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National Nutrition Survey

1978

Office of Nutrition
Development Support Bureau
Agency for International Development
Washington, D.C. 20523

#0883

HAITI NUTRITION STATUS SURVEY: 1978

Bureau of Nutrition
Department of Public Health and Population
Republic of Haiti

in cooperation with

U.S. Department of Health, Education, and Welfare
Public Health Service
Center for Disease Control

and

The Agency for International Development
Department of State
Washington, D.C.

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PREFACE

In response to a request by the Department of Public Health and Population, Republic of Haiti to the United States Agency for International Development (USAID) mission in Port-au-Prince and to the USAID Development Support Bureau/Nutrition in Washington, the Nutrition Division, Center for Disease Control (CDC), United States Department of Health, Education, and Welfare provided technical assistance to the Bureau of Nutrition, Department of Public Health and Population, Republic of Haiti in the conduct of a National Nutrition Status Survey.

The 1978 Haiti National Nutrition Survey resulted from the combined efforts of the Government of the Republic of Haiti, AID/Haiti, AID/Washington, and CDC.

The Republic of Haiti provided the survey personnel, training sites, administrative and logistical support, and the survey vehicles. The efforts of the Bureau of Nutrition staff and the survey team members under varying and sometimes difficult circumstances facilitated the smooth implementation of the survey.

AID/Haiti provided funds for the in-country survey costs and provided logistical support to the CDC technical advisors.

AID/Washington provided funds for the CDC technical personnel, data analysis, and preparation of the final report.

INTRODUCTION

The Republic of Haiti occupies the western one-third of the island of Hispaniola, the second largest island in the Caribbean. Haiti has a land area of about 11,000 square miles, most of which is mountainous. The estimated 1978 population, based on extrapolation from the 1971 Census, is 5.3 million persons. Sixteen percent of the population, about 840,000, is under age 5. Approximately 24 percent of the population live in urban areas, the largest of which is Port-au-Prince, with a population of 800,000.[1]

The population density per square kilometer is 186 but measured in terms of arable land, the average density exceeds 580 persons per square kilometer.

Malnutrition has been cited among the most serious health problems in Haiti. A number of major nutritional surveys have been undertaken since 1958.[2,3,4,5] These studies, for the most part, used the index of weight for age to estimate the prevalence of malnutrition and the survey children were classified into categories of normal and malnourished using a scheme suggested by Gomez.[6] Differences in survey methodology, in the time of the year when the surveys were conducted, and in the use of various reference standards make direct comparisons of data from these surveys difficult. In 1978 King compared and summarized these surveys.[7] She found that between 24 and 57 percent of children between 0 and 6 years of age could be classified into the Gomez categories of second and third degree malnutrition. By extrapolation she estimated that 440,000

children under 5 would have second or third degree malnutrition and an additional 170,000 would have first degree malnutrition.

Other workers have reported deficiencies in vitamin A, riboflavin, and in folic acid, but the magnitude of these deficiencies does not approach the protein-energy deficit reflected in the reported nutritional status of Haitian children.

GOALS AND OBJECTIVES

The overall goal of the Haiti National Nutrition Survey was to provide baseline information concerning the nutrition status of young children. This data could be used for determining policy and priorities, for planning and administration of applied nutrition activities, and for suggesting further nutrition research needs.

Toward this goal this report considers:

*Prevalences and distributions of acute and chronic protein-energy undernutrition in children 3-59 months of age.

*Prevalences and distributions of anemia and clinical signs of selected micronutrient deficiencies.

*Information on the duration of breast-feeding and patterns of weaning.

*Associations of children's nutrition status with certain household, family, and individual characteristics.

*Prevalence of naturally acquired measles antibody in children 3-59 months.

SURVEY METHODOLOGY

SELECTION OF SURVEY UNIVERSES AND SAMPLING METHODS

Survey Universe

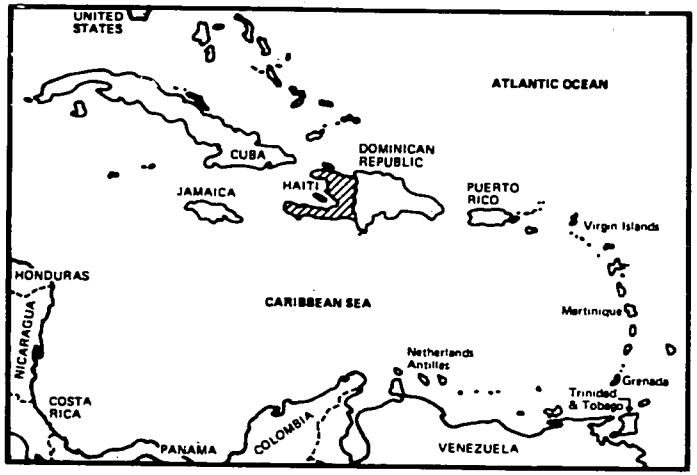
Haiti was recently divided into nine administrative départements each with a separate military and civil authority. For the purposes of this survey, the five former departements, comprising all of rural Haiti and metropolitan Port-au-Prince, were used to form six sampling universes. Urban areas located in the rural départements were not sampled. (See Figure 1 and Table 1).

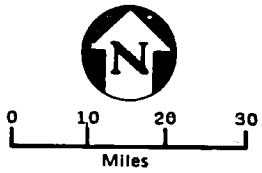
Although Port-au-Prince is considered part of the Département de l'Ouest, this metropolitan area (which included Carrefour and Petionville) was considered a separate sampling universe. The only urban population sampled in this survey was that of metropolitan Port-au-Prince. This population may or may not be representative of other urban areas in Haiti.

Special Group

A special group of 730 children 3-59 months of age was obtained from private nursery schools and from socially advantaged families in Port-au-Prince. Anthropometric indices in these children can be used to provide reasonably valid estimates of the nutrition status attainable by the general preschool-age population of Haiti.

FIGURE 1. Map of Haiti





Ile de la Tortue

ATLANTIC OCEAN

NORD-OUEST
Universe I

Port-de-Paix

Mole-St. Nicolas

Baie-de-Henne

Trois Rivières

Cap Haitien

NORD
Universe II

Gonaïves

L'ARTIBONITE
Universe III

Rivière de l'Artibonite

Saint Marc

DOMINICAN REPUBLIC

Ile de la Gonâve

Anse à Galets

Les Cayemites

Jérémie

Universe VI

Port-au-Prince

Petionville

Léogane

Kenscoff

SUD
Universe V

Petit-Goâve

OUEST
Universe IV

Les Cayes

Jacmel

Ile à Vache

CARIBBEAN SEA

Table 1. Sampling Universes and Population: Haiti 1978

Universe	Departement	1978 Est. Population[1]	Urban/Rural
I	Nord-Ouest	255,000	Rural
II	Nord	855,000	Rural
III	Artibonite	940,000	Rural
IV	Ouest (Excluding Port-au-Prince)	1,250,000	Rural
V	Sud	1,200,000	Rural
VI	Metropolitan Port-au-Prince	800,000	Urban
I-V Representative Rural Sample		4,500,000	Rural
I-VI Representative National Sample*		5,200,000	Rural/Urban
Special Group		-	Urban

[1]King, J.M.: Analyses and Computations of Nutrition Data and Studies, USAID, March 1978.

*Does not include children from urban areas other than Port-au-Prince.

Sampling Methods

The determination of the survey sample size considered:

- resources available, both financial and physical.
- time and field logistics.
- an estimate of the prevalence of sample attributes.
- the precision and confidence level desired in describing each attribute.

Sampling procedures for the survey used a two-stage methodology. In the first stage, 30 rural enumeration districts (section d'enumeration de recensement) were selected in each universe from the total population of that universe as found in the 1971 census listing. In four départements, 30 out of the 80 to 150 rural enumeration districts were randomly chosen, never choosing two districts in the same rural enumeration section. In the Département du Nord-Ouest, there were only 32 districts in 16 rural sections. In this departement, all 32 districts were initially chosen, and 30 districts were then selected from this total. Each enumeration district consisted of from one to seven small villages (habitations). One habitation was chosen randomly in each enumeration district. (A complete list of rural sample sites is presented in Appendix 1).

In metropolitan Port-au-Prince, a different first-stage sampling methodology was used. During the 1977 World Fertility Survey, 46 census enumeration districts had been delineated based on a probability proportional to their 1971 population. For this nutrition survey, 30 districts were chosen randomly from the 46.

The second stage of sampling involved random selection of the initial starting household and collection of data on 30 children in the age range 3-59 months in a surrounding cluster of households. Each survey team was trained in a protocol for selecting the initial household.[8]

The two-stage sampling methodology permits prevalence estimates of approximately the same precision in each universe, and it permits the use of statistical testing to determine if significant difference in nutrition status exists between universes.

(Further details on sampling procedures are presented in Appendix 2.)

Data Collection and Logistics

A staff of 30 received an intensive training course for 3 weeks prior to the field phase of the survey. The staff consisted of 26 survey enumerators who had a minimum of a baccalaureate certificate, 3 survey supervisors, and 1 laboratory technician. The training course included instruction in interviewing, measuring children, and obtaining blood specimens. The staff was divided into eight 3-person survey teams, each with a chauffeur and a survey vehicle.

After instruction and practice in measuring height and weight, team performance was evaluated using a standardization exercise adapted from one proposed by Habicht.[9] The teams obtained further practice in conducting interviews, measuring children, identifying

clinical signs, and obtaining specimens during 3 days of field trials in selected villages (among subpopulations not included in the survey sample).

A sample questionnaire is presented in Appendix 3. Details for administering the questionnaire are available in the Field Training Manual for the Haiti Nutrition Status Survey.

Data collection took place from mid-June through September 1978. Data collection began in the Département de l'Ouest.

All teams worked in one département at the same time until all of the selected sample sites in that département were visited. Teams worked for periods up to 20 days and then returned to Port-au-Prince for 3-8 days for rest. Supplies were distributed and forms and hemoglobin specimens were collected at provincial towns in each département. All hemoglobin determinations were performed in these towns.

During the field work, CDC and Bureau of Nutrition staff traveled with the teams to the sample sites observing and correcting errors. Team leaders edited each questionnaire for accuracy and clarity. Survey supervisors then reviewed the forms.

The completed forms were computer processed and the data was analyzed at CDC in Atlanta. Data analyses and tabulations utilized a series of core computer programs as well as specially written programs for associations specific to the Haiti survey.

Data Collected

Direct measurements of weight, height, hemoglobin, and estimates of age provide prevalence and distribution data on indices related to nutritional status.[10] Hemoglobin measurements on mothers provide prevalence information on maternal anemia. Indirect methods using interview techniques provide information on certain demographic, dietary, health, and socio-economic factors associated with nutrition status. Because literature on Caribbean family structure indicates that there is substantial child dislocation and a young child may be displaced from his biological mother, the questionnaire was designed to elicit responses from either the survey child's biologic mother or his or her female guardian, whomever had routine responsibility for care of the child.

Direct Measurement Survey Items

1. Anthropometry

   Weight and height (or length) was measured on all children using a Salter spring scale and a standard portable measuring board. (See Appendix 4)

2. Hemoglobin Determination

   Hemoglobin values were determined on capillary blood from every fifth survey child and his or her mother or guardian using the cyanmethemoglobin method and a Fisher #74D hemophotometer. (See Appendix 5)

3. Clinical Signs

Signs suggestive of certain nutritional deficiencies were noted in each child and his or her guardian. These included thyroid size and the presence or absence of bilateral pedal edema.

Indirect Measurement Survey Items

1. Household and Family Information

Survey teams obtained the following information about the household, the family, and the survey child:

- occupation of the mother or guardian
- presence or absence of a man in the household, his occupation, and whether he provided support for the child
- age of the mother or guardian
- number of live births and number of children who survived past 1 year of age
- whether or not the mother or guardian is pregnant and/or breast-feeding
- how many adults and children ate meals in this household
- whether or not the household had a radio, latrine, or garden
- type of sugar served in the household
- source of water
- whether or not the mother or guardian had attended school

2. Breast-Feeding and Weaning*

Mothers of survey children were asked to provide information regarding the age of weaning.

- whether or not the child received milk from a bottle
- age of the child when supplementary feeding began
- foods consumed by the child the previous day
- frequency each food item was consumed by the child the previous day

3. Recent Sickness, Diarrhea, and Fever

Mothers or guardians of all survey children were asked to answer three questions regarding recent illness in the survey child.

"In the past 7 days has this child:

a. been sick, that is, been unable to carry on normal daily activities such as playing, eating, etc.?

b. had a fever?

c. had diarrhea, that is watery stools four times per day for more than two days."

Age Determination

If the child's birthdate on a registration form could be verified from a historical calendar, the birth registration form was used as the source for the child's age. A verified birth registration was

*A separate report on breast-feeding, weaning and child feeding practices has been prepared by the Bureau of Nutrition, Department of Public Health and Population, Republic of Haiti.

the source of age in 53.2 percent of the survey children. This percent varied from 44.7 to 58.1 in the rural départements and was 54.7 in metropolitan Port-au-Prince. For the remaining children, whose birth registration form was not available or whose date of birth as shown on the form could not be verified, age was determined from a historical calendar exclusively.

DATA ANALYSIS METHODOLOGY

Anthropometry

Measurements of linear growth and body mass are key indices for characterizing the nutritional status of children.[11] The risk of undernutrition for a population increases as the prevalence of low anthropometric values increases. The use of anthropometric indices, developed by comparison with appropriate reference population data and classified by using selected cut-off values, permits a presentation of the magnitude and distribution of malnutrition, both acute and chronic undernutrition as well as overnutrition.

The index of weight for height relates body mass to stature. Acute undernutrition is characterized by a low weight for height value. This condition is called wasting. The highest prevalences of acute, severe undernutrition occur in times of famine. Overconsumption of food in relation to energy expenditure leads to an elevated weight for height value, identified as overweight in this report.

Linear retardation in growth does not occur during a short-term episode of nutritional deficiency, but frequent episodes of acute food deprivation or a sustained period of inadequate nutrition especially in the first years of life may retard normal growth, resulting in an individual who is short for his age. This condition is called stunting. Although improvement in nutrition may decrease the deficiency in stature over a period of time, complete "catch-up," i.e., normal height for age, may not occur, particularly if the period of growth retardation has been prolonged.

In the past, the most frequently used anthropometric index of nutrition status has been weight for age. Successive weight measurements of an individual child over a long time interval provide a valid longitudinal indication of the nutritional status of the child. A single weight for age measurement of a child is less useful since a low weight for age value cannot distinguish between a thin but tall child who is acutely undernourished from a well-proportioned, short child who may have been at a previous time chronically undernourished.

In the survey report, tabular presentations of prevalences and distributions of wasting and stunting are based upon computations using percentages of reference median values.

Further comparisons of survey measurements with reference population values utilize both the statistical parameters of percent of median and standard deviation scores. Percent of

median is not a useful parameter for expressing anthropometric data from developing countries in which substantially large numbers of children have anthropometric values below the 5th or 3rd centile. Percent of median, by definition, has a fixed relation to the median at all values. It does not identify a fixed proportion of the distribution of values of the reference population. The standard deviation score describes the approximate probability distribution of values, does not have a constant relation to the median values, and the values of the outer distributions may not conform to percent of median values. It is useful in providing an overall picture of the distribution of values in the study population as compared to the reference population.[12]

Reference Population

The National Center for Health Statistics/Center for Disease Control (NCHS/CDC) reference data were used for the anthropometric analyses. This reference is comparable to the commonly used Stuart-Meredith reference for weight and height.[13] The larger numbers of children, improved sampling techniques, direct weight for height calculations, and the complete statistical description used in the NCHS/CDC reference data permit improved statistical precision in describing anthropometric data. (See Appendix 6)

Anthropometric Classifications

Wasting (acute undernutrition) is defined for survey purposes as a weight for height value less than 80 percent of the reference

population. An intermediate classification of wasting that might be called "marginally undernourished," includes those children with a weight for height between 80 and 84.9 percent of the reference median. Use of this classification permits the identification of a wider spectrum of potentially undernourished children and helps place the problem of acute undernutrition in proper perspective.

To be useful as an index of stunting or chronic undernutrition, height for age requires an accurate estimation of the child's age. This is often difficult to obtain. For survey purposes, children with a height for age less than 90 percent of the reference median are considered to be stunted and suffering from growth retardation that may have been due to nutritional deficiencies.

Those children with a weight for height greater than 120 percent of the reference median are considered overweight.

Waterlow has suggested a system of classification which permits the combined assessment of the extent of acute and chronic undernutrition in children by establishing categories of wasting, stunting, and concurrent wasting and stunting.[14] Children less than 80 percent of the reference median weight for height are classed in the category of wasting, if they are above 90 percent of the median height for age. Children are considered to be stunted if they are below 90 percent height for age, but above 80 percent median weight for height.

Children below the above cut-offs for weight for height and height for age are classed as concurrent wasting and stunting. Those children are probably at greater risk of morbidity and mortality.

For comparison purposes, weight for age data are presented using a classification similar to that suggested by Gomez.[15] In this classification children 75-89.9 percent of the NCHS/CDC reference median are considered to have first degree malnutrition; those 60-74.9 percent, second degree; and those less than 60 percent, third degree malnutrition. The Gomez classification groups all children who are greater than 90 percent of the reference median as normal and does not separate overweight children from those of "normal" weight.

Hemoglobin

The prevalences of low hemoglobin values and the distribution of hemoglobin values to different age groups and areas of Haiti describe the general problem of anemia in Haiti. The survey also provides information on anemia among Haiti women who are responsible for at least one survey child.

In general, this survey uses World Health Organization (WHO) criteria for anemia.[16] WHO defines anemia in children 24-59 months of age and for pregnant women as a hemoglobin value less than 11 gms/100 cc. Children under 24 months of age were considered anemic if their hemoglobin was less than 10 gms/100 cc.

Presentation of Survey Results

Survey results for each index are generally presented as a written description, followed by a table or figure, and a summary discussion. Where there is a statistically significant difference, it is so stated. Results obtained in the special group of Haitian children are frequently included in tables to permit easy comparisons with the survey results.

Data from the six geographical areas were analyzed individually, and as various aggregates. The geographical areas and the aggregate groupings are as follows:

- Universe I - Département de Nord-Ouest
- Universe II - Département de Nord
- Universe III - Département de l'Artibonite
- Universe IV - Département de l'Ouest, including La Gônave
- Universe V - Département de Sud
- Universe VI - Metropolitan Port-au-Prince, including Petionville and Carrefour
- Universes I-V - Representative Rural Sample
- Universes I-VI - Representative National Sample
  (This sample does not include data from children in urban areas other than Port-au-Prince.)
- Special Group

In the representative rural and national samples, the stated prevalence values are based on data that has been weighted to correct for the population differences in each geographical area.

URVEY RESULTS AND DISCUSSION

Data from 5353 preschool children were analyzed: questionnaires on 46 children were excluded because of obvious errors in age or anthropometric data. The age and sex distribution of the children is shown in Table 2.

I. ANTHROPOMETRY

RESULTS

A. GEOGRAPHIC AREAS

1. Weight for Height

Table 3 presents the distributions of weight for height values in each geographical area and in the Special Group.

For the representative rural sample (universes I-V) 6.4 percent of the children 3-59 months of age are severely wasted (less than 80 percent of the reference median weight for height). In metropolitan Port-au-Prince (universe VI) 3.8 percent of the children are severely wasted. In the representative rural sample 10.4 percent of the population have a moderate degree of wasting (80-84.9 percent of the reference median).

Table 2. Percentage Distribution of Preschool Children[a] by Age and Sex: Haiti 1978

Age in Months	Male	Female	Total[b]
3-5	3.4% (179)	3.3% (170)	6.7% (349)
6-11	6.7% (341)	7.0% (383)	13.7% (724)
12-23	11.6% (610)	12.2% (645)	23.8% (1255)
24-35	10.5% (577)	9.9% (530)	20.4% (1107)
36-47	10.4% (556)	9.3% (493)	19.6% (1049)
48-59	8.2% (443)	7.6% (426)	15.8% (869)
Total	50.8% (2706)	49.2% (2647)	100.0% (5353)

[a] Representative National Sample. See Table 1 for description of geographic areas and sample universes.

[b] All percentages are weighted by universe population proportions. The actual number of persons surveyed are given in parentheses.

Table 3. Percentage Distribution of Preschool Children by Weight for Height Classes and Geographic Area: Haiti 1978

Geographic Area[a]	Percentage of Reference Median: Wasting <80.0	Wasting 80.0-84.9	Normal 85.0-119.9	Over-Weight 120+	Total[b]	
I	5.3%	9.5%	84.6%	0.6%	100.0%	(891)
II	6.8%	10.3%	82.3%	0.6%	100.0%	(892)
III	6.9%	11.6%	80.5%	1.0%	100.0%	(889)
IV	5.1%	9.3%	85.1%	0.4%	100.0%	(895)
V	7.3%	10.8%	81.0%	1.0%	100.0%	(893)
Representative Rural Sample	6.4%	10.4%	82.5%	0.7%	100.0%	(4460)
VI	3.8%	7.1%	87.0%	2.1%	100.0%	(893)
Representative National Sample	6.0%	9.9%	83.1%	1.0%	100.0%	(5353)
Special Group	0.1%	1.2%	93.6%	5.1%	100.0%	(730)

[a] See Table 1 for description of geographic areas and sample universes.

[b] All percentages are weighted by universe population proportions. The actual number of persons surveyed are given in parentheses.

The weight for height standard deviation (Z-score) distribution curves for the survey children and the Special Group are shown in Figure 2.

Among the Special Group children, only 1 of 730 children showed anthropometric evidence of severe undernutrition.

The overall prevalence in the rural areas of children 3-59 months who are overweight is 0.7 percent. The prevalence of children who are overweight in the Special Group is 5.1 percent, and in Port-au-Prince is 2.1 percent, which is significantly greater than among those children in the rural sample.

2. Height for Age

The height for age distribution in Haitian children is shown in Table 4.

The prevalence of stunting or chronic undernutrition (height for age less than 90 percent of the reference median) ranges from 15.7 to 33.4 percent among the geographic areas. Although there is some variation between the rural areas, these are not statistically significant differences. Metropolitan Port-au-Prince is, however, significantly different than the combined rural sample. The 0.4 percent prevalence of stunting seen in the Special Group is only 1/65 of the prevalence found in the representative national sample.

FIGURE 2. Weight for Height Z-Scores: Haiti 1978

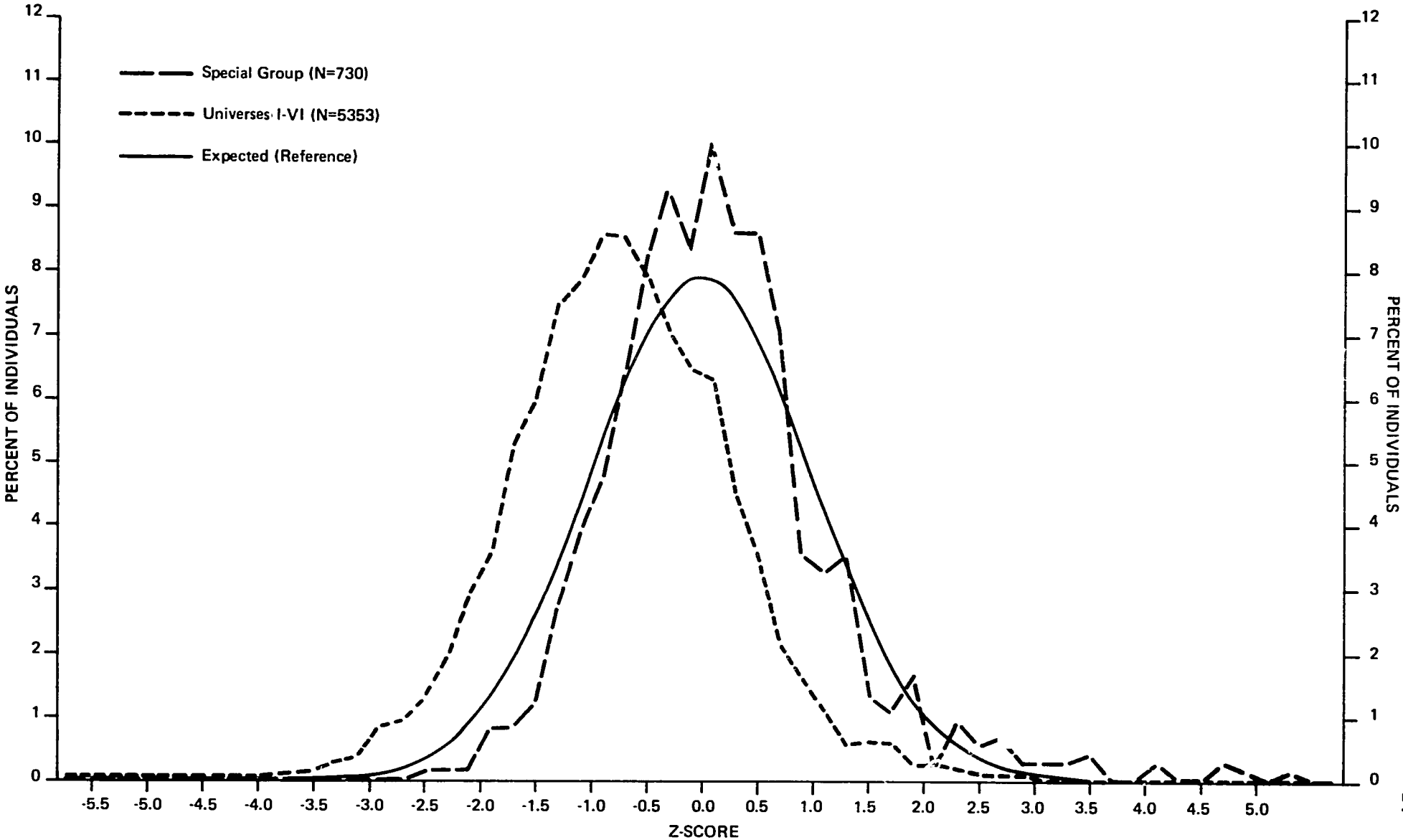


Table 4. Percentage Distribution of Preschool Children by Height for Age Classes and Geographic Area: Haiti 1978

Geographic Area[a]	Percentage of Reference Median						
	Stunting		Normal				
	<85.0	85.0-89.9	90.0-94.9	95.0-99.9	100+	Total[b]	
I	8.6%	18.0%	35.2%	27.4%	10.8%	100.0%	(891)
II	11.8%	21.6%	33.4%	25.4%	7.7%	100.0%	(892)
III	7.9%	21.3%	38.7%	24.0%	8.2%	100.0%	(889)
IV	7.5%	19.6%	33.1%	29.6%	10.3%	100.0%	(895)
V	8.5%	18.4%	35.6%	28.1%	9.4%	100.0%	(893)
Representative Rural Sample	8.7%	19.9%	35.1%	27.1%	9.2%	100.0%	(4460)
VI	4.3%	11.4%	31.6%	34.8%	17.9%	100.0%	(893)
Representative National Sample	8.0%	18.6%	34.6%	28.3%	10.5%	100.0%	(5353)
Special Group	0.1%	0.3%	7.4%	30.1%	62.1%	100.0%	(730)

[a] See Table 1 for description of geographic areas and sample universes.

[b] All percentages are weighted by universe population proportions. The actual number of persons surveyed are given in parentheses.

Figure 3 shows the distribution of height for age values for the survey group and the Special Group. The Special Group closely follows that of the reference population while the distribution of height for age of the survey group indicates that it is shorter by about 1.75 standard deviations (Z-scores).

3. Weight for Age (Gomez-Like Classification)

To permit comparisons with other surveys, the distribution of weight for age values of Haitian children 3-59 months of age are shown in Table 5. The prevalences of second and third degree malnutrition are higher in the rural areas of Haiti than in metropolitan Port-au-Prince. No children in the Special Group have third degree malnutrition and only 0.5 percent in that group have second degree malnutrition.

4. Wasting, Stunting, and Concurrent Wasting and Stunting (Waterlow Classification)

The Waterlow cross-classification of height for age and weight for height which has been used to define nutritional status is shown for Haitian preschool-age children in Table 6. The largest percentage of children with concurrent wasting and stunting (4.4 percent) children considered to be at greatest risk of increased mortality and morbidity - is in the Département du Nord.

FIGURE 3. Height for Age Z-Scores: Haiti 1978

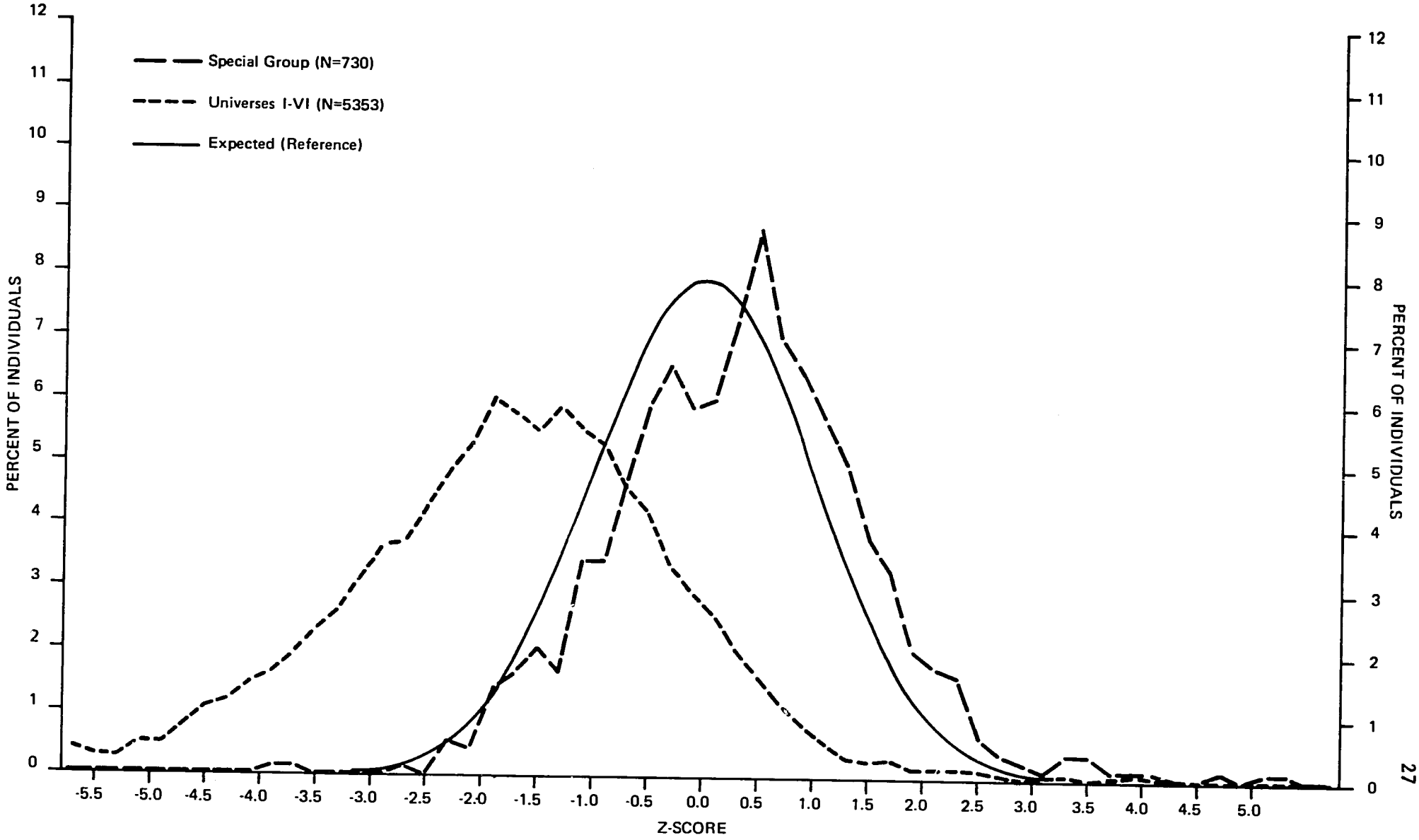


Table 5. Percentage Distribution of Preschool Children by Gomez Classes and Geographic Area: Haiti 1978

Geographic Area[a]	Degree of Malnutrition[b] 3o[c] <60.0	2o 60.0-74.9	1o 75.0-89.9	Normal 90.0+	Total[d]	
I	3.0%	22.8%	48.8%	25.4%	100.0%	(891)
II	5.7%	28.5%	46.2%	19.6%	100.0%	(892)
III	2.5%	28.3%	45.4%	23.7%	100.0%	(889)
IV	2.7%	23.4%	47.2%	26.8%	100.0%	(895)
V	3.6%	25.9%	46.0%	24.5%	100.0%	(893)
Representative Rural Sample	3.5%	26.0%	46.4%	24.1%	100.0%	(4460)
VI	1.5%	13.1%	43.8%	41.7%	100.0%	(893)
Representative National Sample	3.2%	24.1%	46.0%	26.8%	100.0%	(5353)
Special Group	-	0.5%	15.1%	84.4%	100.0%	(730)

[a] See Table 1 for description of geographic areas and sample universes.

[b] Percentage of reference median weight for age.

[c] Children identified as having pedal edema were not automatically classified as third degree malnutrition.

[d] All percentages are weighted by universe population proportions. The actual number of persons surveyed are given in parentheses.

Table 6. Percentage Distribution of Preschool Children by Waterlow Classes and Geographic Area: Haiti 1978

Geographic Area[a]	Waterlow Class					
	Wasting	Stunting	Wasting & Stunting	Normal	Total[b]	
I	3.1%	24.5%	2.1%	70.3%	100.0%	(891)
II	2.5%	29.0%	4.4%	64.1%	100.0%	(892)
III	3.5%	25.8%	3.4%	67.4%	100.0%	(889)
IV	2.9%	24.8%	2.2%	70.1%	100.0%	(895)
V	3.1%	22.7%	4.1%	70.0%	100.0%	(893)
Representative Rural Sample	3.0%	25.2%	3.4%	68.4%	100.0%	(4460)
VI	2.4%	14.2%	1.5%	82.0%	100.0%	(893)
Representative National Sample	2.9%	23.6%	3.1%	70.4%	100.0%	(5353)

[a] See Table 1 for description of geographic areas and sample universes.

[b] All percentages are weighted by universe population proportions. The actual number of persons surveyed are given in parentheses.

B. AGE GROUPS

1. Weight for Height

Figure 4 shows the prevalence of wasting by age groups. The highest prevalence is seen in the 12-23 month group.

2. Height for Age

Figure 5 shows the prevalences of stunting in each age group. Dramatic increases in the prevalence of chronic undernutrition begin during the second year of life. The level of mild stunting (85-89.9 percent of reference median) remains fairly constant from 24 to 59 months.

3. Weight for Age (Gomez Classification)

The distribution of survey children by weight for age is shown in Table 7. The prevalence of 3rd degree malnutrition is highest in the 48-59 months age group. The highest prevalence of combined second and third degree malnutrition is also in the 48-59 months age group. This appears to be a reflection of the high prevalence of stunting in this age group.

4. Waterlow Classes

A table presenting wasting, stunting, and concurrent wasting and stunting by age is shown in Table 8. Concurrent wasting and stunting is at the highest prevalence (5.6 percent)

FIGURE 4. Percent of Preschool Children in Acute Undernutrition, By Age: Haiti 1978

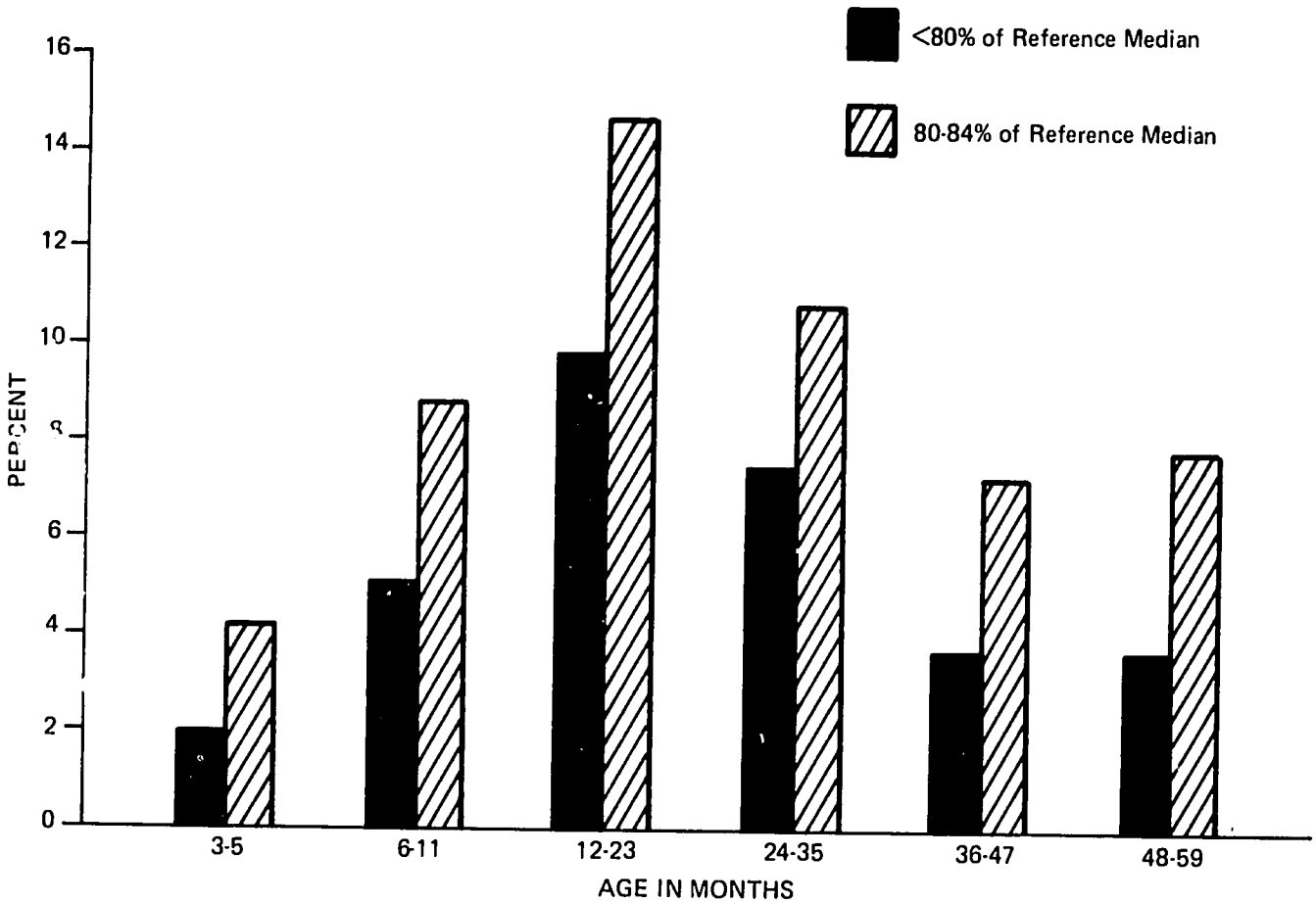


FIGURE 5. Percent of Preschool Children in Chronic Undernutrition, By Age: Haiti 1978

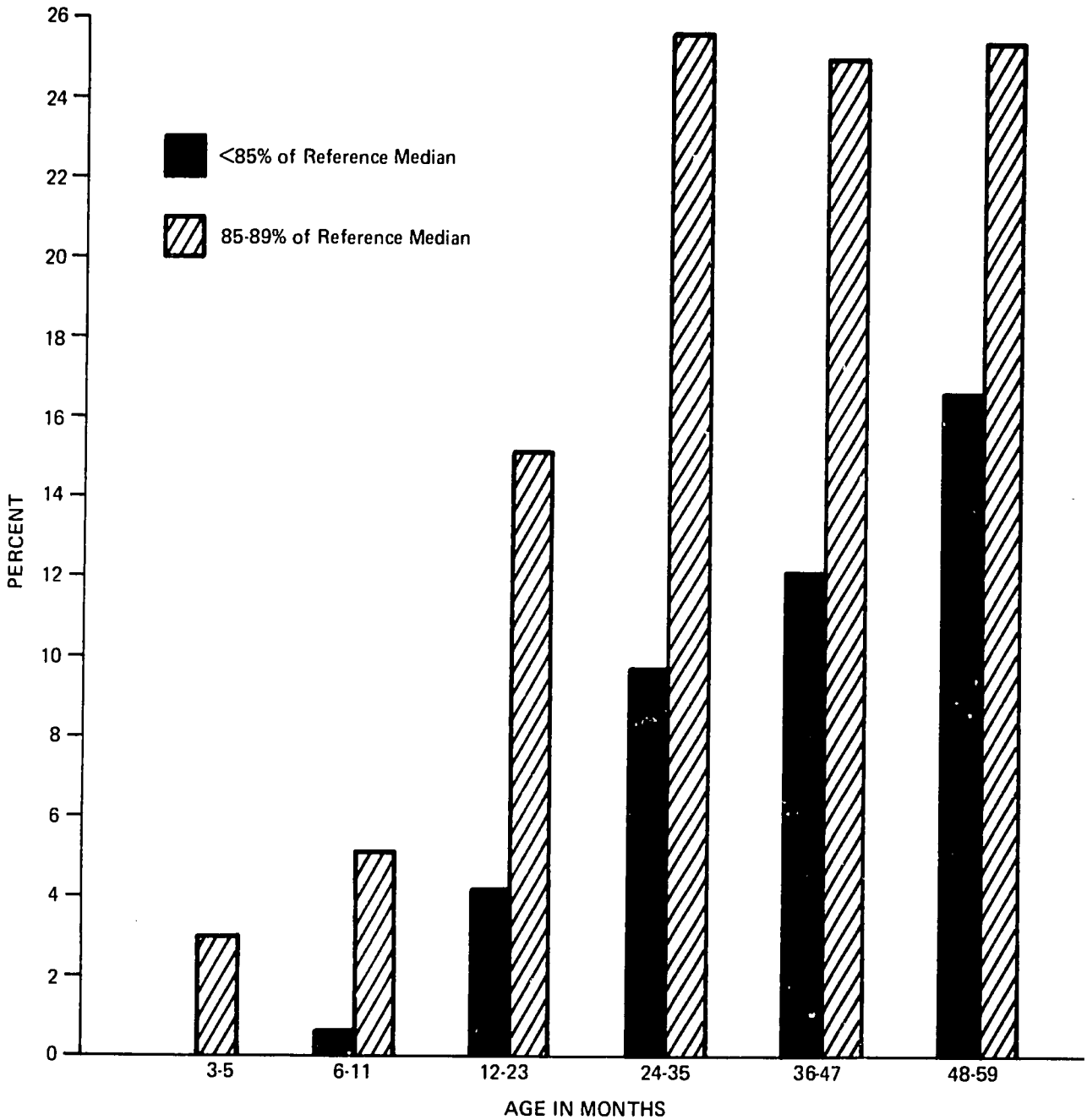


Table 7. Percentage Distribution of Preschool Children[a] by Gomez Classes and Age: Haiti 1978

Age in Months	Degree of Malnutrition[b] 3° <60.0	2° 60.0-74.9	1° 89.9-75.0	Normal 90+	Total[c]
3-5	0.6%	4.5%	29.8%	65.1%	100.0% (349)
6-11	1.8%	13.4%	43.7%	41.1%	100.0% (724)
12-23	2.8%	26.0%	49.2%	22.0%	100.0% (1255)
24-35	3.9%	27.8%	47.6%	20.7%	100.0% (1107)
36-47	3.5%	26.5%	47.8%	22.2%	100.0% (1049)
48-59	4.6%	30.6%	45.8%	18.9%	100.0% (869)
Total	3.2%	24.1%	46.0%	26.8%	100.0% (5353)

[a] Representative National Sample. See Table 1 for description of geographic areas and sample universes.

[b] Percentage of reference median weight for age.

[c] All percentages are weighted by universe population proportions. The actual number of persons surveyed are given in parentheses.

Table 8. Percentage Distribution of Preschool Children[a] by Waterlow Classes and Age: Haiti 1978

Age in Months	Wasting	Stunting	Wasting & Stunting	Normal	Total[b]
3-5	2.7%	1.7%	0.3%	95.3%	100.0% (349)
6-11	4.6%	5.2%	0.5%	89.7%	100.0% (724)
12-23	6.4%	15.8%	3.4%	74.3%	100.0% (1255)
24-35	1.8%	29.6%	5.6%	62.9%	100.0% (1107)
36-47	0.8%	34.2%	2.9%	62.1%	100.0% (1049)
48-59	0.8%	39.0%	3.0%	57.3%	100.0% (869)
Total	2.9%	23.6%	3.1%	70.4%	100.0% (5353)

[a]Representative National Sample. See Table 1 for description of geographic areas and sample universes.

[b]All percentages are weighted by universe population proportions. The actual number of persons surveyed are given in parentheses.

in the age group 24-35 months. The dramatic increase at 12-23 months in wasting and stunting corresponds with the traditional age at which Haitian children are weaned. This decline in availability of a specific food source, coupled with the high nutritional requirements for growth and episodes of infection are probably responsible for creating this high risk nutritional situation.

C. DISCUSSION

In Haiti, acute undernutrition, as evidenced by a substantial percentage of children who are wasted, is a major problem. At the time of the survey, 15.9 percent of the children were severely or moderately wasted. Extrapolating these figures nationally, about 127,000 children (15.9 percent x 795,000, the estimated number of children 3-59 months of age) were in critical need of nutritional support at the time of the survey. A higher prevalence of children in the rural areas are acutely undernourished than in the urban area. Acute undernutrition begins in infancy and by the second year of life assumes major proportions. During this period the nutritional needs of the child are high and the major source of food has changed from breast milk alone to breast milk with some food supplementation. Additionally, these young children are more susceptible to acute infections and to the acute dehydration associated with these infections. The prevalence of acute undernutrition decreases after 3 years of age. Two interrelated reasons can be hypothesized: 1)

the most severely undernourished children in the younger age groups die before reaching 3 years of age; and 2) children over 2 are able to obtain food themselves, no longer being solely dependent on someone else.

In Haiti, there is little stunting during the first year of life. Height for age data compares favorably with the NCHS/CDC reference population which indicates that Haitian children, as compared to American, are not born with a length/height deficit. After 12 months of age, the deficit in height for age becomes marked, and in the second year of life (when the majority of Haitian women begin to wean their children) over 19 percent of Haitian children show signs of stunting. During the third through fourth years of life when the child is weaned and is no longer entirely dependent on another for food, the stunted Haitian child continues to have a deficit in height. The continuing height for age deficit may indicate that undernourished 3-5 year olds do not "catch-up." The failure of Haitian children to demonstrate catch-up growth may be due to the continuing shortage - both qualitatively and quantitatively - of food, or to infectious or parasitic disease processes.

If, as Wat low suggests, children suffering from concurrent wasting and stunting require priority medical response then 3.1 percent of Haiti's 795,000 preschool children 3-59 months of age have priority needs. These children are suffering the effect of

long-term protein-energy undernutrition - a retardation in linear growth - and the effect of an acute deficit in nutrients - a weight loss creating a disproportionately low body weight for height situation. Concurrent wasting and stunting exists in all rural départements with no significant differences in prevalence between départements.

The different implications of a tall thin child and a short, well-proportioned child are not considered in the Gomez classification of weight for age.

The Special Group of Haitian children taken from private pediatric practices and private day care centers in Port-au-Prince have little stunting or wasting. Less than 8 percent of the group were below the 90 percent of reference median cut-off for low weight for height - 6 percent were between 85-89.9 percent of the median, within the normal distribution. Over 5 percent of the children, however, were greater than 120 percent of the reference median weight for height an indication of a problem of overweight. The prevalence of overweight in these Haitian children is greater than that in the reference population.

In summary, among Haitian preschool children, wasting (acute undernutrition) is common. There exists no significant difference in the prevalence of undernutrition among the rural départements. The age groups with the highest prevalence are the 12-35 month old

children. Rural children tend to have a higher prevalence of acute undernutrition than those sampled in the metropolitan Port-au-Prince area. Stunting or chronic undernutrition, as measured by deficit in height for age, is seen in one-third of Haitian children by age 5, and, again, is more common in the rural areas. Overweight children, although seen in the urban and rural samples, are not common. The special group of Haitian children do not exhibit anthropometric signs of either chronic or acute undernutrition, but do tend to be overweight compared to the NCHS/CDC reference population.

II. HEMOGLOBIN STATUS: CHILDREN

Hemoglobin values were available on 1,056 children representing a 20 percent subsample of the survey children.

A. RESULTS

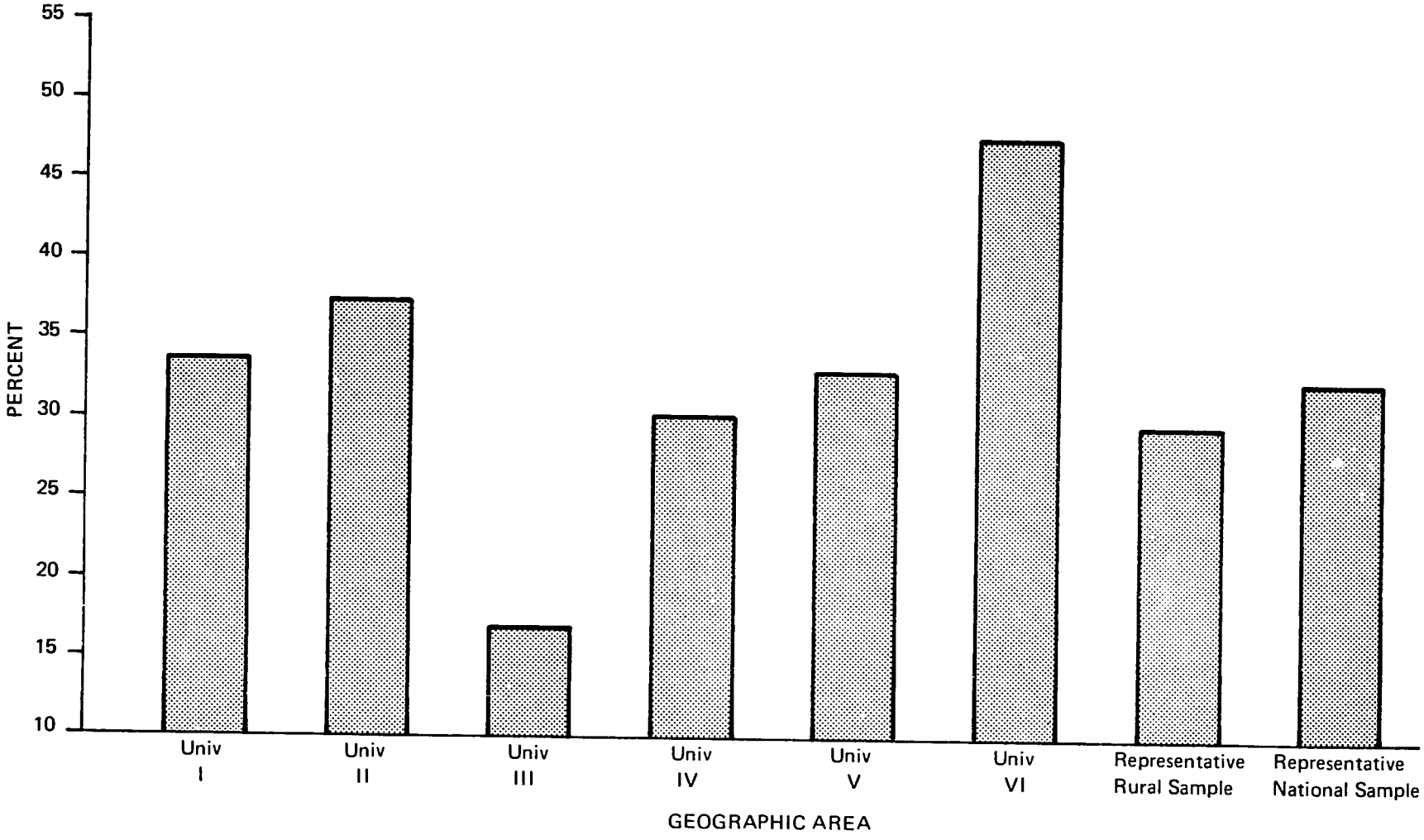
1. Geographic Area - Figure 6 shows the percent distribution of children ages 3-59 months with low hemoglobin by universe. For purposes of this survey, children below age 24 months were considered to have low hemoglobin if the value was less than 10 gms/100 cc. For children over 24 months, the cut-off was 11 gms/100 cc. Anemia was least prevalent in the Artibonite and most prevalent in metropolitan Port-au-Prince.

2. Age - Figure 7 shows the mean hemoglobin values for each age group. Mean values for the 3-5 month age group have been omitted because in this age group developmental patterns create a high degree of variability in hemoglobin values. The lowest mean hemoglobin value was seen in the 6-11 month age group. Mean hemoglobin values increase with age. Figure 8 shows the percentage of children in each age group with low hemoglobin values. The 24-35 month age group has the highest percentage of children considered to be anemic.

B. DISCUSSION

Although nutritional anemia is a worldwide problem, its prevalence is highest in developing countries. It is most commonly seen in pregnant women and in young children. Evidence suggests that severe anemia impairs work capacity. There is also increasing evidence that anemia and iron deficiency may play a role in the ability of an individual to resist infection.[17]

FIGURE 6. Prevalence of Anemia[1] in Preschool Children by Geographic Area: Haiti 1978



[1]Anemia defined as a hemoglobin value of <10 gms/100 cc for ages <24 months and <11 gms/100 cc for ages ≥24 months.

FIGURE 7. Mean Hemoglobin Values of Preschool Children, By Age: Haiti 1978

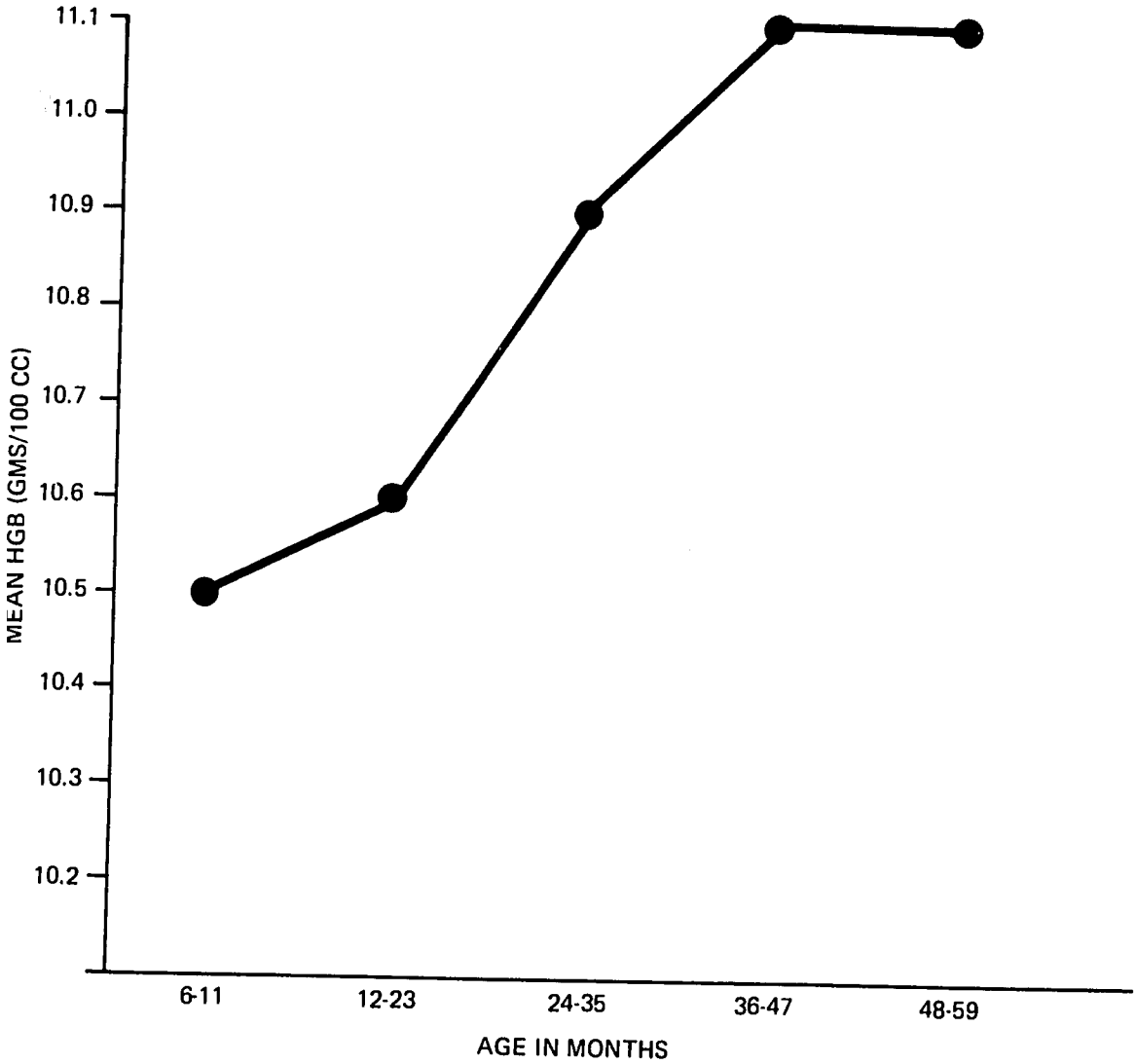
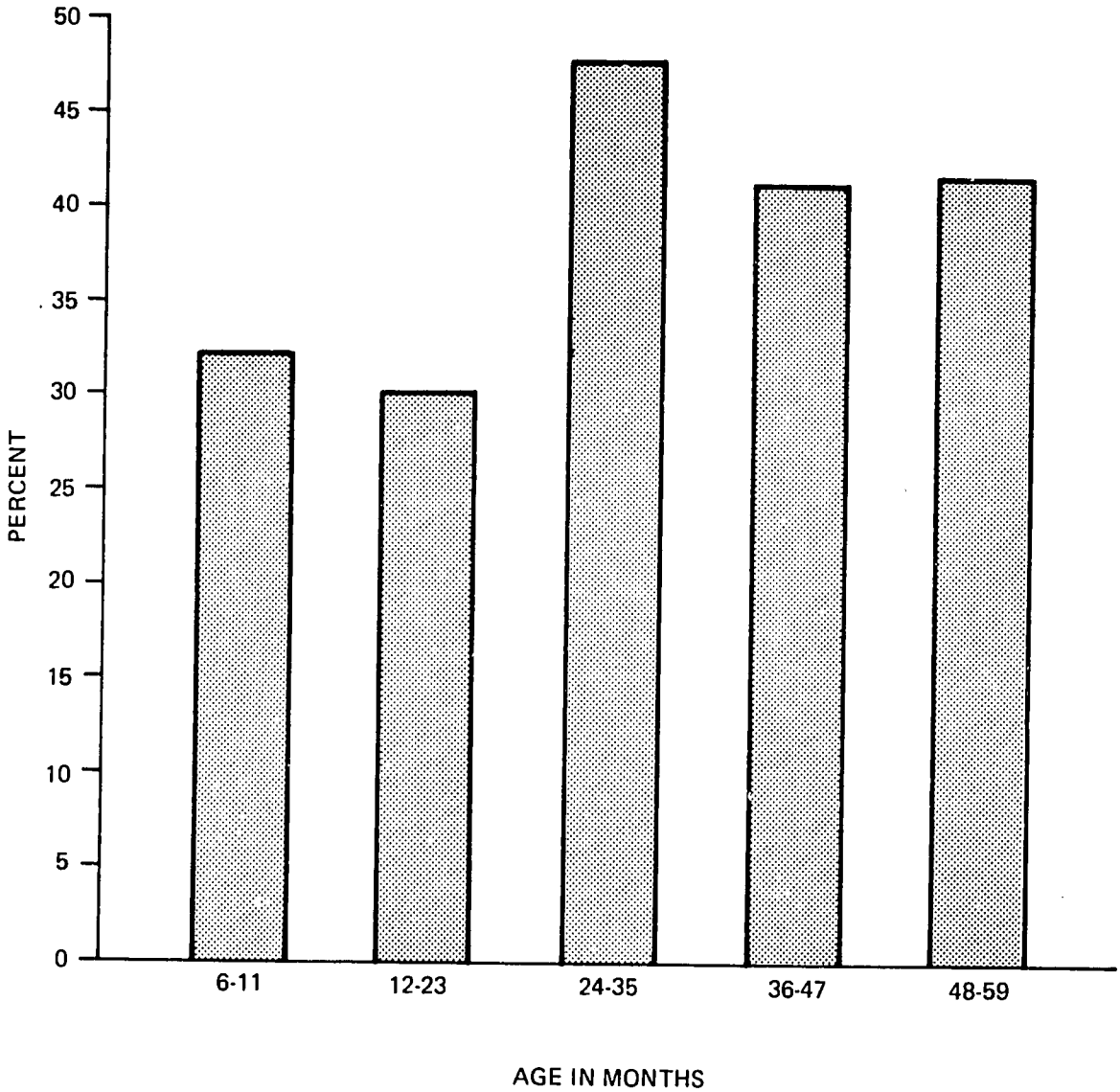


FIGURE 8. Prevalence of Anemia[1] in Preschool Children, By Age: Haiti 1978



[1]Anemia defined as a hemoglobin value of <10 gms/100 cc for ages <24 months and <11 gms/100 cc for ages ≥24 months.

Since hemoglobin values normally increase from age 6 months to 5 years, the use of a single cut-off, such as 11 gms/100 cc, is not appropriate since fewer older children and more younger children would be identified as anemic.

A malarial control program has been conducted nationally since 1961, and there are reports that malaria is in resurgence in the country. Malaria could be a contributive cause of anemia, as could be hookworm and roundworm infections, microbial infections, and nutritional deficiency of iron. This survey did not attempt to define the individual contributions of these factors to anemia.

Nationally about one-third of children between 3-59 months of age are anemic. The significantly higher mean level of hemoglobin in the Artibonite (and conversely lower rate of anemia) as shown in Figure 6 is unexplained and deserves further study.

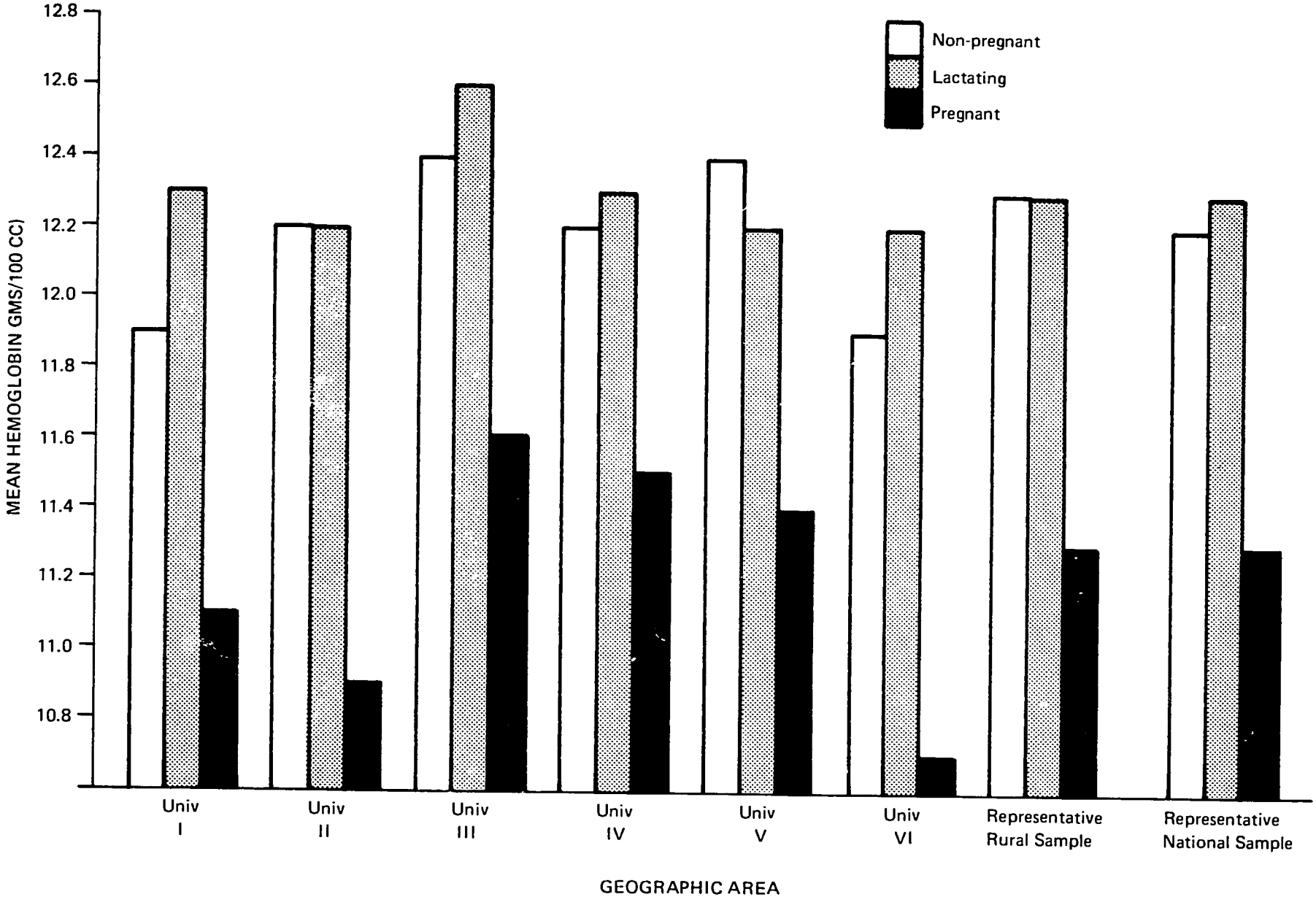
III. HEMOGLOBIN STATUS, MOTHERS, AND GUARDIANS

Hemoglobin values were available for 1,046 mothers and guardians of survey children. These data are not representative of the general population of women in Haiti since only those women who were responsible for the care of at least one child between 3-59 months of age were included in this survey.

A. RESULTS

The distribution of mean hemoglobin values by survey universe is shown in Figure 9. The percentage of survey women

FIGURE 9. Mean Hemoglobin Values of Pregnant, Non-pregnant, and Lactating Guardians, By Geographic Area: Haiti 1978



with low hemoglobin classed as anemia is shown in Figure 10. In this survey pregnant women are considered anemic if their hemoglobin is less than 11 gms/100 cc. For non-pregnant and lactating women, the cut-off is 12 gms/100 cc.

In metropolitan Port-au-Prince, mean hemoglobin values for all three groups of women (pregnant, lactating, and non-pregnant) were lowest. Although there are differences between the mean values among the universes, due to wide statistical variation, these differences are probably not significant.

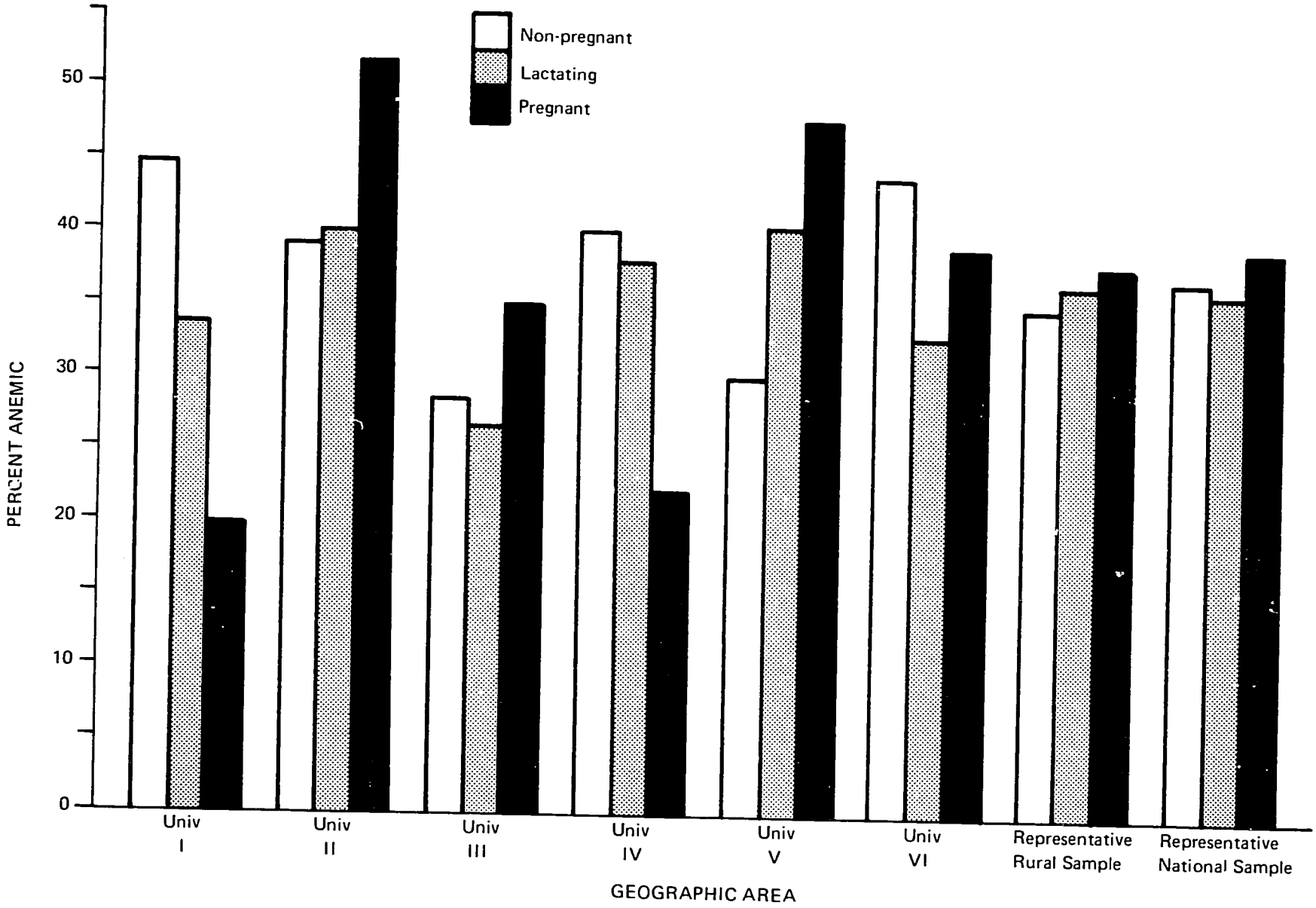
B. DISCUSSION

Severe anemia in pregnant women increases maternal morbidity and mortality and involves a higher risk for the fetus. The deleterious effects of milder forms of anemia are not well defined, although some studies have suggested a correlation between maternal hemoglobin concentration and fetal birth weight.[18]

A major cause of anemia in women is iron deficiency that can result from recurrent menstrual blood loss, too frequent child-bearing, and inadequate dietary intake. The effect of parasitic and microbiological infections on anemia was not determined in this survey.

There is a greater occurrence of anemia in rural women in Haiti, however, wide variances of the mean hemoglobin values prevent statistical significance testing. As expected, there is

FIGURE 10. Prevalence of Anemia[1] in Pregnant, Non-pregnant, and Lactating Guardians/Biological Mothers of Preschool Children by Geographic Area: Haiti 1978



[1]Anemia defined as a hemoglobin value of <12 gms/100 cc for non-pregnant and lactating women and <11 gms/100 cc for pregnant women.

little difference in mean values and anemia prevalence in women who are lactating as compared to non-pregnant, non-lactating women. Although mean values of hemoglobin differ between the pregnant and the lactating and non-pregnant groups, there is little variation in the mean levels of each group among the rural universes. Urban Port-au-Prince tends to have lower mean hemoglobin levels and a higher percentage of pregnant women who are anemic.

IV. NUTRITION-RELATED CLINICAL SIGNS AND SYMPTOMS IN HAITIAN PRESCHOOL CHILDREN AND THEIR GUARDIANS

A. RESULTS

1. Pedal Edema - Pedal edema of nutritional origin is diagnostic of kwashiorkor. The results of clinical examination for bilateral pedal edema disclosed that 144 children exhibited this sign (an overall rate of 26.9/1,000 children surveyed). The pedal edema rate for the 314 children acutely undernourished (below the 80 percent reference median weight for height) was 86/1,000. In the 1,329 children below the 90 percent reference median height for age, 67 had bilateral pedal edema, a rate of 50.4/1,000. In the most severely undernourished category, those classed as exhibiting concurrent wasting and stunting, 10.4 percent of the 144 children had pedal edema, a rate of 104/1,000.

2. Goiter - The presence or absence of goiter was determined in the 3,806 mothers or guardians who were responsible for survey children. A total of 121 of these women (3.8 percent) had clinical signs of goiter. In the Département de l'Ouest, the prevalence of goiter is higher than in other areas (8.0 percent). A high prevalence of goiter, 4.3 percent, also exists in the Artibonite. Data is presented in Table 9.

3. Recent Sickness, Diarrhea, Fever

   a. Sickness - The prevalence of nonspecific illness within the past 7 days for each age group and universe is shown in Table 10.

      These results suggest that the prevalence of perceived illness decreases with increasing age of the survey child in all geographic areas. Although there are not significant differences in prevalence of illness among départements, the metropolitan Port-au-Prince area appears to have a lower rate of illness.

   b. Diarrhea - The prevalence of diarrhea within the past 7 days in survey children is shown in Table 11. The difference in the prevalences of diarrhea in all rural universes is not significant, however, the prevalence of diarrhea is generally lower in metropolitan Port-au-Prince. The prevalence of diarrhea appears to decrease with increasing age.

Table 9. Percentage Distribution of Goiter in Mothers/Guardians by Geographic Area: Haiti 1978

Geographic Area[a]	Goiter					
	Visible		Not Visible		Total[b]	
I	0.8%	(5)	99.2%	(594)	100.0%	(599)
II	2.6%	(16)	97.4%	(597)	100.0%	(613)
III	4.3%	(27)	95.7%	(605)	100.0%	(632)
IV	8.0%	(49)	92.0%	(565)	100.0%	(614)
V	2.4%	(16)	97.6%	(664)	100.0%	(680)
Representative Rural Sample	4.2%	(113)	95.8%	(3025)	100.0%	(3138)
- - - - - - - - - - - - - -						
VI	1.2%	(8)	98.8%	(660)	100.0%	(668)
Representative National Sample	3.8%	(121)	96.2%	(3685)	100.0%	(3806)

[a] See Table 1 for description of geographic areas and sample universes.

[b] All percentages are weighted by universe population proportions. The actual number of persons surveyed are given in parentheses.

Table 10. Percentage of Preschool Children with Illness in the Seven Days Preceding Survey Interview by Age and Geographic Area: Haiti 1978

Age in Months	Geographic Area[a] I		II		III		IV		V		VI		Total	
	Percent Sick	Number	Percent Sick	Number	Percent Sick	Number	Percent Sick	Number	Percent Sick	Number	Percent Sick	Number	Percent Sick	Number[b]
3-5	60.9%	46	52.5%	61	53.6%	56	50.0%	62	40.7%	59	50.0%	64	49.3%	348 (349)
6-11	69.1%	110	73.3%	120	64.4%	118	62.3%	106	60.4%	144	57.1%	126	63.4%	724 (724)
12-23	68.8%	202	60.7%	196	68.2%	220	59.8%	194	64.1%	259	63.9%	183	63.6%	1254 (1255)
24-35	61.7%	188	60.6%	208	64.6%	175	56.5%	191	54.5%	143	44.5%	200	56.6%	1105 (1107)
36-47	58.6%	181	57.1%	161	55.4%	175	43.0%	193	47.9%	167	31.3%	166	47.5%	1043 (1049)
48-59	54.9%	164	52.8%	142	47.6%	143	32.2%	146	43.8%	121	31.6%	152	46.7%	868 (869)
Total	62.3%	891	59.9%	888	60.2%	887	50.6%	892	54.6%	893	46.0%	891	54.6%	5342 (5353)

[a] See Table 1 for description of geographic areas and sample universes.

[b] All percentages are weighted by universe population proportions and are based on children for whom data was available. The numbers in parentheses are the total number of survey children in the specific age group.

Table 11. Percentage of Preschool Children with Recent Diarrhea History by Age and Geographic Area: Haiti 1978

	Geographic Area[a]													
	I		II		III		IV		V		VI		Total	
Age in Months	Percent Diarrhea	Number	Percent Diarrhea	Number	Percent Diarrhea	Number	Percent Diarrhea	Number	Percent Diarrhea	Number	Percent Diarrhea	Number	Percent Diarrhea	Number[b]
3-5	47.8%	46	42.6%	61	50.0%	56	32.3%	62	37.3%	59	31.7%	63	38.6%	347 (349)
6-11	59.1%	110	55.0%	120	58.5%	118	53.8%	106	48.6%	144	44.4%	126	52.2%	724 (724)
12-23	62.9%	202	46.4%	196	61.8%	220	49.5%	194	47.5%	259	47.5%	183	51.1%	1254 (1255)
24-35	52.1%	188	49.5%	208	60.0%	175	46.6%	191	43.4%	143	29.5%	905	46.3%	1105 (1107)
36-47	51.7%	180	47.5%	162	50.3%	175	35.6%	194	33.7%	166	22.2%	167	38.4%	1044 (1049)
38-59	45.7%	164	41.1%	141	40.6%	143	28.3%	145	36.4%	121	25.8%	151	34.7%	865 (869)
Total	53.9%	890	47.4%	888	54.6%	887	41.7%	892	42.3%	892	33.5%	890	44.4%	5339 (5353)

[a] See Table 1 for description of geographic areas and sample universes.

[b] All percentages are weighted by universe population proportions and are based on children for whom data was available. The numbers in parentheses are the total number of survey children in the specific age group.

c. Fever - The prevalence of recent fever in survey children is shown in Table 12. As with the above symptoms related to illness, the prevalence of fever in survey children decreases with increasing age. Again, metropolitan Port-au-Prince has a lower prevalence of fever; each of the five rural regions have approximately the same prevalence of fever.

B. DISCUSSION

The overall prevalence of bilateral pedal edema for the survey children is higher than rates found in Togo, Nepal, and Sri Lanka,[19-23] but is considerably lower than rates seen during famines or disasters, when rates may be as high as 20 percent. If nutritional deficits are assumed to be responsible for all of the pedal edema, then nearly 3 out of 100 Haitian preschool children had clinical evidence of kwashiorkor during the summer of 1978.

Endemic goiter rates are low nationally as compared with rates found in West African countries.[24] Although foci of high prevalences of goiter may exist in Haiti, nationally, endemic goiter, can not be considered a public health problem.

The highest prevalences of acute illness, diarrhea, and fever are seen in children under 1 year of age. The rural areas of Haiti have generally higher prevalences of acute illness than

Table 12. Percentage of Preschool Children with Recent Fever History by Age and Geographic Area: Haiti 1978

Age in Months	Geographic Area[a/] I		II		III		IV		V		VI		Total	
	Percent Fever	Number	Percent Fever	Number	Percent Fever	Number	Percent Fever	Number	Percent Fever	Number	Percent Fever	Number	Percent Fever	Number[b/]
3-5	28.3%	46	42.6%	61	40.4%	57	38.7%	62	25.4%	59	34.9%	63	35.7%	348 (349)
6-11	41.3%	109	41.7%	120	39.8%	118	46.7%	105	42.7%	143	45.2%	126	43.2%	721 (724)
12-23	38.8%	201	44.0%	193	42.9%	219	40.9%	193	51.4%	259	44.3%	183	45.0%	1248 (1255)
24-35	30.1%	186	32.2%	208	30.1%	173	33.5%	188	31.5%	142	26.5%	200	31.0%	1097 (1107)
36-47	24.9%	181	19.0%	163	23.1%	173	21.6%	194	22.3%	166	13.2%	167	20.6%	1044 (1049)
48-59	16.7%	162	22.1%	140	16.9%	142	14.4%	146	24.8%	121	11.8%	152	17.8%	863 (869)
Total	29.8%	885	32.8%	885	31.7%	882	31.3%	888	36.1%	890	28.4%	891	32.2%	5321 (5353)

[a/] See Table 1 for description of geographic areas and sample universes.

[b/] All percentages are weighted by universe population proportions and are based on children for whom data was available. The numbers in parentheses are the total number of survey children in the specific age group.

the metropolitan area. This difference may be the result of differences in the availability of public health services, curative medical services, and health awareness of mothers

V. BREAST-FEEDING, WEANING, AND BOTTLE FEEDING

Earlier studies in rural Haiti[25] found prolonged breast-feeding to be practically universal in rural areas. Little data has been available on breast-feeding in urban areas, although several small studies[26] suggest that the duration of breast-feeding is shorter and that some women never breast-feed. In this survey, questions were asked of the biological mothers which allowed an approximation of the numbers of women currently breast-feeding, those who have never breast-fed, and the average age at which breast-fed children were weaned.

A. RESULTS

1. Children Being Breast-Fed - The percentage of children being breast-fed is inversely proportional to the age of the child. Table 13 shows the percentage of children being breast-fed by age and by geographic area at the time of the survey. In the rural areas almost all children are breast-fed through the first year of life. By 12 months only 3-9 percent of rural children have been completely weaned. This contrasts sharply with Port-au-Prince where nearly 29 percent of the children are not being breast-fed by the age of 12 months. The percent of children being breast-fed declines as the child becomes older.

Table 13. Percentage Distribution of Preschool Children being Breast-Fed at the Time of the Survey by Age of Child and Geographic Area: Haiti 1978

Age in Months	Geographic Area[a] I	II	III	IV	V	VI	Total[b]
3-5	100.0% (44)	98.3% (60)	100.0% (55)	96.7% (60)	100.0% (56)	90.2% (61)	97.3% (336)
6-11	95.1% (103)	97.3% (113)	96.3% (108)	90.9% (99)	94.1% (135)	71.7% (113)	91.0% (671)
12-23	59.7% (181)	66.9% (175)	60.5% (195)	50.3% (177)	53.6% (237)	28.9% (166)	53.1% (1131)
24-35	0.6% (157)	5.4% (184)	5.2% (153)	3.1% (162)	5.8% (121)	3.1% (161)	4.3% (938)
36-59	0.4% (275)	- (262)	1.1% (265)	0.4% (275)	1.2% (249)	1.6% (254)	0.8% (1580)
Total[b]	33.2% (760)	37.3% (794)	37.1% (776)	31.4% (773)	40.1% (798)	25.6% (755)	34.6% (4656)

[a] See Table 1 for description of geographic areas.

[b] All percentages are weighted by universe population proportions. The actual number of preschool children whose biological mothers were questioned about the breast-feeding status of their children is given in parentheses.

2. Children Never Breast-Fed - Information on age at weaning was obtained from mothers who had already weaned their children. In the rural areas, virtually all children were breast-fed for some time. In these areas, the percentage of children never breast-fed ranged from 0.0 to 1.1. In Port-au-Prince, however, 9.7 percent of the survey children had never been breast-fed. (See Table 14)

3. Weaning - Most rural children were completely weaned by 18-23 months of age. Urban children who are breast-fed are generally weaned at a younger age. (See Table 14)

4. Breast-Feeding, Weaning, and Age of Mother - Table 15 shows the percentage distribution of survey children by age of weaning and by stated age of mother in the urban sample and in the representative rural sample. In both the urban and rural areas, younger mothers tend to wean their children sooner than older ones. Also as shown in this table urban mothers, in all age groups, are more likely never to begin breast-feeding than rural ones.

5. Trends in Weaning Practices - Table 16 shows the percentage distribution of survey children by age grouping and by age of weaning. During the past 5 years the age distribution of children into various weaning age groups has remained stable. The percentage distribution of children 12-59 months who were weaned at less than 12 months ranges from 11.6 to 17.8. The

Table 14. Distribution of Weaned Preschool Children by Age of Child at Weaning and by Geographic Area: Haiti 1978

Age Weaned in Months	Geographic Area[a] I	II	III	IV	V	VI	Total[b]
0-5	1.0% (5)	2.0% (10)	0.8% (4)	1.7% (9)	2.5% (12)	18.1% (101)	4.5% (141)
6-11	6.4% (33)	6.6% (31)	3.9% (19)	12.3% (65)	11.5% (55)	35.0% (139)	11.7% (344)
12-17	38.0% (193)	30.2% (150)	32.2% (156)	33.1% (175)	38.5% (183)	27.3% (152)	32.9% (1009)
18-23	45.1% (229)	41.9% (208)	45.0% (218)	43.2% (228)	33.1% (157)	14.7% (82)	36.5% (1122)
24+	9.3% (47)	17.5% (87)	17.1% (83)	7.8% (41)	13.7% (65)	3.8% (21)	11.6% (344)
Never Breast-Fed	- (0)	0.2% (1)	- (0)	1.1% (6)	0.2% (1)	9.7% (54)	2.0% (62)
Unknown	0.2% (1)	1.4% (7)	0.8% (4)	0.8% (4)	0.4% (2)	1.4% (8)	0.9% (26)
Total[b]	100.0% (508)	100.0% (496)	100.0% (484)	100.0% (528)	100.0% (475)	100.0% (557)	100.0% (3048)

[a] See Table 1 for description of geographic areas and sample universes.

[b] All percentages are weighted by universe population proportions and are based on number of children weaned given in parentheses.

Table 15. Percentage Distribution of Survey Children by Stated Age of Weaning and by Age of Mother by Geographic Area[a]: Haiti 1978

Representative Rural Sample

Age of Mother (Years)	Age in Months of Child at Weaning <12	12-17	18+	Never Breast-Fed	Total	Percent of Mothers in Age Group
<25	19.5% (52)	42.8% (128)	36.9% (113)	0.9% (2)	100.0% (295)	13.2%
25-34	10.4% (127)	36.8% (486)	52.3% (698)	0.5% (5)	100.0% (1316)	53.9%
35+	8.2% (66)	26.9% (243)	64.8% (551)	0.1% (1)	100.0% (861)	32.9%
Total[b]	10.9% (245)	34.3% (857)	54.4% (1362)	0.4% (8)	100.0% (2472)	100.0%

Urban Sample (Port-au-Prince)

Age of Mother (Years)	Age in Months of Child at Weaning <12	12-17	18+	Never Breast-Fed	Total	Percent of Mothers in Age Group
<25	51.9% (70)	20.7% (28)	12.6% (17)	14.8% (20)	100.0% (135)	24.6%
25-34	44.2% (133)	28.2% (85)	17.6% (53)	10.0% (30)	100.0% (301)	54.8%
35+	32.7% (37)	34.5% (39)	29.2% (33)	3.5% (4)	100.0% (113)	20.6%
Total	43.7% (240)	27.7% (152)	18.8% (103)	9.8% (54)	100.0% (549)	100.0%

[a] See Table 1 for description of geographic areas.

[b] All percentages are weighted by universe population proportions and are based on numbers of children with known age of weaning.

Table 16. Percentage Distribution of Preschool Children by Age at Weaning and Breast-Feeding Status by Age of Child at Survey: Haiti 1978

Representative National Sample

Age in Months	Age in Months of Child at Weaning						
	<12	12-17	18+	Unk.	Never Breast-Fed	Still Breast-Feeding	Total[a]
3-5	N.A.	N.A.	N.A.	- (0)	1.1% (4)	98.9% (327)	100.0% (331)
6-11	N.A.	N.A.	N.A.	0.3% (2)	1.1% (8)	98.6% (612)	100.0% (622)
12-23	17.8% (133)	N.A.	N.A.	0.4% (3)	1.8% (14)	79.9% (609)	100.0% (759)
24-35	11.6% (111)	28.7% (270)	53.2% (499)	0.4% (4)	1.9% (18)	4.3% (36)	100.0% (938)
36-47	13.4% (113)	30.7% (278)	52.7% (456)	1.4% (12)	1.0% (9)	0.8% (7)	100.0% (875)
48-59	12.2% (87)	32.3% (223)	52.6% (375)	0.8% (5)	1.3% (10)	0.7% (5)	100.0% (705)
Total[a]	10.5% (444)	17.9% (771)	31.2% (1330)	0.6% (26)	1.4% (63)	38.3% (1596)	100.0% (4230)

[a] All percentages are weighted by universe population proportions and are based on numbers of children with available data.

percentage of children never breast-fed remains fairly constant and comprises from 1.0 to 1.9 percent of each age grouping. This continuing trend of stable breast-feeding duration with little change in weaning pattern exists in both urban and rural groupings of children.

6. Use of the Bottle - A high percentage of women in both rural and urban areas reported using a baby bottle at some time to feed milk to their infants. In the representative rural sample, 60.1 percent of mothers had fed milk to their children from a bottle. In the urban sample, 96.0 percent of the mothers had used a bottle for feeding milk to their infants.

B. DISCUSSION

From survey results it is clear that there are urban/rural differences in breast-feeding practices. In rural areas, most mothers breast-feed their children and continue to breast-feed until the child is about 18 months old. In the urban areas, many women do not begin to breast-feed and those who do breast-feed tend to wean their children, on the average, at about 12 months of age.

Breast-feeding practices appear to be age related. Younger mothers tend to breast-feed their children for shorter periods of time than older ones.

Data presented in Table 16 suggests that the age of weaning for Haitian children has not decreased or increased during the past 5 years. Overall, the percentage of children never breast-fed has remained constant, a finding that is unexpected in light of the almost universal use of the feeding bottle in urban areas and the trend for younger mothers to decrease breast-feeding duration.

The use of the bottle for feeding is almost universal for urban children and is quite high for rural children. Although not always used as a substitute for breast-feeding, these bottles appear to be important in the weaning and food supplementation practices of Haitian women.

VI. PARITY, CHILD SURVIVALSHIP, AND INFANT DEATHS

Biological mothers of survey children were asked questions concerning the total number of children to which they had given birth, the numbers still surviving, and the numbers who had died within the first year of life. These retrospective questions, posed within the context of a survey not specifically designed to study fertility or mortality, are likely to produce underestimates of actual levels of mortality, and may exaggerate fertility levels. The data provided in Table 17 should be seen as crude estimates. Actual infant mortality is higher and proportions of child survival are probably lower.

Table 17. Mean Number of Children Ever Born, Still Alive, and Who Died During the First Year of Life, Survivalship Ratios and Estimated Infant Mortality Rate by Age of Mother and Geographic Area[a]: Haiti 1978

Representative Rural Sample

Mother's Age in Years	Number of Mothers	Mean Number of Children Ever Born	Mean Number Still Alive	Survivalship[b]	Mean Number Died During First Year	IMR[c]
15-19	39	1.1	1.1	1.000	0.1	91
20-24	467	1.7	1.5	.882	0.1	59
25-29	800	2.9	2.4	.828	0.3	103
30-34	577	4.5	3.6	.800	0.5	111
35-39	561	6.0	4.6	.767	0.9	150
40-44	235	7.7	5.7	.740	1.1	143
45-49	85	9.1	6.5	.714	1.2	132
50+	17	10.0	6.7	.670	0.9	90
Total[d]	2783	4.2	3.3	.786	0.5	119

Urban Sample (Port-au-Prince)

Mother's Age in Years	Number of Mothers	Mean Number of Children Ever Born	Mean Number Still Alive	Survivalship[b]	Mean Number Died During First Year	IMR[c]
15-19	18	1.2	1.2	1.000	0.1	83
20-24	147	1.8	1.5	.883	0.2	111
25-29	193	2.7	2.3	.852	0.4	148
30-34	105	4.4	3.3	.750	0.7	159
35-39	71	5.7	4.4	.772	0.7	123
40-44	27	7.0	5.3	.757	1.1	157
45-49	7	7.7	6.0	.779	1.0	130
50+	3	5.7	4.7	.825	0.7	123
Total[d]	571	3.4	2.7	.794	0.5	147

[a] See Table 1 for description of geographic areas.

[b] Survivalship = Mean number of children still alive divided by mean number of children ever born.

[c] Estimated infant mortality rate per 1000.

[d] All percentages are weighted by universe population proportions and are based on number of biological mothers on whom data was available.

A. RESULTS

Infant mortality is high in both rural and urban areas. In the rural areas the estimated infant mortality rate is 119 per 1000. In Port-au-Prince, this rate is 147/1000. These estimates compare with other published estimates of 98-147/1000.[27,28]

Of the total number of children ever born to survey mothers over 20 percent were reported to have died.

Fertility appears high in both urban and rural areas.

B. DISCUSSION

There is a reported higher rate of infant mortality in metropolitan Port-au-Prince than in the rural areas. This higher rate does not appear to be consistent with the observation that other possible determinants of infant mortality - the prevalence of undernutrition and the prevalence of symptoms of recent illness, fever, and diarrhea - are lower in Port-au-Prince than in the rural areas. Two possible explanations can be proposed: (1) there is widespread under-reporting of infant deaths in rural areas; (2) the very ill children in Port-au-Prince were not included in the survey sample since it is possible they were away from their homes receiving medical treatment at the time of the survey. This could result in an underestimation of undernutrition and of morbidity in metropolitan Port-au-Prince. On the other hand, urban/rural differences in infant mortality may be real, and the etiology responsible for this difference then remains unidentified.

While data from the 1977 Haiti Fertility Survey are needed for more suitable estimates of infant mortality and fertility, it is clear from this survey that infant and child deaths are very high in both rural and urban Haiti.

Women 15-24 years old in urban areas had nearly the same numbers of children as rural women, but older rural women (over age 30) have considerably more children than older urban women.

VII. PREVALENCE OF MEASLES ANTIBODY IN PRESCHOOL CHILDREN

A. RESULTS

A total of 756 sera were available for measles antibody determination by the hemagglutination inhibition method. Table 18 shows the age prevalence distribution for the rural survey population for urban Port-au-Prince, and for the total country.

B. DISCUSSION

Infectious diseases such as measles are among many factors influencing the nutrition of preschool children. Measles can precipitate a borderline nutritional status into acute undernutrition by causing weight loss leading to a weight for height ratio of less than 80 percent of the median, and in the extreme, to pedal edema. Measles is particularly important because its presence is universal, and it can be prevented by immunization. Immunizations for measles have been done only on a very limited scale in Haiti.

Table 18. Percentage[a] of Sera Positive for Measles Antibodies by Age for Haiti Survey Population: Haiti 1978

	Percentage Positive by Age						
	3-5 Mos	6-11 Mos	12-23 Mos	24-35 Mos	36-47 Mos	48-59 Mos	Total
Total Rural Sample	21.9% (5)	7.9% (8)	14.0% (23)	20.5% (28)	38.6% (51)	49.7% (64)	(179)[b]
Urban Sample	0 (0)	31.3% (5)	47.2% (17)	66.7% (22)	81.5% (22)	78.1% (25)	(91)
Total National Sample	18.5% (5)	11.0% (12)	19.3% (40)	28.4% (50)	44.9% (73)	55.0% (89)	(270)

[a] Percentages calculated from weighted data.

[b] Number of sera in parentheses.

The survey data show an age related increase of the prevalence of measles antibodies with slightly more than half of the children 48-59 months old having acquired antibodies. There are differences between urban and rural areas. In the rural areas, where travel is more difficult and the houses are not tightly grouped together, the onset of measles is delayed.

The naturally acquired measles antibody pattern in Haiti is somewhat different than that of West Africa, where virtually all children have antibodies by age 6. The measurable effect of measles on nutritional status in Haiti can not be learned from this survey. Nationwide extrapolation of the prevalence of measles antibody should not be assumed from the survey data since a portion of the sera samples collected were not able to be analyzed due to insufficient quantities of sera on the filter papers.

VIII. INFORMATION ON THE GUARDIANS

A. RESULTS

1. Type of Guardian - Eighty-eight percent of the guardians interviewed were biological mothers of survey children. This percentage of biological mothers living with survey children was fairly uniform throughout the rural and metropolitan areas ranging from 85.5 percent in Port-au-Prince to 90.0 percent in the south. About 6.5 percent of the guardians interviewed were grandmothers. Another 5.5 percent were some other type of relative or stepmother.

2. Age of Guardian - An age pyramid of the guardian's reported age is shown in Figure 11.

3. Occupation of the Mother/Guardian - Sixty-one percent of rural mothers/guardians were engaged in farming. None of the mothers/guardians in Port-au-Prince were farmers. Slightly more than 20 percent of rural and 55.4 percent of the urban mothers/guardians were full-time in the home at the time of the survey. See Table 19.

4. Current Union Status - Table 20 summarizes the data on current union status for urban and rural biological mothers. A greater percentage of urban women are living out of union or in union without a partner than rural women. Less urban women are married than rural ones. Even when women who are placé (a consensual union not legally sanctioned) are grouped with those who are legally married, the percentage of rural women with a partner is greater than that of urban women. Considering only cohabitation patterns, 79.5 percent of the rural women, but only 65.8 percent of the urban women have a partner present.

5. Man in House as Father of Survey Child - Eighty-eight percent of the men living in the homes were reported to be the father of the survey child.

FIGURE 11. Age Distribution of Guardians and Biological Mothers of Preschool Children: Haiti 1978

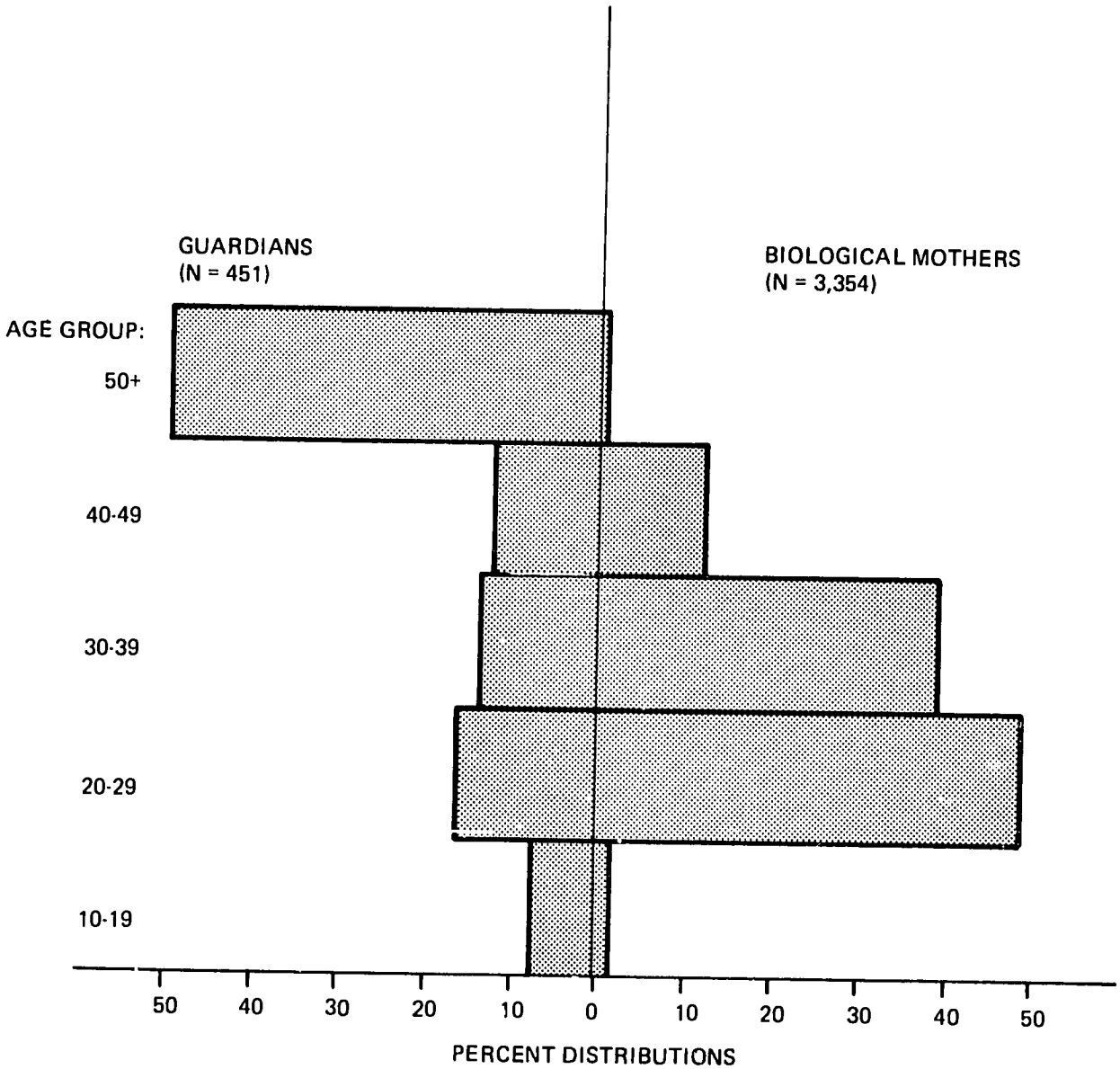


Table 19. Percentage Distribution of Occupations of Mothers/Guardians by Geographic Area[a]: Haiti 1978

	Representative Rural Sample	Urban Sample
Farmer (Cultivatrice)	61.3% (1992)	(0)
Vendor at Home (Commerçante)	4.8% (154)	6.0% (40)
Artisan (Artisane)	4.6% (132)	11.2% (75)
Housewife (Femme de Menage)	20.1% (599)	55.4% (370)
Small Businesswoman (Petite Commerçante)	7.8% (218)	14.8% (99)
Large Businesswoman (Grande Commerçante)	0.8% (21)	4.0% (27)
Employed-Unskilled (Petitie Employee)	0.3% (9)	2.4% (16)
Factory Worker (Ouvriere)	0.1% (5)	5.2% (35)
Secretary, Teacher (Autres)	0.2% (8)	0.9% (6)
Total[b]	100.0% (3138)	100.0% (668)

[a] See Table 1 for description of geographic areas.

[b] All percentages are based on weighted universe population proportions. Actual number of persons surveyed are given in parentheses.

Table 20. Percentage Distribution of Current Union Status of Mothers of Preschool Children by Geographic Area[a]: Haiti 1978

Union Status	Representative Rural Sample	Urban Sample
Out of Union	13.1% (350)	23.5% (134)
Married (Husband Present)	27.0% (799)	20.7% (118)
Married (Husband Absent)	0.6% (20)	2.1% (12)
Placé (Partner Present)	52.5% (1427)	45.2% (258)
Placé (Partner Absent)	4.0% (103)	4.6% (26)
Visiting Union (Resident Partner)	0.0% (3)	- (0)
Visiting Union (No Resident Partner)	2.7% (71)	4.0% (23)
Total[b]	100.0% (2782)	100.0% (571)

[a] See Table 1 for a description of the geographic areas.

[b] All percentages are weighted by universe population proportions and are based on number of biological mothers given in parentheses.

6. Support of the Child by Father - According to the guardian, almost 87 percent of the survey children's fathers provided some support to their children.

7. Occupation of the Man - Of the 3,074 men on whom data was obtained 72.6 percent could be classed as a small farmer, cultivating less than 5 acres. The largest proportion of urban men were factory workers and tradesmen. Other occupations are seen in Table 21.

B. DISCUSSION

The presence of nearly 90 percent of the survey children in homes with their biological mother is not in agreement with recent work by Rawson and Berggren.[27] Although the actual national percentage of children residing with their biological mothers may differ from that found in this survey, it may be safely assumed that child dislocation for children under age 5 is not a major factor in child undernutrition.

As expected, a high percentage of rural women are engaged in various farming tasks. A substantial proportion of these women are also engaged in local sales of produce and in artisan skills. The urban women who work outside the home are primarily engaged in selling and artisan activities.

The major type of union in Haiti is the placé union. This is a consensual union which is not legally sanctioned but involves a

Table 21. Percentage Distribution of Occupations of the Man in the Household by Geographic Area[a]: Haiti 1978

Occupation Category	Representative Rural Sample Universe	Urban Sample
[b] Small Farmer (Petit cultivateur)	83.6% (2252)	1.7% (82)
Large Farmer (Grand cultivateur)	1.6% (36)	0.2% (1)
[b] Laborer-Unskilled Worker (Artisan et petit commerçant Independant)	4.2% (97)	20.2% (93)
[b] Employee (Petit salarie sans metier)	3.5% (77)	15.2% (70)
Factory Worker Government Employee, tradesman (Petit professionnel, employe du governement)	4.8% (105)	45.6% (210)
Business-Professional (Grand Commerçant)	1.0% (20)	7.2% (33)
[b] Unemployed (Chaumeur)	0.6% (12)	5.4% (25)
Unknown (Inconnu)	0.6% (14)	4.5% (21)
Total[c]	100.0% (2613)	100.0% (461)

[a] See Table 1 for a description of the geographic areas.

[b] Unskilled categories.

[c] All percentages are based on weighted universe population proportions. Actual number of persons surveyed are given in parentheses.

social and moral commitment of the two partners. This type of union has normative support from the community and can be as stable and enduring as legal marriage. Although the legal marriage is more prestigious and encouraged by religious authorities, it requires a dowry and ceremonial costs and is beyond the means of many Haitians. The several other visiting types of unions are generally of short duration and usually do not entail cohabitation.[30]

IX. INFORMATION ON THE FAMILY

A. RESULTS

1. Presence of a Garden - An average of 95.2 percent of rural families had gardens that produced food consumed by the family. Only 8.3 percent of the urban families in Port-au-Prince had gardens.

2. Source of Drinking Water - An average of 65.5 percent of rural families obtained drinking water from springs. Less than 9 percent of rural families had water available from piped sources. Over 98 percent of urban families had water available from piped sources, 3.9 percent had water available from public fountains, 94.5 percent had water piped near or into their homes.

3. Presence of a Latrine - An average of 16.7 percent of rural families had useable latrines while 93.6 percent of urban families had latrines. Surveyers observed that the presence

of latrines in rural sample sites was highly variable. In some habitations all homes had latrines. In other habitations, there were none.

4. Type of Sugar Served - Over 90 percent of all families surveyed served predominately suk rouge, a partially refined sugar. In rural areas, only 1.1 percent of the families served white, refined sugar. In Port-au-Prince 8.9 percent of the families served white sugar.

B. DISCUSSION

The urban family generally has what might be considered more household amenities - latrines, a piped source of water. The rural family, living in less densely populated areas has less of these amenities, but do have gardens capable of producing food.

X. SOCIOCULTURAL INFORMATION

A series of four questions were posed to each mother/guardian in an effort to estimate sociocultural levels.

A. RESULTS

1. Attendance at School - In rural areas, 17.6 percent of mothers or guardians attended school. However, in Port-au-Prince, 52.3 percent had attended school for at least 1 year.

2. Ownership of Working Radio - Family ownership of a radio varied from 10.8 percent prevalence in the Département du Nord-Ouest to 60.3 percent in Port-au-Prince. See Table 22.

Table 22. Percentage Distribution Ownership of Working Radio in Each Geographic Area: Haiti 1978

Radio Ownership	Nord-Ouest	Nord	Universe Artibonite	Ouest	Sud	Port-au-Prince
YES	10.8%	12.2%	13.2%	19.8%	24.8%	60.3%
NO	89.2%	87.8%	86.8%	80.2%	75.2%	39.7%

3. Use of a Radio for Guidance - All families, whether or not they had a working radio were asked if they listened to educational radio programs for guidance. The percentage of distribution, only slightly higher than that of radio ownership, is shown in Table 23.

4. Familiarity with AKAMIL - AKAMIL is a nutritional supplement purported to be widely promoted throughout the country. Of the 3,806 women who were asked if they had heard of AKAMIL, 98 (2.5 percent) answered affirmatively. There were no differences between the rural or metropolitan universes.

B. DISCUSSION

Opportunities for schooling and the ownership of radios must be included in the social amenities available to urban families. In both urban and rural areas there is surprisingly little communal use of the radio, and based on these survey data, the use of radios for mass education must be reconsidered. The lack of familiarity with AKAMIL, a material purported to be widely promoted, attests to the lack of success government programs have had in promoting the benefits of this satisfactory weaning food supplement.

Table 23. Percentage Distribution of Use of Radio for Guidance in Each Geographic Area: Haiti 1978

Use of Radio	Nord-Ouest	Nord	Universe Artibonite	Ouest	Sud	Port-au-Prince
YES	11.3%	13.4%	16.3%	26.6%	27.0%	62.0%
NO	88.7%	86.6%	83.7%	73.4%	33.0%	38.0%

XI. ASSOCIATIONS OF NUTRITIONAL AND HEALTH STATUS OF CHILDREN WITH INDIVIDUAL AND HOUSEHOLD CHARACTERISTICS

NOTE

The presence of a statistically significant association does not necessarily indicate a causal relationship between a given characteristic and an indicator of malnutrition. A cross-sectional survey of this nature cannot, in general, provide the type of information necessary to establish causal relationships. Information on the magnitude and location of major nutrition problems plus certain associations of moderate or greater degree can, however, provide guidance in selecting areas for further research into causality, and for planning nutrition intervention programs.

A. Statistical Associations

1. Acute Undernutrition

a. Radio Ownership and Radio Listenership - Children of mothers who either owned or listened to a working radio had a statistically lower prevalence of acute undernutrition (weight for height less than 80 percent of the reference) than children whose mothers did not own a radio or listen to one.

b. School Attendance - Children whose mothers had attended school had a significantly lower prevalence of acute undernutrition than children whose mothers did not attend school.

2. Chronic Undernutrition

a. Radio Ownership and Radio Listenership - The prevalence of chronic undernutrition (height for age less than 90 percent of the reference median) was significantly lower in radio owners/listeners than in non-radio owners/listeners.

b. School Attendance - The prevalence of chronic undernutrition in children of mothers who had attended school was significantly less than in children whose mothers had not attended school.

c. Occupation of Survey Child's Father - Grouping the unskilled (small farmer, artesan, domestic, unemployed) occupations and the skilled (large farmer, government employee, professional), there is an inverse association between the higher skilled occupations and the prevalence of chronic undernutrition in the survey child. There is no association between the child's mother's occupation and the prevalence of chronic undernutrition.

3. Illness, Fever, Diarrhea

a. Latrine Located in Compound - The prevalence of recent illness, fever, and diarrhea was significantly lower in children whose families had useable latrines.

b. Source of Water - The prevalence of recent fever and illness in survey children whose families had a source of piped water (either in the home or at a public tap) were significantly lower than in families without a source of piped water. The prevalence of recent diarrhea in survey children was not significantly different in homes with or without a source of piped water.

4. Bottle Feeding

Children who had received feedings from a baby bottle had a significantly lower prevalence of wasting and stunting than children who had never been fed from a bottle. Some mothers, who are unable to provide weaning foods, tend to prolong breast-feeding without providing food supplementation. The children of these mothers, because they are rapidly growing and receiving only breast-milk, tend to have a deficit nutritional intake.

5. Relationship of Recent Symptoms of Illness, Fever, and Diarrhea with Acute and Chronic Undernutrition - There is a constant relationship between the prevalence of illness, fever, and diarrhea symptoms and acute undernutrition, as indicated by low weight for height relative to the reference median. Table 24 demonstrates this relationship. As the standard deviation (Z-score) of weight for height decreases, the

Table 24. Percentage Distribution of Preschool Children[a/] with Recent Symptoms of Illness, Fever, and Diarrhea by Weight for Height Z-Score: Haiti 1978

Symptom	Weight for Height Z-Score: -6.00/ -3.00		-2.99/ -2.50		-2.49/ -2.00		-1.99/ -1.00		-.99/ -0.00		0.00/ +.99		+0.00/ +1.99		+2.00/ +6.00		Total[b/]	
Illness	83.2%	59	82.5%	130	76.0%	298	60.3%	1622	52.3%	2044	41.6%	974	36.4%	170	36.6%	45	54.6%	5342 (5353)
Fever	61.5%	59	71.8%	130	58.9%	297	49.4%	1620	43.3%	2045	32.1%	973	29.0%	170	33.3%	45	44.4%	5339 (5353)
Diarrhea	62.7%	59	57.6%	130	54.3%	296	36.6%	1615	27.9%	2037	22.9%	969	24.8%	170	30.6%	45	32.2%	5321 (5353)

[a/] Representative National Sample. See Table 1 for description of geographic areas and sample universes

[b/] All percentages are weighted by universe population proportions, and are based on children for whom data was available. The numbers in parentheses are the total number of survey children.

prevalence of recent symptoms of fever, diarrhea, and illness increases. This linear relationship does not hold for chronic undernutrition and the prevalence of symptoms.

B. DISCUSSION

The significant association of variables such as ownership of radios, radio listenership, occupation, school attendance, and bottle feeding with chronic and acute undernutrition are probably more socio-economically related than cause-effect related, i.e., those families with radios, school education, bottles, and skilled occupations are more likely to be able to provide adequate diets for their children.

There is a relationship of increased prevalence of symptoms of recent illness, fever, and diarrhea with increased variation from the normal distribution of weight for height. Those children whose weight for height measurements differ greatly from the normal distribution tend to have a higher prevalence of illness, fever, and diarrhea symptoms, indicating an association of morbidity with anthropometric measurements. This relationship merits further study using prospective techniques.

SUMMARY OF SURVEY FINDINGS

1. The prevalence of undernutrition is extremely high. Nationally, it is estimated that one in eight children suffers from acute undernutrition. Over 26 percent of all survey children between the ages of 3 and 59 months exhibit stunting. Approximately 25,000 children are in critical risk of increased morbidity and mortality. The prevalence of all types of undernutrition is higher in the rural areas than in the urban ones. Undernutrition is about at the same level in all five rural départements.

2. The prevalence of anemia in preschool children and their mothers and guardians is high throughout Haiti. It is generally higher in metropolitan Port-au-Prince than in the rural areas. Little is known about the public health consequences of this high prevalence of anemia.

3. Children from high socio-economic groups do not exhibit signs of wasting or stunting. There is some evidence, however, that this group has a high prevalence of overweight and tends to be more overweight than the United States reference population.

4. Most children are breast-fed between 12 and 24 months. Younger rural and urban mothers tend to breast-feed their children for shorter periods of time. Also, rural mothers tend to breast-feed for a longer period of time than urban mothers. The age of the child at weaning has remained constant during the past 5 years.

5. Bottle feeding is widespread throughout the country and is almost universal in Port-au-Prince.

6. Endemic goiter is not a public health problem in Haiti.

7. Fertility is high. Infant deaths vary between 119 and 147 per thousand during the first year of life.

8. Nearly all children live with their biological mother and approximately half of these children live with both their biological mother and father. In nearly all instances, the biological father provides support to his child. The presence of a father or a father figure in the household is more common in the rural areas than in the urban ones. The major type of union is placé.

9. Few rural women have attended school. In Port-au-Prince, approximately half of the women surveyed have been to school. In urban areas, 60 percent of families own radios. In the rural areas radio ownership is much lower. Attendance at school and ownership of a radio are inversely associated with undernutrition.

10. Fathers who have skilled occupations have fewer malnourished children.

11. The prevalence of the symptoms of illness, fever, and diarrhea is higher in the rural areas than in Port-au-Prince. The prevalence of these symptoms is highest in children under 12 months of age and decreases as the child becomes older. The prevalence of these symptoms is higher for children who are acutely undernourished and is lower for families who have latrines. The prevalence of symptoms of diarrhea has no relationship with the type of water supply.

12. Less than 3 percent of the mothers and guardians surveyed had heard of AKAMIL, a weaning food reported to be widely promoted throughout Haiti.

13. At the time of the survey, white sugar was used in only 1.1 percent of rural families and in 8.9 percent of urban ones. Because of its low usage, white sugar probably does not make an appropriate vitamin/mineral fortification vehicle.

RECOMMENDATIONS

The Haiti National Nutritional Survey was conducted June through September 1978 to quantify the magnitude and distribution of malnutrition in young children and their mothers. It was not designed to determine the causes of the malnutrition found. The survey results have, however, identified various areas which need immediate action. In the section below some of these nutritional, educational, and research areas which need timely support by the Haitian government and by various international agencies are listed. By no means is this list of recommendations exhaustive, nor should execution of these recommendations supplant efforts to improve the economic, agricultural, and health care systems which are essential in all countries and are necessary for optimum health.

NUTRITIONAL

- Immediate nutritional rehabilitation should be provided to those children who are presently severely undernourished (i.e., less than 80 percent weight for height); approximately 48,000 at the time of the survey. Priority should be given to those who exhibit wasting and stunting, nearly 25,000 children at the time of the study. These children are at greatest risk of increased morbidity and mortality.

- Preventive nutritional activities should be directed nationally to all children under 35 months of age. Data from this survey show that many Haitian children begin to develop severe nutritional deficiencies before reaching 6 months of age.

- A nationwide surveillance system should be established to detect, at the earliest possible moment, foci of undernutrition in various geographic and age-specific categories. This surveillance system should be jointly established by governmental health and agricultural and other appropriate ministries and should utilize, as a minimum, nutritional, agricultural, meteorlogical, and health indicators.

EDUCATIONAL

- A nationwide educational program should be directed to all Haitian mothers in an effort to improve weaning and breast-feeding habits. This educational program should take into account various differences in lifestyle and employment between rural and urban women. The use of AKAMIL, a weaning food, should be promoted in this educational effort.

- The development of mass media health educational programs that primarily use the radio should be reexamined. This survey has shown that radios are not effective in reaching either the target population (mothers of undernourished children) or significant numbers of the general population.

RESEARCH

Survey results have identified various research areas that need additional study:

- The etiology of different anemia rates for mothers and children throughout the country and the significance of these rates on their overall health status.
- The epidemiology of measles, its effect on nutritional status, and its significance as a public health problem in Haiti.
- The sociological, behavioral, and anthropological determinants responsible for changes in breast-feeding patterns.
- The relationship of morbidity with anthropometric measurements.

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UNIVERS: Nord Ouest (1)

Localité	Commune	Rural Section & No.	Habitation
001	Port-de-Paix	2e la Pointe 03-07	Nan Michel
501	Port-de-Paix	2e la Pointe 03-08	La croix St-Joseph
002	Port-de-Paix	3e Aubert 05-07	Nan Daniel
502	Port-de-Paix	3e Aubert 05-13	Nan moulin
003	Port-de-Paix	5e Source Beauvoir 07-03	Belier
503	Port-de-Paix	5e Source Beauvoir 07-05	Source Beauvoir
004	Port-de-Paix	7e Mahotière 09-03	Decide
504	Port-de-Paix	7e Mahotière 09-06	Philippe
005	St-Louis du Nord	3e Des Granges 04-13	1/2 Glacis-Courand
505	St-Louis du Nord	3e Des Granges 04-19	1/2 Rabouin
006	St-Louis du Nord	5o Bonneau 06-06	Ti Coni
506	St-Louis du Nord	5o Bonneau 06-08	Meance
007	Bassin Bleu	1e La Plate 01-02	Vieux Mare ou Nan Mare
507	Bassin Bleu	1e La Plate 01-05	Souti
008	Bassin Bleu	3e Haut-Moustiques 03-02	L'allemand
508	Bassin Bleu	3e Haut-Moustiques 03-03	Campagne
009	Anse-a-Foleur	2e Meyance 03-01	Van Bouelle
509	Anse-a-Foleur	2e Meyance 03-10	Nan Souffrance
010	Jean-Rabel	L'Acoma 01-01	L'Acoma
510	Jean-Rabel	L'Acoma 01-02	Cabaret
011	Jean-Rabel	L'Acoma 01-19	Digoterie

UNIVERS: Nord Ouest (1)

Localité	Commune	Rural Section & No.	Habitation
511	Jean-Rabel	L'Acoma 01-21	Vidi
012	Jean-Rabel	L'Acoma 01-26	Raymond
512	Jean-Rabel	L'Acoma 02-29	Nan Cirouelle
013	Jean-Rabel	5e Dessources 07-07	Nan Réserve
513	Jean-Rabel	5e Dessources 07-08	Lalaune
014	Jean-Rabel	7e Diondion 09-04	Golo
514	Jean-Rabel	7e Diondion 09-05	Desir
015	Baie de Henne	3e Réserve 02-01	Nan Zabeth
515	Baie de Henne	3e Réserve 02-02	Nan Ravine
016	Bombardopolis	2e Des Forges 02-02	Falletine
516	Bombardopolis	2e Des Forges 02-04	Nospame

UNIVERS: Nord (2)

Localité	Commune	Rural Section & No.	Habitation
017	Cap-Haitien	Haut du Cap 02-01	Cabane
018	Milot	2 ème Bonnet à l'Evêqu 02-05	Jean Blaise
019	Plaine du Nord	1ère Morne Rouge 01-0[illegible]	Baron
020	L'acul du Nord	3e Mornet 04-14	Boisy
021	Limonade	2e Bas de l'Anse 02-0[illegible]	Dimini
022	Limonade	3e Roucon 04-03	Vanghes
023	Trou du Nord (Ste Suzanne)	3e Bois Blanc 03-18	Garde à Noel
024	Ste Suzanne	6e Fond Bleu 07-02	Mme Jouly
025	Grande rivière du Nord	1o Grand Gilles 01-0[illegible]	Muraille
026	Grande Rivière du Nord	7e Gambade 04-07	Beaujoint
027	Dondon	4 ème Laguille 05-05	Gobert
028	St Raphael	4e Sanyago 04-03	Wallondry
029	Ranquitte	3o Cracaraille 04-01	Dufossac
030	Bahon	4e Bois Pin 01-10	Muscady
031	Vallière	2e Grosse Roche 02-02	Grosse Roche
032	Cerca La Source	2e Cajou Brulé 03-08	Lassière
033	Vallière	2o La Rose Bonite 09-02	La Rose
034	Ouanaminthe	2e Acul des Pins 06-07	Gris
035	Fort-Liberté	1o Loiseau 03-08	Garate
036	Ouanaminthe	6 ème Lamine 05-09	Merandé (une partie)

UNIVERS: Nord (2)

Localité	Commune	Rural Section & No.	Habitation
037	Limbé	2 eme Acul Jeannot 04-16	Salnave
038	Limbé	1e Garde Champêtre 01-03	Beaulieu
039	Plaisance	1e Colline Gobert 01-06	Clerisseau
040	Plaisance	5e La trouble 06-12	Beaubrun
041	Plaisance	6e La Ville 08-08	Figaro
042	Pilate	2o Baudin 03-10	Labouche
043	Pilate	5e Dubourg 06-02	Benoit
044	Port Margot	6o Molas 06-04	Bertrand
045	Port Margot	2e Bas Petit Borgne 01-01	Boideau
046	Borgne	1o Margot 01-07	Georges

UNIVERS: Artibonite (3)

Localité	Commune	Rural Section & No.	Habitation
047	Gonaives	1e Pont Tamarin 13-15	Pont Tamarin
048	Gonaives	5e La Brande 10-06	Grand Fond
049	Gros Morne	1e Boucan Richard 01-05	Morne Laporte
050	Gros Morne	4o L'Acul 04-03	Du charbre
051	Hinche	6e Savanne Carrée 07-15	Politier
052	Ennery	3o Chemin Neuf 03-06	Dacounan
053	Terreneuve	1o Dolland 01-15	Désiré
054	Terre Neuve	3o Lagon 05-08	Cote Garde
055	St Marc	2e le Délugé 04-16	Gresseau
056	St Marc	3o Goyavier 08-04	Bachette ou Rébuté
057	St Marc	4o Lalouère 10-08	Chanclotte
058	Verrettes	1o Liancourt 01-04	Trou José
059	Verrettes	4o Desarmes 05-27	Biquet
060	Verrettes	5o Bastien 06-01	Sapotille
061	La chapelle	2e Bossous 02-10	Pepin
062	St Michel	4e Lalomas 06-10	Nan Bail
063	St Michel	6e Lacidras 09-05	Sabacou
064	St Michel	8e L'attalaye 11-03	La Visite
065	Hinche	1e Juanaria 01-13	La Relouque
066	Hinche	3o Aguahedione 06-04	Palgata
067	Hinche	5e Rang 09-07	Barestil
068	Maissade	2o Narang 03-13	Pois Gratté
069	Thomonde	3o Baille Tourrible 12-06	Nan Jn Jacques

UNIVERS: Artibonite (3)

Localité	Commune	Rural Section & No.	Habitation
070	Tomassique	2o Lociane 14-15	Savanette
071	Dessalines	2o Duvallon 03-02	Bastère
072	Dessalines	4o Poste Pierrot 07-13	Jimpayé
073	Dessaline	6e La croix 09-20	La Croix
074	Petite Rivière de l'artibonite	1o Baccoursin 01-04	Mayant
075	Petite Rivière de l'artibonite	5o Pérodin 07-04	Nicholas
076	Petite Rivière de l'artibonite	6e Médor 09-07	Petite place

UNIVERS: Ouest (4)

Localire	Commune	Rural Section & No.	Habitation
077	Port-au-Prince	11 ème Rivière Froide 06-02	Mariani
078	Port-au-Prince	21 ème Berly 15-02	Dicourt
079	Kenscoff	2 ème Nouvelle Touraine 01-06	(Barrique Baignée) La Mardelle
080	Croix des Bouquets	1o Varreux 01-02	Bon Repos
081	Kenscoff	4o Belle Fontaine 04-05	(Morne Moise) Maime
082	Tomazeau	2o Grande-Plaine 03-06	La Perrière
083	Ganthier	4o Fonds-Verrettes 05-07	Tire-Pian
084	Arcahaie	3o Vases 02-10	Jean Hossé
085	Arcahaie	8o Mont-Rouis 07-05	Lemaire
086	La Gonave	9o Pointe à Raquette 09-02	Dessources
087	Léogane	Grande Rivière 06-17	Débouché et Sercay
088	Léogane	2o Citronniers 12-08	La Borne
089	Grand-Goâve	1o Tête à Boeuf 01-02	Belle Fleur
090	Léogane	7o Gérand 08-02	Fauché
091	Petit-Goâve	5o Trou Canari 06-08	Morne Brigué
092	Petit-Goâve	12o Fourgues 15-01	Gros Roche
093	Jacmel	3o Cochon Gras 05-01	La Combe
094	Bonhomme	3o Bas Coq Chante 10-07	Coteau
095	Jacmel	12o Lavanneau 15-04	Lamondrie
096	Jacmel	3o Haut Cap Rouge 03-05	Trou D'eau Francique
097	Marigot	3o Macary 04-07	Bien Né ou Zaleste
098	Jacmel	5o Bas de Grandou 06-05	Capitaine Garçon

UNIVERS: Ouest (4)

Localité	Commune	Rural Section & No.	Habitation
099	Côtes-de-Fer	4 ème Bras Gauche No 2 04-02	Ca Polyte
100	Saltrou	1o Baie d'Orange 01-07	Terre Bois
101	Grand Gosier	2o Pot de Chambre 02-03	Ste Hélène
102	Mirebalais	Cercule Brulé 06-01	Bayasse
103	Mirebalais	7o Des Bayes 10-05	Balumette
104	Grand Bois	2o Boucan Bois Pin 05-01	Breau
105	Saut d'Eau	2o La Selle 11-06	Madamecy
106	Belladère	2o Roy sec 02-05	La Gueble

UNIVERS: Sud (5)

Localité	Commune	Rural Section & No.	Habitation
107	Cayes	4o Laborde 06-06	Gonin
108	Cayes	10o Dory 10-19	Glaume
109	Cayes	12o Boulmier 15-01	Morancy
110	Torbeck	2 ème Berault 03-03	Labée
111	Port-Salut	3e Arniquet 03-04	Quartier Charles
112	St-Jean du Sud	2 ème Debouchette 02-04	Chapon
113	Camp Perrin	3 ème Tibi Davezac 03-05	Mahotière
114	Aquin	Bellevue 2 ème 02-05	Miraud
115	Aquin	5 ème Mare a Coiffe 05-04	Morne Desbas
116	Aquin	1o Guirand 11-06	Laumond
117	Cavaillon	2o Martineau 02-05	Digo Solon
118	St Louis du Sud	2e Grand Fonds 01-02	Léger
119	St Louis du Sud	5o Sucrerie Henry 06-03	Bossous
120	Coteaux	4o Condé 04-08	Poisson
121	Port-à-Piment	2o Balais 01-12	Nan Moise
122	Jérémie	2o Haute Voldrogue 03-09	La source
123	Jérémie	7o Basse Grande Rivière 10-04	Buvette
124	Corail	4e Beaumont 04-05	Lachicotte
125	Pestel	1o Bernagousse 02-08	Ca Bernard
126	Pestel	4o Tozia 08-07	Pomme Rose (en partie)
127	Roseaux	4e Gommiers 03-07	Bernard
128	Abricots	La Seringue ou St Victor 04-11	Phrache

UNIVERS: Sud (5)

Localité	Commune	Rural Section & No.	Habitation
129	Anse d'Hainault	5e Matador 03-07	Louca
130	Dame-Marie	5e Baliverne 05-02	Mirliton
131	Anse-à-Veau	1o Baconnois 01-06	Brossard
132	Miragoâne	6e Paillant 07-05	Belle Hostesse
133	Petit Trou de Nippes	6e Plaisance 06-03	Tadis
134	Petite Rivière de Nippes	4e Bézin 03-06	Cocoyers Bézin
135	Baradères	5e Rivière Salée 05-01	Alan Débrosse
136	Miragoâne	1 ème Chalons 01-02	Duparc

UNIVERS: Urban Port-au-Prince (6)

Commune: Port-au-Prince

Localite	Sections d'Enumeration
137	1-1-13A
138	1-1-05
139	1-3-08B (3)
140	2-4-01 (9)
141	2-2-10
142	2-2-01
143	2-2-06
144	2-1-08 (5)
145	2-1-16 (6)
146	2-1-18 (5)
147	2-1-07 (8)
148	2-1-23
149	2-1-28
150	3-1-54
151	3-1-41 (4)
152	3-1-15 (5)
153	3-1-28 (4)
154	3-1-07 (3)
155	3-1-08 (2)
156	4-3-01B
157	4-3-07 (5)
158	4-3-14A (2)

UNIVERS: Urban Port-au-Prince (6)

Commune: Port-au-Prince

Localité	Sections d'Emmeration
159	4-4-01B (9)
160	4-4-07 (4)
161	4-5-11A (5)
162	A-5 (11)
163	4-1-04 (4)
164	4-2-08 (8)
165	5-1-01 (2)
166	5-3-03 (2)

APPENDIX 2

Determination of Survey Sample Size

Separate samples were drawn for each universe to allow comparison of these areas on various nutrition parameters. Thirty sample sites or clusters in each sample area allowed the use of normal parametric statistical procedures in the estimation of population characteristics* of a universe and in testing for a significant statistical difference among universes. For survey purposes Haiti was divided into 6 universes. With 30 sample sites in each universe, the total number of sample sites for the entire country was 180.

To determine the appropriate survey sample size for a geographic area the applicability of binomial theory was assumed. Using binomial theory modified for cluster sampling there were four variables affecting sample size, n.

Z = normal deviate for confidence level desired (1.96 for 95% confidence and 1.64 for 90% confidence).

p = proportion of population having the attribute measured.

D = deviation from 'p' due to sampling with confidence level chosen; the confidence limits for p would be $p \pm D$.

K = adjustment for "clustering effect."

The formula for 'n' is:

$$n = \frac{K\ Z}{D2} \quad (p) \quad (1-p)$$

Past experience with NCHS/CDC percent of standard weight for height has shown that K = 2 should provide at least the desired precision. The Z score is generally chosen for 95% confidence (Z = 1.96).

While the value of D can be predetermined, it depends on the value of 'p' and may or may not be acceptable; for example, 50% $\pm$ 5% might be considered acceptable but 10% $\pm$ 5% might not.

The value of 'p' yielding the largest 'n' is 0.5; therefore, if a number of different proportions are to be measured for the universe, it is safest to assume p = 0.5. After fixing K, Z, and p, n and D were the only values not determined.

*Provided the characteristic is not rare (<5% prevalence).

By determining maximum deviation tolerable (D), 'n' for any sample area was solved for as follows:

K = 2 (cluster effect)

Z = 1.96 (95% confidence)

p = 0.5 (50%)

D = .046 (4.6%)

$$n = \frac{2\ (1.96)^2}{(.046)^2}\ (.5)\ (.5)$$

n = 900

Thirty children were drawn using a random start technique within each universe. A total sample of 900 children (30 sample units x 30 children) was drawn for each of the 6 universes, giving a total of 5,400 sample children for the entire country. A universe sample of 900 children with proportions having a characteristic varying as follows would have the following approximate precisions:

% Having Characteristics (p)	95% Confidence Limits (d)	Difference Required for Significance with 95% Confidence Level (p_1-p_2)
50.0%	±4.6%	6.5%
20.0%	±3.8%	5.4%
10.0%	±2.8%	3.9%
5.0%	±2.0%	2.8%

If two universes have a statistically significant difference with respect to a given characteristic, then they must differ on that characteristic at least to the extent shown in the last column (p_1 - p_2).

APPENDIX 3

ENQUETE NATIONALE SUR L'ETAT DE NUTRITION D'HAITI

FORME 1

IDENTIFICATION

Numero de l'Equipe ☐ (1)

Date de la Visit ☐☐ ☐☐ ☐☐ (2-7)

Univers ☐ (8)

Localité ☐☐☐ (9-11)

No/de Famille ☐☐ (12-13)

No/I.D. ☐☐ (14-15)

No/Responsable ☐ (16)

Type de Responsable
1 ☐ Biologique
2 ☐ Belle Mère
3 ☐ Parent
4 ☐ Grand-mere
5 ☐ Autre (18)

Non Ti Moun _____

Sex (17) 1 ☐ M 2 ☐ F

Non Chef Fanmiy _____

INFORMATION SUR L'AGE

Date li té fet: (19-24) Date ☐☐ Mous ☐☐ Ané

Source Information-en: (25) 1 ☐ Baptisté 2 ☐ Estimé

TOUT TYPE DE RESPONSABLE D'ENFANT

Demander a la personne responsable de cet enfant:

"Sa ouap fè?" (26) ☐ (référer à la liste I pour le code)

"Eske ou ginyin mesie kouniéa?" (27) 1 ☐ Oui 2 ☐ Non

SI OUI: "Eske ou 1 ☐ marié avel; 2 ☐ placé avel; 3 ☐ ou bien ginyin lot union avel?" (28)

"Eske mesie ou viv lan kay la tou?" (29) 1 ☐ Oui 2 ☐ Non

"Se lap fè ki bay pitis kob pou souteni fanmiy-en? (30) ☐ (référer à la liste II pour le code)

"Eske mesie ou ce papa pitit la?" (31) 1 ☐ Oui 2 ☐ Non 9 ☐ Pa konnin

"Eske papa pitit la okupé li?" (32) 1 ☐ Oui 2 ☐ Non

"Ki l'age ou?" (33-34) ☐☐ ans

"Kombien pitit ou fè, ki te rété la yo fet?" (35-36) ☐☐

"Kombien nan pitit sa-yo kap viv jodia?" (37-38) ☐☐

"Nan sak mouri, kombien pat enko ginyin un an?" (39-40) ☐☐

"Eske ou ensint kouniéa?" (41) 1 ☐ Oui 2 ☐ Non 9 ☐ Pa konnin

"Eske ou an pedision kouniéa?" (42) 1 ☐ Oui 2 ☐ Non

"Eske ou ginyin youn pitit lan tété kouniéa" (43) 1 ☐ Oui 2 ☐ Non

MERE BIOLOGIQUE SEULEMENT

Demander à la mère biologique seulement:

"Eske pitit sa nan tété toujou?" (44) 1 ☐ Oui 2 ☐ Non

SI NON: "A ki lage ou ouété li nan tété?" (45) 1 ☐ <3 Mo 2 ☐ 3-5 Mo 3 ☐ 6-8 Mo 4 ☐ 9-11 Mo 5 ☐ 12-17 Mo 6 ☐ 18-23 Mo 7 ☐ 24+ Mo 8 ☐ Jamais 9 ☐ Pa konnin

"Eske pitit-sa té jam boué let nan bibon?" (46) 1 ☐ Oui 2 ☐ Non

INFORMATION SUR LA FAMILLE

Demander à la Responsable de cet enfant:

"Kombien moun ki mangé nan mangé-sa? (47-48) ☐☐

"Kombien nan moun sa yo sé ti moun?" (49-50) ☐☐

"Eske moun-nan fanmiy-a ginyin jadin ki bay fanmiy-a mangé?" (51) 1 ☐ Oui 2 ☐ Non

"Ak ki kalité suk moun nan fanmiy-en sevi pi souvan?" (52) 1 ☐ Suk Blan 2 ☐ Suk Rouge 3 ☐ Lot kalité Suk

"Ki koté fanmiy-en prenn dlo pou boué?" (53) 1 ☐ Souce 2 ☐ Puit 3 ☐ Tiyo 4 ☐ Fontain publik 5 ☐ Lot kote

"Eske moun-lan fanmiy-a ginyin youn latrin pou yo sevi kouniéa?" (54) 1 ☐ Oui 2 ☐ Non

INFORMATION SOCIO-CULTURELLE

Demander à la Responsable de cet enfant:

"Eske ou té jam allé lékol?" (55) 1 ☐ Oui 2 ☐ Non

"Eske nou gin, in youn radio ki jouéé?" (56) 1 ☐ Oui 2 ☐ Non

"Eske nou kon tandé program radio ki bay konseil sou sa tout moun doué fè?" (57) 1 ☐ Oui 2 ☐ Non (Référer à la liste III)

"Eske ou konnin sa yo rélé akamil?" (58) 1 ☐ Ii konnin 2 ☐ Ii pa konnin

INFORMATION SUR LA SANTE

Demander à la Responsable de cet enfant:

"Semin passé-a, pandan 2,3 jou ou plis, eske ti pitit la:

a) "té malade. Ii pat mangé, Ii pat jouéé, pat gai?" (59) 1 ☐ Oui 2 ☐ Non 9 ☐ Pa Konnin

b) "Eske Ii té ginyin lafièvre semin-passé-a?" (60) 1 ☐ Oui 2 ☐ Non 9 ☐ Pa konnin

c) "Eske Ii té ginyin vent libre, plisiè foi pa jou, pandan 2,3 jou ou plis?" (61) 1 ☐ Oui 2 ☐ Non 9 ☐ Pa konnin

"Le pitit la ginyin vent-libre, kisa ou fè pou trété li?" (62) ☐ (Référer à la liste IV)

CLINIQUE

Pour toute Responsable d'enfant:

Est-ce que cette femme a un goitre? (63) 1 ☐ Goitre visible sans extension du cou
2 ☐ Goitre visible avec extension du cou
3 ☐ Goitre n'est pas visible

MESEURES DE L'ENFANT

Poids ☐☐.☐ kg (64-66) Hauteur ☐☐☐.☐ cm (67-70) Oedemes aux deux pieds (71) 1 ☐ Oui 2 ☐ Non

DENTS

Combien de dents a l'enfant? (72-73) ☐☐

LABORATOIRE

Prise de sang de l'enfant (74) 1 ☐ Oui 2 ☐ Non Hbg de l'enfant ☐☐.☐ gm (75-77)

Application de papier filtre (78) 1 ☐ Oui 2 ☐ Non

Prise de sang de la Responsable (79) 1 ☐ Oui 2 ☐ Non Hbg de la Responsable ☐☐.☐ gm (80-82)

NATIONAL SURVEY OF NUTRITIONAL STATUS IN HAITI

IDENTIFYING INFORMATION

Team No. ☐ (1)

Date of Interview ☐☐ ☐☐ ☐☐ (2-7)

Universe ☐ (8) | Sampling Unit ☐☐☐ (9-11) | # Family ☐☐ (12-13) | ID# ☐☐ (14-15) | Guardian ☐ (16)

Guardian Type (18)
1 ☐ Biological Mother
2 ☐ Step Mother
3 ☐ Relative
4 ☐ Grandmother
5 ☐ Other

Child's Name _____ Sex (17) 1☐ M 2☐ F

Head of Family Name _____

AGE

Date of Birth Day ☐☐ Month ☐☐ Year ☐☐ (19-24)

Obtained From (25) 1☐ Birth Certificate 2☐ Calculated

ALL GUARDIANS

½"

Ask the child's guardian:

"What do you do?" (26) ☐ (Refer to list I for coding)

"Do you have a man now?" (27) 1☐ Yes 2☐ No

If Yes:

"Are you (28) 1☐ married to him; 2☐ living with him; 3☐ some other living arrangement?"

"Does your man live here?" (29) 1☐ Yes 2☐ No

"What does your man do to support the family?" (30) ☐ (Refer to list II for coding)

"Is your man the father of this child?" (31) 1☐ Yes 2☐ No 9☐ Unknown

"Does the father support this child? (32) 1☐ Yes 2☐ No

"How old are you?" (33-34) ☐☐ years

"How many live births have you had?" (35-36) ☐☐

"How many of these children are alive today?" (37-38) ☐☐

"Of those who died, how many died before one year?" (39-40) ☐☐

"Are you now pregnant?" (41) 1☐ Yes 2☐ No 9☐ Unknown

"Are you in perdition now?" (42) 1☐ Yes 2☐ No

"Are you now breastfeeding any children?" (43) 1☐ Yes 2☐ No

BIOLOGICAL MOTHER ONLY

Ask biological mother only:

"Is this child still breast feeding?" (44) 1☐ Yes 2☐ No

IF NO:

"At what age did you wean him?" (45) 1☐ 3 mo. 2☐ 3-5 mo. 3☐ 6-8 mo.

4☐ 9-11 mo. 5☐ 12-17 mo. 6☐ 18-23 mo. 7☐ 24+ mo. 8☐ Never 9☐ Unknown

"Did this child ever take milk from a bottle?" (46) 1☐ Yes 2☐ No

FAMILY INFORMATION

Ask all guardians:

"How many people generally eat the big meal together?" (47-48) ☐☐

"How many of those are children?" (49-50) ☐☐

"Does any of those (who eat the big meal together) grow food for consumption by the family?" (51) 1☐ Yes 2☐ No

"What type of sugar do you serve in your family?" (52) 1☐ White 2☐ Brown 3☐ Other

"Where does your family obtain its water for drinking?" (53) 1☐ Spring 2☐ Well 3☐ Piped 4☐ Public tap 5☐ Other

"Does your family have a useable latrine?" (54) 1☐ Yes 2☐ No

SOCIO-CULTURAL INFORMATION

Ask all guardians:

"Did you go to school?" (55) 1☐ Yes 2☐ No

"Do you have a working radio?" (56) 1☐ Yes 2☐ No

"Do you listen to a radio program from which you receive guidance?" (57) 1☐ Yes 2☐ No (Refer to list III)

"Have you heard of akamil?" (58) 1☐ Does Know 2☐ Does Not Know

HEALTH INFORMATION

Ask all guardians:

"During the past week, for 2 or more days, was your child:

(59) (a) "ill, did not eat, did not play, was not happy?"
1☐ Yes 2☐ No 9☐ Unknown

(60) (b) " did he have a fever during the last week?"
1☐ Yes 2☐ No 9☐ Unknown

HEALTH INFORMATION (CONT.)

(61) (c) "did he have diarrehea, 4 runny stools for 2-3 days?"

1☐ Yes 2☐ No 9☐ Unknown

(62) "When your child has diarreha what do you give him for treatment?"

☐ (Refer to list IV for coding)

CLINICAL

For all guardians:

"Does this woman have a goiter?" (63)

1☐ goiter visible without neck extension

2☐ goiter visible with neck extension

3☐ goiter not visible

CHILD'S MEASUREMENTS

Weight ☐☐ ☐ kg (64-66)

Height ☐☐☐ ☐ cm (67-70)

Edema for both feet? (71) 1☐ Yes 2☐ No

TEETH

How many teeth does this child have? (72-73) ☐☐

LABORATORY DATA

Blood taken from child (74) 1☐ Yes 2☐ No

Child's hemoglobin ☐☐.☐ gm (75-77)

Filter papers taken (78) 1☐ Yes 2☐ No

Blood taken from guardian (79) 1☐ Yes 2☐ No

Guardian's hemoglobin ☐☐.☐ gm (80-82)

ENQUETE NATIONALE SUR L'ETAT DE NUTRITION D'HAITI

FORME 2

No/Equipe	Date de la Visite	Unions	Localité	No/I.D.
(1)	(2-7)	(8)	(9-11)	(12-15)

QUESTIONS SUR L'AGE D'INTRODUCTION DES ALIMENTS:

"A ki lage ou té kommencé bay li?" Soupe _____

Bouillie _____ (16-17) ☐☐ Mois

"A ki lage ou té kommencé bay li?" Sauce pois _____

Mais Moulin _____ (18-19) ☐☐ Mois

"A ki lage ou té kommencé bay li?" Morceau viande ou poisson _____

Cuite pois _____ (20-21) ☐☐ Mois

QUESTION SUR LA FRÉQUENCE DE CONSOMMATION DES ALIMENTS:

"Ki ib pidi-ou mangé yi plis (22) 1 ☐ Matin 2 ☐ Midi 3 ☐ Annuit?"

1. "Kiss li té mangé nan manjé ou-a hier?"
   a) "Kiss ou té ajouté lotan?"
   b) "Ki lot bagi ankò?"
2. "Kiss ou té bay li avant ma?"
3. "Kiss ou té b.ay li après ma?"

(Codes: X = Oui 0 = Non)

	ALIMENT	REPAS PRINCIPAL	AVANT LE REPAS PRINCIPAL	APRÈS LE REPAS PRINCIPAL
Lait	Lait Frais	(23) _____	(24) _____	(25) _____
	Autre Lait	(26) _____	(27) _____	(28) _____
	Oeufs	(29) _____	(30) _____	(31) _____
Céréales	Maïs	(32) _____	(33) _____	(34) _____
	Riz	(35) _____	(36) _____	(37) _____
	Petit Mil	(38) _____	(39) _____	(40) _____
	Farine de Blé et autres	(41) _____	(42) _____	(43) _____
Légumineuses	Pois rouges, noirs, blancs et mélanges	(44) _____	(45) _____	(46) _____
	Pois congo	(47) _____	(48) _____	(49) _____
	Autres Pois	(50) _____	(51) _____	(52) _____
Tubercules	Cassave	(53) _____	(54) _____	(55) _____
	Banane Vert	(56) _____	(57) _____	(58) _____
	Autres vivres alimentaires	(59) _____	(60) _____	(61) _____
Viande	Poisson	(62) _____	(63) _____	(64) _____
	Viande	(65) _____	(66) _____	(67) _____
Legumes	Feuilles Vertes	(68) _____	(69) _____	(70) _____
	Giraumont	(71) _____	(72) _____	(73) _____
	Carottes	(74) _____	(75) _____	(76) _____
	Autres Legumes	(77) _____	(78) _____	(79) _____
Fruits	Mango	(80) _____	(81) _____	(82) _____
	Citron	(83) _____	(84) _____	(85) _____
	Autres Fruits	(86) _____	(87) _____	(88) _____
	Pain	(89) _____	(90) _____	(91) _____
	Cocoyer	(92) _____	(93) _____	(94) _____
Graines	Graines Commerciales	(95) _____	(96) _____	(97) _____
	Autres Graines	(98) _____	(99) _____	(100) _____
	Thé ou Café ou Chocolat	(101) _____	(102) _____	(103) _____
	Sucre	(104) _____	(105) _____	(106) _____
	Autres	(107) _____	(108) _____	(109) _____

APPENDIX 4

Procedures for Anthropometric Measurements

Principles

Since physical growth is one of the best indicators of the nutritional status of children, its careful measurement is essential for adequate assessment of their nutritional status. Of the many measures of growth, total body length or height, and weight are the measurements most frequently carried out to provide useful information. In practice, however, the accuracy and precision of these measurements is often unsatisfactory, so that anthropometric data commonly fail to attain their potential usefulness. Small between-group differences are immensely important but this significance may be obscured if the measurements have not been made with sufficient accuracy or precision.

There is a deceptive simplicity about making height and weight measurements. It seems to some that the recording of height and weight is so straight-forward that it can readily be done with little attention or care. Adherence to the procedures which follow will appreciably minimize the most common sources of error.

A. Equipment

1. Measuring Board

A combination height/length board with metric scale to 0.1 cm that has been custom made

2. Scale

Salter hanging scale 25 or 50 kgm scale with 0.1 and 0.2 kgm divisions, respectively

Salter pants or seat

B. Procedures

The measurements will be done in the following order:

1. Length/height
2. Weight

1. Length or Height

For a child less than 2 years of age length is measured.

For a child 2 years of age or older height is measured.

a. Length measurements

(1) The measuring board is laid horizontally on the ground or on a table.

(2) With the help of a minimum of two assistants, the baby, barefoot, is placed on the board with the head against the fixed end of the board.

(3) An assistant holds the baby's head in the Frankfort plane and applies gentle traction to bring the top of the head into contact with the fixed end.

(4) The measurer, with the help of another assistant, holds the child's knees together and the legs extended fully. The measurer uses one hand to insure that the child's feet are perpendicular to the board and brings the moveable footboard to rest firmly against the child's heels.

(5) The measurer reads the value of the length to the nearest 0.1 cm reading to the next higher 0.1 cm when the length falls at or above the midway point of a 0.1 cm graduation.

(6) The measurer then records the length clearly in the appropriate blocks on the questionnaire.

b. Height measurement

(1) The measuring board is in a vertical position.

(2) With the help of a minimum of two assistants the child is positioned barefoot on the horizontal platform with his feet together.

(3) One assistant insures that the child stands flat foot with the knees fully extended. The shoulders and buttocks should be in line with the heels and these should all touch the vertical surface of the measuring board.

(4) The moveable headboard is then brought to rest firmly on the crown of the child's head. The head is held in the Frankfort plane.

(5) As in (a) (5) except substitute "height" for "length."

(6) As in (a) (6) except substitute "height" for "length."

2. Weight

a. The Salter scale is suspended from a tripod, quadripod, or a pole held by two assistants.

b. The child is undressed by the parent or guardian.

c. The parent holds the child; the measurer reaches his arms through the leg holes of the Salter pants and draws the legs of the child through the leg holes. He then attaches the Salter pants to the scale.

d. The child in Salter pants hangs freely from the scale. The scale face is read to the nearest 0.1 kgms, reading up to the next higher 0.1 kgm when the pointer tip is at or beyond the midway point of an 0.1 kgm graduation. The reading is made after the child is reasonably still and the needle is stationary.

e. The measurer then records clearly the weight in the appropriate blocks on the questionnaire.

f. The child is then removed from the Salter pants and partially reclothed.

C. Precautions

1. Assistants are necessary--in measuring children their strength and mobility cannot be overstated.

2. The Frankfort plane is a plane perpendicular to the body constructed in profile by a line between the lowest point on the margin of the orbit of the eye and the highest point on the opening of the ear. As much as 2 cm variation in height or length can be produced by flexing or extending the head out of the Frankfort plane.

3. Children, especially infants, have a tendency to extend their feet while lying or standing. Accurate height or length depends on a measurement from the heel.

APPENDIX 5

Procedures for Collecting Blood Samples

A. Fingerstick Method

1. Take one unopette container from the sealed plastic bag which has been premarked with the sample site ID code. Write ID# of child and the mark of "C" for child on the label.

2. Clean index finger or middle finger of child's hand by rubbing with alcohol swab. Allow area to dry. Turn hand palm upward.

3. If you are right-handed, use the thumb and forefinger of your left hand to grip the patient's finger. Make a quick, but firm jab to the fleshy part of the fingertip. (Be prepared for a sudden, instinctive withdrawal movement by the child.)

4. If necessary, use a gentle "milking" motion of your fingers to stimulate flow of blood. Be careful to avoid too much pressure; this will cause tissue juices to be mixed with the blood and introduce error.

5. Using a dry gauze swab, wipe away the first two drops of blood.

6. Remove the unopette pipet from its shield. Use the shield to pierce the plastic cover of the bottle containing the diluting solution.

7. Allow a drop of blood to form on the fingertip. Holding the pipet horizontally, touch the pipet to, but not into, this drop, and allow the pipet to fill by capillary action.

8. Contents of the pipet must be mixed thoroughly and quickly with the diluting solution to avoid clotting of the blood (and therefore loss of the sample). After the pipet is filled, wipe off any excess blood on the outside of the pipet, being careful not to touch the tip which would draw blood out.

9. Loosely insert pipet into the opening of the unopette bottle. Gently squeeze and hold the sides of the container, using your finger to cover the opening of the pipet and then push the pipet down into the neck until it clicks. Release the pressure and remove your finger from the opening. The blood will then be drawn into the container. Squeeze the container several times in order to rinse the pipet thoroughly, being careful not to let the liquid overflow the neck.

10. Placing your finger over the opening in the top of the bottle (leaving pipet in container), invert the bottle several times to mix the blood with the diluting solution. After mixing, place Critoseal in the opening to avoid leakage.

11. Make sure patient's hand is wiped off, and if desired, apply bandaid.

12. Check "yes" on questionnaire in block, next to "blood specimen collected."

B. Heel Stick Procedure (exterior lower lateral side of the sole)

Heel sticks are essentially the same as fingersticks; a rubbing motion from the toes to the heel on the bottom of the food will help stimulate the blood flow especially if the baby's foot is cold. Babies may also be stuck in the big toe. Get a firm grasp on the infant's foot with your hand; babies can display great amounts of resistance. Follow the same procedure for cleaning area and collecting sample. Apply a bandaid when finished.

C. Handling of Unopette

The premarked plastic bag containing the used and identified unopettes is kept in a pack unexposed to light and delivered to the operations officer or project director.

APPENDIX 6

Reference Population for Anthropometry

Reference populations used in anthropometry are frequently criticized as not being applicable to developing areas of the world. In preschool-age growth studies, the influences of environment, such as nutrition and infectious disease, are of much greater importance than those of race or ethnicity. The differences in growth of preschool children associated with social class are many times those attributable to ethnic factors alone. The probable degrees of the genetic effect on height for age and weight for age growth indices are approximately 3 percent and 6 percent, respectively, among children from different ethnic backgrounds but similar socio-economic class. In pre-pubertal children, weight for height indices are relatively independent of age and race and chiefly reflect nutritional status.

Waterlow suggests that a reference be used as a basis for a value judgement. The reference population values are correctly used as a basis for the interpretation of survey results and are not to be used as a standard or target to be sought after by a country.

Two or more studied populations or repeated studies on one population can be compared if a reference population is decided on and if the criteria for subject inclusion, age determination and measurement methodology are the same. Although several reference populations are available for anthropometry, the so-called Stuart-Meredith populations, based on data collected on a relatively small number of children in Iowa and Boston during the 1930's and early 1940's, are most commonly utilized as a reference.

Specific limitations of the Stuart-Meredith data base are the small numbers of children involved, the longitudinal rather than cross-sectional gathering of data, the limited socio-economic and ethnic representation, and the age of the data itself. The 10th and 90th percentile were based on such a small number of people as to severely limit statistical precision in these ranges. In developing areas, a great majority of individuals may fall below the 10th percentile, the very area where the Stuart-Meredith data base is statistically the weakest.

The recent availability of data from large-scale and more representative studies in the U.S. has resulted in more appropriate references for use in population comparisons, known as the National Center for Health Statistics/Center for Disease Control (NCHS/CDC) reference populations for anthropometry. Specifically, the larger number of individuals characterizing the NCHS/CDC reference population improves the statistical precision of outlying percentiles.

The general acceptance of a reference population for anthropometry is an international need. The choice of which reference to use for a single survey is probably unimportant. However, if multiple surveys are to be compared, it would seem reasonable that a single reference be agreed upon.