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Rainy Season Food Behavior of Selected Families in a Miskito Indian Village in East Nicaragua

Rhonda Dale Terry
University of Tennessee, Knoxville

To the Graduate Council:

I am submitting herewith a thesis written by Rhonda Dale Terry entitled "Rainy Season Food Behavior of Selected Families in a Miskito Indian Village in East Nicaragua." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in .

Mary A. Bass, Major Professor

We have read this thesis and recommend its acceptance:

Jane R. Savage, Michael H. Logan

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

To the Graduate Council:

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Mary A. Bass
Mary A. Bass, Major Professor

We have read this thesis
and recommend its
acceptance:

Jane R. Savage

Michael H. Logan

Accepted for the Council:

L. Evans Roth
Vice Chancellor
Graduate Studies and Research

RAINY SEASON FOOD BEHAVIOR OF SELECTED FAMILIES IN A MISKITO INDIAN VILLAGE IN EAST NICARAGUA

A Thesis

Presented for the

Master of Science

Degree

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Rhonda Dale Terry

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ABSTRACT

The availability, distribution, and consumption of food by a group of Miskito Indians during Nicaragua's rainy season were studied. Field research was conducted in July and August of 1976 in the small east coast village of Kakabila.

Field study methods included observation, participant observation, and key informant interviewing. Demographic data were collected on the entire village population, and a week each was spent with four families in home observation. A case analysis approach was used to present data obtained from observation of the four cooperating families.

Cassava was identified as the core food in the diet of cooperating families. Other important foods in the diet were fish, green bananas, breadfruit, coconut milk, coconut water, and mangoes. The family plantation (farm) was the source of the largest percentage of total servings of food for each family observed (mean = 39%). Other frequently served foods were obtained from village grocery stores, fishing, village fruit trees, and loans, gifts, or purchases of food from other villagers.

It was hypothesized that the day to day, seasonal rains during Nicaragua's rainy season would alter both the source of those foods consumed and the kinds of food consumed by

the Miskito villagers. This hypothesis, however, was not confirmed. Out of 28 days of observation in village homes, only on two days were the seasonal rains severe enough to alter the main source of food for two or more meals. However, even when the main source of food was altered, the basic foods eaten at a meal did not always change.

Food behavior data such as were gathered in this project can be used in planning and implementing various nutrition education programs, supplemental feeding programs, and programs to change traditional agricultural practices such as have been projected for rural areas of Nicaragua.

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CHAPTER 1

INTRODUCTION

Foodways, which are the selection, procurement, storage, manipulation, distribution, and consumption of foods and disposal of uneaten portions, are considered adaptive mechanisms between a human population and its environment (1, 2). Therefore, in a study of foodways, the focus is upon both man and his environment. This research report explores selected aspects of the foodways of a Miskito Indian population living on the east coast of Nicaragua.

Nicaragua is the largest Central American republic. It is bounded by Honduras on the north, the Pacific Ocean on the west, Costa Rica on the south, and the Caribbean Sea on the east. This republic encompasses about 139,000 square kilometers (57,100 square miles) (3, 4). On the basis of physical geography, Nicaragua may be divided into three generalized regions: (1) the western region, which borders the Pacific Ocean; (2) the central highlands region, an area composed chiefly of mountains and hills; and (3) the eastern region, which ranges from the eastern slopes of the highlands to the Caribbean (Miskito) coast (Figure 1) (4, 5). The research site is located in the eastern region.

The eastern region has a wet tropical climate. Annual rainfall averages range from 3.8 meters to 7.6 meters

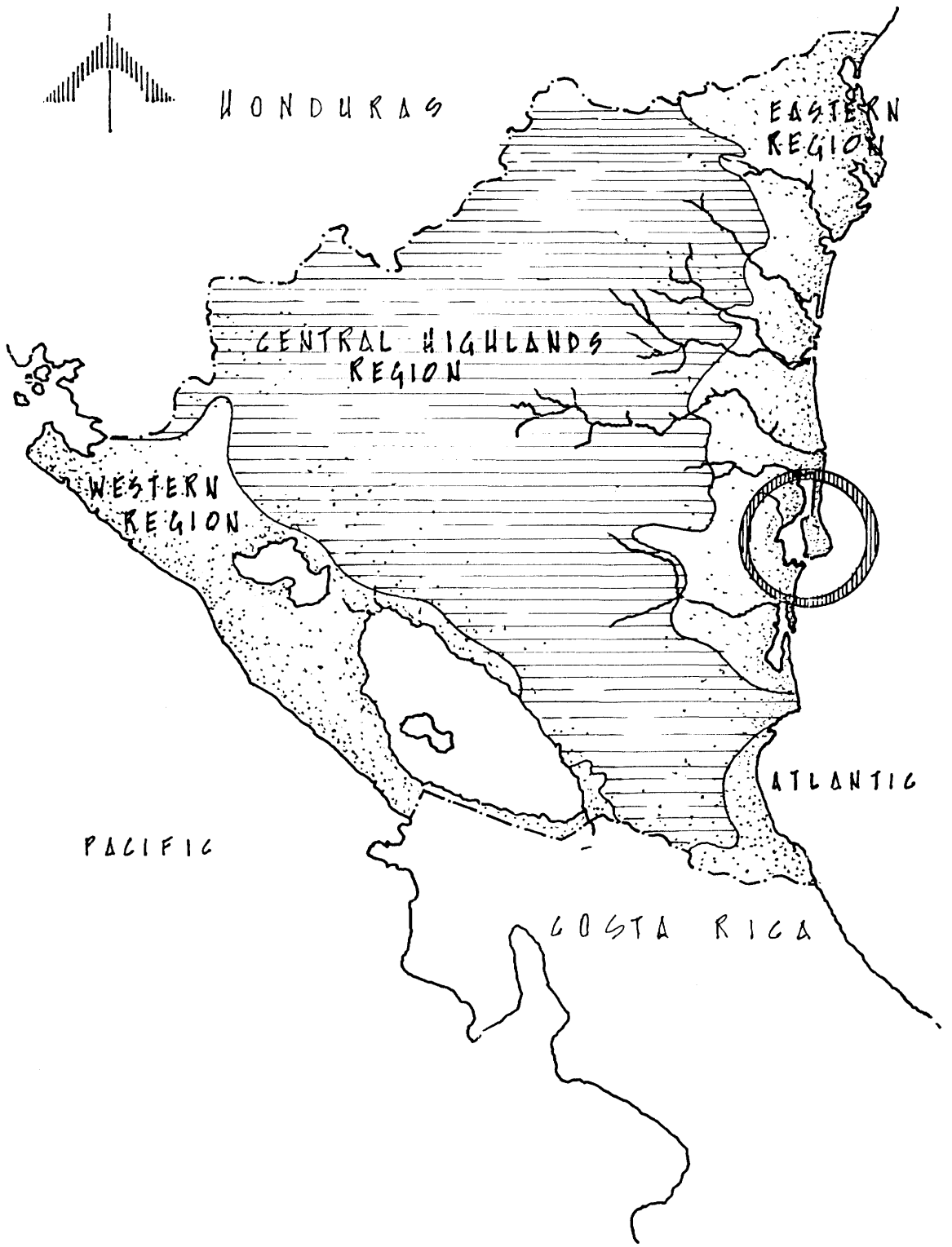


Figure 1. Map of Nicaragua by regions, with research area circled.

(150 inches to 300 inches) per year, most of this rain falling from May until August (4, 6). This period of heavy rainfall from May until August is referred to as the rainy season.

The Miskito Indians are the most numerous of the cultural groups living in the eastern region (7). Both Nietschmann and Helms note that the available food and home food supply in selected Miskito Indian villages were altered during the rainy season (6, 7). Yet, the specific effects of the seasonal rains on the foodways of the Miskito and the nature of the altered food supply have not been adequately documented. This documentation would allow for the description of the Miskitos' food in cultural terms, specifically relating to dietary patterning (8).

Documentation of the Miskito Indians' foodways during the rainy season would aid in explaining the health status of the population as it relates to nutrition and food intake. This information would be especially useful to food and nutrition educators in identification of intervention points and the preparation of educational materials (9-13).

Therefore, the general objective of this research is to document selected foodways of a group of Miskito villagers during Nicaragua's rainy season. The specific objectives are (1) to identify the core food items in the diet of the Miskito during the rainy season, and (2) to record the

distribution and consumption of foods available to the Miskito villagers during the rainy season.

For the purpose of this study, core foods are defined as those foods which form a relatively substantial portion of the diet and are used more than once daily over an extended period of time. Linton characterizes core foods as universal, regular, staple, important, and consistent (14).

The available food supply during the rainy season is defined as those foods which are reported by the research population to be available for consumption from the local environment during the rainy season. Distribution and consumption of the foods available to the Miskito villagers are studied through recording the foods coming into the home and their source, the foods going out of the home and their destination, and the foods consumed daily and their source.

Working under the assumption that the foodways of a population are influenced by the environment, the following research hypothesis was tested: The day to day, seasonal rains during Nicaragua's rainy season will alter both the source of those foods consumed and the kinds of food consumed by the Miskito villagers.

CHAPTER 2

METHODS AND PROCEDURES

Pelto has noted the need for field researchers to use a variety of research tools or techniques in order to secure complete and accurate data (15). Research techniques from the fields of nutrition, sociology, and anthropology were selected for use in this study. The following is a discussion of each step taken in the study.

I. PRELIMINARY WORK

Review of literature. Before entering the field, relevant studies and literature were reviewed. References read pertained to East Nicaragua, the Miskito Indians, and related topics.

Choosing a research site. Upon entering Nicaragua, the researcher proceeded to the east coast town of Puerto Cabezas. Here a period of time was spent in informal meeting with health personnel and private citizens familiar with the east coast Miskito Indian villages.

Pelto has noted that field researchers typically select research sites which are socially tolerable, typical of the general area, and in which the people seem cooperative and friendly (15). In addition to these factors, consideration

was given to the population size and geographical location of each east coast Miskito village. On the basis of its small population and accessible location, the small village of Kakabila was chosen as a research site.

II. FIELDWORK

Field research took place over a seven-week period from July 8 through August 26, 1976. During this time the researcher resided in the home of a village family. Specific research operations undertaken while in the village were:

Background information. Various authorities agree that background data are invaluable as an aid in interpreting other research data and in revealing important characteristics of a population (10, 16-18). Background information thought to be relevant to this research project was gathered.

Two days after entering the study village the researcher, accompanied by a local 16 year old girl who acted, when needed, as guide and interpreter, administered a questionnaire prepared by the University of Wisconsin-Nicaragua Medical Project (Appendix A). The questionnaire was designed for obtaining demographic and health information in east coast villages and had been previously administered in villages similar to the research site. Six questions were added to the questionnaire by the researcher (Appendix A). Seven questions included in the questionnaire were not used for

this research project but were asked upon the request of the above-mentioned medical project director (Appendix A).

The researcher administered the questionnaire by going door to door and asking questions of one adult family member in all homes in the village. One hundred percent response was obtained using this method. Demographic data gathered by this method included population by age and sex, household composition, morbidity and mortality rates over the previous two years, use of health care facilities, family ownership of livestock and poultry, and ownership of and distances to plantations.

Observation and informal questioning during the entire research period were used to gather information concerning occupations, language, educational level, religion, village political structure, transportation, housing, sewerage facilities, and water supply.

Village map. Crane and Angrosino perceive a map of the local research area as important for reference both during field research and after leaving the field (19). Pelto and Williams regard mapping the local research area as fundamental for general community description and as a step in becoming familiar with the research setting (15, 20). A rough map, i.e. not to scale, was drawn of the research village during the researcher's first week in the village.

Crane and Angrosino note that local people should be consulted during mapping so as to benefit from their insights about what is useful and culturally significant (19). With the aid of two village teenagers, a rough map was drawn which includes homesites, boat sheds, public buildings, village path, waterways and other significant physical features, and directions and distances to agricultural areas and neighboring communities.

Weather record. During the period in the study village, a weather chart was completed daily with the following information: date and approximate time and length of rainy periods during the past 24 hours (beginning and ending at 12 midnight). Local villagers were often consulted to ascertain the approximate time and length of rainy periods during the sleeping hours.

In addition, the official rainfall record for the area during the research period was obtained from the National Meteorological Service, Bluefields, Nicaragua.

Observation in the village grocery store. Observation was used in the village grocery store for noting inventory and events. Techniques, advantages, and disadvantages of using observation as a tool in scientific inquiry have been discussed by several writers (15, 21-23).

Two small grocery stores located in village homes were the only physical establishments set up for the sale of food in Kakabila. The researcher chose to observe at the one grocery store where informants indicated that they shopped most often and at which the researcher noted the greater volume of business.

During four consecutive days the researcher observed at the chosen village store during business hours. On the first day of observation an inventory was taken of all items for sale, noting the retail price of each. In addition, on all four days a record was kept of all business transactions in the village store. This information was recorded in the following manner: item bought, amount bought, and by whom.

Observation and participant-observation in the home. As in the village store, observation was used in four village homes as a technique for collecting information. Participant-observation, in which the researcher entered into those activities relevant to the research topic, served as a continuation of observation. Pelto states that participant-observation is central to effective fieldwork (15). Advantages, disadvantages, and techniques of becoming a participant-observer have been discussed (15, 21-23). Kolasa and Bass have described the use of participant-observation for obtaining food behavior information in an Appalachian county of East Tennessee (24).

Four families were selected nonrandomly by the researcher from the general village population to participate in this phase of the research. On the basis of informal questioning and observation, the researcher chose families thought to be "typical" of the village families in terms of family composition, economic well-being, and subsistence patterns. In addition, each family chosen was judged by several village informants to be, in general, cooperative in nature. Cooperativeness was necessary since the researcher planned to spend a number of days observing in the home of each family.

Seven days were spent observing in the home of each of the four families—from Monday until the following Sunday. During the first day of home observation, an inventory of all the foods in the home was taken, noting the source of each food. Then, a record was kept during the week of all the foods coming into the home and their source, or going out of the home and their destination.

Also on the first day, each family was asked to list the foods available to them during the rainy season from each of these sources: plantation, village store, markets or food stores in other communities, domestic animals, hunting, fishing, and gathering wild vegetation. In addition, they were asked to list any other sources of food available to them during the rainy season and state the foods available from these sources.

The researcher observed the preparation and consumption of each meal during the week. Notes were made on all food preparation techniques. Before each meal the amount of food served to each family member was recorded in the following manner: food, approximate amount, served to, and source. The researcher estimated the approximate amount of a food served to each person.

After the evening meal each family member was asked for information concerning the foods he or she had eaten between meals. This information was recorded in the following manner: food, approximate amount, eaten by, and source.

At the end of the seven-day observation period the family member(s) who had been in charge of food preparation during the week was consulted. The informant was asked to list all foods eaten by one or more family members at least once per week and to list all preparation methods for these foods used at least once per week. This list was then compared with the record of observed preparation techniques used and foods consumed during the week. By comparison, the researcher could judge whether or not the preparation techniques and foods consumed during the observation week were part of a regular pattern.

Throughout the week a variety of other information was gathered concerning each family. Recorded were such items as family composition, occupation, housing description, and main income sources.

Interview of key informants. During the first two weeks of fieldwork in the village, three local people were selected to act as key informants. Spradley and McCurdy state that a good key informant is one who knows the culture well, is willing to talk, and accepts his culture as the way things are (25). In addition to these factors, each key informant was selected on the basis of the amount of time that he or she had to participate in interviewing. This was a function of the amount of responsibility that he or she had within their family and community.

The first two key informants selected were a 16-year-old girl and a 20-year-old woman. Both resided in the village with their respective family and attended the local school. Each female was in charge of the majority of food preparation in her home and was judged by the researcher to possess all of the characteristics of a reliable key informant mentioned above.

The third key informant was a 21-year-old woman who resided with her parents in the village. Unlike the first two key informants, this woman's family owned few material possessions, and they lived in a different area of the village. It was thought by the researcher that this key informant might have a different perspective of food behavior than the first two key informants.

Various procedures and techniques for key informant interviewing have been outlined (15, 20, 23, 25). In this

research situation the focused interview, as discussed by Selltiz et al., was used (23). In the focused interview the researcher derives a list of topics to be covered during the interview based upon the research problem and observations while in the field. This list constitutes a framework for questioning during the interview, but the manner in which questions are asked and their timing vary with the situation (23).

The researcher's main objectives in key informant interviewing were to clarify questions resulting from observation and to gain information concerning observed and implied food behavior. Focused interviewing worked well in helping meet these objectives. The researcher made a note of all questions as they arose during fieldwork. Then, every 7 to 10 days these questions were reviewed. A list of interview topics designed to supply answers to the questions was then formulated.

The frequency with which each key informant was interviewed, the amount of time spent in each interview session, and the interview setting varied. One key informant preferred a one to two hour interview session every 10 to 14 days, while the other two informants preferred shorter, 30 to 40 minute interview sessions once or twice per week. The researcher established an interview time with the key informant before each interview. Key informants were

interviewed in many diverse situations, such as while washing clothes at the village stream, while preparing meals, or at night after the other family members had retired for the evening.

Each key informant was interviewed a minimum of three times for around 40 minutes each time during the researcher's last week in the village. This frequent interviewing was necessary in order that the researcher might complete the list of interview topics.

Constructing a schedule of food-related activities. In order to become familiar with the habitual food-related activities of village families, the researcher constructed a schedule of daily, routine food-related activities within a village household. Both observation and key informants were used in constructing this schedule. Reining used observation and key informants to construct a similar schedule while studying food production among the Haya in Africa (26).

The three key informants were asked to verbally construct a daily schedule of food related activities. They were asked to make the schedule general enough to apply to most families in the village and almost any day of the week. Factors which frequently caused variation in the schedule were listed along with the nature of the variation. One key informant found this task too difficult, thus did not participate in this part of the research.

Specific times were not used in constructing the schedule. Activities were simply listed consecutively according to the period of the day when they occurred—morning, midmorning, noon, afternoon, or evening.

The schedules were tested through observation in four households during the course of fieldwork.

CHAPTER 3

RESEARCH SITE: KAKABILA

I. THE HABITAT

When approaching the east coast village of Kakabila, one perceives a line of painted and unpainted homes strung out along a high, grassy bank. From its higher elevations, where the homes are located, the bank gradually descends into the body of water known as Pearl Lagoon. From the village, which is accessible only by water, it is a one hour's dorie (dugout canoe) ride to the nearest commercial center, the town of Pearl Lagoon (Figure 2). Using a map and mileage scale, this is estimated to be a distance of 8 miles. The nearest villages, Brown Bank and Raitipura, are 45 minutes and 50 minutes away by dorie, respectively.

Nietschmann has described the beach-lagoon-swamp type of ecosystem into which Kakabila and the entire Pearl Lagoon area have been classified (6). The plant and animal life in the lagoon area are influenced by salt water from the sea and fresh water from the land. Important marine influences include the presence of sea organisms in the lagoon waters. Fresh water from the land accounts for the lush, rain forest-type vegetation typical of the area. In this type of

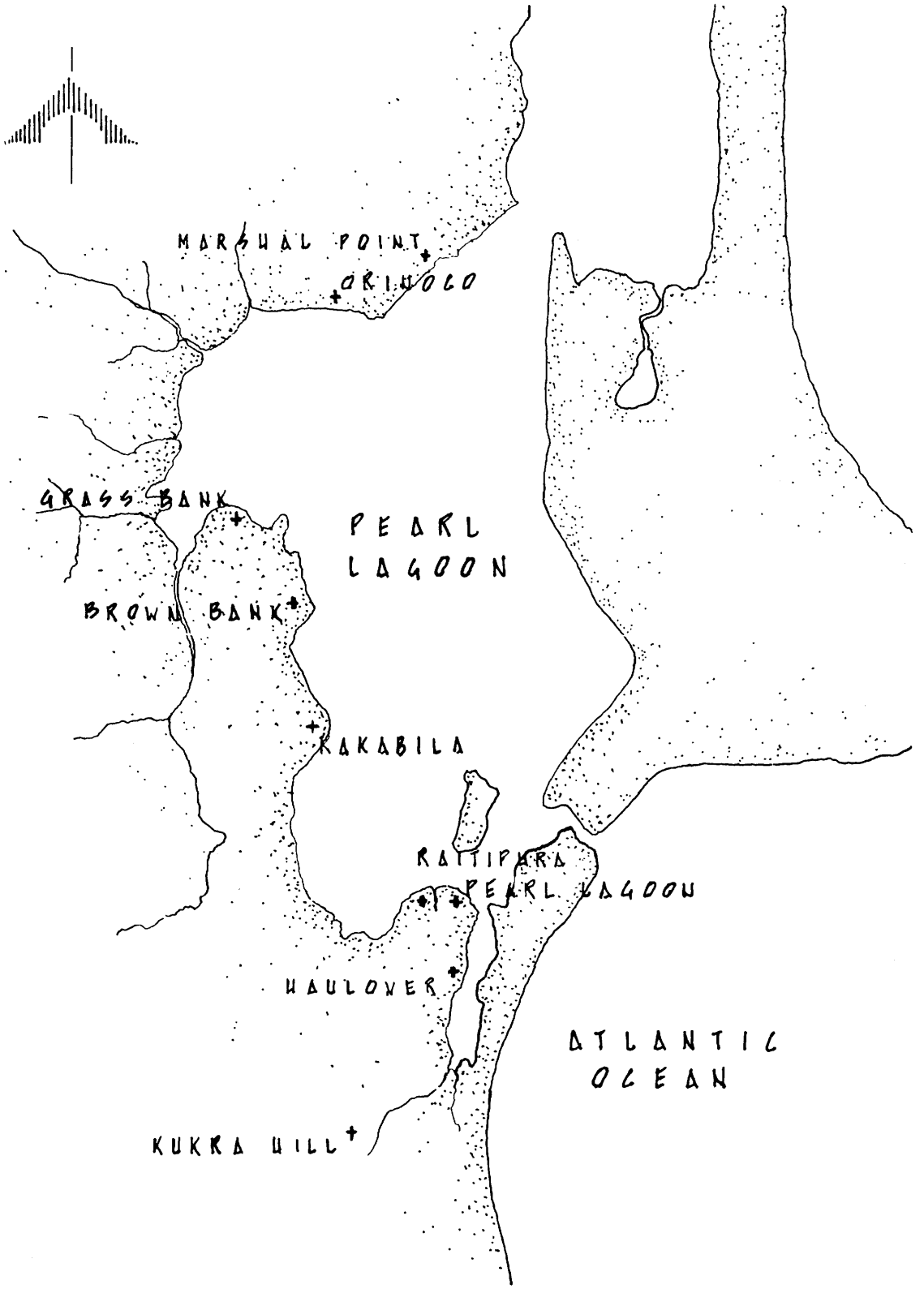


Figure 2. Map of Pearl Lagoon area.

ecosystem both fresh and salt water-based food resources may be exploited.

The soil in the area has been classified as predominately hydramorphic soil and beach sand (27). In areas with these types of soils, drainage is typically excessive, the soil is almost all sand, and soil nutrients are low (6).

The entire Miskito Coast has a climate typical of a humid, tropical area (27). Although there are no official temperature, relative humidity, and rainfall figures available for the Pearl Lagoon area, these figures are available for Bluefields from the National Meteorological Service station located there. Bluefields is located approximately 25 miles south of the town of Pearl Lagoon.

Average monthly temperatures for Bluefields range from 24 to 27°C (75 to 80°F). Mean relative humidity readings vary from 78% to 90%. Nietschmann noted in Tasbapauni, a village in the Pearl Lagoon area north of Kakabila, that this high temperature and high humidity hampered food preservation and storage. Unless eaten quickly, many foods spoiled (6).

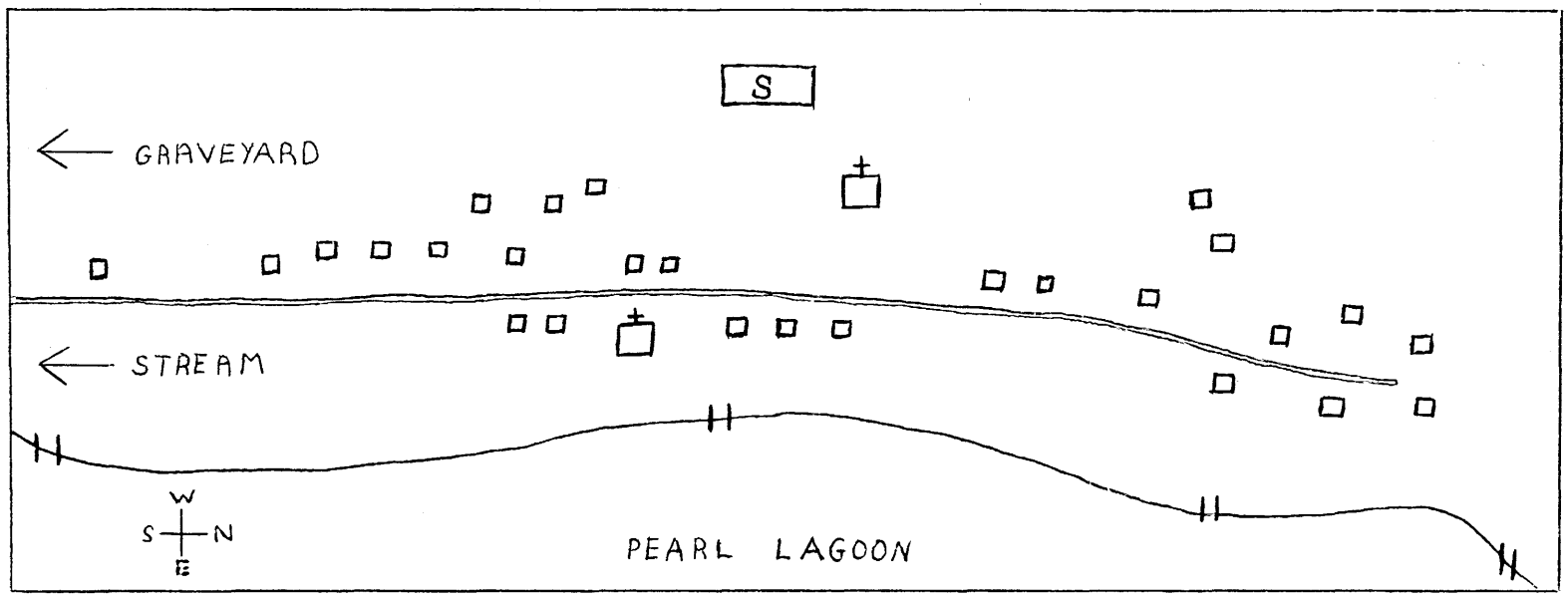
According to a map which divides Nicaragua into rainfall belts by mean annual rainfall, the Pearl Lagoon area and Bluefields are located in the same rainfall belt (27). The average annual rainfall in Bluefields is 4145 mm (163 inches) (6). However, throughout the Miskito coast, rainfall is highly local in character. In Bluefields annual extremes

of 1528 mm (60 inches) in 1935 and 5079 mm (200 inches) in 1927 have been recorded (8).

A precipitation maximum occurring in July and August is characteristic of the Miskito Coast. For Bluefields the average monthly rainfall during these two months is as follows: July—716 mm (28 inches), and August—578 mm (23 inches). The Bluefields daily precipitation totals for July and August, 1976, (the research period) were obtained from the National Meteorological Service station in Bluefields (Table A-1, Appendix B). Although all daily totals were not available, the sum of the available figures exceeds the average figures for Bluefields, cited earlier.

However, a comparison of the researcher's weather record for Kakabila, concerning number and length of rainy periods daily during the research period (Table A-2, Appendix B), with the official record for Bluefields shows that the daily occurrence of rainfall in the two towns did not always correspond. Kakabila had marked rainfall on many days when Bluefields had none, and vice versa.

The village itself was composed of 29 occupied homes, a school, and both an Anglican and a Catholic Church (Figure 3). A footpath ran through the center of the village. Kakabila was surrounded on three sides by forest, known to the villagers as the bush, with the fourth side overlooking the lagoon.



DIRECTIONS AND DISTANCES
TO NEIGHBORING AREAS

South, Plantation area, 30 minutes by dorie

East, Pearl Lagoon, 1 hour by dorie

North, Brown Bank, 45 minutes by dorie

LEGEND

Path
Home
Church
Boat Landing
Lagoon Bank
School

Figure 3. Map of Kakabila.

Twenty-six of the 29 homes had separate structures for sleeping and meal preparation. The typical sleeping unit was a three-room structure which stood on stilts. The floor was built approximately three feet from the ground. The walls and floors were built of rough, unpainted boards, and the roof and window shutters were made of dried palm leaves. The most common, and sometimes the only, furnishings were a wooden bench and a bed. Five of the 29 homes were painted on the outside, and four had corregated zinc roofs.

The typical meal preparation unit, called a kitchen, was located behind the sleeping unit. It had a dirt floor, and the walls were constructed by driving tall, slender posts into the ground very close together. The roof was palm thatched. A feature of the kitchen was a window which had a platform extending to the outside. Dishes and food were washed on this platform, called a washstand.

The dorie was the means of transportation from Kakabila to agricultural areas and surrounding villages. Although every family owned at least one dorie, none of the villagers owned a motor-powered boat.

There were two latrines in the village. One was located behind the Catholic Church, and the other was owned by the family living at the extreme south end of the village. Other villagers utilized the bush for waste disposal.

There were five large, man-made wells in the village that served as sources of water for cooking and drinking. One well was covered at the opening, another had a high shelter built over it and a low fence around it, and the other three had no covering or protection from wandering animals. At these three wells there was no obvious attempt to separate water supply from nearby sewage disposal of humans and animals.

II. THE POPULATION

According to Florentine Joseph, the only native of Kakabila credited with knowing the history of the village, Kakabila was originally one in a series of villages in the Pearl Lagoon area inhabited by the Kukra Indian tribe (29). This is supported in the literature by a map of the area as it was in 1600, which shows a Kukra Indian village at the site where Kakabila is today (7).

Helms has reviewed the history of the Miskito Indians as they grew from a small tribe of around 2000 people to the dominant tribe on the east coast (7). In the late seventeenth century English buccaneers landed at Cape Gracias a Dios on the northern tip of Nicaragua's east coast. They established friendly relations with the native Indians living there, the Miskito. These natives acquired guns from the buccaneers and were soon attacking neighboring tribes, either killing them, capturing them to sell as slaves, or

driving them away. Thus began the expansion of the Miskitos' territory.

By 1850 the Kukra Indians living along the Pearl Lagoon had been driven from their villages by the Miskito (7). Yet, the fate of those Kukras who had lived in Kakabila is not known (29). A map of the Pearl Lagoon area in 1940 shows that the Miskito had resettled the area by that year (7). Joseph reports that Kakabila was populated by the Miskito in the early 1900's, when a hurricane demolished all of the homes in the village (29). The last hurricane reported to have hit the Pearl Lagoon area was on October 9, 1906 (6).

Today, the Miskito are the second most widely distributed Indian group in Central America, after the Maya. Their present-day population in Nicaragua is approximately 35,000 (30). These people are considered a mixed race, since there has been much intermarrying with Blacks (called Creoles), Spaniards, Caribs, Sumu, Syrians, and Chinese (6, 31). Both the Caribs and Sumu are smaller Indian groups living in Nicaragua (6).

Table 1 includes the reported ethnic or race affiliation of the 150 inhabitants of Kakabila. This information was collected through key informant interviewing. According to village informants, it would have been an insult for an outsider, such as the researcher, to individually question each villager concerning his or her ethnic affiliation. The

TABLE 1

SELECTED DEMOGRAPHIC CHARACTERISTICS OF THE RESEARCH POPULATION

Characteristic	Number of People	% of Population
Ethnic affiliation		
Miskito	126	84.0
Miskito-Creole	9	6.0
Miskito-Carib	5	3.3
Miskito-Chinese	4	2.7
Miskito-Spanish	2	1.3
Carib-Creole	2	1.3
Miskito-Sumu	1	0.7
Creole	1	0.7
Age (years)		
0- 5	33	22.0
6-10	28	18.7
11-15	12	8.0
16-20	17	11.3
21-25	14	9.3
26-30	5	3.3
31-35	5	3.3
36-40	11	7.3
41-45	7	4.7
46-50	6	4.0
51-55	3	2.0
56-60	4	2.6
61-65	1	0.7
66-70	1	0.7
71-75	2	1.3
76-80	0	0.0
80+	1	0.7
Sex		
Male	74	49.3
Female	76	50.7

majority of the population (84%) were reported to affiliate totally with the Miskito culture. The ethnic affiliation of another 14% was reported to be half Miskito and half other cultures. These two groups account for 98% of the total village population. Thus, Kakabila's reputation as a Miskito village seems realistic.

Of the 150 village inhabitants, 49% were 15 years of age or under (Table 1). This age group is generally considered economically dependent and unproductive. In the Miskito village of Tausbapauni, Nietschmann found that those individuals between the ages of 16 and 50 were the most productive in regard to the production and distribution of food (6). This age group made up 43% of the total Kakabila population (Table 1). There was almost an equal number of males and females in the population (Table 1).

Of the 27 separate households in the village, five were extended families. The number of people in each household varied from one to eleven, with 61% of the population living in a dwelling which housed five to eight people.

No record of births and deaths had been kept for the village. However, villagers report that there have been 16 births in the village during the past two years, and six deaths. Of these six deaths, two were infants 0-1 year old. The mean annual birth rate during the past two years is eight births per 150 persons, and the death rate is three deaths

per 150 persons. A rough estimate of the annual growth rate may be calculated as birth rate per 1000 persons minus death rate per 1000 persons divided by 10. This figure indicates that Kakabila's population has increased at an annual rate of 3.3% during the past two years, disregarding emigration and immigration. Nietschmann estimated that the nearby village of Tausbapauni is increasing at a rate of 3.0-3.5% annually (6).

Most of the dialogue between Kakabila villagers was in Miskito, the native dialect. However, all of the villagers spoke and understood Creole English to varying degrees. Creole English has been defined as an English-based Caribbean dialect (6). In the local school all instruction was in Spanish, the national language of Nicaragua. Thus, the children in Kakabila commonly spoke and understood all three languages.

The local school was housed in a special building in the back of the village (Figure 3, page 20). The teacher, a native Kakabilian, was paid by the national government. Education through sixth grade was provided at this school. For further education, the children had to be sent to the larger schools in Pearl Lagoon or Bluefields. This usually involved considerable expense for the child's room, board, and school supplies, and most village families could not afford to provide this opportunity for their children.

Not all of the eligible Kakabila children attended school, and few finished sixth grade. During the past five years only two children from the village had been sent to Pearl Lagoon or Bluefields to continue their education. The village schoolteacher estimated that 50% of the villagers were illiterate (32).

The Miskito have traditionally been identified as hunters, fishermen, and farmers (6, 7, 31). During the research period, the greatest amount of effort was observed to be expended toward farming. Annual income was reportedly derived mainly from agricultural labor, such as clearing ground for planting, and from selling shrimp, rice, and various plantation crops outside the village.

Local lay leaders conducted services in both the Catholic and Anglican Churches each Sunday, and most villagers attended both services. Aside from the Sunday services, there were no other regular, church-related activities.

In Kakabila, a village president was elected annually by majority vote. The president's responsibilities were to be in charge of community projects sponsored by the national government and to represent the community at regional government meetings (32). All legal matters were settled by a judge, located in Pearl Lagoon.

In this village, access to modern medicines and medical practices existed along with the traditional curer, who used plant or bush medicine. A government clinic staffed with two nurses was located in Pearl Lagoon. The nearest hospital was in Bluefields. All of the village families except two said that they went to the clinic in Pearl Lagoon for treatment when they were sick. However, it was observed that the villagers went to Pearl Lagoon for medical help only after bush medicine had failed. Village informants verified this observation. The bush medicine was most commonly obtained from the medicine man in the village.

The villagers reported various minor health problems during the two months prior to the research period. According to the head nurse at the Pearl Lagoon clinic, the majority of Kakabilians treated there were children. The most frequently encountered problems were parasitic infections and minor childhood infections with accompanying fever (33).

Nutrition studies of selected east coast Miskito villages were conducted in 1975 and 1976 by U.S. midwestern university students. Weight-for-age data were used to document the nutritional status of children under six-years of age using INCAP standards. Of the 305 children weighed in 1975, 58, 33, 7, and 1% were classified, respectively, as normal weight, low weight, malnourished, and very

malnourished (34). Of the 763 children weighed in 1976, 57, 35, 8, and 1% were classified, respectively, as normal weight, low weight, malnourished, and very malnourished (35).

Weight and age data were collected on children under six-years in Kakabila in February, 1976, and again in August, 1976. These data were used to document nutritional status using INCAP weight-for-age standards (Table 2) (36). The percentage of Kakabila children in each classification is analogous to the percentage of Miskito children in each classification in the 1975 and 1976 studies.

III. FOOD PROCUREMENT

A culture must provide for the basic food needs of its members (37). In Kakabila, the villagers derived their rainy season food supply from various sources. These included the plantation (farm), hunting, fishing, domestic animals, fruit-bearing trees in the village, gathering of wild vegetation, the food store, and other people.

Plantation was the term commonly used to refer to the plot of ground where crops were cultivated by slash-and-burn techniques. Twenty-three of the 27 households reported cultivating a plantation during the research period. The members in the households not cultivating their own plantation stated that they shared both the work and the food from the plantation of relatives living in the village. The

TABLE 2

WEIGHT-FOR-AGE CLASSIFICATIONS OF KAKABILA CHILDREN UNDER AGE SIX IN FEBRUARY, 1976, AND AUGUST, 1976 (36)

Classification	February, 1976 Number of Children N = 27	%	August, 1976 Number of Children N = 34	%
Normal weight	14	52	20	59
Low weight	10	37	10	29
Malnourished	3	11	3	9
Very malnourished	0	0	1	3

number of plantations being cultivated by each household varied from zero to five (mode = one).

It was a 30 minute dorie ride from the village to the plantation area boat landing. From the landing, a series of paths branched out leading to the various plantations. The villagers had to walk down these paths from 15 to 45 minutes to reach the individual plantations. Men, women, and male children worked on and procured food from the plantations. Key informants stated that members from each household went to their plantation(s) to procure food an average of three times each week. Various foods were reported by key informants to be available from the plantations during the rainy season (Table A-3, Appendix C).

The following animals were reported to be available as food from hunting during the rainy season: armadillo, givenot, kiaki, pecari, quash, and wari (Table A-3, Appendix C). Hunting with rifles was limited because only six men in the village owned rifles. This method of hunting was restricted to adult men. The most common hunting method was to let a trained hunting dog trail and kill the animal. Armadillo, givenot, and kiaki could all be killed in this manner. Twenty households owned hunting dogs, and both men and women engaged in this type of hunting.

The villagers used two different methods to catch fish during the research period. First, fish were caught using a

gill net. A gill net was a large fishing net approximately five feet wide and forty feet long with long poles attached to the two short ends. The nets were purchased for about $90 U.S. The poles were stuck in the soft mud of the lagoon to hold the net upright while underwater. The fish were caught as they tried to swim through the net.

The men went into the lagoon in their dories each night to set the gill nets and collected them at sunrise each morning. The researcher observed individual daily catches of from zero to 23 fish. Only three households in the village owned a gill net. However, the gill net owners usually sold a portion of their catch to other villagers. Both men and women fished in the deeper areas of the lagoon from their dories using a hand-held line. Using both this method and the gill net method of fishing, seven types of fish were caught during the rainy season (Table A-3, Appendix C).

Fish was not the only food available from the lagoon during the rainy season. Cockles, small shellfish which inhabited the mud in the lagoon, were sometimes dug and, near the end of the rainy season, lobsters could be caught (Table A-3, Appendix C).

In total, there were 302 chickens, 122 hogs, and 38 cows owned by the villagers at the beginning of the research period. Ownership of these domestic animals, however, was

distributed unevenly among households (Table A-4, Appendix D). The researcher was repeatedly told by the villagers that chickens, hogs, and cows were raised to sell, not to eat. Some families even left the hens' eggs in the nest anticipating that the eggs were fertile, and thus another chicken would be produced. However, key informants said that some villagers occasionally ate hens' eggs when they had no fish.

Only one of the 38 cows in the village was milked regularly. Key informants said that people in Kakabila seldom drank milk. Statements such as, "I like milk, but I can't remember the last time I drank any," were common among the adults.

Key informants reported that each household planted trees near the house from which food could be procured during the rainy season. A variety of foods were available to households from these trees during the rainy season (Table A-3, Appendix C). Each household owned several coconut trees.

The young children were the only villagers who regularly participated in gathering wild plant foods. During the rainy season, the children gathered guava, plums, and grapes from the bush surrounding the village, and from the lagoon bank (Table A-3, Appendix C).

Various food and nonfood items could be bought at two small grocery stores, called shops, set up in two of the

village homes. Over a four-day period, the researcher observed in the shop which key informants indicated had the greater variety of merchandise and the greater volume of sales. The merchandise for sale, as well as the amount of each item in stock and the price per unit, were noted (Table 3). Eleven of the 21 items for sale were food items.

During the four-day observation period, 79% of the total number of items sold were food items (Table 4). The food item sold most often was sugar, and the food item sold in greatest quantity was flour. The researcher observed, and key informants confirmed, that villagers tended to buy only enough of a food item to last one meal or one day. Key informants said that this was related to storage problems in the home (the presence of rats and roaches), lack of money to buy large quantities of food, and habit—the villagers were accustomed to buying food in small quantities.

Of the shop's 56 customers observed during the four days of observation, 52% were women, 39% children, and 9% men. The mean number of items bought per customer was two. Without exception, the villagers shopped at the village store in the morning before breakfast or in the afternoon before supper.

Six shops were located in the nearby town of Pearl Lagoon. In general, these shops had a greater variety of merchandise, and merchandise was less expensive than at the

TABLE 3

VILLAGE STORE INVENTORY, AUGUST 9, 1976

Item	Amount in Stock	Price per Unit*
sugar	225 lbs.	c$1.30/lb.
flour	215 lbs.	c$1.90/lb.
baking powder	1.5 lbs.	c$.10/teaspoon
rice	30 lbs.	c$1.50/lb.
coffee	17 lbs.	c$7.00/lb. or c$.50/oz.
cookies	16 pkg. with 4 per pkg.	c$.60/pkg.
candy	500 pieces	c$.10/piece
rum	24 pints	c$10.00/pint
beer	30-24 oz. bottles	c$3.50/bottle
Coca-Cola	5-16 oz. bottles	c$1.50/bottle
vermouth	18 pints	c$10.00/pint
cigarettes	61 pkg.	c$2.00/pkg. or c$.10/each
cured tobacco leaf	6 leaves	c$.50/leaf
notebooks	15	c$1.00/each
pencils	12	c$.60/each
razor blades	11 pkg.	c$.60/pkg.
kerosene	10 gallons	c$1.00/pint
thread	12 spools	c$.60/spool
laundry soap	8.5 bars	c$1.50/bar
laundry blue	44 pkg.	c$.50/pkg.
toothpaste	1 tube	c$2.00/tube

*Value expressed in cordobas. One cordoba = U.S. $.14.

TABLE 4

VILLAGE STORE SALES, AUGUST 9-AUGUST 12, 1976

Item	Number of Sales	Total Amount Bought	Mode Amount Bought
sugar	27	18 lbs.	1/2 lb.
coffee	16	26 oz.	1 oz.
baking powder	16	19 teaspoons	1 teaspoon
flour	15	19 1/2 lbs.	1 lb.
cigarettes	9	1 pkg. plus 24 individual	2 individual cigarettes
rice	7	11 1/2 lbs.	1 1/2 lb., 2 lbs.
soap	4	2 1/2 bars	1/2 bar
kerosene	4	3 pints	1/2 pint, 1 pint
tobacco leaf	3	4 leaves	1 leaf
cookies	1	1 pkg.	1 pkg.
toothpaste	1	1 tube	1 tube
laundry blue	1	1 pkg.	1 pkg.
Total	104		

shops in Kakabila. Although Kakabilians sometimes bought food at the shops in Pearl Lagoon, they tended to buy only those items that they bought in the Kakabila shop. Also, as in the Kakabila shop, only a small quantity of each food item was purchased.

The Kakabila villagers had another food source that they often depended on during the rainy season—each other. A household could secure food from other households in the village through purchase or loan, or as a gift. Key informants provided much information and insight concerning this food source.

Those foods which the villagers most frequently purchased from each other were plantation foods and food procured through fishing or hunting. In order for one household to buy food from another household, two conditions had to be met: (1) the household buying must not have any of the particular food being bought, and (2) the household selling must have more than enough of the food being bought to satisfy their wants and needs for that day. Whether or not the household wanted to sell the food was not considered. Homemakers reported that they felt obligated to sell a portion of their food supply to anyone in the village who asked to buy.

A homemaker might borrow a certain food from her relatives or close friends in the village when she had none

of that food. The foods most frequently borrowed were plantation foods. Repayment was almost always prompt—sometimes on the same day that the food was borrowed.

A gift of food was given to a household for one of two reasons. First, if a homemaker had an excess of a particular food, she might send a portion of the excess to her close friends and/or relatives in the village. Foods given as gifts in this situation were most frequently meat from hunting or fishing. Second, a household might receive a gift of food as a result of the homemaker asking her female close friends or relatives to give her food. This was called "begging" food. A homemaker would ask for those foods which she didn't have and others had in excess of their needs for the day. Foods given as gifts in this situation were most frequently fish or plantation foods.

The daily lifestyle of the Kakabila villagers revolved around securing food. A daily schedule of routine, food-related activities for a typical Kakabila family was reconstructed by two key informants and verified through observation by the researcher (Table 5). The family normally ate three meals each day. However, on some days only two meals were eaten (variations 1 and 2, Table 5). Sunday meals also varied from the typical pattern (variation 3, Table 5).

TABLE 5

DAILY SCHEDULE OF ROUTINE, FOOD-RELATED ACTIVITIES OF A KAKABILA FAMILY

Time		Activity
Morning	A.	The mother or older girl cooks breakfast. She cooks cassava, coffee, and tea.
	B.	A child is sent to the store to buy coffee and sugar.
	C.	An adult or older child is sent to buy fish.
	D.	The fish is washed and salted.
	E.	The family eats breakfast; then the females clean the kitchen.
	F.	Those going to the plantation leave. (Usually the mother and father).
	G.	The mother or older girl cooks dinner. She cooks rundown (fish and starchy vegetables boiled in coconut milk).
Noon	H.	Those who went to the plantation return home.
	I.	The family eats dinner; then the females clean the kitchen.
Afternoon	J.	The mother or older girl cooks supper. She cooks cassava, coffee, and tea.
Evening	K.	The family eats supper; then the females clean the kitchen.

Variation 1

The family could not purchase fish before breakfast because it was not available. The schedule proceeds through Activity F above, omitting Activity D, then continues as follows:

TABLE 5 (continued)

Time		Activity
Morning (continued)	Ga.	A family member, usually the mother, leaves to go fishing in the lagoon.
Noon	Ha.	The family member who went fishing returns home, as well as those who went to the plantation.
	Ia.	The mother or older girl cooks dinner. She cooks rundown.
Mid-afternoon	Ja.	The family eats dinner; then the females clean the kitchen.

Variation 2

The family has no starchy vegetables to cook for dinner. The schedule proceeds through Activity F above, then continues as follows:

Noon	Gb.	Those who went to the plantation return home.
	Hb.	The mother or older girl cooks dinner. She cooks rundown.
Mid-afternoon	Ib.	The family eats dinner; then the females clean the kitchen.

Variation 3

On Sunday, no one goes to the plantation, so Activity F is omitted. Cake, a thick pudding made from starchy fruit or vegetables and sugar, is eaten with the coffee and tea for breakfast and supper. The cake was prepared by the mother or older girl on Saturday afternoon. Cassava is omitted in Activities A and J.

CHAPTER 4

SELECTED FOOD BEHAVIOR OF PARTICIPANT FAMILIES

A case analysis approach is used to present data obtained from four Kakabila families cooperating in this project. The case analysis method of data handling has two aspects—description and explanation (38). Data are described in terms of a social process; then implications are drawn from the description.

In this chapter, a separate section is presented on each of the four participating families. Each section contains demographic, behavioral, and quantitative data obtained from observation, participant observation, and informal questioning.

I. FAMILY A

The researcher conducted research in the home of family A from July 12 through July 18. This family was composed of a father, age 75; a mother, age 39; two daughters, ages 16 and seven; and two sons, ages 25 and 10. The father, whose ethnic affiliation was Creole, was originally from the village of Pearl Lagoon. The mother's ethnic affiliation was Miskito. She had lived most of her life in Kakabila. The children reported their ethnic affiliation as half

Miskito and half Creole. This family had always resided in Kakabila, except for a four-year span from 1962-66, when they lived in Pearl Lagoon.

Family A's home had separate structures for sleeping and meal preparation. The three-room sleeping structure was built on stilts. The walls and floors were made of rough, unpainted wood, and the roof was palm-thatched. The kitchen (meal preparation unit) was located directly behind the sleeping unit. It was characterized by a dirt floor, palm-thatched roof, and walls made by driving wooden poles into the ground.

The father reported his occupation as "plantation work" or farming. He said that the family derived the bulk of their income from rice grown on the plantation. Rice was sold in October through December.

During the observation week, it was noted that each family member was in charge of a specific, food-related activity. The father's physical activity was limited due to age. His main task was to direct his older son in the plantation work that needed to be done. The mother procured food from the plantation and prepared breakfast each morning.

The 16-year-old daughter directed the bulk of the kitchen-based activities. She cooked dinner and supper and was in charge of all buying, selling, borrowing, lending, and gifts of food. She decided on the food to be cooked for

each meal and how the food would be cooked. She was also in charge of cleaning and dressing the fish caught by her brothers each morning.

The older son had three main food-related responsibilities. First, he was in charge of setting and collecting the family's gill net each day. Second, he was responsible for taking his mother in the dorie to the plantation to procure food. He also performed plantation work directed by his father.

The younger son helped his brother with the gill net each day. Also, on Saturday, he helped his mother with the plantation work. The younger girl was responsible for keeping the water buckets in the kitchen full, called "fulling water."

A list was constructed of the food sources and foods from each source that this family reported to be available to them during the rainy season. Next, the home food inventory made on the first day of observation (noting food and source), the record of all foods coming into the home during the week and their source, and the record of the source of all foods consumed were compiled. From this, a list was made of the foods actually procured, consumed, or available in the home during the observation week. By comparing the two lists (Table 6), one can see that many of the foods reported as available were not procured or consumed, and

TABLE 6

FOODS REPORTED AVAILABLE AND FOOD RESOURCES OBSERVED
IN THE HOME OF FAMILY A

Source	Foods Reported Available	Food Resources Observed	Comments
A. Family Procurement			
Plantation	Banana (5 varieties), cassava, coco, dasheen, pineapple, sugar cane, yam (2 varieties)	Banana (3 varieties), cassava, dasheen, pineapple, potato, sugar cane	
Hunting	None	None	Owned neither a rifle nor a hunting dog.
Fishing	Variety of fish	Variety of fish	Owned a gill net.
Domestic Animals	None (owned 7 hogs and 5 chickens)	None	Reported that these animals were raised to sell.
Village Trees	Breadfruit, coconut, lime, mango, papaya	Coconut, lime, mango, papaya, lime leaves	Lime leaves used for making tea.
Wild Vegetation	Grapes, guava	Chainy root, grapes, guava	Chainy root was used to make tea.
Kakabila Shop	Baking powder, coffee, flour, rice, salt, sugar	Baking powder, coffee, flour, rice, salt, sugar	

TABLE 6 (continued)

Source	Foods Reported Available	Food Resources Observed	Comments
Other Shops	Above, plus red beans, black pepper, yeast, fresh cabbage, and tomatoes	None	
B. Procurement By Others			
Others—Loan or Gift	Plantation foods, foods from village trees, foods from hunting	Plantation foods—cassava, dasheen, pineapple, sugar cane; fish; food from hunting—armadillo; foods from village trees—coconut, supa; prepared foods—bread, cassava cake, rice with beans	Prepared foods were given as gifts in exchange for labor.
Others—Sale	Plantation foods, foods from village trees, foods from hunting	Plantation foods—cassava, pineapple; food from village trees—breadfruit, coconut	

vice versa. No food resources were observed available in the home from the following sources: hunting, domestic animals, and shops in other villages.

The source of each serving of food eaten by individual family members during the week was noted (Table 7). A serving of food was defined as the amount of a particular food eaten by an individual at a meal or between meals. Servings of mixed dishes, for example cake or tortilla, were listed under the source of the major ingredient.

Seventy-four percent of the total servings of food for the week came from food directly secured by the family from the plantation, fishing, village trees, or wild vegetation. The food for 14% of the servings for the week was purchased from the village shop, or other people. Loans or gifts of food from other people accounted for 12% of the total servings of food for the week. The plantation was the source of the greatest number of servings of food.

The number of servings and estimated amount per serving of each food eaten during the week was noted (Table 8). For breakfast, those foods served four or more days out of seven were cassava, fish, coffee, and chainy root tea (refer to Appendix E for food preparation methods observed and identification of mixed dishes). The foods served four or more days for dinner were cassava, coconut milk, fish, and green bananas. These were cooked as rundown. The foods served

TABLE 7

TOTAL AND PERCENT OF TOTAL SERVINGS OF FOOD FROM EACH SOURCE PER FAMILY

Source	Number of Servings				Percent of Total Servings			
	Family				Family			
	A	B	C	D	A	B	C	D
A. Family Procurement								
Plantation	165	128	156	245	38	43	30	46
Hunting	0	0	0	8	0	0	0	2
Fishing	86	0	54	4	20	0	10	1
Domestic Animals	0	1	2	0	0	<1	<1	0
Village Trees	54	46	39	113	12	15	8	21
Wild Vegetation	19	0	3	4	4	0	<1	1
Kakabila Shop	37	50	100	4	9	17	19	1
Other Shops	0	0	27	32	0	0	5	6
B. Procurement By Others								
Others—Loan or Gift	55	43	94	50	12	15	18	9
Others—Sale	22	28	42	69	5	9	8	13
Total	438	296	517	529	100	100	100	100

TABLE 8

CONSUMPTION PATTERN, NUMBER OF SERVINGS, AND ESTIMATED AMOUNT OF EACH FOOD EATEN BY FAMILY A

Food	Number of days served	Number of servings	Mean of estimated amount per serving	Included in family's reported weekly pattern
A. Breakfast				
Cassava	6	33	3 1/2 pieces (4 pieces = 1 medium cassava)	yes
Coffee	5	19	1 cup	yes
Chainy root tea	4	12	1 cup	yes
Fish	4	12	1 piece (approximately 3 ounces)	yes
Cassava cake	2	12	1 square (1 square = 3" × 3")	"cake"—yes
Coconut bun	1	6	1/4 bun (4" round bun)	no
Fish roe	1	4	1/4 total roe from 1 fish	no
Limeade	1	3	1 cup	yes
Dasheen	1	2	1 piece (3 pieces = 1 medium dasheen)	yes
Potato	1	2	1 medium potato	no
B. Dinner				
Cassava	7	42	4 pieces (4 pieces = 1 medium cassava)	yes
Coconut milk	7	42	1/2 cup	yes
Fish	7	40	1 piece (approximately 4 ounces)	yes
Green banana	5	26	1 banana	yes
Breadfruit	1	6	1/9 of whole	yes
Beans with rice	1	6	1/2 cup	no
Coffee	1	3	1 cup	yes
Limeade	1	1	1 cup	yes

TABLE 8 (continued)

Food	Number of days served	Number of servings	Mean of estimated amount per serving	Included in family's reported weekly pattern
C. Supper				
Cassava	6	29	4 pieces (4 pieces = 1 medium cassava)	yes
Fish	5	29	1 piece (approximately 3 ounces)	yes
Wheat flour tortilla	2	11	1/3 of 8" round	yes
Limeade	2	7	1 cup	yes
Coffee	2	6	1 cup	yes
Chainy root tea	2	5	1 cup	yes
Rice	1	5	2 cups, cooked	no
Fish liver	1	1	Approximately 3 ounces	no
Dasheen	1	1	1 piece (3 pieces = 1 medium dasheen)	yes
D. Between meals				
Mango	5	22	2 whole	yes
Pineapple	4	10	1/4 of whole	yes
Ripe banana	3	8	1 1/2 bananas	yes
Coconut water	3	3	Water from 1 coconut	yes
Papaya	2	8	1/8 of whole	no
Sugar cane	2	6	Juice from 18" cane	no
Supa	2	5	4 whole berries	no
Immature coconut	1	2	1 whole coconut	no
Bihu berries	1	1	12 berries	no
Guava	1	1	1 whole	no
Armadillo	1	1	1 piece (approximately 2 ounces)	no

for supper four or more days were cassava and fish. Only mango and pineapple were eaten on four or more days between meals.

Those foods served most often and on the greatest number of days were cassava and fish. Each of the above-mentioned foods was listed by the family as part of their weekly consumption pattern (Table 8). Fifty percent of the foods listed as part of the weekly consumption pattern were eaten four or more days out of the week.

Miscellaneous factors were noted during the week which affected this family's food supply. First, a portion of the fish procured was given away or sold. Fish were caught in the gill net on five out of the seven days of observation. On each day from 30-75% of the catch was given away to relatives or friends, or sold. Fish was the only food observed to be given away or sold during the week.

Heavy rains prevented family members from going to the plantation for food as planned on the second day of observation. As a result, the family's home supply of plantation food was depleted. The family adapted to this situation by (1) borrowing cassava for breakfast on one day, (2) buying cassava for dinner on one day, and (3) making wheat flour tortilla for supper on two days. The 16-year-old daughter reported that the family ate tortilla only when their home supply of plantation food was low or depleted.

The fish eaten for four meals had been preserved for approximately 6-24 hours. On two days, fish was eaten for supper which had been preserved from the morning catch by scoring the cleaned and dressed fish, coating it with a mixture of salt and lime juice, and storing it in a covered dish. On two other days, fish was eaten for the noon meal which had been caught on the morning of the previous day. This fish was preserved by cutting the meat into long, thin strips which were smoked and dried over the fire.

Each family member was usually served a portion of each type of food prepared for a family meal. The largest servings were usually given to the father and the older son and the smallest to the two younger children.

II. FAMILY B

Family B cooperated in the research project from July 26 through August 1. This family was made up of a father, age 57; a mother, age 57; a daughter, age 20; a grandson, age 8; and a granddaughter, age 5. The granddaughter and grandson were the children of a daughter who lived in another village. The ethnic affiliation of the three females was Miskito. The two males reported that they were half Miskito and half Spanish. Both the mother and the father were born and grew up in Kakabila, and the family had always lived there.

This family's home was composed of separate sleeping and meal preparation structures. The two-room sleeping structure was only two years old. It was built on stilts, had walls built of unpainted boards, and had a corrugated zinc roof. The kitchen was located directly behind the sleeping unit, similar to family A.

The father reported that he was a farmer. He said that the family derived most of its income from selling rice from the plantation and from selling shrimp in October. Shrimp was caught in the lagoon and sold to commercial fishing boats in the fall.

Both the mother and father were responsible for obtaining food from the plantation. In addition, the mother was in charge of preparing breakfast, and the father went fishing when fish could not be bought in the village for the noon meal. The older girl was responsible for the same kitchen-based activities as described for the older girl in family A. In addition, she had the task of buying fish each morning.

In the same manner as for family A, lists were constructed of the food sources and foods reported by the family to be available to them during the rainy season, and of the food resources actually observed in the home (Table 9). Many of the foods reported as available were not procured or consumed, and vice versa. No foods were observed

TABLE 9

FOODS REPORTED AVAILABLE AND FOOD RESOURCES OBSERVED
IN THE HOME OF FAMILY B

Source	Foods Reported Available	Food Resources Observed	Comments
A. Family Procurement			
Plantation	Banana (5 varieties), cassava, coco, pineapple, sugar cane	Banana (3 varieties), cassava, pineapple, sugar cane	
Hunting	Armadillo, givenot, kiaki	None	Owned both a rifle and a hunting dog.
Fishing	Variety of fish	None	Did not own a gill net.
Domestic Animals	Chicken eggs (owned 14 hogs and 6 chickens)	Chicken egg	Chicken egg was served to a visitor.
Village Trees	Breadfruit, coconut, lime	Breadfruit, cashews, coconut, lime, lime and orange leaves	
Wild Vegetation	Grapes, plums	None	

TABLE 9 (continued)

Source	Foods Reported Available	Food Resources Observed	Comments
Kakabila Shop	Baking powder, coffee, flour, rice, salt, sugar	Baking powder, coffee, flour, salt, sugar	
Other Shops	Above, plus red beans, yeast, fresh tomatoes, cabbage, onions	None	
B. Procurement By Others			
Others— Loan or Gift	None	Red beans, cassava, coconut, fish, mango, supa	Reported that other village households were "selfish with food."
Others— Sale	Fish	Banana cake, cassava, coconut, fish, armadillo	

available from the following sources: hunting, fishing, wild vegetation, and shops in other villages. Conversely, only one food was reported available from other people through loan, gift, or sale, while eight food items were observed available in the home from these sources during the week.

Fifty-eight percent of the total servings of food for the week came from the family plantation or village trees (Table 7, page 47). Twenty-six percent of the total servings were accounted for by food bought from other people or the village shop. Food acquired through loans or gifts from other people accounted for 15% of the total servings. The source of the greatest number of servings of food was the plantation.

The number of servings and estimated amount per serving of each food eaten for the week was noted (Table 10). Those foods served four or more days out of seven for the breakfast meal were cassava and coffee. Those served four or more days for the noon meal were cassava, fish, and coconut milk (rundown). Only cassava and orange leaf tea were served four or more days for supper, and between meals only coconut water was served on four or more days. Cassava was served more than any other food. Thirty-five percent of the foods listed as part of the weekly consumption pattern were eaten four or more days out of the week.

TABLE 10

CONSUMPTION PATTERN, NUMBER OF SERVINGS, AND ESTIMATED AMOUNT OF EACH FOOD EATEN BY FAMILY B

Food	Number of days served	Number of servings	Mean of estimated amount per serving	Included in family's reported weekly pattern
A. Breakfast				
Coffee	7	31	1 cup	yes
Cassava	6	21	3 pieces (4 pieces = 1 medium cassava)	yes
Johnny cake	2	9	1/2 of 4" round	yes
Ripe banana cake	1	5	2-3" × 3" squares	"cake"—yes
Wheat flour tortilla	1	4	3/4 of 7" round	yes
Breadfruit	1	4	1/6 of whole	yes
Armadillo	1	3	2-4 ounce pieces	yes
B. Dinner				
Cassava	6	26	1 piece (4 pieces = 1 medium cassava)	yes
Coconut milk	6	26	1/2 cup	yes
Fish	6	23	1 piece (approximately 4 ounces)	yes
Green banana pop	2	12	1 cup	"pop"—yes
Green bananas	2	9	2 whole	yes
Red beans	2	3	3/4 cup	no
Breadfruit	1	4	1/6 of whole	yes
Limeade	1	1	1 cup	yes
Egg	1	1	1 whole	no

TABLE 10 (continued)

Food	Number of days served	Number of servings	Mean of estimated amount per serving	Included in family's reported weekly pattern
C. Supper				
Orange leaf tea	4	17	1 cup	yes
Cassava	4	13	2 pieces (4 pieces = 1 medium cassava)	yes
Green bananas	3	9	1 whole	yes
Red beans	2	6	1/2 cup	no
Ripe banana pop	2	6	2 cups	"pop"—yes
Fish	1	5	1 piece (approximately 4 ounces)	yes
Johnny cake	1	5	1-4" round	yes
Breadfruit	1	5	1/6 of whole	yes
Ripe banana cake	1	4	1-3" × 3" square	"cake"—yes
Green banana pop	1	4	2 cups	"pop"—yes
Coffee	1	4	1 cup	yes
Armadillo	1	3	1 piece (approximately 4 ounces)	yes
D. Between meals				
Coconut water	4	6	From 1 coconut	yes
Ripe banana	2	7	1 banana	yes
Pineapple	2	4	3/4 of whole	no
Sugar cane	2	4	Juice from 18" cane	yes
Supa	1	5	8 whole berries	yes
Ripe banana cake	1	4	1/4 of 3" × 3" square	"cake"—yes
Cashew nuts	1	2	4 nuts	no
Mango	1	1	1 whole	no

Miscellaneous factors affecting the family's food supply were noted during the week. Family member's plans to go to the plantation for food were delayed for a day on the second day of observation due to family circumstances and on the fifth day of observation due to heavy rain. On both days, the family's supply of plantation food was depleted. The family adapted to these shortages by (1) making wheat flour tortilla or johnny cake for two breakfast and one supper meal, (2) "begging" cassava for one dinner meal, and (3) buying cassava for one dinner meal.

The fact that both the father and the granddaughter were ill for a period of time during the week possibly altered the family's food behavior in two ways. First, it could have increased the consumption of pop (Appendix E). Key informants reported that pop was often the only food fed to those who were ill. Pop was prepared for five meals during the week. The older daughter reported that pop was usually prepared no more than twice per week. Both the father and the granddaughter consumed only pop during their illness.

Second, because of the father's illness, the family possible derived less food from fishing than usual. The older daughter reported that the father usually went fishing in the lagoon to get the family's fish for each day. But, because he was ill during the week, the family had to purchase their fish or accept gifts of fish from others.

Due to the illness, and to the absence of certain family members for various meals, little can be generalized concerning relative serving sizes.

III. FAMILY C

From August 2 through August 8, the researcher observed in the home of family C, an extended family. This family was composed of the father, age 48; the mother, age 36; the mother's aunt, age 70; and two daughters, ages 9 and 19. The older daughter's husband, age 24; her daughter, age 5; and her son, age 8 months, also lived in the home. The ethnic affiliation of the family was Miskito, except for the mother, who reported that she was half Miskito and half Creole. The older daughter's husband and the aunt had resided in Kakabila less than two years. The other family members reported having lived in the village since birth.

This family's two-room sleeping structure was built of unpainted wooden boards. It stood on stilts and had a palm-thatched roof. The kitchen structure was located approximately 30 feet to the north of the sleeping structure. It had a dirt floor, palm-thatched roof, and walls made of wooden poles.

The father and the daughter's husband reported that they were farmers. Together they cultivated three plantations. The family's income was derived mainly from selling

rice grown on the plantations. The daughter's husband also contributed significantly to the family's income by working as a sugar cane cutter in a nearby village in the fall.

The older daughter and her mother shared the kitchen activities—cooking, cleaning, managing the food supply. They took turns accompanying the men to the plantation to secure food. The mother fished in the lagoon when fish could not be bought for dinner.

The men were responsible for the plantation work and for obtaining food from the plantation. The younger children were not observed to be responsible for any food-related activities.

Lists of the foods reported by the family to be available to them from various sources during the rainy season and of those foods observed in the home during the observation week were constructed (Table 11). When compared, many of the foods observed were not reported available, and many of the foods reported available were not observed. Hunting was the only source from which no food was observed to be procured during the week.

The source of each serving of food during the week was recorded (Table 7, page 47). The food for 48% of the servings came from the plantation, fishing, and village trees. Thirty-two percent of the servings were made up of food bought from the village shop, shops in other villages, and

TABLE 11

FOODS REPORTED AVAILABLE AND FOOD RESOURCES OBSERVED
IN THE HOME OF FAMILY C

Source	Foods Reported Available	Food Resources Observed	Comments
A. Family Procurement			
Plantation	Banana (5 varieties), cassava, coconut	Banana (3 varieties), cassava, corn, dasheen	Corn was shelled and dried—saved from last year's crop.
Hunting	None	None	Owned hunting dogs.
Fishing	Variety of fish	Variety of fish	Did not own gill net.
Domestic Animals	Chicken eggs (owned 5 hogs and 15 chickens)	Chicken eggs	
Village Trees	Coconut, lime, papaya, supa	Coconut, lime, orange and lime leaves, supa, unidentified leaves	Leaves used to make tea.
Wild Vegetation	Grapes, guava	Grapes, unidentified leaves	Leaves used to make tea.

TABLE 11 (continued)

Source	Foods Reported Available	Food Resources Observed	Comments
Kakabila Shop	Baking powder, coffee, flour, rice, salt, sugar	Baking powder, coffee, flour, rice, salt, sugar	
Other Shops	Above, plus black pepper, beans, yeast	Rice	A 100-pound sack of rice had been bought in Pearl Lagoon during the previous month.
B. Procurement By Others			
Others—Loan or Gift	Fish, foods from hunting, plantation foods, foods from village trees	Plantation foods—cassava, coco; fish; foods from village trees—coconut, supa; prepared foods—coconut bread, candied grapes	Coconut bread was given to the aunt only.
Others—Sale	Same as above	Fish; foods from village trees—breadfruit, coconut, supa; foods from hunting—venison; prepared foods—coconut bread	

other people. Gifts and loans of food accounted for 18% of the servings. The source of the greatest percent of servings was again the plantation.

The number of servings and estimated amount per serving of each food eaten during the week were noted (Table 12). Those foods served four or more days out of seven for breakfast were cassava, coffee, and leaf tea. On one day the family ate only two meals—breakfast and a mid-afternoon meal. The foods served at the mid-afternoon meal were cassava, green bananas, fish, and coconut milk (cooked as rundown), and coffee. The foods served four or more days out of six for dinner were cassava, fish, green bananas, and coconut milk cooked as rundown. Cassava, coffee, and leaf tea were the foods served four or more days out of six for supper. Supa was the only food eaten between meals four or more days out of seven. Overall, cassava was served more often than any other food.

The food served to the eight-month-old baby is not included in the calculations for Tables 7, 11, and 12. In addition to breast milk, the baby was fed small amounts of food from his mother's plate. The researcher observed the following foods being fed to the baby during the week: bamie, boiled chicken egg, boiled green banana, cassava, cassava pop, cassava tortilla, coconut water, coffee, fish, leaf tea, limeade, rice, ripe banana, ripe banana pop, and wheat flour tortilla.

TABLE 12

CONSUMPTION PATTERN, NUMBER OF SERVINGS, AND ESTIMATED AMOUNT OF EACH FOOD EATEN BY FAMILY C

	Food	Number of days served	Number of servings	Mean of estimated amount per serving	Included in family's reported weekly pattern
A.	Breakfast				
	Coffee	7	41	1 cup	yes
	Cassava	5	34	3 pieces (4 pieces = 1 medium cassava)	yes
	Leaf tea (lime, orange, unidentified leaves)	5	7	1 cup	yes
	Rice	3	20	1 1/2 cups cooked	no
	Fish	2	13	1 piece (approximately 2 ounces)	yes
	Cassava bamie	1	7	1/3 of 9" round	no
	Wheat flour tortilla	1	7	1/3 of 8" round	yes
	Coconut bun	1	4	1/4 of 4" bun	no
	Ripe banana	1	3	1 whole	yes
	Supa	1	2	15 berries	yes
B.	Dinner				
	Coconut milk	5	35	1/2 cup	yes
	Cassava	5	33	3 pieces (4 pieces = 1 medium cassava)	yes
	Fish	5	32	1 piece (approximately 4 ounces)	yes
	Green bananas	4	19	2 whole	yes
	Breadfruit	3	13	1/6 of whole	yes
	Limeade	2	4	1 cup	yes
	Cassava pop	1	7	1 1/2 cups	"pop"—yes

TABLE 12 (continued)

Food	Number of days served	Number of servings	Mean of estimated amount per serving	Included in family's reported weekly pattern
Ripe banana pop	1	7	1 1/2 cups	"pop"—yes
Egg	1	2	1 egg	no
Coffee	1	2	1 cup	yes
Fish liver	1	1	From 1 fish	no
C. Mid-afternoon meal				
Cassava	1	7	8 pieces	yes
Fish	1	7	2 pieces	yes
Coconut milk	1	7	1/2 cup	yes
Green banana	1	6	1 1/2 bananas	yes
Coffee	1	6	1 cup	yes
D. Supper				
Coffee	6	31	1 cup	yes
Leaf tea (orange, lime)	6	9	1 cup	yes
Cassava	4	24	3 pieces (4 pieces = 1 medium cassava)	yes
Fish	3	15	1 1/2 pieces	yes
Rice	2	14	1 1/2 cups cooked	no
Wheat flour tortilla	1	7	1/4 of 8" round	yes
Venison	1	7	Approximately 4 ounces	no
Cassava bamie	1	7	1/8 of 12" round	no
Cassava tortilla	1	7	1/2 of 6" round	no

TABLE 12 (continued)

Food	Number of days served	Number of servings	Mean of estimated amount per serving	Included in family's reported weekly pattern
Coconut milk	1	7	1/2 cup	yes
Dasheen	1	6	1 1/2 pieces (4 pieces = 1 medium dasheen)	no
Green banana	1	6	1 whole	yes
Coco	1	5	1 1/2 pieces (4 pieces = 1 medium coco)	no
Supa	1	4	5 berries	yes
Coconut bread	1	1	1-1" slice	no
Limeade	1	1	1 cup	yes
Breadfruit	1	1	1/8 of whole	yes
E. Between meals				
Supa	4	15	8 berries	yes
Bihu berries	2	3	35 berries	yes
Coconut water	2	2	From 1 coconut	yes
Ripe banana	1	6	1 whole	yes
Dried corn kernels	1	4	1/2 cup	no
Cassava	1	4	1 whole, medium cassava	yes
Candied bihu grapes	1	3	30 grapes	no
Limeade	1	2	1 cup	yes

The mother or father caught fish for dinner on five out of seven days. They gave away approximately 20% of the catch to a relative. On two days fish for dinner had been preserved from the previous day's catch. This family preserved fish by cutting it in half lengthwise, scoring and salting each half, then hanging the sections over the fire to smoke and dry.

The family's plantation food supply was depleted one and one-half days during the week. The men were working in the bush and thus could not go to the plantation as often as needed. The family adapted by: (1) buying breadfruit and coconut and "begging" cassava for the dinner meal, (2) buying rice for supper and breakfast, and (3) postponing dinner until midafternoon on the day when the men went to get food from the plantation.

In general, the men and the older daughter were served the largest portions of food at mealtime. The two younger girls were served the smallest portions.

IV. FAMILY D

Family D cooperated in this research project from August 16 through August 22. The family was composed of a grandmother, age 65; her daughter, age 24; the daughter's two sons, age 5 years and 1 year, 3 months; and the daughter's daughter, age 3. Also living in the home were the

grandmother's deceased daughter's children: two girls, ages 10 and 6; and a boy, age 7. The father of these children ate in this household but did not reside there.

The ethnic affiliation of the daughter and the daughter's 5-year-old son was half Miskito and half Carib. The ethnic affiliation of the other family members was Miskito. All of the family members reported that they had resided in Kakabila since birth.

This family's two-room dwelling structure was composed of a larger room which served as the kitchen and a smaller room which served as the bedroom. This structure was palm-thatched with wooden pole walls. A wooden platform built about one foot off the ground constituted the kitchen floor. The bedroom had a dirt floor.

The grandmother and her daughter reported that they had no occupation. They, plus the deceased daughter's husband, cultivated one plantation. This family derived its income from two main sources. First, they sold rice grown on their plantation, and secondly, the deceased daughter's husband worked on a fishing boat about four months per year and gave the bulk of his earnings to the household.

The grandmother and her daughter shared many food-related activities—cooking, cleaning the kitchen, and managing the food supply. They took turns accompanying the deceased daughter's husband to the plantation to procure food. The

daughter was in charge of going fishing when fish could not be bought for dinner. The deceased daughter's husband was responsible for all plantation work and procuring plantation food. None of the children were observed to be regularly responsible for specific food-related activities.

As for the other cooperating families, a list of the foods reported by the family to be available to them from various sources during the rainy season and a list of those foods observed in the home during the observation week were constructed (Table 13). By comparing the two lists, it can be seen that many foods were reported available that were not observed, and vice versa. No foods from domestic animals were observed available during the week.

The researcher noted the source of each serving of food eaten by each family member during the week (Table 7, page 47). The source of 46% of the servings of food was the plantation. Food bought from Kakabila shops, shops in other villages, or other people accounted for 20% of the servings. Loans and gifts of food made up the remaining 9% of the servings.

The number of servings of each food and the estimated amount per serving were noted (Table 14). For breakfast, the foods eaten four or more days out of seven were cassava, leaf tea, and coffee. Dinner and supper were combined into one evening meal on two days during the week. The foods

TABLE 13

FOODS REPORTED AVAILABLE AND FOOD RESOURCES OBSERVED
IN THE HOME OF FAMILY D

Source	Foods Reported Available	Food Resources Observed	Comments
A. Family Procurement			
Plantation	Banana (7 varieties), cassava, coco, coconut, dasheen, sugar cane	Banana (4 varieties), cassava, coco, sugar cane	
Hunting	Armadillo, givenot, kiaki	Armadillo	Owned a hunting dog.
Fishing	Variety of fish	Crawfish	Did not own a gill net.
Domestic Animals	None (owned 8 hogs and 20 chickens)	None	
Village Trees	Breadfruit, coconut, mango	Breadfruit, mango, unidentified leaves	Leaves used to make tea.
Wild Vegetation	Grapes, guava	Grapes	
Kakabila Shop	Baking powder, coffee, flour, rice, salt, sugar	Baking powder, coffee, flour, sugar	

TABLE 13 (continued)

Source	Foods Reported Available	Food Resources Observed	Comments
Other Shops	Above, plus beans, coconut oil, yeast	Coffee, sugar, yeast	
B. Procurement By Others			
Others—Loan or Gift	Fish, plantation foods, foods from hunting, foods from village trees	Fish; plantation foods—banana, cassava, coconut, pineapple; foods from hunting—pork; prepared foods—corn cake	
Others—Sale	Same as above	Fish; foods from village trees—coconut, supa; prepared foods—coconut bread	

TABLE 14

CONSUMPTION PATTERN, NUMBER OF SERVINGS, AND ESTIMATED AMOUNT OF EACH FOOD EATEN BY FAMILY D

	Food	Number of days served	Number of servings	Mean of estimated amount per serving	Included in family's reported weekly pattern
A.	Breakfast				
	Leaf tea (orange, lime, unidentified leaves)	7	36	1 cup	yes
	Cassava	6	45	3 pieces (4 pieces = 1 medium cassava)	yes
	Coffee	6	18	1 cup	yes
	Green banana	2	11	1 1/2 bananas	yes
	Corn cake	1	8	1-2" × 2" square	"cake"—yes
	Breadfruit	1	7	1/6 of whole	no
	Cassava cake	1	6	1 1/2-2" × 2" square	"cake"—yes
	Ripe banana	1	3	1 whole	yes
B.	Dinner				
	Cassava	5	39	3 pieces (4 pieces = 1 medium cassava)	yes
	Coconut milk	4	31	1/4 cup	yes
	Green bananas	3	20	1 1/2 bananas	yes
	Ripe plantain pop	2	16	1 cup	"pop"—yes
	Fish	2	8	Approximately 4 ounces	yes
	Armadillo	1	8	Approximately 3 ounces	yes
	Pork	1	8	Approximately 3 ounces	no
	Coco	1	8	1 piece	no
	Breadfruit	1	7	1/6 of whole	no
	Ripe plantain	1	1	1 whole	yes

TABLE 14 (continued)

Food	Number of days served	Number of servings	Mean of estimated amount per serving	Included in family's reported weekly pattern
C. Mid-afternoon meal				
Coconut milk	2	14	1/4 cup	yes
Cassava	2	12	1 1/2 pieces (4 pieces = 1 medium cassava)	yes
Fish	2	9	1 piece (approximately 3 ounces)	yes
Breadfruit	1	8	1/8 of whole	no
Green banana	1	7	1 whole	yes
Ripe plantain pop	1	7	1 cup	"pop"—yes
Green plantain	1	6	1/2 of whole	yes
Crawfish	1	4	1/2 of whole	no
Ripe plantain	1	1	1 whole	yes
D. Supper				
Cassava	5	38	3 pieces (4 pieces = 1 medium cassava)	yes
Leaf tea (lime, orange, unidentified leaves)	4	16	1 cup	yes
Coffee	4	16	1 cup	yes
Supa	1	8	7 berries	no
Ripe plantain	1	8	1 whole	yes
Ripe banana pop	1	7	1 cup	"pop"—yes
Fish	1	6	1 piece (approximately 2 ounces)	yes
Ripe plantain pop	1	2	1 1/2 cups	yes
Pork	1	1	Approximately 4 ounces	no

TABLE 14 (continued)

Food	Number of days served	Number of servings	Mean of estimated amount per serving	Included in family's reported weekly pattern
E. Between meals				
Mango	7	41	2 whole	yes
Coconut water	6	7	From 1 coconut	yes
Sugar cane	3	8	Juice from 2' cane	yes
Immature coconut	3	4	1/2 of whole	yes
Cassava	2	3	1 1/2 pieces (4 pieces = 1 medium cassava)	yes
Pineapple	1	8	1/4 of whole	no
Bihu grapes	1	4	20 grapes	no
Coconut bun	1	2	1-3" bun	no
Coconut bread	1	1	1-1" slice	no
Supa	1	1	5 berries	no

eaten on both of these days were fish, cassava, and coconut milk. Cassava, coconut milk, and green bananas were eaten most frequently for dinner. For supper, the foods most frequently eaten were cassava, leaf tea, and coffee. The only foods eaten between meals four or more days out of seven were mango and coconut water.

The foods eaten by the daughter's one year, three month old son are not included in Tables 7, 13, and 14. This child was fed little other than breast milk. During the week the researcher observed small amounts of these foods being fed to the child: ripe banana pop, ripe plantain pop, and corn cake. The mother reported that she had first introduced the child to table foods two months earlier.

On one day, dinner was postponed and combined with supper in a midafternoon meal. The cook waited for a family member to return from fishing to bring fish before preparing the meal. On another day, no supper was prepared. The family members had eaten mangoes during the afternoon and were not hungry.

The pork eaten for one meal had been preserved two days by cutting it into small cubes, salting, rubbing in lime juice, and storing in a covered container. Fresh armadillo meat was preserved for two days before cooking for a meal by roasting the fresh meat over the fire, then storing in a covered pot.

The largest portions of food were generally served to the adult male who ate with this family. The next largest portions were served to the adult daughter and the 10-year-old granddaughter. The five and three-year-old children generally received the smallest portions of food. Each family member commonly received a portion of each different food cooked for a meal.

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS

An objective of this research project was to identify the core food items in the diet of the research population during the rainy season. Cassava was the only food which met the criteria of a core food in the observed diet of all cooperating families. For the purpose of this study, core foods were defined as those foods which form a relatively substantial portion of the diet and are used more than once daily over an extended period of time.

Janick et al. have identified cassava as a food that is high in calories, bland in flavor, easily grown, and easily stored (39). Most civilizations have been able to cultivate in abundance at least one food plant with these four characteristics. It has also been noted that cassava is important as a food crop because it grows on poor soils with minimal production inputs and presents no post-harvest storage problems (40, 41).

Nutritionally, cassava has a low protein content and provides mainly calories in the form of carbohydrate (42). The researcher has estimated that the amount of cassava eaten daily by the individuals observed varied from 500 grams to 1000 grams. With this high intake, cassava may

become an important source of other nutrients, especially ascorbic acid (Table 15). Cassava also may be the main source of calcium in the diet of those families observed, since milk and milk products were not commonly eaten.

Secondary core foods have been defined as those foods which are in widespread but not universal use in a society and which supplement the core foods (43). Secondary core foods for those families observed were fish, green bananas, breadfruit, coconut milk, coconut water, and mangoes. The nutrient composition of these foods per 100 gram portion has been noted (Table 15).

Fish was the main protein source in the diet of the families. Green bananas and breadfruit supplied mainly carbohydrate in the diet. Coconut milk, an important cooking liquid in all the homes, is rich in fat. Mangoes are a good source of vitamin C. Coconut water supplied mainly calories in the diet.

Coffee and various leaf teas were frequently drunk with meals. Because from one to three tablespoons of sugar were added to each cup, these beverages supplied mainly carbohydrate. Also worthy of mention is supa. These berries, which were sometimes included in the diet, are an excellent source of vitamins A and C (Table 15).

The researcher observed and key informants confirmed that those in the village who were ill were usually fed only

TABLE 15

NUTRIENT COMPOSITION* OF SELECTED FOODS PER 100 GRAM RAW PORTIONS (42)

Food	Energy	Pro.	Fat (total lipid)	Carbohydrate	Calcium	Iron	Vitamin A	Thiamin	Riboflavin	Niacin	Vitamin C
	kcal	gm	gm	gm	mg	mg	IU	mg	mg	mg	mg
Cassava	132	1.0	0.4	33	40	1.4	0	.05	.04	0.6	19
Green Bananas	110	1.4	0.2	29	8	0.9	483	.04	.02	0.6	31
Green Breadfruit	81	1.3	0.5	20	27	1.9	0	.10	.06	0.7	29
Mango	44	0.4	0.2	12	14	0.4	392	.02	.03	0.2	128
Fish, general	145	17.0	5.0	0	20	0.7	33	.10	.11	3.2	0
Coconut Milk	259	4.6	28.2	2	11	1.4	0	.05	.02	0.4	1
Coconut Water	22	0.2	0.1	4	20	0.4	0	0	.01	0.1	2
Supa**	196	2.6	4.4	42	14	1.0	2233	.05	.16	1.4	35

*Woot-Tsuen Wu Leung. (1961) Food Composition Table for use in Latin America. A research project sponsored jointly by INCAP-ICNND, National Institutes of Health, Bethesda, Md.

**Genus reported.

pop for a period of time during the illness and during the beginning of the recovery period. Since infections increase body nitrogen losses, it is important that the diet supply adequate protein to replace these nitrogen losses, especially during recovery (44). The effect of this therapeutic practice on nutritional status needs to be investigated.

In all families, the largest servings of food were given to the working men and, when present, lactating women. These groups would have the highest caloric requirements. Those family members with the lowest caloric requirements, the young children, were served the smallest portions of food.

Some of the foods listed by key informants to be available to the villagers during the rainy season (Table A-3, Appendix C) were not procured by any of the four families during the observation weeks. Five of the six animals listed as available from hunting were not taken. At the other extreme, all of the fish listed as available were served. Five of the foods listed as available from the plantation, village trees, shell fishing, and wild vegetation were not observed in the homes.

Those foods not secured were either not available to the individual families, as in the case of yams, avocados, and soursop, or the families did not fully utilize the food resources from their environment, as in the case of cockles

and sea grapes. Key informants reported that the wild animals were not hunted for two reasons. First, not all of the families owned the guns and/or dogs necessary for hunting. Second, frequent rains discouraged hunting activities during the rainy season.

The plantation was the source of the largest percentage of total servings of food for each family (Table 7, page 47). The percentage of servings from this source varied from 30% to 46% per family, with a mean of 39%. Food bought from shops and other people made up from 14% to 32% of the total servings of food per family, with a mean of 23%. The mean of the percentage of total servings of food from both village trees and loans or gifts from other people was 14%.

The percentage of the total servings of food from fishing varied from 0-20% with a mean of 8%. The family for whom 20% of the total servings of food came from fishing was the only one of the four families who owned a gill net. The total servings of food from hunting, wild vegetation, and domestic animals was negligable.

The researcher noted five trips planned to obtain foods from the plantation which were postponed. Two postponements were due to rain and three to individual family circumstances. These postponements led to a depletion of the family's plantation food supply for two or more meals. Since plantation foods, especially cassava, played a central

role in the diet, each family had to adapt to these depletions.

When the plantation food supply was depleted, the families used one of three methods to secure food for each meal. The method most frequently used was to buy, borrow, or "beg" plantation foods from others in the village. Second, for the breakfast or supper meal, the families sometimes bought rice or flour from the village shop. The flour was used to make tortillas or johnnycakes. The third method was used on those days when a family member had gone to the plantation to secure food. The second meal of the day was not prepared until the family member returned home with the plantation food, (Table 5, variation 2, page 40). Key informants reported that line fishing was sometimes delayed due to heavy rains. However, this situation was not observed by the researcher.

The research hypothesis was not strongly supported by the data. Findings suggest that the day-to-day, seasonal rains do not significantly alter the source or kinds of food consumed by the Miskito villagers during the rainy season. Out of the 28 days of observation in village homes, only on two days were the seasonal rains severe enough to cause alteration in the main source of foods for two or more meals. When the rains made it necessary to utilize the village shop as the main source of food for a meal, the primary food

consumed changed from the usual cassava or plantation food to johnnycake, tortilla, or rice. However, plantation foods were the main foods secured when other villagers supplied the primary foods for a meal. In this case, the basic meal pattern was not changed. Also, it should be noted that severe rain was only one of many factors which sometimes led to the observed family's reliance on other villagers or on the village shop as the main source of food for a meal.

Those tools which were most successful for identifying specific food behavior in this study were observation and key informant interviewing. Key informant interviewing was especially useful for obtaining food-related beliefs and food terminology, and as a means of clarification.

Plans for nutrition education programs, supplemental feeding programs, and programs to change traditional agricultural practices are projected for rural areas of Nicaragua (45, 46). Information such as was gathered in this project concerning the availability, safety, nutritive quality, and acceptability of food is essential for planning and implementing such programs. Without such information, it would be impossible to draft realistic recommendations for the correction of food and nutritional problems.

Additional research is needed concerning the food behavior of other cultural groups in the area. Year-round studies of food behavior in the research area would be useful in understanding seasonal food behavior.

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APPENDIXES

APPENDIX A

FORM USED IN GATHERING DEMOGRAPHIC DATA

1. Head of household:

   Name:_____ Age:_____

2. Resides in household? Yes_____No_____

3. Relationship to other family members_____

4. Other family members:

Name	Age	Relationship to head
_____	___	_____
_____	___	_____
_____	___	_____
_____	___	_____
_____	___	_____
_____	___	_____

   Put * by woman married or living with a man.

5. Who was born in your house in the past two years?

   _____

6. Who has died in your house in the past two years?

   _____

7. What illnesses were there in your house in the past two months?_____

8. Who is your doctor when you are sick?

   _____

The following questions were asked upon the request of the University of Wisconsin-Nicaragua Medical Project director. They were not used for this research project.

9. For each woman:

How many:				
	a. Pregnancies	_____	_____	_____
	b. Miscarriages	_____	_____	_____
	c. Live births	_____	_____	_____
	d. Still births	_____	_____	_____
	e. Child deaths	_____	_____	_____
	f. Age of child's death	_____	_____	_____
	g. Reason for child's death	_____	_____	_____

The following questions were added to the form by the researcher.

10. How many cows does your family own?_____ pigs?_____ chickens?_____ other animals? (list)_____

_____

11. Do you own a farm or plantation? Yes_____ No_____

If yes, how many?_____

If yes, how far from your home is the plantation(s) located?_____

APPENDIX B

RAINFALL INFORMATION

TABLE A-1

RAINFALL INFORMATION FROM THE NATIONAL METEOROLOGICAL SERVICE STATION, BLUEFIELDS, NICARAGUA, FOR JULY AND AUGUST, 1976

Date	Rainfall	Date	Rainfall
July 1	4.2 mm	August 1	14.2 mm
July 2	10.4 mm	August 2	N.A.
July 3	90.4 mm	August 3	N.A.
July 4	32.2 mm	August 4	73.5 mm
July 5	32.6 mm	August 5	17.4 mm
July 6	27.4 mm	August 6	5.3 mm
July 7	11.8 mm	August 7	0.2 mm
July 8	6.5 mm	August 8	0.6 mm
July 9	15.8 mm	August 9	34.6 mm
July 10	0.8 mm	August 10	9.5 mm
July 11	4.2 mm	August 11	53.8 mm
July 12	74.4 mm	August 12	25.4 mm
July 13	18.1 mm	August 13	36.4 mm
July 14	0.0 mm	August 14	1.6 mm
July 15	1.6 mm	August 15	1.7 mm
July 16	5.8 mm	August 16	8.4 mm
July 17	1.8 mm	August 17	0.0 mm
July 18	22.7 mm	August 18	0.0 mm
July 19	16.0 mm	August 19	4.3 mm
July 20	28.0 mm	August 20	6.1 mm
July 21	0.4 mm	August 21	77.9 mm
July 22	4.2 mm	August 22	104.4 mm
July 23	255.7 mm	August 23	5.4 mm
July 24	51.6 mm	August 24	8.4 mm
July 25	30.4 mm	August 25	0.0 mm
July 26	4.7 mm	August 26	27.5 mm
July 27	8.2 mm	August 27	58.2 mm
July 28	19.8 mm	August 28	N.A.
July 29	21.8 mm	August 29	N.A.
July 30	14.2 mm	August 30	N.A.
July 31	N.A.	August 31	N.A.

N.A.—data not available.

TABLE A-2

TOTAL NUMBER AND LENGTH OF DAILY PERIODS OF RAINFALL
JULY 9 THROUGH AUGUST 25, 1976, KAKABILA, NICARAGUA

Date	Number of Rainy Periods in 24 Hours	Approximate Total Length of Rainy Periods in 24 Hours
July 9	4	3 1/2 hours
July 10	0	-
July 11	4	1 hour
July 12	2	3/4 hour
July 13	1	9 hours
July 14	4	1 hour
July 15	2	1 hour
July 16	1	1 1/2 hours
July 17	0	-
July 18	1	1/4 hour
July 19	9	2 hours
July 20	7	2 hours
July 21	3	1/4 hour
July 22	4	1 hour
July 23	1	20 hours
July 24	1	24 hours
July 25	1	22 hours
July 26	1	1/4 hour
July 27	6	1 1/2 hours
July 28	2	3/4 hour
July 29	8	3 hours
July 30	6	4 hours
July 31	6	1 1/2 hours
August 1	8	1 1/2 hours
August 2	6	13 1/2 hours
August 3	5	8 1/2 hours
August 4	4	6 hours
August 5	2	12 hours
August 6	4	4 hours
August 7	2	1/4 hour
August 8	2	1/4 hour
August 9	3	3/4 hour
August 10	3	1/2 hour
August 11	3	3/4 hour
August 12	1	4 hours

TABLE A-2 (continued)

Date	Number of Rainy Periods in 24 Hours	Approximate Total Length of Rainy Periods in 24 Hours
August 13	2	3/4 hour
August 14	1	1 hour
August 15	4	1/2 hour
August 16	4	1 hour
August 17	3	1 hour
August 18	0	-
August 19	0	-
August 20	1	1/4 hour
August 21	2	1/4 hour
August 22	1	10 hours
August 23	3	1/2 hour
August 24	3	1/2 hour
August 25	0	-

APPENDIX C

SUPPLEMENTARY FOOD PROCUREMENT DATA

TABLE A-3

RAINY SEASON PLANT AND ANIMAL FOOD RESOURCES

Source	Common Name	Miskito Name	Creole Name	Scientific Name
Plantation	Banana (10 varieties)	Siksa	Banana	Musa (sp.)
Plantation	Cassava	Yauhra	Cassava	Manihot dulcis
Plantation	Coconut	Kukra	Coconut	Cocos nucifera
Plantation	Corn**	Aya	Corn	Zea mays
Plantation	Dasheen	Dasheen	Dasheen	Colocasia esculenta
Plantation	Duswa	Duswa	Coco	Xanthosoma (sp.)
Plantation	Pejibaye	Supa	Supa	Guilielma utilis
Plantation	Pineapple	Pihtu	Pine	Ananas comosus
Plantation	Sugar cane	Kayu	Cane	Saccharum officiarum
Plantation	Yam* (2 varieties)	Yampus	Yam	Dioscorea (sp.)
Hunting	Agouti	Kiaki	Kiaki	Dasyprocta punctata
Hunting	Armadillo	Taira	Armadillo	Dasypus (sp.)
Hunting	Coati-mundi	Wistiting	Quash	Nasua narica
Hunting	Collared peccary	Buksa	Pecari	Pecari tajacu
Hunting	Paca	Ibina	Givenot	Cuniculus paca
Hunting	White-lipped peccary	Wari	Wari	Tayassu pecari
Fishing	Catfish	Batsi	Catfish	Arius melanopus
Fishing	Coppermouth	Bilapau	Coppermouth	Cynoscion (sp.)
Fishing	Drummer	Susumaya	Drummer	Micropogon furnieri
Fishing	Jack	Krauhi	Jack	Caranx hippos
Fishing	Shark	Illili	Shark	Many genera
Fishing	Sheepshead	Sikuku	Sheepshead	Scianidae
Fishing	Snook	Mupi	Snook	Centropomus (sp.)

TABLE A-3 (continued)

Source	Common Name	Miskito Name	Creole Name	Scientific Name
Fishing	Lobster**	Wastara	Lobster	Panulirus argus
Shell fishing	Cockles	Klitu	Cockles	Polymesoda solida
Village trees	Avocado	Sikya	Pear	Persea gratissima
Village trees	Breadfruit	Bredput	Breadfruit	Artocarpus communis
Village trees	Coconut	Kuku	Coconut	Cocos nucifera
Village trees	Lime	Leimus	Lime	Citrus aurantifolia
Village trees	Mango	Mango	Mango	Mangifera indica
Village trees	Papaya	Twas	Papaya	Carica papaya
Village trees	Pejibaye	Supa	Supa	Guilielma utilis
Village trees	Soursop	Dwarsop	Soursop	Annona americana
Wild vegetation	Bihu**	Bihu	Grape	Melastomo
Wild vegetation	Guava	Sigra	Guava	Psidium guajava
Wild vegetation	Hog plum*	Pahara	Plum	Spondias lutea
Wild vegetation	Sea grape**	Waham	Grape	Coccoloba uvifera

*Procured only during the beginning of the rainy season.
**Procured only near the end of the rainy season.

APPENDIX D

SUPPLEMENTARY DATA CONCERNING OWNERSHIP OF DOMESTIC ANIMALS

TABLE A-4

OWNERSHIP OF SELECTED DOMESTIC ANIMALS BY HOUSEHOLD

Household	Number of animals owned		
	Cows	Hogs	Chickens
A	0	5	15
B	0	0	0
C	0	4	3
D	0	10	5
E	0	11	8
F	0	1	3
G	0	1	2
H	0	0	17
I	0	2	10
J	0	1	3
K	0	20	50
L	0	8	20
M	0	2	20
N	0	14	6
O	32	14	46
P	4	4	24
Q	0	0	0
R	0	4	10
S	1	1	6
T	0	7	5
U	0	1	1
V	0	1	1
W	0	0	0
X	0	0	2
Y	0	1	30
Z	0	0	0
AA	1	10	15
Total	38	122	302

APPENDIX E

OBSERVED PREPARATION OF FOODS AND DISHES

Food or dish	Preparation
Armadillo	Fried in coconut oil, boiled alone in coconut milk, or boiled in coconut milk as the meat in rundown.
Bihu berries	Eaten raw, or candied by boiling in sugar.
Breadfruit	Boiled in water, or boiled in coconut milk as a part of rundown.
Cake—cassava, corn, ripe banana	Baked, pudding-like mixture made from sugar, flour, coconut milk, and pulverized fruit or vegetable.
Cashew nuts	The dried, unshelled nuts are roasted in the fire.
Cassava	Unpeeled—roasted in the coals of the fire; peeled—boiled in water, or boiled in coconut milk as a part of rundown; also, as cake and pop, and next two entries.
Cassava bamie	Hard, very thin bread made by browning a thin layer of grated, dehydrated cassava; before eating, the bread is soaked in beverage.
Cassava tortilla	Bread made by browning a mixture of grated cassava, flour, grated coconut, and coconut milk.
Chainy root tea	Beverage made by boiling thin slices of chainy root in water; sugar is added before serving.
Chicken egg	Boiled in shell.
Coco	Boiled in water, or boiled in coconut milk as a part of rundown.
Coconut bread or bun	Yeast bread made from flour, sugar, coconut milk, and commercial yeast.

Coconut milk	Made by squeezing the liquid from a mixture of grated coconut and water; used as a liquid in preparing various fruit, vegetable, meat, bread, and cake dishes.
Coconut water	Refers to the naturally-occurring liquid in the cavity of the coconut kernel; it is drunk as is.
Coffee	Beverage made by boiling ground coffee beans with water; sugar is added before serving.
Crawfish	Boiled in coconut milk as a part of rundown.
Dasheen	Boiled in water, or boiled in coconut milk as a part of rundown.
Dried corn kernels	Roasted until brown; also, as cake.
Fish—all varieties	Fried in coconut oil, roasted over fire, boiled alone in coconut milk, or boiled in coconut milk as the meat in rundown.
Fish liver—shark, coppermouth	Fried in coconut oil, or roasted over the fire.
Fish roe—coppermouth	Fried in coconut oil.
Green bananas	Boiled in water, or boiled in coconut milk as a part of rundown; also, as pop.
Guava	Eaten raw.
Immature coconut	Jelly-like flesh is eaten raw; coconut water is drunk.
Johnnycake	Bread made from flour, grated coconut, and coconut milk.
Leaf tea—orange, lime, unidentified leaves	Beverage made by boiling fresh green leaves in water; sugar is added before serving.

Limeade	Beverage made from lime juice, water, and sugar.
Mango	Eaten raw, while ripe or green.
Papaya	Eaten raw.
Pineapple	Eaten raw.
Pop—green banana, ripe banana, ripe plantain, cassava	Thick beverage made from pulverized fruit or vegetable, and coconut milk.
Pork	Boiled in coconut milk.
Potato	Boiled in water.
Red beans	Boiled in coconut milk.
Rice	Boiled in coconut milk.
Rice with red beans	Boiled in coconut milk.
Ripe banana	Eaten raw; also as pop and cake.
Ripe plantain	Boiled in water, or roasted, unpeeled, over the fire; also as pop.
Rundown	Starchy vegetables and meat boiled in coconut milk.
Sugar cane	Chewed raw to extract juice.
Supa	Unpeeled berry was boiled in salted water.
Venison	Boiled in coconut milk.
Wheat flour tortilla	Bread made from wheat flour, grated coconut, and coconut milk.

VITA

Rhonda Dale Terry was born in Monroe, North Carolina, on March 18, 1953. She was graduated from Pageland High School, Pageland, South Carolina, in 1971. In June, 1975, she received a Bachelor of Science degree in Home Economics magna cum laude with a major in Communication Arts from the University of North Carolina at Greensboro.

She began graduate study at the University of Tennessee, Knoxville, in June, 1975. For a period of time while at the University of Tennessee, she was a graduate assistant with the Coordinated Undergraduate Program in Dietetics.

Dale is a member of Omicron Nu, American Home Economics Association, and Golden Chain Honor Society.

She is the daughter of Mr. and Mrs. Wade H. Terry, Jefferson, South Carolina.