consume approximately 600cc (450 Kcal) of breast-milk per day in addition to other foods. Energy requirements range from 800 - 1000 Kcal per day. Thus supplemental foods must provide an additional 350 - 550 Kcal per day. This requirement can be met in a number of ways:¹

1. Children who are given fura with milk as a first food, will require a minimum of 2 louches (300 cc/334Kcal) per day at the beginning of the age range, and 3 louches (450cc/501Kcal) Kcal/day at the end of the age range to approach energy requirements. (These volumes are the minimum as they do not take into account the dilution that occurs throughout the day.) If one soup spoon (15cc.) of oil is added to each louch, less fura is needed (1.25 louch at the beginning of the age range, and 2 louch for older children).
2. Children given purchased koko as a first food would require from 700 to 1100 cc of the koko per day -- far more than would be reasonable. If given koko made at home, they would require approximately 400 - 650 cc per day, requiring at least 2 servings. Some home preparations of koko however, are quite low in energy density, approaching that of purchased koko. An appropriate intervention might be to encourage the preparation of thick koko by either specifying the desired consistency or by specifying the proportions of water and flour.

Alternatively, if koko is enriched with some of the additions recommended in the study, smaller volumes will be required. Enriching koko with either sour milk and sugar, or with peanut solids and sugar does not significantly increase the caloric density (although it does provide some complementary protein). Enriching koko with fried bean cakes and sugar, however, does increase the caloric density as well as providing complementary protein.⁴ Children would require 400 - 600 cc. per day of purchased koko enriched with fried bean cakes and sugar to meet energy requirements. Mothers' willingness to

¹It is recognized that children, particularly those at the upper end of this age range, are given a variety of snacks and small bits of family food. In considering the options for improving nutrient intake, however, only one food will be considered at a time.

give this mixture to children 4-12 months of age, however, needs to be further explored.

If koko is made thick at home and enriched with fried bean cake and sugar, only 280-450cc would be required per day. This could be given in a single serving. Adding fried millet cakes or fried wheat cakes would probably provide a similar increase in calories (this was not measured in Phase III), although it does not offer any complementary protein.

3. By supplementing the diet with snacks. For example, one recommendation to increase vitamin A intake is for women and children to eat two portions of fresh green leaf kopto or other fresh greens with oil twice per day.⁵ Fried bean or millet cakes may also be eaten as snacks instead of (or as well as) adding them to koko. More information is needed about the acceptability of this recommendation for young children, and about the caloric density of this food and other snacks.
4. By a combination of interventions, for example by increasing the amount of fura consumed and by providing additional snacks.

Options for Increasing the Intake of Children 12-24 Months

Previous studies conducted in The Gambia estimate that children over 12 months of age receive 300ml (225Kcal) of breast-milk per day. Since tuwo is the staple family food throughout Niger, it will be assumed that it will be possible for most families to provide 1 breast-milk plus one serving of tuwo per day (although it is recognized that this is not necessarily the case in all families at all times). In Phase III of the current study, mothers reported that children 12-24 months old can eat about 400 grams (448 Kcal.) of tuwo per serving.

A diet of breast-milk plus one serving of tuwo per day provides a total of 673 kcal per day. If the child also receives 1 louche (150cc) of fura made with milk per day, it will add an additional 167 Kcal bringing the total to 840 Kcal/day. Energy requirements of children in this age group average 1150 Kcal a day, thus leaving a deficit of 310 - 477 Kcal/day. This deficit can be addressed in a variety of ways:

1. By providing an additional full serving (400grams/448Kcal) of tuwo per day. This is essentially a recommendation to feed the same food more frequently. The current study documented that tuwo is only made once per day, but that tuwo from the night before is often given to children in the morning. The problem is that the left-over tuwo is kept at ambient

temperature and probably provides an ideal culture medium for bacteria.

2. By providing additional fura. An additional 2-3 louches (for a total of 3-4 louches) of undiluted fura would be required to provide an additional 334 - 501 Kcal/day. Ethnographic research suggests that this would be difficult as it would diminish the portions for other family members. It would also be difficult to add extra milk to the child's fura as no extra milk is available in most of the villages.
3. By adding oil to the current diet. Adding 1 soup spoon (15cc.) of oil to the portion of fura and to the portion of tuwo will add an additional 248 Kcal/day, still falling short of the estimated deficit. Current data suggests that it is culturally unacceptable to add oil to fura. There is disagreement about whether it would be possible and acceptable to add oil (or butter) to the sauce that is poured over the child's portion of tuwo.
4. By supplementing the diet with a serving of koko enriched with fried bean (or other) cake and sugar. During Phase III, mothers estimated that children in this age group can eat 300 cc. of koko. If the koko is purchased from a street vendor, this will provide an additional 249 Kcal/day, still falling short of the estimated deficit. If it is made at home, it will provide an average of 371 Kcal/day (although it should be noted that the caloric density of koko prepared at home varies greatly). Adding skimmed milk or peanut solids to koko does not significantly increase caloric density and would not be a particularly useful intervention.
5. By supplementing the diet with snacks (see above).
6. By a combination of interventions (see above).

RECOMMENDED NEXT STEPS:

Before proceeding to formalize recommendations for feeding during and after diarrhea, some additional information should be collected. First, there appears to be some disagreement among researchers, consultants and individuals charged with implementing nutrition interventions about the acceptability of adding oil to fura, tuwo and to the traditional bouillies. This needs further evaluation. If Peace Corps workers are indeed promoting the addition of oil to fura and tuwo, then a follow-up study to assess the adoption rate of this practice would be in order.

Second, information is needed about the caloric density of various "snacks" so that mothers can be guided to purchase those with high caloric density. (The vitamin A content of Nigerian snacks has

already been documented). The availability of snacks in non-commercial villages and the acceptability of snacks for children under 12 months of age should also be explored.

Finally, the caloric density of fura should be checked again as the value determined in Phase III seems a bit high for a drink made of millet and sour skimmed milk.

REFERENCES

1. Keith N. Young child feeding, weaning, and diarrhea illness: Practice in a Hausa village and educational implications. Part I: The ethnographic study. Part II: Survey of the Doguerawa Canton - June 1989. 1991. (USAID Contract No. AID-683-0929.83-C-8023-00). Washington, D.C.
2. Huffman S, Martin L. First Foods: Optimal Feeding of Infants and Toddlers. July 1992. Nuture/Center to Prevent Childhood Malnutrition, Washington, D.C.
3. Brandstetter R, Fishman C. Rapid Ethnographic Assessment of Infant Feeding: Niger. January 1989. Nutrition Communication Project, Academy for Educational Development, Washington D.C.
4. Hung M. Evaluation de la Valeur Nutritive de Trois Preparations Traditionnelles (koko, fura, et tuwo) et de Recettes Preconisees par le Projet PRITECH. May 1992. Report prepared for the PRITECH Project, Washington, D.C.
5. Keith N, et al. Field Research in Birni'n Konni Vitamin A Communication Project: Republic of Niger. March-June 1991. Nutrition Communication Project, Academy for Educational Development. Washington, D.C.