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To Nick Luykx

From Bob Weil *Bob*

Subject Kathryn Kolasa Study of Self-Targeting Foods

I am attaching a copy of the final report of the study of self-targeting foods prepared by Kathryn Kolasa.



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Filmer

SELF-TARGETING WEANING FOODS

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INTRODUCTION

An important aspect of the Agency for International Development's (AID) nutrition work is the development of weaning foods and weaning foods programs for infants and young children in developing countries. Current programs include weaning foods that are prepared at home or locally in village communities, or distributed through institutions or in commercial channels. Many of these weaning foods are then distributed through the market or through government food distribution activities. By far the largest weaning food program consists of food distributed through maternal and child health centers.

A persistent problem that limits the effectiveness of these nutrition programs is that a large portion of the food intended for the weaning age child is consumed by others. A similar problem is seen in the efforts to provide additional food or nutritional supplements to pregnant women. This is often referred to as a dilution problem since the nutritional impact of the feeding for the target individual is lessened.

Since the 1960's there have been reports from nutrition and health field workers that there are self-targeting foods in some areas of the world. That is, that specific foods are preferentially fed to or eaten by specific individuals. These reports have received little attention and less systematic study however they encouraged the implementation of this study. If foods existed that were served preferentially to weaning age

children and/or to pregnant women, use of these foods in weaning foods programs and maternal supplementation programs could potentially reduce the dilution or sharing of food that has been specifically intended to improve the nutriture of weaning age children and pregnant women

A potential solution to the food dilution problem is use of foods which are perceived as being intended primarily for the intended beneficiary rather than other family members. These foods might be considered "self-targeting" in that they would be served preferentially to the beneficiary and not diverted to other family members.

In addition, if foods could be identified which have a strong image associated with the intended beneficiary, this information could also be useful in home prepared and commercial programs. For example, an effort to promote a home prepared weaning food could build on the existence of a food now used traditionally as a weaning food. Perhaps the mother could simply be taught to add an ingredient to that food as opposed to trying to introduce the mother to a whole new food. Similarly, a program to promote a weaning food to be distributed through commercial channels could also use as its base a traditional weaning food. For example, a traditional food which did not have a high nutritional value could be simulated in an enriched form.

Background and Purpose of this Study

While there have been many investigations on weaning food and on maternal supplements, little has been published about self-targeting foods for weaning age children and women. In reality, little has actually been published describing the foods that infants, toddlers and women eat.

Reports from fieldworkers that self-targeting foods existed in some areas of the world for weaning age children and pregnant women encouraged us to look for these foods and examine their potential for improving the nutriture of weaning age children and pregnant women. This study, then, is an overview of the readily available experiences of nutritionists and other health workers with self-targeting foods for weaning age infants and pregnant women. It was a short term, exploratory effort to fill the information gap.

The objectives were:

1. to produce an overview of readily available experience with self-targeting foods for weaning age children and pregnant women.
2. to identify ideas that could be applied to the selection of foods for nutrition interventions.

As it was believed that little information existed in the published literature the study focused primarily on obtaining information from interviews or correspondence with knowledgeable individuals. The object was to obtain readily available information from these sources within a short time. In addition, the published literature was also examined. In total approximately 100 people were interviewed and over 500 literature reports screened. A group of individuals with experience in nutrition, nutrition education, anthropology and the infant food industry also reviewed the information collected and some of the preliminary conclusions reached.

Findings:

Weaning Foods

1. The study identified instances of self-targeting weaning foods in both the traditional and commercial centrally processed

categories. In addition, some limited experience with experimental efforts to develop nutrition programs which utilize the self-targeting concept were also found. While this brief study identified only a few examples of self-targeting foods for which considerable information was available, a fair number of other instances with less complete data were also found where the foods appeared to be self-targeting. From the information available, it therefore appears warranted to conclude that self-targeting weaning foods are not limited to a few isolated instances but rather exist in a number of countries and cultures.

2. The existence of self-targeting foods would suggest that AID should explore and test the possibility of using the self-targeting food concept to improve the effectiveness of nutrition programs.
3. Elements that appear to contribute to the self-targeting character of a weaning food include: texture, as affected in particular by preparation; ingredients, in particular the combination; color and flavor; and marketing, packaging and education.
4. Some specific ideas for testing which emerged from this study are:
 - (a) Use of village vendors already established and trusted by the local community should be tested as an influential means of promoting a food as primarily suitable for the weaning age child.

- (b) A weaning food resembling a traditional weaning food should be developed and tried out. Specifically a cassava, sago and other starch based traditional gruels consumed as weaning foods in many areas might be considered as a model.
- (c) The feasibility should be explored of promoting the use of a special sauce for infants. This sauce would parallel the sauces adults in many cultures now add to the family staple. That staple (rice, cassava, potato) is often fed by itself to the small child without the benefit of nutrients the adult sauce provides.
- (d) Snacks specially designed to have a strong child's image should be tested.

Foods for Pregnant Women

1. The study found little evidence of the existence of foods consumed preferentially by pregnant women but did identify some principles that might be applied to see if such foods could be developed.

Major findings and principles identified are:

- (a) There is some limited evidence that herbs and teas and other liquids are used preferentially by pregnant women, and could form the basis for a self-targeting supplement.
- (b) There is wide spread evidence of the consumption of pica, non-food substances, by pregnant women. Clay and starch are common examples of pica. The characteristics of pica,

in particular the capacity to reduce nausea and constipation, provide a potential basis for developing a self-targeting supplement with nutritious properties.

- (c) There is widespread concern among many groups of women that consuming additional food during pregnancy should be avoided because the larger child is more difficult to deliver and because extra weight gain during pregnancy is otherwise undesirable. Addressing this concern should be a key element in promotion of a self-targeting food supplement.

2. The above finding suggest several ideas for development of self-targeting supplements which appear worth exploring. Some of these ideas might be combined into a pilot project with mutually reinforcing elements.

- (a) The feasibility should be explored of designing and introducing a nutritious supplement which would reduce nausea and constipation which are associated with pica consumption.

- (b) A more detailed study in selected countries should be undertaken to determine whether liquids, tonics and other beverages may provide a basis for the development and testing of a self-targeting supplement.

- (c) An education effort accompanying provision of a self-targeting supplement should take into account the problems perceived by many women in consuming additional food

during pregnancy. Messages might emphasize strength of baby, or other than size, and impact of supplement of how mother will feel.

Collection of Further Information

While this study has been far from exhaustive, a fair amount of readily available information on self-targeting foods has been collected. To add to this information substantially would require in-country studies. At the same time, it is believed that sufficient information has been collected to permit proceeding with pilot tests without additional global study. In-country studies might rather be undertaken as part of, or background to, tests of particular intervention concepts.

DEFINITIONS AND METHODOLOGY

Self Targeting Weaning Foods.

As used in this report the term "self-targeting foods" is defined to be foods which are consumed selectively by a particular "target" group such as weaning children, and are not normally consumed by other groups. The term food is meant to include the items which are eaten or drunk both during regular meals and between meals, and is intended to refer to the total food preparation consumed (such as cooked mashed rice with mild and sugar) and not just the ingredient (such as rice or milk or sugar.) Self-targeting foods might be so designated because of the special method of preparation (such as peeling and pureeing of fruit), by advertising and promotion (such as packaging in small containers, use of pictures of

babies on the label, by naming it baby food) or by other techniques. The use of the term self-targeting does not mean that the food is used entirely or exclusively by the targeting group -- it might also be used by certain other groups regularly and it might be used occasionally by the general population. However, self-targeting food by definition are not used regularly by the general population. For example, although bread and cookies are normally fed to young children, they are commonly consumed by the general population. Accordingly, bread and cookies can not normally be classified as self-targeting foods for young children.

The Weaning Process

For this study, the definition of weaning as a process that occurs over the time that mothers gradually introduce their infants to culture specific or manufactured fluids and solids while they continue to breastfeed, was accepted (Raphel, 1982). The process can be characterized as having several different stages that might be called neonatal nibbles which occur very early in life; occasional tastes of foods more in a playlike mode, eating special infant recipes; eating modified family foods; eating family foods with some restriction and finally full access to family food. Since each culture defines this period differently, the time frame of 6 to 24 months offered by Cameron and Hofvander (1965) was generally used in this study as the weaning period.

Feeding The Weaning Age Child

While there is a great deal of interest and research on the extent and duration of breastfeeding, there is little research and few systematic observations on the overall patterns of infant feeding, particularly the

mixes of food provided the infant in the weaning period. The difficulty in reporting on infant feeding patterns is complicated by the fact that infant feeding is not static and generally changes as the growth and development needs of the infant change.

In the early 1960's Jelliffe (1962) wrote that the concept that certain foods are especially suitable for young children did exist in some areas, however, in many cases there is no such idea or if present only refers to a relatively unimportant food. "The concept," he continues, "that children need more frequent meals than adults and specially and separately cooked dishes are particularly likely to be absent and under village circumstances not easy to effect."

While Jelliffe and other nutrition workers have called for the study of local weaning practices to determine what is customarily given to infants coming off the breast, at what age new foods are presented and reasons for providing such weaning foods, what foods are locally available, how these are prepared and served and what the cultural and religious and other factors are that determine food preferences and taboos, there is surprisingly little literature and that existing literature provides very little detail.

Even where food availability is not restricted drastically, children may have no special foods, but mothers feed them in a special pattern. The following comments are derived from an interview with Stekel (1983) but are representative of the thoughts of many nutrition fieldworkers. One only has to substitute the names of foods and countries and months of age.

"There are no special weaning foods in Chile, only a typical infant feeding pattern. At 3-4 months such solid or semi solids foods as

fruit juice, mashed fruits or gruels are introduced. At 4-5 months children get soup with vegetables and if available a bit of poultry, meat or fish. At 6 months, the children eat mashed legumes and gruels. At 7 months, they eat cereal, bread, spaghetti or noodles. At 8 months they eat adult foods. The foods used in this pattern are eaten by adults."

There is no comprehensive report that indicates which groups of people feed their children a targeted weaning food, feed their children some type of weaning food and those who feed no weaning foods at all. There are scattered reports of groups who may give the infants a first feed of sugar and water or honey and water or herbs and then nothing until the adult diet. For example, it's been reported that infants in Najargarh, India receive a first feed of GHUTTI (sugar and water) soon after birth. Anand and Rao (1962) reported that those mothers said they preferred to start the children directly on adult foods rather than cook special dishes for them, unless they were sick.

The problems, specifically with weaning, are reported in hundreds of literature citations. Those problems include: 1) the late timing of introduction of foods 2) insufficient quantities of food fed to children 3) the insufficient quantities of food is in part due to the low frequency of feeding infants 4) failure to add protein and/or vitamin and mineral food sources to the local staples fed children and 5) a generalized lack of knowledge of health promoting weaning practices.

The problems encountered in supplementing pregnant women include: 1) lack of food resources, 2) pregnant women's fear of gaining too much weight that complicate delivery and mobility in late stages of pregnancy and 3)

lack of appetite or hunger which is in part due to low frequency of eating.

The idea that special foods or self-targeted foods are fed to weaning children can be distilled from the literature. Those times and places where children receive special foods can be categorized in three ways. There are some cultures where regardless of income of the family cultural beliefs prescribe a special feeding patterns for children. Secondly, children receive special food if the adults believe their food has something dangerous, like hot peppers, in it. And lastly, children are given special foods where leisure and/or economics allow the purchase of special baby foods and/or the preparation of special baby foods.

It is believed by many fieldworkers that where cultures already follow a prescribed infant feeding scheme that pattern could be improved upon using the self-targeting food concept. Many also believe that through education or development activities the concept could be created that special foods are for infants. In the sections that follow, examples of these type of activities are provided. There are a few field workers, however, that react negatively to the concept of self-targeting weaning foods. They argue that people in developing countries are too poor to have special weaning foods, that when food is scarce and people are poor, adults and older children will eat whatever foods are available.

At the outset of this study it was assumed that information about self-targeting weaning foods existed in the experiences and field notes of nutrition workers around the world rather than in published research reports. Therefore, a methodology that relied heavily on review of

unpublished reports, on review of non-refereed reports and on personal interviews through written correspondence and verbal communication was adopted.

A list of 45 people thought knowledgeable on self-targeting weaning foods was provided by USDA/OICD to this researcher, who added another 48 names. A one page description of the project and a short questionnaire were prepared in English and Spanish (Appendix A) and mailed to these nutrition workers. The intent of the questionnaire was to identify self targeting foods, identify sources of information (persons or literature) about these self targeting foods, and other potential informants. A total of 170 abstracts and self addressed and stamped return envelopes and questionnaire forms were mailed by the end of this study. About 80 percent were returned; 2 percent were returned as undeliverable.

Each returned questionnaire was reviewed and the appropriate follow-up action completed. Follow up included: obtaining and reading literature reports, interviewing by telephone or in person an individual who had information about self-targeting weaning foods, and sending questionnaires to individuals listed. Approximately 100 people were interviewed during this study.

Simultaneously a formal literature review was conducted. Recommendations for the initial literature review were obtained by UDDA/OICD; the librarian of the Weaning Food Archive, Home and Village Prepared Weaning Food Project, MIT; and this researcher's personal experiences and files. A data form for the literature data collection was prepared to ensue obtaining information from each article on the country, name of special food for children, designation of traditional or commercial, age at which

food was introduced, description of food's color, flavor and texture, information on product acceptability, description of other foods used for weaning, indications that adults did or did not eat the food, preparation techniques, description of the nutritive value of the food, references to foods given to sick children, references to taboo foods and any other relevant information. Literature citations were also obtained by reviewing reference lists of other documents; by recommendations from interviewees; from a search of the Nestle Nutrition Data Bank System; From a Med-Line and a Social Science literature computer search at East Carolina University; from a search of the literature files at the American Public Health Association's Clearinghouse on Infant Feeding and Maternal Nutrition; from a review of the International Nutrition Communication Service (INCS) Maternal and Infant Nutrition Reviews; from correspondence initiated through the Women and Food Network, Folklore Digest and the Committee on Nutritional Anthropology newsletter.

In the end, more than 500 literature reports were screened and 200 carefully studied.

Nutrition and anthropology consultants were used throughout the project to advise this researcher on specific weaning food projects; to identify and travel obscure reports; to brainstorm from evidence discovered; and to prepare summary reports.

Finally, a brainstorming workshop was held in Washington, D.C. with representatives from various AID projects, the infant food industry, and the anthropology, nutrition and nutrition education fields. These professionals all had a demonstrated interest and experience in the

weaning foods area and represented expertise on many areas of the world. These professionals reviewed the results of the literature search to determine if the readily available literature search to determine if the readily available literature on self-targeting foods for weaning age children and pregnant women was represented. They did provide some examples that had not been included. Additionally, they reviewed discussion papers prepared by this researcher on the concept of baby food; on the role of vendors in promoting baby foods; on the role of pica in pregnant women's diets and on the role of porridges and gruels in infant feeding. These professionals also discussed the merits of suggested pilot projects and analyzed the underlying concepts that characterize a self-targeting weaning food.

The data collected through interviews, correspondence, literature review and brainstorming meeting were reviewed and analyzed. That data that had the most relevance to this study and judged reliable were included in this study.

A table listing the self-targeting foods and supplements for pregnant women discovered in this study was created noting the country/region, name of food and source of information. The table includes a few foods where that evidence that the food is preferentially fed to children is very convincingly based on actual diet surveys. Other foods are included where reports from several qualified professionals shows little disagreement. The table also includes foods named as child specific or self-targeting based solely on fieldworkers observations. In sum, Table 1 includes all foods alluded to as child specific or self-targeting or foods fed preferentially to children of weaning age that were discovered in this

study. These are provided to give a complete picture of the literature.

All the foods discussed in the body of the report are based on refereed or well documented sources. This report therefore is not so much a summary of studies as primarily one of observations. Nevertheless, the observations reported are believed to be reasonably well-founded.

The study includes information about the nutritive value, composition and general nature of the food i.e. ingredients, shape, form, color, method of preparation, consistency, as well as quantities consumed, age specificity, distribution, marketing and packaging of foods. The amount of readily available information varies with relatively complete information present for only a few foods, and with the more limited data provided for other foods identified as self-targeting.

The foods were then grouped into the following categories: starch based gruels and porridges, beverages, fruits, and special commercial preparations and breads. These foods were then studied to determine if there were any common threads or underlying concepts that made them self-targeting foods. The results of that review are presented in the text.

Other self-targeting food approaches, apart from the food itself, were also reviewed and are reported in the text.

Throughout this study, this researcher provided progress reports to USDA/OICD and discussed the information being found with that staff and other interested AID staff. The research community, too, is eager to hear the findings.

DESCRIPTION OF SELF-TARGETING FOODS AND FOOD CONCEPTS FOR
WEANING AGE CHILDREN

There is sufficient evidence to believe that self-targeting weaning foods do exist and that their use is sufficiently extensive to consider developing nutrition interventions based on such foods. However, as noted, there is little detailed information readily available. There is a generalized feeling among fieldworkers that most of the self-targeting weaning foods are low in nutritive value but little documentation exists.

Expected Characteristics

It was expected that the characteristics of the weaning foods would vary depending on the age of child consuming the food. For example, an infant weaning food for a 6 month old child would have a different texture and consistency (more liquid or soft) than a food for a child 24 months old.

Color is another food characteristic that was expected to be important in defining a child specific food. For the younger child, for example, the closer a food product looked to breast milk, the more likely it was expected to be self-targeting.

The foods that are self-targeting must also fit into the cultural setting. They must, for example, be neutral if a food classification system exists; or be in keeping with socialization of an infant to an adult. The food might also have some perceived link to health. For example, a food that might be thought to control diarrhea might be self-targeting to weaning age children. If a self-targeting food was a traditional food then it was expected to be made from a staple crop.

Combination of ingredients would be one way by which the food might be differentiated from normal adult foods. For example, if the food were traditional it might normally have a staple crop as its base, but might have added ingredients making it different from adult foods. If the self-targeting food was a commercial preparation marketing and promotion would be expected to be important in differentiating it from adult food.

The following descriptions of self-targeting foods identified are discussed according to food groupings. Some are traditional foods that are self-targeting and some are commercial centrally processed foods. Experimental efforts using a self-targeting food as part of a nutrition program will be touched on in those food groups. Also weaning food programs that have some self-targeting elements but cannot be classified as foods that are really self-targeting will be noted. Finally, some ideas for self-targeting foods which appear promising but have not been tested will be described.

GRUELS AND PORRIDGES

As cited in hundreds of references and by many nutrition fieldworkers in this study infants are fed a gruel or starchy paste as a first weaning food. The main ingredient (rice, maize, oatmeal, wheat, banana, potato) is determined by the local staple. These first semi solid gruels are prepared and fed to the infant depending upon the place, local custom and a variety of other reasons, however, the literature provides little explanatory detail.

Table 1 summarizes all the foods that were reported to be preferentially fed to children in different locations. For the most part they are

gruels, porridges or soups made from locally available staples. In Central America and South America that meant potatoes, cassava, corn, rice and bananas. In the Caribbean arrowroot is a popular food and regarded as a binding and strengthening food for infants. In Asia the rices and legumes were singled out as good porridge ingredients. In Africa the staples most often mentioned were cassava, rice and legumes for porridges. In developed countries infant cereals are similar to porridges and gruels. In some areas gruels and porridges are only eaten by infants and ill adults. However, in many areas gruels and porridges are also a part of the adult diet. The gruels and porridges that are self-targeting are those foods (i.e. sago), or are made through preparation techniques (i.e. mashed) or have an image or name (i.e. Bubur Campur) that makes them suitable or appropriate for children.

Table 1 includes many of these mixtures such as Ugi, a mashed corn pap fed to children in many African nation, or mashed potatoes and a thin noodle soup called Caldo are fed to children more frequently than to adults in South America. These mixtures and many others often take many forms. For example, the Ugi served in the morning is a mashed corn, cooked very smooth and moist. The UGI eaten in the evening is more stiff and dry. The stiff UGI is made from a corn flour rather than mashed corn. In general, the smoother the product, the more likely it is to be served to children only (Howard, 1983).

A description of a number of foods that were reported to be fed preferentially to children and are gruel-like in consistency and therefore thought to be baby foods, follows. The foods that considerable evidence was found are presented first, followed by those foods that appear to be

self targeting based upon reports but have little supporting data. Bubur Campur, Panetela, Sago and Sarbottam Pitho are examples of traditional gruels or porridges that have sufficient evidence to describe them as self-targeting weaning foods. Their descriptions follow in alphabetical order. Gruels and porridges that are commercial centrally processed are discussed in a later section.

BUBUR CAMPUR

Bubur campur is an example of a porridge, based on a traditional rice porridge fed to small children, that has been: 1) enriched with local ingredients, 2) given a name, and, 3) used in a nutrition education program. The added food ingredients, the name and the education program changes bubur, rice porridge eaten by all in Indonesia into bubur campur, a self targeting weaning food. The full description of this home processed weaning food used in Indonesia is found in Manoff International's Project Description: Nutrition Education and Behavior Change Component, Indonesian Nutrition Improvement Program (Manoff, 1982).

Bubur campur is rice porridge enriched with local ingredients. Recipes were developed after numerous in-home trials. Several recipes resulted with similar ingredients but differing preparation techniques. The ingredients included rice, green vegetables, tahu or tempe, and coconut milk. The rice can come from the family pot (5 tablespoons) or can be made separately (4 tablespoons of uncooked broken rice). Cooked green vegetables are added to the rice from the family pot; finely chopped green leaves are added to the broken rice. The cooked rice and vegetables are then mashed with fried fish. The uncooked rice and leaves are cooked in a half cup of coconut milk and half cup water, with one piece of soybean

curd. There are other variations by region. For example, the fat is added in differing ways. Oil is added to the porridge in one area by frying the tahu or tempe before it is mashed in the porridge. In another area a few drops of coconut oil are added to the cooked rice. In another area, the entire mixture is cooked in the coconut milk. The amount of green vegetable is limited to the tolerances mothers have for a green looking porridge. Other details are not given

After developing recipes in the homes to determine what was feasible for women to do, the food was named and an educational program developed. The educational program not only promoted the recipes but also promoted frequent feeding (four times a day) of the targeted baby food. The education program included community health workers, action posters, and radio messages.

In 1982 an evaluation was conducted with 1,000 program and non program households. Nutrition knowledge of parents in program villages had improved more than parents in nontested areas; parents in the test villages offered more greens and coconut milk (foods stressed in radio messages) than those in nontested villages; children of families in the nutrition education villages had higher protein and caloric intakes than nontested villages, and children in the test areas grew significantly better after 5 months of age than children in other areas. By the age of 24 months there was one kilogram of difference between the mean weights of the two groups.

The project workers suggest several items are important for success in creating what can be termed a targeted food for children that is actually

fed to children. These suggestions include: ensure the target group participates in the communications strategy; establish behavior change objectives based on what people can and will do rather than on what nutritionists think they should do; select a few priority behaviors and focus sharply on those; package messages so they will reach people who need them at a time when they can use the advice.

IN SUMMARY. Bubur campur, is a rice porridge enriched with green vegetables, tahu or tempe, coconut milk and/or oil. Mothers enrich their own product. This food preparation behavior resulted after community needs assessment, in-home trials of new infant feeding methods by mothers, development and implementation of a communication and education strategy. The project researchers reported changes in feeding behaviors of mothers as well as changes in growth measurements of infants over 5 months.

PANETELA

A gruel type food, PANETELA has been reported recently as becoming a targeted food. PANETELA is made in the home from ingredients available in the market. PANETELA is viewed by mothers and health professionals as a food to be given for diarrhea. In practice, it is reported, that since most children have diarrhea often, mothers just routinely give PANETELA--almost in a preventive way. The food is commonly fed to children until age 18-24 months.

The recipe is: 1 1/2 c. rice, 2 bread pieces, 3 cinnamon sticks, 2 qt. water, may be quinoa water, 1 carrot, grated chuno (potato starch), optional. Toast rice and bread and cinnamon. Add water. Boil about 3/4 hour with carrot. The rice and bread should be dissolved, a mush like consistency. Blend until smooth. Serve.

The consistency of the final product is a thick slurry. The color is dark to light brown. A preference for dark brown has been reported. The smell of the final product is of burnt toast.

It is not clear how wide spread this feeding practice is becoming although it has been reported by fieldworkers from different sectors of Central and South America.

SAGO, CASSAVA, ARROWROOT

Cassava, sago and arrowroot are reliable carbohydrate energy sources used throughout the world in infant feeding. Various consistencies of gruels are made from cassava, sago and arrowroot and are fed preferentially to weaning age children in many areas of the developing world. Detailed recipes for these gruels are not readily available. However, generally the pith of the sago palm or the cassava root is made into flour. That flour is then mixed with water or milk. The consistency is thin for the young child and often fed through a bottle with a nipple with a large hole. The consistency becomes thicker as the child grows to a paste or pudding consistency that is eaten with a spoon. This gruel, although varies in color, is more preferred if it is white.

Definitive nutritive composition for these gruels is not readily available. However, they are thought to be of low nutritive value since the plants provide primarily carbohydrate which is diluted with liquid to make the gruel. The plants themselves provide:

Nutrients (per 100 grams)	Sago	Cassava
Protein	0.4 g	0.8 - 1.0 g
Carbohydrate	54.8 g	32.8 - 37.4 g
Kilocalories	220.0	132 - 148.0

The nutritive value of any of these gruels are improved if the mixtures are made with milk rather than water and or ingredients are added such as greens, fish, meat or oil. Mothers have successfully been taught to add ingredients to gruels.

Examples of the use of cassava and sago in India and Papua New Guinea follow.

Sago In Calcutta, India. Sago (a gruel made from small beadlets of cassava tapioca) was documented as a food fed preferentially to children in a Study of Food Habits in Calcutta conducted in the early 1970's by Hindustan Thompson Associates (1972). While sago was not one of the foods specifically studied, some information about sago and its use was volunteered by survey participants. It conforms well to this study's definition of a self-targeting weaning food.

First, Sago is fed preferentially to young children. In fact it appears to be perceived as almost exclusively intended for children. While not asked directly if adults eat Sago, it was named as a food for adults by less than 1% of housewives interviewed. Second, Sago, a semi-solid food, is provided to the really young child. Children up to 12 months were fed an average of 13.3 grams per day. Further, it appears to be perceived as primarily limited to the weaning age. Daily consumption continued for the 12 months to two year age group at 14 grams but then dropped for the two

to four year age group to only 2.2 grams. Finally, those households consuming Sago include all income groups with the greatest percentage falling in the lower three fifths. Not all weaning children consume Sago. Rather the percentage reported is about one fifth. Those that do consume Sago probably consume more than the 13-14 gram average. Frequency of feeding is relatively high with some groups reporting four and five times per day.

Some details from this study are important to note.

The researchers noted that the consumption of sago, along with baby food and barley does decrease as the child ages. The consumption of sago and barley also decrease as the income of the household increases. Mothers did volunteer that if they had more money they would buy more milk, rice, branded baby foods, fruit, fish, sago and barley for babies.

Mothers were asked specific questions about their attitudes toward 30 different foods for children. Unfortunately sago was not included in those foods. However, it is clear from other consumption data reported that sago in some form is fed to children frequently. Data for sago and a dish of sago and milk were reported. As the amount of per capita total expenditures (Rs) rose from less than 20 to more than 100, the percentage of mothers feeding sago only to children less than 1 year decreased. However, the use of sago and milk both as a uniform meal and as a supplementary meal increased with increased expenditures. The percentages ranged from 0 to 12 percent for sago only with a mean of 3.6 percent; and ranged from 11 to 25 percent for sago and milk with a mean of 19 percent (for uniform meals). For children between 1 and 2 years of age a similar pattern emerged. The percentages ranged from 0 to 20 percent for sago

only with a mean of 8.2 percent; and ranged 3 to 29 percent for sago and milk with a mean of 21.6 percent (uniform meal). The average daily consumption of sago for children less than 1 year averaged 13.3 grams and for children between 1 and 2 years averaged 14.0 grams. Sago was purchased and used in 208 of 2386 (8%) households at least monthly.

Sago is consumed by all income groups including the lowest group. Half of the lowest income group purchase the sago daily in a non packaged form; while others purchase it on a weekly basis.

Sago, like many weaning foods provides a supplement to the diet rather than being the only food used by those consuming it.

Sago in Papua New Guinea. Palm Sago is viewed as a staple food crop in the lowland areas of Papua New Guinea for about 10 percent of the total Papua New Guinea population. Although sago has a long history of use, perhaps 20,000 years, it is being replaced in Papua New Guinea as it has been in Indonesia and other countries by a more prestigious food such as rice. Several researchers have studied sago as a food resource and as a source of ethanol (Townsend, 1982; Morauta, L, 1982; and Ulijaszek, 1982 and 1983).

While sago is eaten only by a small percentage of the Papua New Guinea population it is an important source of calories for that group. Ulijaszek (1982) reported that males, 2-9 years of age derived 48 percent of their calories from sago and females of the same age derived 46 percent; males 10-19 years old obtained 46 percent of their calories from sago and females of the same age obtained 44 percent; and adult males

obtained 39 percent of their calories while adult females obtained 37 percent from sago. A sago stew (made of sago flour and water without vegetables) is fed to infants in the sago eating areas of Papua New Guinea. Perhaps the most important observation is that sago, has been widely spoken of as unpalatable and lacking in nutritive value. Sago has been criticized as an inferior food that is replaced as soon as an individual can afford to substitute another food. Since sago had been criticized for its nutritional value Townsend (1982) and Ulijaszek (1982, 1983) explored the links between malnutrition and sago. They both reported that no simple relationship could be seen, for example, between subsistence on sago and nutritional status in the 1978 National Nutrition Survey.

Generally, malnutrition was found where diets that centered around sago did not include supplements such as fish, shellfish, coconut milk, or greens. Townsend suggested that supplementation did not occur because the people were too poor or because they had no access to food such as fish. Ulijaszek noted that the children who were malnourished needed more frequent meals and snacks. Both researchers noted that sago meals should be supplemented with a variety of items including greens, fish, shellfish, sago grubs, coconut milk and coconut cream. Sago is also eaten in the form of baked sticks (roasted in bamboo tubes or in a nepa-leaf).

Townsend also noted that sago had a role in myths, rituals and social life. She reported that sago was used for informal household exchange as well as in a barter market, with women being the primary traders.

Townsend also suggested that opportunity to make snack foods based on sago should be explored, noting that women in cottage industries in Indonesia and Malaysia make biscuits with sago, rice bran and coconut.

Ways to improve the nutritive value of sago stews (such as adding coconut cream) are worth exploring.

Other Cassava Gruels or Paps. While the porridges, gruels or paps made from the cassava root are often self-targeting foods in areas like the Caribbean, the cassava root itself is an ingredient used in many family dishes. The same is true for mingau a cassava or manioc gruel served in Brazil or gari served in Nigeria. Table 1 reports many countries where the paps or gruels conform to the definition of self-targeting weaning foods including Cameroon, Guatemala, Liberia, Panama, the West Indies, Venezuela and Zaire. Little detail is reported about the composition of these gruels although they are perceived by health workers to be of low nutritive value. These gruels are reported to be of thin consistency so they can flow through the nipple of a bottle and white in color.

SARBOTTAM PITHO

Throughout this literature search, many fieldworkers named SARBOTTAM PITHO as a self-targeting weaning food. It is a new-old food developed and promoted in the Shenta Bhawan Hospital Community Health Program in Nepal. The full description of this home processed weaning food used in Nepal is found in HOVIPREP Monograph No. 2 (Krantz, Pahari and Colgate, in press). A few comments about the self targeting nature of SARBOTTAM PITHO are given here.

After researching local foods, infant feeding practices and traditional food preparation practices in Nepal, nutrition workers prepared a new-old food and named it SARBOTTAM PITHO. The product is made from a combination

of homegrown soybean and homegrown wheat and homegrown corn that is roasted. The SP is prepared in a traditional manner also used to make a nutritious and popular adult snack. That method includes roasting and combining whole pulses with some roasted grains. For the elderly, the product called satty was further processed by grinding the roasted ingredients into powder and mixing it with water or milk to make a gruel. This gruel was not, however, a child specific food.

There were a variety of traditional weaning foods fed to children, generally made of one grain. While these foods were made from the ingredients also consumed by the adults, the preparation made them baby foods. A few examples include Litho which is very soft; Jaulo which is overcooked rice that sometimes has legumes added and cooked until very soft (Shakya, 1983).

The new-old food, SP, was introduced to women who had been receiving CSM for their infants, in a program attempting to phase out imported/donated commodities. Women were told they would receive dry skim milk by bringing roasted grain flour to a clinic. At the clinic the women's flour was mixed with the skim milk and returned to them with instructions on how to prepare the porridge. When the skim milk supply was exhausted, the women were taught to add roasted soybean flour in place of the milk to the SP. The project staff reported that the women did not complain about the ending of the food distribution program nor the encouragement they were given to prepare a new food for their children. The clinic staff, relieved of food distribution tasks, became more involved in nutrition education activities that supported feeding of SP to weaning age children.

Analyses of SP has been completed at the Food Research Laboratory in

Kathmandu, at the Central Institute for Nutrition and Food Research in Zeist, Netherlands and at the National Institute of Nutrition in Hyderabad. The combination of two parts roasted soybeans with one part roasted wheat and one part roasted corn are reported to supply a young child's daily protein need and 366 calories with one hundred grams of the SP.

The SP can be drunk with liquids such as milk, eaten as a dry flour or used in baking. The SP is reported to store well and therefore grinding and roasting need only be done every few weeks.

The SP project nutrition workers report that SP, an instant porridge flour, is viewed as a baby food and is not diverted to adults. Characteristics that Krantz (1983) believes makes it a baby food include the product is: soft; easy to digest; tastes good; and made from culturally acceptable foods. With an education campaign women learned that SP was more nutritious than other foods such as "jaulo" or "litho" that were traditionally fed to babies.

Some nutrition workers are less enthusiastic about SP (Axinn, 1983). They suggest that although the SP is an instant porridge that can be easily used by mothers to feed their infants, the poor rural women do not have the time or fuel to grind and roast the flour. These workers suggest that they very poor in Nepal, as well as elsewhere, feed their children whatever food is leftover, particularly when food is scarce. They report that poor women who learned how to make SP rarely make it since they work 16 hours day and have little time or fuel to prepare the grains. A woman rises early in the morning, nurses the child, cooks food for the family (usually rice and dahl and a vegetable curry) and then works in the fields.

In the evening she nurses the child and sleeps. There appears to be little or no time for the woman to spend time with special foods or special preparations.

No data assessing the actual consumption and the self targeting nature of SP were found in this literature search. It appears that encouragement of mothers to identify SP as a food for children and then to prepare it for children would require a comprehensive education campaign.

GRUELS AND PORRIDGES--OTHER TRADITIONAL EXAMPLES

Table 1 includes many listings of rice, wheat, corn cornstarch and sorghum based gruels used throughout the world. These, too, appear to be self-targeting but incomplete data describing these mixtures is available. Short descriptions of rice based gruels Rice, Cunjee, Linagaw and Pablum; of wheat flour gruel Ugi and of maize or corn based gruel Nyuka/Ngima are given.

RICE CUNJEE

Rice cunjee is a gruel that is widely used in Sri Lanka. It is a traditional weaning food that is fed primarily to weaning age children. Rice cunjee consists of rice cooked in twice the volume of water used to prepare rice for adults. Salt is added to taste and the rice grains are then pureed.

Kola Kanda is a variation of Rice Cunjee. It is cooked rice pureed with green vegetable leaves added.

Another variation is Mung-Kiri-Bath which is a traditional multimix fed to 6 month old infants. The ingredients are rice, green gram flour, milk and

water cooked to a gruel consistency. Oil is sometimes added.

LINAGAW AND PABLUM

Two rice based weaning gruels are reported from the Philippines: Pablum and Linagaw. The Pablum is a prepared rice product and the Linagaw is a thin gruel.

UGI

Ugi is the name given to a porridge made from wheat flour and used in Kenya as well as other African nations. The wheat flour is cooked with water and fed to the infant through a feeding bottle. Efforts to improve ugi have been described by health workers. Attempts to have mothers cook the ugi to a gluey consistency have met with some success. Fieldworkers report that this pap is viewed as preventing diarrhea.

NYUKA/NGIMA

NYUKA is a porridge or thin gruel that is specifically fed to Luo infants in South Nyanza, Kenya. This porridge, introduced to the infants between the fourth and sixth month is most frequently made from a commercial, white purchased refined maize meal flour. Cosminsky (1982) noted that the Luo had traditionally fed their infants a porridge. In the past a millet porridge was the standard weaning food. As maize replaced millet as a staple crop, the porridge was made from home grown, ground maize. Additionally, Cosminsky noted that older women reported they used to make the porridge with milk however the porridge is now made with water since there are fewer cows and it is difficult to obtain milk.

The Luo have been observed to serve a variety of porridges to infants and children. Porridges are made from millet and finger millet and from mixed

grains (half maize and half millet) and on occasion cassava meal. Cosminsky interviewed women about the differences in the porridge and reported that women used differentiating terms such as light, strong or heavy. These terms were applied to the porridges in the following ways: maize porridge is too strong for young infants and will cause diarrhea if they eat it; millet porridge is good to stop diarrhea and it is heavier than maize; finger millet porridge is heavier and stronger than millet porridge and is used at a later age of the children. Heavier porridges are thought to be better and make stronger bones; they are also from grains more difficult to weed and harvest and more expensive to purchase.

A maize cereal porridge with a description similar to Nyuka is NGIMA. Van Steenberg and coworkers (1978) reported its being fed to infants in rural areas of the Machakos District, Kenya. They reported that this porridge is first served as a thin gruel through a bottle and at about one year of age it is a thicker dish served along with beans and tomatoes. This porridge is reported to resemble a porridge eaten by the entire family.

These porridges resemble reports of maizena, fed to infants in Central and South America.

BEVERAGES

There are many references to infants receiving a variety of beverages both before and during the weaning period. Beverages seem particularly important in the infant feeding pattern as prelacteal feeds or feedings that occur well before a mother introduces semi-solid or solid foods to

the infant. These prelacteal feeds will be discussed in the following section. Maizena is widely reported as a food fed to infants of weaning age. Although maizena is sometimes referred to as a beverage, it more accurately is a gruel or pap of various consistencies. Therefore the use of corn or cornstarch as the base ingredient for self-targeting weaning foods was discussed in the section under porridges and gruels. In recent years the development of an acidified milk to be used as a self-targeting weaning food has been accomplished and tested. A brief report of that commercial work follows. The use of branded baby milk products has been cited in some locations. Data from India will be presented later. Finally, rice water and rice juice have been cited as self-targeting beverages in some locales and they will be discussed.

PRELACTEAL FEEDS

An infant feeding behavior not really studied in this literature review were the prelacteal feeds. Many of these feeds are briefly alluded to in the infant feeding literature (Brown, 1978; Raphael, 1982) but an overall discussion of them, their meanings in the cultures and their potential as a special and positive feeding behavior to be built upon was not found. These prelacteal feeds are clearly self-targeting to the infant and often connected with ceremonies and rituals that if studied might provide insights to improved infant feeding strategies.

A few examples are cited here. Mixed skimmed buffalo or cow's milk diluted with ghee (sour milk), sugar and honey, is fed to infants in Pakistan before the mother's milk comes in. Gur or homemade sugar and water or Jamman Ghutti, a herbal mix with honey, is given to some infants in India. Bouillon, butter and sugar have been observed as a prelacteal

feed in rural Spain. Lime bud tea was observed in Trinidad. Water with sugar, camote tea and rice water have been observed in the Philippines.

Anthropologists report that these bush teas are often thought of as a positive medicine. There are anecdotal reports that health workers have successfully had mothers mixing evaporated milk into the bush teas, thereby improving the nutritional value of the tea. The teas, some reportedly using large amounts of sugar or honey are used for teething, cleansing and/or strengthening.

There are new anecdotal accounts coming from Central and South America that would define lemonade as a child specific beverage. Fieldworkers are reporting that mothers indicate the lemon or the juice of the lemon is good for children since it helps control diarrhea and therefore the juice is being preferentially fed to weaning age infants. One could surmise that this may be an unintended effect from many of the Oral Rehydration Therapy (ORT) programs now in operation.

Acidified Milk

Acidified milk has been tested in take-home feeding program field trials in Chile. The milk was acidified both to increase the absorption of iron that had been added to the milk and to reduce sharing with other family

members. 100 milligrams of ascorbic acid were added to each 100 grams of milk powder as detailed in the following table:

	per 100 of powder
Fat	26 g
Non-fat solids	68 g
Iron (as FeSO ₄ x 7H ₂ O)	15 mg
Ascorbic acid	100 mg
Vitamin A	1500 I.U.
Vitamin D	400 I.U.

The milk powder was used first in 1976-78 with 280 weaning age children and 278 controls. In 1978 it was tried again on a larger scale in an area of Santiago inhabited by about 400,000 people. The powdered milk was picked up by mothers once per month from health clinics participating in Chile's National Program of Supplementary feeding. Three kilograms were provided for infants 0 to 6 months and two kilograms for children 6 to 24 months. Children born in August and September 1978 received the acidified milk and children born in June and July 1978 received the regular milk.

Dietary surveys and anthropometric measurements for both the pilot and larger scale field tests were conducted. The dietary surveys indicated that only about one quarter of the households receiving acidified milk engaged in significant sharing of the milk with other family members as compared to about three quarters of the households receiving the regular milk. In addition, the children receiving the acidified milk had significantly higher weight increments than the controls

While experience with acidified milk is limited to a pilot test and a larger field project, it does represent an unusually good example of a self-targeting food. The food was designed to have as one of its objectives the property of being unattractive to other family members to encourage feeding to the small child. Field trials suggest this was the case. It is interesting that at the same time acceptance among the target population was good. At 12 months of age 94 percent of infants weaned to acidified milk were still consuming it and at 15 months of age this figure was 89 percent. Acidified milk is also significant as an instance of use of a self-targeted food in a food distribution program.

Rice Soup

The preparation of a rice soup or rice juice specifically for children has been reported in a variety of countries. For example, in Japan the rice is cooked with a large amount of water for about one hour and then fed to the child plain without sugar or salt. This rice juice is started at about four months with the amount of liquid decreasing as the child ages, (Ozoe, 1983). In Malaysia and Indonesia rice water is introduced to children soon after birth (Jelliffe, 1983). In Sri Lanka rice water is given to infants in early months of life (Jelliffe, 1968). Rice water is fed infants in Indian villages at a few months (Raphael, 1982).

AGUA DE QUINUA

Quinoa or a thick quinoa drink is eaten children and by adults. The AGUA DE QUINUA made for infants is prepared differently than that eaten by

adults. Children 0-5 years drink quinoa water either undiluted or diluted with milk. The recipe for infants is:

1/4 c. quinoa grains, 3 qt. water, cinnamon, cloves, optional. If using washed quinoa grains it is sweet so it is rinsed and used. If using rustic quinoa grains it is bitter and is soaked 10-15 minutes, scrubbed several times and well rinsed.

Boil quinoa in water for 15 minutes. When grains open and water is yellow it is ready. Pass through a sieve. Put water in bottle or mix with milk (half and half) and feed to babies.

The color of the final product is yellow. The odor is sweet.

Infant Juices

As a final note in this section on beverages, Gerber Products Company, Fremont, Michigan, USA introduced two new juices in their product line during 1983. The company now markets 22 fruit juices which comprise Gerber's second largest selling product line. Reports from other U.S. baby food manufacturers are similar. In the Western world, infant baby juices are self-targeting beverages.

MODIFIED TEXTURE FRUITS AND VEGETABLES

A few fruits and vegetables were noted by interviewees and in the literature studied, however almost no details were available. The primary fruit cited was the banana and it will be discussed.

Banana

The banana appears to be a universal weaning fruit. The Gerber baby food company reports that it is the leading seller in almost all locations. Jelliffe (1983) reported that in Malaysia a special banana was given only to children to eat. In numerous other locations the banana was cited as a food preferentially fed to children (Table 1) including in Baganda. the

Carribbean, El Salvador, Costa Rica, Haiti, Honduras, India, Indonesia, Ivory Coast, Kenya, Malaysia, Mexico, Micronesia, New Guinea, Panama, Philippines, Solomon Islands, Surinam, Thailand, Trinidad, United States and Venezuela. In the long lists of taboo foods for infants studied in this project, the banana was mentioned only once as a taboo food for infants.

The banana is a prolific food plant and contains about 20 percent assimilable sugars. It is also valued for its vitamin A, B, C and B₂ content as well as its iron, phosphorus, potassium and calcium.

Other-Fruits

Neave (1969) reported that the paw paw had the reputation as a baby food for Polynesian children. The infants were also fed immature coconuts around 4 1/2--6 months. These foods are good sources of vitamin A and ascorbic acid. However, Neave does not describe why these foods are fed preferentially to infants.

Cosminsky reported that Luo infants in Kenya are fed lemon or orange juice with water between two and four months. Mothers feed the infants this juice to clear the skin, soften the stomach and build the body.

Increasing number of reports of infants being fed lemons in South America are heard.

Vegetables

A review of Table 1 uncovers few vegetables listed, other than the starchy tubers. When cited the vegetables are generally small additives to a sauce or a stew or a gravy such as in India. It does not appear that the

addition of vegetables to the mixtures is a traditional practice but learned to improve the nutritive value of the weaning age child's food. For example, Verkleij and Jansen (undated) reported that children under two years age in Kenya are not given green vegetables since they are considered too tough to digest. Some mothers were reported to prepare a thick green stew suitable for small children after an educational experience. Strained peas, on the other hand, was one of the first self-targeting successful commercially made baby foods in the United States. The commercial baby foods will be discussed in the next section.

COMMERCIAL CENTRALLY PROCESSED SELF-TARGETING FOODS

There are self-targeting foods which are commercial centrally processed foods. These foods produced by such companies as Gerber, Heinz and Nestle's are too expensive to reach large numbers of the vulnerable pre-school children in any significant quantity. They do however represent a very clear and important example of a self-targeting food. They are important to this study for the lessons that can be learned that might be applied to the development of lower-cost self-targeting foods. A brief description of some of Gerber's self-targeting weaning foods and its experience with their development and marketing follow.

There have been other examples of engineered multimixes as well and a few examples will be discussed.

Gerber Baby Food

In 1983, the Gerber Company alone marketed over 150 varieties of food including strained and junior fruits, vegetables and meats, fruit cereals;

bakery products; toddler meals; chunky food; and meat based formula. The Gerber plants are located in the United States, Canada, Costa Rica and Mexico. Efforts to expand and export market for the products is underway.

Prior to 1927 some strained vegetables were available in the United States sold at a premium price and in the drug stores. In 1927 most babies in the United States were fed hand strained foods, derived from the non-strained foods generally eaten by the entire family. The Gerber Company at that time was the Fremont Canning Company and was processing fruits and vegetables when Mrs. Dan Gerber inspired the idea of the straining the baby foods in the cannery. In 1928, the first five strained baby foods in the market place: vegetable soup, carrots, peas, prunes and spinach. Unlike their predecessors, these strained products were sold in the grocery stores. The introduction of these products was met with both positive and negative criticism as well as the question, will women purchase a convenient relatively expensive but nutritious product? It is important to note that it is not the raw ingredients in the jars and cans that are child specific, but rather their preparation and image that make them conform to definition of self-targeting weaning foods.

While some mothers immediately accepted the Gerber product as a self-targeting food for infants a continued program of advertising and education over the last 57 years have firmly embedded the Gerber baby food as a self targeting food in the developed nations' cultures. Even so, it is known that adults do on occasion consume these products, particularly when other foods are scarce or the product is not very different from adult food.

For example, during World War II, no points were required to buy Gerber baby food and many childless families improvised recipes to utilize baby foods. John Glenn ate Gerber applesauce on his 1962 space flight. Garbage studies conducted in Arizona show that senior citizen households with no evidence of children or grandchildren present have many junior textured fruit and dessert mix empty containers in their trash.

It seems appropriate to this project to give a brief synopsis of the marketing techniques that aided the establishment of strained baby foods a self-targeting foods over the last 57 years. The use of a trademark, the charcoal Gerber baby drawing has been in use, unchanged since 1928. The labels from the beginning were printed in soft and baby colors. An extensive advertising campaign including ads in magazines read by mothers and physicians introduced the products. A long list of other marketing techniques including premiums to be earned from labels, a special booth at the 1933 Century of Progress Exposition in Chicago, preparation and production and distribution of recipes, booklets on child feeding and behavior; circus paintings on delivery trucks, sponsorship of weekly radio broadcasts called Rocky-A-Bye-Baby; use of retail salesmen to all upon grocery stores and physicians and to homes of new mothers; free distribution of samples; a Gerber Austin touring the country; personal letters from Mrs. Dan Gerber encouraging mothers to try the products; development and implementation of a folding display rack for grocery stores, use of slogan: babies are our business---our only business", of a newspaper column called "bringing baby", sponsorship of programs like Kate Smith, Perry Como, Break the Bank, Ding Dong School, Bob Crosby Variety; production of a poem "What Is A Baby" by Rosemary Clooney, Sponsorship of Captain Kangaroo as well as merchandising in other countries complete with

Gerber educator spoons. The creation of this self-targeting foods has taken time and planning.

Gerber and other commercial baby food manufacturers currently market their products to women in some developing countries who have the economic status to purchase the products. For example, the Research staff at Gerbers Inc., reported (1983) that their international market is the upper 14 percent of the income groups in developing countries. They reported that the same foods that sell well in the United States sell well to those mothers and therefore those foods may have little relationship to the local food supply. Over the year Gerbers has produced local and traditional food products but with only a few exceptions find that the foods based on local and traditional foods are not good sellers.

Since the infant food industry has demonstrated that the same products that sell well in the United States sell well in other countries, it is clear that self-targeting weaning foods do exist. The research staff at Gerbers indicate that there are a wide variety of suitable products or foods already formulated to be nutritious and therefore they suggest that any existing weaning food given the right image, right coloring, right packaging and right price will be self-targeting to weaning age infants.

Branded Baby Milk Products.

In the study of food habits in Calcutta, India (H. Thompson, 1972), branded baby foods (milk products) were fed to all children regardless of their economic group. Up to 12 months of age babies were fed an average of 22.9 gm/day; one to two year old children averaged 15.5 gms/day and 2-4 year olds were fed 2.9 grams/day of canned baby food. This was 4 and less

than 1 percent respectively of the total grams of food consumed per day by these children. Excluding the milk consumed, branded baby foods accounted for 29, 10 and 1 percent of the total grams of food consumed each day for these children. Mothers reported that branded baby foods were good foods for children, especially up to two years of age, but that they were expensive.

Among the lower capita expenditure groups of housewives, the canned baby foods were served only at mealtimes. As monthly expenditures rose for a household, the baby also often received canned baby food as a supplementary meal.

This report provided little insight into why canned baby foods were considered child specific. At one point, the report noted that mothers fed their babies whatever the doctors told them to feed the infants, and doctors told them to use canned baby foods.

It has been reported by many that merely labeling a product as a baby food will target it to those children. For example, Schweiger and Cutting (1978) reported that barley water was sold in red and blue tins labeled for infants or invalids in Bangladesh. A short time after its availability babies suffering from protein-energy-malnutrition (PEM) were seen in clinics as a result of misuse of the product. Since babies were affected, the target for the product was obviously reached. No details on the appearance of the barley water product were given.

The idea of creating a new tradition of infant feeding has been discussed by many researchers as a way to make a food more likely to reach a weaning age infant. Beaton and Chassemi (1979) speculated that if the nature of a

food can affect its sharing, one could expect an infant premix with characteristics that make it of limited acceptability to the remainder of the family, would reach the infant. They note, that this is difficult to truly examine.

GRUELS AND PORRIDGES--DESIGNED TO BE SELF-TARGETING

Many interviewees in this study provided descriptions of weaning foods that sought self-targeting as an objective. For the most part these engineered multi mixes have met with limited successes. Only a few examples will be cited here including Cerex, Nutri-Pak and Soy-Ogi. Other attempts such as Likuni, Phala, Poshak, Cini-Nutrimix, Superamine, Pro-Nutro, Ferelin, Kaset Baby Food, Colombiharina, Bien Bienestrarina, Bennimix Baby Food, Corn-Soy Weaning Food, Maisoy, Licha, Triposha, have been described by Lachmann (1979).

CEREX

Cerex is a nutritious, cereal based weaning food in Guyana, made from rice, sugar, corn meal, soybean flour, soybean oil, milk powder, vitamins and minerals. The product is processed through low cost extrusion cooking system before blending with ICSM and then packaged in eight ounce polyethylene consumer packets.

Cerex is a weaning food that was introduced to a population with a history of feeding infants paps or porridges.

An evaluation of the product was conducted six months after the food had been on the market (Hopkins, et al., 1983). The survey showed that the food was clearly on its way to becoming a self-targeting weaning food.

About one fourth of the children under two years of age were given CEREX as the first semi-solid food. Almost 40 percent (38.8%) of those interviewed equated the term Cerex with baby food and 64 percent reported correctly to whom Cerex was to be fed.

This is not to say that the food was going only to the targeted infants. The survey showed that more than half (54%) of the production was going to non-targeted individuals and that 11 percent of the adults were consuming Cerex. The survey did report however, that 80 percent of those who were using Cerex consumed it two to three times a day. There were differences between the Indian and Negro populations. Half of the Indians and 62 percent of the Negros consuming Cerex were getting at least a one-fourth cup serving. Sufficient amounts of Cerex were defined as a minimum of one-quarter cup eaten two to three times a day. This was observed by only 27 percent of those surveyed.

The largest single complaint was about Cerex's texture although the report does not detail the problem. It is used in a semi liquid form by many since 64 percent of the Indians and 53 percent of the Negros using Cerex serve it through a bottle and nipple.

The final blend is reported to be 17.7 percent protein, 2.8 percent fat, 64 percent carbohydrates and 395 calories/100 grams.

Directions for preparing a porridge include add 1/2 cup cooled but previously boiled water to 1/4 cup of Cerex while stirring. Enough hot water is added to make one cup. The mixture is then simmered for 5 minutes.

NUTRI-PAK

NUTRI-PAK is the name applied to a variety of powdered products that are to be added to traditional weaning foods or used as a seasoning in infants' food or as a nutritious condiment for children. The original NUTRI-PAK concept in 1974 converted inexpensive, locally available protein sources such as small shrimp and fish into finely ground protein powder that was sealed in plastic packets. The packets were sold at well baby clinics, feeding centers and schools and mothers were instructed to add the packets to food fed children and infants. The designation of this packet as something to be added to infant and children food was the beginning of creating the concept that NUTRI-PAK would be self-targeted to infants and children.

The Nutrition Center of the Philippines modified the NUTRI-PAK concept by adding rice and oil to the protein powder and also developed three sizes: for infants, for toddlers and for children four to five years old. The official Nutrition Center of the Philippines NUTRI-PAK also at times had added protein sources such as anchovy and mung bean and skim milk. In addition to the official NUTRI-PAK by 1978 there were 133 NUTRI-PAK processing plants set up primarily by municipalities. The products produced at the local level were similar to the official NUTRI-PAK. However, local initiatives received little guidance and support from the Nutrition Center. The literature has little description of the local products but suggest that some omit the oil or skim milk or both. Some plants add other ingredients such as sugar, boullion cubes, banana powder. The official NUTRI-PAK underwent further changes during a cooperative effort between the Nutrition Center of the Philippines and the Coca-Cola Company. The small shrimp and anchovy proteins were replaced with donated

commodities and textured vegetable protein to improve product stability and only one size of NUTRI-PAK was distributed.

The composition of the multimixes varies between 10-17 percent protein, 27--37 percent fat and between 484--550 calories/100 grams. The total weight of the NUTRI-PAK mixtures vary between 95--100 grams depending upon the composition. (Lachmann, 1979).

The directions for preparing NUTRI-PAK include add rice and oil to boiling water and cook for 10 minutes. Add the powder to the rice-oil-water mixture and boil for 5 minutes. It has been observed by many field workers that the mix is prepared only once a day but fed to the children during meal times and at mid morning and mid afternoon.

While some fieldworkers insist that NUTRI-PAK qualifies as a self targeting infant food, there are reports of intrafamilial sharing.

Three promotional approaches have been tried including face-to-face communication, comic books and video cassettes. The video-cassettes program showed sufficient promise that Nutri-buses visit villages to present televised lessons dramatizing the nutritional needs of infants and NUTRI-PAK'S role in meeting them.

The available literature describing NUTRI-PAK speaks more to the political issues surrounding its development than the self-targeting nature of the food.

Soy - Ogi

Soy-Ogi was developed by the Federal Institute of Industrial Research, Oshodi, Nigeria based on the traditional and acceptable acid fermented

ogi. Morgan and Pellett (1982) reported that the production was based on the traditional procedure for preparing the corn but that the milled corn was fortified with cooked soybean. The product was then fermented, spray dried and packaged in polyethylene. Development and testing were completed by the early 1970's but by the 1982 there was only pilot scale production. Morgan and Pellett (1982) cited some potential problems with the product including* rancidity affecting acceptability, higher protein level than needed for a supplement; with the 20% protein the product after cooking separates into layers, traditional ogi does not; adequate availability of soybeans for full scale production. It is not clear if the product reflects the traditional product.

BREAD

Although bread and biscuits are eaten by the entire family, field workers report that mothers make a special effort to give bread and biscuits to the older weanling. For example, in Japan a special preparation of bread, water and sugar is given to the 5 month old child. The bread, water and sugar are boiled with the amount of liquid reducing as the child cuts teeth (Ozoe, 1983). Children are fed bread more often than adults in Ghana. Davey (1981) suggested that it may be due to the softness of the bread. Rural mothers in Pakistan were reported to give small children biscuits and toasted bread purchased from little shops outside the home in the morning rather than cook a cereal or gruel (Khan, undated). Anthropologists observed biscuits and breads as the first semi-solid foods fed village children in Egypt (Raphael, 1982).

Hard dry toasts, products Zweibeck rusk toasts have been fed to teething children world-wide. Breads, crackers, cookies and other bakery products are given to the older weaning age child as snacks. A good example of a self-targeting weaning food for the older weaning age child is the animal cracker found in the developed country. Cookies are formed into the shape of animals or current popular figures like E.T.. These crackers are packaged in small boxes with a string tied onto it for easy handling by a small child. Characteristics of these products that have been reported as child include: taste is acceptable to child; generally on the sweet side; mothers perceive there is some nutritional value to the product; children are able to manage the food, that is, they are in sizes that the child can hold in hand and put in mouth; they also can be spilled on the ground or dropped on the ground but picked up with little danger; they are soothing to a child as a child cuts teeth; and they are inexpensive.

OTHER SELF - TARGETING FOOD APPROACHES

In addition to the experience described with existing self-targeting foods, a number of ideas have been suggested as ways to make foods self-targeting. A description of the more promising of the ideas identified follows:

Marketing Weaning Foods through Vendors

The idea of marketing weaning foods or creating the image to make a food a self-targeting weaning food have been alluded to earlier in this report. Some elaboration on that idea is presented here.

The Gerber Company found it important to market their line of baby foods through the same avenue that mothers bought all food, the grocery store.

In many developing countries the poor purchase much of their foodstuffs through vendors or petty traders. The Equity Policy Center, (EPC) (1983) with support of AID is studying street foods in five countries including Bangladesh, Egypt, Indonesia, Philippines and Senegal. EPC recognizes that in many countries street foods are an important component of the diet and that the urban poor allocate a considerable percentage of their food expenditures to prepared foods purchased on the street. There is concern over the nutritive value of these generally cheap foods and possible health hazards associated with their preparation. Some researchers have noted that women purchase snacks or entire meals for children on the street. The results of the EPC studies are not available yet, but an example from Indonesia will illustrate the role vendors have with self-targeting weaning foods.

The streets of any major town are crowded with vendors, most of them selling food. Even in residential districts vendors with small carts or baskets strapped to their backs can be seen selling soups, sweets, breads, or herbal drinks. People are accustomed to buying snacks or part of their main meals from vendors. Some vendors from urban centers move to peripheral towns, and others move from town to rural areas. Or the women in the towns and villages begin their own businesses. Thus vendors are common even in the countryside.

Many of the foods sold by vendors in Indonesia are traditional foods, although they may contain food coloring to make them appear novel. Although most of the foods could be made at home, Indonesians buy them for a variety of reasons. The food may contain one or more ingredients that are either expensive or difficult to obtain on a daily basis. Or they are

purchased because the food takes a long time to prepare. There is also a feeling among many Indonesians that food is purchased is more "delicious" than the food they cook at home, or has an added prestige value. One possible strategy would be to take advantage of the position established by these vendors in order to distribute an enriched self-weaning food.

Weaning foods or foods to feed infants are sold in this way in Indonesia. One food item commonly sold by vendors is bubur, a smooth rice porridge made from broken rice grains and cooked in either water or coconut milk until the rice is soft. During the research phase of a recent project in Indonesia, The Indonesian Nutrition Improvement Program, Nutrition Education and Behavior Change Component, most of semi-urban women reported buying most of their weaning food at stalls in their villages or from traveling vendors. The women said that they bought the bubur because they did not have time to make it. Some said they thought the commercial bubur was better than they could make and others said that it was simply easier to buy the porridge than to make it.

This bubur was made and sold by the vendor in individual portions between 1/2--3/4 cup, wrapped in a banana leaf. One portion of bubur sold for Rp 10-15, (approximately US\$.02 to .03). Women usually bought one or two packages a day for their children. In addition to the bubur, children 5-8 months also were fed banana, cookies or bread and breastmilk.

Another possible strategy is to improve the nutritive value of the street foods sold for weaning age infants. One example this strategy is from Nigeria where improved Eko was vended. Storage problems interfered with success but the experience is instructive.

Cold EKO is a widely vended food consumed by all age groups in Nigeria. During 1974-75 a special EKO was made for infants as part of the Isoya Rural Development Program. The EKO for infants had dried, ground fish and palm oil added. The EKO was sold in loaves by vendors. It had been observed that as food items required more labor to produce, women relied more on vendors to provide that food. In some areas it was thought women relied on vendors for at least one meal per day. So vendors were encouraged to sell the infant EKO. The loaves were half as large as the plain EKO. It was reported that the food was very popular with the children and that parents bought it especially for the children. However, it was reported that vendors soon stopped selling the infant EKO which had to be sold within 6 hours or spoilage resulted whereas plain EKO could be sold up to 24 hours after packaging.

Added Ingredients

Some examples of traditional weaning foods that were improved by the addition of ingredients like vegetables and oil have been described in the section on porridges and gruels. These new-old foods appeared to become self-targeting weaning foods after an educational campaign created a new image for the foods--an image of being special for the baby. The concept of adding an ingredient to an already existing food or creating a weaning food supplement is worth exploring further especially since it has caught the support of many health workers.

One experiment that had limited success using the "added ingredient" concept was conducted in Kenya (Verkleij and Jansen, undated). A short description of the maize-milk-oil mixture follows.

A supplement which was a mixture of maize flour, dried milk and corn oil was prepared for distribution to mothers of malnourished children. The mixture was chosen because it could be prepared into local child dishes but had a higher protein and energy content than the local dishes. The mixture was reported to be self-targeting because it was sweet and because the pre-mixing of the ingredients prevented the use of those ingredients in adult cooking. Mothers were instructed on the amount their child should eat daily and the way of combining it with other foods available at home. Mothers were instructed to divide the amount of food the child needed every day into five meals. They stressed the importance of giving frequent meals to small children.

The researchers reported limited success since mothers were reluctant to accept weaning mixtures that were new to them: laborious to prepare; or advice that involved extra cooking. It was also learned that it was against a local custom to give in-between meals to children.

Baby Sauces.

A concept that was not reported in the literature but discussed by the consultants to this study was the use of "baby sauces" to be added to the starch fed to babies. In many areas of Africa and Asia the adults eat a starch with condiments or sauces. Often it is believed that the baby cannot tolerate these additions so the weaning age infant is given the starch (rice, cassava, etc) without the sauce providing protein, vitamins, minerals and calories. The use of a "baby sauce" might fit into the already existing family meal format. In addition to "baby sauces" a

special baby dish that the starch and sauce would be served on might enhance the added ingredient concept.

Indigenous Snack Foods

The encouragement of feeding snacks to weaning age infants has been briefly mentioned by several fieldworkers. As mentioned earlier, some cultures do not allow snacking behavior and in others it does not fit into the family meal format, however, in some areas snacking may be the way to supplement the weaning age child's diet. Several examples of ideas follow.

Kuzhandai Amudhu. Devadas (1976) reported the development of several nutritional snacks based on inexpensive local foods that involved minimal processing in India. A snack food named Kuzhandi Amudhu which means "Children's heavenly food" was prepared and tested and received good acceptance. Recipes were developed for this cereal like snack foods for women to prepare fresh daily at home or to prepare in bulk. Devadas (1976) reported six different combinations of ingredients to make Kuzhandai Amudhu. The ingredients were roasted sorghum flour, roasted bengalgram dhal flour, defatted groundnut cake, jaggery, roasted greengram dhal flour, roasted maize flour, roasted ragi flour. The mixtures ranged from 300 to 311 calories per 80 grams and from 9.92 to 11.46 grams protein per 80 grams depending upon the mixture. From the short research report it was not clear if this snack became self-targeting to weaning age children or if it was shared more broadly.

Crackers and Cookies. A variety of crackers and cookies and biscuits have been developed to be nutritious and used as snacks in the developing countries. Kupagani Biscuits were developed with 7.9 percent protein and distributed throughout South Africa. They were reported to have good acceptance but eaten by all ages. The New Zealand Whole Milk Biscuit intended for children ages 2 to 9 years was also reported to have good acceptance by all ages. The Arnott-Brockhoff-Guest Pty. Ltd. developed a milk biscuit to be eaten by all ages but when softened with water used as a weaning food. It had 20 percent protein and was made of butter oil, wheat and soy flour, vitamins, minerals, wheat meal, sugar and tri-calcium phosphate.

Crackers, Cookies and Biscuits can be formulated to be nutritious and fill the nutritive gap left by small and infrequent meals. These foods can be formulated to be acceptable in taste. Biscuits, crackers and cookies are easy for the older weaning age child to hold and eat, they require little preparation for mothers. The problem that biscuits, crackers and cookies have is that they are snacks enjoyed by all ages. There were no reports in this literature study of trying special shapes and colors of cookies, crackers and biscuits that might make the snack more self-targeting. The idea has been used in the U.S. as described in the section Bread.

Other Snacks. Health workers report as soon as possible children forage for wild fruits and other snack items. Some field workers have observed, for example, that wild fruits are often eaten by children but rarely by adults.

Children, too, are observed eating things on sticks or in plastic tubes. For example, children are observed in developing countries eating flavored ice on sticks, in small plastic bags and in plastic tubes. This study, however, did not find any reports of nutritious snacks being fed to children on sticks, in plastic bags or tubes.

Food Classifications.

The ideas that a self-targeting weaning food must have an image and a place in the family meal format have already been introduced. The use of food classification systems to both develop and promote self targeting weaning foods is an idea that has been briefly described but not yet studied in detail.

Many cultures place foods into different categories. Jelliffe (1967) brought the existence of food classifications to the attention of nutritionists. At that time he suggested that innumerable systems of classification can be made but presented five that appeared to be world-wide: cultural superfoods, prestige foods, body image foods, sympathetic magic foods and physiologic group foods. Jelliffe and others over the years have noted that these food classification often have public health significance and yet little serious attention has been given to the study of these classifications and their application.

The idea of taking advantage of food classification systems in order to develop a self-targeting weaning food appears worth exploring.

Knowledge of these classification systems is now emerging. Some new concepts are being found in this literature. For example, Cosminsky (1982) discussed NYUKA, the porridge fed to Luo infants in Kenya. She

found mothers differentiate the various milk substitutes and infant foods with concepts and criteria such as heavy, light, sweet, thick and fatty.

Rizvi (1983) discussed an expansion of the hot-cold categorization in Bangladesh. She indicated that the classification NIROG or harmless foods exists. The NIROG foods are considered at times to be blood producing, strength giving and have medicinal qualities. They are also considered disease-free. She provided the example that both breast milk and rice are classified as NIROG by the majority of the people she studied. These foods then were strength giving, life givers and ideal baby foods.

Rizvi suggested that use of the NIROG food category could be helpful in developing weaning foods, in nutrition education and disease management programs. She indicated village women delay solid food for the fear of indigestion and diarrhea and therefore suggested that foods which are considered disease free have a better chance of being accepted.

Rizvi asserted that the NIROG food category is a traditional concept and that researchers in Bangladesh and perhaps other areas where hot-cold systems exist have either overlooked the category or forced those NIROG foods into cold foods.

Understanding and applying information about food classifications is more than knowing what foods are taboo and therefore not fed to children or infants. As Goyea and Johnson (1977) and many other researchers have noted, food taboos are dying out and as Ogbeide observed (1973), taboos per se rarely cause undernutrition.

CONCEPTS

This section is an analysis of the common threads that are seen in the self-targeting weaning foods already described. They are presented as characteristics that must be considered in developing and/or promoting self-targeting weaning foods.

Texture.

Texture is a food characteristic that often defines the role of a food. For example, in the United States snack foods are generally crispy and firm. These foods are designed to be eaten when the consumer might otherwise be inactive and the texture provides some stimulation or variety to activities such as watching television or a movie. The texture of a gruel or a pap tends to define the food as a food for people those who have no teeth, do not have mature stomachs, have difficulty swallowing or digesting their food. While this is not exclude adults from eating gruels it does tend to direct the food to infants. Gruels can be a variety of consistencies from very thin to very thick. For the most part the literature reports that infants are fed THIN rather than THICK gruels. It is important to build on the concept that children should be fed foods that are refined, but THICK consistencies could be promoted.

In many areas mothers have thickened the gruel as the child aged. It is important to remember that the viscosity of a gruel is an important feature of a food from a physiological developmental view.

Ingredient Combination

The combination of ingredients can be a distinctive factor that makes a

food self-targeting. For example the particular combination of ingredients used to make Panatela helps to make this food self-targeting. As one approach, a traditional food used for weaning but also used in the family food dish can be modified to make it self-targeting. For example an ingredient could be added so that it no longer functions as well in the family food dish. Or, the addition of the ingredient could change the food's image. For example, some field workers suggest that in cultures where milk is viewed as a baby food, its addition to a food material might achieve this end.

As will be discussed further below, it should be noted that in any effort to introduce a new self-targeted food, promotion or education will probably also be required to reinforce the special qualities of the food.

Primary Ingredient

A good weaning food is a food that trains the infant to eat at the family pot. For the most part, that means that infants must learn to eat a variety of starch based foods and therefore weaning foods should be starch based (rice, cassava, sago, potato, etc.). In addition, that means that the self-targeting weaning foods should be flexible in their ingredients. Weaning foods should be made from a variety of pulses and grains mixtures.

Color

Color is often used to target a food to a specific consumer. For example, presweetened cereals in the United States that are marketed primarily to children might be purple or pink. This is true also of milk products marketed to children. However, many reports indicate colors are very culture specific. One color, however, seems to be more often associated

with infant foods than any other color and that is WHITE. It appears that mothers identify white as a color of food acceptable for infants. Color has been blamed for the failure of ICSM in Egypt where Morgan and Adelman (1982) reported that the Egyptians expected a weaning mix to be white or resemble milk and not be the yellow of ICSM.

Added-Ingredients

BUBUR CAMPUR, SARBOTTHAM PITHO AND NUTRI-PAK are examples of additives or ingredients that when added to a gruel, pap or other food make the food more nutritious and also child specific.

There are some that suggest that in cultures where milk is viewed as a baby food, the addition of milk to a product might achieve this end. There are others who suggest adding colorings, flavorings, sounds (snaps, pops, sizzles) or other additives might make the food targeted without an education or a marketing campaign. In example of Bubur Campur ingredients are added to the porridge. These ingredients by themselves, however, did not make the product targeted to weaning age children.

Familiarity of Ingredients

Some of the experiences with the development of multimixes in Project Poshak, India are important in this discussion of self targeting.

While several researchers have indicated that a food is not too acceptable to the adults in its characteristics might more likely reach an infant Gopaldas and coworkers (1974) noted that rural Indian dwellers cannot be easily persuaded to feed an unfamiliar or an unacceptable food, no matter how nutritious to their weaning age children.

This behavior, however, is not universal. Nicholas, (1974) reported that parents in Ghana were willing to add powdered fish to AKASA porridge for infants but would not eat fish flour themselves. No further details about the fish flour and its acceptability were reported.

The Project Poshak experience also found that flavor was relatively unimportant but sweetness was important in overall acceptability of the multimix. Western cereal companies have amply demonstrated this sweetening principle with a variety of grains becoming acceptable cereals when presweetened.

Flavor

Flavor can also contribute to self-targeting. For example, as previously described, acidified milk appears to have been successful on an experimental basis in creating a self-targeting food, while in South America there are increasing reports of a new indigenous practice of feeding lemons to infants.

Education and Marketing

Generally, when an effort is made to introduce a new self-targeting food, education or marketing and advertising will be important. In part, such education or marketing helps to reinforce a distinctive image of the food associated with its texture or ingredients. In addition, however, the education or marketing can itself help to create an image of the food as predominantly appropriate for the weaning age child. Gerber considers that marketing and advertising were critical to its success in creating a

food with a special image. Similarly, nutrition education was found essential in success achieved to date with Bubur Campur.

Miscellaneous

A few miscellaneous observations are important. Self-targeting weaning foods should be filling; easy to prepare, with little or no cooking; should also be fed by neighbors to their children; and to fit into the cultural classification of food.

SELF TARGETED FOODS FOR THE PREGNANT WOMAN

There is very little evidence of foods consumed preferentially by pregnant women. Nevertheless from what is known it is believed some principles can be derived that would be applicable to an effort to see if self-targeting foods for this group could be developed. Since the information available can be described quite briefly, this section will also include the underlying concepts and implications that emerge from this information.

Perceptions

The review of literature and the interviews with knowledgeable individuals yielded virtually no information about foods targeted by cultural groups specifically for pregnant women (Table 1). The comments about the food habits of pregnant women generally indicated that in many groups the pregnant woman actually tried not to eat foods or additional amounts of food. The literature is filled with many references to food prohibitions during pregnancy. It is not clear to what extent these prohibitions or taboos are followed. As Kolasa reported elsewhere (1979), it's thought that taboos against eating high protein foods such as meat and milk and fish often disappear as those foods become more plentiful in an area. There are a few instances where it has been reported that pregnant women are fed more meat and more milk during pregnancy. However, these foods (meat and milk) are not specifically eaten by the pregnant women alone.

Many fieldworkers have cited that women choose not to gain too much weight during pregnancy for a variety of reasons including fear of difficult delivery, inability to work until delivery and quick return to work after

delivery, as well as lack of appetite and husband's attitudes toward the woman's size and shape.

The problem, then, of designing a supplement self targeting to pregnant women is extremely perplexing. There appear to be no nutritious foods crossculturally naturally targeted to the pregnant woman. Indeed, there are no examples to cite except references made in the literature to herbs and teas. However no substantive information about teas and herbs was located in this study. A few observations about liquids will be discussed. The other food habit to be discussed is the practice of pica or eating of non-food items. The practice of pregnant women around the world has been described in some detail.

Liquids

The literature is filled with lists of foods that are taboo for women during pregnancy. There are no definitive studies however on how carefully these taboos are adhered. However, the lists of foods rarely includes liquids. Where observed, liquids are thought to have a tonic effect on the pregnant woman. For example in Indonesia Jamu a herbal tea made with rice, egg and ginger is thought make women feel better. Many of the liquids reported were alcoholic in nature such as a beer from sugar cane or pony malt or commercially brewed beers or palm wine

It is possible that a more detailed study of use of liquids, and other potions by pregnant women would reveal that foods of this type are self-targeting, and if so, might provide a basis for development of self-targeting foods. Such study should, if possible, include field observation.

Pica

The one practice, however, that is associated with pregnant women is that of pica or geophagia. It may contain principles that could be used in the development of a food supplement with self-targeting characteristics. There has been renewed interest in pica in the United States with a recent National Academy of Sciences report (1982). However, this is a practice that has been observed by groups of women for centuries around the world. It will be described briefly. That description will be followed by some thoughts about the relevance of this practice to the development of a supplement for pregnant women.

Pica and Pregnancy Pregnant women and young children have engaged in pica practice for centuries. While today it is considered an abnormal practice in developed countries, it is still practiced among some groups of women. In the developing regions of the world it is difficult to obtain good information about the practice, but in many places it is viewed as a normal pregnancy behavior.

Pica denotes the compulsion for persistent ingestion of unsuitable substances having little or no nutritional value. While this practice is not limited to pregnancy, pregnant women have been studied as the primary subgroup of pica practitioners. The craved substance may be the more commonly reported dirt and clay (geophagia) or starch (amylophagia) or the less frequently reported substances such as burnt matches, charcoal, soot, termite mounds, toilet bowl air-freshener, cigarette ashes, baking soda, and coffee grounds.

Cooper (1957) and Laufer (1933) provided descriptions of pica practices from the sixth through the early 20th century. From these reports, one concludes that pica is not limited to any one geographic area, time, race, creed, culture, sex or status within a culture. Nor is there one etiology that is applicable to all pica situations.

A description of the hypotheses of pica's etiology; nutritional concerns of the evidence linking iron deficiency anemia and pica ingestion; other medical complications of pica in pregnancy; specifics of clay and starch eating are in Appendix B.

CLAY

The manner of handling clays and types preferred varies widely. Red clays are prized by some while white or yellow clays are selected in other areas. Clay may be eaten in lump form as it comes directly from the earth or receive minor treatment by drying or more elaborate preparation by boiling and/or molding in shapes of bricks, baskets, tablets or figurines. Observers report Mexican women mold baskets of clay and sell them to pregnant women for consumption. Addition of salt and/or vinegar prior to baking was noted by Verneer and Frate (1979). Clays are extracted from exposed banks as well as clay pits of several feet deep. White clays have been described as creamy and sweet and red clays are gritty and tart. Clay eaters attribute taste and texture differences as important distinguishing factors among clays. A clay's value and demand has lead to introduction of clay into the exchange economy, at a value that is affordable by the lower classes. Often clays are available in markets from traders. Clay eating may be introduced at an early age as mothers

pacify a whining child with a lump of clay. It is believed that female members of households play a primary role in initiating the practice and providing entry into the socially acceptable parameters of pica. School teachers are known to sell or give children lumps of clay.

Clay eaters in the U. S. and Africa report daily consumption of lump or two of clay to in excess of 1 quart of clay. Average consumptions of 50, 50 and 30 grams daily have been reported.

The actual frequency of clay eating varies from study to study. As much as highs of 72 percent of one population group were found to eat clay. Vermeer reported that at least 46 percent of the African women in a section of Nigeria and Ghana ate clay (Vermeer, 1971 and Vermeer, 1976). Others report that 50 percent, 27 percent, 10 percent and 9 percent of their groups eat clay.

STARCH. It appears that starch eating occurred when starch became a substitute for clay. For example, when local clay became unavailable through migration from the clay containing southern homeland in the U.S., laundry starch was an alternate pica substance selected and consumed. Starch eaters have indicated that clays are unclean and commercial packaged products are more sanitary.

Unlike clay, starch has a very definite impact on nutritional status since it supplies about 1600 calories per pound. Consumption levels range from handfuls to several boxes a day or up to 4 pounds. One survey found women on average consuming 120 grams (480 calories) of starch daily. In the U.S., large quantities may result in excess calories and obesity or to nutrient dilution by displacing other foodstuffs.

Argo brand laundry starch is reported most often as the starch of choice. The lump dry starch is eaten without any further preparation. The dry starch "squeaks" in the mouth. It has been reported to calm nausea.

Reports of starch eating incidence vary from 41 percent (Ferguson and Keaton, 1950), 75 percent (Edwards et al., 1959), 35 percent (Keith et al., 1968), 46 percent (Bronstein and Dollar, 1974), 24 percent (Keith et al., 1969), 18 percent (Posner et al., 1957), 17 percent (Payton, 1960), to 10 percent (Lackey, 1978) for the various populations sampled.

Underlying Concepts - Relevance to Self Targeting Supplementation
for Pregnant Women

Many cultures have viewed pica during pregnancy as a desirable and usual practice. In some areas pregnant women are supplied with locally acceptable pica substances. Lack of visible ill effects has positioned pica as an acceptable folk medicine practice in those areas.

The substitution of dry laundry starch when clay is unavailable gives evidence to a practice that is not easily eliminated, although it is not clear why. For example, clays generally provide no calories although they may depress appetite while laundry starch provides 4 calories per gram. There is no tradition associated with the source of laundry starch - it is purchased in a store as opposed to clays being secured from a special location. Pregnant women rarely if ever view sound medical practice such as consuming iron supplements or calcium rich foods with the same intensesness that is ascribed to pica. The preparation of clay figurines, loaves and other clay objects for the marketplace also points to the institutionalization of the practice in some cultures.

There are some common attributes shared by clay, starch, and other pica substances. Most pica substances are dry and consumed dry. Most have a smooth texture or slick mouthfeel. Many of them are described as being tart, bitter or biting as opposed to being mild or tasteless. Perhaps the most important characteristic ascribed to pica is that it is antinauseal. There are no common nutrients supplied by the substances since pica substances are usually non-nutritive and not from the usual food supply. These substances are introduced by females to females.

CONCLUSIONS AND RECOMMENDATIONS

This study has described the existence of self-targeting foods in the developing and developed world. Unfortunately the published literature and even the fieldnotes of nutrition and health workers provide little documentation about the extent of use of these foods; their nutrient composition, flavor, color, texture, aroma and shape; and their attributes that clearly make them preferentially fed to weaning age infants. This study has also made note that there are places in the developing world that the concept of weaning foods does not exist.

Those foods that appear self-targeting can be grouped into gruels, porridges and paps; beverages; texture modified fruits and vegetables; commercially prepared baby foods; and breads, cookies and biscuits. Some of these foods are traditionally self-targeting and others have become self-targeting as a result of education or merchandising. Some of the characteristics that appear to make a food self-targeting include its texture, which varies with the age of the weaning child; the use of a starchy food as the primary ingredient; a color that is either white or

culturally specific to infants; an image from traditional culture or created through education and/or marketing; and familiarity of ingredients as well as acceptability of ingredients to mothers. Some other characteristics of the food that are important if a mother is going to feed the food to the child is that it is easy to prepare requiring little or no cooking time and should fit into the cultural classifications and family meal pattern schemes.

This study uncovered sufficient evidence to demonstrate that the concept of a self-targeting weaning food is worthy of future study and concept development in solving the problem of dilution or sharing of foods intended for the weaning age infants. Some suggestions for application follow.

SPECIFIC IDEAS FOR APPLICATION--WEANING FOODS

Self-Targeting Food Design Principles

From the information collected there would appear to be a large number of principles that should be taken into account in designing a self-targeting food. These include texture, which may vary with the age of the child; preparation; ingredient composition; color; flavor; and image. This latter may be either already part of the culture or created or reinforced by education or marketing. Some other characteristics of the food that are important are that it is easy to prepare and should fit into any food classification perceptions that may exist.

Vendors and Self-Targeting Weaning Foods

Projects combining nutrition and income generation goals have been initiated recently. In some instances organized groups of women make weaning foods to sell locally for profit. These projects often have problems results from the members' lack of business marketing and management skills.

To overcome some of the shortcomings of these past projects and to reach the semi- or peri-urban families directly, the utilization of existing food vendors/traders should be considered. These vendors are adroit business people. Some already fill a demand for an affordable "ready-to-serve" baby food (of varying nutrient value). Their low overhead operations make them small profits. Usually the vendors, who are most often women, sell small breads, cookies, cereals, and other snack foods. These vendors or petty traders are found throughout the developing world. Working with these women to improve the nutritional quality of the food

they market would be a worth-while strategy to explore to improve available infant foods.

Vendors/traders could be used in two ways. First they could prepare and sell the improved baby food themselves. The food formula, the incentives for the vendors and the marketing strategy would need to be defined. A second method would require that vendors develop the image of selling a superior baby food. Small scale food processors could prepare the food and sell it to the vendors at a subsidized rate (ie, no more than cost of ingredients vendor is currently using in baby food). Development of the food processor, education of the vendors and creation of marketing strategy are needed.

Pilot projects should be initiated in countries where street food is an important dietary component.

A part of the Indonesian Nutrition Improvement Program recommended women make an improved, homemade weaning food called bubur campur. Most of the vendors were interested in learning about the project and the food but were skeptical about its chances for commercial success. Those who could best conceptualize their operations in business terms said that they would have to charge more money because of the added ingredients, and they felt this would price their product higher than their customers would be willing to pay. At this time there was no answer for these vendors, since no information or estimate of how much the mothers would pay for a superior infant food is available. This aspect of the Indonesia project should be conducted as a feasibility study. In general there has been little effort to understand the effectiveness of marketing services

influencing supply and demand among low income consumers in developing countries.

Riley and Weber (1979) noted that the relationship between nutrition and marketing services and their combined effect on the welfare of consumer and producer groups in an area needing research. They reported that large and rapidly growing groups of low income consumers allocate high portions of their cash income of purchased foods, procured small scale urban retailers in market place stalls. Riley and Weber suggested that research to determined how small scale food retailing in rural and urban areas can be improved.

It would seem that any project undertaken with vendors/traders should have the advice of a marketing specialist, nutritionist and food scientist. If the food is to be prepared by the vendor, formulating a nutritious product requires nutrition expertise. If vendors purchase, for example, a locally commercially prepared food at subsidized rates, food technologists assistance is needed. Marketing specialists are needed to answer some of the following questions.

1. In depth research with the potential buyers of the food is needed to determine: What do they want?
How much can they pay? What are the expected benefits?
2. Established incentives for vendors to try to sell the food are needed: free publicity, subsidized ingredients, subsidized product, packaging provided, etc.
3. Formulation of the enriched food with the vendors to ensure that they are in agreement with the recipe and preparation procedure.
4. Careful cost calculation given market potential

5. Tests of food with potential buyers.
6. Appropriate and adequate promotion materials and media and strategy for vendors.

Simulated Traditional Self-Targeting Food

AID should consider developing and testing a self-targeting food intervention using a traditional self-targeting food as a base.

One of the strong examples of a self-targeted food is sago and cassava gruels. This traditional food is fed preferentially to children in mar., places and by all economic groups. The cassava and sago gruels now served have caloric value but lack protein, vitamins and minerals. An improved weaning food based on cassava or sago could enhance the diets of many children.

It is recommended that AID explore the possibility of using Sago (cassava tapioca) as a basis for an improved weaning food which would still be perceived as an acceptable food for weaning age children. One possibility would be to add ground nut or soy flour protein plus vitamins and minerals to the present Sago. Another approach might be to use the technology for producing small shaped pasta products to manufacture a food with the same form, shape and texture as Sago. The base for the product could be CSM or other blended food available under Title II. The enriched Sago could be introduced and merchandised as a snack that should be fed to the infants in-between meals.

Added Ingredients

AID should explore the feasibility of preparing "baby sauces" in the areas where this meal pattern is followed by adults. The baby sauce should be a

protein, vitamin and mineral supplement. It might include the use of oil and vegetables. Field trials to determine if these sauces would be most effective if marketed through vendors or distributed in health clinics should be tried. The feasibility of distributing this baby sauce or added ingredient with a special dish or spoon to help create the image of self-targeting baby foods should also be explored.

Snack Foods

Since one of the easiest ways to have individuals increase their caloric intake is to promote snacking AID should more fully study the role of snacks and snack foods in the diet of weaning age children. Biscuits, cookies and crackers are well liked foods by people of all ages and therefore are not self-targeting to children. Perhaps a more detailed study on how to make crackers, cookies, biscuits self-targeting to weaning age children would be warranted. The literature could be more thoroughly searched for examples of uses of shapes, colors and flavors. One nutritionist suggested that the idea of a set of finger cookies in the shape of Hamz be tested in countries where that religious symbolism is strong. The Hamz is a five fingered hand and a set of cookies could be used to encourage feeding of the infant five times a day for protection. Others have suggested that the concept of infant feeding should be tied to prayer or religion. This concept requires very careful study before adoption as a strategy. Or perhaps snack foods could be designed similar to pacifiers used in different countries.

Since children enjoy iced flavored products, AID should more fully explore the possibility of developing a weaning food targeted at the older weaning age child made with milk solids and other vitamins and minerals. The

products could be processed as small plants or the mix for a popsicle like product could be processed.

The overall recommendation, then, is that AID should support a program of concept development for self-targeting weaning snacks. This type of program would require the expertises found in food technology, child development, nutrition and pediatrics.

Along with the development of the concept of the snack, the question should be explored of "who is credible to introduce a new food for infants" into the culture.

SPECIFIC IDEAS FOR APPLICATION - PREGNANT WOMEN

There is little evidence that the concept of self-targeting foods for pregnant women exists. Some small evidence that herbs and teas and other liquids are used preferentially by pregnant women and the possibilities for fortifying or enriching those liquids may be warranted.

Much evidence of the use of pica substances (dirt or clay or starch) exists throughout the world. This is generally thought of as a negative behavior that may be linked to anemia or other medical complications. However, the characteristics of pica substances that pregnant women like seem worth exploring. Those characteristics include: drying, powdery, anti-nauseal, provides feeling of freshness and helps constipation. In particular the characteristics of anti-nauseal and aiding constipation are important to pregnant women.

Overall, while evidence of self-targeted supplements is sparse, the above findings suggest several ideas for the development of a self-targeting

supplement which appear worth exploring. Perhaps a number of these ideas could be brought together in a pilot project with mutually reinforcing elements. These ideas follow:

Liquids

AID should support the more detailed study of the use of liquids, tonics and other portions by pregnant women to determine if these liquids are self-targeting in nature. If they appear to be self-targeting a program of concept development might be initiated to design more nutritious liquids and introduce them to women.

Pica Like Substances

AID should support a program of concept development to determine if a self-targeting pregnancy supplement could be built upon the centuries old practice of pica. The substance would have to be anti-nauseal and aid in constipation as well as be nutritious. A program to determine how such a supplement could be introduced into the culture might also be conducted.

Education Campaigns

AID should review their education campaigns aimed at encouraging pregnant women to eat more foods. The messages for these programs should be reviewed to determine if they are presenting messages women will not accept. For example, are women being encouraged to eat strengthening foods so their babies will be stronger, rather than so they will be bigger. Are campaigns encouraging women to eat strengthening foods so they will feel better? Any messages to accompany a self-targeting

pregnancy program must be based on appropriate ethnographic or media research.

FURTHER INFORMATION COLLECTION

While this study has been far from exhaustive, a fair amount of the readily available information on self-targeting foods has been collected. To add to this information in a major way, it is believed specific in-country studies would be required. At the same time, in indicating the limits of what could be achieved by this study, it should be noted that it is felt that sufficient information was collected to permit pilot tests of various approaches to proceed at the present time without an additional global study. In-country studies might rather be part of such pilot studies, geared to efforts to develop a self-targeting food intervention in a particular country or group of countries.

Table 1. Summary of Self Targeting Weaning Foods and Supplements for Pregnant Women

Country/Region	Special Food for Children	Special Food for Pregnant Women	Source of Information
Africa Zulu	* <u>Gruel</u> thin maize, water	_____	Gumede, 1978
West Africa	* <u>Gruel</u> pounded millet & water	_____	Barrell and Rowland, 1980
Algeria	<u>Labnamine</u> imported cereal	_____	International Children's Centre, 1982
	<u>Superamine</u> processed food rich in proteins from inexpensive local foods	_____	Brown, 1978 International Children's Centre, 1982
Australia	<u>Milk Biscuit</u> butter, oil, wheat and soy flours, vitamins, minerals, wheat meal, sugar, tricalcium phophate	_____	Devadas, 1976

* traditional

Bangladesh

Cereal

wheat or rice mixes, bengal gram,
black gram, mung bean, lentil,
khesan

*Barley Water

barley powder, mixed with sugar and water
and added to milk

*Porridge

rice-prepared with sugar and cow's milk
or water

*Sago

Baganda, Africa

*Matoke

steamed banana

Tea

Paw Paw

Passion Fruit

Belize

*Porridge

flour or corn-
meal, sweetened
with condensed milk

*Tortillas

maize

Hambraeus, et. al., 1981
Brown, et. al., 1982
Akmed, et al., 1981

Schweiger, and Cutting, 1978

Black, et. al., 1980
Rizvi, 1983

Venury, 1981

Welbourn, 1963
Jelliffe, 1962

Jelliffe, 1962

Harrison, A, 1983

Harland and Lizaraga, 1979
Dorea, J., 1983

Brazil

*Mingau,
a manioc gruel
arrocina, rice starch
milk

_____ Dorea, J., 1983

Maizena
commercial formula - soya
flour, skimmed milk, corn
starch, sucrose

_____ Griffiths, 1983

Gerber

_____ Dosreis, 1983

Burma

*Polished Rice

_____ Robinson, 1957

Condensed or dried milk

_____ Jelliffe, 1962

Upper
Burma

Honey

_____ Jelliffe, 1962

*Rice & Rice Gruel
prechewed by
mother, pressed
through muslin
gauze

_____ Folls, 1958
Jelliffe and
Jelliffe, 1980

Cameroon

*Pap
corn pap

_____ Notzon, 1983
AID, 1978

*Pap
cassava,
coco yam

_____ Leader, 1983
AID, 1978

Pap
staple, dried
shrimp, milk

_____ Leader, 1983

Cameroon (cont.)	<u>Teas</u> lemon grass tea	_____	Leader, 1983
Caribbean	* <u>Porridge</u> banana cassava, taro or swt. potato, sweetened	_____	Patterson, 1983
Chile	* <u>Gruels,</u> Fruit juices Spaghetti Breads	_____	Stekel, 1983
<u>Chile</u> Santiago	Fortesan Powdered milk Cacao	_____	de la Luz Alvarez, et. al., 1974
China	<u>Kanji</u> watery rice gruel cooked with salt	_____	Ashkenaz, undated
Colombia	* <u>Gruel</u> plantain flour w/milk	_____	Bustillo, 1983
	<u>Incaparina</u> cottonseed flour	_____	Brown, 1978

Columbia (cont.)	Bienestarina Colombiharina	_____	Harpstead, 1983 Moench, 1983
Costa Rica	Wheat Soy, Blend, Corn Soy Milk	_____	Anderson, et., al., 1981
Dominican Republic	Corn Soy Milk; Wheat Soy Blend; Soy Fortified Rolled Oats	_____	Anderson, et. al., 1981
Ecuador	None	_____	Goldman, 1983
	Nestle	_____	Oleas, 1983
	Ordesa		
	Gerber		
	*Gruel plaintain flour w/milk	_____	Bustillo, 1983
	*Colada de dulce thick porridge	_____	Witcher, 1983
Egypt	Superamine	_____	Harrison, G., 1983 Galal et. al. 1983 Morgan and Adelman, 1982
	*Biscuit "Mary's Biscuit"	_____	Hussein, et. al., 1979 Human Lactation Center. 1982

Egypt
Cairo
(cont.)

*Mehallabia/Mahalabya
milk, rice power and sugar --
could be buffalo milk and
cooking starch

Abdou, et. al., 1965
Morgan and Adelman, 1982

Egypt
Cairo

Seven Seeds
rice, barley, wheat, maize,
fenugreek, lentils, favabeans
ground and cooked with water

Morgan and Adelman, 1982

Belila
boiled wheat
or its soup

Abdou, et. al., 1965

*Liquids
anise, caraway, helba tea
fenugreek or rice water;
sometimes sweetened with
sugar

Abdou, et. al., 1965
Human Lactation Center, 1982

*Balouza
starchy pudding
made of starch, sugar,
and water

Abdou, et. al., 1965

Legumes
Vicia Faba -
dish of
broad beans
Foul Madames -
stewed
beans w/oil

Abdou, et. al., 1965

Egypt
Cairo
(cont.)

"Tamjeh" -
bean cake -
beans,
vegies fried
in oil

Egypt
Cairo

Bread
whole wheat
Rice

Abdou, et. al., 1965

Tubers

Milk

El Salvador;
Costa Rica

Jarred Baby Foods

USDA, 1977

Gerber

Infant Cereal Products

Gerber, Cerelac

Nestum Cereal

USDA, 1977

Incaparina

USDA, 1977

Infant Soups

USDA, 1977

Nestle

Ethiopia

Toasted corn,

*Corn bread

*Porridge

Buttermilk

Teff
wild wheat

_____ Selinus, et. al., 1971

_____ Wilson, C., 1983

Ethiopia

Faffa

_____ Brown, 1978
Abrahamsson, 1978

Cow's Milk

_____ Hoffman, C., 1983
Knutsson and Mellbin, 1969

*Porridge/Gruel
emmer wheat
abish
sometimes w/milk

_____ Mgaza, 1982
Hofvander, 1966
Selinus, et. al., 1971
Hoffman, C., 1983

Butter

Fiji

*Porridge
taro & fish
broth or coconut
milk

Taro

Turner, 1983

Gambia

*Pap
sweetened rice water with pieces
of available fruits, mangoes or oranges

Thompson and Rahman, 1967

Gambi (cont.)	<u>*Porridge/Gruel</u> steamed millet maize	_____	Thompson and Rahman, 1967 Barrell and Rowland, 1979
	Ground nut sauces	_____	Thompson and Rahman, 1967
Ghana	<u>*Porridge</u> maize, sorghum, millet, rice with water	_____	Ghana Nutr. Div., 1982 Hicks, 1983
	<u>*Plantain</u> roasted, boiled, mashed	_____	Hicks, 1983
Guatemala	<u>*Gruel</u> thin cornstarch, maize, oatmeal or cassava starch	_____	Solien deGonzalez, 1963 Flores, et. al., 1966 Jelliffe, 1962
	Sugar water	_____	Solien deGonzalez, 1963
	Bean broth	_____	Flores, et. al., 1966 Pigott and Kolasa, 1979
	Incaparina	_____	Pigott and Kolasa, 1979 International Children's Centre, 1982 Griffiths, 1983
	White bread	_____	Flores, et. al., 1966
	Sweet roll	_____	Pigott and Kolasa, 1979
	<u>*Maize tortilla</u>	_____	Flores, et. al., 1966 Pigott and Kolasa, 1979

Guyana	<u>*Gruel</u> taro season w/ nutmeg and brown sugar	_____	Patterson, 1983
Haiti	<u>Gruels</u> imported corn products, oat meal, sago, crackers	_____	Jelliffe and Jelliffe, 1961 Jelliffe, 1962
	<u>*Plantain/Banana</u>	_____	Jelliffe and Jelliffe, 1961
	<u>Sweet potato</u> boiled and mashed		
Haiti	<u>*Herbal Infusions</u> made from different plants: mint and various fruit bearing trees	_____	
Honduras	Atole	_____	Dewalt, 1983
	Rice		
	Eggs		
	Potatoes	Okra	Will, 1983
	Gerbers food		
	Soups		
India	Commercial baby foods	_____	H. Thompson Assoc., 1972
	Sago/tapioca		Apte, undated
	Fruits	_____	H. Thompson Assoc., 1972

India (cont.)	Soy fortified bulgur	_____	Anderson et. al., 1981
	Wheat		
	Soy fortified sorghum		
	Oil		
	Balahar		
	Honey and dates	_____	Jelliffe, 1962
<u>India</u> Maharashtra	None		Dodds, 1983
	Arrowroot/ Tea	_____	Ghosh, 1966
India	<u>Kuzhandai Amudhu</u> flour - general ingredients: roasted sorghum, bengal gram, groundnuts	_____	Devadas and Murthy, 1971 Devadas, 1976
<u>India</u> South	<u>*Gruel</u> rice	_____	Human Lactation Center, Ashkenaz, undated
	Ragi flour	_____	Human Lactation Center, 1982
	Rice water		
<u>India</u> Andhra Pradesh	<u>Cereals</u> local food as supplementary	_____	Hunumantha, et. al., 1975

India
Andhra Pradesh
(cont.)

Pulses
local food as
supplementary

Hunumantha, et. al., 1975

Nub
local food as
supplementary

Hunumantha, et. al., 1975

Sugar/Jaggery
local food as
supplementary

Hunumantha, et. al., 1975

India
Bombay

Milk
buffalo

Ashkenaz, undated
Ghosh, 1966

India
Bombay
Calcutta
Kashmir
Punjab
Ramandtha puram
Singhi
Tanjore

Rice
with salt and
drop of oil or
mashed w/ sugar

Brown, 1978
Apte, undated
Sharma, et. al., 1977
Ashkenaz, undated
Ghosh, 1966
Thaman and Manchanda, 1968
Thaman et. al., 1964
Thizgarajan, undated

India
Calcutta

Barley

H. Thompson Assoc., 1972

India
Bombay
Calcutta
Majafgarh/Mitraon

Sago

H. Thompson Assoc., 1972
Anand and Rao, 1962
Ashkenaz, undated

<u>India</u> Calcutta Simla-Hills	Vegetables	_____	Bansal, et. al., 1973 H. Thompson Assoc., 1972
<u>India</u> Calcutta Majafgarh/Mitraon Naila Singh Tanjore	<u>Milk</u> cow's goat's	_____	Jelliffe, 1962 Apte, undated H. Thompson Assoc., 1972 Thizgarajan, undated Gupta, et. al., 1979 Sharma, et. al., 1977
<u>India</u> Calcutta Kashmir Singh colony Tanjore	Tea	_____	Apte, undated Sharma, et. al., 1977 Thaman, et. al., 1964
<u>India</u> Delhi	<u>Bajra</u> millet bread and jawar flour	_____	Seth and Ghai, 1961
<u>India</u> Delhi Simla-Hills Calcutta	<u>Chappattis</u> wheat cake	_____	Seth and Ghai, 1961 Bansal, et. al., 1973 Datta Banik, 1975 H. Thompson Assoc., 1972
<u>India</u> Delhi Simla-Hills	<u>Bananas</u> mashed	_____	Seth and Ghai, 1961 Bansal, et. al., 1973 Datta Banik, 1975 Krishnamurthy, undated

<u>India</u> Delhi Simla-Hills Naiala Majafgarh & Mitraon	<u>Dalia</u> rice with pounded steamed wheat cooked in water or milk	_____	Thizgaragan, undated Seth and Ghai, 1961 Gupta, et. al., 1979 Anand and Rao, 1962 Datta Banik, 1975
<u>India</u> Delhi Simla-Hills Majafgarh & Mitraon Singhi	<u>Khichri</u> rice and lentil gruel	_____	Seth and Ghai, 1961 Bansal, et. al., 1973 Anand and Rao, 1962 Datta Banik, 1975 Sharma, et. al., 1977
<u>India</u> Simla-Hills Himachal Pradesh Mujafgarh & Mitraon Delhi	<u>Janam Ghutti</u> honey or sugar mixed with indigenous herbs	_____	Bansal, et. al., 1973 Brown, 1978 Anand and Rao, 1962 Datta Banik, 1975
<u>India</u> Fatherpur- Hyderabad	None Rice, watery	_____	Madhavi, et. al., 1972 McLaren, 1956
<u>India</u> Hyderabad	<u>Rice</u> <u>rich families:</u> cooked with salt, milk, ghee <u>poor families:</u> cooked with salt, groundnut oil None	_____	Jyothi, et. al., 1963 Vijayadurgamba and Geervani, 1979
<u>India</u> Kashmir Ramanthapuram	Coffee	_____	Thaman, et. al., 1964 Ghosh, 1966 Apte, undated

<u>India</u> Kashmir Naila Punjab Ramanthapuram Simla-Hills Singhi Tanjore	<u>Bread Biscuits</u> dipped in coffee or milk or crumbled in liquid	_____	Thaman and Manchanda, 1968 Sharma, et. al., 1977 Thaman, et. al., 1964 Bansal, et. al., 1973 Gupta, et. al., 1979 Apte, undated Krishnamurthy, undated
<u>India</u> Khonds Oriyas	<u>Vegetables</u>	_____	McLaren, 1965
	<u>Redgram</u>	_____	McLaren, 1965
<u>India</u> Majafgarh Mitraon	<u>Sooji</u> soak baira or wheat flour in buttermilk and boil on fire	_____	Anand and Rao, 1962
<u>India</u> Majafgarh Mitraon	<u>Adult Food</u>	_____	Anand and Rao, 1962 Gopalan, 1957
<u>India</u> Madhya Pradesh	<u>Commercial mixes:</u> prepared from - corn/wheat/rice, jowar; grams (mung/bengal); oil seeds (groundnut) and jaggery	_____	Gopladas, et. al., 1974
<u>India</u> Naila colony	<u>Dahl</u> buttermilk	_____	Gupta, et. al., 1979
<u>India</u> Ramanthapuram Tanjore	<u>Idli</u> steamed rice cakes; made of rice and black gram, soaked, fermented and coarsley ground	_____	Apte, undated

<u>India</u> Ramanthapuram	<u>Castor Oil</u> mixture of castor and neem oils or mixture of castor oil and sugar	_____	Jelliffe, 1962 Apte, undated
<u>India</u> Ramanthapuram Tanjore	<u>Gur</u> Homemade sugar and water	_____	Brown, 1978 Apte, undated Jelliffe, 1962 Krishnamurthy, undated
<u>India</u> Singhi colony	<u>Porridge</u> <u>Pulses</u>	_____	Sharma, et. al., 1977 Datta Banik, 1975
<u>India</u> Delhi	<u>Suji Khir</u> suji, milk, and sugar	_____	Datta Banik, 1975
<u>India</u> Olappalayam Tamil Nadu project	<u>Banana</u>	_____	Thizgarajan, undated
<u>India</u> Tiru vanmiyur Tamil Nadu project	<u>Kolambu</u> Gravy: mixture of tamarind, ground spices, pieces of vegetables with meat or fish	_____	Krishnamurthy, undated
Indonesia	<u>Soup</u> leaves of spinach, papaya, sweet shoots	_____	Wilson, C.. 1983
	<u>Bubur Campur</u> enriched rice porridge with added finely chopped green vegetables, with either fried fish (Sumatra) or soybean curd (Java)	_____	Zeitlin, 1983 Griffiths, 1980 Griffiths, 1983

Indonesia (cont.)	<u>*Porridge</u> rice mashed called "bubur"	_____	Griffiths, 1980 Kardjati, et. al., 1978 Jelliffe, 1962 Underwood, 1982 Khumaidi, 1983
	Coconut Meat	_____	Griffiths, 1980 Jelliffe, 1962
	<u>Mixed Food</u> soft rice, tahu, bayam (green leafy vegetables)	_____	Griffiths, 1980
	Bread	_____	Griffiths, 1980
	Cookies	_____	
	Banana, mashed	_____	Kardjati, et. al., 1978
Israel	<u>Cereals</u> corn flour, rice semolina	_____	Winter and Mundel, 1956
Ivory Coast	<u>*Starches</u> banana, yam, cassava, plaintain	_____	Mauber and Reinhardt, 1979
Jamaica	<u>*Gruel/Porridge</u> sweetened (sugar) cornmeal or green banana w/sweetened condensed milk	_____	Jelliffe, et. al., 1954 Ashkenaz, undated Human Lactation Center, 1982
	Crushed irish potato	_____	Jelliffe, et. al., 1954 Jelliffe, 1983

Jamaica
Kingston

Crushed Foods

Human Lactation Center, 1982

Strained Oats

Liquids

milk, Tea, Sugar water,
orange juice, bush teas

Japan

*Soup

rice and water

Ozoe, 1983

*Soup

bread, water, sugar

Jordan

Laubina Cereal

boiled wheat,
chick peas, dry skim
milk, bone ash, sucrose,
citric acid, Vit. A, D

Co, et. al., 1974
Jelliffe et. al., 1954
Human Lactation Center, 1982

Kenya

Porridge, watery

rice, pounded
bananas, yams, liver

Ojiambo, 1967
Mgaza, 1982
van Steenberg, et.al., 1978

Maize Porridge/gruel

milk, sugar
sometimes with millet

Kiney, 1983
Mgaza, 1982

Banana Stew

banana, bean,
meat/fish -
boil w/salt

Kiney, 1983
Mgaza, 1982

Millet Porridge

sourmilk & sugar

Kenya
(cont.)

Nyuka
thin gruel or porridge
of maize meal and water
sometimes mixed with millet
or cassava

Cosminsky, 1982

Cassava

Mgaza, 1982

Banana

*Ngima
porridge, maize dish served
with milk or tomato stew

van Steenberg, et. al., 1978

Isyo
maize and beans

Korea

None

Mo, 1983

Korea
Seoul - urban,
upper middle class

Eggs

Mo and Mo, 1982

Cereals
commercial and traditional

Rice
porridge or boiled

Park, and Mo., 1981

Lebanon

Laubina cereal
cereal: boiled wheat,
chickpeas, dry skin
milk, bone ash,
sucrose, citric acid
Vitamins A, D

Co, et. al., 1974

Porridge

Kanawati and McLaren, 1973

Lebanon (cont.)	<u>Fruit</u> mashed		
	Eggs		
Liberia	<u>Gruel</u> cassava, rice, pounded	_____	Mgaza, 1982 Notzon, 1983
Malawi	Bean juice	_____	Barnes - McConnell, 1983
	Corn porridge		
Malaysia	None	_____	Wilson, C., 1983
	Rice for everyone		Chen, 1978 McKay, and Wade, 1970
North Malaysia rural, rice farming area	<u>Cereals</u> commercial - given alone or in combination with home prepared foods	_____	Pathmanathan, 1975 Chen, 1978
North Malaysia	<u>Rice</u> Boiled until soft and then mashed or flour	_____	McKay and Wade, 1970 Pathmanathan, 1975 Chen, 1978 Brown, 1978 Jelliffe, 1962 Ashkenaz, undated
	Potatoes		
	<u>Tapioca</u> addition to the rice; also mashed	_____	Pathmanathan, 1975

North Malaysia (cont.)	<u>Fruits</u> ripe mashed banana grapes and orange juice if available	_____	Pathmanathan, 1975 Jelliffe, 1962 Jelliffe, 1983
Mexico	Mashed cooked eggs or beans & tortilla		Butler, 1983 Sanjur, et. al., 1970 Martinez, 1983
	<u>Atole</u> cornstarch or cornflour, water, sugar milk, cinnamon	_____	Butler, 1983 Millard, 1983
Central Mexico	Herb teas	_____	Sanjur, et. al., 1970
	Bananas	_____	Sanjur, et. al., 1970
Mexico	<u>Gruel</u> oatmeal, sugar, water	_____	Martinez, 1983
Mexico	<u>Agua de Arroz</u> rice water	_____	Martinez, 1983 Baer, 1983
	<u>Arroz con Leche</u> rice, milk, sugar	_____	Martinez, 1983
	Lime juice		
<u>Micronesia</u> <u>Kosrae</u>	Boiled mashed bread fruit	_____	Maretzki, A., 1983
	Mashed ripe banana		
Morrococo	Wheat bread dipped in mint tea	_____	Brown, 1978

Nepal

Sarbottam Pitho
gruel/slurry of soybean,
cereal grain, corn

Colgate, 1983
Krantz, et. al., in press

*Pap
millet, sorghum

Zerfas, 1983

None

Axinn, N., 1983

Bread

Cereal Grains
roasted, ground

Krantz, 1978

Pulses

Rice Bran

New Guinea
Chimbu area

Pit-Pit
Setaria palmaefolia, the white inner stem

Bailey and Whiteman, 1963

Sweet potato, baked

Taro

Banana

Beans

Leafy greens

<u>New Guinea Highlands</u>	Peanut butter	_____	Jelliffe and Maddocks, 1964
<u>New Guinea Papua</u>	<u>Ipomoea</u> sweet potato	_____	Jeffries, 1978
New Zealand	<u>Whole Milk Biscuit</u> compressed wafer confection made of whole milk solids	_____	Devadas, 1976
Nicaragua	None	_____	Martell, 1983 Ruiz, 1983
	* <u>Pap</u> flour and water corn starch and water	_____	Horner, et. al., 1982 Griffiths, 1983
Nigeria	* <u>Ogi Pap</u> corn, fermented	snails	Akinyele, 1983 International Children's Centre, 1982 MacLean, 1966 Morley, et. al., 1968 Hauk and Tabrah, 1963 Kazimi and Kazimi, 1979 Human Lactation Center, 1982 Eka, 1978 Morgan and Pellett, 1982

Nigeria
(cont.)

Ole
steamed bean
cake with palm
oil, tomato, peppers

Morley et. al., 1968
Morgan and Pellett, 1982

Cowpeas

Akinyele, 1983

Gari
cassava flour
fortified with soya or leaf protein

Eka, 1978

Baby cereals

Human Lactation Center, 1982
Kazimi and Kazimi, 1979

Sugar water

Human Lactation Center, 1982

Nigeria
Aro Omamma Tribe

Agidi
thick form of cooked cornstarch

Hauk and Tabrah, 1963

Yam Soup

Nigeria
Hausas

Kanu or Koko
thin carbohydrate gruel
from guinea corn,
maize, millet

Oshuhor, 1980

Nigeria
Igbo tribe

Plantain

Kazimi and Kazimi, 1979

Bread

Biscuits

Nigeria
Igbo tribe
(cont.)

Beans

Human Lactation Center, 1982

Rice

Kazimi and Kazimi, 1979

*Eko Pap
maize,

Naismith, 1973
Hauk and Tabrah, 1963
Eka, 1978
Kazimi and Kazimi, 1979
Morley et. al., 1968

Nigeria
Igbo tribe

*Cassava

Naismith, 1973
Kazimi and Kazimi, 1979

Yam, mashed

Naismith, 1973
Hauk and Tabrah, 1963
Kazimi and Kazimi, 1979
Human Lactation Center, 1982

Nigeria
Yoruba tribe

Yam

Longo, 1964
Kazimi and Kazimi, 1979

Cassava

Rice

Nigeria

Soy-ogi

Morgan and Pellet, 1982

Pakistan

Milk
skimmed buffalo or cow's
mixed with ghee, sugar, honey

Brown, 1978

Chaputti
dipped in family curry

Whey soy drink
mix

Anderson, et. al., 1981

Oil

Panama

*Chucula
thick drink from
maize flour, ground
cocoa beans, cane
juice and water

Jelliffe and Jelliffe, 1961a

*Purees
mashed, ripe banana;
yams, cassava or
malanga all
boiled and pureed

Jelliffe, and Jelliffe, 1961a

Peru

Panetela
gruel/slurry of bread

Marquis, 1983

Mashed potatoes

Kanashiro, 1983

Noodles (caldo)

Mashed bananas

Peru (cont.)	Quinoa food		
	Agua De Quinoa	Agua De Quinoa	Marquis, 1983
Philippines	<u>Tiki-tiki</u> rice bran extract	_____	Balderrama-Guzman and Tantangco, 1971 Cruz, et. al., 1970
	<u>Lugar</u> gruel	_____	Ocampo, 1983
	<u>Nutripak</u> finely-ground protein powder: small shrimp, fish, oil and rice	_____	Ropes, 1982 Guthrie, 1983 Lockwood, 1983 Griffiths, 1983
	<u>*Gruel/Linagaw</u> thin rice and water, sometimes with sugar	_____	Nurge, 1957 Guthrie, 1967 Human Lactation Center, 1982 Jelliffe, 1962 Griffiths, 1983 Gussler and Mock, in press
	Banana, mashed	_____	Nurge, 1957 Jelliffe, 1962
	Ampalaya juice	_____	Cruz, et. al., 1970
	Potatoes		Guthrie, 1967

Philippines (cont.)	<u>Liquids</u>	_____	Guthrie, 1967
	Sugar water; rice water; Camote tea, broths		Human Lactation Centre, 1982
	Egg or Egg Yolk	_____	Guthrie, 1967
	<u>Pablum</u> prepared rice product	_____	Guthrie, 1967
	<u>Porridge</u> corn	_____	Guthrie, 1967 Gussler and Mock, in press Popkin, 1983
Russia	Beans	_____	Romanova - Bosevka, 1969
	Bread		
	Tea		
	Peppers		
	Biscuits		
	Potatoes		
	<u>DAS</u> dried adapted supplement - cereals; dried whole milk; vegetable oil; sugar; butter; fat; water - soluble vitamins; and iron glycerophosphate	_____	Fateeva, et. al., 1979

St. Kitts	<u>Cereal</u> commercial baby cereal; cornmeal	_____	Human Lactation Center, 1982 Gussler and Mock, in press
	Sugared milk		
St. Vincent West Indies	<u>Cereals</u> arrowroot, sweetened cornmeal, commercial cereals	_____	Greiner and Latham, 1981 Antrobus, 1971
	<u>Bottled Milk</u> mixture of milk, cod liver oil, and chocolate powder		Greiner, and Latham, 1981
West Samoa	Immature coconuts	_____	Neave, 1969
	Paw paw		
	Polished rice		
Sardinia shepherd mountain village	Semolina cereal in broth	_____	Human Lactation Center, 1982
	Mashed potatoes		
	Spaghetti		
Saudia Arabia	<u>*Paste</u> mixture of almonds, butter, honey	_____	Brown, 1978
Senegal Wolofs region	<u>*Rouy/Roug</u> porridge - flour with maize and milk	_____	Senegal, Ministry of Public Health and Social Affaires, undated Berggren, 1981

<u>Senegal</u> Fouta region Ferlo region	<u>Couscous</u> with fresh milk	_____	Senegal Ministry of Public Health and Social Affaires, undated
Senegal	* <u>Bouilli</u> gruel of water and millet flour	_____	Berggren, 1981
Sierra Leone	* <u>Pap</u> rice sometimes with added milk	_____	Thomas and Abraham, 1978
	<u>Bennimix</u> parboiled rice, sesame, cowpeas, sugar & vitamins	_____	Thomas and Abraham, 1978 Zerfas, 1983
<u>Singapore</u> Chinese children	* <u>Starches</u> thin porridge of highly milled rice or corn flour or oatmeal	_____	Gillis, 1959
<u>Singapore</u> Indian children	* <u>Cereals</u> rice porridge, wheat, oatmeal, millet, corn flour	_____	Gillis, 1959
<u>Singapore</u> Malay children	* <u>Porridge</u> highly milled rice cooked with sugar, condensed milk or water	_____	Gillis, 1959

Signapore
Malay children
(cont.)

Breads, Biscuits, Rusks

Sri Lanka

Thriposha
blend of ICSM, corn and soya
beans, and fortified with
vitamins and minerals

Rice

*Rice Kanjee
rice, water, salt, pureed

*Kola Kanda
rice puree with green
vegetable leaves

*Mung-KiriBath
gruel of rice, green
gram flour, milk, water
sometimes with oil

Solomon
Islands

Imported baby foods

Sweet Potato, dried

Paw Paw

Banana

South Africa

Kupagani Biscuit
wheat, soy meal, sugar,
fat, glucose, milk powd
vitamins & minerals

_____ Drake, et. al., 1982
Brown, 1978
Griffiths, 1983
Berggren and Abeyakoon, 1981

_____ Soysa, 1979

_____ Berggren and Abeyakoon, 1981

_____ Berggren and Abeyakoon, 1981

_____ Berggren and Abeyakoon, 1981

_____ Jansen, 1979

_____ Devadas, 1976

<u>South Africa</u> Tsolo, Transkei	<u>Porridge</u> maize	_____	Stott, 1978
<u>South Africa</u> Johannesburg	<u>Porridge</u> corn flour and water	_____	Jelliffe, 1962
Spain	Bouillion	_____	Human Lactation Center, 1982
	Butter		
	Sugar		
	<u>None</u> given food eaten by adults- diluted stew added to bread, made into paste	_____	El-Shazali, 1972 Lockwood, 1982
Sudan	<u>Niama</u> suggested food: mixture - sorghum or wheat flour, milk, eggs, sugar, and dates	_____	El-Shazali, 1972
	<u>Isma</u> suggested food: mixture - flour dried or fresh meat, vegetable oil and salt made into paste	_____	El-Shazali, 1972
	<u>Porridge</u> from dura (sorghum)	_____	Lockwood, 1982
<u>Surinam</u> South America	<u>Porridge</u> rice, soft or rice flour cassava flour	_____	Abrahamsson, 1978 Vanstaveren et. al., 1971
	Bananas	_____	Vanstaveren, et. al., 1971

Surinam
South America
(cont.)

Enriched infant biscuits

Vanstaveren, et. al., 1971

Sweden

Beikost
generic name -
semi-solid and
solid baby food

Kohler, et. al., 1977

Milk - cereal

Vanstaveren, et. al., 1971
Abrahamsson, 1978

Enriched bread

Swaziland

Gruel
Maize

Mgaza, 1982

Syria

Semi-solid adult food

Brown, 1978

Taiwan

None

Chen, 1983

Rice porridge

Lee et. al., 1972

Taiwan

Baby food

Tsiang, 1983,
Lee et al., 1982

Tanganyika

Baobab Fruit
gruel - mixture of uncooked powder
or grounded seeds of fruit mixed
with water

Jelliffe, et. al., 1962

Tanganyika
Wahehedan
Wagago cla

*Uji

Moller, 1961

Tanganyika
Wahehedan
Wagago clan
(cont.)

Bone Marrow

Jelliffe, et. al., 1962

Pre-chewed meat

Soft fats

Bananas, mashed

Moller, 1961

Tanganyika
Nyamwezitribe

*Pap
raw millet flour mixed with water

Jelliffe, 1962

Tanzania

*Pap
mashed bananas

Howard, 1983
Ngaza, 1982

Melasc, soup

Ugi

Tea with milk

Gruel
maize; rice with sometimes milk
or ground nuts added; baobab

Mgaza, 1982

Thailand

Specially prepared
commercial product, consisting
of rice, high protein seeds,
(mung or soya) and sesame or
fish meal or ground nut

Inst. Nutr. Thailand, undated
Griffiths, 1983

Banana, mashed, ripe

Jelliffe, 1962

Thailand

Rice

Viseshakul, et. al., 1978
Tontisirin et. al., 1979

Thailand
(cont.)

Jelliffe, 1962
Notson, 1983

Trinidad

*Gruel/Pap
cornmeal, wheat flour

Young, A.L., 1983

Forex

Mashed bananas

Trinidad
Moslem Village

Roti

Human Lactation Center, 1982

Rice

Liquids

milk; lime bud tea

Eggs

Chopra and Gist, 1966

Trinidad
Negroes

Meat

Poultry

Trinidad
Negroes; East
Indian Children

Breads

Biscuits

Chopra and Gist, 1966

Orange Juice

South
Trinidad

*Gruels and Paps
sago, wheat flour,
arrowroot; sometimes
diluted dried milk

Young, A. L., 1983
Jelliffe, et. al., 1960
Chopra and Gist, 1966
Jelliffe, 1962

South Trinidad	<u>Root Vegetables</u> Boiled irish potatoes and yams	_____	Jelliffe, et. al., 1960
	Legumes	_____	Jelliffe, et. al., 196 Chopra and Gist, 1966
	Bush Teas	_____	Jelliffe, et. al., 1960
Trinidad; Guyana	<u>Semi-Solids:</u> potato, banana, plantain flour	_____	Gurney, 1971
	<u>Cereals</u> corn (maize) meal	_____	Gurney, 1971
Uganda	Beans/peas <u>Adult Food</u> mashed	_____ _____	Gurney, 1971 Mgaza, 1982
Uganda Acholi tribe	Beans	_____	Jelliffe, et. al., 1963
	Sesame		
	Maize		
	Millet		
Uganda Lugbara	<u>Porridge</u> peas, groundnuts, millet	_____ _____	Jelliffe et. al., 1962a
Uganda Karamojong tribe	<u>Porridge</u> sorghum	_____	Jelliffe, et. al., 1964

Uganda
Karanojong tribe
(cont.)

Soft meat

Beer

Uganda
West Nile
district

Peas

Ground Nuts

Millet

Upper Volta

Bouillie
cereal-based weaning food

USA

Commercial baby foods

Gerber

Heinz

Beechnut

Cereals

USA

Fruits

Meats

Vegetables

USA
Dade County, Florida
Cuban: Puerto Rican

Liquid from beans

USA
Houston, Texas
Chicano

Corn; softened tortilla

Jelliffe, et. al., 1964

Griffiths, 1983

Pregnancy
vitamin
supplements

Kolasa, 1983
Lackey, 1983, 1978
Ferris, et. al., 1978
Human Lactation Center, 1982

clay
laundry starch

Human Lactation Center, 1982

Venezuela
Amazon tribes

Sweet potatoes

Cassava

Bananas

Velez Boza and
Baumgartner, 1962

Venezuela
Amazon tribes
Caracas

Fruits and Fruit Juices

apple

orange

Venezuela
Caracas

Soups

Cereals

oats, barley, maize

Legumes

Meat

Fish

Eggs

Zaire

Beverage

sugared or sweetened

Cornmeal gruel

Fufu

manioc flour

Roots

Velez Boza and Gonzalez, 1964

Franklin et. al., 1981

Franklin et. al., 1981

Gussler and Mock, in press

Zaire
(cont.)

20 country
observations

Tubers

Cereals

*Gruel Or Pap
using local
staple

Pines, J., 1983

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I am conducting a small, exploratory study on foods targeted for weaning infant or pregnant women, that is foods that are eaten by or fed primarily to weaning infants or pregnant women. I am particularly interested in foods that the culture has targeted for these groups rather than foods that have been created in an intervention program. As an interested and experienced professional in this area I would appreciate your response to the questions below. A short description of the project is attached.

Please review the description, then complete the form and return it in the addressed and stamped envelope. Your cooperation is greatly appreciated. If you have any questions please feel free to call me at (919) 757-6917 or (919) 726-1709.

Sincerely,

Kathryn M. Kolasa, Ph.D., R.D.
associate professor and chairperson
Food Nutrition and Institution Management,
East Carolina University
Greenville, N.C. 27834 U.S.A.

1. _____ I am unaware of any foods targeted for weaning infants or pregnant women. Go to question 5.

2. _____ The targeted foods I am familiar with include: food(s) country age group eating the food) _____

3. _____ Information about these foods can be obtained from person/literature :

4. _____ I would be willing to discuss these foods with you on the telephone:

My number is: _____ A convenient time to call is: _____

5. _____ Other people who may have information include: (name/address/phone): _____

PLEASE RETURN TO DR. KATHRYN KOLASA, BOX 1919, ATLANTIC BEACH, NC 28512

FOODS FOR WEANING INFANTS & PREGNANT WOMEN

Dr. Kathryn Kolasa in a short term contract with U.S.A.I.D. is compiling the observations of nutritionists, health professionals, food scientists and social scientists have made of foods eaten specifically by weaning infants and pregnant women.

WHAT ARE THE FOODS THAT WEANING INFANTS AND PREGNANT WOMEN, PARTICULARLY IN DEVELOPING COUNTRIES ARE FED OR EAT?

What is the name of the food? What are the ingredients, shape, form, odor, texture, method of preparation, and acceptability of the food(s)? What is the nutritive value of the food? Specifically, what is the food like?

WHAT IS THE AVAILABILITY AND CONSUMPTION OF THESE FOODS FOR INFANTS AND PREGNANT WOMEN?

How widely is it consumed? In what quantities is it consumed? Specifically, what age groups eat the food? Is the food marketed in any way? What is the cost?

DOES THE CULTURAL GROUP IDENTIFY THE FOOD AS SPECIAL FOR WEANING INFANTS AND PREGNANT WOMEN?

Why don't other adults or older children commonly eat the food(s)? Are there specific beliefs related to the food's appropriateness for weaning infants or pregnant women? Does the cultural group have attitudes about its color, flavor, texture, shape, packaging?

WHERE DOES THE FOOD COME FROM?

Is it a traditional food that is prepared in the home or purchased from a local producer or vendor? Is it a commercial food? Is it a result of a foreign or local intervention program?

Nutrition programs for weaning infants and for pregnant women have met with varying degrees of success. A common problem is that foods designed for the weaning infant or pregnant woman are often consumed by others, diluting the nutritional benefit for the infant and woman. Other common threads may account for a food's success or failure to reach the targeted individuals. This study seeks to find any of those factors. Both nutritious and non nutritious foods are of interest.

The results will be used to assess the practicality of applying the food targeting approach in weaning and supplementation programs; to provide several specific food concepts that could be used in the development of a new program; and to determine if there are food concepts for weaning infants and pregnant women that warrant further study or pilot testing.

For more information contact: Dr. Kathryn Kolasa, Box 1919, Atlantic Beach, N.C. 28512 (919) 726-1709 or (919) 757-6917.

6/1/83

Alimentos para destetar los bebés y alimentos para las mujeres embarazadas

La Dra. Kathryn Kolasa está compilando en un contrato de corto tiempo con U.S. AID las observaciones hechas por nutricionistas, profesionales en salud, profesionales en ciencia química de alimentos y profesionales en las ciencias sociales; dichas observaciones se han hecho sobre los alimentos consumidos específicamente por los bebés y por las mujeres embarazadas.

CUALES SON LOS ALIMENTOS QUE COMEN LOS BEBES Y LAS MUJERES EMBARAZADAS, PARTICULARMENTE EN PAISES SUBDESARROLLADOS?

Cuál es el nombre del alimento? Cuáles son los ingredientes, forma, olor, textura, método de preparación y aceptabilidad del alimento (s)? Cuál es el valor nutritivo del alimento?

CUAL ES LA DISPONIBILIDAD Y EL CONSUMO DE ESOS ALIMENTOS POR LOS INFANTES Y LAS MUJERES EMBARAZADAS?

Qué tan ampliamente se consumen? En qué cantidad se consumen? Específicamente que grupos de edad los consumen? El alimento se vende de alguna manera? Cuál es el costo?

IDENTIFICA EL GRUPO ETNICO EL ALIMENTO COMO ESPECIAL PARA DESTETAR LOS INFANTES Y PARA MUJERES EMBARAZADAS?

Porque otros adultos o niños mayores no los comen normalmente? Hay creencias especiales sobre el uso apropiado para destetar los bebés y para las mujeres embarazadas? Tiene el grupo étnico creencias sobre su color, sabor, textura, forma y su empaque?

DE DONDE PROVIENE EL ALIMENTO?

Es el alimento un alimento tradicional que es preparado en la casa o es comprado a un empresario o vendedor local? Es un alimento comercial? Es el alimento el resultado de un programa de intervención local o extranjero?

Programas en nutrición para destetar bebés y para mujeres embarazadas han tenido éxito en diferentes grados. Un problema muy frecuente es que los alimentos designados para destetar los bebés o para las mujeres embarazadas son también consumidos por otras personas y entonces disminuyendo así el beneficio nutritivo para el bebé y la mujer. Otros factores pueden explicar el éxito o el fracaso de un alimento en alcanzar los individuos designados. Este estudio trata de buscar algunos de esos factores. Ambos, los alimentos nutritivos y no nutritivos son de interés.

Los resultados serán utilizados para evaluar la factibilidad de usar un acercamiento de alimentos designados para programas de destete y suplementación; para proveer algunos conceptos específicos sobre alimentos que pueden ser utilizados en el proceso de desarrollar un nuevo programa; y para determinar si hay conceptos de alimentos para destetar infantes y para mujeres embarazadas que justifiquen más estudios o una "prueba piloto".

Para más información comuníquese: Dr. Kathryn Kolasa, Box 1919, Atlantic Beach, N.C. 28512 (919) 726-1709 or (919) 757-6917.

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Yo estoy haciendo un pequeño estudio investigando acerca de los alimentos designados para destetar infantes o para las mujeres embarazadas, mejor dicho alimentos que son consumidos por o son dados a infantes detetados o a mujeres embarazadas. Me interesan específicamente alimentos que el grupo étnico ha desginado para esos grupos mas bién que alimentos creados por un programa de intervención. Como interesado y experto profesional en esta area yo apreciaría su respuesta a las preguntas formuladas a con_ tinuación. Adjunto una pequeña descripción del programa.

Por favor, revise la descripción, luego complete la forma y retornela en el sobre in_ cluido. Su cooperación será altamente apreciada.

Sinceramente,

Kathryn M. Kolasa, Ph.D., R.D.
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East Carolina University
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1. _____ Yo no conosco ningun alimento designado para destetar los infantes o para mujeres embarazadas. Siga a la pregunta 5.

 2. _____ Los alimentos desginados con los que yo estoy familiarizado incluyen:
(alimento (s)/pais/grupo de edad que consumen el alimento).

 3. _____ Información sobre esos alimentos puede obtenerse a través de (persona/litera_ tura).

 4. Otras personas que pueden tener mas información son: (nombre/dirección, teléfono):

Por favor, retorne este formato a: Dra. Kathryn Kolasa, Box 1919, Atlantic Beach, NC 28512

Nutritional Concerns of Pica Practice

The ingestion of clay and laundry starch among pregnant women raises some nutrition concerns.

Medical workups have not been performed in most pica surveys although hemoglobin and hematocrit levels have sometimes been obtained. It is feared that the pica substance if used as an appetite depressant may displace other foods thus leading to calorie and/or nutrient malnourishment. The pica substance (particularly starch) may provide calories and result in undesirable weight gain if total calories are not compensated or in areas where the calories are needed, these are not nutrient dense calories. The ingested substance (especially clays) may contain toxic substances or quantities of normal nutrients not tolerated by individuals in certain disease states. And last, the pica substance may have a cation exchange capacity, thus absorption of essential nutrients may be reduced. Other pica complications reported in medical literature pose a fifth concern, intestinal blockage or perforation from a pica substance. For these reasons, then, the actual practice of eating clay or starch is not promoted by the modern medical community.

CLAY. Ill effects of prolonged eating of clay or dirt were reported in the early 1900's and coined cachexia africana. This was later recognized as a potassium deficiency. Women in tropical regions seemed more predisposed than women in other climates to this practice. And, poor nutrition was often a concomitant problem.

Incidence of clay and dirt eating is reported for the southern U.S. and studies have focused mainly upon the black population. Suggested origins

for the practice include adoption by acculturation from American Indians and migration of the practice from Africa with slave trade. Poverty and poor nutrition are often given as factors that favored adoption and perpetuation in the U.S. Tradition is the reason West African women studying in the U.S. have given for eating clay - "almost like candy."

Clays have been analyzed for both mineral content and cation binding capacities. Potassium content varies greatly with type of clay evaluated. Values of 0.07-0.56 mEq/100g and 100 mEq/100g have been reported (Vermeer and Frate, 1979 and Gelfand et al., 1975). Hunter's analyses of 12 samples for 11 elements provided the following ranges on a microgram per gram sample basis: phosphorus 59-755; potassium 2025-33,232; calcium 810-9009; magnesium 1257-8081; copper 9-34; zinc 25-77; manganese 10-138; iron 3697-38,817; nickel 0-165; cadmium 0-8 and chromium 34-168. Eleven elements were detected in samples of Iranian clay with silicon, calcium, aluminum being the 3 present in greatest quantities (Halsted, 1968). The variability of values is thus wide depending upon the sample analyzed.

Hunter (1973) suggested that clay may have been a source of calcium for African societies who were lactose intolerant. In a simulated digestion analyses, median rates of absorption for nutrients were as follows: copper, 46 percent; calcium, 38 percent; zinc, 32 percent; magnesium, 8 percent; phosphorus, 5 percent; potassium, 0.7 percent and iron, 0.5 percent. Another theory was that clay eating was adopted as slavery evasion tactic since slave traders rejected clay eating natives (Halsted, 1968). While that may explain the limited clay eating of males, pica practice for females and children had much earlier origins than slave trading.