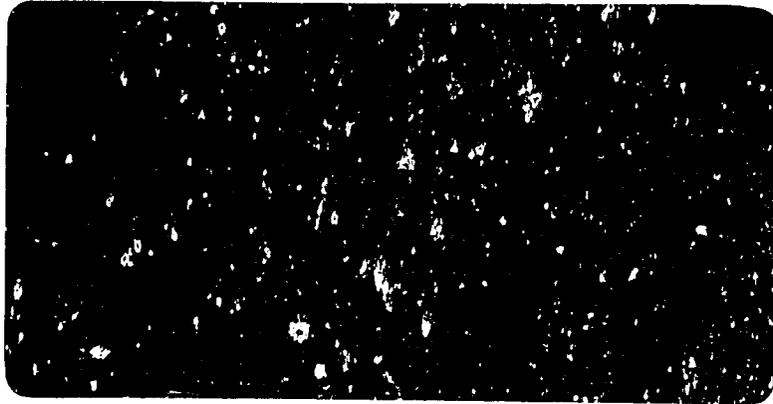


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**AGRICULTURAL DEVELOPMENT SUPPORT II
HAITI**



**University of Arkansas,
Fayetteville**

NUTRITION AS A PART OF FARMING SYSTEMS
RESEARCH:
FOOD CONSUMPTION PROFILE OF
HAUT CAP ROUGE, HAITI

Report #48

ADS-II
Agricultural Development Support II Project

Nutrition as a Part of Farming Systems Research:
Food Consumption Profile
of
Haut Cap Rouge, Haiti

By

Cynthia D. Bertelsen

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REPORT ON NUTRITION STUDY OF HAUT CAP ROUGE AREA, HAITI

Rationale for Nutrition Studies in FSR Projects

As Longhurst (1985) states, "It is very obvious that a major aim of agricultural policy and development in developing countries should be to increase consumption of food and reduce malnutrition." Unfortunately, nutrition is not usually integrated into FSR projects, even though there are attempts to increase production of various crops in hopes of increasing cash income and thereby improving the nutritional status of the rural farm family.

It is important to examine the effects that increasing these crops will have on the nutritional status of the farm family. Cash cropping is often associated with a reversal in nutritional status (DeWalt, 1982; Longhurst, 1985). It is also important to understand the many intricate nutritional and health interrelationships that occur when changes are made in food availability. A good comprehension of the following factors is vitally important in determining whether or not certain changes suggested by FSR projects will achieve the implied goal of improving the farm family's nutritional and health status: seasonal fluctuations in food availability, environmental stresses (i.e., climate and work load), illnesses and parasitic infections, inadequate use of resources, food preferences, food preparation methods (poor methods can affect nutrient composition), baseline nutritional status, food habits within the family structure (i.e., food distribution within the family), cultural food restrictions imposed on certain age groups (i.e., pregnant women, young children, older people, etc.), and folk medicine beliefs. For example, overemphasis on certain foods, and the consequent dietary deficiencies that can result, is a strong characteristic of peasant societies' food consumption patterns. At this point in time, in contrast to the previous emphasis on protein foods in most nutrition-related development projects (in the 1950's and 1960's), the production of basic staple grains (or calories) has been given priority in many present-day development projects. There is a real danger in this, too, since such a priority will "simply provide farmers with a 'more of the same' diet," and will overlook any other deficiencies that might exist (Tripp, 1983).

Food Consumption Studies in FSR Projects

Many agricultural development programs have not been

successful in improving the nutritional status of small farm families because "the circumstances of small farmers have not been well understood" (Tripp, 1983). In recent years, there have been several publications which attempt to define the role of nutrition in the day-to-day existence of the small farmer (FAO, 1982; Tripp, 1982; Viteria and Trun, 1975; Heywood, 1974; Mason, 1982; Longhurst, 1985; Mason et al., 1985; FAO, 1984). All in all, the inclusion of nutritional factors is not a common procedure. Furthermore, when such projects do include nutritional concerns, there is no emphasis on food preparation methods nor on cultural aspects such as food avoidances and other belief systems. Such factors also play an important and often major role in the food consumption patterns of certain family members. Also absent is any emphasis on the woman's role as the chief determining factor of the family's ultimate nutritional status (all other factors considered): it is she who selects the food available, decides what to prepare, and prepares the food. Cooking utensils, kitchen set-up, the fuel source, the wife's health, the competing duties (other than cooking) that demand the woman's time, the number of children in the family who have to be cared for, can all be extremely significant in determining the family's nutritional status, in addition to the factors listed in the previous section.

Including a nutrition component in FSR projects can therefore accomplish two major goals: 1) assure that technological change would benefit the farm family nutritionally and 2) pinpoint technological alternatives that would be in keeping with food consumption patterns and preferences (Tripp, 1982). In order for FSR nutrition studies to be truly effective, baseline nutrition information should be collected before a project starts.

Focus of the Present Study

The present study was designed and developed in April of 1987 as an adjunct to the FSR work being done in Jacmel, Haiti by the ADS-II project (sponsored by USAID/University of Arkansas/Winrock International). It was decided to focus on the effects of seasonal fluctuations on food availability on the nutritional status of a selected subsample of 13 farm families in the Haut Cap Rouge region near Jacmel. The study was to examine the following:

1. The relationship between seasonal differences in food intake and body size (especially the effects on the growth of children).
2. Correlations between caloric intake, body size, and activity level.

3. The quantity of food ideally available to the whole family and that actually available to the family, based upon individual needs (determined by age, body size and activity level.)

4. Methods of food preparation and storage methods, and their potential effects upon the nutritional value of the food prepared and stored.

5. Food that is always available and food that is purchased as a result of money gained from ANS-II project efforts; and whether nutritional status is changed in any way because of that extra income.

6. The size of land holdings, income, and the relationship of these to the nutritional status of the family.

7. Sanitation practices in the kitchen, illnesses, and the effects of these on overall nutritional status.

8. The number of times food is eaten per day and the implications of this for the nutritional status of family members (especially children).

9. What people were actually eating over a period of time and how the seasonal changes affected food consumption.

Methodology

I. Questionnaires:

The following questionnaires were designed (see Appendix A for examples) and translated into Haitian Creole with the help of Madame Jacqueline Jean-Baptiste:

a. General Household Information (baseline data collected once on each family).

b. Food Frequency Checklist (collected every two weeks after the initial baseline data was collected) (Mullen, 1984).

c. Two-Day Food Recall (collected about every three months during planting or harvesting season).

d. Anthropometric Data (ideally to be collected during the same 2-day time period as the Two-Day Food Recall data).

e. Kitchen Set-Up Information (included information on where and how cooking was done, where and how food was stored if at all, and where dish-washing, etc. was done).

II. Personnel:

One female nutritionist (Master's level) and one female country national were in charge of gathering the necessary data. At times, a female Peace Corps volunteer stationed in the Haut Cap Rouge area helped with surveying the kitchen set-up situation and was going to help with the anthropometric measurement. An on-site female agricultural economist (Master's level) also helped with daily coordination and supervision of the work of the country national. Because the work was done with the wives of the farmers, it was deemed imperative that women survey workers be involved rather than males, since most males (especially in a culture where food preparation was clearly allocated to the females in the family) would not be as observant or familiar with the terminology of cooking and the kitchen as would be females. Furthermore, the farmers' wives would likely be more comfortable with female interviewers.

III. Equipment

The following equipment was necessary for the culmination of the study: four-wheel drive vehicle, paper for questionnaires, Salter spring scale for weighing infants, Lang skinfold calipers, arm circumference tapes, bathroom scale for weighing adults (not ideal but most feasible given time and financial constraints), measuring board for measuring length of infants and young children, measuring tapes for measuring heights of older children and adults, marmites and other measuring devices common to daily household measuring, scale for weighing food samples, computer for data analysis.

Methodology for Measurement of Food Consumption (2-Day Recalls)

In order to approximate the measurements used by the housewife as she prepared the daily meals, the ubiquitous white enamel cup of the rural Haitian kitchen was taken as the standard. This cup holds slightly more than the standard American 1-cup measure. Foods were measured Haitian-style (heaped rather than leveled-off as American cooks do) and the amounts of food contained in the cup were weighed and used as standards for the analysis of the nutritional content of the 2-day recalls. Three weight trials were recorded and averaged to determine standard weights. Other foods which did not lend themselves to being measured in this way were weighed (a total of three weights were taken and then averaged) and these weights were used as the standard weights for those foods. Plantains, sweet potatoes, and breadfruits are examples of the types of foods measured by unit rather than by cup. Data was analyzed by means of food composition data entered into Lotus 123. Food composition tables for Haiti were used as the basis for the analysis (Dominique, 1965).

Methodology for Anthropometric Measurements: Anthropometric measurements (skinfold thickness, arm circumference, height and weight or length and weight) were to be taken following the methodology outline by Jelliffe (1966).*

*Note: The anthropometric measuring equipment was never received and no anthropometric data was collected due to this and for other reasons which will be discussed in the following section.

RESULTS AND DISCUSSION

(Note: The results of this study were severely affected by the deteriorating political situation in Haiti at the time that the study was getting underway. Therefore, this discussion of the results will focus chiefly on what data was actually gathered before the political situation declined to the point that field work was impossible. The study was stopped unofficially in July 1987 and officially at the beginning of September 1987, when the chief investigator left the country. In addition, the study suffered from a lack of baseline data dating to the beginning of the ADS-II project. Nevertheless, the results may still be viewed as descriptive.)

Subjects:

The total number of subjects was 76, which included 26 adults and 50 children. Thirty-six (36) children were under the age of fourteen; 15 of these were under the age of 5 years and 4 of those 15 were 18 months of age or younger. In other words, nearly 50% of the sample consisted of children fourteen years of age or younger, which is approximately the age distribution that one would find in an average lesser developed country (LDC) population group.

Pregnancy incidence was 2; 5 mothers were still breastfeeding. It was difficult to determine just how many children were breastfeeding if they were older than a year. The local enumerators were derisive when a mother said she was still breastfeeding a two-year old. From this example, it would seem that the respondents gave the answer that they thought the interviewers wanted to hear.

Nearly every family had experience with young children dying and there appeared to be three critical stages if a pregnancy resulted in a live birth: 1) the first stage averaged 5.5 days when death occurred, 2) the second stage averaged 6.4 months, and 3) the third stage averaged 5.35 years. Causes of death were

usually listed as diarrhea or unspecified fever. In general, most families could expect to have approximately 2 child deaths ; the number of live births ranged from 2-13, with 6 or 7 live births being average.

The number of surviving children increased the number of mouths each farm family had to feed, but there was also a custom among many of the families to feed even more people than are found in their immediate families. Most families had one or more people eat with them, in addition to the usual family members, at least once and often twice a day. Usually these extra mouths belong to young men living in the immediate area and who are not (apparently) related to the families.

KITCHEN LAYOUT AND FOOD STORAGE:

The Haitian peasant kitchen, like its counterpart in so many other LDCs, is located in a separate thatched structure away from the living quarters of the family. This structure is loosely made, usually of sticks roughly tied together and roofed with thatching. Ventilation is necessary, for the primary cooking fuel is either charcoal or wood, and the smoke escapes through the cracks in the walls and the thatching. Cooking is done on the ground. Three stones, evenly placed in a triangle about 6 inches away from each other, form the stove. Pots rest on these stones and the cook squats nearby, her ingredients lined up on banana leaves placed on the ground near the "stove".

Information on kitchen utensils was available from 8 of the 13 families. Every family had at least one large pot and most had more than one small pot for basic cooking. Wooden spoons, a knife, a ladle, and a small mortar and pestle complete the list of cooking equipment. A large mortar and pestle or "pilon" for pounding corn and sorghum was usually prominent in the yard or "lakou".

Food (primarily beans and corn from harvests) was stored in woven sacks. These sacks most frequently are stored on the boards that form the ceiling in the sleeping rooms of the families. Because food is not bought or prepared in large quantities, storage is not a major concern to the Haitian peasant wife, but if some food is left after a meal it is stored in a plastic or metal container. Just inside the door of the thatched kitchen hut there is usually a shelf located at an arm's reach, and it is there that leftovers are stored, along with the batterie de cuisine.

Dish-washing was done in the yard; many families possessed cisterns and the majority of their water supply came from this source. Other families followed the traditional pattern of peasants and allocated the task of water-fetching to the women or

children of the family. Fetching water usually required anywhere from 1 to 4 hours of work per day.

FOOD PREPARATION PATTERNS:

The families in the study tended to prepare their food in similar ways, using the same recipes and the same methods of cooking. Because of the nature of the kitchen set-up, boiling was the universal method of cooking, although some families reported that they roasted some foods over fire (chiefly cob corn and some cuts of meat). Meats are generally marinated in sour orange juice or lime juice with garlic and herbs before roasting and stewing. The acids from the juices aid in "digesting" the tough protein fibers and in possibly eliminating harmful bacteria.

Corn and other grains are boiled in water, along with flavoring agents like garlic or onion. Beans are boiled as well. Tubers are also boiled, without flavorings added. In the case of grains, boiled beans are often added at the beginning of the cooking period.

These bland grains and tubers are enlivened by sauces, usually made with dried salted fish, tomatoes, herbs, Maggi cubes, and garlic. Beef or other meats are often substituted for fish when available. Fats are used when available, and especially pork fat, as seasoning agents. When fats are not available, grated coconut is added to serve as a flavoring agent and a fat source.

In a society where the chief source of fuel is scarce wood or expensive charcoal, these cooking methods are inefficient and wasteful (Eckholm, 1975). Beans especially require a long cooking period (approximately 2 hours under optimum conditions); storage of beans in humid circumstances can result in beans having a harder shell and hence requiring an even longer cooking time (Molina, 1976). The implications are especially serious for a country like Haiti where severe fuel shortages may mean a shift to more quickly cooked tubers and a consequent decline in nutritional status. Provision of cooking fuel, chiefly firewood, is also a time-consuming activity, and as its availability becomes even scarcer, more time will be required to secure it. If gathering cooking fuel is the mother's job within a certain family unit, more of her time will be required to find fuel. Therefore, less time will be available for cooking. Less cooking will be done because of less fuel and family nutrition will suffer. Likewise, if wood is unavailable for cooking and only charcoal is available at \$6.00 per bag (1987 price), less cooking will be done since the average family using charcoal goes through approximately one bag or more of charcoal per week.

Food Consumption Patterns (General):

Based on the results of the food frequency questionnaire and the 2-day (48 hour) food recalls, the following core foods were found to be fairly representative of the daily intake of the families in Haut Cap Rouge:

<u>GRAINS</u>	<u>TUBERS</u>	<u>LEGUMES</u>	<u>MEATS</u>	<u>FATS</u>
corn rice	plantains igname	black beans red beans	beef dried fish	oil coco-- nut
sorghum farin frans* bread akassan+	sweet potato breadfruit**	mixed beans	sardines salted fish	
<u>VEGETABLES</u>	<u>FRUITS</u>	<u>SWEETS</u>	<u>BEVERAGES</u>	
pumpkin carrot watercress	sweet orange lime	red sugar	coffee clairin (?)++	

*Farin frans is a pudding made with white flour, water, sugar, and cinnamon.

**Although breadfruit is not a tuber, it is included under "tubers" because its role in the Haitian diet is similar to that of tubers.

+Akassan is a cornmeal mush that is boiled until thick. It is often sweetened and wrapped in banana leaves for sale on market days.

++Clairin is a raw, clear rum which has been reported as a morning "pick-me-up" drunk by rural Haitian farmers [Beghin (1970) and Comhaire-Sylvan (1952)]. No one reported its use in this study.

Most of the families reported that they ate three times a day; some families said two times. In practice, however, in the food recalls many of the families did not report any food being eaten after the main meal of the day. This has potentially serious implications for young children who, because of smaller stomach capacity, should ideally eat 4-5 times per day in order to take in an adequate diet (Suitor, 1984). Nearly all subjects reported the consumption of "fridodoy" or snacks, especially during mango season. The first meal of the day usually consists of coffee, boiled plantains or bread, and large amounts of sugar. Milk was not consumed as a general rule, but when its use was reported, it nearly always was consumed at the first meal of the day. The next meal could be the main meal or a light lunch, depending upon whether the wife was at home that day, whether it was a market day, and whether there was a great deal of work

being done in the fields.

The main meal usually consisted of a boiled grain, usually served with beans and boiled tubers or with a fish-based sauce. Vegetables were also cooked with meat, if available, and served with the grain. Coconut was used widely, both for flavor and for the fat content. Vegetable oil usage was reported to be approximately 1/2 cup per family per day. This pattern was repeated consistently among all of the families in the study. Avocadoes were not reported at this period of the study, but along with coconut, avocadoes play a vital role in providing much needed fats in peasant diets (May, 1973; Sebrell, 1959).

The last meal of the day, if reported on the recall, was usually fruit, sugar, a flour-based pudding (farin frans) seasoned with lime, or herring with vegetables.

Meals were prepared in most cases by the wife, with the help of her daughter(s). Most respondents stated that the preparation of the main meal cost them anywhere from one (1) hour to four (4) hours of labor. Most reported that 3 hours was the amount of time needed to fix this meal. The mother's role as a marketing agent for the family's produce is a crucial factor in the overall nutritional picture. How her time is allocated is another important factor, and on market days the mother usually will boil some tubers, cornmeal, or rice, and leave this food for the children to eat until she gets home. Aside from the inherent nutritional deficiencies of this sort of meal, there are also detrimental microbiological effects (Hobbs, 1986). For example, cooked rice and cooked cornmeal, when left to sit in hot humid conditions, foster the growth of *Bacillus cereus*, a causative factor in food poisoning (Beuchat, 1978).

Once the main patterns of food consumption were determined, an attempt was made to determine which foods family members did not like to eat, even if these foods were available. Because the father's food habits are generally strongly associated with those of his children ("Similarity...", 1987), the wife was asked what foods her husband wouldn't eat even if the foods were available. The results were somewhat surprising, because the foods listed as being unacceptable are those foods generally thought of as being staples in the Haitian peasant's diet: 4 fathers were reported as disliking plantains (banane vert), 6 disliked sweet potatoes (patates), 5 disliked cornmeal (mais moulu), 1 disliked sorghum (petitmil), 3 disliked breadfruit (veritable), and 1 disliked chicken. In three families there was a correspondence between what the mother said the children disliked and what the father disliked. There was little correspondence between the dislikes of the mother and the other family members.

Even though some foods were disliked, each family had a garden of a sorts and usually grew the disliked foods, as well as

others and several varieties of fruits. The garden was generally an informal arrangement planted near the house and usually cared for by a number of people, usually the mother, but only on a sporadic schedule. No concrete labor information was gathered on this question, though it appeared that the average time worked per week in the garden was never more than 1 or 2 hours, according to the respondents.

These gardens, it is clear, provided a large number of accessory and principal foods for the families. The following foods were found in nearly all the families' plots: mirliton, cabbage, yam, green leaves (liane panier usually), hot peppers, pumpkin squash, breadfruit, bananas, oranges, limes, grapefruit, avocado, plantain, corosol, grenadine, and coconut. Foods not commonly found were tomatoes, sweet or bell peppers, herbs (parsley, thyme, watercress), lettuce, papaya, and carrots. It was assumed that the usual field crops of corn and beans were cultivated elsewhere.

Many researchers have stated that corn and beans form the major core of the Haitian peasant's diet and furthermore have assumed that these foods are eaten everyday (Beghin, 1970; Comhaire-Sylvain, 1952). Seasonal variations do exist and so food frequency lists were made up (see Appendix A for an example), in order to examine approximately how many times per week farmers and their families ate certain foods. Because these lists were to be examined every two weeks, it was felt that this tool would indicate any gradual tapering off of consumption of certain foods throughout the seasons. The results of the four trials of food frequency lists that were undertaken are shown in Appendix B. Table 1 is a summary of the number of times certain foods were eaten per week by all the families involved with the study. Over time, food frequency lists can point out changes in frequency that occur, due to decreased availability, increased cost, or increased availability of more preferred foods. Certain general observations can be made concerning the food frequency lists: 1) the number of mangos declined dramatically in the second two week period that frequencies were obtained (and no other major vitamin A source was substituted), 2) use of sweet potatoes and plantains increased in the second two week period, 3) intake of corn increased in the second two weeks of the period, and 4) there was also an increase in the use of fresh pork, fresh beef, and salted fish in the second two weeks. There seemed to be more food available during the second two week series of frequency lists. This period coincided with post-harvest activities. Perhaps greater availability of food and disposable income were responsible for this apparent difference.

NUTRIENT INTAKES:

[The following discussion is based on the 2-day food recalls conducted in June of 1987. As with any interpretation of data

Table 1: Food Frequencies - 4 Week Periods

		Week			
		1	2	3	4
DAIRY					
	MILK	29	12	24	15
GRAINS					
	EGGS	6	4	14	5
	CORN	8	31	62	58
	RICE	50	40	45	46
	SORGHUM	12	6		
	FLOUR	28	15	22	19
	RED BEANS	45	46	51	31
	BLACK BEANS	5	8	17	16
	WHITE BEANS	1	0	0	0
	POIS CHOUS	2	1	5	5
	POIS INCONNU	10	12	21	9
	MIXED BEANS	24	25	29	22
	OTHER BEANS	1	0	0	0
STARCHES	AND TUBERS				
	CASSAVA BREAD	3	0	6	4
	MANIOC	1	0	0	0
	GREEN BANANA	39	35	51	48
	YAM	14	17	17	17
	SWEET POTATO	30	33	52	46
	MALANGA	7	0	10	5
	BREAD FRUIT	25	29	30	21
MEATS					
	CHICKEN	2	6	6	3
	FISH	2	1	0	0
	FISKETTE	8	16	9	12
	SARDINE	10	3	8	4
	SALTED FISH	1	0	44	30
	BEEF	24	24	25	18
	GOAT	1	6	5	3
	PORK	2	0	12	3
VITAMIN A					
	PUMPKIN	11	10	17	1
	CARROT	1	10	9	7
	MANGO	3584	2317	0	0
	SAPODILLA	0	0	0	6
NUTS					
	PEANUT	1	1	0	0
	PEANUT BUTTER	5	0	3	0
	BREAD FRUIT SEED	7	1	0	1

Table 1 (Cont)

VEGETABLES					
	GREEN LEAFY VEG	39	24	24	28
	CHAYOTE	16	14	9	6
	WATERCRESS	15	11	15	9
	TOMATO	6	13	0	0
CITRUS					
	PINEAPPLE	1	0	0	0
	JACMEL ORANGE	1	1	32	25
	SWEET ORANGE	0	0	6	23
	SOUR ORANGE	29	30	47	12
	LIME	19	25	17	8
	GRAPEFRUIT	1	0	13	2
	SOURSOP	8	7	5	0
ENERGY 1					
	BREAD	54	42	75	69
	RED SUGAR	84	76	138	151
	WHITE SUGAR	1	0	0	0
	AKAMIL	0	0	1	0
	CORN MEAL MUSH	13	7	18	25
	FRITTERS	15	10	9	6
	ACCRA	2	0	0	0
BEVERAGE					
	TEA	16	24	14	16
	COFFEE	86	73	102	132
	COCOA	17	12	0	16
ENERGY 2					
	OIL	203	217	210	217
	CANNED BUTTER	55	55	28	16
	STICK BUTTER	0	0	0	9
	VEGETABLE SHORTENING	17	9	3	0
	LARD	3	0	10	12
	COCONUT	39	29	55	53

from recalls based on retroactive subject participation, it must be remembered that at best all figures can only be approximations of reality. Only when there is daily weighing of food and direct observation of consumption can there be a high degree of accuracy. Such methods require tremendous outlays of personnel, money, and time. The 24-hour recall is a concise, rapid, and inexpensive approximation of food intake and is endorsed as such by most authorities (Buss, 1986; Chavez, 1977; Jelliffe, 1969; Karvetti, 1985; Miller, 1977; Solomons, 1983).]

Approximate nutrient intake information is available for a consecutive 2 day period in June of 1987. This data was collected at the height of mango season; therefore, vitamin A, vitamin C, and caloric intakes reflect the tremendous numbers of mangos reported as being eaten by the respondents.

TABLE 2:

<u>CALORIC INTAKE OF 13 FAMILIES IN HAUT CAP ROUGE</u>					
<u>FAMILY</u>	<u>DAY</u>	<u># PEOPLE</u>	<u># TOTAL CALORIES</u>	<u># CALORIES /PERSON*</u>	<u># CALORIES/ PERSON (w/o MANGOES)</u>
1	1	6	14,450	2,416	1,877
	2	4	14,679	3,669	2,873
2	1	7	10,676	1,525	NA
	2	7	12,395	1,770	1,467
3	1	9	16,735	1,859	1,249
	2	9	16,718	1,857	1,248
4	1	9	25,753	2,861	2,350
	2	11	14,362	1,305	NA
5	1	4	22,947	5,736	4,719
	2	3	10,155	3,385	NA
6	1	9	10,232	1,137	566
	2	8	11,766	1,470	NA
7	1	6	13,591	2,265	1,870
	2	6	7,423	1,237	1,001
8	1	6	18,761	3,126	2,949
	2	6	26,064	4,344	3,636
9	1	14	31,726	2,266	2,190
	2	12	32,127	2,677	2,087
10	1	9	18,528	2,058	1,763
	2	9	14,421	1,602	NA
11	1	12	19,213	1,601	1,202
	2	11	21,492	1,953	1,455
12	1	8	16,011	2,001	NA
	2	8	14,780	1,847	NA
13	1	7	27,938	3,991	3,763
	2	6	21,214	3,535	2,798
Totals		207	464,157	63,493	41,163
Averages		8	17,852	2,442	2,166

From Table 2, it is apparent that the average family of 8 people had 17,852 calories at its disposal, with a total of 2,442 calories available per person during mango season. If the mangoes are not included in the calculations of total calories, each person in this hypothetical family received a total of 2,166 calories available to him or her, which was a reduction of 276 total calories from the total with mangoes.

As the following figures from the FAO requirements show, 2,166 calories meet the caloric requirements for children aged 4-6 years old and for adult women who are not pregnant or breastfeeding. The caloric needs of adult males are not met by this caloric level.

REQUIREMENTS PER DAY (FROM FAO 1973):

	<u>Child, 4-6 years</u>	<u>Adult male</u>	<u>Adult female</u>
Calories	1,750	2,900	2,050
Protein	33 grams	60 grams	45 grams
Calcium	450 mg	450 mg	450 mg
Iron	10 mg	9 mg	28 mg
Niacin	11.6 mg	19.1 mg	13.5 mg

Looking at the caloric intake each of the individual 13 families, it can be determined that even with the caloric contribution of mangoes there was a caloric deficit in 15% of the families for children aged 4-6 years, in 69% of the families for adults males, and in 53% of the families for adult non-pregnant or non-lactating women. These figures are assuming an equal distribution of calories throughout all the age groups within the families; this is not likely to be the situation in reality. According to Beghin (1970) and Comhaire-Sylvain (1952), the adult working male gets the chief portion of the food, and the women and especially the children suffer from nutritional deprivation.

Although the current thinking in nutrition science is that total calories are most important in determining the overall strength of the diet, protein is still a vitally important factor in the diet as well. Nowhere is this importance more apparent than in the diets of young children and pregnant and nursing women. When calories are deficient, any protein available will be utilized for energy, rather than for growth and tissue repair (National Research Council, 1980).

In Haut Cap Rouge, protein intake was variable among the study families. Ranging from 16 grams per day to 99 grams per

day per person, the average intake was 49 grams per day per person, when mangoes were included in the sample. Mangoes contain, along with vitamin C and vitamin A, enough protein to affect marginal individual protein intakes. With one mango, sliced, containing 1.2 grams of protein, protein intake can be increased greatly. A person who eats 4 mangoes per day, as some children did in this study, can increase his or her baseline protein intake by nearly 5 grams. This protein, however, is low quality protein and, to be well utilized, it must be eaten with proteins of higher quality.

For example, FAO recommends that a 3 year old child have 30 grams of protein per day; 5 grams from mangoes is 1/6 of the daily requirement and that can be a significant factor in a marginal diet. Protein intake from mangoes ranged from .5 grams per person to as much as 7 grams per person. It is possible that mango intake was higher, according to the results of the food frequency questionnaires. On the other hand, such intake may be exaggerated, because the respondents' ability to count was questionable.

Despite the protein contributed by mangoes, in 30% of the families the average protein intake per person was inadequate for children in the 4-6 year old group. In 62% of the families, adult males were not getting enough protein and in 54% of the families, adult females lacked enough protein in their diets on the days of the food recalls. Caution must be exercised in interpreting this information, since it is the overall diet that is important and that subjects can have inadequate intakes on some days and not on others. Also of special importance is the quality of the protein in the diet; for example if most of the protein is obtained from plant sources--as is the case for the majority of peasants' diets in Haiti (Beghin, 1970)--the protein quality of the diet is considered to be low. The more protein that is eaten from animal sources (meats, eggs, dairy products, etc.), the higher the protein quality of the diet and therefore the protein requirement can be more easily met with a lower overall intake of protein that is of high quality. The poorer the quality of the protein in the diet (i.e., incomplete protein, which refers to a lack of certain essential amino acids in certain foods), the more crucial it is that the amount of protein eaten approach the figures stated in dietary tables. Even though the dietary recommendations set by FAO and other agencies are meant to serve only as guidelines for population groups, and not as strict dietary regulations for individuals, these recommendations do serve as yardsticks by which we can make inferences about human diets.

The picture that emerges from these figures is that the families in Haut Cap Rouge appeared to have marginal diets in terms of calories and protein at the time that the food recalls were done. The major sources of these nutrients, at the time of

the recalls, were beans, salted fish, rice (contraband rice was available in the markets), roots and tubers, plantains, bread, and red sugar. When protein and calories are marginal, minerals and vitamins are generally also marginal. The data from Haut Cap Rouge support this generalized relationship. For example, calcium intake (set at 450 mg by FAO for all age groups) was adequate only in 4 of the 13 families. Iron intake was inadequate for adult women in all but 5 of the families. And even though iron intake appeared to be adequate for men and children in several of the other families, in actuality worm infestation and poor bioavailability of iron decrease the amount of iron absorbed by the body. Vitamin intake also reflects the marginal quality of the diet; for example, niacin intake was inadequate for adult men in all but 4 of the families. The situation is such that niacin intake in a corn-eating culture is almost always low unless some sort of lime (calcium-type) is used in the preparation of the corn, as is the case in Central America where the corn for making tortillas is treated with lime.

THE EFFECTS OF FOOD PREPARATION AND STORAGE ON NUTRITIONAL VALUE:

Because all foods undergo chemical changes before, during, and after cooking, and because these changes can affect essential nutrients, it was deemed important to try to observe and document the cooking habits of the women in Haut Cap Rouge. As was stated in an earlier section, the most common method of cooking was that of boiling. Not only was boiling the common method, but boiling food for long periods of time was also common, in spite of the universal problem with fuel.

Keeping foods like cereals (including corn and rice, which are low in the amino acid lysine) and milk at even moderate temperatures over a period of time can produce a reaction called the Maillard or browning reaction. This reaction affects the amino acids in these foods and causes them to change form, so that they are not available to be used by the body. Lysine, tryptophan, and histidine are crucial in human nutrition, because the body cannot manufacture its own supply of these amino acids. Hence, they must be obtained from foods in the diet. Furthermore, tryptophan acts as a niacin precursor and in a corn-based diet, niacin is scarce under even the best of circumstances if animal protein is not eaten and if the corn is not treated with lime. As Coultate (1984) says, "...in poor vegetarian diets there can often be a deficiency of lysine [so] that the importance of retarding the Maillard reaction in stored foods becomes most obvious."

The practice of cooking cornmeal or rice and letting the food sit in the hot, humid climate in Haiti is therefore a practice that should not be encouraged. At the same time, meats which are soaked in sour orange or citrus lime juice, also undergo protein changes. The acid from the juice denatures the

surface proteins, and makes the meat more tender. At the same time, the acidic medium discourages bacterial growth and retards spoilage. Nearly all meats are rubbed with citrus juice prior to cooking, whether the method be boiling or roasting. This is an example of a positive cooking practice, which does a great deal to enhance the taste and safety of the food.

Meats are also cooked for long periods of time, often with vitamin-rich vegetables. Prolonged cooking has a detrimental effect on water-soluble vitamins for two reasons. First of all, because they are water-soluble, these vitamins are leached out into the cooking water. If the vegetables are cut up into small pieces, there is an increased surface area exposed to the water and even more vitamins are leached than if the food were left in larger pieces. Peeling the vegetables, if they are cooked whole, also leads to a loss of nutrients. Secondly, many of these vitamins are heat sensitive and are destroyed by high temperatures. Thiamine is changed by high heat into a form that cannot be used by the body and vitamin C is destroyed by high heat. Using less water, lowering temperatures, delaying the time that certain foods are added to the pot, and cutting food into bigger pieces are all ways in which vitamins can be conserved.

Fat-soluble vitamins like vitamin A are able to withstand heat better and because they are fat-soluble there is no problem with leaching in water mediums. Leaching does occur in fatty mediums, such as sauces and gravies, but since these mediums are usually eaten there is only a minor loss of vitamins.

Vegetables like igname, sweet potatoes, and breadfruit contribute primarily energy to the Haitian diet, but leafy greens like liane panier, spinach, and cabbage (and other wild nameless greens as yet unclassified by researchers) contribute a great number of nutrients to the Haitian diet. Vitamin A, folic acid, vitamin C, and iron, calcium and other minerals like magnesium all are available in varying amounts in leafy green vegetables. Heat, of course, affects the water soluble vitamins, but minerals and fat-soluble vitamins are relatively stable. Iron absorption is enhanced with the addition of a vitamin C-rich food like lemon juice. Calcium, which is in short supply in the Haitian diet, fares less well since leafy green vegetables also contain a compound called oxalic acid which binds with the calcium in the intestines and forms an insoluble salt. This new compound makes the calcium unavailable to the body and the calcium salt passes right on through the intestines. One final point that needs to be made in regard to leafy green vegetables is that the dark outer leaves of cabbage and certain lettuces are the most nutritious parts of the plant, but they are almost always thrown away in favor of the lighter colored and more tender inner leaves.

SUMMARY AND CONCLUSIONS

The Haitian peasant in Haut Cap Rouge today is eating a diet which has changed little from the diet of slave times. Slavers fed their cargo on boiled grains and salted fish (Kiple, 1984). These foods play an important role in the nutrition of farmers and their families. Today, beans, in combination with corn, supply the majority of the protein in the diet. Calories come from corn and other grains like sorghum or rice, supplemented by fats, sugar, starchy tubers, and fruits. As a group, women and children were hypothetically getting enough calories and protein, but the adult males were not. The real picture is probably somewhat different, since there is a cultural tendency for the adult males to get more and choicer food. A number of individual families clearly were consuming a diet deficient in most nutrients for which FAO has set requirements.

When protein and calories are insufficient, it is generally the case that vitamins are also usually at an unacceptable level in the diet. A variety of vitamin- and mineral-rich vegetables are grown, according to the respondents' answers to the questionnaires, but day-to-day evidence of vegetable consumption was hard to come by. Results from food frequency questionnaires suggest that actual consumption may be sporadic. Vegetable production and consumption is one area in which work should continue to be done. ADS-II introduced cabbages into the area and people had supposedly accepted this new food, but none of the families reported cabbage as being eaten during the two day recalls. Because mangos probably provide the majority of the year's vitamin A supply, which is stored in the liver, production of other acceptable regular food sources of vitamin A and vitamin C should be a priority in future projects. For example, papayas, tomatoes, dark green leafy lettuces, yellow squashes, sweet peppers, and herbs would be possibilities. A thorough study of the wild green leaves eaten by the peasants would also be of vital importance, since these can also be potential vitamin A, iron, and calcium sources. The evidence suggests that unless vegetables are eaten in stews and soups, that few fresh vegetables are eaten. Raw vegetables don't seem to form a part of the diet, either. Evidence from the 2-day recalls suggests that vitamin deficiencies are probably common, except for vitamins A and C during mango season.

Food preparation methods, chiefly prolonged boiling of foods, tend to be detrimental to many vitamins and to protein under certain circumstances. In marginally poor diets, the differences made by these cooking methods can be extremely important. The effect of storage on the amino acid lysine in corn and other grains (both cooked and uncooked) is one that must be examined more closely, but outside of the laboratory. Research must mimic reality as much as possible in order to be truly valid.

Nutrition research has traditionally focussed on measuring growth in certain susceptible groups and on looking at key foods (which are suppliers of key nutrients). This study was no exception. However, it is vitally important that, as fuel shortages become more and more severe in LDCs and as women's time and labor become more and more oriented to work either outside or inside the family unit, that the powerful nutritional "vehicle" of cooking and food preparation be examined even more closely. Foods may be available, but if they are prepared and presented in unappetizing ways, people will not eat those foods. Taste, and not just food availability, has a lot to do with good nutrition. New and efficient ways of fixing traditional foods and dishes will have to be worked out and tested, in order to help people adjust to the ever increasing shortage of cooking fuel. The most challenging work will lie in filtering these new methods to the people who will most benefit nutritionally and economically from them.

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APPENDIX A

ENFOMASYON JENERAL SOU LAKAY

1. NON (SIYATI) _____
 2. KOTE _____
 3. NIMWO IDANTIFIKASYON ETID-LA _____
 4. DAT _____
- KESYON SOU LAFAMIY:
5. KANTITE MANM FAMIY KI MANJE ANSANM CHAK JOU OU KI MANJE NAN KAY LA _____
 6. KANTITE LOT MOUN KI MANJE NAN KAY LA ANSANM AK FAMIY--AN _____ KI LAJ YO? _____
 7. KANTITE TIMOUN KI POKO GEN 14 ZAN, KI RETE NAN KAY-LA? _____
 8. KI LAJ TOUT TIMOUN KI RETE NAN KAY-LA? _____
 9. KONBYEN TIMOUN KI ALE LEKÒL? _____
 10. ESKE OU BAY PI JÈN PITIT LA (SA VLE DI TI MOUN JISKA 30 MWA) TETE? WI _____ NON _____
 11. ESKE OU BAY PITIT KI NAN TETE-A LOT LET AN PLIS? WI----- NON-----
 12. SOU KI LAJ BEBE-A KOMANSE MANJE MANJE SALE (CHODYÉ/KWIT)? _____ MWA
 13. ESKE OU BAY PITIT KI NAN TETE-A YON LOT KALITE LET AN PLIS? WI _____ NON _____

SI WI, DI KI KALITE LET:

LET BÈF FRE____
LET AN POU D____
LET ESPESYAL POU TI BEBE PITI____
LET BÈF AN BOUTEY____
LET SIKRE NAN TI MAMIT____
LET PA SIKRE NAN TI MAMIT____
LOT KALITE____

14. KONBYEN TAN OU TE BAY DENYE PITIT OU-A TETE? _____MWA

15. KONBYEN FWA PA JOU MANM FAMIY YO KONN MANJE?

PAPA _____ KI LÈ _____, _____, _____, _____

MANMAN _____ KI LÈ _____, _____, _____, _____

TI MOUN YO _____ KI LÈ _____, _____, _____, _____

LOT MOUN _____ KI LÈ _____, _____, _____, _____

16. ESKE GEN KÈK KALITE MANJE MARI OU DEREFIGE MANJE MENM SI
GENYEN? WI_____ NON_____

SI WI, KI KALITE MANJE?_____

17. ESKE GEN KÈK KALITE MANJE PITIT OU YO DEREFIGE MANJE MENM SI
GENYEN? WI_____ NON _____

SI WI, KI KALITE MANJE?_____

KESYON POU MANMAN YO

18. ESKE OU GWO VANT KOULYEYA? WI_____ NON_____

19. SOU KONBYEN MWA OU YE? _____ MWA

20. ESKE GEN KÈK KALITE MANJE OU PA KAPAB MANJE OSINON OU PA VLE
MANJE KOULYEYA? WI_____ NON_____

KI KALITE MANJE?.....
.....
.....
.....
.....

21. ESKE FAMIY OU KILTIVE LEGIM? WI_____ NON_____

22. SI WI, KI KALITE LEGIM?

MILITON_____
CHOU_____
KAWOT_____
YANM_____
FEY VET_____
TOMAT_____
PIMAN DOUS_____
PIMAN PIKE_____
JOU MOU_____
PÈSI_____
TEN_____
KRESON_____
LETI_____
LÒT KALITE_____

23. ESKE FAMIY OU GEN PYEBWA KI DONNEN FWI? WI_____ NON_____

24. SI WI, KI KALITE FWI:

VERITAB_____
FIG_____
PAPAY_____
MANGO_____
ZORANJ_____
SITRON_____
CHADEK_____
ZABOKA_____
LÒT KALITE_____

25. KI MOUN KI TRAVAY NAN JADEN LEGIM?_____,

26. KONBYEN TAN MOUN KI TRAVAY NAN JADEN AN KONN PASE **CHAK** JOU
NAN TRAVAY JADEN?_____

27. ESKE OU BAY KOUT MEN NAN TRAVAY JADEN ALÈKILÈ? (SI OU GWO
VANT)? WI_____ NON_____

28. KONBYEN TAN PA JOU OU KONN BAY KOUT MEN NAN JADEN
YO?_____

29. AK KI KALITE DIFE OU KONN SÈVI POU PARE MANJE?

CHABON_____
BWA_____
KEWOZEN_____
TWOPIGAZ_____
LÒT KALITE_____

30. SI OU SÈVI AK BWA POU OU PARE MANJE, KI MOUN KI ALE CHECHE

BWA POU OU?_____, _____, _____, _____

31. KONBYEN TAN PA JOU MOUNN SA-A PASE NAN ALE CHÈCHE

BWA?_____

32. ESKE SOUS DLO OU SÈVI LWEN LAKAY OU? WI_____, NON_____, KI
DISTANS LI?_____

33. KI MOUN NAN FAMIY KI BWOTE DLO?_____, _____,
_____, _____

34. KONBYEN TAN MOUN SA-A BEZWEN POU LI ALE CHÈCHE DLO CHAK
JOU?_____

35. ESKE OU KONN BOUYI DLO POU BWÈ LAKAY OU? WI_____, NON_____

36. SI WI, KONBYEN TAN OU KONN KITE DLO A BOUYI? _____

37. KI LÈ OU TANMEN PARE MANJE CHODYÈ?_____

38. KONBYEN TAN OU BEZWEN POU OU FINI PARE MANJE
CHODYÈ?_____

39. KI KOTE OU ACHTE FARIN, LWIL, EPI TOUT PWODWI EPISRI
KOUWAN?_____, _____, _____

40. KONBYEN TAN LI PRAN POU ALE ACHTE TOUNEN
LAKAY?_____

41. LÈ OU ALE NAN MACHE A, CHAY OU KONN POTE A, KONBYEN GWO
MAMIT KONSA LI KAPAB FÈ?_____

42. DI MWEN KI KALITE TRAVAY TIMOUN OU YO KONN FÈ NAN KAY

LA:

43. KONBYEN TAN YO KONN PASE AP FÈ TRAVAY SA-A?

44. KI LAJ TIMOUN YO TANMEN FÈ TRAVAY SA-A? _____

45. KONBYEN KOB OU DEPANSE CHAK JÒU POU OU ACHTE KALITE MANJE
OU PA JWENN NAN JADEN OU? _____

46. KANTITE TIMOUN KI FÈT TOU VIVANT? _____

47. KANTITE TIMOUN OU TE PÈDI? _____

48. KI LAJ TIMOUN YO YE GENYEN LÈ YO TE MOURI? _____, _____,
_____, _____, _____, _____

49. KI LAKÒZ LANMÒ TIMOUN YO, SI OU KONNEN?

2 JOU ANKÈT SOU MANJE MOUN TE MANJE YÈ

SEZON_____ DAT_____

1. NON (SIYATI)_____

2. NIMWO IDANTIFIKASYON ETID LA_____

3. MOUN KI BAY RESPONS_____

4. KONBYEN TAN OU TE BEZWEN YÈ POU OU TE FINI PARE MANJE
CHODYE?_____

MATEN_____

MIDI_____

SWA_____

LOT MOMAN_____

5. ESKE YE, OU TE MANJE KÈK MANJE YO TE FÈ OU KADO? WI_____

NON_____

6. KI KALITE MANJE LI TE YE?_____, _____,

7. KI JAN OU TE PARE MANJE A:

BOUYI_____

FRI_____

SOTE_____

TOUFE_____

BOUKANEN_____

OSINON LOT KALITE PREPARASYON_____

8. KI VALÈ MANJE OU TE PARE?_____

9. KI MOUN KI TÈ MANJE PLIS NAN MANJE A?_____

_____, _____, _____

10. ESKE OU TE FÈ YON MOUN KADO KEK KALITE MANJE YÈ? WI_____

NON_____

11. KISA LI TE YE?_____, _____,

12. KI VALÈ MANJE LI TE YE?_____

13. ESKE YE SE AK MANJE OU TE ACHTE NAN MACHE A OU TE SEVI POU
OU PARE MANJE?

WI_____ NON_____

14. SI WI, AK KI KALITE MANJE OU TE SEVI?

15. KI KANTITE MANJE OU TE ACHTE POU OU SEVI AK
LI?

16. SI OU GEN YON JADEN LEGIM, ESKE OU TE SEVI AK LEGIM KI SOTI
LADAN LI POU OU PARE MANJE YE? WI_____ NON_____

17. AK KI KALITE LEGIM OU TE SEVI? _____,

_____, _____, _____,

18. AK KI VALÉ NAN LEGIM SA YO OU TE SEVI?

19. ESKE OU TE GEN KÉK ENVITE KI TE MANJE AK OU YE? WI_____

NON_____

20. KONBYEN MOUN AN PLIS TE MANJE ANSANM AK OU YE?

21. ESKE CHAK MOUN NAN FAMIY AN TE MANJE ISIT YE? WI_____

NON_____

22. SI NON, KI MOUN KI PA TE MANJE ISIT YE? _____,

_____, _____, _____

23. FE YON LIS TOUT TI FRIDODÓY FAMIY OU TE MANJE

YE? _____ KANTITE _____
_____ KANTITE _____

ENSTRIKSYON YO POU MONITE YO:

- MANDE: 1) KISA FAMIY OU TE MANJE YE KÒM MANJE PRENSIPAL?
2) KISA FAMIY OU TE MANJE YE ANVAN MANJE PRENSIPAL LA?
3) KISA FAMIY OU TE MANJE YE APRE MANJE PRENSIPAL LA?
4) FE YON LIS TOUT-TI FRIDODOY EPI TOU-TI BAGAY YO TE MANJE TOUT KOTE YO TE PASE.
5) NAN KI FASON ESKE MANJE PRENSIPAL LA TE PARE YE?
6) MONTRE MWEN KI VALE MANJE OU TE BAY CHAK, MOUN NAN FAMIY OU MANJE.

DAT..... (PREMYE JOU)

MANJE PRENSIPAL KANTITE KI MÒD PREPARASYON

ANVAN KANTITE KI MÒD PREPARASYON
MANJE PRENSIPAL

APRE KANTITE KI MÒD PREPARASYON
MANJE PRONSIPAL

DAT (DEZYEM JOU)

MANJE PRENSIPAL KANTITE KI MÒD PREPARASYON

ANVAN
MANJE PRENSIPAL KANTITE KI MÒD PREPARASYON

APRE
MANJE PRENSIPAL KANTITE KI MÒD PREPARASYON

FEY KI ENDIKE KONBYEN FWA SOU 1 SEMENN YON FAMIY KONN MANJE MANJE

SA YO:

SEZON _____ DAT _____

NON (SIYATI) _____

MANDE "KONBYEN FWA FAMIY OU TE MANJE MANJE SA-A PANDANT SEMENN
DENYE A."

LET FRE _____
LOT LET _____
ZE _____
MAYI _____
DIRI _____
PITIMI _____
FARIN FRANS _____
LOT KALITE FARIN _____
PWA WOUJ _____
PWA NWA _____
PWA BLAN _____
PWA CHOUS _____
PWA ENKONI _____
PWA MELANJE _____
PWA KONGO _____
LOT PWA _____
KASAV _____
MANIOK _____
BANNANN VET _____
POMDETE _____
POUL _____
KODENN _____
KANNA _____
PWASON _____
LAMBI _____
KRIBICH _____
KARET _____
KRAB _____
PISKET _____
SADIN _____
PWASON GWO SEL _____
WOMA _____
VYANN BEF _____
TASO _____
VYANN KABRIT _____
VYANN KOCHON _____
GRIYO _____
JOUYOU _____
KAWOT _____
YANM _____
TAYO _____
PATAT _____

MALANGA -----
 VERITAB -----
 KANN -----
 DIRI DYON-DYON -----
 PISTASH -----
 MAMBA -----
 NWA KAJOU -----
 LABAPIN -----
 FEY VET -----
 KALALOU -----
 MILITON -----
 LETI -----
 KRESON -----
 TOMAT -----
 KOKOYE -----
 ZANNANA -----
 ZORANJ JAKMEL -----
 ZORANJ DOUS -----
 ZORANJ SI -----
 SITRON -----
 CHADEK -----
 MELON DLO -----
 MELON FRANS -----
 MANGO -----
 KOWOSOL -----
 ABRIKO -----
 PEN -----
 SIK WOUJ -----
 SIK BLAN -----
 SIK BEJ -----
 RAPADOU -----
 AKAMIL -----
 AKASSAN -----
 MARINAD -----
 AKRA -----
 TE -----
 KAFE -----
 FOSKAO -----
 TIZAN -----
 TOUT KALITE GRES:
 LWIL -----
 BE AN MAMIT -----
 BE BATON -----
 MANTEG -----
 GRES KOCHON -----
 LOT GRES -----
 LOT MANJE -----

KESYÒN SOU LASANTE:

1) KI MOUN KI TÈ MALAD SEMENN KI SÒT PASE A?

-----, -----, -----

2) KI LAJ MOUNN YO MALAD? 1. -----, 2. -----, 3. -----,

4. -----, 5. -----, 6. -----

3) KI SIY MALADI MOUN NAN TÈ PREZANTE?

	#1	#2	#3	#4	#5	#6
LAFYEV	_____	_____	_____	_____	_____	_____
DYARE	_____	_____	_____	_____	_____	_____
GONFLEMAN	_____	_____	_____	_____	_____	_____
VANT FÈ MAL	_____	_____	_____	_____	_____	_____
TOUSE	_____	_____	_____	_____	_____	_____
MANKE APETI	_____	_____	_____	_____	_____	_____
NEN BOUCHE	_____	_____	_____	_____	_____	_____
LÒT SIY :	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____
	_____	_____	_____	_____	_____	_____

Season_____ Date _____

Anthropometric Measurements and Clinical Observations

1. Family name_____
2. First name_____
3. Age_____
4. Study I.D. #_____
5. Height_____
6. Weight_____
7. Arm circumference_____
8. Skinfold thickness _____
9. Bilateral pitting: 0 _____, 1_____(slight but definite), 2
_____ (moderate to marked)
10. Goiter: yes_____, no_____
11. Hyperkeratosis: yes_____, no_____
- 11a. Cracking skin: yes_____, no_____
12. Cheilosis: Yes_____, no_____
13. Stomatitis: yes_____, no_____
14. Swollen stomach: yes_____, no_____
15. Umbilical hernia: yes_____, no_____
16. Muscular wasting: yes_____, no_____
17. Other_____
- _____
- _____
18. Illness in the past week: yes_____, no_____
19. Symptoms: diarrhea_____ Other_____
- vomiting_____
- abdominal cramping_____
- coughing_____
- loss of appetite_____
- fever_____

Season _____ Date _____

Observation Sheet: Kitchen Set-Up

Family Name: _____

Study I.D. # _____

1. Utensils Available:

a) For cooking: _____

b) For serving: _____

c) For washing up: _____

d) For food storage: _____

2. Location of kitchen: _____

3. Dish washing done where? _____

4. # of water containers present: _____

5. Type of water containers used: _____

6. Hand washing practiced? yes _____ no _____

7. How often is hand washing done?

After latrine use _____
After field work _____
Before meals _____
Before food preparation _____

8. Latrine present? yes _____ no _____

9. Latrine used regularly? yes _____ no _____

10. Location of latrine: _____

11. Food preparation:

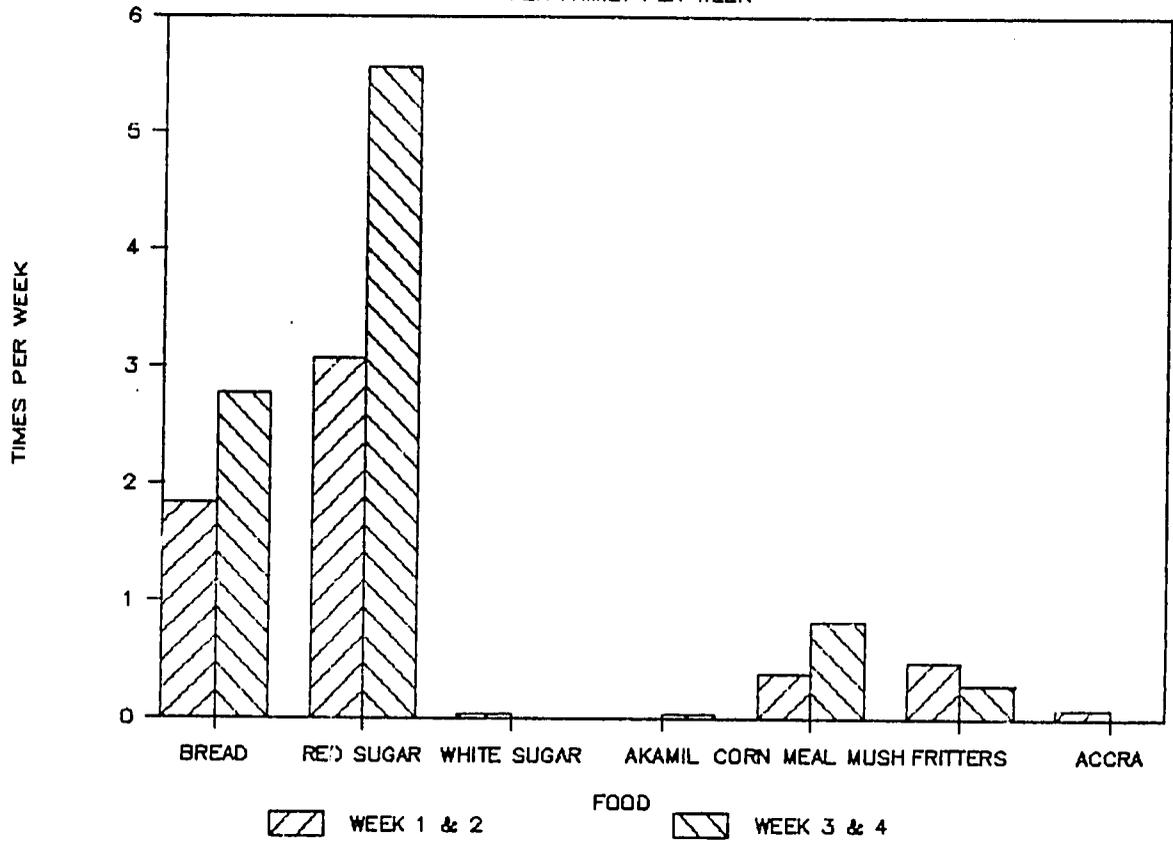
- a. Type of stove used_____
 - b. Most common means of preparation:
 - Boiling_____
 - Frying_____
 - Roasting_____
 - Grilling_____
 - c. Most common dishes prepared_____
- _____
- _____
- _____

8. Observations on food preparation:_____

APPENDIX B

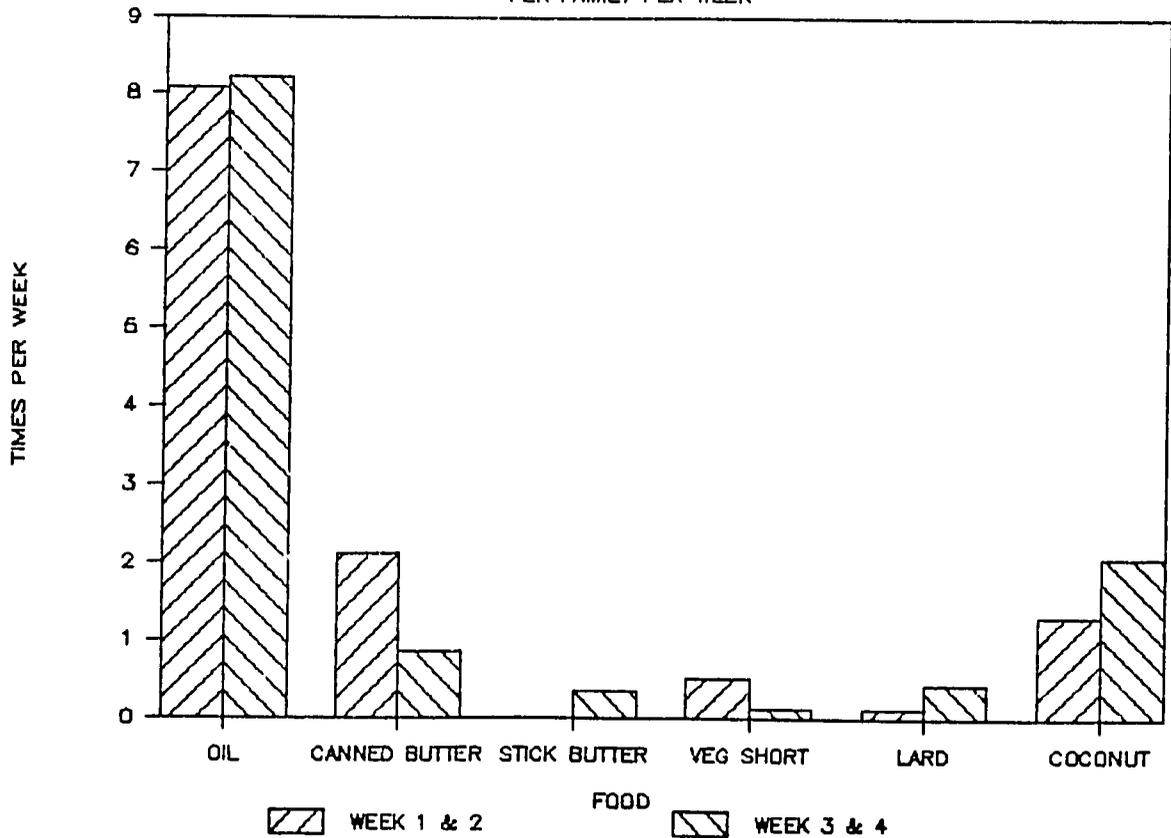
ENERGY FOODS FREQUENCY (1)

PER FAMILY PER WEEK

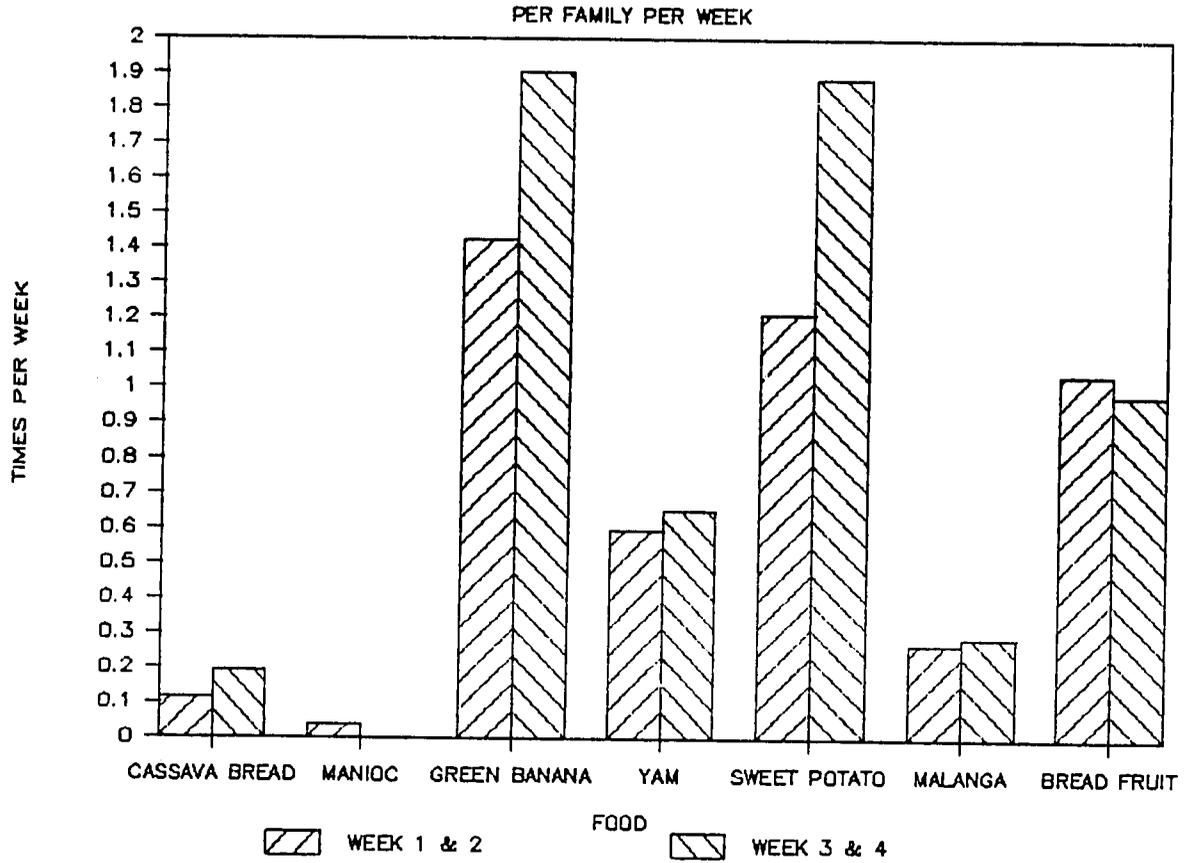


ENERGY FOODS FREQUENCY (2)

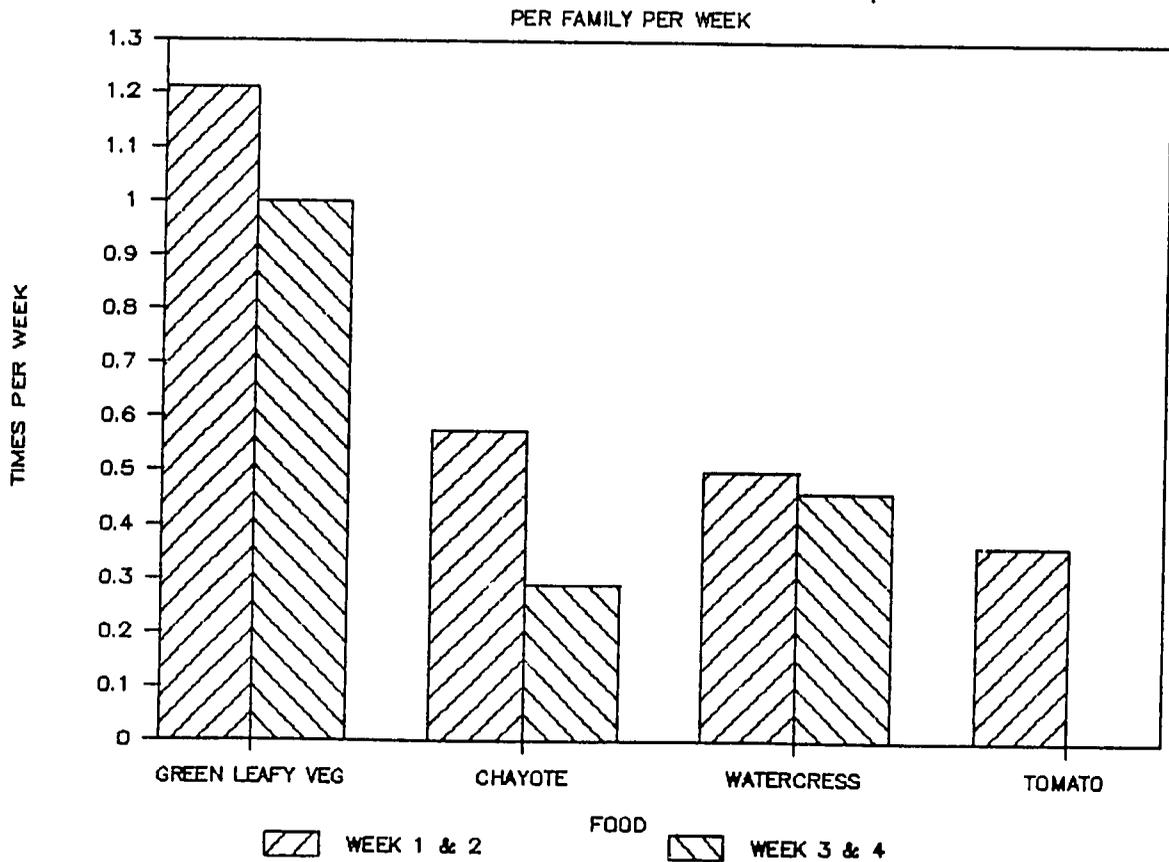
PER FAMILY PER WEEK



STARCH FOOD FREQUENCY

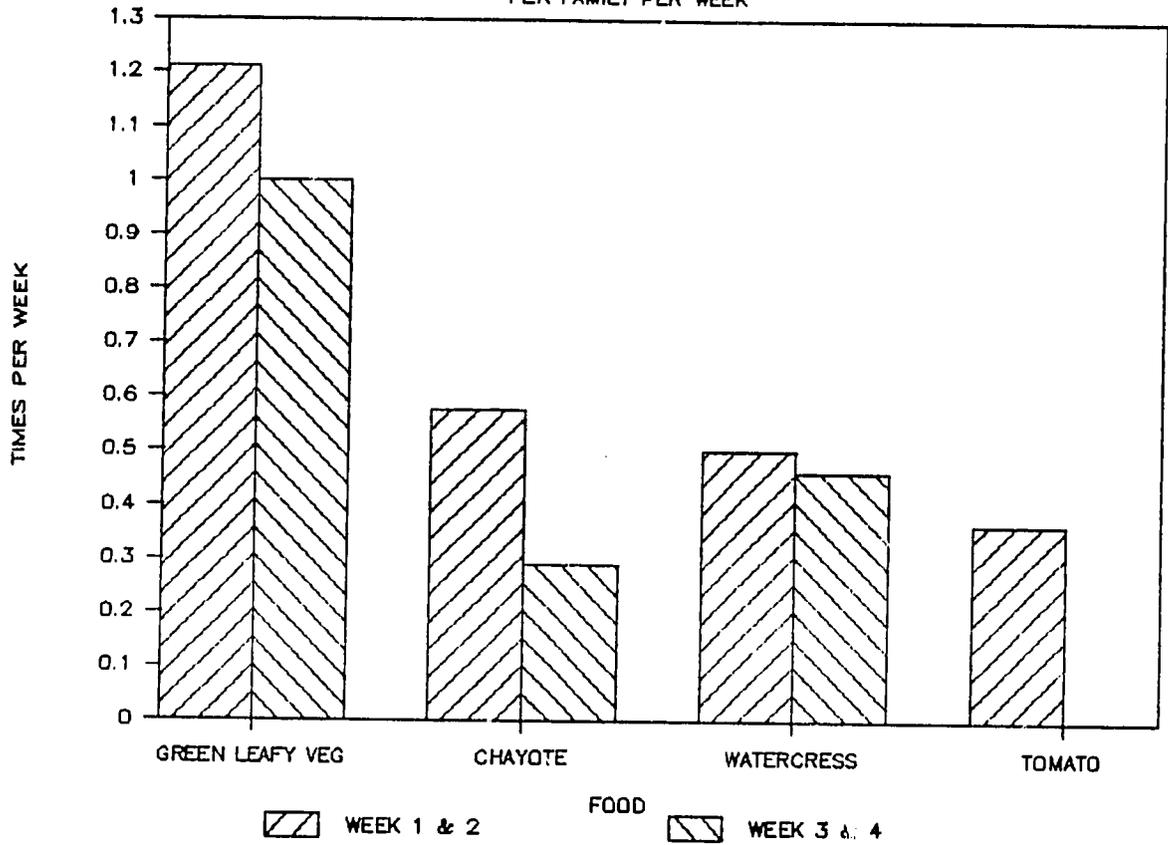


VEGETABLE FREQUENCY



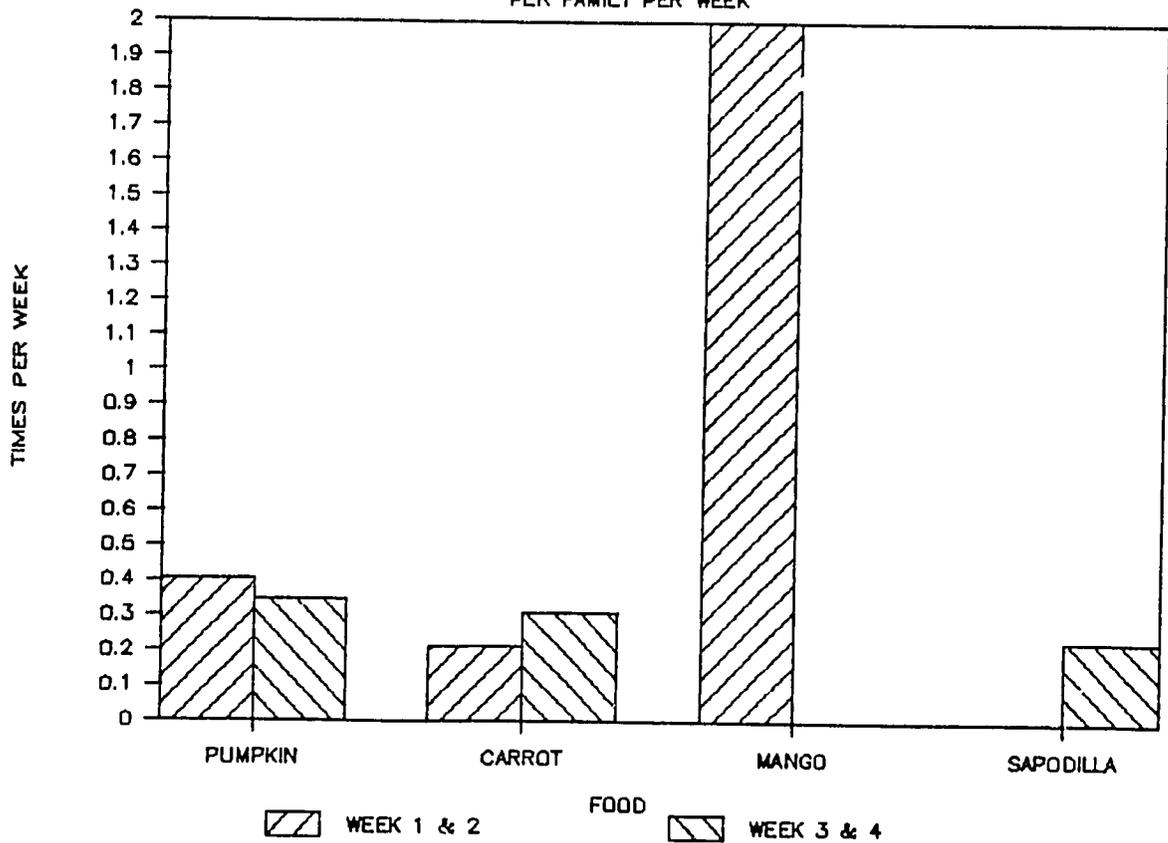
VEGETABLE FREQUENCY

PER FAMILY PER WEEK



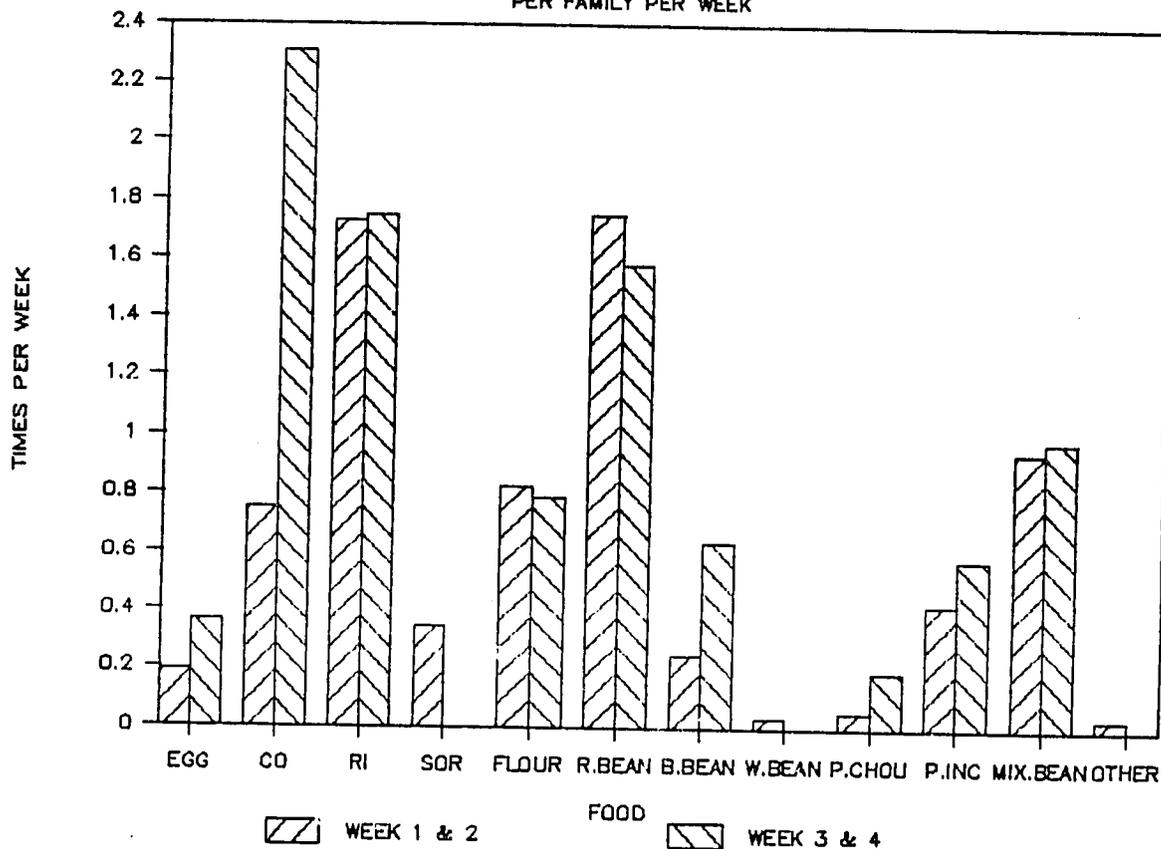
VITAMIN A FOOD FREQUENCY

PER FAMILY PER WEEK



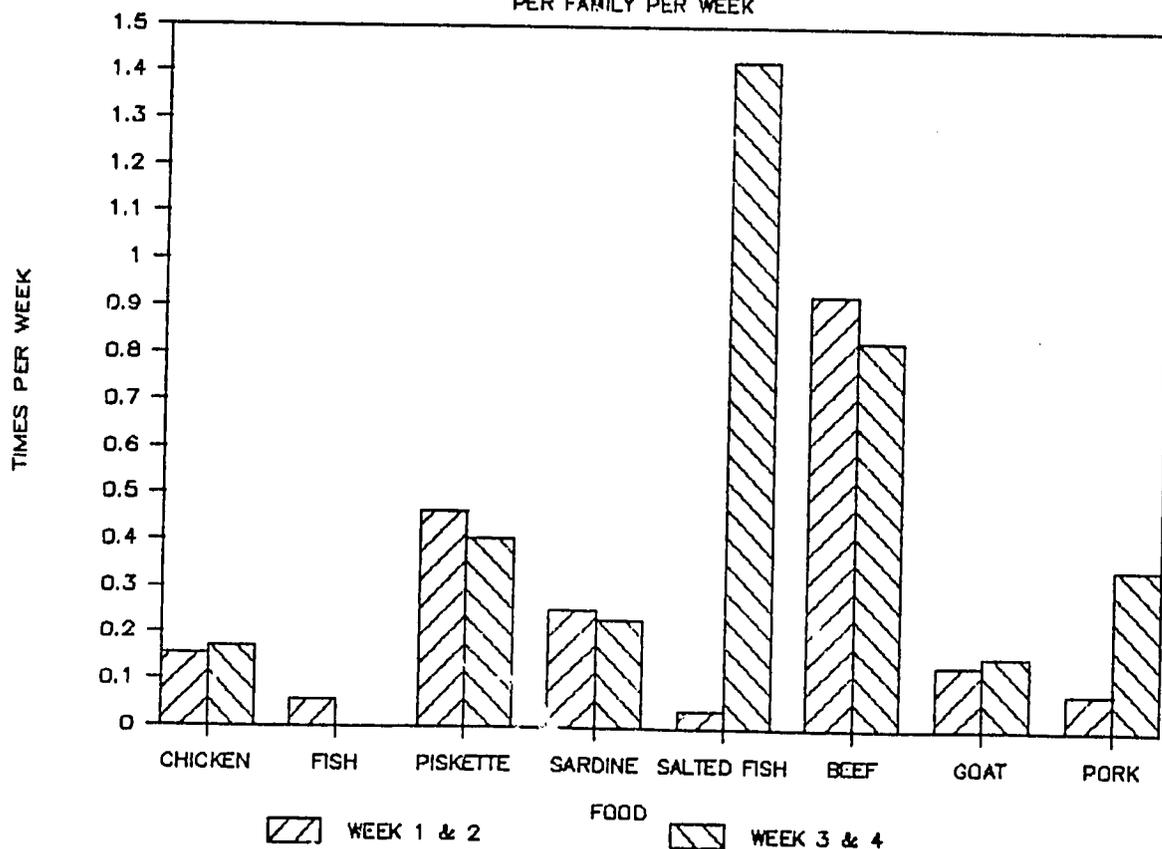
CEREAL FOOD FREQUENCY

PER FAMILY PER WEEK



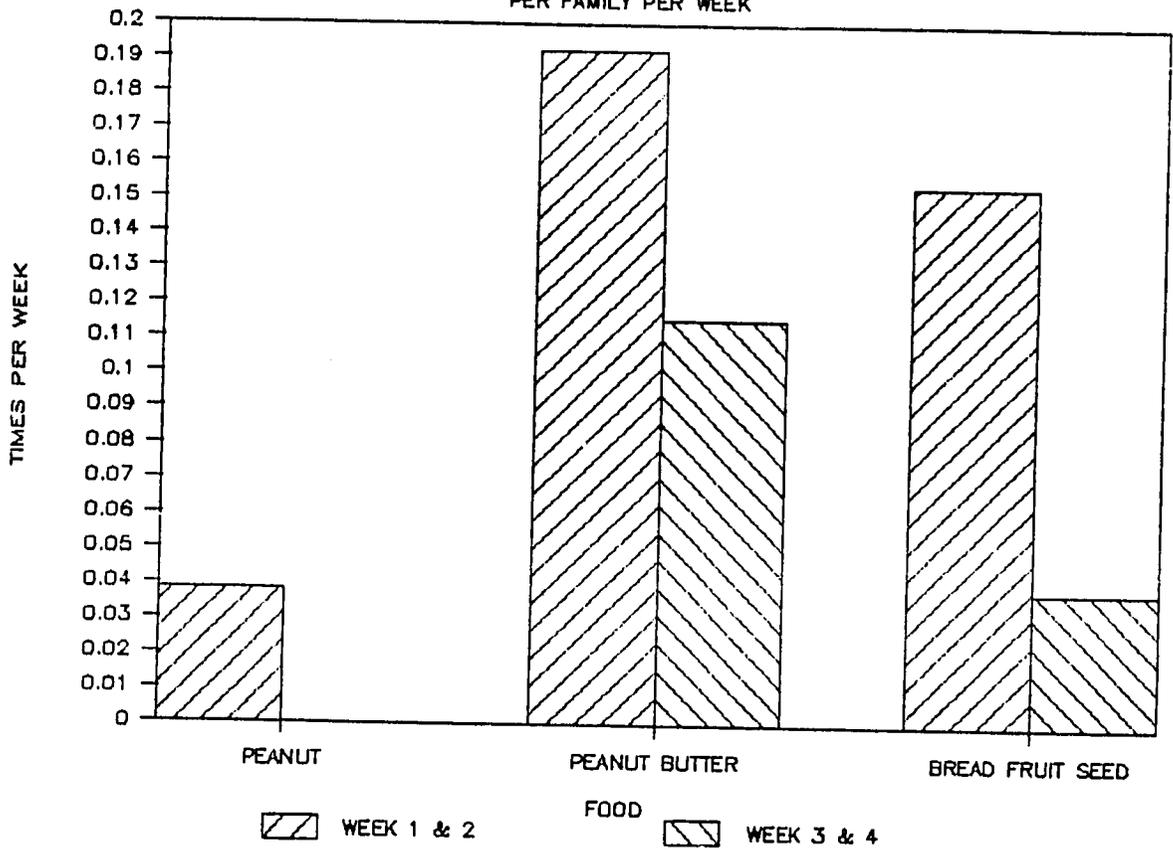
MEAT FREQUENCY

PER FAMILY PER WEEK



NUT FOOD FREQUENCY

PER FAMILY PER WEEK



BEVERAGE FREQUENCY

PER FAMILY PER WEEK

