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Methods for the Field Studies

Food Wastage/Sanitation Cost-Benefit
Methodology Project (AID/csd-2959)

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I. Introduction

This study of environment-diarrheal morbidity-food wastage relationships was designed to develop a methodology, conduct field studies and provide data to demonstrate the effects and benefits of environmental improvements. These improvements included (1) a piped water supply to households, (2) improvements in the household environment, and (3) modification of health behavior through education. The presumed benefits that were measured included (1) a decrease in the prevalence of diarrheal disease and (2) a decrease in intestinal malabsorption. The economic consequences of improved intestinal absorption were measured and expressed in terms of decreased food wastage resulting in a savings in food costs and agricultural production.

The study design included the introduction of a piped water supply to households in a test village, which was followed by a health education program to promote increased water use for utensil washing, household sanitation, personal cleanliness and food protection. The health education program also encouraged the construction and use of latrines. Health behavior modification was emphasized in order to promote and institutionalize the use of water and to reinforce positive sanitation practices in the village population. The timing of the sanitation improvements was critical since the effect of each phase was to be evaluated through the cohort population using intestinal absorption studies and morbidity incidence. Comparisons were made over time in the test village and between the test and control villages.

The Project Design

The hypotheses for the study were:

1. A population living under unsanitary conditions will have an increased prevalence of diarrheal morbidity. Improvements in sanitation should diminish diarrheal morbidity. Sanitation was improved by providing a piped water supply to each house, thus improving water quality and availability and increasing water consumption. Educational and community development programs encouraged the sanitation-related use of water and sanitation facilities. The environmental inputs were introduced in stages.

2. A population with a high prevalence of diarrheal morbidity may have increased food wastage due to intestinal malabsorption when compared to a population with a more favorable diarrheal morbidity experience.

3. The losses from intestinal malabsorption of food (in terms of nitrogen, fat and calories) may be of significant economic importance. A further hypothesis was that these economic losses could then be extrapolated to the Guatemalan population at the regional and national level and further generalized to rural populations in other countries. These losses will be described in terms of wasted energy, nonutilized nutrients, lost agricultural commodities and food costs.

The economic consequences of food losses due to diarrhea are complex and were not measured directly in this study. However, these economic considerations may be expressed as:

1. Diarrheal morbidity leads to diminished productivity in terms of hours worked, money earned, absenteeism, and other measures of economic productivity. Illness also imposes treatment and other medical costs.

2. Food wastage is additive to and interactive with diarrheal morbidity in that intestinal malabsorption leads to losses of energy and nutrients. These losses, by themselves, and in combination with

diarrheal morbidity may lead to diminished economic productivity.

The documentation of these hypotheses requires a study of the interrelationships among a large number of variables to measure health status, dietary and nutritional status, intestinal efficiency and other biomedical, economic, social and demographic characteristics. Two of the most important variables were diarrheal morbidity and intestinal absorption for the determination of food wastage. The environmental improvement inputs were measured in reference to these outputs. The timing between the introduction of inputs and measurement of outputs is shown in Table I.1 and I.2.

The piped water supply was introduced in September, 1973, and was chlorinated starting January, 1974. A baseline measure of food wastage was completed in 1973, and each year thereafter through December, 1976. Thus, there were four annual measurements of intestinal absorption efficiency in the cohort population.

It was assumed in this study that the full benefits of water can only be realized when a population has the piped water supply and an understanding of sanitation practices, so that the proper utilization of water becomes a part of the daily life of the individual and family.

Enteric infections constitute one of the leading causes of morbidity and mortality in Central and South America. To change this picture, more water supplies and sewerage systems are needed. In addition, public comprehension of how elementary good hygiene promotes good health is required. It is in these latter aspects that this study differs from previous studies. The effect of the health education component was limited, however, because of the short time interval between the introduction of health education and the termination of the project.

TABLE I.1

TIME INTERVALS BETWEEN INPUTS AND OUTPUTS

Input	Output	Time Interval
Piped Water Supply	**Analysis of Food Wastage**	
September 1973 - Introduction	I. April-October 1973	baseline
January 1974 - Chlorination of piped water supply	II. June-December 1974	9 months
	III. June-December 1975	21 months
Health Education and Sanitary Improvements	IV. June-December 1976	33 months (15*)

September 1973 - Water use promotion

April 1974 - Community development program and recruitment and training of community leaders

January 1975 - School health education program

February 1975 - Latrine program

April 1975 - Health education program completely operational

August 1976 - Field studies terminated

* Interval for health education and sanitary improvements

These time intervals are based on the assignment of an input date of October 1973 for water supply and April 1975 for health education. The output date is taken as the start of the malabsorption studies in June. Actually, individuals in the malabsorption ward are tested through December, thereby extending the time interval on an individual basis.

TABLE I.2

SCHEDULE OF PROJECT INPUT AND OUTPUTS

Project Dates	Project Phase	Project Outputs
June, 1971 to December, 1971	1. Project Planning	1.a. Recruitment of project staff b. Development of project design c. Preliminary development of the methodology
Jan. 1, 1972 to March 31, 1972	1. Preparation for the field study in Guatemala	1.a. Complete negotiations with INCAP b. Joint planning of study design and methodology with INCAP
April 1, 1972 to Oct. 31, 1972	1. Selection of study villages	1.a. Initial choice of 100 communities b. Selection of 36 communities for evaluation c. Intensive evaluation and choice of the test and control villages
Nov. 1, 1972 to March 31, 1973	1. Initiation of field studies	1.a. Establishment of completed methodology b. Start of field studies including census, morbidity, dietary survey and habits, water supply and environmental sanitation, economics, microbiology and parasitology, D-xylose c. Pilot studies on detailed intestinal absorption
	2. Planning for environmental sanitation program	2. Preparation for installation of piped water supply

TABLE I.2 Continued

Project Dates	Project Phase	Project Outputs
April 1, 1973 to March 31, 1974	1. Full operation of field surveys	1.a. Field studies performed on regular schedule b. Complete detailed intestinal absorption study in both villages
	2. Health posts for provision of medical care in operation in both villages	
	3. Piped water supply installed in test village	3.a. Water supply completed in September 1973 b. Water supply chlorinated in January 1974
	4. Data management system development	4.a. Data collection, initial processing, editing, updating and maintaining of master data files and preliminary analysis operational at INCAP b. Statistical methodology and data analysis methodology development at UNC
April 1, 1974 to Mar. 31, 1975	1. Continued operation of field surveys	1.a. Field operation performed on regular schedule b. Complete detailed intestinal absorption study in both villages (No. 2)

TABLE I.2 Continued

Project Dates	Project Phase	Project Outputs
April 1, 1974 to Mar. 31, 1975 (cont.)	2. Initiation of health education program	2. Preparation for health education program started April 1974, including community development, identification and training of community leaders and recruitment and training of field staff
	3. Initiation of sanitation improvement program including latrines	3. Program started in February 1975
	4. Performance of digestibility studies	4. Assessment of absorption and biological value of the rural diet
April 1, 1975 to Mar. 31, 1976	1. Full operation of field surveys (economic survey discontinued)	1.a. Field studies performed on regular schedule b. Complete detailed intestinal study in both villages (No. 3)
	2. Implementation of health education and sanitation improvement programs in test village	2.a. Latrines made available through joint project-government program b. School health education program in process since January 1975 c. Community group leaders working with test village population since April 1975 d. Community health education evaluation surveys initiated
	3. Data management system	3. Development of the system for data handling and analysis at UNC and INCAP

TABLE I.2 Continued

Project Dates	Project Phase	Project Outputs
April 1, 1976 to Nov. 30, 1976	1. Phasing out of field surveys	1. Field surveys terminated in August 1976
	2. Phasing out of health education program in the test village	2. Health education program terminated in August 1976
	3. Phasing out of metabolic ward	3. Fourth metabolic ward sample collection completed
Dec. 1, 1976 to Mar. 31, 1977	1. Data management	1. Data handling
April 1, 1977 to Mar. 31, 1978	1. Completion of project	1. Final year of contract
	2. Data management	2. Completion of analysis files and interpretation of data
	3. Reports	3.a. Final report on the background, design and methodology for the study b. Final report on scientific results of the study and interpretation of the significance of the results to planners in the Less Developed Countries c. Preparation of a manual describing a simplified methodology for use in the Less Developed Countries

The health education component was fully operational in April, 1975, though some aspects of the program began in September, 1973 (Table I.1). The field studies were discontinued in August, 1976.

Food Wastage, Diarrheal Morbidity and Other Output Indicators

The assessment of the amount and cost of food wastage was basic to the project. This was done through annual tests in a longitudinal sample from each of the village populations to determine the extent of food wastage due to intestinal malabsorption. Findings from this study will contribute to the further understanding of malabsorption, especially at the population level but also in the clinical setting.

The significant question in relation to policy analysis is whether intestinal food wastage can be decreased through environmental improvement and personal hygiene. A study of a small group of Guatemalan soldiers housed in an army camp has shown that these soldiers, living under sanitation conditions that are better than those in the test and control villages, are able to absorb food more efficiently than the village population. This finding is significant because the recruits were residents of villages similar to those studied in the Pacific lowlands region. None of the soldiers were in the army more than two years, since their usual period of service was 18 months to two years. The assumption can be made that they were able to improve their intestinal efficiency to absorb food within that period of time. Complete data analysis will provide more specific information as to the level of improvement in intestinal efficiency that can be realized over time while living under improved sanitary and personal hygiene conditions.

The measure of the benefits of improved water supply are primarily related to food wastage. This choice was made because food wastage

would be an important source of economic loss. Its alleviation would present an important area for realization of economic benefits through health projects. However, there should also be other benefits due to the decreases in diarrheal disease and improvements in the quality of life, which can be related to the availability of a water supply in sufficient quantities to provide a sound basis for personal hygiene. There are presently unresolved difficulties, both practical and methodological, in calculating the health and social costs of the absence of water or the social benefit of its provision. These difficulties were summarized by Carruthers and Browne[1]:

> There is no satisfactory method of evaluating the benefits of urban or rural water supplies in developing countries at present. To attempt such an evaluation would mean making heroic, if not absurd assumptions and result in a meaningless answer.

One phase of the study was designed to measure the effect of diarrheal disease and malabsorption on earnings and worker productivity. This was discontinued because of funding limitations. Economic surveys were initiated to measure the following indicators: (a) total hours worked (salaried and self-employed), (b) gross income, (c) absenteeism, and (d) agricultural production. An external review committee for the study met in January, 1975 and noted that the resources of the project were not sufficient to carry on detailed earning and productivity surveys. The review committee recommended that the economic component of the project, particularly the study of productivity, should be eliminated. There does remain, however, a useful reservoir of economic data which is directly applicable to the analysis of the economic effects of food wastage.

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[1]Carruthers, Jan and Browne, David, "The Economics of Community Water Supply" in Fearhem, R., McGarry, M. and Mara, O., Water, Wastes and Health in Hot Climates (London: John Wiley and Sons, 1977).

It is apparent that the assessment of economic benefits was limited in order to concentrate on the economic costs and benefits associated with intestinal food wastage. The economic benefits that are realized from other improvements, such as a decrease in diarrheal disease, are not quantified in economic terms. However, the potential benefits which may flow to the population from the improvement of water supply and sanitary status should not be disregarded.

Water supply may be considered as a basic social requirement for a population. The benefits of an improved water supply may be measured in terms of the prevalence of enteric disease. Subsequent economic benefits then flow from the improvement of the health status of a population. However, these traditional benefits are associated with measurement problems. The importance of the food wastage approach is that (1) the effect can be measured in terms of energy content, composition, cost, and quantities of food, and (2) the benefits from decreased food wastage may be considered as additive to the traditional benefits of a water supply.

This study is comprehensive in scope and includes health care, biomedical, environmental, economic and health education components. A vast amount of data has been gathered which is directly applicable to the planning and implementation of health programs in the rural Less Developed Country setting. The results of the study will have spin-offs beyond the economic aspects of food wastage. The availability of the extensive data on village health, as well as environmental, economic, demographic patterns and social conditions will provide a valuable base for the planning of health programs in rural areas of Less Developed Countries.

The original experimental design contained provision for a nutritional supplement to be introduced in the test village and the control village. The purpose of the nutritional supplement was to see if any advantage observed in the test village would still be maintained when both villages were placed on a nutritional supplement. The project external review committee in 1975 recommended the elimination of the nutritional supplement for both the test and control villages after considering the experimental merits and financial difficulties. This proposal depended on the contribution of the nutritional supplement from governmental and voluntary food distribution programs. The world situation changed in respect to food availability through these sources. The cost, both in food and manpower required for the nutritional supplementation, became prohibitive.

Project Constraints

The design and operation of a field study presents difficulties in design, control, sampling, and in the use of resources. One basic difficulty is that the time span for the field study may be too short for demonstrating the influence of environmental improvements in reducing diarrheal disease and particularly for indicating decreased food wastage due to intestinal malabsorption.

There are a number of other problems which are generally encountered in the performance of field studies. For instance, the sample population for all surveys was determined by statistical criteria. However, a field study must deal with free-living village populations who choose to what degree they will participate in such surveys, in the bio-medical tests and other measurements. It should be noted that we have had excellent participation from the village populations in this study.

The sampling design will be dealt with in Chapter III. The study dealt with the inter-relationships of a large number of variables. At the same time, there were limitations on sample sizes imposed by constraints in funds and by the size of the populations that were involved. The project, therefore, had limitations on the number of measurements that could be made for each of the variables.

Variables

There is no field-based study that is so comprehensive as to make the claim that all the pertinent variables were considered and evaluated. The conclusions of a study must depend on the variables that the investigators have chosen to include. It is useful to explain why the particular variables were chosen:

1. Sanitation

The sanitation variables were directed to assessing the various combinations and interactions of sanitation factors that may influence diarrheal morbidity rather than expecting a single variable, such as water quality, to explain diarrheal morbidity. This approach was required because diarrheal morbidity is related to a wider spectrum of etiology than water-borne diseases. In fact, diseases such as shigella dysentery are more correctly classified as water-washed diseases and are mediated through poor sanitation and personal hygiene rather than by ingestion of polluted water. The complexity of the causation of diarrheal morbidity is further complicated by studies (in Guatemala) which show that less than half the cases of diarrhea and dysentery yield pathogenic microbes by present techniques.

The sanitation factors, considered in relation to diarrheal morbidity, included provision of the piped water supply, provision of utensils that

promote the effective use of water, and health behavior modifications. Also included were measures of economic status, level of living, wealth index and other attributes of economic status, social class and life style that may influence morbidity. Of course, seasonal change and epidemic cycles were also considered. The attempt to isolate single causes has led to frustration.

The complexity of the sanitation variables also presented data analysis problems. The approach to this complex problem was to schedule the (1) piped water supply and (2) health education and sanitation improvements at intervals that were separated in time so as to permit the measurement of the effect of the water supply and then, the additive effect of other sanitation improvements and health behavior modification across the range of variables.

White, Bradley and White[1] discuss the difficulties in relating improved water supplies to improved public health. They note that the ideal way to assess the relationship of inadequate water supplies to health is to do a baseline study, then provide abundant water without permitting other environmental changes and after a period of adjustment make a re-survey. However, keeping other environmental changes static is not possible in a free-living village. There will always be difficulties in fully assessing the impact of water on diarrheal morbidity.

2. Intestinal Malabsorption

A primary hypothesis of this study was that continued assault on the intestinal tract through repeated diarrheal episodes will cause pathological changes in the intestinal tract, leading to malabsorption of food. If this hypothesis is correct, then increased prevalence of

[1]White, G.F.; Bradley, D.J.; and White, A.U., Drawers of Water, (Chicago: University of Chicago Press, 1972).

malabsorption in a population is significant in two ways: (1) as a factor in food wastage which is of economic significance; and (2) as an index of the long term history of diarrheal morbidity in a population. A high prevalence of diarrhea, whether microbiological or other, could serve as an indicator for intestinal malabsorption.

The individuals in the longitudinal sample who enter the metabolic ward for intestinal absorption studies are given a medical examination and those who are not in good health at that time are excluded. This means that the balance studies do not include the assessment of food wastage associated with acute diarrheal morbidity or febrile conditions. These latter conditions are a source of economic loss due to food wastage but were not studied in order to establish the effects of subclinical and chronic malabsorption on food wastage.

II. The Study Communities

Criteria for Village Choice

The study design required a test and control village. The selection of two comparable villages was a critical decision early in the project. The criteria for judging comparability among villages included:

1. Village census (including data on age, sex, marital status, children, socio-economic data, occupation, years of residence and a health survey)
2. Mortality statistics for the past 5 years
3. Morbidity statistics of the villagers and their families for 15 days prior to the evaluation
4. An evaluation of the water supply available to each village
5. An environmental study including housing characteristics
6. Dietary habits, food consumption and anthropometric studies.

Obviously, villages had to be assessed on less objective criteria before the number could be limited for more careful evaluation.

A list of 100 eligible communities was prepared. Of these communities, 36 were deemed acceptable for closer evaluation and evaluated (over a four month period) according to the criteria listed above. Finally, Guanagazapa and Florida Aceituno were selected as the test and control villages, respectively.

Description of the Villages

Both villages are in the Pacific Coastal region within one hour's driving time from the INCAP headquarters and laboratories in Guatemala City. Florida Aceituno, with a poor quality water supply from private wells, was designated as the control village. Guanagazapa, on the other

hand, with a central water source suitable for developing into a more sophisticated piped water system, was designated as the experimental or test village.

Guanagazapa is located in the Department of Escuintla, about 10 miles southeast of the town of Escuintla, along the outskirts of the Volcano Pecaya. Its mean elevation of approximately 235 meters varies up to 65 meters between different parts of the town. The annual average temperature in the area is 20 C and the annual rainfall averages 2,000 mm. An ethnic mixture of approximately 80% Ladinos and 20% Indians makes up Guanagazapa's population, estimated at 973 and representing 209 families, as of June 1972 (averaging 4.65 people per family).

Florida Aceituno is about five miles west of the town of Escuintla at an elevation of approximately 200 meters. Its climate and rainfall patterns are similar to those of Guanagazapa. The population of Florida Aceituno was estimated at 923. This village appeared to be less developed socially and economically than Guanagazapa, although for the purpose of this study the two villages are not significantly different. Finally, it should be noted that the two villages are sufficiently separated by distance so that contact and communication between them is minimal and perhaps nonexistent.

Overall, Florida Aceituno and Guanagazapa have many common characteristics: (1) stability, size and homogeneity of population, (2) type of dwellings, (3) sanitation characteristics, (4) type of soil, (5) prevalence of gastrointestinal disease, and (6) location within one hour of travel time by automobile from the project headquarters and the INCAP laboratories in Guatemala City. However, as the study progressed and more information was gathered about the villages, differences (primarily economic and

ethnic in nature) were noted. For example, despite a first impression to the contrary, Florida Aceituno has a stronger economic base than Guanagazapa since the former is closer to the fincas (farms) that offer employment opportunities.

Nonetheless, the comparability between the two villages is well substantiated by the following information derived from the baseline evaluation of the project. First, Figures II.1 and II.2 illustrate that Florida Aceituno and Guanagazapa are similar in size, and age and sex distribution. Secondly, the mortality experience by major disease category (Figure II.3) is similar for each village. Thirdly, the long term study of morbidity during the project indicates comparable experiences in the two communities (at least in the early years of the study). This is shown by the average weekly morbidity experiences of each depicted in Figure II.4.

Some miscellaneous characteristics; such as ethnic origin, occupational structure and literacy levels (Table II.1) do show differences between the study communities.

FIGURE II.3

Average Annual Mortality During 1967 - 1971

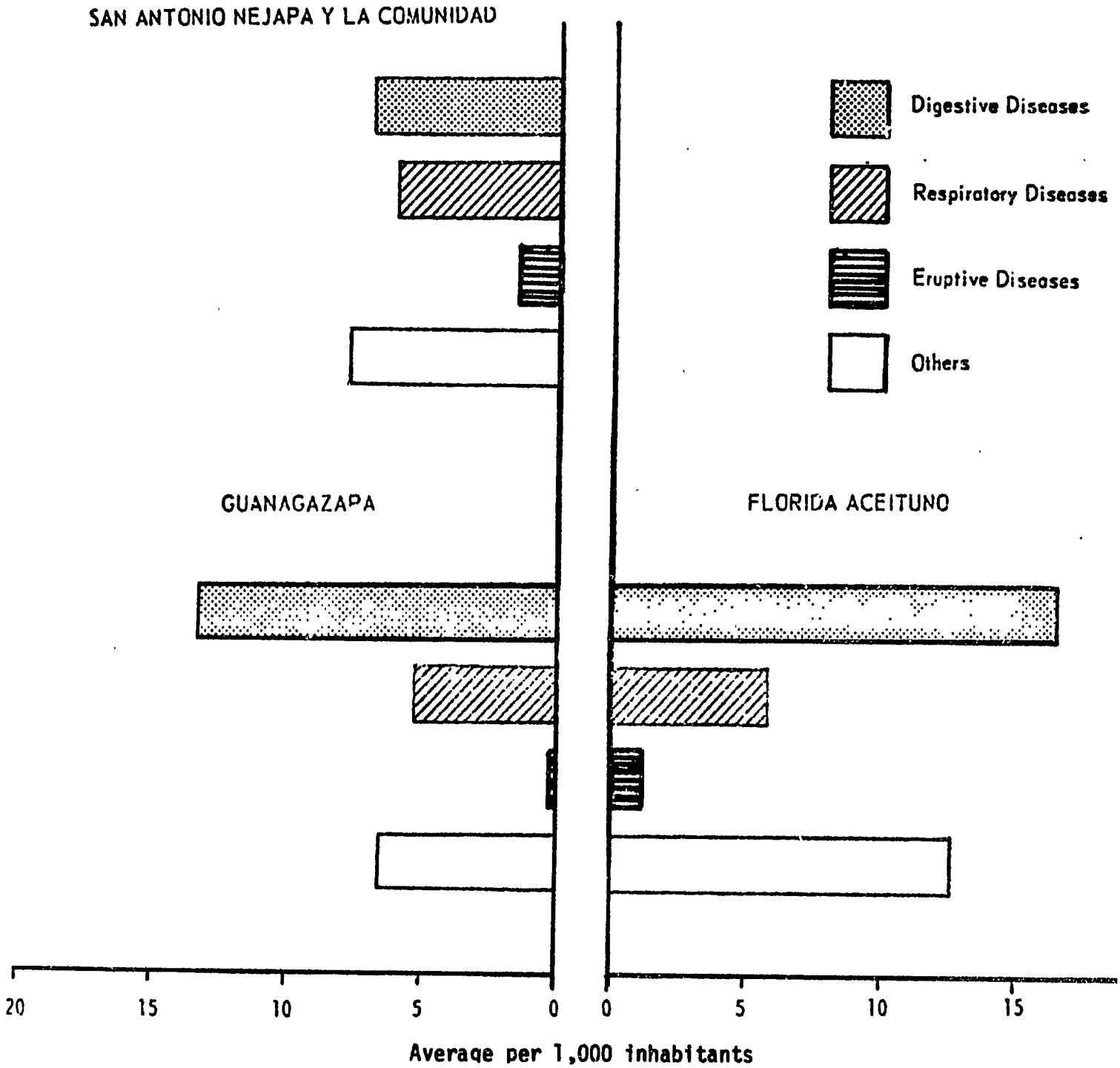

FIGURE II.4

Morbidity (1972)

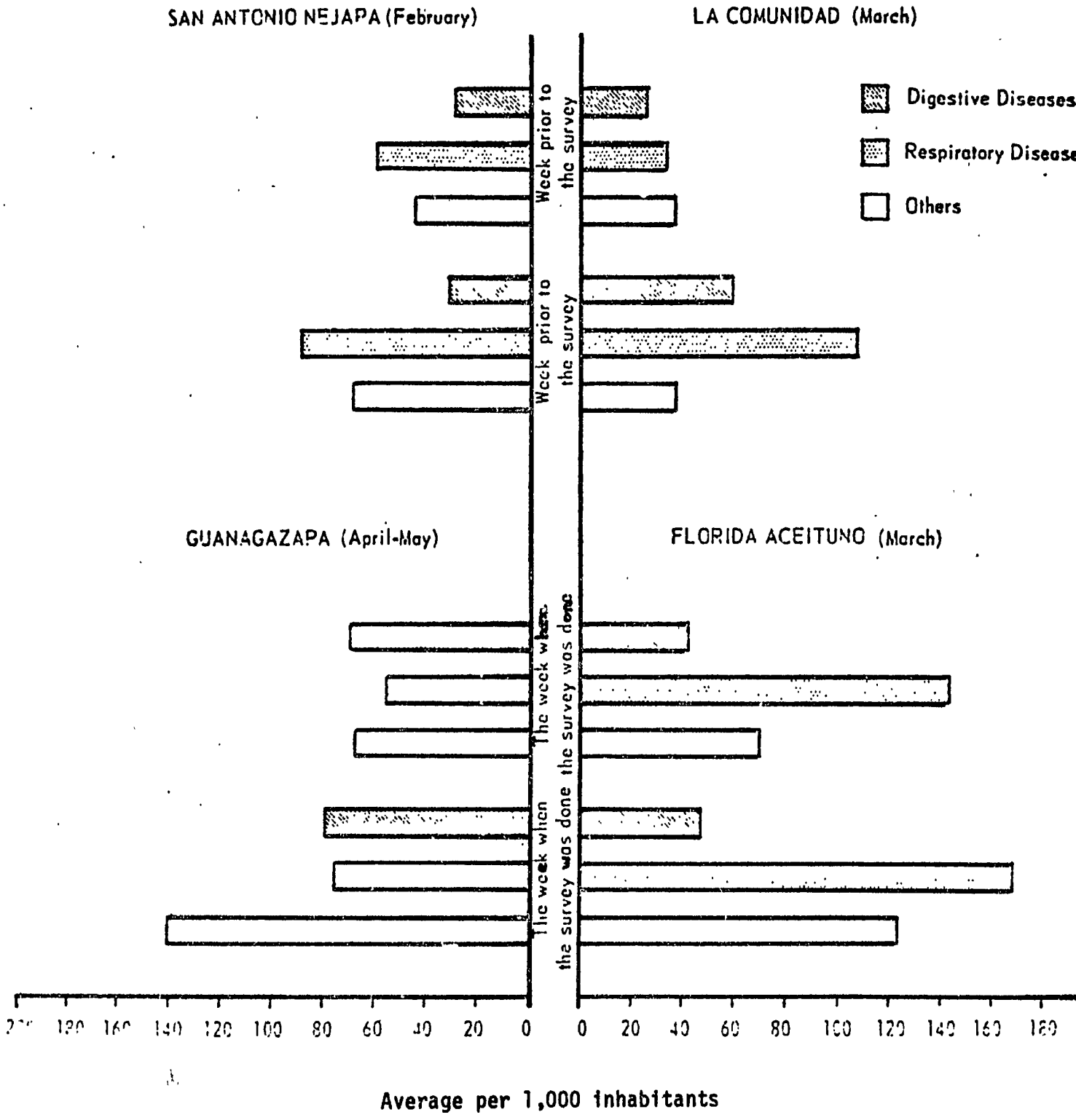

Figure II.1

Total Population of Florida Aceituno (1972)

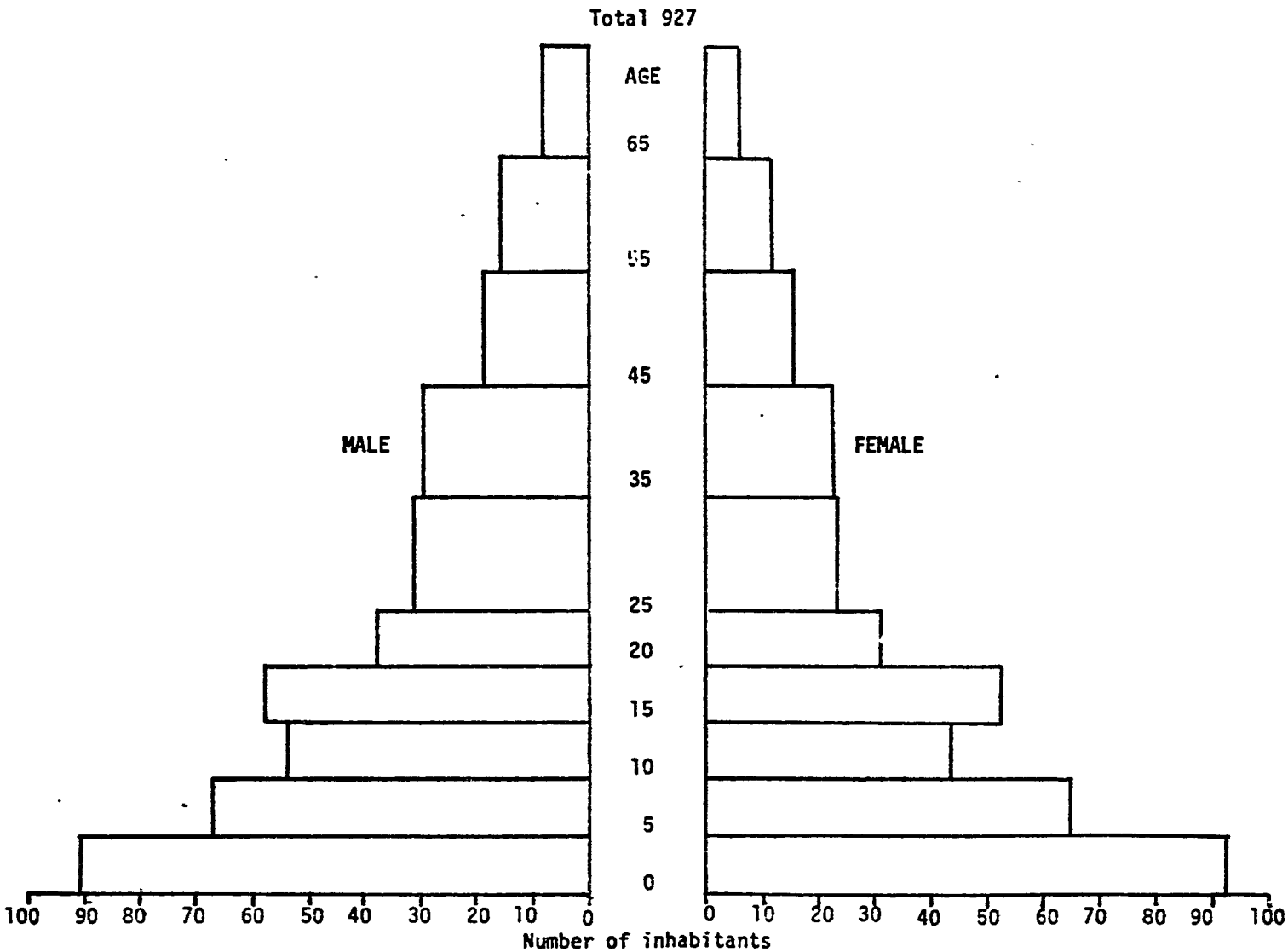

Figure II.2

Total Population of Guanagazapa (1972)

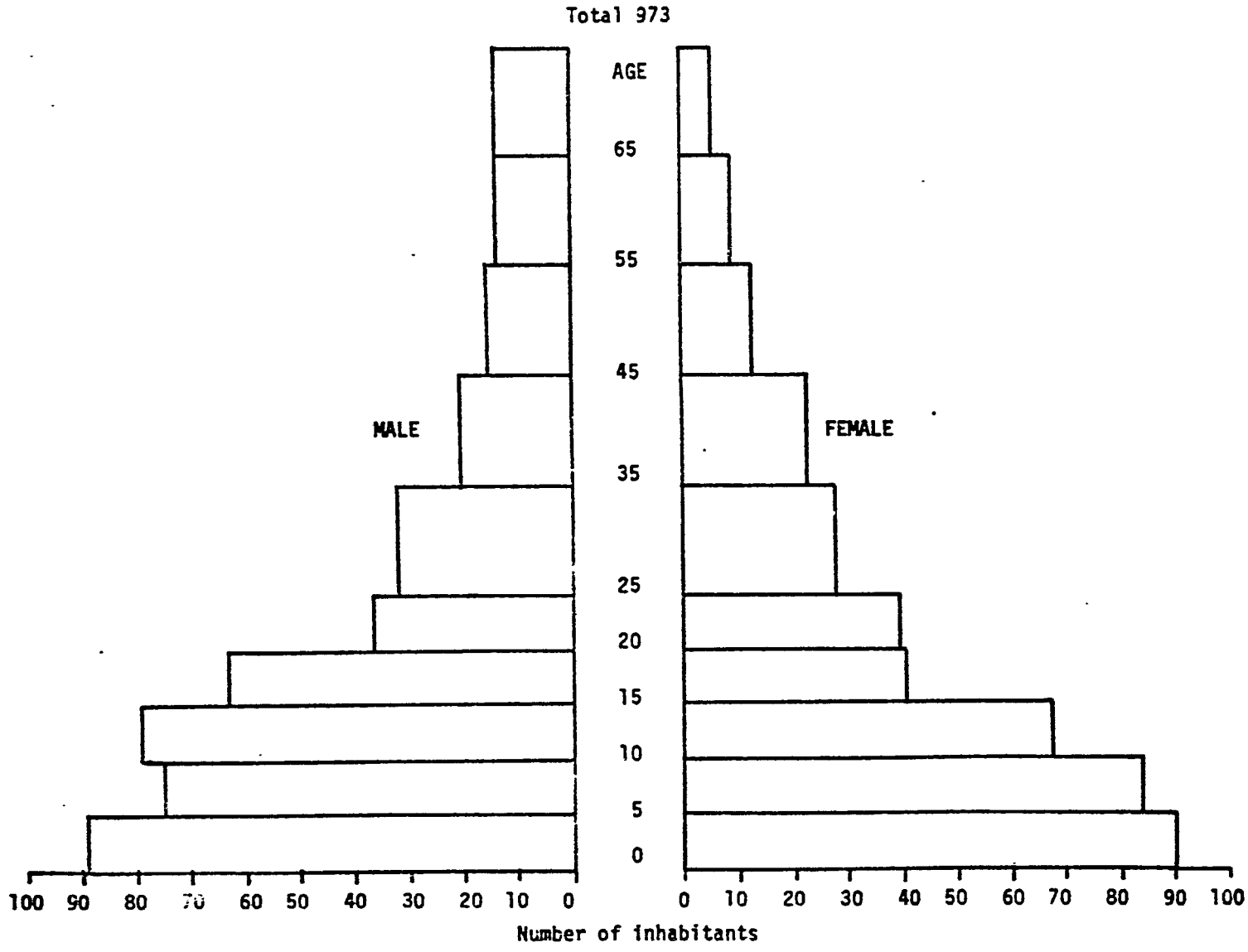

TABLE II.1

Other Characteristics of the Population of Florida Aceituno (F.A.) and Guanagazapa (GUA)

	F.A. (921 persons)	GUA. (968 persons)
RACIAL DISTRIBUTION		
a) Ladinos	67.2%	81.0%
b) Indians:		
1. In cultural transition	18.3%	19.0%
2. With no cultural change	14.4%	0.0%
ORIGIN		
a) Born in town	21.3%	78.6%
b) Arrived later on:		
1. > 5 years ago	67.9%	18.5%
2. < 1 year ago	10.0%	2.6%
MAIN OCCUPATION (males)		
a) Agriculture	49.0%	35.0%
b) Others	51.0%	65.0%
DEGREE OF ILLITERACY		
Illiterates (15-65 years old)	67.0% (512 persons)	41.5% (480 persons)

III. Sampling Methodology

The nature of this field study, as well as financial and personnel constraints, imposed limitations on sample sizes and the frequency of measurements.

There were two major sample populations utilized: (1) each village as a whole for cross-sectional studies, and (2) a longitudinal sample chosen from each village for determinining changes over time.

Sampling Schedules

Some information was collected on every subject (individual or family) in both communities within a specified time frame. For example, the census and morbidity surveys were done monthly on all individuals. For other components, costs or other factors required that subsets of subjects (or families) be used. A stratified random sampling technique* was used to select the subjects for detailed absorption (Metabolic Ward) studies.

The sample families for sanitation and health education studies were selected from the pool of subjects identified for the detailed absorption studies. Therefore, families of all individuals participating in the metabolic ward study were defined as the longitudinal sample for sanitation and health education measurements.

Figure III.1 gives the "Time Schedule of Field Activities Performed in 1972, 1973 and 1974)". Scheduling and sampling frequencies were closely linked since the same staff were used for multiple sampling

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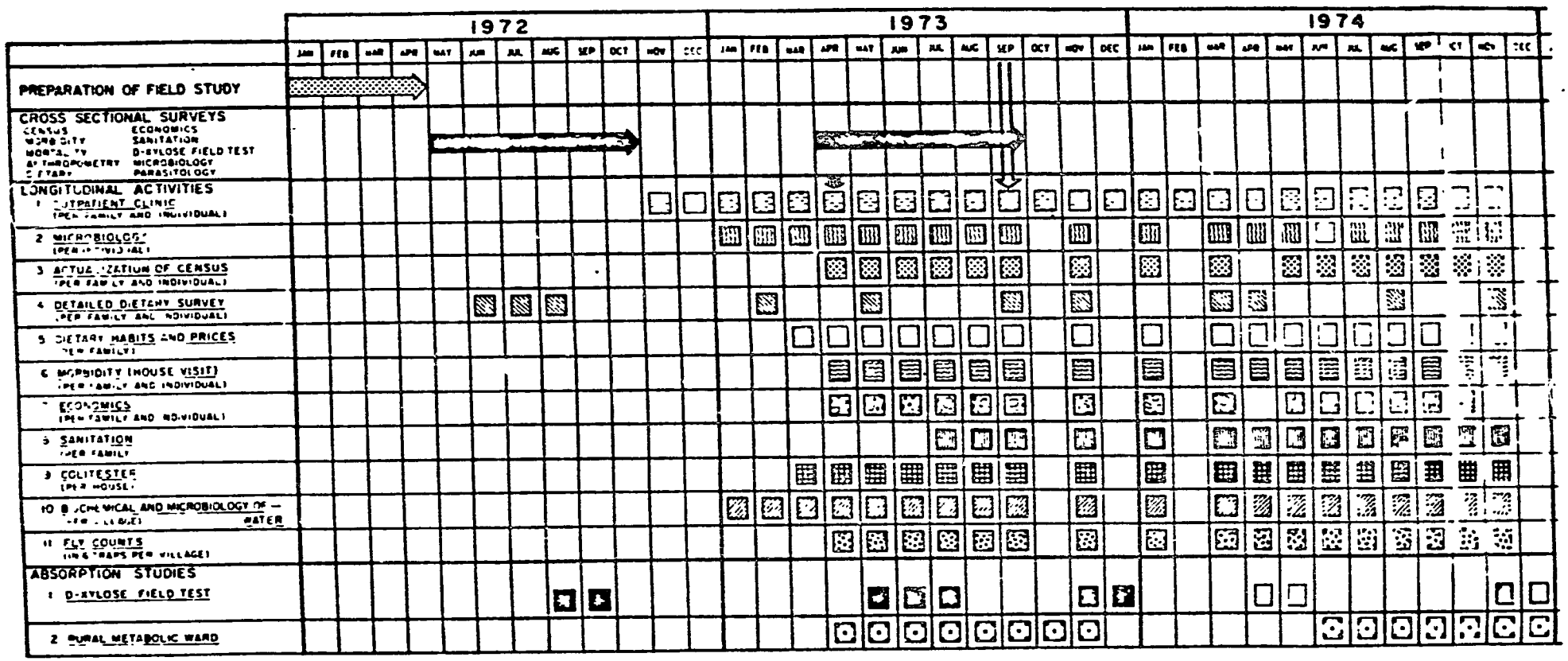
*The statistical techniques used in sample selection and the technical terms used in this report are described in Sampling Techniques by William G.Cochran (New York: John Wiley and Sons, Inc.).

Figure III.1

Schedule of Field Activities For 1972, 1973 and 1974



activities. Schedules were devised to permit the full utilization of personnel, however, this efficient approach limited sampling intervals and frequencies. This interdependence is illustrated in Tables III.1 through III.4 which present monthly field activities and number of subjects during 1973 - 1975. A complete record of field activities from January, 1973 to August, 1976 is presented in Tables III.5 and III.6.

Metabolic Ward - Detailed Absorption Studies Sample

Adult males were selected as subjects for the metabolic ward studies. Each subject was to be studied once each year from 1973 through the end of the study. Females and children were not used as experimental subjects for the detailed absorption studies since these tests required the subjects to leave home for more than a week and to be placed in an unfamiliar setting.

D-Xylose tests were administered to males who were 15 years and older in both villages (about 10% refused to participate or were unavailable). An equally-weighted, stratified random sample of 75 subjects was selected from each village on the basis of their d-Xylose absorption: upper 33.3%, middle 33.3%, and lower 33.3%. These individuals formed a pool of subjects to be used for detailed absorption studies (DAS Pool) in the metabolic ward.

The first metabolic ward sample (1973) consisted of 60 males from each village chosen randomly from the stratified d-Xylose absorption pool. The availability of space in the metabolic ward and the time and expense of absorption studies determined the size of this sample. Six men, all from the same village, were studied during each 10-day period. Groups of six subjects were selected alternately from each of the villages during each annual study.

Table III.1

Monthly Frequency of Field Activities and Population Covered In Guanagazapa During 1973 and 1974

ACTIVITIES	1973 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1974 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
ACTUALIZATION OF THE CENSUS (PER FAMILY)	---	---	---	190 100%	200 100%	207 100%	216 100%	210 100%	214 100%	---	202 100%	---	210 100%	---	218 100%	---	217 100%	214 100%	215 100%		219 100%	217 100%
MORBIDITY (PER FAMILY)	---	---	---	190 100%	200 100%	207 100%	216 100%	210 100%	214 100%	---	202 100%	---	210 100%	---	218 100%	---	217 100%	214 100%	215 100%		219 100%	217 100%
ECONOMICS (PER FAMILY)	---	---	---	58 28.4%	57 28.5%	70 33.8%	73 33.8%	73 34.8%	75 35.0%	---	75 37.1%	---	75 35.7%	---	---	---	---	71 33%	71 33%	71 33%	72 33%	72 33%
ENVIROMENTAL SANITATION (PER FAMILY)	---	---	---	---	---	---	73	73 34.8%	75 35.0%	---	75 37.1%	---	75 35.7%	---	---	---	---	71 33%	71 33%	71 33%	72 33%	72 33%
DIETARY HABITS (PER FAMILY)	---	---	170 89.5%	89 46.8%	---	95 45.9%	97 45.0%	62 29.5%	85 39.7%	---	63 31.1%	---	25 11.9%	---	---	---	60 27.6%	---	---	---	---	---
DETAILED DIETARY SURVEY (PER FAMILY)	---	20 10.5%	---	---	20 10.5%	---	---	---	20 9.5%	---	20 9.9%	---	---	---	20 9.17%	20	---	---	---	20	---	---
MORBIDITY (PER INDIVIDUAL)	88	58	92	75	113	64	150	125	183	152	185	180	151	138	185	186	253	229	245	244		
MICROBIOLOGY (PER INDIVIDUAL)	55		20	22	54	22	20	21	25	---	22	---	54	---	20	21	23	31	50	21	28	21
D-XILOSE FIELD TEST (PER INDIVIDUAL)	---	---	---	63		---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
COLITESTERS (PER HOUSE)	---	---	15	60	86	30	38	---	30	---	17	---	17	---	17	17	17	17	17	17	17	17
BACTERIOLOGICAL AND CHEMICAL SURVEY OF WATER (PER HOUSE)	3	3	3	3	3	3	3	3	3	---	3	---	3	---	3	3	3	3	3	3	3	3
FLY INDEX (WEEKLY) (COUNTS PERFORMED IN 6 TRAPS)	---	---	---	24	24	24	24	24	24	---	24	---	24	---	24	24	24	24	24	24	24	24

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Table III.2

Monthly Frequency of Field Activities and Population Covered
In Florida Aceituno During 1973 and 1974

ACTIVITIES	1973 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	1974 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
ACTUALIZATION OF THE CENSUS (PER FAMILY)	---	---	---	215 100%	201 100%	204 100%	205 100%	202 100%	202 100%	---	200 100%	---	200 100%	---	197 100%	---	196 100%	209 100%	211 100%		219 100%	216 100%
MORBIDITY (HOUSE VISIT) (PER FAMILY)	---	---	---	215 100%	201 100%	204 100%	205 100%	202 100%	202 100%	---	200 100%	---	200 100%	---	197 100%	---	196 100%	209 100%	211 100%		219 100%	216 100%
ECONOMICS (PER FAMILY)	---	---	---	48 21.4%	48 23.9%	75 36.8%	72 35.1%	72 35.6%	75 37.3%	---	75 37.3%	---	75 37.5%	---	197 100%		196 100%	69 33.%	70 33.%	71 33.%	72 33.%	71 33.%
ENVIROMENTAL SANITATION (PER FAMILY)	---	---	---	---	---	---	72 35.1%	72 35.1%	75 37.3%	---	75 37.3%	---	75 37.5%	---	197 100%		196 100%	69 33.%	70 33.%	71 33.%	72 33.%	71 33.%
DIETARY HABITS (PER FAMILY)	---	---	163 75.8%	100 46.5%	---	89 43.6%	94 45.8%	65 32.2%	80 39.6%	---	54 27.0%	---	30 15.0%	---	---	---	55 28.0%	---	---	---	---	---
DETAILED DIETARY SURVEY (PER FAMILY)	---	20 9.5%	---	---	20 10.0%	---	---	---	20 9.9%	---	20 10.0%	---	---	---	20 10.15%	20	---	---	---	20	---	---
MORBIDITY (HEALT POST) (PER INDIVIDUAL)	160	76	72	109	248	128	140	157	124	168	175	127	142	113	147	140	211	184	208	182		
MICROBIOLOGY (PER INDIVIDUAL)	53		20	20	50	21	20	20	20	---	21	---	52	---	20	20	21	21	51	21	22	22
D-XILOSE FIELD TEST (PER INDIVIDUAL)	---	---	---	---	-- 183		---	---	---	---	92	---	---	---	---	134		---	---	---	---	---
COLITESTERS (PER HOUSE)	---	---	18	19	31	34	25	23	13	---	17	---	17	---	17	17	17	17	17	17	17	17
BACTERIOLOGICAL AND CHEMICAL SURVEY OF WATER (PER HOUSE)	3	3	3	3	3	3	3	3	3	---	3	---	3	---	3	3	3	3	3	3	3	3
FLY INDEX (WEEKLY) (COUNTS PERFORMED IN 6 TRAPS)	---	---	---	24	24	24	24	24	24	---	24	---	24	---	24	24	24	24	24	24	24	24

Table III.3

Monthly Frequency of Field Activities and Population Covered
In Guanagazapa During November 1974 through May 1975

ACTIVITIES	1974 NOVEMBER	1974 DECEMBER	1975 JANUARY	1975 FEBRUARY	1975 MARCH	1975 APRIL	1975 MAY
ACTUALIZATION OF THE CENSUS	217*	---	226	228	237	221	---
(Per family)	100°	---	100	100	100	100	---
MORBIDITY-HOUSE VISIT	217	---	226	228	237	221	---
(Per family)	100	---	100	100	100	100	---
ECONOMICS	72	---	72	72	---	---	---
(Per family)	33	---	32	32	---	---	
ENVIRONMENTAL SANITATION	68	---	67	---	74	74	74
(Per family)	31	---	30	---	31	33	
DIETARY HABITS	---	---	203	---	---	---	---
(Per family)	---	---	90	---	---	---	---
DETAILED DIETARY SURVEY	20	---	---	---	---	---	---
(Per family)	9	---	---	---	---	---	---
MORBIDITY	146	68	198	117	140	172	181
(Health Post)	14	7	18	11	13	15	
D-XYLOSE FIELD TEST	---	---	---	---	---	110	---
(Per individual)	---	---	---	---	---	11	---
COLITESTERS	17	---	17	17	17	17	17
(Per house)	8	---	8	8	7	8	
BACTERIOLOGICAL AND CHEMICAL	3	---	3	3	3	3	3
SURVEY OF WATER (Per house)	1.5	---	1.5	1.5	1.2	1.3	
FLY INDEX - WEEKLY	24	---	---	---	---	---	---
(Counts performed in 6 traps)	11	---	---	---	---	---	---
MICROBIOLOGY	20	---	52	20	20	21	24
(Per individual)	2	---	5	2	2	2	

* SURVEYS
° PERCENTAGE OF INDIVIDUALS

Table III.4

Monthly Frequency of Field Activities and Population Covered
In Florida Aceituno During November 1974 Through May 1975

	1 9 7 4		1 9 7 5				
ACTIVITIES	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY
ACTUALIZATION OF THE CENSUS	208*	---	219	225	221	227	---
(Per family)	100°	---	100	100	100	100	---
MORBIDITY - HOUSE VISIT	208	---	219	225	221	227	---
(Per family)	100	---	100	100	100	100	---
ECONOMICS	71	---	71	71	---	---	---
(Per family)	34	---	32	32	---	---	---
ENVIRONMENTAL SANITATION	49	---	95	---	75	69	67
(Per family)	24	---	43	---	34	30	
DIETARY HABITS	---	---	206	---	---	---	---
(Per family)	---	---	94	---	---	---	---
DETAILED DIETARY SURVEY	20	---	---	---	---	---	---
(Per family)	10	---	---	---	---	---	---
MORBIDITY	209	79	166	170	130	119	138
(Health Post)	23	8	18	17	13	12	
D-XYLOSE FIELD TEST	71	42	---	---	---	---	148
(Per Individual)	7	4	---	---	---	---	---
COLITESTERS	17	---	17	17	17	17	17
(Per house)	8	---	8	8	8	8	
BACTERIOLOGICAL AND CHEMICAL	3	---	3	3	3	3	3
SURVEY OF WATER (Per house)	2	---	1.5	1.5	1.5	1.5	
FLY INDEX - WEEKLY	24	---	---	---	---	---	---
(Counts performed in 6 traps)	12	---	---	---	---	---	---
MICROBIOLOGY	20	---	51	21	21	21	21
(Per individual)	2	---	5	2	2	2	

* SURVEYS
• PERCENTAGE OF INDIVIDUALS

Table III.5

Field Activities In Florida Aceituno From 1973 to 1976

ACTIVITIES	1973												1974												1975												1976									
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
ACTUALIZATION OF THE CENSUS (per family)	---	---	---	215	201	206	205	202	202	---	200	---	200	---	197	---	196	209	211	---	219	216	217	---	226	---	233	227	230	234	242	236	232	234	234	---	236	---	234	226	22[illegible]	230	228	2[illegible]
MORBIDITY (House visits) (per family)	---	---	---	315	201	204	205	202	202	---	200	---	200	---	197	---	196	209	211	---	219	216	217	---	226	---	233	227	230	234	242	236	232	234	234	---	236	---	234	226	---	---	---	---
ECONOMICS (per family)	---	---	---	68	68	75	72	72	75	---	75	---	75	---	197	---	196	69	70	71	72	71	72	---	75	---	77	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ENVIRONMENTAL SANITATION (per family)	---	---	---	---	---	---	72	72	75	---	75	---	75	---	197	---	196	69	70	71	72	71	72	---	75	---	77	75	76	78	80	236	---	234	75	---	76	---	76	75	75	75	76	75
DIETARY HABITS (per family)	---	---	161	500	---	89	94	65	80	---	54	---	30	---	---	---	55	---	---	---	---	---	0	---	--	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DETAILED DIETARY SURVEY (per family)	---	20	---	---	20	---	---	---	20	---	20	---	---	---	20	20	---	---	---	20	---	---	20	---	---	---	---	---	---	---	30	---	---	---	30	---	---	---	---	30	---	---	30	---	---
MORBIDITY (Health post) (per individual)	160	26	72	109	248	178	140	157	174	168	175	127	142	113	142	140	211	184	208	187	---	---	216	68	167	217	169	205	207	261	275	186	175	255	241	176	231	240	258	282	205	187	201	175
MICROBIOLOGY (per individual)	53	---	20	20	50	21	20	20	20	---	21	---	52	---	20	20	21	21	51	21	22	22	20	---	51	21	21	21	21	56	22	19	21	20	21	---	50	---	21	20	51	20	21	20
D-XYLOSE FIELD TEST (per individual)	---	---	---	---	183	---	---	---	---	---	92	---	---	---	---	134	---	---	---	---	---	---	112	---	---	---	---	---	148	---	---	---	---	---	157	---	---	---	---	165	---	---	---	---
COLITISTERS (per house)	---	---	18	19	31	34	25	28	13	---	17	---	17	---	17	17	17	17	17	17	17	17	17	---	40	40	40	40	40	40	40	40	40	40	40	---	40	---	40	40	40	40	40	40
BACTERIOLOGICAL AND CHEMICAL SURVEY OF WATER (per houses)	3	3	3	3	3	3	3	3	3	---	3	---	3	---	3	3	3	3	3	3	3	3	3	---	2	1	1	2	1	1	2	1	1	2	1	---	2	---	1	1	2	1	1	2
FLY INDEX (weekly) (counts performed in 6 areas)	---	---	---	24	24	24	24	24	24	---	24	---	24	---	24	24	24	24	24	24	24	24	24	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Table III.6

Field Activities In Guanagazapa From 1973 to 1976

ACTIVITIES	1973												1974											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ACTUALIZATION OF THE CENSUS (per family)	---	---	---	190	200	207	216	210	214	---	202	---	210	---	218	---	217	214	215	---	219	217	208	---
MORBIDITY (per family)	---	---	---	190	200	207	216	210	214	---	202	---	210	---	218	---	217	214	215	---	219	217	208	---
ECONOMICS (per family)	---	---	---	58	57	70	73	73	75	---	75	---	75	---	---	---	---	71	71	71	72	72	69	---
ENVIRONMENTAL SANITATION (per family)	---	---	---	---	---	---	73	73	75	---	75	---	75	---	---	---	---	71	71	71	72	72	69	---
DIETARY HABITS (per family)	---	---	170	89	---	95	97	62	85	---	63	---	25	---	---	---	60	---	---	---	---	---	0	---
DETAILED DIETARY SURVEY (per family)	---	20	---	---	20	---	---	---	20	---	20	---	---	---	20	20	---	---	---	20	---	---	20	---
MORBIDITY (Health post) (per individual)	88	58	92	75	113	64	150	125	183	152	185	180	151	138	185	196	251	229	245	244	---	---	288	79
MICROBIOLOGY (per individual)	55	---	20	22	54	22	20	21	25	---	22	---	54	---	20	21	23	31	50	21	28	21	20	---
O-TOLIDINE FIELD TEST (per individual)	---	---	---	63	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
COLITESTERS (per house)	---	---	15	40	86	30	36	---	30	---	17	---	17	---	17	17	17	17	17	17	17	17	17	---
BACTERIOLOGICAL AND CHEMICAL SURVEY OF WATER (per house)	3	3	3	3	3	3	3	3	3	---	3	---	3	---	3	3	3	3	3	3	3	3	3	---
FLY INDEX (counts performed in 6 traps)	---	---	---	24	24	24	24	24	24	---	24	---	24	---	24	24	24	24	24	24	24	24	24	---

ACTIVITIES	1975												1976							
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
ACTUALIZATION OF THE CENSUS (per family)	209	---	225	221	224	225	224	234	237	243	247	---	236	---	241	242	239	238	240	235
MORBIDITY (per family)	209	---	225	221	224	225	224	234	237	243	247	---	236	---	241	242	239	238	240	235
ECONOMICS (per family)	73	---	75	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
ENVIRONMENTAL SANITATION (per family)	73	---	75	73	74	75	74	234	---	240	73	---	75	---	75	74	75	73	75	74
DIETARY HABITS (per family)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DETAILED DIETARY SURVEY (per family)	---	---	---	---	---	---	30	---	---	---	30	---	---	---	---	30	---	---	30	---
MORBIDITY (Health post) (per individual)	149	180	112	137	146	273	262	264	244	230	240	---	245	260	251	248	266	270	245	251
MICROBIOLOGY (per individual)	52	20	20	21	24	51	23	29	21	21	20	---	51	---	20	22	50	20	21	21
O-TOLIDINE FIELD TEST (per individual)	---	---	---	---	164	---	---	---	---	---	115	---	---	---	---	95	---	---	---	---
COLITESTERS (per house)	40	40	40	40	40	40	40	40	40	40	40	---	40	---	40	40	40	40	40	40
BACTERIOLOGICAL AND CHEMICAL SURVEY OF WATER (per house)	2	1	1	2	1	1	2	1	1	2	1	---	2	---	1	1	2	---	1	1
FLY INDEX (counts performed in 6 traps)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

In subsequent years (1974, 1975, 1976), it was not possible to use exactly the same 60 subjects (per community) who participated in the original 1973 detailed absorption studies because of "dropouts". However, 60 subjects from each village were studied each year. Replacements for "dropouts" were selected from the original pool with the highest priority in 1975 and 1976 given to those subjects who had participated previously. In 1976, it was not possible to obtain 60 subjects from the original pool in each village and additional replacement subjects were selected on the same basis as the original pool.

Sanitation Longitudinal Sample

Sanitation studies used the family as a sampling unit. In order to maintain as great a correspondence as possible between household sanitation data and individual detailed absorption study data, the "sanitation longitudinal sample" (SLS) was defined as follows:

> A family belongs to the Sanitation Longitudinal Sample, if and only if, at least one metabolic ward participant was a member of that family some time during 1973, 1974, 1975 or 1976.*

Initially, the SLS families corresponded exactly to the DAS Pool members. Families were subsequently added to the SLS when new participants were chosen for absorption studies. For example, a young single male might marry and form a new family, which would then be added to the SLS. If an adult male head-of-household changed families, the new family was added to the SLS and the previous family was retained.

Some families moved away after selection of the DAS Pool but prior to participation in the absorption studies. These families were omitted

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*The SLS also included 3 families who were surveyed extensively using Forms 26 and 32 but for whom no family member ever participated in absorption studies.

from the SLS because they were never available for data collection. Thus the SLS had variable membership, as with any long-term longitudinal cohort. In August 1976, the SLS contained 88 Florida Aceituno families and 82 Guanagazapa families.

Health Education Longitudinal Sample

Several samples were selected for health education studies. In each case the sampling unit was a family. The health education longitudinal sample (HELS) was designed to be identical to the SLS (sanitation longitudinal sample) but, because of clerical errors, there were minor differences. For practical purposes, the HELS can be considered to have the same sampling history as the SLS (i.e., a stratified random sample).

1. Health Education Monthly Supplemental Sample

The Health Education Monthly Supplemental Sample (HEMSS) was used to increase the community representation in the health education surveys. The HEMSS sampling unit, as with the HELS, was a family. The frame (population from which families were selected) consisted of all families in Guanagazapa except those families belonging to the HELS. Samples were selected monthly. Sample size depended upon the time available to field personnel and thus varied from month to month. Each month the frame was revised to omit all families who had been sampled in the previous two months. The objective was to obtain a simple quarterly random sample (without replacement). Data were collected from HEMSS families monthly from June 1975 through June 1976 except for December 1975, and February and March 1976.

2. Health Education Participation Sample

In December 1975, the health education participation sample (HEPS) was selected to evaluate participation in the health education program.

The sampling unit was a family. The frame consisted of all Guanagazapa families that had participated in one or more extension programs. The sample size, n=33, was based upon interviewer time availability. The sampling procedure was a simple random sample (without replacement). Data were collected in December 1975.

IV. Census

The food wastages study depended upon an accurate census of the population in the experimental (Guanagazapa) and control (Florida Aceituno) villages. One objective of the census was to obtain individual information on: sex, race, place of birth, name, literacy, years of education, occupation, and date of birth. As the study progressed, additional monthly information on each individual's family affiliation, address, position within the family, and whether or not the person was "present" in the village was collected. These monthly additions were subject to change. Individuals and families were not restricted in their movements in any way. Therefore, the census methodology had to account for these dynamic population characteristics.

The census interviewers proceeded through each village from house to house. Therefore, the census was organized so that each interviewer would have all the current information about a household readily available as she conducted the survey. After a few survey problems were resolved, an adequate definition of each house was determined by assigning a unique block number and house number within the block.

The entire population was surveyed to produce a baseline census for each village. Form 01 in Appendix IV is the census form. This basic survey was initiated in August 1972 and completed in March 1973. During each month of the study, each interviewer recorded the changes from the previous month's census, thus, producing an updated census.

Each monthly survey followed three basic steps. First, the interviewer inquired at each household as to what changes had occurred since the

previous census. Secondly, the interviewer filled out the appropriate forms (01, 31 or both) according to the type of change that had occurred (as defined by the protocol). The updated forms were taken to the INCAP office each Friday. Finally, this data was checked, keypunched and processed to produce a "new" census for the next month's survey. The processing was done by computer programs which included field and range checks and produced a "new" census by updating the "old" census with the new data from Form 01's and 31's.

The keypunchable forms that were filled out by the surveyors included the individual data form (Form 01) and the family-data form (Form 31). The fields that appear on each form are described in the form protocols in Appendix IV. Variables which require further description include:

1. INDID. Whenever new individuals arrived in the village, they were assigned a unique individual identification number within the village. Every individual who was ever present in the study villages can thus be completely identified by a community number (COMM) and the four digit individual number.
2. ADDRS. Each dwelling within each village was assigned a block and house number defining and aiding the survey team in locating the dwelling.
3. FAMID. Each family was assigned a three digit number within each village. A family was defined by the household head (usually male) and his (her) economic dependents. Even if a family left the village, it retained its original family identification number if it should return. There was no movement of families or individuals between the two villages.

The census was used to follow individuals and families across time and in different locations. The protocols for encoding the changes are provided in Appendix IV. The monthly census of everyone in the village (present the preceeding month) was printed out by computer for each surveyor, and sorted first by address and then family number. Within each family, individual records were listed according to ascending "family position number". Position 1 was used for the male head of household, 2, for the female head. Other positions indicated sons and daughters, parents, other relatives and non-related individuals. Thus, the data for each group of individuals within a dwelling was recorded in an organized array for the census-taker. Each interviewer first noted any changes, additions, deletions, or corrections on the printout sheet and then transferred them to the relevant form (01 or 31).

The data processing team produced a quarterly list of all individuals currently "active" in the study. This list was used by many of the study-team members such as the health post staff, the health education and sanitation survey group and in the metabolic ward. Multiple copies were made and widely distributed. This was necessary to insure that all data streams were identifying houses, families and individuals in a consistent manner.

V. Water Supply, Diarrheal Morbidity and Health Benefits

There have been marked changes over the last five years in expert opinions on the feasibility of (1) demonstrating the role of improved water supplies in reducing diarrheal morbidity, and (2) quantifying health benefits for the purpose of benefit/cost analysis.

It is important to differentiate between the mutual but distinct purposes of the economist and the scientific investigator. One viewpoint of the economist may be seen in the report on the "Measurement of the Health Benefits of Investments In Water Supply" to the International Bank for Reconstruction and Development. The report deals with the feasibility of quantifying health benefits for the purpose of benefit/cost analysis (World Bank, 1976), and recommends that large size, long term, longitudinal studies be abandoned, even though these studies provide the primary mechanism for isolating specific quantitative relationships between water supply and health. These studies have not provided either the methodology or information for the quantification of health benefits. However, the scientific investigator has other objectives. One objective may be to explain biological mechanisms of disease, and another, the design of practical intervention programs to combat malnutrition and infection. These objectives are contributory to any economic analysis, but do not satisfy the needs of the economist. The economist's task is to propose criteria for the allocation of resources. In water supply studies, attempts have been made to establish reliable procedures for estimating and predicting the health effects likely to result from water supply investments. There are recognized methodological conventions required for economic analysis and the demands of economic analysis

have contributed valuable insights into the water supply/health relationship. However, there is a current impasse in the quantification of health benefits for the purposes of benefit/cost analysis. This constraint does not remove the challenge of exploring the full range of variables and inter-relationships that contribute to an understanding of the role of water supply in diarrheal disease etiology and control. A better understanding of etiological determinants may provide a future opportunity for establishing specific quantitative relationships between water supply and health and for expressing these in terms of economic benefits.

The purpose of this background statement is to examine the results of previous studies on the dynamics of the water/health relationship and relate these to the design of the UNC/INCAP study. The IBRD report recommends modest impact studies that would make it possible to gradually increase our knowledge of how water supply and other governmental, economic, social, educational and environmental changes have been associated with changes in health. It is this interaction which is critical in establishing the water/health relationship and the multi-variable relationships which are described.

Suggested variables for the study of acute diarrhea in children have been summarized by Rhode and Northup and include:

1. Studies of biochemical and immunological processes relating to etiological agents and aberrations in the gut.
2. Ecological factors that influence the interaction between microorganisms, persons and populations.
3. Behavior patterns, beliefs and practices which comprise the socio-economic elements of the problem.
4. Structure and influences of communications and health delivery systems.

A review of studies on the relationship between water supply and health demonstrates progressive change in the scope of the study designs, moving from straightforward cause-effect studies to the broader studies of behavioral and biological dynamics.

Despite these new developments, there are justifiable reservations by the economists with respect to the feasibility of demonstrating the benefits from water supply investments in quantitative terms. There are two levels of questions which have yet to be answered:

1. Does water supply have a significant impact on the health of a population?
2. If so, to what extent can water supply reduce the prevalence or severity of specific diseases?

The evidence indicates that water supply does have an impact, but that the size of the impact depends upon a very complex interaction of factors. Saunders and Warford recently published the results of their review of the efforts to predict and measure the specific benefits of water supply and sanitation investment in economic, social, physical or monetary terms. Their book is based on a thorough review of the available evidence, and they conclude that:

> Although improvement in health is normally cited as the basic justification for investment in this area, the empirical evidence to date does not do much to help us predict the impact of a water supply or sanitation project on health in a particular instance...Our conclusion is that prediction with an acceptable degree of precision as to the exact effects of improved rural water supply and sanitation is unlikely and that the time is wasted in trying to make such predictions. Rather, we shall have to continue to rely upon rule-of-thumb tests of project desirability, at least for investments which provide for the basic needs -- necessary to achieve health objectives -- of the rural poor. (Saunders and Warford, 1976, pp. 26-27)

Yet, dependence on rule-of-thumb tests does not relieve the scientist or the decision-maker of the responsibility for questioning the assumptions

on which the rule-of-thumb tests of project desirability are based. Indeed, policy planners and operating officials will continue to ask for supportive evidence for allocating resources for water supplies.

Water and Health

Supplying water to a population is one of the mediums for improving the health of that population. Water can vary in terms of its quality, availability or volume. The project design may or may not call for a chlorinated supply. Delivery to the recipient population may be by public faucets or by piping the water into the home, or it may be achieved by digging wells. The system designer must make tradeoffs between the project's cost and its perceived health and social benefits.

Most of the hypotheses concerning the effects of water supply on health are based on the historical experiences of the western industrialized countries. Over the years, several reservations have arisen with respect to these hypotheses. These reservations resulted from the observation that water supply is necessary but not sufficient in itself to improve the sanitation environment. Not only does there have to be safe and adequate water available but water has to be used in a manner that promotes health. As Saunders and Warford noted:

> ...permanent improvements in health are unlikely, if not impossible, unless a safe and convenient water supply either precedes or accompanies other sanitary measures. Improved excreta disposal, food and market sanitation, personal hygiene, and village cleanliness, undertaken to prevent and control filthborne diseases, are dependent on the availability of a good water supply. (Saunders and Warford, 1976, p. 35)

Earlier assumptions about water were based upon the microbial etiology of disease. It is now necessary to progress to agent-mechanism-disease relationships, particularly where interventions are to be considered. Bradley has proposed a classification of water-related diseases that deals with mechanisms and provides a basis for specific interventions (Bradley,

1970; White, et. al. 1972). Bradley's system deals with a water/health classification of: water-borne diseases, water-based diseases, water-vectored diseases and water-washed diseases. His classification system is used to encapsule the current evidence for the efficacy of water supply improvement in disease prevention and control. Special attention is given to identifying conditions where there is a choice between a supply that is of high bacteriological purity or to provide for a high volume of use.

1. Water-borne Diseases

These are the classic diseases on which most of the positive evidence for the efficacy of water is based. Water-borne diseases are those in which water acts as a passive carrier of the infective agent. Infection takes place by the ingestion of the contaminated water. Included in this classification are diseases such as cholera, typhoid, amoebiasis and infectious hepatitis. Cholera and typhoid, which occur as dramatic outbreaks in areas of dense population, are short-lived and effectively controlled by the treatment of the contaminated source. These diseases can be spread by routes other than water (Cruickshank, et. al. 1976), however, the control of water quality is a very effective way of combating these diseases. Water quality is of greater importance for this purpose than its availability. The disease potential of a water supply is held to be a function of population density and the number of people using a given source. Thus, in the rural areas, with low population density, the effect of water quality would not be expected to be as strong as in urban areas. Mild pollution of a water source used by many people may have a more severe effect than the heavy pollution of a source used by a few people (White, et. al. 1972).

2. The Water-Based Diseases

The water-based diseases are caused by parasitic worms which are dependent on aquatic organisms for the completion of their life-cycles. Studies on schistosomiasis in South Africa and St. Lucia, in the Caribbean, have attempted to evaluate the impact of water-supply on the incidence and prevalence of the disease. The objective was to give the population at risk the water-use facilities that would make it unnecessary for that population to enter the natural waters containing the infective agents. Showers, laundry-facilities and swimming pools were built in the hope that these would cut down on exposure. It is unlikely that such methods will eliminate all water contacts, but the severity of infection in the individual should be diminished. These controls are also generally more effective for women and children, since for adult males, infection occurs during working hours at the place of work (Unrau, 1975; Saunders and Warford, 1976). The value of water-use facilities for the control of schistosmiasis is yet to be substantiated. The cost-effectiveness of water-use facilities, chemotherapeutic intervention, engineering or molluscacidal control need to be evaluated and compared.

Guinea worm infections have been associated with contamination of wells used as a source of domestic water. The person becomes infected by ingesting the crustacean harbouring the infective larvae. It has been found that the protection of wells by lining and especially by the construction of concrete parapets to stop the crustaceans from falling into the well, have been effective methods of controlling the disease (White, et. al., 1972).

3. The Water-Vectored Diseases

The water-vectored diseases are those caused by insects that breed

in water or that live near water. These diseases are yellow fever, dengue fever, filariasis, malaria, onchocerciasis and sleeping sickness. Generally, control of these diseases is by the use of pesticides at the breeding grounds or by the destruction of vegetation that harbours the insects (Saunders and Warford, 1976).

Water-supply projects could play a role in disease control by keeping people away from the breeding ground sources. These projects also could have an effect by decreasing water-storage in containers near or within the home, which can be breeding sites for the insects. However, this latter effect on insect breeding is dubious unless a wastewater disposal system is installed at the same time as the water-supply. Where the disposal of water is at the discretion of the household, and with the increased use of water in the home, the problem of stagnant water and continually moist ground around the home is accentuated.

4. The Water-Washed Diseases

The water-washed diseases are associated with a lack of water and with poor personal hygiene. These diseases fall into two groups: (1) those affecting the gastrointestinal tract, including paratyphoid, non-specific diarrheas, enteroviral diarrheas and the helminthic infections, and (2) those affecting the skin and body surfaces including scabies, yaws, trachoma and conjunctivitis (Saunders and Warford, 1976). The gastroenteric diseases are among the leading causes of death in the LDC's, especially among children below the age of seven years.

With respect to these water-washed diseases it is assumed that the volume of water used for the maintenance of personal and household hygiene is of greater importance than its bacteriological quality. The ready availability of water is considered to be a necessary requirement for

disease prevention but if poor hygiene is present, the water-washed diseases will persist.

> Water use habits wrapped up as they are in tradition, culture and a simple lack of knowledge about consequences to a great extent determine the magnitude of any health related benefits a population may derive from a given water supply investment (Saunders and Warford, 1976, p. 44).

a. Water Quantity. The quantitative relationship between water use and morbidity has not been determined. The minimum requirement for consumption in a tropical area has been estimated to be about 2 to 3 liters per person per day (White, et. al., 1972). If water consumption is below 5 liters per person per day, very little of that consumption can be used for hygienic purposes and we would therefore expect to find a high prevalence and incidence of the water washed diseases. Thus, water will not be available for bathing, clothes washing, food protection and utensil cleaning. Through intuition, we assume that an increase in water consumption by a user with a "low" consumption rate will result in greater health benefits accruing to that user than would an equal increase in water consumption by a user with a "medium" or "high" consumption rate. Since there are no numbers to define the terms "low", "medium" and "high", these can be supplied only by some rough guesses. One such guess is that with a per capita daily consumption of 20 to 80 liters, the health benefits of increasing water usage begin to show decreasing marginal returns (White, et. al., 1972).

Water consumption is also determined by access to and convenience of the water source. The World Health Organization defines reasonable access to water in urban areas as having the source less than 200 meters from the home. For rural areas, the criterion is only that people do not have to spend a disproportionate part of the day fetching the water

to the home (Saunders and Warford, 1976).

The studies done in East Africa observed that when the source was between 10 and 100 meters away from the home, there was little difference in consumption. Where households were supplied with piped water, the additional factors affecting water use were found to be family size, income level, education, cultural heritage and level of material wealth. For households without piped supplies, the important factors affecting consumption were type of community, size of vessels for water transportation, the energy required to fetch the water, the use made of rainwater and the location of clothes-washing activities (White, et. al., 1972).

b. Water use vs. Health. The evidence indicates that the water-washed diseases are strongly linked with the hygienic level of the home environment including the presence of sanitation facilities such as toilets, showers and piped water.

Piped water can be linked to significant decreases in enteropathogenic bacterial infections such as shigella and salmonella. However, diarrheal morbidity from all causes is significantly reduced only in connection with the availability and proper use of other sanitation facilities, together with easy access to water. Studies show that having a faucet within the home has a greater health impact than having a faucet in the yard, and that having a faucet in the yard has more of a health benefit than having access to a faucet away from the home property (Saunders and Warford, 1976).

Parasitic infection has not been shown to be affected by water supply, however it is affected by the proper disposal of human excreta. The Costa Rican study showed the persistence of parasites despite the widespread availability of privies. They concluded that this might

be due to continued exposure of people working in the fields and by the use of damp, earthen floors within the home (Moore, et. al. 1965).

Intervention for the control and prevention of diarrheal morbidity depends on a number of mechanisms. Some of these are well defined and depend on the provision of facilities, including water supply. Others are rooted in practices, behavior and culture. The intervention factors for the water-washed diseases include:

a. The provision of a safe and adequate water supply.

b. The provision of a sanitary method of excreta disposal within or convenient to the home, and the prevention of fecal contamination of water supply.

c. The elimination of fecal contamination on the ground close to the home or to any area of human activity.

d. The prevention of access of disease vectors, such as insects, to human fecal wastes.

e. Adequate housing including the absence of crowding, vermin and domestic animals.

f. Food preparation and handling carried out in sanitary surroundings.

g. Available facilities for people to wash, so that personal hygiene is both appreciated and practiced.

h. Public comprehension of the elementary essentials of hygienic behavior must finally be achieved.

The gastro-enteric infections which may occur through the water-washed mechanism is not explainable through microbial etiology alone. Not only are multiple variables involved, but there is an interaction of these variables. Some of the variables, other than etiology, are:

a. Behavior patterns, beliefs and practices which comprise the

socio-economic elements of the problem.

(1) Economic Differences. Health status is nearly always related to socio-economic level. Increased ability to spend means increased ability to purchase better health care, more sanitary facilities, better housing, better education, better food, or at least more of it. Introduction of a water supply into a higher socio-economic level community is more likely to achieve its full health-inducing potential than the introduciton of an identical supply into a community at a lower socio-economic level.

(2) Cultural Differences. Hygienic behavior within the home depends on the degree of modernity of the health-belief system, notwithstanding that some traditional systems call for positive hygienic behavior. The cultural system will influence the relationship of its members to modern medicine including its practitioners and institutions. Cultural influences determine the actions which constitute a "healthy" environment and "health promoting" behaviors. These influences may be expressed as indifference to the presence of fecal matter in contrast to the strongly negative attitudes seen in industrialized cultures.

b. Structure and influence of educational and health delivery systems.

(1) Educational Level. The educational level will have a marked influence on the impact of the water supply. Interventions based on education and alteration of health behavior are more successful in populations with higher educational levels and

literacy. Secondarily, higher educational levels are associated with individual modernity. Also, these higher levels are usually associated with socio-economic levels that permit families to purchase the supportive facilities that are necessary for realizing the full benefits of the water supply.

(2) Other Health-Realted Facilities. The degree of contact that a population has with modern health services may affect the impact of the water supply in a secondary manner. Ready access to modern health services is likely to raise health consciousness and to lead to a decline in the use of more traditional health services (Wood, C. M. & T. D. Graves, 1973). Higher modernity with respect to health perceptions may be associated with better acceptance of educational programs, behavioral changes and greater willingness to invest in sanitation facilities.

c. Ecological factors that influence the interaction between microorganisms, persons and populations.

(1) Geographical Differences. Certain diseases are associated with geographical features, including altitudes, rainfall and climate. Diseases are often linked with seasonal changes in rainfall in several ways. Lack of rainfall may be beneficial in that the dryness may lead to the dying off of pathogenic organisms. Heavy rainfall may be detrimental because pollution material is washed into the water supply or because wet soil is conducive to the growth of the pathogens.

(2) Urban-Rural Differences. There are greater risks of large epidemics caused by the "classical" water-borne diseases in

urban areas with dense populations. Urban areas water supply systems have a central distribution system for water as well as a central collection system for waste-water. However, in many cities there are problems of interrupted water-service that can lead to the contamination of the distribution system because of negative pressures.

Industrial pollution of water supplies is more likely to be found in urban areas, since the pattern in many countries is for all the industrial production facilities to be located within or close to the urban areas. The industrial pollution may give rise to health problems not found in the rural areas.

In the rural areas, water availability is more likely to be of concern than water quality, either in terms of its physical availability or the human energy required to get the water.

(3) Facilities Associated With Water. Moore, et. al., (1965) conclude that even where a population has piped water and uses privies, it is necessary to have a bathing facility to obtain the best health effect of that piped water-supply. Lack of clothes-washing or bathing facilities utilizing the new source could mean that some of the old, polluted sources continue to be used and remain as sources of disease. Lack of facilities can also act as an obstacle to the increase in water use. The frequency of clothes-washing or bathing are unlikely to increase unless it becomes more convenient to do so. This generally means that the facilities needed to carry out these functions become available in or close to the home site.

(4) The Home Environment. The main factor affecting household morbidity levels is the sanitation environment within the home. Water supply cannot be treated in isolation. Putting pure water into a household that uses contaminated containers to store that water leads to recontamination of that water. Lack of soap makes it difficult to maintain hygienic activities such as hand-washing or clothes-washing.

The benefit of simple pit privies is open to question. The Moore study in Costa Rica indicates that parasites persist despite the widespread use of privies. The World Health Organization (WHO) diarrheal study of seven countries concluded that:

> The availability of water definitely influenced the incidence of diarrhea. However, in all areas with basic sanitation (pit privies) where a piped water supply was available, diarrhea rates were reduced but still remained at a high level. This indicates that such a facility alone without complete sanitation (inside faucet, flush toilet, shower, safe and effective waste-removal system), was of limited benefit to the population in so far as reducing the incidence of diarrhea was concerned. (WHO, 1966)

Problems in Methodology

One of the most difficult questions to answer is whether water supplies have a significant impact on the incidence of diarrheal disorders in developing countries. Except for a few studies, such as the one done in Kampur, India (Trivedi, et. al., 1971) where the sociocultural and religious background of the recipient population enhanced the effect of improvements in the bacteriological quality of water on the incidence of diarrhea, the evidence available at the present is not conclusive (Bradley, 1970; Dietrich and Henderson, 1965; Hollister, et. al., 1955; Schliessman, 1959; Unrau, 1975; White, et. al., 1972). The evidence

to date suggests that water supplies do have some impact on diarrheal disorders. Nevertheless, the size of such an impact is not clear because it also depends on many other factors in addition to a water supply of greater purity and volume.

There are also problems in assessing the other side of the water/health relationship, particularly diarrheal morbidity and its measurement. Water quantity and microbiological quality are important to the evaluation. For example, it is suggested that water consumption is closely related to the beneficial effect of water, especially when the level of consumption is high. Nevertheless, water consumption does not reflect the use that the recipient individuals make of the available water. An increase in the consumption of water per capita does not necessarily mean that such water was used for improving individual hygiene and sanitation habits. Therefore, without further information regarding water usage, the value of water consumption data is limited.

Microbiological tests also have limitations. The use of standard methods for the examination of water samples in a field study involves complex logistics and expense. Transporting samples, the number of samples required, and the demands of laboratory methods are mostly beyond the resources available to the experimenter.

The problems extend to the microbiological evaluation of stool samples for diarrheal morbidity. This subject is reviewed in other sources (Draser and Hill, 1974; Rhode and Northrup, 1976). Despite persistent attention to determining etiology, a specific agent was found in only 10-25% of patients in five major studies. Diarrhea caused by rotavirus has been found to be a major cause of acute diarrhea in many parts of the world. There are presently technical difficulties in the

laboratory isolation of rotavirus.

The epidemiological method currently used to evaluate the effect of water on gastro-intestinal diseases consists primarily of measuring changes in the incidence of diarrhea among recipient populations through what may be called Diarrhea Surveys. The usefulness and reliability of such surveys in rural areas of developing countries depends on whether the survey approaches have been adapted to the health-belief system of the populations under study. Results from surveys done without taking this aspect into consideration most probably will be inaccurate.

The insult to the gut in the rural areas of the Less Developed Countries starts early in life. The importance of a contaminated rural home environment in the perpetuation of gastrointestinal infections has been mentioned often but not carefully analyzed. There is sufficient evidence that the intestinal colonization of rural Guatemalan newborns and infants is influenced by such environments (Mata and Beteta, 1965; Mata, et. al., 1972). Their early contact with enteropathogens, especially Shigella, Salmonella, and E. Coli is not only due to contamination with the feces of the mother during delivery (Mata, et. al., 1967), but also to repeated contact with unclean nipples while being breast fed (Mata, et. al., 1969; Wyatt and Mata, 1969). Food is also frequently contaminated by the female head of the family while it is being prepared (Capparelli and Mata, 1975).

The heavy contamination of the external and home environments is closely related not only with the development of gastrointestinal alterations but also with the high prevalence of diarrhea and malabsorption observed in these populations. It has been known for many years that a significant proportion of individuals living in developing countries

present structural changes in their duodenojejunal mucosa, which may or may not be associated with functional and/or absorptive alternations (Sprinz, et. al., 1962; Troncale, 1967). This poorly defined entity is commonly called "tropical enteropathy" since it is considered to occur more frequently in tropical countries (Sheehy, et. al., 1968).

Diarrheal disorders represent the most frequent clinical manifestation of this altered gastrointestinal ecology. Pre-school children represent the group with the hightest risk of suffering diarrhea; actually, the latter causes the death of 1 to 4.2% of children below 2 years of age, in spite of the prophylactic and therapeutic measures (antibiotics, antidiarrheals, absorbants, antispasmodics, etc.) used. The morbidity caused by diarrhea must be measured also in terms of its detrimental influence on nutrition. Most of the time diarrheal morbidity is associated with variable degrees of malabsorption.

The information summarized above suggests that a significant proportion of the low socioeconomic populations of developing countries have an altered gastrointestinal ecology which seems to be related to unsanitary and heavily contaminated environments. The high morbidity and mortality produced by diarrheal diseases constitute a pressing health problem for developing nations which needs to be controlled and reduced.

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VI. Morbidity

The objectives of the morbidity survey methodology were:

1. To determine the incidence of illnesses affecting the inhabitants of the study community, particularly diarrhea and diseases of the gastro-intestinal tract.

2. To correlate disease incidence with environmental intervention over time.

3. To document the presence of bacterial and parasitic intestinal infections among the study populations.

The following activities were carried out:

1. Monthly home visits to provide morbidity information on every family and each individual living in the study communities.

2. Careful recording of all morbidity observed at the health posts in both villages.

3. Periodic stool cultures and fecal parasitological studies in subsamples of both populations.

Morbidity Survey Records

Morbidity data were collected at two sites, the home and at the health posts which were provided in each community. The basic protocol for gathering information was similar at both sites. Diseases were codified in order to standardize diagnoses and symptoms that might affect the village populations.

The codification of diseases and symptoms was based on the World Health Organization International Code System for Diseases. This protocol is divided into 10 systems according to the organ affected and the following codes are used:

01 = Body in general

02 = Skin

03 = Muscles and bones

04 = Respiratory System

05 = Cardiovascular System

06 = Blood and Lymphatics

07 = Digestive System

08 = Urogenital System

09 = Metabolic and Endocrine System

10 = Nervous System

11 = Senses

Within each system there are two subsections. The first subsection is for diseases (codes 01 to 60) and the second for symptoms (codes 61 to 99).

Since morbidity surveys were carried out by surveyors and auxiliary nurses and only occasionally by physicians, special care was taken to standardize diagnostic criteria. This was accomplished through written guidelines for the diagnosis of those diseases considered most important. These guidelines were very useful for the subprofessional personnel who did the surveys.

The house visit survey was based on the respondents recall of those diseases occurring in the family during a period of 15 days prior to the visit and therefore was open to misinterpretations. A fifth digit was added to the disease code to categorize how the diagnosis of a given disease or symptom was made. When a diagnosis was made by the nurse or surveyor, a number 1 was used if the diagnosis was solely based on the history given by the respondent. A 2 was used if the interviewer considered

that the person being interviewed was sick or met the criteria for a given disease. When the diagnosis of a disease or symptom was made by a physician, codes 4 and 5 were used. Therefore, the final coding of a given disease had five digits. The first two digits indicated the body system affected, the following two digits, the disease, and the last digit, the diagnostic criteria. For example, the coding of a "common cold", made by the nurse on the basis of the history of the person interviewed would be 04-02-1.

In order to validate the diagnoses made by the nurses and surveyors, the physician in charge of field activities revisited 10% of the homes and recorded the diagnosis for subsequent comparison with the surveyors record of the visit.

In addition, two basic field records were developed: Form 25 for house visits, and Form 24 for recording the morbidity observed at the health post. These forms had the following features:

1. Both were designed to facilitate transfer of the information to IBM cards and into computerized data files.

2. Simplicity for field use.

3. Complete identification of ill subjects in the same manner as on census Form 01 assuring easy cross-identification control.

4. The design permits registering of more than one disease in a given individual (for example upper respiratory infection and diarrhea).

5. Form 24 can be used to record as many as 6 different visits to the Health Post.

House Visits and Health Post Activities

House visits were performed by auxiliary nurses or specially trained surveyors, once per month, at all houses in the study communities.

Fifteen to seventeen house visits per day (5 days a week) were required to provide total surveillance of each community in one month. The morbidity survey was done at the same time that the census was recorded. In this way, identification of each individual was easier and the chances of error minimized. All forms were filled out in the field. They were checked by a field reviewer before being sent to the central offices where they underwent a second review. Finally, the data was punched onto computer cards and stored in computerized data banks.

The health posts were staffed by auxiliary nurses and open 6 days a week from 8 a.m. to 5 p.m.. Besides the general activities related to an outpatient clinic, immunization and minor surgical services were provided. Prenatal and maternal-child health control were also routinely done. Every other day, a physician would visit the health post to supervise the work done by the auxiliary nurse and to provide patient consultations. The physician could also be called in case of emergencies or serious medical cases. Most of the latter received first aid at the clinic and then were transfered to Escuintla's rural hospital.

Health post activities, either in the provision of health services or administratively, were defined according to instructions and manuals prepared by INCAP and/or the Ministry of Public Health of Guatemala*. INCAP's therapeutic guide was slightly modified to minimize the use of antibiotics and other drugs that could affect the evolution of diarrheal disorders, since one of the basic objectives of this project was to evaluate the effect of water supply and sanitary education on diarrhea.

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*Guatemala, Ministerio de Salud Publica y Asistencia Social, Manual de Operaciones para Puestos y Centros Rurales de Salud de la Republica de Guatemala.

Parasitological Surveys

The parasitological surveys were scheduled for the early and final stages of the field studies. The objective was first to evaluate the incidence of intestinal parasitism among the study populations and secondly to document how parasitism was affected by the sanitation interventions. Unfortunately only two surveys (1972 and 1973) were done. In each survey, a stool specimen was obtained from 55% to 60% of the inhabitants of each community (500 to 600 samples per community). Special containers were distributed to these subjects during house visits and they were asked to bring the fecal stool sample to the health post. Upon receiving the sample at the health post, it was properly identified and processed. Processing consisted of placing aliquots into vials containing PVA and ether-formalin. The rest of the stools were discarded.

The vials, properly identified, were sent to INCAP's headquarters where the presence of parasites was investigated by: (1) direct stool exams, (2) Trichromic colorations, and (3) helminth egg counts (Stoll's Concentration Method). The results were recorded on Form 11, reviewed, punched, and stored in computerized data banks.

Shigella-Salmonella Prevalence

It has been shown that the prevalence of Shigella-Salmonella among rural Guatemalan populations is a good indicator of the degree of fecal environmental contamination.*

In this project, the prevalence of Shigella-Salmonella was monitored by obtaining rectal swab specimens every month from a randomly chosen cohort of 20 children (1 to 4 years) in each community. Every 6 months (January and July), an additional group of 30 children, picked at random

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*Mata L. J., The Children of Santa Maria Cauque; A prospective field Study of Health and Growth: The M.I.T. University Press, (1976).

from each community, was also studied. The results were recorded on Form 11.

VII. Sanitation

Household Sanitation

Two survey instruments, an annual and a monthly sanitation survey, were used to document the quality of the home environment in Florida Aceituno and Guanagazapa. Each house in the survey sample was visited by a field surveyor and the appropriate form was completed by observing the house and its environs.

1. Annual Sanitation Survey

A baseline survey of 50 houses in each village was completed in August 1972. This survey predated the installation of the water supply in Guanagazapa. These houses (25% of the approximately 200 homes in each village) were selected to represent the longitudinal study sample (i.e., one adult male from each of these families would be included in the metabolic ward studies).

The 1972 survey collected information regarding the number and arrangement of rooms; general sanitation; food protection; quality of water source and storage; latrine construction and use; and personal hygiene of the respondent (see Forms 04, 05, 06, 07, 08, 09 in Appendix VII). A rough sketch was made of each of the houses at the time of the survey.

The second annual sanitation survey was completed in January 1974 (16 months after the first survey). A modified instrument was used (see Form 40 in Appendix VII). This change was made to eliminate those variables which did not appear to be significant indicators of environmental quality. Significant characteristics were retained including the number and arrangement of rooms; some construction items; sleeping

arrangements; food protection; storage of water; and latrine construction and use. Sixty-eight houses in Florida Aceituno (36 from the 1972 annual survey) and sixty-eight houses in Guanagzapa (29 from the 1972 annual survey) were visited. The variability of the sample between 1972 and 1974 (36/50 = 72% in Florida and 29/50 = 58% in Guanagazapa) was due to a redefinition of the "longitudinal sample" which was based on households with metabolic ward subjects.

The annual sanitation survey instrument (Form 40) was significantly revised for the third (February 1975) and fourth (March 1976) surveys. This new form (Form 42) was patterned after the Belcher Level-of-Living Scale and included number of rooms; arrangement of cooking and sleeping areas; construction characteristics; sanitary facilities; and cooking, eating and cleaning equipment.

A summary of the annual sanitation surveys is given in Table VII.I:

Table VII.I

Summary of Annual Sanitation Surveys

Date of Annual Survey	Form Number	Number of Houses Guanagazapa	Florida Aceituno
August 1972	06, 07 08, 09	50	50
January 1974	40	68 (29)*	68 (36)*
February 1975	42	74 (29,62)**	80 (36,63)**
March 1976	42	67 (25,60)	68 (37,60)

*( ) Number from the original 50 houses.
**( ) Number from the original 50 houses and number from the 1974 sample.

2. Monthly Sanitation Survey.

This survey (see Form 32 in Appendix VII) was initiated in July 1973. Twenty-six sanitation and hygienic behavior variables were measured on each family in the longitudinal sample each month. After two months use, twelve of the 26 variables were deleted from Form 32 as being non-discriminating and poor measures of household quality. The revised survey form (Form 32-revised) was used throughout the remainder of the study.

A summary of the monthly sanitation surveys is given in Table VII.2:

Table VII.2

Summary of Monthly Sanitation Surveys

Time Interval	Form Number	Average Number of Houses/Month Guanagazapa	Florida Aceituno
July-Aug 73	Form 32 Original	70 (39)*	72 (49)
Sept 73-Feb 74	Form 32 Revised	68 (40)	59 (40)
Mar-May 74	Form 32 Revised	136 (28)	124 (34)
June 74-July 75	Form 32 Revised	66 (15)	62 (17)
Aug 75-May 76	Form 32 Revised	99 (20)	103 (17)

*Average number of houses in the longitudinal sample ( ).

The monthly sanitation surveys were done principally by two trained surveyors with occasional assistance from other members of the field staff. Each surveyor was assigned one of the villages and, except for short periods of a month or two, completed all the surveys in that village throughout the study. The annual sanitation surveys were done principally by UNC personnel.

Water Quality

Water quality was determined by bacteriological analysis (Standard Methods for total and fecal coliform concentrations and the coli-tester field method for total coliforms); chemical analysis (Standard Methods); and periodic surveys of wells, faucets, and home water containers.

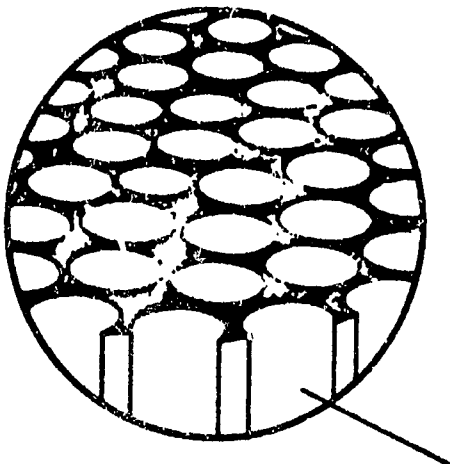
1. Bacteriological analysis

a. Field Test. The Coli-Count Water Tester (Millipore Corporation, Bedford, Massachusetts) was used to detect the presence or absence of total coliform bacteria in well water in Florida Aceituno, treated water from the mains in Guanagazapa, and home water containers in both villages. This device (Figure VII.1) is extremely useful in field testing of the bacteriological quality of water since it requires no preparation (the medium is contained in the unit); no particular knowledge of microbiology; a protective case is provided with each unit; and no staining or magnification is required. A 35° C incubator is necessary.

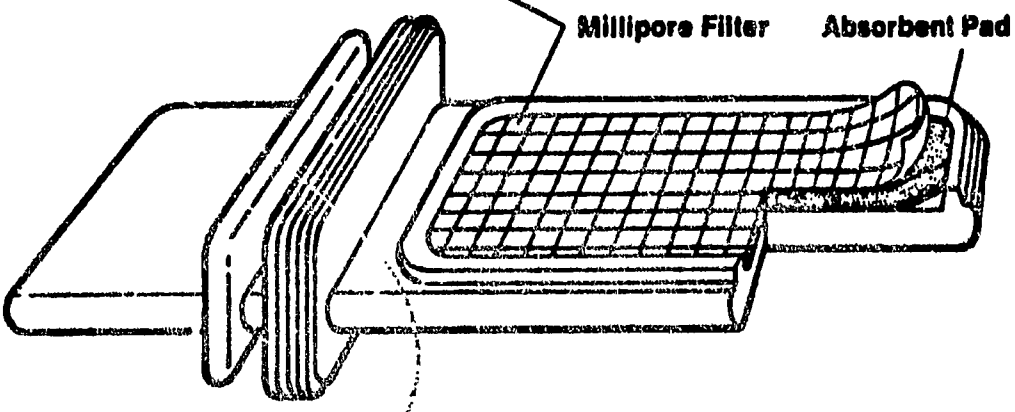
All sampling was done by a sanitarian assigned to the field staff. Testing was carried out in wide mouth bottles which had been previously sterilized by autoclaving. Water from a well bucket, home faucet or water container was poured into a sterile bottle and the Coli-Tester was then inserted into this sample. A separate sterile bottle was used for each sample.

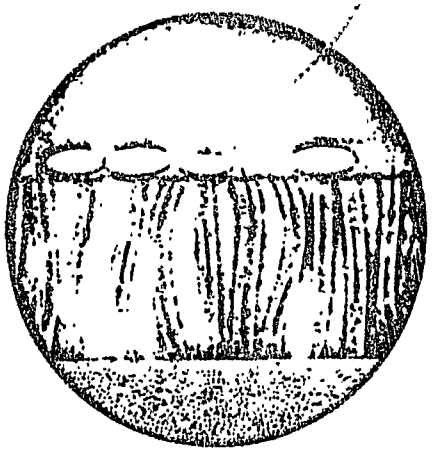
Figure VII.1

Coli-Count Water Tester

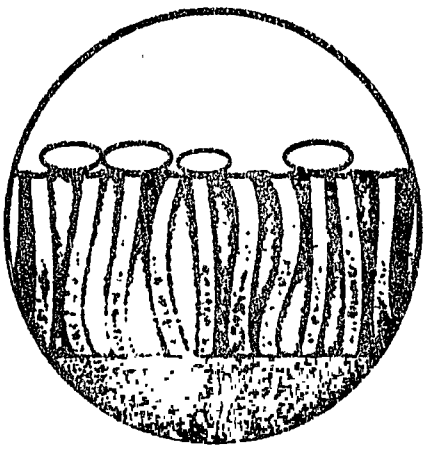


Millipore water testers consist basically of a plastic tab which supports a Millipore filter bonded to an absorbent pad. The pad contains dehydrated nutrient media. The Millipore filter is a thin plastic membrane with millions of uniform pores which are 0.45 μm in diameter. The filter surface is gridded to aid in counting bacteria colonies.





When a Millipore water tester is immersed in the sample, the absorbent pad rapidly draws 1 ml. of water through the Millipore filter and into the pad When water passes through the filter, all bacteria are retained on the filter surface because they are larger than the pores.



When water is drawn into the pad, it immediately hydrates the nutrient media which then diffuses up through the pores of the filter to the filter surface. Here it provides nutrient for the trapped bacteria so that they develop, during incubation, into visible colonies which can be readily examined and counted.

(Courtesy of the Millipore Corporation)

Water faucets were flamed using a propane torch and the water was allowed to flow for one minute before a sample was collected in the sterile bottle. The flaming procedure was discontinued in August 1974 in order to measure "use quality" rather than "source quality". When a faucet was sterilized by a flame, the water obtained was th same quality as that circulating in the system but the family used water which could have been contaminated by a dirty faucet even when the system was uncontaminated.

The Coli-Tester is not recommended for treated waters and potable ground waters if a statistically valid coliform count is desired. Statistically valid counts are attained only when the coliform count averages 10-15 per milliliter (Cotton, et. al., 1975, p. 449). However, this test is adequate for both treated waters (Guanagazapa) and potable ground waters (Florida Aceituno) if only "contaminated" and "uncontaminated" information is necessary.

Procedure for testing bacteriological quality of water in the field:

a. Autoclave wide-mouth bottles (minimum mouth diameter 4 cm and minimum water depth 6 cm).

b. Fill sterile bottle with water to be tested. Pour from container or bucket or directly from faucet.

c. Dip coli-tester paddle into bottle containing sample. Allow to remain for 30 seconds, remove coli-tester and shake to remove excess water.

d. Insert coli-tester into airtight incubation case. Incubate 18-24 hours at 35^{0} C.

e. Count the number of blue-blue green colonies.

f. The total absence of blue-blue green colonies is recorded as

as an uncontaminated water sample.

Field testing of water quality began in March 1973. The water source (well or faucet) and the water in one household container were concurrently tested in fifty homes in each village every four months (600 samples annually). These fifty homes in each village were chosen as representative of the longitudinal study sample. A water quality survey (see Form 26 in Appendix VII) was completed for each house at the time samples were tested. Form 26 covers: condition of the well; condition of the faucet; and condition of domestic water containers.

A summary of the field tests of bacteriological water quality is given in Table VII.3.

Table VII.3

Summary of Field Water Quality Tests

	Average Number Samples/Month			
	Florida Aceituno		Guanagazapa	
Time Interval	Well	Water Containers	Faucet	Water Containers
Mar 73-Mar 74	9 (7)*	16 (12)*	12 (11)*	30 (22)*
Apr 74-Dec 74	6 (6)	10 (10)	8 (8)	5 (5)
Jan 75-May 76	24 (23)	42 (41)	34 (34)	24 (24)
Total Samples (Mar 73-May 76)	465	816	641	629

*Average number of houses in the longitudinal sample ( ).

The longitudinal sample (adult males in metabolic ward studies) was redefined in 1974. This resulted in a change in the houses at which water was tested. After the installation of the water system in September 1973, many families on the water system stopped using household containers for water and this resulted in a reduced number of containers available for testing.

b. Laboratory test. Water samples from wells in Florida Aceituno, treated water from mains in Guanazapa and home water containers in both villages were collected in sterile bottles and transported to the laboratory of the Instituto Centroamericano de Investigacion y Technologia Industrial (ICAITI). ICAITI reported the most probable number of total coliform and fecal coliform bacteria. These results provided an external control for the coli-tester results obtained in the field. All samples collected for ICAITI analysis were also tested with the coli-tester.

Procedure for the independent testing of bacteriological water quality:

a. Autoclave wide mouth bottles (minimum 500 ml capacity). Add a few crystals of sodium thiosulfate to each bottle before autoclaving (neutralizes residual chlorine present in the sample).

b. Fill sterile bottle with water to be tested. Pour water from container or bucket or directly from the faucet.

c. Store sample bottles in ice during transport to the laboratory.

d. Deliver samples to the laboratory on the same day they are collected.

A summary of laboratory tests of bacteriological water quality is given in Table VII.4.

Table VII.4

Summary of Laboratory Water Quality Tests

	Total Samples Collected			
	Florida Aceituno		Guanagazapa	
Time Interval	Well	Water Containers	Faucet	Water Containers
Apr 74-Dec 74	6 (5)*	5 (4)*	4 (3)*	3 (2)*
Jan 75-Dec 75	11 (11)	9 (9)	11 (10)	8 (7)
Jan 76	1 (1)	0	1 (1)	0

*Houses included in the longitudinal sample ( ).

2. Chemical Analysis

One thousand milliliter water samples were collected periodically from wells, the treated water system and home water containers for chemical analysis. Two independent laboratories, San Carlos University and Instituto Centroamericano de Investigacion y Technologia Industrial (ICAITI), were used for these analyses. A sanitarian attached to the field staff collected all samples and delivered them to the laboratories.

Procedure for collecting water samples for chemical analysis:

a. Use clean glass containers with a minimum capacity of 1000 milliliters.

b. Rinse the container with the water to be sampled. Discard the rinse water and briefly allow the container to drain.

c. Fill the bottle with water to be tested. Pour water from household container or bucket or directly from the faucet.

d. It is not necessary to ice the samples or to deliver to the

laboratory on the same day on which they are collected.

Each sample was analyzed for color, turbidity, total hardness, total alkalinity, total solids, chlorides, nitrates, sulfates, copper, iron, manganese and lead. The methods used conformed to Standard Methods for the Analysis of Water and Wastewater, American Public Health Association, 12th edition.

A summary of water samples collected for chemical analysis is given in Table VII.5.

Table VII.5

Summary of Chemical Water Tests

	Total Samples Collected			
	Florida Aceituno		Guanagazapa	
Time Interval	Well	Water Containers	Faucet	Water Containers
Aug 73-Dec 73	3	0	2	1
Jan 74-Dec 74	7	1	6	2
Jan 75-Dec 75	4	0	4	0

Water Consumption

Water uses and consumption were measured in both villages beginning in November 1973. The treated water system in Guanagazapa was completed in September 1973 and chlorination commenced in January 1974.

The monthly survey of water use and consumption was recorded on a survey form (see Form 37 in Appendix VII). This form contains information on the water source, water uses, recall of water consumption in Florida Aceituno, water meter readings in Guanagazapa, number of

individuals living in each house and a calculation of water consumption in liters per person per day.

The procedures used to determine family consumption of water each day can be summarized:

a. Houses without a metered water supply

(1) Using a metric ruler, measure the dimensions of all containers used for storing or carrying water. Draw a rough sketch of each container.

(2) Ask the household informant how many times each container was filled in the past 24 hours.

(3) Compute the capacity of each container using the measured dimensions.

(4) Compute the total water use of the family for the past 24 hours using the container capacities and the number of times each container was filled.

(5) Compute the amount of water consumed per person per day using the total volume of water used and the number of individuals living in the house. The average volume of water used per person per day is estimated only once during the month, thus it is assumed that this average is consistent throughout the month or until the next estimate is made.

b. Houses with a metered water supply

(1) Read the water meter once each month. Subtract the previous reading from the current reading to determine the total volume of water used by the family between meter readings.

(2) Divide the total volume of water used by the number of days between readings to determine the average daily volume of water used by the family.

(3) Compute the average amount of water consumed per person per day using the total volume used by the family per day divided by the number of individuals living in the house.

(4) Since the exact amount of water used by the family is known, water use for a single day does not have to be extrapolated from a daily to a monthly basis.

A sanitarian assigned to the field staff completed the monthly survey of domestic water uses and consumption. All computations were made by an engineering consultant in the project office.

Density of Fly Population

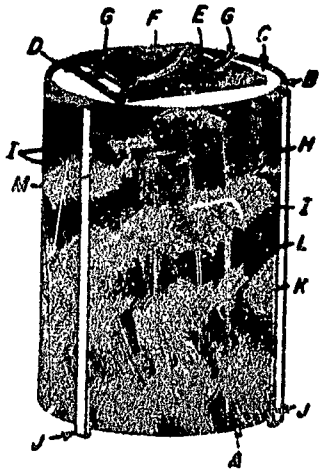
Fly counts are a crude, but sensitive, index of the general environmental sanitation of a community. Various species of flies are attracted to and breed in different materials such as human feces, animal feces, organic litter, liquid wastes and human habitats. If all species are included in the index, this indicator usually reflects the sanitary practices and habits of the community.

Six wire-mesh fly traps (Figure VII.2) were installed in each village. Each village was divided into six equal sectors and one trap was placed in the center of each sector. These traps were of standard design and constructed so that flies could enter the trap but were unable to find their way out.

Once each week the sanitarian visited each trap, removed and counted the collected flies. Results were recorded on an Insect Survey Form (see Form 21 in Appendix VII). Fly counts were started in April 1973. During the first year (April 73 - May 74) no attempt was made to speciate the flies collected and no precipitation data was collected During this period information was collected on the maintenance and

Figure VII.2

Fly Trap Design



Conical flytrap, side view. *A*, hoops forming frame at bottom; *B*, hoops forming frame at top; *C*, top of trap made of barrel head; *D*, strips around door; *E*, door frame; *F*, screen on door; *G*, buttons holding door; *H*, screen on outside of trap; *I*, strips on side of trap between hoops; *J*, tips of these strips projecting to form legs; *K*, cone; *L*, united edges of screen forming cone; *M*, aperture of apex of cone. (*After Bishopp, courtesy of U.S. Department of Agriculture.*)

functioning of the trap, adequacy of bait, location of the trap, and the total number of flies collected.

In June 1974, Form 21 was revised to add information on the Cleanliness of the area around the trap, the number of Musca domestica species collected, and the precipitation during the previous week. A rain gauge was installed in each village to measure precipitation.

The procedures used can be summarized as follows:

a. Counting trapped flies

(1) Place a piece of paper on the ground.

(2) Turn trap upside-down.

(3) Open the top of trap and shake flies onto the piece of paper.

(4) Count the number of flies collected and record data.

b. Maintenance of the fly trap

(1) Place fresh bait (dried fish) in the bait container.

(2) Center the bait container under the trap.

(3) Firmly close and latch the top of the trap.

Fly counts were discontinued in November 1974 due to the following operating problems:

a. Other insects such as ants were eating the collected flies, making accurate counts impossible.

b. Large animals such as dogs were eating the fly bait and turning over the traps.

c. The wooden traps were deteriorating in the rainy season.

d. Home occupants objected to the odor from the fish bait.

Rainfall

Many investigators have suggested that diarrheal diseases in the

tropics vary with the dry and rainy seasons. In order to examine this hypothesis, precipitation data was reviewed beginning in January 1972. Even though manually operated rain guages were installed in both Florida Aceituno and Guanagazapa, these measurements were not considered to be highly reliable. Instead, precipitation data was extrapolated from five official government meterological stations.

Florida Aceituno: Precipitation measurements from Sabana Grande (north of Florida) and St. Maria Fegua (south of Florida) were averaged to estimate average monthly rainfall.

Guanagazapa: precipitation measurements from Escuintla Fegua (northwest), La Morena (southeast), and Guazacoran (south-southeast) were averaged to estimate average monthly rainfall.

The meterological stations selected as surrogates were located at approximately the same elevation as each of the study villages.

Household Crowding

Monthly crowding indices (persons/bedroom, persons/room) for each house in both villages were computed from the number of rooms (or bedrooms) and the census (see Form 01 in Appendix IV). Information on the number of rooms in each house was collected during each annual survey and were recorded on Forms 06 (1972), 40 (1974), and 42 (1975-76) (see Appendix VII).

Starting in August 1975, a quarterly survey was made on each home in both villages to determine the number of living and bedrooms in each structure (see Form 48 in Appendix VII). This information was also available for computing crowding indices.

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VIII. Health Education

Health education was accomplished through an intervention program designed to elicit behavior changes in water and food hygiene practices. The purpose was to increase the effect of the introduction of the potable water supply system and promote utilization of that system. This chapter documents the principal methods used in the organization of this program as well as the survey instruments used in the evaluation of the program.

Program and Process Goals

The sanitary education component was directed to the residents of Guanagazapa. This is the village which had received a water supply system. The following behavior changes were anticipated as a result of the program and identified as the major goals of the health education component of the project:

1. Hands are washed with soap after returning from work in the fields, defecating, urinating or changing a child's diaper, and before handling, preparing or eating food
2. Raw foods are washed before eating
3. Cooked food and water are stored in washed, covered containers
4. The water tap and the surrounding area are routinely kept cleaned
5. Water consumotion is increased as a result of using more water for dishwashing, food washing, kitchen and household cleanliness, handwashing, bathing and personal hygiene
6. Doors or barriers are installed that keep animals out of the kitchen
7. Each family who does not have access to a latrine builds one
8. All families use a latrine, keep it clean, and in usable condition.

In order to assess the attitudes, behaviors and beliefs of the communities before the village education program began, Forms 04 and 05, (the Annual Sanitation Surveys) were carried out in August 1972 on a sample of 50 families in each village. These surveys provided information about attitudes toward causes, cures and control of diarrhea, contagious diseases, and illness; attitudes towards defecation practices, latrinization, and fly control; and attitudes and practices related to food hygiene (See Appendix VIII).

Methods through which the behavioral changes could be introduced into the village culture were developed. The intermediate process and program goals were developed:

1. Intermediate Program Goals
   a. To develop new educational opportunities for community residents
   b. To bring to Guanagazapa resources available from agencies, individuals, and institutions supportive of change efforts
   c. To develop new roles in the community for teachers, midwives, informal leaders, and interested persons
2. Intermediate Process Goals
   a. To create an environment within the community which would support change and facilitate personal growth
   b. To develop skills in community organization, group process and collaborative program action within the community
   c. To use program planning and development as a means for socialization and learning by community participants.

Previous experience with adult education programs indicates that the introduction of change should be accompanied by a high degree of

participation on the part of the target population. The program and process goals reflect this orientation. Key persons within the community who have significant influence on others through informal channels were considered as primary pathways through which the health education program could be extended to the entire community. These informal leaders were identified using both a panel of judges and socio-metric methods.

In the panel of judges method, project personnel who had worked in the community and who knew the social structure well were asked to identify persons who had considerable influence on villagers and from whom villagers sought advice. This was done for male leaders in 1974 and a group of men were selected for initial involvement in the group which later became known as the Community Betterment Committee.

In the socio-metric method, women heads-of-household were visited in Guanagazapa and asked to name people from the community to whom they went for advice on child-care, health, cooking and homemaking and who were considered knowledgeable. From these results two groups of women were identified: (1) mid-wives who were later invited to participate in a midwifery education program, and (2) other women opinion leaders who were encouraged to meet on a weekly basis in a group which later became known as the Homemakers Club.

These simple methods of leadership identification were carried out in April of 1974 (males) and in February of 1975 (females) and program planning was begun.

Since the village offered few opportunities for community involvement, vehicles promoting institutional change took the form of organizing groups, committees, and clubs. These groups provided the vehicle for bringing together opinion leaders with project personnel to shape the

educational program in a way which would be accepted.

Survey Methodology

Participation in these community programs was expected to directly affect the health awareness and beliefs of participants as well as diffuse new ideas throughout the community. A survey (see Form 39, Appendix VIII) was developed to monitor health attitudes and behaviors related to the program's primary goals. This survey was done on 134 families in Guanagazapa and 136 families in Florida Aceituno in 1974. A surveyor interviewed the female head of household in families in the longitudinal sample and asked questions related to the use and cleanliness of utensils, frequency of bathing and handwashing, principal causes of diarrhea, defecation habits and the control of domestic animals. Form 39 was later revised and was standardized in February 1975 as Form 41, (Evaluation of Sanitary Education, see Appendix VIII). The revised questions were mainly concerned with handwashing and hygiene, water potability, attitudes toward latrinization, domestic animals, fly control, disease causation and susceptibility to disease.

In early 1975 based on the complete list of families in the longitudinal sample, 76 families in Florida Aceituno and 80 families in Guanagazapa were identified as those who would be monitored over time with Form 41. The female head of household of these families was interviewed three times per year. Additionally, 20 families, composing a random sample apart from the longitudinal sample families, were interviewed in Guanagazapa every month from June through November of 1975 and from March through July of 1976. This latter sample was selected to monitor diffusion of program ideas throughout the community using Form 41.

A community extension program, which is described later, was completed

in late 1975. In December of 1975, 30 families who participated in this program were selected at random and interviewed to monitor their changes in health attitudes with varying degrees of exposure to the extension program. Table VIII.1 below is a summary of the number of interviews carried out.

Table VIII.1

Summary of Interview Dates and Forms Used for Health Education Program

		Florida Aceituno		Guanagazapa	
Form	Year	Sample	No. of Interviews	Sample	No. of Interviews
04,05	1972	purposive	50	purposive	50
39	1974	longitudinal	134	longitudinal	136
41	1975	longitudinal	208	longitudinal	204
				random sample	131
				extension program	30
41	1975	longitudinal	180	longitudinal	168
				random sample	128

Community Organization

The organization of groups was in keeping with the cultural norms of the community. Male and female groups were formed around the particular needs

and interests associated with sex roles within the community. The principal organizations which served as vehicles for learning and determined the method and content of the community education program were:

1. Male Leadership Development
   a. Community Betterment Committee
   b. Food Distribution Project
   c. Cooperative
   d. Latrine Program
2. Community Extension Program
3. Institutional Support for Women
   a. The Homemakers Club
   b. Midwifery Training
4. Recording Village Involvement with the Program
5. The School Health Program

1. Male Leadership Development

a. Community Betterment Committee. Field educators began to organize those leaders identified by the panel of judges in 1974. A small group of interested men who met on a monthly basis, with assistance from project personnel, petitioned the Guatemalan Government to recognize their group as the Community Betterment Committee for Guanagazapa (comite pro-mejoriamiento de Guanagazapa). The petition was granted in August of 1974 for the group to solicit funds and initiate community development projects. The early development and maintenance of this group required considerable support from project staff. The process goals stressed self-government as a means of developing group and organizational skills needed to foster wide-spread change within the village. Therefore, this support for the group was in keeping with the goals of the health education

program. The group was encouraged to discuss all community problems and to look for methods for solving them. The development of institutions within the community to facilitate change was seen as essential to meeting program objectives.

The Betterment Committee took on the following projects during the two and one half years in which the project personnel were present:

(1) Development of fund raising activities for future construction to improve the health post

(2) Development and operation of a food distribution center cooperatively managed

(3) Development of latrinization program guidelines

(4) Development of community health promotor extension projects

(5) Development of a savings and loan cooperative.

The Betterment Committee promoted raffles, dances, lotteries, special activities and donations to build their treasury. This money was earmarked to expand the facilities of the health post in Guanagazapa within the next several years. The committee's first long-term priority was given to this project since they felt that health services were inadequate before the INCAP involvement and they knew that services would probably decrease after the INCAP project terminated. The fund-raising activities during the project period not only produced more than $1000 dollars, but also served to increase community involvement in the program and increased the credibility of the group.

b. Food Distribution Project. In mid-1975, due to a poor harvest, families in Guanagazapa faced having to purchase food previously produced at home. Because most were subsistence farmers with small cash reserves, Guanagazapans faced serious food shortages. The Betterment

Committee undertook a special project to meet this crisis. They solicited the right to set up a government food distribution center in which subsidized food was sold at lower than market price. The program was the only cooperatively run distribution center in Guatemala and sold 115,000 pounds of corn; 27,000 pounds of beans; and 6,000 pounds of rice, handling over $10,000 in cash from June through October of 1975. The project served to strengthen the ability of the Committee members to organize projects that were in fact helpful to the community. The goals of the sanitary education program were to introduce and to maintain change through community institutional support. The distribution program helped move the group toward the health education program goals because it increased contact between male leaders and villagers, increased credibility in the villagers opinion about the worthwhileness of the projects that the committee would support, developed group organization and group process skills within the committee, and developed rapport between leaders and village women who used the center. Female participation in the leader extension program which followed some months later and which focused exclusively on sanitary education is in part attributable to this experience.

c. Cooperative. The food crisis during this time highlighted the increasing difficulty of obtaining rentable land on which the villagers grew their food. The land problem was in fact critical. Villagers became aware that each year land was harder to find because land was being turned into pasture at a rate that could force them from their village within a few years. The Committee was sent to the Minister of Agriculture to seek his advice. At the same time, interest in cooperatives and the benefits they offer arose as an increasingly frequent subject at the male leaders' Betterment Committee meetings. Talks on cooperatives

held during 1975 attracted much attention and were highly attended.

As a result of this interest and information from the Minister of Agriculture, the group decided that the only solution to the land problem was through the cooperative purchase of a plantation which could be divided into small parcels of land of a size the villager needed and could afford. During late 1975 and early 1976 an existing Pacific Coast savings and loan cooperative was contacted and invited to help with the community organization needed to launch the venture in Guanagazapa.

Late in March of 1976, the directors for the Guanagazapa branch of the Cooperativa Esquintlan were chosen. By the fall of 1976, a cooperative store had opened providing members with reduced prices on machetes, hoes and other farm and household needs. The formation of the cooperative was an additional method of increasing community involvement in development programs, developing and strengthening leadership in the community and creating an atmosphere within the community which facilitated personal growth and change. While these conditions are widely recognized as necessary to insure the success of community health intervention programs, there are few illustrations of how existing community needs and interests have been used to develop this readiness.

d. Latrine Program. Latrine installation and use was an integral part of each of the programs described in this section. Procedures for latrinization were established which are important in a methodological guideline since these served as the basis for organization and program acceptance.

The patios and area immediately around the homes in Guanagazapa were contaminated with large quantities of animal and human excrement present. While adults sought some cover in the bushes during the day, children

indiscriminately defecated on the patio connecting the various parts of the house or in the yard. After nightfall, adults also tended to use the patio. The need for latrines was obvious to an observer, yet latrinization had not been accepted by the majority of villagers. A number of latrines were already present during the 1972 housing survey in homes located near the center of town; 37% of the households (66) reported having a latrine, but interviewers did not verify this report by visual inspection. The use made of these latrines was not determined. Existing latrines were often very dirty or in a state of disrepair. In some, feces and soiled paper were scattered around the latrine indicating that the latrine itself was not being used.

In April of 1975, the Latrine Program was planned to increase use of existing latrines and to introduce latrines to families without one. These ideas were presented to the male leaders group for their consideration and for their suggestions on implementation. The installation of a latrine represents a special effort on a family's part. The cost of construction varied between $1.00 and $20.00, depending on the materials and labor source used. In order to reduce cash outlay, the male head of household generally spent between 5 and 15 days. after working in the field, digging the hole and building the out-house.

Several sessions were spent with the members of the Community Betterment Committee discussing the advantages, use, and construction of a latrine. The men were supportive of the program. However, they recalled a government latrine program directed at the community some 6-8 years previously which, in their opinion, was unsuccessful. Latrine materials had been given away, but relatively few were installed. There was little community control and participation in the planning of that

program. The men offered advice on how the new program should be implemented. As a result of the sessions, the following steps were followed:

(1) A series of visits were made by the sanitary inspector to any family wanting a latrine to help select the site, supervise and assist with construction, and confer on special problems

(2) The family had the right to buy the cement platform and seat for $1.00 only after the hole and curbstone had been completed and approved by the sanitary inspector

(3) Families who installed latrines were instructed to provide a special shelf outside the latrine where a wash-basin, soap, soap holder and towel could be kept

(4) During the final visit, the sanitary inspector or the sanitary education field worker discussed the use and maintenance of the latrine, as well as the importance of handwashing. Families with facilities were given a sanitary package consisting of a wash-basin, soap, soap holder and towel. Subsequent visits indicated that the sanitary package materials were appreciated by the family as a special reminder of the need for handwashing after using the latrine.

Individual family problems varied, but some general difficulties that acted as barriers to the installation of a latrine could be identified.

During the rainy season certain common low-cost building materials such as palm were unavailable. The excavations sometimes filled with water and the ground was so wet that men were reluctant to work inside the six to nine feet deep excavation for fear that it would collapse. Digging a latrine during the dry season was even more difficult since the soil became rock hard after months of no rain. Generally, it was observed that a campaign for latrinization was more successful during

the rainy season when soil conditions permitted easy excavation.

The terrain of the area presented special problems. There is a rock ledge running through the town of Guanagazapa which made excavation practically impossible for some houses. Where people lived in hard to reach areas of the village, the transportation of the cement platform and seat posed a problem. The help of neighbors was required since two or three men were needed for transporting materials. Land was scarce, and in a few cases crops were cultivated around the home. Under these conditions, people were reluctant to destroy food-stuffs before harvest to put in a latrine. In such cases, latrine installation was delayed by several months. During busy farming periods such as during the planting season, when fields were hand hoed and corn was cut for drying and during harvesting, there was little time for home improvement activities. In addition, during these same periods, some 1 to 3 months at the beginning of the dry season, men often left their homes and fields to work on outside plantations to earn extra money. This employment resulted in a shortage of male labor needed to dig the latrine.

Attitudes toward the responsibilities of owners and tenants also acted as a barrier. People who did not own a home were reluctant to buy and build a latrine and to invest the money for nails and materials for the latrine. They argued that it was impossible to take a latrine with them when they moved. Generally, it was seen as the owner's responsibility to make improvements, but because absentee ownership was common, there was no one to approach. In all cases, the owner's permission was needed.

The most common building materials used were wood or bamboo for the walls, and tin for the roof. Dry palm which, unlike tin, could be cut free of charge, was an excellent roof material. It was not feasible to

cut it, however, until the dry season when the palm was naturally dry and would resist water as well as bugs. A number of families indicated they would not build until the palm was ready to be cut, but the majority used alternative materials since they preferred to build at the end of the rainy season.

In the case of renters, most did not use cement to make their curbstone, nor did they anchor their latrine platform with anything more permanent than mud. Mud was commonly used for economic reasons and provided a secure base. Most latrines were built slowly at first. Of those completed before October of 1975, the average time between receipt of a first request and completion was 2.5 months. However, after the Community Extension Program, this time was greatly reduced.

With the community group's help, the Latrine Program was introduced throughout the community. Participants in the community groups then talked with spouses, friends and neighbors about why they felt latrines were useful and how to go about getting one. The Community Extension Program set the stage for the technical help to follow, and often provided technical help as well. Male promoters had generally built latrines themselves and during the program many villagers visited their homes to inspect the construction. As a result, by the end of September of 1976, about 80 latrines were installed in the village. The high acceptance was a result of person-to-person information and influence since no advertising or mass campaign had been organized. Of these requests, a number came from families who already had latrines but wanted to repair them or put them back in usable condition.

Follow-up visits made to the families showed that the latrines were cared for, clean and used. A good deal of emphasis was placed on maintenance

as it was felt that dirty latrines discouraged use. The lady of the house was usually responsible for cleaning the latrine and for teaching the children how to use it. Usually, the sanitary inspector or the sanitary education field worker made a special effort to include her in the educational process from the time the request was first received from her spouse.

Usage, which has been a problem in other communities, was not a problem in Guanagazapa. A person did not easily make the decision to put in a latrine because he had to expend considerable family resources and personal labor to do so. Commitment had to be demonstrated before the latrine was sold. One dollar, an amount that represents something just short of a full day's wage, was charged. In addition, families bore the full cost of the expense of the outhouse and its construction.

Form 49, Control of Latrines (see Appendix VIII) was developed to insure that information was documented and that families were followed from the time they first expressed an interest through completion. This form records: (1) the date of first request, latrine installation, outhouse completion, and educational visits during which the sanitary package was distributed, (2) information about the construction materials used, depth of the pit, and cost, and (3) information on the number of persons and families who are using the latrine. Form 49 was filled in for each household in Guanagazapa that built a latrine during the time the Health Education Program was in progress in the community.

2. Community Extension Program

The Betterment committee, through their scheduled meetings and community activities, began examining and solving community porblems. Health matters were often brought to their attention and increasingly

they requested additional information on the health problems of the village. As a result of this growing interest, the men requested an intensive training program in June of 1975. They felt that an expanded view of health problems and recommendations for controlling these problems should be brought to the attention of all villagers. The group suggested a special two month training course with visual aids to bring this information to all families. The 27 men who completed the training course later became known as health promoters. This discussion was divided into three phases:

a. Background information and discussions about the reasons why health behavior changes were desirable

b. Methods of inviting community residents to participate in promoter-led adult education sessions and the organization and form those sessions would take

c. Practice in presentation of sessions through role playing and practical direct experience.

From July 22 through October 1, during the height of the rainy season, two meetings per week lasting approximately two and one half hours per session were spent in training. Participation was voluntary and without remuneration. The willingness of the group to attend late night meetings and to assume responsibility for helping their community become aware of health innovations was a product of the more general experiences this group had known. It required a tremendous level of motivation. The program planning allowed the committee members to become aware of and act on the needs and interests they already felt.

The organizational plan which the health promoters chose was the following:

a. Nine teams of three promoters would be responsible for organizing between five and ten families of their choice

b. The teams would meet with the families as a group once per week for a six week period

c. Each session would be devoted to a particular area of sanitary education which would be the same for all teams and include:

(1) How disease travels

(2) Proper handwashing with soap prevents diseases

(3) Water storage and handling is important now that the village has potable water

(4) Control food contamination by keeping animals out of the kitchen

(5) Why and how to build a latrine

(6) The importance of keeping a latrine clean

d. Each session would take the form of an informal talk and discussion with the participants as well as a practical demonstration including:

(1) Seeing microbes under a microscope in contaminated water

(2) Handwashing demonstration

(3) Use and maintenance of food and water storage containers

(4) How to build a barrier

(5) Visit to a latrine and how it is cleaned

e. Each session would be stimulated by appropriate visual aids

f. Every family who attended four out of six meetings would receive a sanitary package which included a (1) wash basin, (2) bar of soap, (3) soap holder, and (4) towel.

The health promoters, the majority of whom were illiterate, requested two specific forms of support from INCAP personnel. The first was

consultative in nature. An INCAP field educator met with each team during each week of their scheduled extension sessions to provide assistance and advice. The second request was for a series of visual aids which the men could use for two purposes: (1) to stimulate interest and (2) to provide a guide for the discussion sessions. In rural villages where most homes do not have electricity, and where villagers have little access to or experience with complicated teaching aids, simple technology is essential. The visual aids had to be portable, easily used by illiterate people, interesting, culturally acceptable, and relatively inexpensive to produce. Development of such materials presented an enormous challenge. Several visual aids were pre-tested with appropriate groups. It was decided that a family of characters who were culturally similar to the villagers but were in cartoon form would provide a framework in which suitable storyboards and illustrations could be developed for each theme. The family of Don Chema, his wife Dona Tina and their children, provided continuity between different themes in the series while allowing each theme to be developed.

It was decided that posters would provide the vehicle most appropriate for the small group situation in the rural village setting. Heavy poster paper, in a variety of background colors, provided additional interest without changing production costs. Had the series been produced in off set color, the cost would have been considerably greater, thus, limiting its use in other rural programs. Seventy-three posters were produced, approximately 12 for each theme. These were available during the practice phase of the promoter training period.

The extension program was first held in the community during October and November of 1975. More than eighty families from the community

participated in the series. Project personnel evaluated the usefulness of this methodology of adult education by:

a. Attending at least three talks given by health promoters to observe the content, quality and acceptance of the program

b. Tape recording at least three sessions from each of the team's presentations to play back at a later time with the health promoter. This served as a useful method for feedback in which the promoters could assess their strengths and make suggestions for future sessions.

c. Interviewing a random sample of 25 participating families in December after the first extension program was completed. Form 41 (previously described) was used as a method of appraising health beliefs and attitudes. In addition, families were asked about their reaction to the meetings, what they thought of the visual aids, and how they intended to use any materials which had been distributed.

Health promoters, INCAP personnel, and community residents were so positive about the results of the extension program, that early in 1976 the commitee discussed the possibility of repeating the project. Quite a number of families who had not participated, but whose friends and neighbors had talked to them about the program, requested that the program be repeated. Health promoters, using the same methodology, decided to offer the 6 week program again from late April through May of 1976. This program was essentially a repeat of the methodology already described and was equally well recieved.

3. Institutional Support For Women

Village women did not have many formal opportunities to socialize other than in church related activities, during shopping trips, and during fiesta activities. While women did not usually pay social calls

on family and neighbors, they did congregate at the water tank, fountains and river to fill water vessels and to wash clothing or bathe. With the introduction of the piped water supply into the home patio, these opportunities for social contact decreased even though the amount of housework for the women was considerably lessened giving them more free time. Many families bought or improvised washing sinks, and as a result, women washed clothes at home alone.

The formation of a women's group, if it were not opposed by husbands, was seen as an appropriate institution. It could promote change since it would provide the women with a focused group activity and new opportunities for social interaction. Generally, women were expected by their husbands to be caring for the home unless the woman was out on an errand such as shopping or gathering wood. The approval and support of the male Community Betterment Committee was obtained before the program began, and as a result, most village men saw the women's group as beneficial and worthwhile.

The meetings began in March of 1975 and, while a special attempt was made to invite female leaders, all who cared to participate were welcomed. Sessions focused on topics of interest to rural housewives and discussions or practice of the hygienic behaviors that the program wished to introduce. Typical sessions during the year included: how to wash dishes, make trash bins and dust pans, make soap, jelly and preserves; the human body and how the digestive and circulatory systems work; proper care of the water tap and storage vessels and maintenance of the latrine.

Because communication networks had changed, project personnel wondered if information was being spread to the rest of the village women as quickly as it might. This concern was discussed with the women's group and it was decided that women would make social visits to friends and explain

some of the new ideas they had heard about. The women carried a pamphlet on latrine hygiene, or water storage and hygiene, or on kitchen hygiene through animal control, to friends. Although most were illiterate, the pamphlets told a story in pictures about the family of Don Chema and the women, having heard and seen the story at the meetings on slides or posters, found them easy to re-tell.

a. The Homemaker's Club. Late in 1975, field personnel and active group members reviewed programming and discussed new ideas for the coming year. It was decided that if participation in program activities could be increased, greater levels of awareness and interest in the innovations could be expected. Informal networks of communication would be used more since the group activities provided opportunity for informal interaction.

The women suggested that the core of women who regularly participated form a homemakers club. Thus, late in 1975, the group became formalized as the "Homemaker's Club: The Pearls of the South". An executive committee was elected and was responsible for working with INCAP on programming details. The women in the club selected topics about which they felt a series of courses should be offered which would be open to all community women. Each course would be 6-8 weeks in length and would meet once per week in the afternoon. The Homemaker's Club would officially sponsor the course, help plan the topics and design, talk to friends and family and do all of the publicity in the community. An enrollment fee of $0.25 per course was charged (club treasury) and women were asked to buy or bring any materials that might be required. The courses selected were: sewing, cooking, child-care, knitting and home improvement. Between sixty and eight-five women from the village subscribed to each course.

The executive committee and INCAP field educators worked closely to integrate the women's learning interests with sanitary education. In every course, the basic behavioral changes sought by the program were given attention. For example, in the sewing course a tablecloth and napkins were produced and embroidered making discussions of kitchen and food hygiene a natural complement. In knitting, baby clothing was produced giving rise to discussions about the care of children, basic cleanliness, and cleanliness of clothing. Cooking instruction stressed food and water hygiene and gave women practice in proper handwashing methods using soap and water.

The program design was similar to that used with the men's groups. It was assumed that the health innovations the program wished to introduce would be most readily accepted if they were consistent with the felt needs and interests of the women. The program included those interests, as well as inclusion of village women in all phases of the planning. The courses which integrated the educational program's goals with the women's own needs were not the result of a plan written in a remote office by project directors. Instead, it was the result of dialogue with village women. The high level of participation and the trust that village ladies felt in INCAP personnel and their advice was a product of the mutual involvement in program planning. The planning process itself became a prime vehicle for change.

b. Midwifery Training. Midwives in Guanagazapa, as in most rural areas, were important sources of information and were respected counselors not only regarding pregnancy but also on issues generally related to health and child care. In order to successfully introduce hygienic behavior into the community, it was important that these health leaders adopt,

approve and support such changes.

Although the project provided health post facilities, midwives were somewhat isolated from health post personnel at the start of the project. Using home visits and asking for consultations about pre-natal patients, the health post physician began to make midwives aware that they were accepted as part of the Western health care system. It was a health post priority that pre-natal health post visits were made. However, midwives always delivered the children except in those cases where it was obvious beforehand that the mother would require hospitalization. Throughout 1975, midwives were visited and consulted by the health post physician both to foster good relations and to assess their specific needs and interests. It was discovered that most of these women wanted to be recognized as card carrying government approved midwives. To do so, a special training course had to be attended, but it was only offered in the town of Escuintla every few years, so none had ever attended. Project personnel drew up plans for an expanded and revised midwifery training program which would stress midwifery skills, education of the patient and integration with other health services. This was approved and supported by the regional health center in Escuintla and by the Maternal and Child Health Division in Guatemala.

Since a major objective was to stress hygiene, an important principal used throughout the educational program was that change could only come about when appropriate facilities are available. Through these agencies a small carrying case for midwives which included some basic supplies was obtained. Throughout the course, each midwife was asked to bring from home one or two of the materials needed to each meeting. In this way, by the graduation day each case contained all of the equipment, packed

in a sanitary manner, that a midwife would use for delivery.

The objectives of the midwifery course were:

(1) Each midwife knows and collaborates with health post and hospital personnel to provide integrated pre and post-natal services

(2) Each midwife practices personal and environmental hygiene in her midwifery practices

(3) The role of midwife as health change agent in the community is strengthened

(4) Each midwife acquires knowledge about the reproductive system, the physiology of pregnancy, childbirth, and child development in order that she can:

(a) Recognize problems and complications during pregnancy and detect high risk pregnancies

(b) Apply pre-natal care

(c) Apply appropriate procedures while attending women in childbirth

(d) Apply appropriate care to the newborn child

(5) Each midwife recognizes the normal birth process and appropriate conduct for cases which deviate from normal or who present abnormal risk

(6) Each midwife distinguishes between normal and abnormal process during the post-natal period and follows appropriate procedures in each case.

(7) Each midwife recognizes abnormal indications in the newborn infant and the appropriate measures to follow.

The approximately fourteen midwives in Guanagazapa participated in the six week course from the 24th of May through the 9th of July of 1976. Classes met twice a week for three hours per session and included

a full day tour to the regional health center and hospital in Escuintla to which complicated cases are referred. Blood, urine, stool, and chest x-ray examinations were carried out on each midwife. A complete tour of hospital facilities, maternity wards, surgical and maternal delivery operating rooms, and other facilities was made. Procedures for incoming patients and emergency cases were discussed and midwifes were impressed with the role they played in the integration of health services.

The final course evaluation of each participant was conducted by individual oral exams under the complete control of the Area Health Director in Escuintla and the Maternal and Child Health Division of the Health Ministry. Every midwife attending the course passed the examination. All who had attended the required number of births were granted the midwife identification card signed by the Ministry of Health and by INCAP.

4. Recording Village Involvement with the Program

Participation in the various programs was recorded using Form 51, Summary of Participation in Health Education (see Appendix). Field educators and health promoters (in the case of the extension program) took attendance at all meetings. At the end of each month, these attendance records were used to document program participation. Thus for each individual, the time and kind of formal program contact was documented. This information was recorded from February 1975 through September 1976. Each record represents one individual's participation in each activity during the month and is summarized in Table VIII.2.

5. The School Health Program

Because children form a prime target for gastrointestinal disease and are a prime reservoir of infection, they were an important consideration

Table VIII.2

Summary of the Number Participating In the Health Education Programs

Type of Activity	Total N Forms	1975 N of Forms	1976 N of Forms
Community Betterment Committee	293	124	169
Training of Health Promoters	128	106	22
Participation in Extension Program	401	236	165
Health Promoters Teaching	96	54	42
Counseling Sessions with Promoters	42	0	42
Cooperative Sessions	123	165	42
Women's Group Meetings	239	239	0
Homemakers Courses			
sewing	99	0	99
cooking	129	0	129
childcare	129	0	129
knitting	69	0	68
Midwifery Training	42	0	42

in building a comprehensive community intervention program. Few previous attempts have been made to develop methods for integrating community and school health programs although the effectiveness of such a program might provide strong reinforcement.

a. Procedure. In the fall of 1974, initial contacts within the Ministry of Education were followed by discussions emphasizing the importance of rural primary educational institutions in the development of community change programs. An outline of the community intervention project and a proposal for the development of a rural school health curriculum was presented and the Ministry of Education was invited to endorse and support such a venture. With Ministry approval, the regional superintendents of schools for the Pacific coastal region were contacted, and the existing school curriculum was reviewed in detail. Integration of school and adult educational programs was of interest to superintendents as a vehicle for improving elementary education through new educational methods and as a vehicle for making health education more relevant to the needs and circumstances of the rural population.

In Guanagazapa, as in most rural villages, a single elementary school with grades one through six serves as the only educational opportunity for most of the people. Students generally complete third grade. Only a few finish the six year program. High illiteracy rates and low educational levels are the rule throughout the country and rural teachers are congnizant of the fact that their classrooms provide the only formal education the rural villager is likely to receive. Yet, given a short school day and poor teacher preparation, health teaching is often neglected.

The Ministry, local superintendents, and project personnel designed a three-day workshop for teachers as the method for introducing a special

school health program. The purpose of the workshop was to stimulate a new approach to health teaching in rural areas by giving teachers adequate scientific background, direct experience with new technology and an opportunity to participate in the planning of such an undertaking. In addition to teachers from Guanagazapa, approximately fifty other teachers working in similar Pacific coast communities were invited. The workshop which was attended by over 60 participants and superintendents was held in the tropical areas of Guatemala.

The school program development was a two year undetaking: the first school year would develop an integrated and expanded rural health curriculum; the second year would serve to refine the curriculum, classroom methods and materials and provide a demonstration of implementation methods. The following behavioral objectives for the elementary school child were developed for the first year's program:

(1) That each child knows how to use a toilet and uses only the school's facilities for urinating and defacating during school hours

(2) That each child uses toilet paper after defecating and disposes of it in an hygenic manner

(3) That each time he uses the toilet the child washes his hands using liquid soap, dries his hands on a clean towel and disposes of the towel in the trash bin

(4) That each child practices cleaning the bathroom sanitary facilities and disposing of bathroom trash

(5) That each child identifies a latrine and its proper function and lists the following home behaviors as a part of its proper use:

(a) Washing hands with soap after using the latrine

(b) Cleaning the latrine

(c) Disposing of contaminated toilet paper or substitute in an appropriate manner

(6) That each child identifies or explains why he should wash his hands with soap before eating or handling food

(7) That each child differentiate potable and non-potable water and identify how potable water is subject to contamination according to its handling

(8) That each child can draw or list those fruits or vegetables that are eaten raw and need to be washed before eating

(9) That each child identifies the need to prevent the contamination of food through its correct storage in the kitchen, by keeping animals out of the kitchen and through kitchen cleanliness

(10) That each child defines microbes as the causative agent in some diseases and identifies principal pathways by which they enter the body

(11) That each child has a basic concept of the process of digestion and that each recognizes diarrhea as a malfunction of this process.

Because the school program was to be integrated with the community adult intervention program, the curriculum stressed basic hygiene, sanitary behavior, water and food hygiene. Teachers noted that it was not uncommon for children to defecate outside the lavatory or on the floor inside the lavatory.

School toilets and sinks were replaced or repaired, and four existing and newly installed liquid soap dispensers were filled with soap before the 1975 school year began. Wastebaskets for each lavatory and classroom were supplied as well as toilet paper, paper towels, cleansing powder and other cleaning aids needed to use or maintain the school facilities.

Throughout the program, teachers were directly responsible for

contributing to the development of and conducting at least two classes per week in health education. Teachers organized the schedule whereby each class was assigned one week out of every six to be responsible for the cleanliness of the bathroom. Children learned to clean the lavatories and to safely and properly dispose of the bathroom rubbish. One difficulty was stimulating the use of new teaching methods. Earlier health teaching had emphasized rote learning, i.e., teachers had lectured while children had copied the information into their notebooks. Modern teaching methods, stressing the involvement of the children in the learning process, and an opportunity for practicing hygenic behavior was emphasized in the experimental program. At first teachers tended to under use the newer methods, as they were unaccustomed to designing curriculum plans, materials, or methods to improve learning. With the help of project personnel they were able to make significant changes and add some suggestions for the new curriculum. As a result, teachers used a wider variety of learning experiences to stimulate change in their students. Activities included giving demonstrations on how to wash hands, take showers, visit the health post with the use of visual worksheets, movies and agar plate culture experiments. Lessons were planned on food handling and storage to prevent contamination, water quality in use, the relation between sanitation, hygiene and health at home as well as school common areas.

Three principal goals in the development of the school health program were set: (1) development of a rural health and hygiene curriculum which could be integrated into the school general curriculum, Ministry requirements, and a community adult education program, (2) development of teaching methods and materials that were applicable in rural village schools where

resources are limited, and (3) development of methods that could be used by rural teachers to evaluate their teaching and student learning.

b. Evaluation. The development of a specific methodology for the school program was seen as the joint venture of INCAP field educators, project consultants and rural staff. Each teacher was visited at least once per week for the purpose of reviewing lesson plans related to health and hygiene and for discussing suggestions for their improvement. During the first year, lessons were jointly developed by the project staff and teachers. Materials, including films, slides, posters, worksheets, visual aids and demonstration materials, were jointly selected and previewed. Detailed records of health classes including lesson objectives, content, method, materials, evaluation and student reaction were kept by each teacher.

Each classroom was visited once every three weeks for the purpose of observing a health or hygiene classroom presentation and independently evaluating the content and the educational methods in teaching health education. Each field staff visitor recorded his observations. General teacher meetings and/or meetings with the superintendent were held at 6 to 8 weeks intervals to discuss the program and problems.

At the close of the first year, based on the experiences and information described above, the entire health curriculum was reviewed. During the three month vacation period, a new health curriculum guide was developed correcting the weaknesses found in the initial program and developing additional teaching methodologies. The 1976 school year continued to refine the curriculum using the methods described and emphasizing continued support and close liaison between school and project personnel. The second year served to further refine and test the usefulness of an

integrated curriculum. A guide composed of specific teaching units and lesson plans with learning objectives, contents, methods, visual aids, activities for children and lesson evaluation methods was prepared. The guide provides each teacher with the specific information and materials needed to implement a health curriculum in other rural areas which complements an adult action program.

Two multiple choice examination type evaluations, one for grades 1-3 and the other for grades 4-6 (see Forms 56 and 57, Appendix VIII), each one hour in length, were designed, pretested and applied to provide additional measures of student and teacher progress toward meeting program objectives. These evaluations were carried out on the entire school population. After the start of the school program (July, 1975) and at the close of each school year (Fall, 1975; Fall, 1976) the evaluation was administered by classroom teachers using the usual test conventions with the help of INCAP personnel who were responsible for seeing that each group used only the stated one hour time period, evaluating the performance of each child and providing the teachers with the results of the children in their respective classrooms. Teachers used this information in the manner that they considered most appropriate. Most used the score as a component in figuring the child's health and hygiene grade for the year. Beliefs and self-reported behavior both at and outside school were requested in the evaluation. The following general areas were included: (1) hygiene behavior in school, (2) microbial theory of disease, (3) general science and its relation to health education, (4) the human body, (5) water potability, and water and food contamination, and (6) hygenic behavior at home.

IX. Anthropometry

Anthropometric measurements evaluate physical dimensions of the human body which are indirectly related to body composition (Brozek, 1970). These physical characteristics are influenced not only by genetic heritage and environmental factors, but also by the status of health and nutrition (Brozek, 1970; WHO, 1963).

During the last forty years, anthropometry has been a useful clinical method for the assessment of nutritional status of populations (WHO, 1963; ICNNO, 1963). Although there have been several attempts to standardize procedures and methodologies (WHO, 1963; ICNNO, 1963; Jeliffe, 1966), there are still some unresolved questions regarding the use of a particular anthropometric parameter. Currently a combination of parameters are used to evaluate nutritional status. This is particularly true in the case of children where important events, such as growth and maturation, must be taken into consideration when defining the set of anthropometric measurements that will be used (Habicht).

The anthropometric survey was carried out to obtain an overview of the nutritional status of the adult and infant populations living in these communities. The effectiveness of sanitation intervention in reducing morbidity should result in the long run in improvements in their anthropometric characteristics. Anthropometric surveys were done on 70% to 75% of the inhabitants of the study communities in 1972 and 1973 (base period). It was not possible to carry out the concluding survey that was planned for the final stage of the project.

All families were invited to participate in the survey, however, special emphasis was given to those families with small children.

Attendance was completely voluntary. Five basic anthropometric parameters were measured in the field: weight, height, arm circumference, tricipital skinfold, and head circumference. All measurements were done in duplicate or triplicate. With this basic information, three additional parameters were calculated: arm circumference corrected for tricipital skinfold (A.C.C.), weight for height index, and height for age index.

The anthropometric survey methodology included the following steps:

1. Standardization of Procedures (INCAP and ICNND, 1971). All measurements were taken by two physicians who were instructed in the techniques and standardization methods to minimize investigator differences. Auxiliary non-professionals were trained to record the measurements dictated by the investigator on Form A06.

2. Preparation of the Subjects. Upon arrival at the anthropometry examining room, children up to 5 years of age were prepared for measurement by removing their shoes and all clothes above the waist. Babies below one year of age kept only diapers but on cold days their undershirts or shirts were also left on. Male adults and children older than 5 years were prepared in the same way as children up to 5 years of age. The females were asked to remove shoes and all clothing except their dresses or skirts, blouses and underwear. This was necessary because of the resistance of the older girls and adult females to undress in the presence of the investigators.

3. Measurements of Body Weight. Infants (children who could not stand by themselves) were weighed on an infant scale ("SECA", Vogel, Germany). The weight of older children and adults was taken with "Detecto" scales (Detecto International, Brooklyn, N.Y.). The unit of measurement was the kilogram, recorded to 0.1 kilogram. Body weights

included the clothing worn which never exceeded 2% of total weight.

4. Measurement of Body Heights. Infants were measured for body length by stretching them in a supine position in a wooden infantometer. The measurement was taken from the bottom of the heels to the top of the head. Older children and adults were measured against a measuring tape attached to the wall in a vertical position with the aid of a right angle wooden device. Care was taken that the subject was standing straight with head, back, buttocks and heels touching the wall, and heels touching each other. The unit of measurement was the centimeter with an approximation to one millimeter.

5. Measurement of Arm Circumference. Arm circumference was measured at the middle third of the right arm with a standard tape measure. In small children, it was taken with the child in a recumbent position. Older children and adults were seated on a high stool with their right arm slightly bent over their legs to prevent strain. The unit of measurement was the centimeter and approximated to one millimeter.

6. Measurement of Skinfold Thickness. Skinfold thickness was measured with the aid of a Lange skinfold caliper. The thickness of a fold of skin pulled parallel to the longitudinal axis of the arm at the mid-distance between the acromion and the olecranon on the posterior surface of the arm (over the triceps) was determined. The pressure surfaces of the caliper were placed about one centimeter from the top of the fold. The measurements were rounded to the nearest millimeter.

7. Measurement of Head Circumference. Head circumference was measured with a flexible metal tape placed over the frontal and occipital protuberances to obtain the maximum circumference of the head. In women, all hair adornments and interfering hairdos were avoided and enough

pressure was applied to press down any abundant hair. The measurement was recorded in centimeters and approximated to one millimeter.

8. Calculating Weight for Age and Height for Age Indexes in Children Below 6 Years of Age. The indices for weight and height for age were prepared using tables from the Department of Maternal and Child Health, Harvard School of Public Health and the Iowa Child Welfare Research Station, State University of Iowa (Nelson, Vaughan, and McKay, 1969).

The standards used for comparison were taken primarily from the United States because Central American standard measurements are not yet available. A basic premise is that these U.S.A. standards are a goal toward which the Central American populations can aspire as their environment improves and their genetic potential is fully attained.

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X. Dietary and Food Consumption Surveys

Dietary surveys are useful in evaluating the nutritional state of individuals and populations and have played a very important role in defining food and nutrient requirements (FAO 1962; Leitch and Aitken 1950). The type of information required depends on the purpose for which these surveys are carried out. Three levels of inquiry are usually considered: (1) surveys in which a populations' dietary habits are investigated, (2) a more detailed survey aimed at obtaining information about the quality and quantity of food consumed, and finally, (3) a very strenous and detailed survey, whose primary objective is an accurate measurement of food intake (FAO 1962; Leitch and Aitken 1950; Widdowson 1947).

The family unit has been most frequently used for dietary surveys (Flores 1972; Leitch and Aitken 1950). Depending on the survey used, information may be limited to the whole or may provide details of how the food is distributed among the members of the family (Leitch and Aitken 1950; Widdowson 1947). Very detailed dietary surveys can be carried out at the individual level (Marr).

The less sophisticated method generally consists of a 24 hour recall dietary history without actual measurement of food. On the other hand, the most detailed method entails the daily recording of the weight of food consumed per individual per meal per day (Marr). Usually, intermediate variations of these two methods are used.

Objectives

Considering the general objectives of the project, the specific aims of the dietary surveys were to:

1. Define the dietary intake of the populations studied

2. Maintain proper monitoring of such intake throughout the duration of the project

3. Define and follow the dietary intake of all metabolic ward study subjects

4. Monitor the cost of food items in the local markets of the communities under study.

Methodology and Experimental Design

The following activities were carried out to fulfill these objectives:

1. Family dietary surveys to measure the food intake of each family member

2. Individual dietary surveys, also using the dietary intake method

3. Monthly surveys to determine the cost of different food items in the local markets.

1. Family Dietary Survey

Workers at INCAP (Flores 1972) and elsewhere (Leitch and Aitken 1950) have found that the dietary record method is the most appropriate for obtaining accurate data on food intake. Consequently, this method was selected for the study on family food distribution.

In 1950, Isabel Leitch in her publication on techniques and interpretation of family dietary surveys suggested that the best estimation of food intake is provided by the record method, which is based on measuring the food intake of each member family (Leitch and Aitken 1950). This method required a visit to the home before each meal, in order to weigh the food to be prepared for the family. Another visit is necessary on the day following to verify additional foods consumed during the night

by different members of the family.

The project methodology for dietary surveys during these visits required that the surveyor record pertinent information regarding: (1) kind and weight of food items available to the whole family per meal (recorded on field Form D1), (2) kind and weight of food items consumed at each meal by each member of the family (recorded on field Form D2), and (3) serving capacity of different household and kitchen utensils, such as table spoons, cups, serving spoons, etc., in terms of grams of food that each utensil can hold (recorded on Field Form D1). From this information, a summary form (Field Form D3) was prepared with as accurate an estimation as possible of food portions consumed by each family member for every meal. The data from Field Form D3 was transferred to a daily summary form (Form D7) which summarized the food intake per meal and per day for each family member.

Due to the time consuming and complex nature of these activities, the measurement of food consumption per family was done only for one day. Therefore, a representative number of families had to be studied in each survey to be able to distribute the results of each survey to cover three consecutive days of the week. In this way, a clear and representative picture of food consumption was obtained throughout the duration of this project.

In 1972 the first detailed dietary survey was completed on 75 families that were chosen from each community as the longitudinal sample (a total of 150 families). During the years 1973 and 1974, 20 families from the sample pool were studied every four months. Finally, during 1975 and 1976 the frequency of these surveys were decreased to 30 families every six months due to budgetary limitations.

The surveys at the field level were carried out during three consecutive days of the week. The other two days were used to complete and revise the information contained in the dietary forms. A well trained surveyor was able to interview three families per day; therefore, she was able to complete the field survey of 30 families in 13-15 working days. In addition, the surveyor needed an average 30-35 working days to prepare Form 07 (for the members of 30 families) for key punching. This information was incorporated into data banks.

Two data banks were established: the first containing the food consumption for each member of the family, and the second summarizing the food consumption of the whole family. The different nutrients in the food consumed was calculated using INCAP's food composition table (Flores, et. al., 1960). The recommended allowances (Flores, et. al., 1960: INCAP 1973) estimated for these population groups were applied to evaluate the intake levels of each family and its different members to determine the adequacy of their calorie and nutrient intakes. Therefore, the final data is reported in terms of food intake and levels of adequacy at the family level and for each member separately.

2. Individual Dietary Survey

These surveys were performed periodically using the dietary record method and the forms described in this section.

The food consumption of 75 adult males (ages 15-45 years) randomly chosen from each community was investigated in detail during 1972. The results provided the basis for formulating the rural metabolic ward diet. Furthermore, these 75 subjects from each community were the longitudinal sample population for the detailed absorption studies carried out at the rural metabolic ward in subsequent years. During 1973 and 1974,

20 subjects from each community were surveyed every 4 months. Unfortunately, during 1975 and 1976 these activities were performed only every 6 months on 30 subjects.

Data handling and analysis were the same as that for family dietary surveys.

3. Surveys To Determine Food Cost

These surveys were performed every month in order to determine the cost of the foods most commonly consumed by the village populations. These surveys were done at the local market in the study communities and in the city of Escuintla. Form 80 was used to record these results.

Forms Used In Dietary and Food Consumption Surveys

A brief description of how dietary survey forms were handled in the field is presented below.

1. Field Form D1 (Form 44)

This form was used in the field to record the general characteristics of the family as well as the capacity of utensils commonly used to handle or serve food.

In respect to the general characteristics of the family, the surveyor registered the name, correlative census number, sex, age, weight and apparent health status of each family member. The latter is important in cases of severe infantile malnutrition and in pregnant women. Finally, attendance at the 3 regular meals (breakfast, lunch, supper) was recorded.

The form was also used to register the capacity of common utensils used to handle or serve food. Such information was useful in calculating individual intake. In addition, there was a section to include the price of food items not recorded on Form 80.

2. Field Form D2 (Form 44)

Form 44(D2) was used to record the amount of food eaten by each member of the family at each meal. This amount was expressed as the actual weight of food or as the number of portions eaten. When using the latter measurement, it was necessary to state the kind of utensil used to serve that food in order to translate the number of portions eaten into weight, using the table provided on Field Form D1.

The distribution of certain foods such as meat, tortilla and others among family members was based primarily on the family's dietary history obtained during the interview.

3. Field Form D3 (Form 44)

Field Form D3 represents the summary of the food intake of each family member and of the whole family per meal per day. It was also used to record the sex, age and meal attendance of each individual, as well as some pertinent characteristics of the food eaten (percentage of waste, etc.).

4. Form 07

This form summarizes individual food consumption (expressed in grams) per meal per day for each member of the family. This is the form that was the basis for the analysis of food intake.

5. Form 80

This form contains a comprehensive list of those foods which are consumed commonly in rural Guatemala. Besides the food's popular names, their individual codes from INCAP's Food Table are also included. Finally, there is a space to record the unit price of each food.

Usually this form was filled out every month for each community and Escuintla. The sources of food prices were the local markets and stores where food was sold.

The information contained on Form 80 was transferred to computer cards and from cards into computer data banks.

XI. Malabsorption Studies

A significant number of asymptomatic and apparently healthy individuals from low socioeconomic groups of pre-industrialized countries suffer mild to moderate degrees of intestinal malfunction characterized by abnormally low absorption of d-Xylose (Keush, et al., 1970; Lindenbaum, et al., 1972) and/or vitamin B12 (Jeejeebhoy, et al., 1968; Klipstein, et al., 1968; Klipstein, et al., 1972; Klipstein, et al., 1973), as well as non-specific morphological alterations in their duodeno-jejunal mucosa (Sprinz, et al., 1972; Baker, et al., 1962; Schenk, et al., 1972). The pathogenesis of this entity, often called "sub-clinical or tropical malabsorption" remains obscure. However, it is commonly accepted that it is an acquired condition related to the insanitary environments where these individuals live (Lindenbzum, et al., 1972), the high incidence of parasitic diseases (Kotcher, et al., 1966; Tandon, et al., 1969), the kind of diet consumed, and the high incidence of chronic mild-moderate malnutrition (Mayoral, et al., 1968).

In studying protein-calorie malnourished children and children with non-specific diarrhea, it has been found that the structural changes of the intestinal mucosa of these children (Schneider and Viteri, 1972), which closely resemble those of Tropical Enteropathy, are associated with the presence of high concentrations of intestinal free bile acids (Schneider and Viteri 1974b) and upper gastrointestinal bacterial overgrowth (Mata, et al., 1972). Varying degrees of intestinal malabsorption of nitrogen, fat, calories, d-Xylose, vitamin B12, and other nutrients have also been documented (Schneider and Viteri 1974a; Viteri and Schneider 1974; Schneider 1973). One important fact brought out in these studies is that

the evolution of the gastrointestinal alteration is influenced not only by nutritional status but also by the presence or absence of non-specific diarrhea occurring during the study of such individuals (Schneider and Viteri 1972; 1974a; 1974b; Mata, et al. 1972).

The gastrointestinal tract of a group of apparently healthy children from low socioeconomic environments in Guatemala who had no known history of malnutrition presented a picture similar to, but less severe than, that of recovered children (Schneider and Viteri 1972; 1974a; 1974b; Mata, et al. 1972). Some of the same gastrointestinal alterations have been noted in post-mortem material of Guatemalan children as young as 4 months of age (Schneider 1973). Preliminary observations indicate that healthy adult Guatemalans, living in similar environments, also present gastrointestinal alterations similar to these children.

These findings suggest that modifications of the gastrointestinal milieu and its flora are wide spread in living situations characterized by a high prevalence of malnutrition, diarrheal disorders, and poor sanitation. Furthermore, it is possible that the gastrointestinal alterations observed in these individuals reflect changes along a continuum starting at an early period of life and persisting in variable degrees through adulthood. The living conditions of these subjects may predispose them to a greater susceptibility to malabsorption and to chronic non-specific diarrhea depending on their intensity of the stress. As a result, a wide clinical spectrum of gastrointestinal malfunction might be present in such populations. At one extreme, tropical sprue and other severe malabsorptive syndromes are characterized by intense gastrointestinal alterations. This entity would represent the seriously diseased bowel and, therefore, tend to give rise to clinical manifestations. Individuals

suffering mild to moderate degrees of intestinal malfunction represent the clinically "silent" or subclinical part of the spectrum. Such individuals are difficult to identify at present due to the lack of a suitable test to evaluate their gastrointestinal function and ecology, but they probably comprise a significant proportion of rural and urban poor populations of developing countries.

Despite an extensive bibliography documenting the frank malabsorpiton suffered by subjects with severe gastrointestinal disorders (Jeejeebhoy, et al., 1968; Klipstein, et al., 1968; Klipstein, et al., 1973; Mayoral, et al., 1968; Gorbach, et al., 1970; Corcirio, et al., 1973), very little is known regarding the impact produced by subclinical changes in a subjects' health status. A high prevalence of low urinary d-Xylose excretion has been demonstrated in apparently healthy asymptomatic subjects in tropical areas of Asia (Sprinz, et al., 1962; Troncale, et al., 1962; Lindenbaum, et al., 1966), and Latin America (Klipstein, et al., 1972; Klipstein, et al., 1973; Brunner, et al., 1966; Klipstein, et al., 1966, Robins, et al., 1967). Similar results were reported with the vitamin B12 absorption test (Lkipstein, et al., 1972; Klipstein, et al., 1973; Troncale, et al., 1973; Troncale, et al., 1967; Lindenbaum, et al., 1967; Baker, et al., 1972; Klipstein 1970).

The significance of these findings is obscure since it is not clear if findings of abnormal d-Xylsoe or vitamin B12 absorption actually indicate food malabsorpiton in general populations. Food wastage in such populations is significant since most persons already eat marginal diets. Under these conditions, even moderate degrees of wastage of the calories and proteins present in the diet may have an important impact in the nutritional status of these populations. Except for preliminary reports

suggesting the presence of steatorrhea in healthy adults from India, Pakistan and the Dominican Republic*, and the recent demonstration of a significant decrease in amino acid and dipeptide absorption in the upper intestine of Indian subjects as compared with English subjects (Hellier, et.al., 1976), no further information can be found in the literature. A similar conclusion is reported in a WHO Expert Committee Report on the subject (WHO 1976).

Objectives

A major objective of this project was to evaluate the extent of intestinal malabsorption in rural populations of Guatemala. This objective was met by:

1. Developing an appropriate methodology to measure the efficiency of the gastrointestinal tract of rural Guatemalan adult subjects to absorb food.

2. Studying the biological impact of food loss due to malabsorption and determining the economic implications of this food wastage.

General Concepts On Malabsorption

The primary purpose of the digestive and absorptive process taking place in the gastrointestinal tract of human beings is to make available to the body the energy and nutrients present in the diet (Spiro 1970; Kaiser 1964). These processes play an important role in maintaining the nutritional status of man.

In general, the term digestion comprises all the processes occurring in the lumen of the gastrointestinal tract which transform the aggregation of nutrients from the ingested food into simpler nutrients such as

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*Preliminary reports from other AID projects carried out in Ludhiana, India, Shiraz, Pakistan and the Dominican Republic.

monosacharides, amino acids, monoglycerides, and fatty acids. The events related to absorption are those that make it possible for these simple nutrients to traverse the membrane of the intestinal epithelial cell, and to enter either the blood or lymph for transport to different areas of the body for eventual utilization (Davenport 1966).

The digestion and absorption of food and nutrients is a dynamic and complex process that may vary depending on interactions among the environment, pertinent characteristics of the human subject (health status, gastrointestinal flora, etc.) and the nature of the dietary intake. This variability in the absorption of food must be considered in determining the absorptive capacity of a given individual.

Failure to absorb one or more of the major constituents of the diet (protein, fat, carbohydrate) as a result of an abnormal digestive process is called maldigestion. Failure of the normal products of digestion to be transported from the lumen of the intestine across the intestinal mucosa into the portal venus flow; or in the case of fat, soluble digestive products into the lymphatics, is called malabsorption. The failure to absorb inorganic elements, minerals or vitamins as part of the malabsorptive syndrome must also be considered. It is difficult to separate one event from the other. For example, the coefficient of digestibility is determined by relating the amount of nutrients present in the food ingested to the amount of nutrients found in the feces. When evaluating the absorptive efficiency of the gut, this relationship is also called the coefficient of absorption.

From the clinical point of view, malabsorption represents a syndrome reflecting varing degrees of failure of the gastrointestinal tract to absorb food or nutrients due to disorders or diseases affecting the

digestive system. If the degree of gastrointestinal failure is severe, such an altered absorption of food can be demonstrated both by a series of laboratory tests and by clinical signs (clinical malabsorption), particularly malnourishment. Any diagnosis should take into consideration the primary cause(s) for malabsorption so that an appropriate course of action can be recommended for an individual patient.

When the degree of gastrointestinal failure is minimal or moderate (subclinical malabsorption), its detection and measurement becomes difficult. Under these conditions, it is important to define a quantitative value for the "lower limit of normal absorption" and to establish criteria as to how such a reference value should be used. Currently, this reference value can only be tentative since the functional absorption tests now available are not suitable for measuring the gastrointestinal efficiency in absorbing complex diets. The interpretation of results of balance studies designed to measure the absorption of complex diets is also limited due to the wide fluctuations observed in normal individuals. Such variability means that subjects having subclinical malabsorption may still be labeled as "within normal limits" or on the "low end of a normal range".

The term population malabsorption is less familiar than clinical malabsorption. The concept of clinical malabsorption, as applied to individual patients, is not readily applicable in assessing malabsorption in a general population or to compare the extent of malabsorption in two populations. This measurement requires quantitative epidemiological concepts and a corresponding definition of population rather than clinical malabsorption.

Malabsorption may be considered as the capacity of the gastrointestinal

tract to absorb a given diet or substrate. Two aspects of this syndrome need to be taken into consideration when it is used to characterize the prevalence of malabsorption in a community. In the first place, absorptive capacity is measured on a continuous scale, as percent absorption; not on an "either-or", "yes-no" scale. In the second place, absorptive capacity is influenced by multiple factors in nature. Different tests are required to measure the absorption of substrates in food, such as proteins, fat, and calories. Since the absorption of each of these components can be considered to be a "variable", the measurement and integration of all of these variables is required to characterize absorptive capacity and to define malabsorption. Nevertheless, in contrast to the term, "malabsorption", which must be related to some standard or reference, the measurement of absorptive capacity is explicit. For example, the term "50% absorption of all ingested calories" is directly interpretable in input-output terms.

The extent of malabsorption present in a given population, must be defined relative to a point of reference, which is a part of the definition. If a multivariate measure of gastrointestinal absorptive capacity is used (e.g., simultaneous use of percent absorption of total calorie, fat, and nitrogen), there must be multiple points of reference including one reference value for each measured variable. The epidemiological definition of malabsorption will be appropriate and will lead to a reasonable interpretation only if the point of reference is used.

Further, comparison of a village community in Guatemala to a reference population in Minneapolis may be less appropriate than comparison to a reference population in Guatemala, unless the objective is to set a standard at the level of an industrialized nation. A practical method for determining

a point of reference is to select an appropriate reference population, measure the absorptive capacity of the subjects in this population, and define malabsorption for any other population relative to the findings in the reference population.

The degree of malabsorption present in a population, relative to a specified reference population may be defined by the following approach:

1. Randomly select subjects from the population of interest
2. Randomly select subjects from the reference population
3. Experimentally evaluate the absorptive capacity of each subject
4. Compute the difference in absorptive capacity between the subjects in the population of interest and the subjects in the reference population. The average of repeated tests over an extended period would represent the extent of malabsorption in the populations of interest as compared to the reference population.

Reference Population Used In This Study

In order to have an appropriate reference group to whom the rural subjects could be compared, 20 healthy soldiers born in the Pacific lowlands of Guatemala who had been living during the previous 18 months to 2 years in a military installation near Guatemala City were studied. The degree of sanitation at the military post was higher and the diet quantiatively superior to that available to the rural population in the test and control village.

The 20 soldiers in the sample were chosen as follows: 100 soldiers who had been born in the lowlands of Guatemala and who had been living in the military barracks were screened and the twenty healthiest were selected. Physical check-ups and anthropometry measurements were done on all subjects. Hemoglobin, hematocrit, urine analyses, direct stool

examination and helminth egg counts by the Stoll's concentration method were also performed. A careful history of previous illnesses with special emphasis on digestive disorders was also obtained. A 25 gram d-Xylose absorption test was carried out on all of the twenty soldiers who met these criteria: normal physical check-up, anthropometric measurements, hematocrit, hemoglobin, and serum proteins, negative urine analyses and stool examinations for parasites. Finally, each was willing to participate in the study.

The study required 29 days of hospitalization. The following schedule was used:

Day 1-4: Regular diet (as served at military barracks) ad libitum (no control on consumption); 4 days balance study (Balance 1).

Day 5-8: A modified version of the regular diet to duplicate the caloric intake of the rural metabolic diet (approximate 2800 metabolizable calories per day) was given; 4 day balance study (Balance 2).

Day 9-11: Adaptation to the rural metabolic diet; no detailed absorption studies.

Day 12-14: Adaptation to rural metabolic diet; 3 day balance study (Balance 3).

Day 14-16: Rural metabolic diet; 3 day balance study (Balance 4).

Day 17-19: Rural metabolic diet; 3 day balance study (Balance 5).

Day 20-22: Rural metabolic diet; 4 day balance study (Balance 7).

The techniques and tests used in these reference absorption studies are described under "Tests for Malabsorption".

This approach makes it possible to determine the extent of food wastage in populations as distinct from clinical evaluations. The biological impacts of the loss of energy and protein due to malabsorption

and the severity of such a loss would have to be correlated with specific parameters that reflect the status of health and nutrition of each subject under study since this effect is an individual one.

It is also feasible to calculate the cost due to food wastage in a population if the monetary value of the food ingested is known, though a number of assumptions are required. A value can be placed on the number of Calories lost through stools due to malabsorption, if the calculation is based on caloric measurement. This general concept of economic loss will be further amplified and discussed in the section on costs.

Tests for Malabsorption

A discussion on the concepts of malabsorption is incomplete without a review of the tests and techniques used to evaluate the measurement of intestinal malabsorption. This review is limited to tests used in this project.

1. Screening Tests

These tests are used mainly to evaluate the gastrointestinal efficiency of subjects under conditions where more sophisticated measurements cannot be made (Table XI.1). Two screening tests have been widely used:

a. D-Xylose Absorption Test. Xylose is a 5-carbon monosacharide. It is absorbed by the same transport system as the hexoses, glucose, and galactose. Since d-Xylose has less affinity for the hexose transport system, it is relatively poorly absorbed (41). At one time it was believed that d-Xylose was only passively absorbed and not broken down in the body. Csaky (1964) presented evidence that d-Xylose is actively transported from the lumen of the intestine. The work of Isselbacher and Senior (1964) indicates that as much as 60% of the xylose absorbed is metabolized.

TABLE XI.1

AN EVALUATION OF

TESTS USEFUL IN THE DETERMINATION OF MALABSORPTION

TEST	TEST USEFUL IN EVALUATION OF	FACTORS WHICH CAUSE ARTIFACTUALLY LOW VALUES OF THE TEST	FACTORS WHICH CAUSE ARTIFACTUALLY HIGH VALUES OF THE TEST
Quantitative fecal fat	Digestive and absorptive capacity for dietary fat	Inadequate fat intake Constipation Incomplete fecal collections	Ingestion of large quantities of castor oil or nut oils
Quantitative fecal nitrogen	Digestive and absorptive capacity for dietary protein	Inadequate protein intake Constipation Incomplete fecal collections	Excessive leakage of plasma proteins into the intestinal lumen (i.e., protein-losing enteropathy)
Vitamin B_{12} absorption test	Functional integrity of the ileum Presence of massive bacterial overgrowth in the small bowel	Vomiting after administration Inadequate hydration Intrinsic renal disease Incomplete urine collections Presence of subtotal or total gastrectomy	Contamination of urine with feces
Xylose absorption test	Functional integrity of the jejunum Presence of massive bacterial overgrowth in the small bowel	Vomiting after administration Delayed gastric emptying Inadequate hydration Intrinsic renal disease Massive ascites Incomplete urine collection Old age	Contamination of urine with feces

MODIFIED FROM: Disorders of the Gastrointestinal Tract. John M. Dietschy, M.D., Editor, Section by Frederick A. Wilson, Grune & Stratton, New York, 1976 (1), p. 43.

The appearance of xylose in the blood following oral ingestion reflects the ability of the intestine to absorb this pentase (Drooken 1974) and provides useful information on the functional integrity of the intestinal mucosa. The appearance of ingested xylose in the urine is dependent upon normal renal function.

The test is usually performed through the oral administration of 25 grams of xylose to a fasting patient or subject. After the subject empties his bladder, a 5-hour urinary collection is obtained. Sufficient fluid intake is provided to maintain satisfactory urine flow. Usually 4.5 g of xylose is excreted in normal subjects in the first 5-hours of urinary collection. The normal excretory values decrease with age, particularly in patients over 50 years of age. Vomiting or delayed gastric emptying will lead to low urinary values. Inadequate hydration or decreased effective circulating volume, renal disease, and the presence of massive ascites leads to a decreased urinary clearance of xylose and a low xylose excretory value.

A very low value for xylose excretion, usually 2.5 g per 5-hours, may be seen in the presence of massive bacterial overgrowth in the proximal small intestine where there is uptake and metabolism of xylose by the organisms. Low values are also obtained in disease states where there is significant loss of the functional integrity of the jejunum (Wilson and Dietschy 1971).

Despite these limitations, the d-Xylose absorption test represents the most commonly applied test of intestinal function currently in use. Unfortunately, different investigators have used different doses of xylose, differing ways of carrying out the test and expressing the results obtained. Therefore, it is difficult to make an accurate evaluation

of the usefulness of this test. A more extensive discussion is found in a reprint of a WHO consultation on intestinal malabsorption (WHO 1976).

b. Vitamin B12 absorption (Schilling) test: The absorption of vitamin B12 involves the binding of the vitamin with the intrinsic factor of the stomach, transport of the vitamin B12 intrinsic factor complex to specific sites in the ileum, and absorption of vitamin B12 into the portal venous circulation for transportion to areas of deposit, including the liver. Using radioactive vitamin B12, it is possible to investigate the different steps of this complicated process and to evaluate the presence or absence of the intrinsic factor. The speed of absorption of vitamin B12 is judged by its appearance in the blood. (Abbol Labs Radio-pharmaceuticals 1965).

The most common test used to evaluate B12 small intestine absorption consists in giving a 0.50 ci^{57} Co Cyanocobalamin capsule and another capsule of intrinsic factor orally to fasting subjects and then collecting urine for 24 hours. The amount of radioactivity is measured in the urine. Two hours after swallowing the capsules the subjects receive a "flushing" dose of 1000 micrograms intramuscularly of non-radioactive cyanocobalamin which saturates the plasma binding capacity so that the excess cyanocobalamin (radioactive and non-radioactive) is excreted in the urine. Since the ^{57} Co Cyanocobalamin is excreted in the urine only if it is absorbed from the gastrointestinal tract, urinary counts (24 hour urine) are a direct, but not quantitative measure of the percentage of the total dose absorbed. Normal absorption is assumed if the total radioactivity of the urine is 6% of the dose given.

There are a number of pitfalls to be avoided to insure valid results

with this test. Vomiting after administration of the radio-labeled vitamin, incomplete urine collection, decreased extracellular fluid volume, and intrinsic renal disease will lead to false low values. False high values are seen when urine is contaminated with feces.

There are two other instances in which the percent absorption of vitamin B12 may be as low as 1 to 2% per 24 hours. These are, 1) the presence of massive bacterial overgrowth or infestation with the tapeworm, Diphyllobothrium latum, in the proximal small intestine, and 2) disease states that lead to significant loss of the functional integrity of the terminal ileum.

Tests Related to Nutrient Absorption

These tests are intended to evaluate the absorption of a specific food component. The tests require the performance of a 72-96 hour balance study during which the quantity and quality of the intake is controlled and complete stool samples are taken. This procedure can be done only in a metabolic ward.

1. Quantitative Stool Fat Determination

The quantitative determination of stool fat is a reliable measure of the digestive and absorptive function of fat. The mean daily fecal fat excretion in a healthy person is generally estimated to be below 7-8 grams while ingesting a 100 g fat diet. This loss implies a 92-93% absorption coefficient. There are few studies that support this estimate. Annegers, et al., (1948) found that the mean fat excretion of healthy persons over 5 days varyed between 0.8 and 10.4 g/day. In the isocaloric exchange of 60, 120, and 160 g of lard and hardened vegetable oil, there was no significant change in the amount of fecal fat. Wollaegar, et. al. (1947) found that healthy persons excreted 4.1 ± 0.5 g of fat/day with an intake of 102 g and 8.7 ± 0.7 g of fat/day with a 208 intake while

maintaining protein and carbohydrate constant. These authors felt that there was a linear correlation between the oral fat intake and the fecal fat. This was tested by Kasper (1932) who fed healthy subjects a diet with a constant amount of protein, fat, minerals and vitamins. Increasing amounts of fat, up to a maximum of 639 g/day, were added to the diet. Under extremely high oral fat loads, the fat utilization differed individually. However, the coefficient of absorption was generally over 90% and in one subject was 98% during 20 days on a 639 g fat diet. A positive correlation existed between the amount of fat ingested and the amount of fat excreted in the feces. In contrast, in malabsorption syndromes, the slope of the linear correlation between the amount ingested and the amount excreted increases. In cases of severe malabsorption, the correlation becomes non-linear curving upward. A review of abnormal values in various malabsorption syndromes has been published (Wilson and Dietschy, 1971).

In North American man (Dietschy, 1976), the amount of fat in the stool is relatively constant despite variations in the quantity of dietary fat. Under fasting conditions, the fecal output of fat is 2.9 g/24 hr. This probably represents the daily loss from biliary contents, sloughed mucosal cells and bacterial lipids. However, the fecal content increases to 4.1 ± 0.5 g/24 hr and 8.7 ± 0.7 g/24 hr in subjects receiving 100 and 200 g fat respectively in their daily intake. In normal individuals, fecal fat is < 7% of dietary intake and in the North American a daily intake of 50-100 g is equivalent to an excretory fecal fat rate of < 6 g/24 hr. based on a 72 hr. stool collection (Dietschy, 1976; Jeffries et al., 1964; Chandler, 1963; Dworken, 1974). A table of fecal fat excretion in various intestinal disorders is given in Brooks (1974). Fecal fat excretion increases as the clinical severity of disease increases

in non-tropical sprue and exocrine pancreatic insufficiency (Renalds, 1961).

The van den Kamer method of fat analysis (Van den Kamer et al., 1967; Braddock et al., 1968; Saunders, 1967) is the most commonly used reliable procedure for the determination of fecal fat on a field study scale. This method is based on the extraction and neutralization of long chain fatty acids. Their presence is determined colormetrically. Although the error is small, the method is not totally accurate if medium chain triglycerides are present in the diet (Dietschy, 1976; Saunders, 1967). This quantitative measurement of fecal fat is too cumbersome and lengthy to be used as a rapid screening test for fat malabsorption. However, this is the only reliable method for balance studies and was used in the metabolic ward.

In a modestly equipped laboratory, the number of fat determinations per day can be increased by employing automated procedures.

2. Fecal Nitrogen

The chemical determination of total fecal nitrogen by the Kjeldahl procedure (Osler, 1965) provides a measure of digestive and absorptive capacity for dietary proteins. Wolleager, et.al., studied stool nitrogen in eleven normal persons (5 men and 6 women). The total fecal solids varied from 13.6 to 39.1 g and averaged 27.6 ± 2.2 g per day. The fecal nitrogen varied from 0.8 to 2.5 g and averaged 1.7 ± 0.1 g per day. This is the only carefully controlled study that was addressed to the average nitrogen excretion in healthy individuals. The study indicates that normal stool nitrogen is less than 2.5 g.

In a more recent study, Wilson cautions that the subject or patient "should be on a balanced protein diet and the stool should be collected

for at least 72 hrs." Under these conditions and while on a 80 to 100 g protein intake, the normal fecal nitrogen excretion was from 2.0 to 2.5 g per 24 hours. This study also provides representative values for the diagnostic tests used to differentiate various malabsorption syndromes in specific diseases. This information is summarized in Table XI.2.

The presence and extent of intestinal malabsorption was evaluated in the two rural communities of Guatemala through the use of the d-Xylose absorption test and the detailed food absorption studies.

3. D-Xylose Absorption Test

This test was performed as a screening field test to detect individuals from both study communities with d-Xylose malabsorption. The purpose of the test was to establish the range of d-Xylose absorption in the village populations. The sociocultural constraints in these communities made it difficult to study children and females. Therefore, only male subjects were studied. The age of the male subjects ranged from 15 to 45 years. There is evidence that the urinary excretion of d-Xylose decreases after 50 years of age (Hla-Yee-Yee et al., 1973).

The test was performed twice per year, once during the rainy season (April-May) and once during the dry season (November-December). At least 75 percent of the adult males present in these villages were studied each time the test was performed. The test was performed on weekends at the Escuintla Health Center which is located equidistant from the two study communities. A maximum of 80 subjects could be studied in one day due to technical and physical limitations. Therefore, three to four weekends were needed to study the adult males living in these villages.

During the week prior to the test, project personnel visited adult males at their home and invited them to participate. Attendance was

Table XI.2

Excretion of Nitrogen, Fat, B_{12} and D-Xylose

	Fecal N excretion	Fecal Fat excretion	Urinary B_{12} excretion	Urinary d-Xylose
Normal	< 2 g./24 hr.	< 6 g/24 hr.	> 7.0%/24 hr.	> 4.5 g/5 hr.
Insufficient intraluminal pancreatic enzyme activity	4.2 - 4.7 g.	25 - 44 g.	8.4%	5.5 - 6.1 g.
Insufficient intraluminal bile and activity	1.2 - 1.9 g.	13 - 19 g.	0.9%	3.0 g.
Intramural small bowel disease	0.6 - 5.0 g.	8 - 49 g.	1.1 - 19.0%	1.9 - 11.2 g.
Parasitic infestation	2.4 g.	10 - 26 g.	1.7%	0.3 - 4.0 g.

on a voluntary basis; however, 75 percent participation was maintained throughout the study. The d-Xylose test was administered according to the following schedule (Table XI.3).

Table XI.3

Schedule of D-Xylose Tests

4:30 a.m. to 3:30 a.m. The study subjects were transported in buses from the villages to Escuintla.

6:00 a.m. A list of all subjects was prepared containing the identification number of the d-Xylose test, the full name of the subject, his census number, and the hour when the d-Xylose had been administered. At that time, a pre-weighed plastic container with small amounts of benzoic acid as a preservative was given to each subject. The container was used to collect all the urine produced during the next 5 hours. The container was also marked with the identification number of the d-Xylose test.

Twenty-five grams of d-Xylose (Pfanstiehl Co., USA) dissolved in 250 ml of water was administered to all the study subjects after they had emptied their bladder.

6:30 a.m. to 8:00 a.m. The subjects remained comfortably seated at the health center while movies were shown.

8:00 a.m. The subjects were asked to drink 250 g of water and to urinate. Careful surveillance was maintained. Fifteen to 20 subjects were supervised by each of the field workers present during the test. The field worker was directly responsible for maintaining control of the 20 subjects assigned to him and to make sure that the urine collection was as complete as possible

8:30 a.m. to 10:00 a.m. Movies were shown.

10:00 a.m. The subjects were given another 250 g of water and asked to empty their bladders.

11:00 a.m. The test was completed after asking the subjects to empty their bladders again.

11:30 a.m. Lunch was served at the health center. The subjects were transported back to their village after lunch.

All subjects were asked periodically if they had any side effects during d-Xylose testing. The presence of nausea, diarrhea and headache were recorded. The subjects were seen the next day at home to ascertain if they had experienced any side effects after the test.

Urine samples were analyzed in the following manner:

1. During the afternoon on the day of the test, the plastic containers were weighed and the amount of urine measured and recorded on Form 10.

2. The urine from each subject was tested using "clinitest" strips.

3. After thoroughly mixing the container contents, an aliquot of 50-100 ml was transferred to labelled clean glass vials and the rest of the urine was discarded. The aliquots were transported to INCAP laboratories where they were refrigerated until processed.

4. Laboratory analysis was performed in an automated Technicon system. This method detects the presence of all reducing agents in the urine (Hoffman, 1937). Pilot tests in which this method was compared with the photometric method (Row and Rice, 1948) showed a very high index of reproducibility.

All information about each d-Xylose test was recorded on Form 10.

2. Detailed Food Absorption Studies

These studies were considered to be the most important procedure to detect and to measure food malabsorption in the inhabitants of the study villages.

a. Sample Population. Food absorption studies were done only on a small sample of adult males from both communities. Based on the results of the first d-Xylose field test performed in 1972, 60 adult males between 15 and 45 years of age were chosen from each community. This sample consisted of twenty-five men having low d-Xylose absorption (less than 16% of the oral dose given); 10 men from the intermediate group (16 to 20% of the oral dose given); and 25 men from the group with normal d-Xylose absorption (more than 20% of the oral dose given). Five additional subjects were added to each group to increase the sample to 75. The 15 additional individuals were substitutes in case some of the original 60 subjects dropped out of the study. The families of each of these males represent the longitudinal family sample in each community.

These studies were carried out in these 120 individuals at the rural metabolic ward (8-12 beds) built in Esquintla. This unit had all the physical facilities needed for the performance of these studies. The metabolic ward study of 120 subjects required 6 months of continuous effort. The chemical analysis of the ten thousand samples collected annually took 7 to 8 months of laboratory time.

b. Rural Metabolic Diet. This diet was based on the results of a detailed dietary survey carried out in 150 adult males living in the study communities. The diet represents the average daily intake of these subjects, both quantitatively and qualitatively. This diet is shown in Table XI.4.

Table XI.4

Rural Metabolic Diet

CALORIES	2800 Kcal/day-metabolizable energy (3081 Kcal/day by bomb)
vegetable origin (mainly from corn and beans)	72%
animal origin	28%
PROTEIN	40 g/day
vegetable	66%
animal	34%
FAT	9 g/day
vegetable	78%
animal	22%
FIBER	11 g/day
CARBOHYDRATES	173 g/day

Main components: corn, bean, rice, bread, vegetables (guisquil, carrots), consomme, lemonade, coffee, banana.

Minor components: meat, eggs, cheese

The food in this diet was divided into four meals which were fed to the participants each day.

c. Protocol of study. A careful record of the following parameters was made each time the subjects were admitted to the rural metabolic ward:

(1) Age. sex, community, census number of the individual, and the position that the subject occupied within the family.

(2) Measurements related to anthropometry and nutritional status of the individual including:

(a) Weight, height, weight/height index.

(b) Arm circumference, tricipital skinfold and arm circumference corrected for skinfold (C.A.C.).

(c) Shoulder, thoracic, abdominal, and girdle circumferences.

(d) Body surface index.

(e) 24-hour consecutive urinary creatinine excretion (expressed in relation to body weight and height and muscle mass).

(f) Serum folate and blood vitamin B12 levels.

(3) Parasitological examinations

(4) Stool cultures.

(5) Detailed absorption studies to evaluate calorie, nitrogen, and fat absorption.

The detailed absorption studies consisted of 72-hour balance periods during which the individuals were daily given a 2800 Calorie diet (rural metabolic diet). This diet was similar to that consumed regularly in the study communities. Careful control of food intake and excreta was maintained. Food and biological samples were analyzed to evaluate calories, nitrogen, and fat absorption. The activities carried out during hospitalization consisted of:

1973 Activities

Day 1	11:00 hours	Admission
	12:00 hours	Beginning of 72-hour balance period (Carbon 1g., administered orally)
Day 2		Continuation of balance
	6:00 hours	Blood drawn for hematological work-up
Day 3		Continuation of balance

Day 4.....12:00 hours.....End of balance period (carmine 0.5 g., administered orally)

Day 5.....No activities scheduled

Day 6.....6:00 hours.....d-Xylose absorption test

12:00 hours Discharged

The following procedures were performed during the balance period:

(1) Stool samples for parasitological and microbiological analysis were collected during the first and second day.

(2) Body weight was measured every day at 6:00 and 18:00 hours.

(3) Each subject exercised for 10 minutes every day at 1:00 and 16:00 hours on a stationary bicycle while under close supervision. A speed between 10-15 miles/hour was maintained during the exercise period.

(4) The 2800 Calorie rural metabolic diet was used all through the period of hospitalization.

1974-1976 Activities

Day 1.....11:00 hours.....Admission

Physical check-up and anthropometry measurements

12:00 hours Beginning of Balance I; 2000, 2400 or 2800 Cal/day diet to match the pre-study diet. (administer carbon, 1 g orally).

Day 2.....Continuation of Balance I

Day 3.....Continuation of Balance I

Day 4.....12:00 hours.....End of Balance I (carmine 0.5 g. orally)
Beginning of Balance II; 2800 Kcal/day
Rural metabolic diet

Day 5.....Continuation of Balance II

Day 6.....Continuation of Balance II

Day 7.....12:00 hours.....End of Balance II (carbon 1 g., orally)

Day 8.....No activities

Day 9..... 6:00 hours.....d-Xylose test

12:00 hours Discharged

(1) Stool samples for parasitological and microbiological analysis were collected on days 1 or 2.

(2) Body weight was measured every day at 6:00, 12:00, 18:00, and 21:00 hours.

(3) Schedule and intensity of daily exercise were identical to the 1973 study.

(4) The 2800 Calories rural metabolic diet was given to the subjects during both balance periods.

All metabolic ward data was recorded in a special booklet. The forms are shown in the Appendix.

d. Preparation of food and biological samples. All samples were frozen at the rural metabolic ward and periodically transferred to INCAP headquarters in Guatemala City where they were processed and prepared for analysis. Preparation included the following steps:

(1) Food samples were ground and dried to stable weight in a vacuum oven and the dry matter weight was recorded.

(2) Stools were collected in pre-weighed cans which were weighed again after each collection. The difference, in grams, was recorded as the total weight of stools excreted by a given individual during a balance period. To obtain an appropriate aliquot of the stools, an amount of water (grams) equal to that of the stools was added and

homogenized in a large blender for 10-15 minutes. After mixing, a 50 to 100 aliquot was stored in a small plastic bag and maintained frozen for further processing. Part of the sample was placed in a vacuum oven until it reached a stable weight (solid sample) and the weight of the dry matter in each sample was recorded.

(3) The total urine collection was transferred from the metabolic ward to INCAP headquarters in pre-weighed plastic containers. They were reweighed and the difference was considered to be the amount of urine produced by the individual during a balance period. After energetic agitation, 50 to 100 ml aliquots were stored in clean glass vials properly identified.

e. Laboratory analyses performed. Laboratory analyses for calories, nitrogen and fat in the food and the stool samples were performed. The urine samples were analyzed for nitrogen, urea and creatinine concentrations.

The determination of caloric content of samples and standards was carried out in a Gallenkamp Ballistic Bomb Calorimeter, model CB 370*, equipped with a galvanometer calibrated to register temperature changes during ignition to an accuracy of 0.1%. The samples and standards were ignited in a 100% environment of oxygen at 28 atmospheres. A small thread was used to spark the reaction. The galvanometric deflection resulting from the burning of the thread was taken as the "blank" sample. Therefore, all the sample results were corrected for this "blank".

1. Calibration of the Bomb

This calibration was done once each month using Standard Benzoic Acid (British Chemical Std. BCS No. 1900 H) with a caloric equivalent

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*A. Gallenkamp & Co. Ltd. England.

of 6324 calories (15°C) per gram, weighed in air.

a. Triplicate runs, at five benzoic acid concentrations, were used to prepare a calibration curve. The weights of benzoic acid used were 0.1, 0.2, 0.3, 0.4, and 0.5 grams.

b. The galvanometer reading for each run was recorded.

c. A regression analysis was used to compute a "standard" curve. The coefficient of regression (R_2), standard deviation (s), mean ($\bar{x}$), and coefficient variation (relative standard deviation in percent) were also computed.

d. The slope (m) and entercept (c) were derived and the regression line ($y=mx+c$) was used to calculate sample values done during that month.

2. Preparation of samples for each day's run

a. Solid samples were weighed in duplicate (generally about 300 mg.).

b. Each day, benzoic acid (either 0.1, 0.2, 0.3, 0.4 or 0.5 grams) was analyzed along with the samples being processed.

c. The caloric content of each sample was calculated using the following procedure.

(1) (Galvanometric reading) - (blank x 6.319*) = sample value

The average of duplicate aliquots was computed.

(2) The value for the benzoic acid standard was also determined.

(Galvanometric reading) - (Blank x 6.319) = value of standard

(3) The value for the standard was adjusted by reference to the standard curve using the formula:

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*6.319=calorie equivalent of 1 gm. of Benzoic Acid (weighed in air).

(Galvanometric reading) - Blank +

$$\frac{(\text{Curve intercept for the weight of benzoic acid used} \times 6.319)}{\text{Curve slope}} =$$

adjusted value for standard that day was computed.

(4) A correction factor $\frac{B}{C} = f$ was computed.

(5) The final result was obtained from: A x f

Note: If the difference between the value obtained for the benzoic acid standard that day, when compared to the standard curve, was above 5.2%, the samples run that day were processed again.

3. Determination of Nitrogen content of samples

The Kjeldahl's (macro) Method (52) was used for these determinations.

a. Reagents used:

(1) Sulphuric acid

(2) Selenious acid solution: 172 g. of selenious acid in 1000 ml. of distilled water.

(3) Sodium sulphate

(4) Sodium hydroxyde: 60% solution by volume.

(5) Boric acid: 2.5% solution by volume.

(6) Methyl red: 0.2 g. in 1000 ml. ethyl alcohol

(7) Bromochresol green: 1 g. in 1000 ml. ethyl alcohol

b. Procedure:

(1) Digestion

(a) Add the following reagents to each flask (500 - 1000 ml volume): 25 ml. of sulphuric acid, 1 ml. of 5% sodium sulphate, 4-5 glass beads.

(b) Add 0.5 to 1 g. of solid sample to each flask (all samples were prepared in duplicate).

(c) Apply heat to the flask for 45 minutes with the extraction apparatus in operation

(d) Allow flasks to cool to room temperature.

(2) Distillation

(a) Add to each flask: 260 ml. of distilled water, 5-10 drops of methyl red.

(b) Place flasks on the water bath. Add 100 ml. of boric acid solution to the Ehrlenmeyer receptor flask and connect to the distillation column.

(c) Add 60 ml. of sodium hydroxyde to the separatory funnel. Agitate gently to see if there is any change in color. If not, close the funnel.

(d) Add distilled water to the separatory funnel and open the valve to let water run through the cooling coils.

(e) Distill until liquid volume is reduced to 260 ml.

(3) Titration. Use HCL (70 ml of pure HCL in 7000 ml of distilled water)

(4) Preparation of standard

(a) A stock solution of ammonium sulphate containing 10,000 g/ℓ was prepared and stored (it can be stored for years without alteration).

(b) Standard curve

Prepared every 3-4 months or whenever a new solution of HCL for titration was mixed.

Standard solutions (containing 20, 40, 50, 80, and 100 grams of ammonium sulphate/ml) were prepared by dilluting the stock solution with distilled water.

The standard solutions were processed starting with the distillation step.

A standard curve was prepared by regression using the results obtained from the standard solutions. The R_2, S, x, and CV values, as well as "m and c", were calculated. With the latter, the formula $y = m x + C$, was used to calculate standard recovery and to correct sample values using the formula $x = \frac{y-c}{m}$.

(c) The acid factor values obtained from the standard curve were so stable and reproducible that most of the time, the control and correction of biological samples was made from what is called the acid factor. The latter is calculated as follows:

0.14 g. of ammonium sulphate (dry weight in duplicate) placed in two flasks.

These flasks were then included along with the days samples (starting at the distillation phase).

Both duplicates were titrated with HCL.

The acid or HCL factor was calculated:

$$\frac{28 \times 14 \times 100}{132 \times \text{ml. of HCL used}} = \text{HCL factor}$$

(5) Formula used to calculate nitrogen content of samples:

$$\frac{\text{ml. of HCL used} \times \text{HCL factor}}{\text{weight of the sample (g)}} = \text{N/100 g. of sample}$$

4. Determination of Fat Contents of Samples

The original method described by van de Kamer, Huim and Weyers (54) was used:

a. Brief description of the procedure

(1) Solid samples (food or stools) were weighed (in duplicate) in 250 ml flasks (approximately 0.5 - 1.0 g.).

(2) Ten ml of a 33% solution of KOH was added to the sample.

(3) Forty ml of pure ethyl alcohol with 0.4% methyl alcohol (by volume) was also added to the sample.

(4) The flasks were then refluxed for 30 minutes and allowed to cool to room temperature.

(5) Seventy ml of a 25% hydrocloric acid solution was slowly added while maintaining constant agitation and then allowed to cool at room temperature.

(6) Fifty ml of heptane was added.

(7) Each flask was agitated for 3 to 5 minutes and allowed to stand for 5 to 10 minutes until the layers were clearly separated.

(8) Approximately 25 ml of the heptane phase was separated into a clean vial.

(9) The fatty acid content of this aliquot was determined by titration using KOH in isobutyl alcohol (0.05 N) with thymol blue as indicator.

(10) The formula used to calculate the concentration of fatty acids in the sample was:

$$\frac{\text{VKPH (ml)} \times \text{NKOH (Eq/litter)} \times 256.43 \times 1.04 \times 2.5}{\text{Weight of sample (g)} \times 100{,}000 \text{ (ml/litter)}} \times 100 = \text{g/100g of sample}$$

Formula components:

VKOH = volume of KOH used for titration

NKOH = normality of the KOH solution. It should be 0.05 N. It was checked every day using a fresh solution of potassium phtalate.

256.43 = molecular weight of palmitic acid.

1.04 = factor to compensate for the incomplete extraction of fatty acids with heptane (96%).

2.5 = the titration was carried out in a 20 ml aliquot from the heptane phase and an additional 50 ml. of heptane was added (50 + 20).

(11) The formula can be simplified to:

$$\frac{VKOH \times NKOH \times f^*}{\text{Weight of sample}} \times 66.6718$$

*f (standard): The standard consisted of Triolein, 90% pure, with a molecular weight of 885.4 from Sigma Co. USA. To calculate the oleic acid content the following formula was used:

$$\frac{287.47 \text{ (MW oleic acid)} \times 3}{885.4 \text{ (MW triolein)}} \times 0.9 \text{ (purity)} \times 100 = 86.14\% \text{ oleic acid content}$$

(12) A triolein standard was included with every 10 biological samples. The value for this standard after processing was calculated using the following formula:

$$\frac{VKOH \times NKOH \times 282.47}{\text{Weight of the sample} \times 1000} \times 1.04 \times 2.5 \times 100 = \text{g. of oleic acid/100 g of triolein}$$

(13) $f = \frac{\text{Real content of oleic acid in the triolein Std (1)}}{\text{Actual content of oleic acid detected in the triolein Std processed (2)}}$

<u>Important</u>: The calorie, nitrogen, and fat results were corrected for dry matter content in all instances. In the case of stool samples, results were corrected for the dilution factor introduced by adding water before homogenization.

b. Data handling. Since 1974, all the data related to the detailed food absorption studies was handled using standardized forms, keypunched from the forms, and analyzed by computer (Forms E10 through E19). A detailed description of all forms and calculations are described in the Appendix.

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^{57}Cobalt. Cyanocobalamine (Racobala min-57). Abbott Radio-pharmaceuticals Publications. Abbott Laboratories, Chicago, U.S.A., 1965.

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XII. Cost-Benefit Analysis of Food Wastage

A major hypothesis of this study, as stated in Chapter I, is that losses from intestinal malabsorption of food may be of significant economic importance. The primary benefits anticipated from the implementation of the project were (1) a decrease in the prevalence of diarrheal disease, and (2) a decrease in the incidence of intestinal malabsorption through the introduction of a piped water supply to households, improvement in the household environment, and modification of health behavior through education in the test village. However, it was difficult to distinguish clearly between the independent costs and benefits in this Food Wastage/Sanitation project. While the direct costs of installing a water supply system in Guanagazapa was fairly simple to calculate, the value of the benefits is far more subtle and not at all certain.

This chapter is divided into three main sections. First, the criteria for the installation of the water supply system in the test village are stated. Second, the identificable costs of installing the water supply system are outlined. Last of all, the difficulty of attaching an accurate economic price to the benefits of such a system is discussed.

Objective Criteria

The costs and benefits of any project should be calculated in light of the objective criteria of that project. In planning the water supply system for Guanagazapa, four main general design characteristics were considered:

1. The quantity of water to be supplied per person
2. The minimum allowable pressures in the network
3. The accessibility of water to users

4. The degree of reliability of the system.

In addition, four experimental criteria, related to the choice of the control village (Florida Aceituno), guided the design of the water supply system:

1. The supply of "acceptable" water in sufficient quantities for anticipated water demand over the next five years

2. The prior improvement of the water supply available at public fountains and taps

3. The capability of increasing the availability of the water supply to provide individual service at each home within a limited cost

4. The willingness of the population to pay a minimum water charge to be collected through a formal community financial arrangement. Finally, it was decided that the total cost of improving the system to provide for individual house connections should be less than (U.S.) $40,000.

Financing and Costs

1. Financing and Specific Design Criteria

The water supply cost constraint was relieved by the decision of the Ministry of Public Works to construct a new water supply for the town in 1973. An agreement between INCAP and the Ministry of Public Works was reached in a letter dated May 24, 1972. The UNC/INCAP project agreed to contribute $10,000 and the Ministry of Public Works an estimated $38,000 to build the new system.

The Ministry of Public Works began construction of the new water supply system in August 1972, well ahead of the planned schedule. By the end of September 1972, the excavation work for the 200 cubic meter storage tank was virtually complete and work was proceeding on the development of the two springs, La Arabia (29 gpm) and Pedra Baleada

(90 gpm). The water supply system was put into operation in September 1973 and chlorination equipment was added in January 1974.

A complete description of the Guanagazapa water project is contained in a document from the Departmento De Aquedectos Y Alcantarillados entitled "Proyecto De Aqueducto La Cabercera Municipal De Guanagazapa Departmento De Escuintla". Among the specific design criteria listed in this document are:

Design period	25 years
Designed to serve population	3000
Actual population	1520
Actual number of homes	190
Estimate of future homes	380
Capacity	125 liters/person/day
Average flow	4.34/liters/second

This report also designates that the water is to be stored in a 200 cubic meter storage tank.

2. Project Cost Data

The project inputs for the Guanagazapa water supply can be classified according to the following major categories.

1.1. Planning

1.1.1. Topographic survey

1.1.2. Engineering and design

1.2. Construction Materials

1.2.1. Pipes, valves and fittings

1.2.2. Meters and meter boxes

1.2.3. Cement, aggregate and stone

1.2.4. Not otherwise noted

1.3. Labor

1.4. Transpotation

2. Private Water Supply and Other Facilities

2.1. Water facilities

2.1.1. Lateral lines, faucets and fillings

2.1.2. Basins

2.1.3. Trenching and installation

2.1.4. Not otherwise noted

2.2. Latrines

2.2.1. Concrete plate

2.2.2. Pit

2.2.3. Enclosure

3. Water System Operation

3.1. Public costs

3.1.1. Chemicals (chlorine)

3.1.2. Maintenance

3.1.3. Accounting

Although the detailed project cost analysis is available, a summary statement of costs is given here. Costs are stated in quetzals (Q) which had a 1:1 foreign exchange rate with respect to the U.S. dollar in 1972-74 (Table XII.2).

Table XII.1

Final Costs of Guanagazapa's New Water Supply System

Construction Labor (payroll)	Q24,674
Materials	13,608
Transportation of Materials	2,700
Ministry of Public Works Cost	40,982
UNC/INCAP Contribution (allocated as above)	9,282
Total Construction Cost	50,264
Chlorinator and accessories	1,574
Compound Meter	645
House Water Meter (125 X 20.45)	2,556
Total Cost	Q55,039

Source: Ministry of Public Works, Guatemala.

The above figures do not include planning, engineering and design costs for the project incurred by the Ministry of Public Works. In general, a strict accounting of these costs is not kept for each project.

Latrine costs were subsidized by the Ministry of Health and the village of Guanagazapa. The market value of concrete latrine plates (planchas) was about Q 5.00. The Ministry of Health made the plates available for about Q 2.00 which was the cost of a 100-pound bag of cement. The project charge to the householder was Q 1.00. In addition, the homeowner had to provide for the transportation of the plate to the home site, digging of the pit, and the installation of the latrine and its outhouse. The pit and housing are estimated to have a market value (in terms of hired labor and materials) of about Q 8-10.

Table XII.2

Water Supply System Maintenance and Operation

Annual Cost

Operator	Q 540
Bookeeping and accounting	180
Chlorine	40
	Q 760

3. Income from the System

The estimated income from the system was based on the planned connection of 194 households to the water supply. The monthly household payment of Q 0.65 entitles each household to 30,000 liters of water per month. The potential revenue from the expected 194 household monthly payments would be about Q 126 per month or Q 1500 per year. Initially the actual income, however, was from fewer households.

Expected Benefits

The primary hypothesis underlying this study was that a population living under poor sanitary conditions and subject to repeated incidents of diarrheal disease (especially in infancy and early childhood) will demonstrate a decreased lifelong ability to absorb nutrients. This latter condition is known as malabsorption whose losses are measured at the population level in comparison to a "standard" or "normal" level. The excess loss due to malabsorption is calculated as food wastage. In economic terms, if the malabsorptive syndrome can be reversed, the averted food loss at the individual level can be converted into real economic benefits for the community and the nation as a whole.

There are a number of difficulties with this hypothesis. First, the biological mechanisms underlying the assumed relationship between repeated diarrheal disease and chronic population malabsorption have not

been established. Secondly, measurements and studies on malabsorption have been limited to individual clinical cases and small groups with special reference to hospital laboratories and to clinical medicine. In the third place, the "normal" values for stool nitrogen and fat losses are primarily based on measurements made in a western industrialized setting and under the above mentioned hospital and clinical conditions. Dietschy* notes that for these applications, the literature sources simply give the normal values found in their laboratories and most of these are from hospital laboratories, not research laboratories.

This study dealt with population rather than clinical malabsorption and in a distinct setting (the Guatemalan lowland village). The measurements were designed to determine "subtle" rather than overt clinical changes. These "subtle" changes then had to be compared with a "normal" value in an equivalent population free from diarrheal incidence for a sufficient period of time to allow for the recovery of gastrointestinal tract efficiency.

Obviously, concepts and measurements of normality in large populations are difficult to manage. When the question was put to an investigator with no previous knowledge of the project, the response was:

> ...you are attempting to identify very subtle forms of malabsorption. In my opinion, one could be certain of the clinical significance of low values of fat excretion in the range of 6, 7 or 8g only if one has performed a series of balance studies in a group of patients free of gastrointestinal disease from the same region who are eating the usual "local" diet. Only under these circumstances could one make a valid judgement concerning very subtle elevations in stool or nitrogen output. Again, I would emphasize that even in this country this has seldom ever been done in most major hospitals.

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*Personal Communication. John M. Dietschy, July 20, 1977.

The computation of economic loss due to "subtle" and chronic malabsorption on a population level is difficult. The difficulty is not as much in the economics but in the variability of biological measurement. Though clinicians may propose "normal" values to distinguish malabsorbers from non-malabsorbers, these values are not applicable to the Food Wastage study for the reasons which have been presented above.

The costing of food losses, therefore, has several facets. The most difficult and critical is the establishment of some value or range of values which will serve as a point of comparison for the subsequent calculations. A limited search of the food-agriculture-economics literature relating to all types of food wastage was made to find out if others have examined this problem. The search revealed what had been anticipated: other than some vague references that between ten to fifty percent of all food produced is lost along the production-distribution-marketing-consumption chain before it reaches the consumer's mouth (Borgstrom 1974; Hawley 1932), it does not appear that the question of how much of the food production (or purchase) dollar is lost generally by wastage or more specifically due to malabsorption, has been dealt with rigorously in the literature.

Food Loss Versus Food Wastage

Dr. Alfred J. Field of the Department of Economics of UMC-CH suggests that there is a clear difference between the terms "food loss" and "food wastage" and that the two should not be used interchangeably. Similarly, Georg Borgstrom defines "pathologic wastage" as that caused by insects, pests, fungi, disease, etc., distinguishable by its potential to be controlled and minimized. On the other hand, "natural wastage" or loss (in Field's terminology) is that normal amount of crop production

that is expected to be lost annually due to such uncontrollable factors as the weather (Borgstrom, 1968, ch. 9).

Early References to Food Wastage

Although no one seems to have laid out a systematic method for calculating food wastage, concern for food wastage is not new. In discussing the waste from the perishability of produce, W. O. Hedrick (1924) reports: "It is claimed...that from 30 to 40 percent of those products (produce) spoil on their way from grower to user" (Hedrick, p. 211). A few years later (1932), Edith Hawley claims that "10 percent is the figure commonly estimated as the household waste" in order to derive consumption statistics from food expenditure surveys (Hawley, pp. 32).

FAO Publications

None of the listings in the Food and Agriculture Organization of the United Nations (FAO) cumulative publications catalogue, Books in Print, since 1974 indicate any effort to calculate the amount or cost of food wastage due to malabsorption or otherwise. The most recent FAO yearbook, The State of Food and Agriculture 1976, does not mention food waste or loss. In addition, current issues of the new FAO international agricultural sciences and technology index, AGRINDEX, with their innumerable entries of publications and reports from around the world, indicate little, if any, interest in the whole area of food wastage. Only the FAO Food Balance Sheets, 1964-66 includes a column for the millions of metric tons wasted in production and in making food available at the retail level for a select group of countries. However, no explanation as to how the reported figures are derived is offered.

USDA Publications

The 1974 U.S. Department of Agriculture (USDA) yearbook, Shopper's

Guide, contains two articles concerning the amount of food wasted in home preparation for consumption, "How Much Food You Should Buy" by O. M. Batcher and L. H. Fulton (pp. 21-26) and "Food Cost Tables to Help Stretch Your Dollar" by J. P. Chassy and J. B. Nichols (pp. 27-40), but are culturally-specific to the United States. Agricultural Handbook No. 8, Composition of Foods (1963) and its revised version, Agricultural Handbook N. 456, Nutritive Value of American Foods (1975), are useful in providing figures for the nutritional composition of foods in household measures and market units of food typically consumed in the American household. However, only the earlier edition includes a column in its tables for "refuse" indicating the percentage of purchased food normally discarded in home preparation.

American Journal of Agricultural Economics

A perusal of all issues of the American Journal of Agricultural Economics from 1973-76 failed to locate a single article or comment on the food wastage question.

Conclusion

A brief search of the food-agriculture-economics literature produced little information concerning the calculation of the amount and cost of food wastage in general or specifically due to malabsorption.

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APPENDIX

Protocols and Data Forms

Each appendix number (Roman Numerals) corresponds to a chapter number in the text. The following chapters have no appendix: I (Introduction), II (Study Communities), III (Sampling Methodologies), V (Water Supply, Diarrheal Morbidity and Health Benefits), and XII (Cost-Benefit Analysis of Food Wastage).

Appendix IV

Census

Protocol

Form 01

This is one of the forms that was used to record the monthly census in the study communities.

Columns	Description
1	Community: 1=Florida Aceituno; 2=Guanagazapa.
2-3	Block number: where a given house is located. In Florida Aceituno, the block numbers go from 01 to 29 and in Guanagazapa from 01 to 40.
4-5	House number.
6	Changes related to the character of the family: see the description of this section on form 31.
7-8	Position of a given subject within the family: the codification was: 01 Male head of the family. 02 Wife or if the head of the family is a female. 03-19 Children forming part of the family. They are classified according to age from the older to the younger. 20-25 Relatives of the head of the family (his mother, his father, etc.). 30-39 Brothers of the head of the family. 40-49 Nephews. 50-59 Grandchildren. 60-69 Other relatives of the head of the family if such relation is political or religious in nature (godchildren). 70-79 Without any relation to the family, these individuals are living with the family but are not relatives.
9	Used to record any change in the status of the individual. Such changes may be birth, demise, emigration of a given individual, etc. A detailed description of these changes can be found on form 31.
10	Sex: 1=male; 2=female.
11	Race: 1=ladina; 2=indigena; 3=others. If number 3 is used, the reason for its use should be explained under Observations.

12-13 Place of birth:

a) if the individual was born in Florida or in Guanagazapa: 01.

b) if the individual was born within the Department of Escuintla, he was classified in one of two groups:
10, if he was born in the town of Escuintla
02, if he was born in any other area of the Department of Escuintla.

c) if the individual was born in any of the other Departments of Guatemala, the following codification was used:

03 Alta Verapaz
04 Baja Verapaz
05 Chimaltenango
06 Chiquimula
07 El Peten
08 El Progreso
09 El Quiche
11 Guatemala
12 Huehuetenango
13 Izabal
14 Jalapa
15 Jutiapa
16 Quezaltenango
17 Retalhuleu
18 Sacatepequez
19 San Marcos
20 Santa Rosa
21 Solola
22 Suchitepequez
23 Totonicapan
24 Zacapa
25 El Salvador

15-16 Blocked (not used).

17-28 Last Name of a given individual:

29-36 Mothers Maiden Name.

37-48 First and Middle Name of a given individual: In case of a very long name, they were classified as follows:

Gloria Consuelo Valenzuela Castellanos

17-28 V A L E N Z U E L A __

29-36 C. __ __ __ __ __ __

37-48 G L O R I A __ C. __ __ __

49 Used to record literacy:

0 = does not know how to read and write

1 = knows how to read and write

50-51 Number of years attended school:

01-06 = elementary school
07-13 = high school
14-20 = university

52-53 Principal occupation of a given individual. The following codification was used:

00	Ninguna	None
01	Agricultor	Farmer or peasant farmer
02	Albanil	Mason
03	Alfarero	Potter
04	Ama de casa	Housewife
05	Ayudante de camion	Truck driver's assistant
06	Barbero	Barber
07	Bombero	Fireman
08	Cantinero	Bar tender
09	Cargador	Laborer for carrying items
10	Carnicero	Butcher
11	Carpintero	Carpenter
12	Cartero o mensajero	Mailman or message boy
13	Cocinero (a)	Cook
14	Comerciante (propietario, fijo)	Business person, owner
15	Conserje	Janitor
16	Contador	Accountant
17	Chofer	Chauffeur
18	Electricista	Electrician
19	Enfermero (a)	Nurse
20	Estudiante	Student
21	Farmaceutico	Pharmacist
22	Fotografo	Photographer
23	Jornalero	Day laborer
24	Lavandera	Washer woman
25	Maestro (a)	Teacher
26	Mecanico	Mechanic
27	Mecanografo (a)	Typist
28	Molinero (a)	Miller
29	Oficinista	Office clerk
30	Panadero (a)	Break baker
31	Partera	Mid-wife
32	Pescador	Fisherman
33	Pintor	Painter
34	Policia	Policeman
35	Sastre	Tailor
36	Secretario (a)	Secretary
37	Tejedor (a)	Weaver

38	Telegrafista	Telegraph operator
39	Tendero	Store keeper
40	Tipografo	Printer
41	Vaquero	Cowboy
42	Viajante de comercio	Salesman
43	Otros	Others
99	Ignorada	Unknown

54-59 Date of birth:

Col. 54-55: day
Col. 56-57: month
Col. 58-59: year, last two digits of the year.

This date was used to calculate the age of individuals for other uses. During the first census, this date was recorded, in most instances, from an official document such as a birth certificate or its equivalent.

60-65 Survey Date: as above, day-month-year (last 2 digits)

68-69 Form number:

70-72 Census correlative number of the family: This was a sequential number which is never above 3 digits. This number will identify a given family (did not change during the project). If a new family arrived in town, its correlative number was obtained from a special log-book kept at the health post; the interviewer will use this number and at the same time write all the information needed in the log-book.

73-76 Census correlative number of individuals: All individuals living in the study communities have their own individual number. Since the number of inhabitants in these communities might be above 1,000, this number has 4 digits. If a new individual arrived in the community, his number was obtained from the log-book available at the health post.

Form 01 was also used to record changes occurring to individuals in the communities. These changes might include such things as:

1) Address

2) Position of the individual within the family: for example, if the second son of a given family becomes the first son because his brother left town.

x: several names in Spanish can be used indistinctly specify males or females. In this event, the sex a given subject is emphasized on this form to avoid nfusion.

4) Place of birth

5) Date of birth

6) Name

In addition to recording changes in the appropriate column, the following information was also collected:

Column	
1-5	Identification of the community.
9	A number 1 in this column indicates that this form was used to make a correction.
60-65	Date when the visit was made.
66-67	Code number of the interviewer.
70-72	Census correlative number of the family.
73-76	Census correlative number of the individual.
70-72	Census correlative number of the family.
73-76	Census correlative number of the individual.

This form (01) was used to record changes in individual or family status as well as to record original census data.

Description of Variables on Form 01

Card Columns	Variable Name	Description
1	COMM	community identification (1=FA, 2=GU)
2-3	BLOCK	block number of dwelling
4-5	HOUSE	house number of dwelling
6	CHG_FAM	family change code
7-8	FAMPOS	family position
9	CHG_IND	individual change code
10	SEX	sex (1=male, 2=female)
11	RACE	race (1=ladina, 2=indigena, 3=other)
12-13	BIRTHPL	place of birth (department of town)
14	BIRTHVL	have you always lived here?
15-16	BIRTHTM	number of years you have lived here
17-28	NAME	last name
29-36		maiden name
37-48		first/middle name
49	LITERACY	can you read and wriate (1=yes, 2=no)
50-51	EDUC	years in school
52-53	OCCUP	occupation code
54-59	BIRTHDAY BIRTHMON BIRTHYR	date of birth
60-65	DATEDAY DATEMON DATEYR	date of survey
66-67		surveyer identification
68-69	FORM	form number = 01
70-72	FAMID	family identification number
73-76	INDID	[illegible]al identification number

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
DIVISION DE BIOMEDICA

ESTUDIO DE MALABSORCION EN EL AREA RURAL DE GUATEMALA

ENCUESTA DE PERSONAS

Forma 01

Col.	Descripción	
1-5		Identificación
6		Cambios en la familia
7-8		Posición en la familia
9		Cambios en el individuo
10		Sexo
11		Raza
12-13		Lugar de nacimiento
14		Ha vivido siempre aquí?
15-16		Años que ha vivido aquí

Col.	Descripción	
49		Lee y escribe
50-51		Grados aprobados
52-53		Ocupación principal
54-59		Fecha de nacimiento
60-65		Fecha de la visita
66-67		Empadronador
68-69	0 1	Tarjeta
70-72		Número de familia
73-76		Número de individuo

17-28		Primer apellido
29-36		Segundo apellido
37-48		Nombre inicial

Chequeo general			Fecha
1	Primera Observación		
2	Segunda Observación		
3	Tercera Observación		

Protocol

Form 31

This form was used to record changes or corrections in the monthly census, either to the family or the individual.

Columns	Description
1-5	Community and address: A more detailed description can be found on Form 01 protocol.
6	Used to codify changes that affect the family: 0 = new family, composed of individuals from the study communities. Since each individual has his own census correlative number, the only thing needed is a new census correlative number to the family. 1 = new family formed by individuals who are also new-comers to the community. Census forms were filled out not only for the family but also for each member. Census correlative numbers were given to the family and to each member. 2 = this code is used when a new family is formed by individuals, some of whom are from the study communities and some are not. In this case, census forms are filled out for the family which will receive a census correlative number. Census forms will also be filled out for the individuals of the family who are new-comers; they will also receive a corresponding census correlative number. 3 = this code is used when a family within the community changes its address. The new address recorded in columns 1-5. 4 = this code is used when a family leaves town, either for a short period of time or forever. 5-6 = these codes are not used. 7 = old family that comes back to town. This identifies those families that left town for a given period of time and then came back to live in the community. 8 = this code is used when a family desintegrates. It is also used when a family is composed of one person and he dies; in the latter case, the code for demise is also recorded in column 9.
7-10	Not used.

10-58 These columns are divided in seven lines, each containing an equal number of columns. They are used to record changes occurring to one or several members of one family. Example: if changes occurred in two subjects of the same family, those changes related to the first individual will be recorded in columns 10-16, and those of the second individual in columns 17-23.

Since the data recorded in each of these spaces is of the same nature, a detailed description of the information on the first line of each space is given below:

Col. 10-13: used to record the census correlative number of the individual.

Col. 14-15: used to record the position of the individual within the family. See the description of this item on Form 01 protocol. An additional code to those reported on Form 01 is used. This code is 00 which is used when the individual dies or leaves the family.

Col. 16: used to codify any change which occurs in the status of the individual; the code is:

0 = no change

1 = not used

2 = for individuals that work outside the community. Although, they remain most of the time out of town, they are still part of the family.

3 = hospitalized: this code is used for individuals who are hospitalized for illness or during the period when they are at the rural metabol . ward.

4 = not used

5 = temporal inmigrant: These are relatives of a given family who come to live with the latter for a short period of time. This might occur when:

1) the individual has been recorded in the census previously, has left town and returned for a short period of time.

2) a relative who is a new-comer to the town becomes a member of the family for a short period of time.

In either case, all the census forms will be completed and a census correlative

number will be given to this individual.

6 = identifies new-borns. In this case, all the census forms will be filled out and the child receives his own census correlative number.

7 = this code is used when a person dies. A change must be made in columns 14-15 relating to changes in the position of the individual within the family. The surveyor should record code 00.

8 = used when a person leaves town. This change also affects codification in columns 14 and 15, where code 00 will be recorded.

9 = this code is used for individuals that leave the family but remain within the community. In this case, the code for columns 14 and 15 will be also 00.

To the right of each group of columns, there are segmented lines on which the surveyor should record the full name of the individual or individuals that have changed.

59 Column 59 is used to codify the number of forms used to report the changes to the members of a given family. As mentioned before, this form may contain changes for as many as 7 individuals or members of one family. If this number is larger than 7, two forms will be needed. In this case, a number 1 is placed in this column when only one form is completed for a given family, 2 if there are two forms and so forth. Care must be taken so that, in each of these forms, the information contained in columns 1 through 6 and 60 to 77 are the same.

60-65 Date when the survey was performed:

Col. 60-61: day
Col. 62-63: month
Col 64-65: last two digits of the year

66-67 Special code that identifies the surveyor who completed the form.

68-69 Number of the form.

70-72 Census correlative number of the family (see description on Form 01).

77 Used to categorize a special situation within families or with families that arrive in town for the first time.

P: this letter is used when a family from out of town comes to live in the house of another family. Usually, this occurs just for a short period of time.

B: this letter is used when a family who has been living for a short period of time in the house of another family leaves.

Description of Variables On Form 31

Card Columns	Variable Name	Description
1	COMM	community identification
2-3	BLOCK	block number of dwelling
4-5	HOUSE	house number of dwelling
6	CHG_FAM	family change code
10-16	INDID	individual identification
	FAMPOS	family position
	CHG_IND	individual change code
17-23	the above 3 variables repeated for another individual in the family	
24-30	"	
31-37	"	
38-44	"	
45-51	"	
52-58	"	
60-65	DATEDAY DATEMON DATEYR	date of survey
66-67		surveyer identification
68-69	FORM	form number = 31
70-72	FAMID	family identification
77	SPECHAR	family special character

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA

División Biomédica - Sección Estudios Gastrointestinales

HOJA DE FAMILIA

Forma 3!

(1-5) Ubicación

(6) Cambio Familiar

	Número de individuo	Relación familiar	Cambio individual	Nombre
(10-16)				
(17-23)				
(24-30)				
(31-37)				
(38-44)				
(45-51)				
(52-58)				

(59) No. de orden de la forma

(60-65) 7 4 Fecha

(66-67) Empadronadora

(68-69) 3 1 Tarjeta

(70-72) Número de familia

(73-76) Bloqueado

(77) Carácter de la familia

CAMBIOS EN LA FAMILIA

Códigos para columna 6

0 Familia nueva autóctona
1 Familia nueva de fuera
2 Familia nueva mixta
3 Cambio de dirección
4 Emigró
7 Familia antigua que vuelve
8 Familia que se desintegra

CAMBIOS EN EL INDIVIDUO

2 Trabaja afuera
3 Hospitalizado
5 Inmigrante temporal
6 Nació
7 Fallece
8 Emigra
9 Abandona la familia

CARACTER ESPECIAL

Códigos para la columna 77

P Familia posando

Revisiones		Revisor	Fecha
1	Primera observación		
2	Segunda observación		
3	Tercera observación		

Appendix VI

Morbidity

Simplified Protocol

Fecal Microbiology and Parasitology

FORM 11

This form was used to record the results of the laboratory examination of fecal samples from both communities.

Columns	Description
1	Community
2-10	Not used
11-15	Laboratory number assigned to sample
16-21	Date of laboratory examination
22	Agent 1) Parasite 2) Bacteria 3) None
23-25	Type of agent (see attached codes)
26	Detailed study performed 0 = No 1 = Yes
27-29	Method of identification 27 Direct examination 28 Trichromic stain 29 Concentration method
30	Characteristic of fecal sample 1) Formed 2) Semiliquid 3) Liquid
31-35	Stolls concentration (see attached codes) 31 Parasite stage

Protozoa	Helmintho
1) trophozoits	4) Ova
2) cysts	5) larvae
3) trophozoits & cysts	6) ova & larvae
	7) proglotidae

32 Ascaris ova per gram

Columns	Description
	33 Trichiuris ova per gram
	34 Hookworm ova per gram
	35 Other, per gram
36-67	Not used
68-69	Form number
70-72	Not used
73-76	Number of individuals (source of specimen)

CLASSIFICATION OF AGENTS

ENTEROPATHOGENIC BACTERIA	Code	Type
Negative for *Shigella*, *Salmonella* and *EEC*	2000	
Shigella, Subgroup A (*dysenteriae*):	2001	A1
	2002	A2
	2003	A3
	2004	A4
	2005	A5
	2006	A6
	2007	A7
	2008	A8
	2009	A9
	2010	A10
Shigella, Subgroup B (*flexneri*):	2021	B1, B1a, B1b
	2022	B2, B2a, B2b
	2023	B3
	2024	B4, B4a, B4b
	2025	B5
	2026	B6
	2027	x
	2028	y
Shigella, Subgroup C (*boydii*):	2041	C1
	2042	C2
	2043	C3
	2044	C4
	2045	C5
	2046	C6
	2047	C7
	2048	C8
	2049	C9
	2050	C10
	2051	C11
	2052	C12 (and "M")
	2053	C13
	2054	C14
	2055	C15
Shigella, Subgroup D (*sonnei*):	2061	D

ENTEROPATHOGENIC BACTERIA	Code	Type
Shigella, S.N.D.*	2070	
Shigella, Subgroup A, S.N.D.*	2071	
Shigella, Subgroup B, S.N.D.*	2072	
Shigella, Subgroup C. S.N.D.*	2073	
Escherichia coli (ECE):	2101 ECE	A 026:B6
	2102	A 055:B5
	2103	A 0111:B4
	2104	A 0127:R8
	2105	A Other
	2106 ECE	B 086:B7
	2107	B 0119:B14
	2108	B 0124:B17
	2109	B 0125:B15
	2110	B 0126:B16
	2111	B 0128:B12
	2112	B Other
E.C.E., S.N.D.*	2120	
E.C.E., A, S.N.D.*	2121	
E.C.E., B, S.N.D.*	2122	
Salmonella, Subgroup A*	2131	
Salmonella, Subgroup B*	2132	
Salmonella, Subgroup C1*	2133	
Salmonella, Subgroup C2*	2134	
Salmonella, Subgroup D*	2135	
Salmonella, Subgroup E1*	2136	
Salmonella, Subgroup E2*	2137	
Salmonella, Subgroup E4*	2138	
Salmonella, Subgroup E4*	2139	
Salmonella, Subgroup F*	2140	
Salmonella, Subgroup G*	2141	

*Serotype not determined

ENTEROPATHOGENIC BACTERIA	Code	Type
Salmonella, Subgroup H*	2142	
Salmonella, Subgroup II	2143	
Salmonella, other subgroup	2144	
Salmonella *	2150	
Salmonella, serotype determined	2160-2995	

PARASITES

Protozoa

1000	Negative
1001	*Entamoeba histolytica*
1002	*E. hartmanni*
1003	*E. coli*
1004	*E. polecki*
1005	*Endolimax nana*
1006	*Iodamoeba butschlii*
1007	*Dientamoeba fragilis*
1008	*Trichomonas hominis*
1009	*Enteromonas hominis*
1010	*Chilomastix mesnili*
1011	*Giardia lamblia*
1012	*Balantidium coli*
1015	*Isospora spp.*
1016	Other

Helmynths

1021	*Ascaris lumbricoides*
1022	*Trichuris trichiura*
1023	*Uncinaria*
1024	*Strongyloides stercoralis*
1025	*Enterobius vermicularis*
1026	*Taenia spp.*
1027	*Hymenolepis nana*
1028	*H. diminuta*
1030	*Diphyllidium caninum*
1031	Heterodera spp.
1040	Schistosoma mansoni
1041	Schistosoma (other)
1042	Fasciola hepatica
1043	Paragonimus spp.
1044	Other

*Serotype not determined

CODES FOR HELMYNTH'S OVA COUNTS

CODE	ASCARIS	TRICHURIS	HOOKWORM
1	1-999	1-999	1-999
2	1000-9999	1000-1999	1000-1999
3	10,000-49,999	2000-2499	2000-2999
4	50,000-99,999	2500-2999	3000-4999
5	100,000-299,999	3000-4999	5000-9999
6	300,000+	5000-9999	10,000-19,999
7		10,000-29,999	20,000-29,999
8		30,000+	30,000+

INSTITUTE OF NUTRITION OF CENTRAL AMERICA AND PANAMA
Program of Nutrition and Gastrointestinal Function
Division of Biology and Human Nutrition

FECAL MICROBIOLOGY AND PARASITOLOGY

Form 11

1	___	Community
2 - 10	[redacted]	To be duplicated from census form

Laboratory number

COLUMN 11 - 15	_ _ _ _ _

COLUMN	ITEM	CODE
16-21	_ _ _ _ _ _	Date
22	___	AGENT (1) Parasite (2), (3) Bacteriae
23-25	_ _ _	Type of agent (see classification)

Detailed study

No: 0 Sf: 1

METHOD OF IDENTIFICATION

26	___

27	___	Direct exam
28	___	Trichromic stain
29	___	Concentration method

Characteristics
1 Formed
2 Semiliquid
4 Liquid

STOLL's METHOD

30	___

31	___	PARASITE STAGE Protozoa: (1) Trophozoits, (2) Cysts, (3) Trophozoits + Cysts Helmynths: (4) Ova, (5) Larvae, (6) Ova + Larvae, (7) Proglotidae
32	___	ASCARIS OVA/g (1) (3) (5) (7) (9) (2) (4) (6) (8)
33	___	TRICHURIS OVA/g (1) (3) (5) (7) (9) (2) (4) (6) (8)
34	___	HOOKWORM OVA/g (1) (3) (5) (7) (9) (2) (4) (6) (8)
35	___	OTHERS (1) (3) (5) (7) (9) (2) (4) (6) (8)

No. of individual

73-76	_ _ _ _

Card number

68-69	1 1	Form number

77	___

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
Programa de Nutrición y Función Gastrointestinal
División de Biología y Nutrición Humana

MORBIDITY SURVEY-HEALTH POST — Form 24

Name: _____ Age: _____

1-3 ___ ___ ___ ___ Location	6-8 [illegible] Blocked
10 ___ Sex	11 ___ Total No. of visits

Col. 12-13 Day											
Body in General	Measles	01	21								
	Chicken pox	01	22								
	Rubella	01	23								
	Other eruptive	01	24								
	Accident	01	25								
	Others	01									
Skin	Eczema	02	01								
	Herpes	02	02								
	Dermatitis	02	07								
	Impetigo	02	15								
	Dermatomycosis	02	23								
	Burns	02	05								
	Others	02									
Muscle bones	Arthritis	03	17								
	Others	03									
Respiratory	Cold	04	01								
	Whooping cough	04	12								
	Tonsillitis	04	13								
	Bronchitis	04	21								
	Pneumonia	04	30								
	Flue	04	33								
	Others	04									
Cardiovascular	Insufficiency	05	05								
	Others	05									
Blood-lymph nodes	Anemia	06	01								
	Adenitis (neck)	06	10								
	" cervic	06	11								
	Others	06									
Digestive	Mumps	07	13								
	Diarrhea	07	32								
	Disentery	07	33								
	Gastritis	07	21								
	Parasites	07	26								
	Others	07									
Urogenital	Cistitis	08	04								
	Amenorrhea	08	20								
	Puerperal fever	08	27								
	Others	08									
Endocrine metabolism	Kwashiorkor	09	07								
	Marasmus	09	08								
	Others	09									
Nervous system	Neuritis	10	06								
	Epilepsy	10	08								
	Others	10									
Senses	Conjunctivitis	11	10								
	Otitis	11	11								
	Others	11									
Other											
Col. 48-49 No. of BMs/day											
Col. 50-51 Surveyor											

SPECIAL INFORMATION

52-56	___ ___ ___ ___	Date when mense began
57-58	___ ___	Mense duration (days)
59	___	Duration of pregnancy (months)

67-65	___ ___ ___ ___	Date
68-69	2 4	Form number
70-72	___ ___ ___	Family number
73-76	___ ___ ___ ___	No. of individual
77	___	Validation

Obra:

Observaciones:

REVISION	Rev.	FECHA
PRIMERA		
SEGUNDA		
TERCERA		

Protocal

Form 25

This form was used to record different illnesses when they were detected during periodic house visits in both communities. Each house was visited once each month by an auxiliary nurse or a surveyor following a pre-determined time sequence. This activity was carried out concurrently with the monthly census.

This morbidity information was obtained by questioning the members of the family present in the house during the visit or from the wife or female head of the family.

The diagnosis of a given disease or symptom followed a definite protocol and is described later in this Appendix.

In January 1975, the form was modified to facilitate the gathering of data during the house visit. These changes did not alter in any way how the information was recorded or alter the character of the information. The following is a description of the revised form:

Columns	Description
1	Community: Florida Aceituno = 1; Guanagazapa = 2.
2-3	Block number where a given house is located.
4-5	House number.
6-9	BLOCKED (not used).
10	Sex.
11-12	Day of the month when the visit was performed.
13-47	Divided in 7 sections of 5 columns each. Thus, it is possible to code 7 different diagnoses on this form. The diagnoses are based on 3 different inputs: a) the system of the body which is affected; b) the symptoms, and c) the method used to make the diagnoses. Each of these inputs has a special protocol which is followed in coding a given disease. An example of how the coding is done is presented here: Col 13-14: System of the body affected. Eleven systems were used.

Columns	Description
	Col 15-16: Symptoms affecting the individual.
	Col 17: Used to codify the criteria from which the diagnosis was made: a) diagnosis made only on the basis of a patient history; b) the patient is checked by a nurse or doctor; c) if, in case of diarrhea, the character of the patient's stools is observed by the nurse, MD, or surveyor.
	Codes 1-2-3 were used when the information was obtained by a nurse or surveyor. Codes 4-5-6 were used when the information was obtained by an MD. Therefore, a) the diagnosis of a cold by history detected by the nurse or surveyor, during a house visit was coded as: 04-02-1. If it was detected by an MD: 04-02-4. b) The diagnosis of a cold by physical examination, detected by the nurse, coded as: 04-02-2. When detected by an MD: 04-02-5.
	The surveyor must write the name of the disease (s) and/or symptom (s) detected during the visit.
48-49	BLOCKED (not used).
50-51	Number of bowel movements per day: This is used only when diarrhea is present.
	SPECIAL INFORMATION: Related to fertility patterns in the study communities.
52-56	Date of the last menstrual period:
	Col 52-53: Day Col 54-55: Month Col 56: Year: last digit; example: 1974 = 4; 1975 = 5.
59	Duration of Pregnancy: In months.
60-61	BLOCKED (not used).
62-65	Month and year when the visit was made.
66-67	Surveyor's code.
68-69	Form number.
70-72	Census correlative number for the family (see Form 01).

Columns	Description
73-76	Census correlative number of the individual (see Form 01).
77	Validation: In order to validate the information gathered by the nurse or surveyors, the MD visits 10% of the houses in each community every month chosen at random. He completes a data form after each of these visits:

a) In case of a healthy family, he will complete only one Form 25, giving particular attention to the following columns:

Col 1- 5: Identification.

Col 70-72: Census correlative number of the family.

Col 77: He will place number 2 (visit by MD)

b) If he detects one or several members of a given family suffering from one or several illnesses, he will complete a Form 25 for each case, taking care to record a number 2 in column 77.

Protocol for Coding Diseases

Body In General (01)

Symptomes		Diseases	
61	Body aches	01-04	No diagnoses
62	Chills	05	Alcoholism
63	Fever	06	Intoxication due to other substance
64	Nervousness, Anxiety	07	Infection due to virus (N.S.)*
65	Light-headedness	08	Infection due t. bacteria (N.S.)*
66	Somnolence	09	Infection due to Salmonella (N.S.)*
67	Paleness	10	Typhoid Fever
68	Loss of weight	11	Rheumatic Fever
69	Overweight	12	Dyphtheria
70	Chills and Fever	13	Tetanus
71	Born defects	14	Cholera
72	Madness	15	Brucellosis
73	Traumas	16	Malaria (Vivax)
74	Allergy	17	Malaria (Phalciparum)
75	Accidents	18	Malaria (Others)
		19	Poliomyelitis
		20	Syphilis
		21	Measless
		22	Chickenpox
		23	Rubella
		24	Eruptive disease (N.S.)*
		25	Filariasis
		26	Gonorrhea
		27-29	No Diagnoses
		30	Trauma, Light
		31	Trauma, Severe
		32-35	No Diagnoses
		36	Wound (simple)
		37	Wound (Severe)
		38-39	No Diagnoses
		40	Mild Psychological alteration
		41	Severe Psychological alteration
		42	Madness
		43-44	No Diagnoses
		45	Fracture, upper extremity
		46	Fracture, lower extremity
		47	Fracture, body
		48	Fracture, craneum
		49	Fracture, others
		50	Luxation
		51	Coma

*(N.S.) = Not specified or non specific.

Protocol for Coding Diseases

Skin (02)

Symptomes		Diseases	
61	Generalized itching	01	Exzema
62	Hives	02	Herpes
63	Marks/bruises, body	03	Zoster
64	Marks/bruises, face	04	Urthicaria
65	Marks/bruises (N.S.)*	05	Burus (Superficial)
66	Swelling of the face	06	Burus (Severe)
67	Swelling of the feet and legs	07	Dermatitis (N.S.)*
68	Swelling of the abdomen	08	Dermatomycoses (N.S.)*
69	Swelling (N.S.)*	09-13	No Diagnoses
70	Boils	14	Abscess (N.S.)*
		15	Impetigus
		16	Abscess in any extremity
		17	Abscess in the body
		18	Abscess in face or head
		19	Dog bite (extremities)
		20	Dog bite (body)
		21	Dog bite (face or head)
		22	Snake bite
		23	Sarcoptioses
		24	Pediculosis (body)
		25	Pediculosis (head)
		26	Gangrene (N.S.)*
		27	Omphalytis
		28	Scorpion bite
		29-49	No Diagnoses
		50	Infection of the breast
		51	Tumor of the breast
		52	Mastitis
		53	Fissures
		54	Erysipelas

*(N.S.) = Not specified or non specific.

Protocol for Coding Diseases

Muscles and Bones (03)

Symptomes		Diseases	
61	Back ache	01	Congenital disease of bones
62	Aching legs	02	Osteomyelitis
63	Aching arms	03	Osteoporosis
64	Rheumatism	04	No Diagnosis
65	Aching joints	05	Bone Tumors
66	Pain in the face	06-09	No Diagnoses
		10	Congenital disease (N.S.)*
		11	Pes equinus (N.S.)*
		12	Congenital luxation of the hip
		13	Acute arthritis
		14	Aquirred deformity of joints
		15	Swelling of a joint
		16	No Diagnosis
		17	Arthralgias (N.S.)*
		18-19	No Diagnoses
		20	Myositis or tendynitis; traumatic
		21	Myositis or tendynitis; non traumatic
		22	Torticolis

*(N.S.) = Not specified or non specific.

Protocol for Coding Diseases

Respiratory System (04)

Symptomes		Diseases	
62	Cold (N.S.)*	01	Common cold
63	Lung illness (N.S.)*	02	Sinusitis
64	Stuffiness of the nose	03	Saddle nose
65	Dyspnea and cough	04	Atrophic Rhinitis
66	Boiling of the chest (modism for secretions in bronchial tree)	05	Trauma of the nose
		06	Fracture of the nose
		07	Tumors of the nose
67	Hoarseness	08	Other Rhinitis
68	No Diagnosis	09	Foreign bodie in the nose
69	Painfull throat	10	Laryngitis acute
70	No Diagnosis	11	Laryngitis chronic
71	Cough	12	Whooping cough
		13	Tonsillitis
		14-18	No Diagnoses
		19	Bronchitis (N.S.)*
		20	Tracho bronchitis acute (Croup)
		21	Bronchitis, acute
		22	Bronchitis, chronic
		23	Asthma
		24	Bronchiolitis
		25	Non-senile Emphysema (N.S.)*
		26	Senile Emphysema
		27	Pneumonitis, viral
		28	Pneumonitis (N.S.)*
		29	Pneumonia
		30	Bronchopneumonia
		31	Pulmonary abscess
		32	Tuberculosis
		33	Influenza-Flue
		34	Nose bleed
		35	Hemoptysis
		36	Foreign body in Tracheobronchial tree
		37	Plural effusion

*(N.S.) = Not specified or non specific.

Protocol for Coding Diseases

Cardiovascular System (05)

Symptomes	Diseases
61 Dyspnea on exertion	01 Dextrocardia
62 Dyspnea, recumbent	02 Congenital C.V. disease, cyanotic
63 Palpitations	03 Congenital C.V. disease, non-cyanotic
64 Pain in the heart	04 Coarctation of the Aorta
65 Cyanoses (by History)	05 Cardiovascular Insufficiency
	06 Rheumatic heart disease
	07 Angina
	08 Cardiac arrhythmia (N.S.)*
	09 Cardiac arrythmia, severe
	10 Tachicardia
	11 Bradicardia
	12 Generalized Arteriosclerosis
	13 Chagas Disease
	14 Perypheral Insufficiency
	15 Varices
	16 Thrombophlebitis
	17 Hypertension, benign
	18 Hypertension, malignant
	19 Shock
	20 Hypertension (N.S.)*

*(N.S.) = Not specified or non specific.

Protocol for Coding Diseases

Blood and Lymphatic System (06)

Symptomes	Diseases
61 Inguinal adenopathy (Hijios)	01 Anemia (N.S.)*
	02 Iron defficiency Anemia
	03 Vitamin B12 defficiency Anemia
	04 Folate defficiency Anemia
	05 Anemia due to other defficiency
	06 Hemolytic Anemia
	07 Hemophilia
	08 Accute adenitis, upper face
	09 Accute adenitis, lower face
	10 Accute adenitis, neck
	11 Chronic Adenitis
	12 Scrofulodernia, active
	13 Scrofulodernia, inactive
	14 Infections Mononucleosis
	15 Neoplasms
	16 Leukemia

(N.S.) = Not specified or non specific.

Protocol for Coding Diseases

Digestive System (07)

Symptomes

61 Tooth ache
62 Anorexia
63 Jaundice (by History)
64 Bad breath
65 Flatulence
66 Nausea
67 Vomiting
68 Belching
69 Heart burns
70 Constipation
71 Stomach ache
72 Anal pruritus
73 Vomiting blood
74 Bleeding gums
75 Swelling of the mouth
76 Earth eater
77 Herpes of the mouth
78 Salivation

Diseases

01 Stomatitis
02 Congenital anomalies of mouth
03 Accute glositis
04 Wound of the tongue
05 Burn of the tongue
06 Tumors of the mouth
07 Abscess of the gums
08 Gingivitis
09 Postextraction infection
10 Dental caries
11 Post extraction bleeding
12 Melena
13 Mumps
14 Faringitis, accute
15 No diagnosis
16 Tumors of the pharinx
17 Congenital anomalies of Esophagus
18 Infections abscess of Esophagus
19 Tumors of the Esophagus
20 No diagnosis
21 Gastritis (N.S.)*
22 Gastric Ulcer
23 Tumors of the Stomach
24 Gastroenteritis
25 Enterocolitis
26 Intestinal parasitism (N.S.)*
27 Intestinal obstruction
28 No diagnosis
29 Duodenal Ulcer
30 Tumors of the intestine
31 Colitis
32 Diarrhea
33 Dysentery
35-39 No diagnoses
40 Apendicitis
41 Rectal prolapse
42 Congenital anomalies, anus
43 Anal abscess
44 Anal fistula or fissure
45 Hemorrhoids
46 Hepatic abscess
47 Hepatitis
48 Cirrhosis
49 Tumors of the liver
50 Cholelithiasis
51 Cholecystitis
52 Accute Pancreatitis
53 Hernia
54 Peritonitis
55 Ascites

*(N.S.) = Not specified or non specific.

Protocol for Coding Diseases

Urogenital System (08)

Symptomes

61 Burning pain during micturation
62 Oliguria (by History)
63 Menstrual pain
64 Menstrual dissorders
65 Hematuria (by History)
66 Urinary incontinence
67 Pain in lower abdomen
68 Polyuria (by History)

Diseases

01 Glomerulo nephritis
02 Nephrosis
03 Pyelonephritis
04 Accute Cystitis
05 Chronic Cystitis
06 Tumors of Bladder
07 Stones in urinary tract
08 Vaginal discharge
09 No diagnosis
10 Congenital anomalies, Urethra
11 Urethritis (N.S.)*
12 Phimoses
13 Congenital anomalies, Genitalia
14 Gonorrhea
15 Crypto orchidia
16 Orchidoepididimitis
17 Prostatitis
18 Vulvovaginitis
19 Cervicitis
20 Amenorrhea
21 Aborption (N.S.)*
22 Complication during delivery
23 Tumors, Urogenitals
24 No diagnosis
25 Pregnancy
26 Delivery
27 Puerperal fever
28 Vaginal hemorrhage

*(N.S.) = Not specified or non specific.

Protocol for Coding Diseases

Metabolic and Endocrine System (09)

Symptomes

61 Menopause
62 Loss of weight-thinness
63 Hair depigmentation
64 Malnutrition

Diseases

01 Congenital abnormalities
02 Thyroiditis
03 Hyperthyroidism
04 Hypothyroidism
05 Diabetes Mellitus
06 Tumors
07 Kwashiarkor
08 Marasmus
09 Avitaminoses A
10 Pellagra
11 Beri-beri
12 Other defficiencies, Complex B
13 Rickets
14 High blood sugar levels
15 Ca of Thyroid

Protocol for Coding Diseases

Nervous System (10)

Symptomes	Diseases
61 Paresthesias	01 Congenital anomalies
62 Anesthesia	02 Encephalitis
63 Amnesia	03 Encephalomyelitis
64 Aphasia	04 Meningitis
65 Paralysis	05 Meningoencephalitis
66 Tics	06 Neuritis
67 Vertigo	07 Corea
68 Sizures	08 Epilepsy
69 Insomnia	09 Tumors
	10 C.V.A.
	11 Convulsive dissorders (N.S.)*
	12 Headache

*(N.S.) = Not specified or non specific.

Protocol for Coding Diseases

Senses (11)

Symptoms		Diseases	
61	Blurred vision	01	Congenital anomalies
62	Night blindness	02	Keratitis
63	Burning itching eyes	03	Ulcers of the cornea
64	Blindness	04	Stye
65	Deafness	05	No Diagnosis
66	Ear che	06	Tumors
67	Anosmia	07-09	No Diagnoses
68	Drainage from ear	10	Conjuntivitis (N.S.)*
69	Foreign body, ear	11	Otitis (N.S.)*

*(N.S.) = Not specified or non specific.

INSTITUTE OF NUTRITION OF CENTRAL AMERICA AND PANAMA
Program of Nutrition and Gastrointestinal Function
Division of Biology and Human Nutrition

Form 25

MORBIDITY - HOUSE VISITS

Name: _____ Age: _____

1- 5	Location	6- 9	Blocked
10	Sex	11-12	Day of visit

COLUMNS	SYSTEM	DISEASE OR SYMPTOM	CRITERIA	DISEASE NAME
13-17				
18-22				
23-27				
28-32				
33-37				
38-42				
43-47				

48-49		Blocked
50-51		Number of sms/day

SPECIAL INFORMATION

52-56		Date when menstruation started
57-58		Menstrual duration (days)
59		Duration of pregnancy (months)

60-61		Blocked
62-65		Month and year
66-67		Surveyor's code
68-69	2	Form number
70-72		Family number
73-76		No. of individual
77		Validation

Criteria For the Diagnosis of Selected Diseases

Most of these diagnoses must be validated by the M.D. if they are made by the auxiliary nurse or surveyor during house visits.

Measles

Highly infecto-contagious disease which usually affects small children. It is characterized by fever and a generalized eruption formed by small red macules. It is usually associated with conjuctivitis, pharyngitis and occasionally clinical evidence of a flu-like syndrome. Fever is an important symptom of this disease. Notify M.D.

Chickenpox

Infecto-contagious disease of infancy characterized by a maculose eruption at the beginning which, within 2 or 3 days, become vesicles, many of them full of pus; fever and a flu-like syndrome are frequently present. Conjuctivitis, pharyngitis and large lymphnodes are rarely seen. Notify M.D.

Rubella

Infecto-contagious disease which predominantely affects small children but can also affect adults. Characterized by a generalized eruption of large macules; fever usually is only mild and conjuctivitis and pharyngitis are practically never seen. Large lymphnodes are present in the area of the neck. This disease may produce damage to a fetus, therefore, special care should be taken with a pregnant woman that develops this disease. The M.D. should be notified.

Common Cold

Respiratory disease that affect children and adults. It is characterized by nasal congestion, runny nose, general malaise and sometimes

cough. Fever is absent or very mild. May be present in short-lived and limited epidemics.

Flu

Respiratory infection characterized by similar symptomes as those of common cold but of a more severe intensity. Fever is always present and complicatons such as pneumonia are frequently seen. It occurs only in epidemics of variable intensity. Notify M.D. in case of complications.

Tonsilitis

Infectious disease of children and adults characterized by high fever, sore throat and swollen cervical lymphnodes. This diagnosis is made by examining the throat of the sick person. Cases in which it is not possible to examine the throat will be codified as sore throat.

Mumps

Infecto-contagious disease that mostly affect children and only on occasions adults. Characterized by moderate fever, painful and swollen salivary glands (located in the posterior angle of the lower maxilary bone). To make this diagnosis, the nurse should palpate the swollen glands. Notify M.D.

Kwashiorkor

One form of severe malnutrition of children characterized by generalized swelling (specially legs and face), depigmented and loosely fixed hair (sometimes redish color), protuberant abdomen, paleness of mucosas, poor general conditions of the child. Notify M.D.

Marasmus

Another severe form of infantile malnutrition usually seen in children below 3 years of age. The child is literally reduced to skin and Bones. Notify M.D.

Diarrhea

This diagnosis is used when the person interviewed, adult or child, is considered to have suffered or is suffering of "asientos" (liquid-semiliquid BMS). Additional criteria are "absence of blood and mucus in the stools," no fever, severe systemic symptomes or cramps.

Disentery

When there are severe systemic symptomes, fever, cramps or blood and mucus in the stools. It usually occurs in epidemics.

Appendix VII and VIII

Sanitation and Health Education

Simplified Protocol

Annual Sanitation Survey

FORM 04

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY ADDRESS IDENTIFICATION 1 Block number 2 House Number
6-20	NAME OF MALE HEAD OF HOUSEHOLD
21-22	FAMILY POSITION OF PERSON INTERVIEWED
23	SEX OF PERSON INTERVIEWED
24	THE HOUSE OR PROPERTY IS: 1 Owned 2 Rented 3 Freely given 4 Estate property 5 Kept for someone else 6 Other arrangement
25	GENERALLY, WHAT TYPE OF LIGHTING IS USED IN THE HOME? 1 None 2 Kerosene lamp 3 Gas lamp 4 Candles 5 Candil 6 Electric
26	IS THERE ANYONE IN THE HOUSE WITH A RADIO? 0 No 1 Yes
27	DO THE ANIMALS REMAIN IN THE HOUSE OVERNIGHT? 0 No 1 Yes
28	DO YOU USE ANIMAL DUNG AS FERTILIZER? 0 No 1 Yes

Columns	Description
29	HOW DO YOU USUALLY GET RID OF YOUR GARBAGE? 1 Throw it into the bushes 2 Throw it into the yard 3 Use it as fertilizer 4 Burn it 5 Bury it 6 Throw it into the street
30	WHERE DO YOU DEFECATE WHEN YOU ARE AT HOME DURING THE DAY? 1 In the latrine 2 In a special place in the yard 3 In the bushes 4 In the ditch 5 By the river 6 In the ravine 7 Nowhere in particular
31-32	WHERE DO YOU DEFECATE WHEN YOU HAVE TO GO IN THE MIDDLE OF THE NIGHT? 1 In the latrine 2 Near the house 3 In the yard 4 In the chamber-pot 5 In the bushes 6 In the ditch 7 By the river 8 In the ravine 9 In the street 10 Don't go out
33-34	WHAT IF IT IS RAINING HEAVILY, WHAT DO YOU DO? (USE SAME CODES AS FOR PREVIOUS QUESTION)
35	EVERYONE KNOWS THAT CHILDREN DEFECATE FREQUENTLY. WHERE DO YOU USUALLY PERMIT THEM TO DO IT? 1 Anywhere 2 Behind the house 3 In the diaper 4 In the bushes 5 In the chamber-pot 8 Not applicable
31	IF THE CHILDREN DEFECATE INSIDE THE HOUSE, WHAT DO YOU DO WITH THE FECES? 1 Throw it out the door 2 Put it where one stores the dung 3 Throw it into the bushes 4 Put it into the latrine 5 The animals clean it up 8 Not applicable

Columns	Description
37	WHERE DO YOU NORMALLY CLEAN THE PLATES AND KITCHEN UTENSILS? 1 At home 2 At the public sinks 3 In the river 4 In the ditch 5 At some other location 8 Not applicable
38	DO YOU HAVE A BASIN USED ONLY FOR CLEANING PLATES? 0 No 1 Yes
39	WHAT DO YOU NORMALLY USE FOR CLEANING THE PLATES AND KITCHEN UTENSILS? 1 Water and soap 2 Water and sand 3 Water only 4 Only wipes off the remains, without the use of water 5 Ashes 8 Not applicable
40	BY CHANCE, DID YOU HAPPEN TO CLEAN THE PLATES AND KITCHEN UTENSILS AFTER THE LAST MEAL? 0 No 1 Yes
41	WHEN YOU WISH TO TAKE WATER FROM A BIG CONTAINER, DO YOU DIP IN A CUP TO GET IT? 0 No 1 Yes
42	DO YOUR HANDS GET WET PUTTING THE CUP INTO THE WATER, OR WHEN POURING WATER OUT OF THE CONTAINER? 0 Never 1 Sometimes 2 Always 3 Don't know
43	HOW OFTEN DO YOU CLEAN YOUR WATER CONTAINERS? 1 At least daily 2 At least twice a week 3 At least weekly 4 Less than weekly 8 Not applicable
44	WHEN DO YOU WASH YOUR HANDS? 1 Before eating and after defecating 2 Before preparing food 3 Before eating 4 After defecating

Columns	Description
	5 After dirtying the hands 6 On getting up in the morning 7 Every now and then
45	DO YOU HAVE A BASIN FOR WASHING HANDS? 0 No 1 Yes
46	AFTER WASHING THEM, WITH WHAT DO YOU DRY THEM? 1 Towel 2 Skirt or blouse 3 Apron 4 Cloth 5 Handkerchief 6 Napkin
47	HOW OFTEN DO YOU BATHE YOURSELF COMPLETELY? 1 At least daily 2 At least twice a week 3 At least weekly 4 At least twice a month 5 Less than twice a month 9 Don't know
48	BY CHANCE DID YOU GIVE YOUR YOUNGEST CHILD A COMPLETE BATH YESTERDAY? 0 No 1 Yes 8 Not applicable
49	DO YOU USE SOAP WHEN YOU WASH YOUR CLOTHES? 0 No 1 yes 8 Not applicable
50	DO YOU USE SOAP WHEN YOU WASH THE PLATES? 0 No 1 Yes 8 Not applicable
51	DO YOU USE SOAP WHEN YOU WASH YOUR HAIR? 0 No 1 Yes
52	DO YOU USE SOAP WHEN YOU BATHE? 0 No 1 Yes
53	DOES YOUR HUSBAND WEAR SANDALS OR SHOES WHEN HE WORKS IN THE FIELDS?

Columns	Description
	0 No 1 Yes 8 Not applicable 9 Don't know
54	DOES HE WEAR THEM AT HOME? 0 No 1 Yes 8 Not applicable
55	DOES HE WEAR THEM SUNDAYS, FOR FIESTAS OR FOR MAKING VISITS? 0 No 1 Yes 8 Not applicable 9 Don't know
56	DO YOUR CHILDREN WEAR SHOES OR SNADALS WHEN THEY GO TO SCHOOL? 0 No 1 Yes 8 Not applicable 9 Don't know
57	DO THEY WEAR THEM AT HOME? 0 No 1 Yes 8 Not applicable
58-61	NOT USED
62-67	DATE OF SURVEY 1 Day 2 Month 3 Year
68	SURVEYOR 1 INCAP 2 UNC
69-70	INTERVIEWER IDENTIFICATION
71-72	FORM IDENTIFICATION
73-76	INTERVIEWEE IDENTIFICATION NUMBER

INCAP-UNC STUDY

DEVELOPMENT AND EVALUATION OF MEASURES TO REDUCE FOOD WASTE CAUSED BY INTESTINAL DISEASE

HOUSE SANITATION FORM

INTERVIEW SECTION FORM 04

COMMUNITY
1. Florida Acaitumo ( )
2. Guanagazapa ( )

FAMILY IDENTIFICATION
Block number

House number

NAME OF HEAD OF HOUSEHOLD

The Informant is to be the wife or woman of the head of the household. The head of the household is the financial supporter of the household. The household, for the purposes of this survey is that number of people eating from the same cooking facilities.

IDENTIFICATION OF PERSON INTERVIEWED

01	Family head-male	( )
02	Family head-female	( )
03	Child of family head	( )
20	Parent of family head	( )
30	Sibling of family head	( )
40	Nephew or niece of family head	( )
50	Grandchild of family head	( )
60	Other step-or religious relationship	( )
70	No familial relationship to family head	( )

SEX
1. Male
2. Female

NAMES OF INTERVIEWERS (INCAP & UNC)

1. IS THE HOUSE OR PROPERTY
   1 Owned? ( )
   2 Rented? ( )
   3 Given free? ( )
   4 Owned by the Finca ? ( )
   5 Other arrangement? ( )

2. USUALLY, WHAT MEANS OF LIGHTING DO YOU HAVE IN THE HOUSE?
   0 None ( )
   1 Kerosene lamp ( )
   2 Pressure lamp ( )
   3 Candles ( )
   4 Electricity ( )
   5 Other ( )

3. DOES ANYONE IN THE HOUSEHOLD HAVE A RADIO?
   0 No ( ) 1 Yes ( )

4. DO THE ANIMALS STAY IN THE HOUSE OVERNIGHT?
   0 No ( ) 1 Yes ( )

5. IS ANIMAL EXCRETA USED AS FERTILIZER?
   0 No ( ) 1 Yes ( )

6. WHAT IS THE MOST USUAL WAY OF GARBAGE DISPOSAL?
   1 Thrown away into the underbrush ( )
   2 Thrown away in the yard ( )
   3 Used as fertilizer ( )
   4 Burned ( )
   5 Buried ( )
   6 Other means of disposal ( )

7. WHERE DO YOU DEFECATE WHEN YOU ARE AT HOME DURING THE DAY?
   1 In the latrine ( )
   2 In a special place in the yard ( )
   3 In the underbrush ( )
   4 In the ditch ( )
   5 In the river ( )
   6 In the gully ( )
   7 No special area ( )

8. WHERE DO YOU DEFECATE IF YOU HAVE TO IN THE MIDDLE OF THE NIGHT?
   01 In the latrine ( )
   02 In a special place in the yard ( )
   03 In any part of the yard ( )
   04 In a chamber-pot ( )
   05 In the underbrush ( )
   06 In the ditch ( )
   07 In the river ( )
   08 In the gully ( )
   09 In the street ( )

9. IF IT IS RAINING HEAVILY WHERE DO YOU GO?
   01 In the latrine ( )
   02 In a special place in the yard ( )
   03 In any part of the yard ( )
   04 In a chamber-pot ( )
   05 In the underbrush ( )
   06 In the ditch ( )
   07 In the river ( )
   08 In the gully ( )
   09 In the street ( )

10. ALL YOUNG CHILDREN HAVE TO MAKE "POPO" FREQUENTLY. WHERE DO YOU USUALLY ALLOW THEM TO DO IT?
   1 Anywhere ( )
   2 In special places only ( )
   3 Must be far from the house ( )
   4 Must be in the underbrush ( )
   5 In a chamber pot ( )

11. IF THE BABY DOES "POPO" IN THE HOUSE WHAT DO YOU USUALLY DO WITH THE MESS?
   1 Put it out the door ( )
   2 Put it on the rubbish or manure pile ( )
   3 Put it into the underbrush ( )
   4 Put it in the latrine area ( )

12. WHERE DO YOU NORMALLY CLEAN THE PLATES AND COOKING UTENSILS?
   1 At home ( )
   2 At the pila ( )
   3 In the river ( )
   4 In the ditch ( )
   5 Another place ( )

13. DO YOU HAVE A SPECIAL BASIN FOR CLEANING DISHES?
    0 No ( ) 1 Yes ( )

14. WHAT DO YOU USUALLY USE TO CLEAN THE PLATES AND COOKING UTENSILS?
    1 Water and soap ( )
    2 Water and sand ( )
    3 Water only ( )
    4 Scraping clean (no water used) ( )
    5 Other means ( )

15. DID YOU HAPPEN TO CLEAN THE PLATES AND COOKING UTENSILS AFTER THE LAST MEAL?
    0 No ( ) 1 Yes ( )

16. WHEN YOU WANT TO TAKE SOME WATER FROM A BIG WATER CONTAINER, DO YOU DIP A CUP INTO THE WATER?
    0 No ( ) 1 Yes ( )

17. DO YOUR HANDS GET WET WHEN YOU USE A CUP FOR TAKING WATER OR WHEN YOU POUR OUT WATER?
    0 Never ( ) 1 Sometimes ( )
    2 Always ( ) 3 Don't know ( )

18. HOW OFTEN DO YOU CLEAN OUT THE WATER CONTAINERS?
    1 At least daily ( )
    2 At least twice weekly ( )
    3 At least weekly ( )
    4 Less than weekly ( )

19. WHEN DO YOU WASH YOUR HANDS?
    1 Before eating and defecating ( )
    2 Before preparing food ( )
    3 Before eating ( )
    4 After defecating ( )
    5 After dirtying the hands ( )
    6 On getting up in the morning ( )
    7 Never ( )
    8 Don't know ( )

20. DO YOU HAVE A WASH BASIN?
    0 No ( ) 1 Yes ( )

21. AFTER WASHING WITH WHAT DO YOU DRY YOURSELF?
    1 With a towel
    2 With the skirt or blouse
    3 With the apron
    4 Other means

22. HOW FREQUENTLY DO YOU TAKE A COMPLETE BATH?
    1 At least daily
    2 At least twice weekly
    3 At least weekly
    4 At least twice monthly
    5 Less than twice monthly
    6 Don't know

23. DID YOU HAPPEN TO GIVE YOUR YOUNGEST CHILD A COMPLETE BATH YESTERDAY?
    0 No ( ) 1 Yes ( )

24. DO YOU USE SOAP WHEN WASHING THE CLOTHES?
    0 No ( ) 1 Yes ( )

25. DO YOU USE SOAP WHEN WASHING THE DISHES?
    0 No ( ) 1 Yes ( )

26. DO YOU USE SOAP WHEN WASHING YOUR HAIR?
    0 No ( ) 1 Yes ( )

27. DO YOU USE SOAP WHEN BATHING?
    0 No ( ) 1 Yes ( )

28. DOES YOUR HUSBAND WEAR SANDALS OR SHOES IN THE FIELDS?
    0 No ( ) 1 Yes ( )

29. DOES HE WEAR THEM AT HOME?
    0 No ( ) 1 Yes ( )

30. DOES HE WEAR THEM ON SABBATHS, FIESTAS OR WHEN VISITING?
    0 No ( ) 1 Yes ( )
    2 N.A. ( ) 3 Don't know ( )

31. DO YOUR CHILDREN WEAR SANDALS OR SHOES AT SCHOOL?
0 NO ( ) 1 Yes ( ) 2 N.A. ( ) 3 Don't know ( ) [ ] 66

32. DO YOUR CHILDREN WEAR THEM AT HOME?
0 NO ( ) 1 Yes ( ) 2 N.A. ( ) [ ] 67

DATE OF INTERVIEW [ ] 63 65
Day
Month [ ] 64 65
Year [ ] 66 67

IDENTIFICATION OF INTERVIEWER [ ] 68

1 INCAP 2 UNC

SUBJECT KEY [ ] 69 70

CARD TYPE [0 4] 71 72

CARD NUMBER [0 0 0 1] 73 74

Simplified Protocol

Annual Sanitation Survey

FORM 05

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY ADDRESS IDENTIFICATION 1 Block number 2 House number
6-20	NAME OF MALE HEAD OF HOUSEHOLD
21-22	IDENTIFICATION OF PERSON BEING INTERVIEWED
23	SEX
24-25	WHAT DO YOU THINK IS THE PRINCIPAL CAUSE OF DIARRHEA? 1 Cold weather 2 Water 3 Microbes 4 Worms 5 Hot weather 6 Bad digestion 7 Tooth loss, in children 8 Flies 9 Bad foods 10 Overeating 11 Suffering hunger 12 Weakness 13 Infection of the liver 14 Hot or cold liver 15 Anaemia 16 Bathing too much 17 Inflammation of the stomach 18 Defecating on the ground 19 It comes from other homes 20 Don't know
26	DO YOU KNOW A WAY OF CURING DIARRHEA? 1 There is no way of curing it 2 Medicine 3 Diet 4 Local medicine 5 Cleanliness 6 Other way 9 Don't know

Columns	Description
27	DO YOU KNOW SOME WAY OF AVOIDING DIARRHEA? 1 There is no way of preventing it 2 Medicine 3 Diet 4 Cleanliness 5 Don't suffer hunger 6 Don't overeat 7 Local medicine 8 Well-cooked food 9 Don't know
28	DO PEOPLE THINK THAT DIARRHEA MERITS MUCH ATTENTION? 0 No 1 Yes 9 Don't know
29	DO YOU THINK THAT SOMETHING OUGHT TO BE DONE TO PREVENT DIARRHEA? 0 No 1 Yes 9 Don't know
30	WHO DO YOU THINK SHOULD BE THE PERSON WITHIN THE FAMILY RESPONSIBLE FOR PREVENTING DIARRHEA? 1 The father 2 The mother 3 The parents 4 The grandmother 5 Other members 6 The entire family 9 Don't know
31-32	WHO IN THE COMMUNITY SHOULD BE RESPONSIBLE FOR DOING SOMETHING TO PREVENT DIARRHEA? 1 Doctor 2 Nurse 3 Health worker 4 Sanitation inspector 5 Teacher 6 Native healer, <u>curandero</u> 7 Mayor 8 All the mothers 9 Government 10 There is no one who can do it 11 Other 99 Don't know
33	WOULD YOU LIKE TO LEARN NEW METHODS OF PREVENTING DIARRHEA IN CHILDREN? 0 No 1 Yes

Columns	Description
34	ARE PEOPLE PREPARED TO HELP, IF IT IS DECIDED THAT SOMETHING SHOULD BE DONE? 0 No 1 Yes 9 Don't know
35-36	WHAT DO PEOPLE BELIEVE IS THE CAUSE OF CONTAGIOUS DISEASES? 1 Transmission by micro-organisms 2 By nearness 3 By personal contact 4 Dirt 5 Bad airs 6 Supernatural causes 7 Other causes 8 Flies or mosquitoes 9 Breath 10 Using the same utensils 11 Lack of medicine 12 Sleeping together 13 Bad humours (body imbalance) 14 Body weakness 15 Water 16 Climate 17 Washing too much 99 Don't know
37	DO YOU BELIEVE THAT FLIES ARE DANGEROUS TO ONE'S HEALTH? 0 No 1 Yes 9 Don't know
38	IF SO, WHY? 1 They carry microbes 2 Flies transmit diseases 3 Flies contaminate food 4 Flies walk on dirty things 5 Flies are a nuisance 6 Flies are dirty 8 Not applicable 9 Don't know
39-49	WHAT DO YOU BELIEVE CAN BE DONE TO FIGHT FLIES? 1 Fumigate with insecticide 2 Put up fly-paper 3 Use poison 4 Hit them with something 5 Keep the latrine clean and closed

Columns	Description
	6 Maintain the house and yard clean 7 Don't let animals into the house 8 Cover the food 9 Keep one's body clean 10 Shoo them away 11 It's the government's responsibility 12 You can't prevent flies 13 Other 99 Don't know
41	DO YOU HAVE A LATRINE ON YOUR PROPERTY? 0 No 1 Yes
42	HAVE YOU EVER SEEN A LATRINE? 0 No 1 Yes
43	HAVE YOU EVER USED A LATRINE? 0 No 1 Yes
44	DO PEOPLE LIKE TO USE LATRINES? 0 No 1 Yes
45	ARE YOU ACCUSTOMED TO BOILING DRINKING WATER ONLY FOR SICK PEOPLE? 0 No 1 Yes
46	DO YOU BELIEVE THAT IT IS NECESSARY TO BOIL WATER FOR DRINKING FOR HEALTHY PEOPLE? 0 No 1 Yes 9 Don't know
47	WHO IS THE MOST IMPORTANT PERSON IN THE FAMILY THAT KNOWS ABOUT ILLNESS? 1 Grandfather 2 Grandmother 3 Husband 4 The informant or mother 5 Parents 6 Others 7 None of them 9 Don't know

Columns	Description
48-49	WHO IS THE MOST IMPORTANT PERSON IN THE COMMUNITY TO DEAL WITH ILLNESSES? 1 Doctor 2 Nurse 3 Health worker 4 Sanitation inspector 5 Curandero 6 Mayor 7 Teacher 8 Judge 9 Military commisioner 10 Store-owners 11 Go to Escuintla 12 There is no one 99 Don't know
52-53	WHERE IS THE BEST PLACE IN THE COMMUNITY FOR GIVING THESE TALKS? 1 In the home 2 Health center 3 School 4 Church 5 Municipal buildings 6 Marketplace 7 Central park 9 Other location 99 Don't know
54-61	NOT USED.
62-67	DATE OF SURVEY 1 Day 2 Month 3 Year
68	SURVEYOR 1 INCAP 2 UNC
69-70	INTERVIEWER IDENTIFICATION
71-72	FORM IDENTIFICATION
73-76	INTERVIEWEE IDENTIFICATION NUMBER

INCAP-UNC STUDY

DEVELOPMENT AND EVALUATION OF MEASURES TO REDUCE FOOD WASTE CAUSED BY INTESTINAL DISEASE

HOUSE SANITATION FORM

INTERVIEW SECTION

COMMUNITY
1. Florida Acaitumo ( )
2. Guamaganaga ( )

FAMILY IDENTIFICATION
Block number

House number

NAME OF HEAD OF HOUSEHOLD

The Informant is to be the wife or women of the head of the household. The head of the household is the financial supporter of the household. The household, for the purposes of this survey is that number of people eating from the same cooking facilities.

IDENTIFICATION OF PERSON INTERVIEWED
01 Family head-male ( )
02 Family head-female ( )
03 Child of family head ( )
20 Parent of family head ( )
30 Sibling of family head ( )
40 Nephew or niece of family head ( )
50 Grandchild of family head ( )
60 Other step-or religious relationship ( )
70 No familial relationship to family head ( )

SEX
1. Male
2. Female

NAMES OF INTERVIEWERS (INCAP & UNC)

33. WHAT IS THE PRINCIPAL CAUSE OF DIARRHEA?
01 The weather ( )
02 Water ( )
03 Microbes ( )
04 Worms ( )
05 Heat ( )
06 Bad digestion ( )
07 Teething ( )
08 Flies ( )
09 Other cause, specify_____ ( )
10 Don't know ( )

34. DO YOU KNOW A WAY OF TREATING DIARRHEA?
1 Nothing is successful ( )
2 Medicine ( )
3 Diet ( )
4 Purging ( )
5 Cleanliness ( )
6 Other treatment, specify_____ ( )
7 Don't know ( )

35. DO YOU KNOW OF A WAY TO PREVENT DIARRHEA?
1 There is no way to prevent it ( )
2 Medicine ( )
3 Diet ( )
4 Cleanliness ( )
5 Other prevention, specify_____ ( )
6 Don't know ( )

36. DO PEOPLE THINK THAT DIARRHEA MERITS MUCH ATTENTION?
0 No ( ) 1 Yes ( ) 3 Don't know ( )

37. DO YOU THINK THAT SOMETHING SHOULD BE DONE TO PREVENT DIARRHEA?
0 No ( ) 1 Yes ( ) 3 Don't know ( )

38. WHO IN THE FAMILY DO YOU THINK SHOULD BE RESPONSIBLE FOR PREVENTING DIARRHEA?
1 Father ( )
2 Mother ( )
3 Grandmother ( )
4 Other members, specify_____ ( )
5 Entire family ( )
6 Don't know ( )

39. WHO IN THE COMMUNITY SHOULD BE RESPONSIBLE FOR DOING SOMETHING TO PREVENT DIARRHEA?
1 Doctor
2 Nurse
3 Health worker
4 Sanitation inspector
5 School teacher
6 Curandero
7 Mayor
8 Other, specify_____
9 Don't know

40. WOULD YOU LIKE TO LEARN NEW WAYS OF PREVENTING YOUR CHILDREN FROM GETTING DIARRHEA?
0 No ( ) 1 Yes ( ) 3 Don't know ( )

41. ARE PEOPLE PREPARED TO HELP IF IT IS DECIDED THAT SOMETHING SHOULD BE DONE?
0 No ( ) 1 Yes ( ) 3 Don't know ( )

42. WHAT DO PEOPLE THINK IS THE CAUSE OF CONTAGIOUS DISEASES?
1 Micro-organism transmission
2 By infection
3 Personal contact
4 Dirt
5 Bad air
6 Supernatural causes
7 Other cause, specify_____
0 Don't know

43. DO YOU THINK THAT FLIES ARE DANGEROUS TO HEALTH?
0 No ( ) 1 Yes ( ) 2 Don't know ( )

44. (IF YOU THINK SO) WHY?
1 Flies carry disease
2 Flies contaminate food
3 Flies walk on dirty things
4 Flies are a nuisance
5 Flies are dirty
6 Other reply, specify_____
7 Don't know

45. WHAT DO YOU THINK COULD BE DONE TO COMBAT FLIES?
01 Spray with insecticide ( )
02 Keep latrine clean and covered ( )
03 Keep house and yard clean ( )
04 Keep animals out of the house ( )
05 Cover food ( )
06 Keep body clean ( )
07 Shoo them away ( )
08 Local remedy, specify_____ ( )
09 It is up to the Government ( )
10 One cannot prevent flies ( )
11 Don't know ( )
12 Other reply, specify_____ ( ) 37 38

46. IS THERE A LATRINE ON THE PROPERTY? 39
0 No ( ) 1 Yes ( )
(If answer is yes go to question 49)

47. HAVE YOU EVER SEEN A LATRINE? 40
0 No ( ) 1 Yes ( ) 2 N.A. ( )

48. HAVE YOU EVER USED A LATRINE? 41
0 No ( ) 1 Yes ( ) 2 N.A. ( )

49. DO PEOPLE LIKE TO USE LATRINES? 42
0 No ( ) 1 Yes ( ) 3 Don't know ( )

50. IS IT THE CUSTOM TO BOIL WATER FOR DRINKING ONLY FOR SICK PEOPLE? 43
0 No ( ) 1 Yes ( )

51. DO YOU THINK IT IS NECESSARY TO BOIL DRINKING WATER FOR HEALTHY PEOPLE? 44
0 No ( ) 1 Yes ( ) 3 Don't know ( )

52. WHO IS THE MOST IMPORTANT PERSON IN THE FAMILY WHO HAS KNOWLEDGE ABOUT SICKNESSES?
1 Grandfather ( )
2 Grandmother ( )
3 Husband ( )
4 Self ( )
5 Others, specify_____ ( ) 45
6 Don't know ( )

53. WHO IS THE MOST IMPORTANT PERSON IN THE COMMUNITY TO SPEAK TO ABOUT ILLNESSES?
1 Doctor ( )
2 Nurse ( )
3 Health worker ( )
4 Sanitation inspector ( )
5 Curandero ( )
6 Mayor ( )
7 School teacher ( )
8 Other, specify_____ ( )
9 Don't know ( ) 46

54. WHO DO YOU BELIEVE IS THE MOST APPROPRIATE PERSON TO TALK ABOUT HEALTH AND SICKNESS?
1 Doctor ( )
2 Nurse ( )
3 Health worker ( )
4 Sanitation inspector ( )
5 Curandero ( )
6 Mayor ( )
7 School teacher ( )
8 Other, specify_____ ( )
9 Don't know ( ) 47

55. WHICH IS THE BEST PLACE IN THIS VILLAGE FOR DOING THE TEACHING?
1 At home ( )
2 At the health center ( )
3 At the school ( )
4 At the church ( )
5 At the town hall ( )
6 Other place, specify_____ ( )
7 Don't know ( ) 48

DATE OF INTERVIEW
Day 58 59
Month 60 61
Year 62 63

IDENTIFICATION OF INTERVIEWER
1 INCAP 2 UMC 64

SUBJECT KEY 65 70

CARD TYPE 01 71 72

CARD NUMBER 0002 73 76

Simplified Protocol

Annual Sanitation Survey

FORM 06

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY ADDRESS 1 Block Number 2 House Number
6-20	NAME OF PERSON INTERVIEWED 1 First Name 2 Last Name
21	SEX 1 Male 2 Female
22	HOUSE AND ENVIRONS FRONT GATE 0 No (absent) 1 Yes (present)
23	HOUSE TYPE 1 Separate (individual unit) 2 Attached (duplex)
24-34	NUMBER OF ROOMS 1 Bedrooms 2 Kitchens 3 Eating rooms 4 Living rooms 5 Storerooms 6 Chapel 7 Shop 8 Bath-house 9 Oven
35	SEPARATION OF BEDROOM AND KITCHEN 1 Bedroom and kitchen are one room 2 Partition between bedroom and kitchen 3 Kitchen attached to principal structure 4 Bedroom and kitchen are separate structures

Columns	Description
36-39	ROOF MATERIALS-BEDROOM/LIVING ROOM 1 Straw and palm 2 Metal 3 Asbestos 4 Tile
40-47	WALL MATERIALS-BEDROOM/LIVING ROOM 1 Sheet plastic 2 Cane 3 Bamboo 4 Irregular wood pieces, sticks 5 Irregular planks 6 Regular planks 7 Adobe 8 Concrete blocks
48-50	FLOOR MATERIALS-BEDROOM/LIVING ROOM 1 Earth 2 Cement 3 Tile
51	PERCENT OF FLOOR CEMENTED OR TILED-BEDROOM/LIVING ROOM 0 0 percent 1 25 percent 2 50 percent 3 75 percent 4 100 percent
52	NUMBER OF UNLOCKED DOORS
53	NUMBER OF UNLOCKED WINDOWS
54-57	NUMBER AND TYPES OF BEDS 1 Mats 2 Hammock-child 3 Hamock-adult 4 Frame bed
58-60	ROOF MATERIALS-KITCHEN 1 Straw and palm 2 Metal 3 Tile
61	NUMBER OF COMPLETE OUTSIDE WALLS-KITCHEN 0 None 1 One 2 Two 3 Three 4 Four
62-67	DATE OF SURVEY
68	NOT USED

Columns	Description
69-70	IDENTIFICATION NUMBER OF SURVEYOR
71-72	CARD NUMBER
73-76	IDENTIFICATION NUMBER OF HEAD OF HOUSEHOLD

INCAP-UNC STUDY

DEVELOPMENT AND EVALUATION OF MEASURES TO REDUCE

FOOD WASTE CAUSED BY . .ESTINAL DISEASE

HOUSE SANITATION FORM

OBSERVATION SECTION FORM 06

COMMUNITY

1 Florida Aceituno
2 Guanagazapa

IDENTIFICATION OF THE FAMILY

Block number

House number

NAME OF PERSON INTERVIEWED

SEX

1 Male
2 Female

------HOUSE AND PROPERTY CHARACTERISTICS-----

FRONT GATE

0 No
1 Yes

HOUSE TYPE

1 Separate
2 Attached

ROOM AND STRUCTURE QUANTIFICATION

Bedroom

Kitchen

Eating Room

Living Room

Storeroom

Room

Chapel

Shop

Bath-house

Temascal

Oven

BEDROOM AND KITCHEN ARRANGEMENTS

1 Bedroom and kitchen are one room
2 Partitioning between bedroom and kitchen areas
3 Kitchen attached to main structure
4 Bedroom and kitchen are separate structures

CHARACTERISTICS OF THE BEDROOM/LIVING ROOM

ROOF MATERIALS

Straw and palm

Metal

Asbestos

Tile

WALL MATERIALS

Sheet plastic

Cane

Bamboo

Irregular wood pieces

Irregular planks

Regular planks

Adobe

Concrete blocks

FLOOR MATERIALS

Earth

Cement

Tile

PERCENTAGE OF FLOOR CEMENTED OR TILED

0 Zero percent

1 Twenty-five percent

2 Fifty percent

3 Seventy-five percent

4 One hundred percent

NUMBER OF UNLOCKED DOORS

NUMBER OF UNLOCKED WINDOWS

SLEEPING FACILITIES (ALL SLEEPING AREAS INCLUDED)

NUMBER AND TYPES OF BEDS

Mats

Hammock - Child's

Hammock - Adult's

Frame bed

CHARACTERISTICS OF THE KITCHEN

ROOF MATERIALS

Straw and palm

Metal

Tile

NUMBER OF COMPLETE OUTSIDE WALLS

DATE OF SURVEY

Day

Month

Year

I.D. OF SURVEY-TAKER

1 INCAP 2 UNC

SURVEY-TAKER NUMBER

CARD NUMBER

I.D. NUMBER OF HOUSEHOLD HEAD

Simplified Protocol

Annual Sanitation Survey

FORM 07

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY IDENTIFICATION 1 Block Number 2 House Number
6-20	NAME OF PERSON INTERVIEWED 1 First Name 2 Last Name
21	SEX 1 Male 2 Female
22-29	WALL MATERIALS/KITCHEN 1 Sheet Plastic 2 Cane 3 Bamboo 4 Irregular wood pieces 5 Irregular planks 6 Regular planks 7 Adobe 8 Concrete blocks
30-32	FLOOR MATERIALS/KITCHEN 1 Earth 2 Cement 3 Tile
33	POSITION OF HEARTH 1 On the floor 2 Raised off the floor
34	COMPOUND FOR ANIMALS 0 No (none present) 1 Yes (present)
35-41	TYPE OF ANIMALS IN COMPOUND 1 Chickens 2 Ducks

Columns	Description
	3 Turkeys 4 Guinea-pigs 5 Rabbits 6 Pigs 7 Horses
42-49	ANIMALS IN BEDROOM AT TIME OF SURVEY 0 None 1 Chickens 2 Ducks 3 Turkeys 4 Dogs 5 Cats 6 Pigs 7 Parrots
50-55	TYPE OF FECAL MATERIAL ON FLOOR-BEDROOM 0 None 1 Poultry 2 Cat 3 Dog 4 Pig 5 Human
56-61	NOT USED
62-67	DATE OF SURVEY
68	NOT USED
69-70	IDENTIFICATION NUMBER OF SURVEYOR
71-72	CARD NUMBER
73-76	IDENTIFICATION NUMBER OF HEAD OF HOUSEHOLD

INCAP-UNC STUDY

DEVELOPMENT AND EVALUATION OF MEASURES TO REDUCE

FOOD WASTE CAUSED BY INTESTINAL DISEASE

HOUSE SANITATION FORM

OBSERVATION SECTION FORM 07

COMMUNITY

1 Florida Acaitumo
2 Guamagazapa

IDENTIFICATION OF THE FAMILY

Block number

House number

NAME OF PERSON INTERVIEWED

SEX

1 Male
2 Female

------HOUSE AND PROPERTY CHARACTERISTICS-----

WALL MATERIALS/KITCHEN

Sheet plastic

Cane

Bamboo

Irregular wood pieces

Irregular planks

Regular planks

Adobe

Concrete blocks

FLOOR MATERIALS/KITCHEN

Earth

Cement

Tile

POSITION OF HEARTH

1 On the floor
2 Raised off the floor

COMPOUND FOR ANIMALS

0 No
1 Yes

TYPE OF ANIMALS IN COMPOUND

Chickens

Ducks

Turkeys

Guinea-pigs

Rabbits

Pigs

Horses

AT THE TIME OF THE SURVEY WHAT NUMBER OF ANIMALS COME INTO THE BEDROOM?

None

Chickens

Ducks

Turkeys

Dogs

Cats

Pigs

Parrots

TYPE OF FECAL MATERIAL ON THE FLOOR OF THE BEDROOM

Human

Poultry

Cat

Dog

Pig

Human

DATE OF SURVEY

Day

Month

Year

I.D. OF SURVEY-TAKER

1 INCAP 2 UNC

SURVEY-TAKER NO.

CARD NUMBER

I.D. NUMBER OF HOUSEHOLD HEAD

07

Simplified Protocol

Annual Sanitation Survey

FORM 08

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY IDENTIFICATION 1 Block Number 2 House Number
6-20	NAME OF PERSON INTERVIEWED 1 First Name 2 Last Name
21	SEX 1 Male 2 Female
22-29	ANIMALS IN KITCHEN AT TIME OF SURVEY 0 None 1 Chickens 2 Ducks 3 Turkeys 4 Dogs 5 Cats 6 Pigs 7 Parrots
30-35	TYPE OF FECAL MATERIAL ON FLOOR-KITCHEN 0 None 1 Poultry 2 Cat 3 Dog 4 Pig 5 Human
36-39	TYPE OF GARBAGE ON FLOOR-BEDROOM 0 None 1 Corn husks 2 Bottles and tins 3 Other
40	IS COOKED FOOD STORED IN KITCHEN 0 No (absent) 1 Yes (present)

Columns	Description
41	IS COOKED FOOD PROTECTED 0 Uncovered 1 Covered
42	FLIES OR OTHER INSECTS ON COOKED FOOD 0 No 1 Yes
43-48	STORAGE OF CORN 1 In a special room 2 In a special part of a room 3 At floor level 4 At roof level 5 In a steel drum 6 In no container
49-51	DRINKING WATER CONTAINERS IN HOUSE 1 Pottery 2 Plastic 3 Metal
52	PROTECTION OF DRINKING WATER IN CONTAINERS 0 None covered 1 Some covered 2 All covered
53	STORAGE CABINET/SHELVES PROVIDED FOR GLASSES AND PLATES 0 No 1 Yes
54	GLASSES AND CUPS INVERTED WHEN STORED 0 No 1 Yes
55	KITCHEN AND COOKING UTENSILS PROTECTED FROM ANIMAL CONTAMINATION 0 No 1 Yes
56	LATRINE IN USE 0 No 1 Yes
57-58	TYPE OF SEAT-LATRINE 1 Wood 2 Cement
59-61	ROOF MATERIALS-LATRINE 1 Plastic 2 Wood 3 Metal

Columns	Description
62-67	DATE OF SURVEY
68	NOT USED
69-70	IDENTIFICATION NUMBER OF SURVEYOR
71-72	CARD NUMBER
73-76	IDENTIFICATION NUMBER OF HEAD OF HOUSEHOLD

INCAP-UNC STUDY

DEVELOPMENT AND EVALUATION OF MEASURES TO REDUCE

FOOD WASTE CAUSED BY INTESTINAL DISEASE

HOUSE SANITATION FORM

OBSERVATION SECTION FORM 08

COMMUNITY

1 Florida Acaitumo
2 Guanagazapa

IDENTIFICATION OF THE FAMILY

Block number

House number

NAME OF PERSON INTERVIEWED

SEX

1 Male
2 Female

-----HOUSE AND PROPERTY CHARACTERISTICS-----

AT THE TIME OF THE SURVEY WHAT NUMBER OF ANIMALS

COME INTO THE KITCHEN (IF KITCHEN IS SEPARATE)?

None

Chickens

Ducks

Turkeys

Dogs

Cats

Pigs

Parrots

TYPE OF FECAL MATERIAL ON THE FLOOR OF THE KITCHEN?

NONE

Poultry

Cat

Dog

Pig

Human

TYPE OF GARBAGE ON THE FLOOR OF THE BEDROOM?

None

Corn-husks

Bottles & tins

Other

--------FOOD HANDLING AND STORAGE--------

IS THERE COOKED FOOD STORED IN THE KITCHEN?

0 No
1 Yes

IS COOKED FOOD PROTECTED?

0 Uncovered
1 Covered

ARE FLIES OR OTHER INSECTS CRAWLING ON COOKED FOOD?

0 No
1 Yes

CORN IS STORED

In a special room

In a special part of a room

In the room, at floor level

In the room, at roof level

In a steel drum

In no container

TYPES AND NUMBERS OF DRINKING-WATER CONTAINERS

INSIDE THE HOUSE

Pottery

Plastic

Metal

DRINKING-WATER CONTAINER PROTECTION

0 None covered

1 Some covered

2 All covered

SPECIAL STORAGE CABINET OR SHELVES FOR GLASSES, PLATES?

0 No
1 Yes

ARE GLASSES OR CLEAN CUPS INVERTED WHEN STORES?

0 No
1 Yes

ARE KITCHEN OR COOKING UTENSILS SAFE FROM ANIMAL CON-TAMINATION?

0 No
1 Yes

LATRINE ON THE PROPERTY IN USE ?

0 No
1 Yes

TYPE OF SEAT

Wood

Cement

ROOF MATERIALS

Plastic

Wood

Metal

DATE OF SURVEY

Day

Month

Year

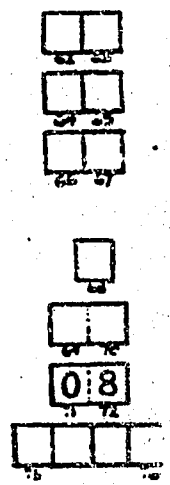
I.D. OF SURVEY-TAKER

1 INCAP 2 UNC

SURVEY-TAKER NO.

CARD NUMBER

I.D. NUMBER OF HOUSEHOLD HEAD



Simplified Protocol

Annual Sanitation Survey

FORM 09

Columns	Description
1-21	IDENTIFICATION
22-26	WALL MATERIALS-LATRINE 0 None 1 Plastic 2 Cloth 3 Wood 4 Metal
27	ADULT FLIES PRESENT IN LATRINE 1 Present 2 Absent
28	WELL COVERED AT TIME OF SURVEY 0 No cover 1 Partial 2 Complete
29-34	PROTECTION OF WELL FROM SURFACE WATER 0 No parapet 1 Tire parapet 2 Cement slab 3 Earthen parapet
33	WELL BUCKET ON GROUND 0 No 1 Yes
34	PROTECTION OF OUTSIDE DRINKING WATER CONTAINERS 0 Uncovered 1 Covered 2 None present
35-38	CLEANLINESS OF PROPERTY 1 Garbage heaped close to house 2 Garbage heaped in uncleared area of property 3 Garbage heaped on boundary of property 4 No garbage seen
39	YARD RECENTLY SWEPT 0 No 1 Yes
40	WAS THE INFORMANT WEARING FOOTWEAR AT THE TIME OF SURVEY 0 No 1 Yes

Columns	Description
41	WAS THE INFORMANT WEARING CLEAN CLOTHES AT THE TIME OF THE SURVEY 0 No 1 Yes
42-61	NOT USED
62-67	DATE OF SURVEY
68	NOT USED
69-70	IDENTIFICATION NUMBER OF SURVEYOR
71-72	CARD NUMBER
73-76	IDENTIFICATION NUMBER OF HEAD OF HOUSEHOLD

INCAP-UNC STUDY

DEVELOPMENT AND EVALUATION OF MEASURES TO REDUCE

FOOD WASTE CAUSED BY INTESTINAL DISEASE

HOUSE SANITATION FORM

OBSERVATION SECTION FORM 09

COMMUNITY

1 Florida Aceituno
2 Guamagazapa

IDENTIFICATION OF THE FAMILY

Block number

House number

NAME OF PERSON INTERVIEWED

SEX

1 Male
2 Female

------HOUSE AND PROPERTY CHARACTERISTICS-----

WALL MATERIALS/LATRINE

None

Plastic

Cloth

Wood

Metal

ADULT FLIES IN LATRINE

1 Present
2 Absent

WELL-COVER-PROTECTION AT THE TIME OF SURVEY

0 None
1 Partial
2 Complete

WELL-SURFACE-CONTAMINATION PROTECTION

None

Tire lining

Cement lining

Protective parapet

DRAWING-BUCKET ON THE GROUND

0 No
1 Yes

DRINKING-WATER CONTAINERS OUTSIDE

0 Uncovered
1 Covered
2 None

CLEANLINESS OF THE PROPERTY

Garbage heaped close to the house in the cleared area

Garbage heaped in uncleared section of property (Monte)

Garbage heaped at the boundary of the property

No garbage seen

YARD RECENTLY SWEPT

0 No
1 Yes

IS THE INFORMANT WEARING FOOTWEAR AT THE TIME OF THE SURVEY?

0 No
1 Yes

IS THE INFORMANT WEARING CLEAN CLOTHES AT THE TIME OF THE SURVEY?

0 No
1 Yes

DATE OF SURVEY

Day

Month

Year

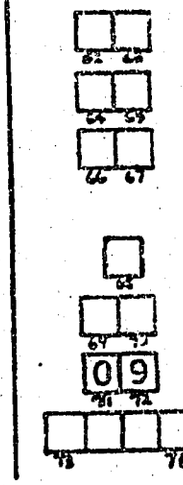
I.D. OF SURVEY-TAKER

1 INCAP 2 UNC

SURVEY-TAKER NO.

CARD NUMBER

I.D. NUMBER OF HOUSEHOLD HEAD



Protcol

FORM 21

Title: Insect survey

Purpose: To measure the density of fly population in each community

No. of versions: 2

Form history: Version 1 was introduced in April 1973 and used until May 1974. Version 2, started in June 1974 and was used until November 1974, the last month that the survey was completed.

Coverage: Six fly-traps were located in each village in such a manner as to get a comprehensive sampling of the fly population over the complete community. Readings were scheduled to be taken at each fly-trap at weekly intervals throughout the year.

INSTRUCTIONS FOR THE USE OF FORM 21

Version 1: April 1973-May 1974

1. Counting trapped flies

   a) Place a piece of paper on the ground
   b) Turn trap upside-down
   c) Open top and shake flies onto the paper
   d) Count flies
   e) Record count
   f) Prepare trap. If a trap is not counted during any given week, the trap should be emptied at the beginning of the next week to give an accurate count for that week. Do not allow flies to accumulate from one week to the next.

2. Preparation of scudder fly-trap

   a) Put bait (dried fish) in dish-container
   b) Center dish-container under trap
   c) Check trap to be sure it is firmly closed

Columns	Description
1-5	Address of house in whose yard the trap has been placed. 1: Community number 1 = Florida Aceituno 2 = Guanagazapa

Columns	Description
	2-3: Block number
	4-5: House number
11	Trap number: identification number of trap being read (1 to 6 in each community).
12	Properly maintained: the bait is in place, the trap is closed, there are no holes in the mesh, the woodwork is not in a severely deteriorated condition sufficient to allow the exit or entrance of flies.
13	Functioning: the trap is considered to be functioning (=1) when the condition of the trap is completely satisfactory. Thus, if either columns 12 or 15 are marked "no" (=0) then column 13 is marked "no" (=0) as well.
14	Moved: Has the trap been moved to a new home site since the last count? Yes = 1; No = 0.
15	Bait adequate: Is there still bait left at the time the count is made? If the bait has been carried off by ants, dogs, or other animals, the reply is "no" (=0).
16-20	Count: result of counting flies caught in the trap that week. If each fly is counted individually, then the quantity will be an exact number. If there are too many flies for individual counting, separate out a pile of 25 or 50 flies and then group the remaining flies into piles approximating this "standard" pile. It follows that the count will only be to the nearest 25 or 50, depending on the size of the "standard" pile used. If column 13=0, then columns 16-20 are filled with 9's.
60-65	Date of trap-reading:
	60-61: day 62-63: month 64-65: last two digits of year
66-67	Identification of survey-taker
68-69	Form/card number: 21
70-72	Identification of family in whose yard the trap is located.

Version 2: June 1974-November 1974

Preliminary instructions same as for version 1

Columns	Descriptions
1-5	Address of house in whose yard the trap has been placed. 1: Community number 1=Florida Aceituno 2= Guanagazapa 2-3: Block number 4-5: House number
11	Trap number: identification number of trap being read (1 to 6 in each community).
12	Properly maintained: the bait is in place, the trap is closed, there are no holes in the mesh, the woodwork is not in a severely deteriorated condition sufficient to allow the exit or entrance of flies.
13	Functioning: the trap is considered to be functioning (=1) when the condition of the trap is completely satisfactory. Thus, if either columns 12 or 15 are marked "no" (=0) then column 13 is marked "no" (=0) as well.
14	Moved: Has the trap been moved to a new home site since the last count? Yes = 1; No = 1.
15	Bait adequate: Is there still bait left at the time the count is made? If the bait has been carried off by ants, dogs, or other animals, the reply is "no" (=0).
16	Hygiene of the site: refers to the environs in which the trap sits, that is, the yard of the home. If the yard is clean, kept free of garbage and other fly attractants then the hygiene is good (=1), if not the hygiene is poor (=0).
17-21	Total count: result of counting the flies caught in the trap that week. If column 13-0, then columns
22-26	Mosca domestica: separate the flies of this species and count. Place total in columns 22-26.

Columns	Description
27-31	MM of precipitation: sum of rain-gauge readings taken for the previous week and expressed as millimeters of water; (error made on form in placement of decimal point. Decimal point fills column 29. During revision of form prior to keypunching, the decimal point was moved to column 30 by erasing the printed point and marking in the new one).
60-65	Date of trap reading: 60-61: day 62-63: month 64-65: last two digits of year
66-67	Identification of survey-taker.
68-69	Card/form number: 21
70-72	Identification number of family in whose yard the trap is located.

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
División Biomédica - Sección de Estudios Gastrointestinales

CONTROL DE INSECTOS

Forma 21
VERSION 1

1-5	Ubicación
6-10	

Codificación: No - 0 Si - 1

11		No. de trampas para moscas
2		Bien conservada
13		Funciona?
14		Trasladada?
15		Cebo adecuado?
16-20		Conteo

60-65	7 3	Fecha
66-67		Empadronador
68-69	2 1	Tarjeta
70-72		Número Familiar
73-76		

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
División Biomédica - Sección de Estudios Gastrointestinales

CONTROL DE INSECTOS

Forma 21
VERSION 2

1-5	___ ___ ___ ___ ___	Ubicación

11		No. de trampas para moscas
12		Bien conservada
13		Funciona?
14		Trasladada?
15		Cebo adecuado?
16		Higiene del lugar
17-21	___ ___ ___ ___ ___	Conteo total

Codificación: No = 0 Si = 1

22-26	___ ___ ___ ___ ___	Mosca doméstica
27-31	___ ___.___ ___	*mm de agua caida

60-65	___ ___ ___ ___ ___ ___	Fecha
66-67	___ ___	Empadronador
68-69	2 1	Tarjeta
70-72	___ ___ ___	Número familiar
73-76	[redacted]	

Protocol

Form 26

Title: Survey of water quality.

Purpose: To evaluate the bacteriological quality of the water used by a household in the house, and the sanitary conditions of the water source and the storage container.

No. of versions: 1

Form of history: Form 26 was first used in March 1973.

Coverage: The form was designed for use only with families in the longitudinal samples.

a) Guanagazapa: Starting in March of 1973, the same fifty families, from the longitudinal sample of 76, were to be visited each month. Starting in April of 1974, these 50 families were to be visited once every 3 months, with the same families being visited every quarter. The groups were chosen by ordering the longitudinal sample families by address and then splitting the sample into thirds so that the houses in any one group were in the same geographical area for the convenience of the survey taker.
Beginning in January of 1975, all the 76 families in the longitudinal sample were to be visited every 2 months, with the same families being visited each 2 months.

b) Florida Aceituno: from March of 1973 until December of 1974, 50 families out of the 80 families comprising the longitudinal sample were visited at 3 monthly intervals, with the same families being visited quarterly. The groups were chosen in the same manner as for Guanagazapa.
Beginning in January of 1975, all the 80 families in the longitudinal sample were to be visited every 2 months, with the same families being visited each 2 months.

INSTRUCTIONS FOR THE USE OF FORM 26

1. The homes to be visited each month were specified in the Memorandum written by the Sanitation Consultant.

2. Courtesy and politeness are to be shown to the people visited. Permission to enter the property must always be requested even if many other visits have been made to the home before. Permission to take samples should be requested; the right to take samples must never be taken for granted.

3. It will be helpful to write the name of the head of the family at the top of the form at the beginning of the visit.

Columns

1-5 Address of home being visited:

1: Village number 1 = Florida Aceituno
2 = Guanagazapa

2-3: Block number

4-5: House number

11-22 Condition of well:

11 Well: if a sample is being taken from the well, the code is "1", if not, the code is "3". If there is no well, place 3's in columns 11-17.

12 Cover present: is a cover present and in place over the well? If yes, the code is "1", if no the code is "0".

13 Solid curb or tire: is a concrete, cement or stone curb or a rubber tire used around the top of the well? 1 indicates yes, 0 no.

14 Rope on the ground: is the rope used to draw water from the well in contact with the ground? yes 1, no 0.

15 Container on the ground: is the container used to draw water from the well placed on the ground when not in use? yes 1, no 0.

16 Interior dirty: is the interior of the well dirty? yes 1, no 0.

17 Interior protected: the interior is protected if the well is lined with brick, concrete or metal. Protected 1, unprotected 0.

18-22 Count: Record the result of the colitester sample i.e. the number of colonies counted on the colitester after 24 hours of incubation. If the colonies were too numerous to count place 9's in columns 18-22 and write below "plate covered with colonies". If no sample was taken from the well, put 8's in columns 18-22.

23-34 Condition of faucet:

23 Faucet: if a sample is being taken from the faucet, the code is "1", if not, the code is "3". If there is no faucet, place 3's in columns 23-27.

24 Leaks when closed: does the faucet leak when it is completely closed? yes 1, no 0.

25 Height above waist: is the faucet more than waist height (adult) above the ground? yes 1, no 0.

26 Faucet corroded: is the faucet corroded? yes 1, no 0.

27 Dirty: is the faucet soiled i.e. obviously contaminated with dirt, food particles or other foreign matter? yes 1, no 0.

28-32 Count: results of colitester sample. Instructions as for columns 18-22.

33-43 Condition of domestic container:

33 Domestic container: if a sample is being taken from a domestic container, the code is "1", if not, the code is "3". If there is no domestic container place 3's in columns 33-38. If there is more than one container used for water storage, take a sample from the one that looks to be in the least hygienic condition.

34 Cover present: was a cover present and in place over the domestic container? (do not count a piece of cloth as a cover) yes 1, no 0.

35 Metal container: is the container being sampled a metal one? yes 1, no 0.

36 Container in deteriorated condition: for clay and plastic containers, this means the container is broken in places or is leaking. For metal containers this means that the finish is coming off, or it is dented or rusted. Deteriorated condition = 1, good condition = 0.

37 Dirt at the bottom: is there visible foreign matter that has settled to the bottom of the container? yes 1, no 0. If it is not possible to see to the bottom, place 9.

38 Placed on the ground: is the container being sampled sitting on the ground? yes 1, no 0.

39-43 Count: results of colitester sample. Instructions as for columns 18-22.

44-59 Not Used.

60-65 Date survey completed:

60-61: day
62-63: month
64-65: last 2 digits of year

66-67 Identification of survey-taker.

68-69 Form/card number: 26

70-72 Identification of family surveyed.

Simplified Protocol

Survey of Water Quality

FORM 26

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazape
2-5	FAMILY IDENTIFICATION 1 Block Number 2 House Number
11	SAMPLE TAKEN FROM WELL 1 Yes 2 No 3 No well present on property
12	COVER PRESENT ON WELL 1 Yes 2 No
13	PARAPET USED IN CONSTRUCTION OF WELL 1 Yes (either concrete, stone or a rubber tire to divert surface water) 2 No
14	ROPE ON GROUND 1 Yes (rope used to draw water is in contact with soil) 2 No
15	CONTAINER ON GROUND 1 Yes (bucket in contact with soil) 2 No
16	INTERIOR OF THE WELL DIRTY 1 Yes 2 No

Columns	Description
17	IS WELL CASED 1 Protected (lined with brick, concrete or metal) 2 Not protected (dirt only)
18-22	COLI-TESTER COUNT OF WELL SAMPLE
23	SAMPLE TAKEN FROM FAUCET 1 Yes 2 No 8 No faucet present on property
24	FAUCET LEAKS 1 Yes 2 No
25	HEIGHT OF FAUCET ABOVE GROUND 1 Waist height or greater (adult) 2 Less than waist height (adult)
26	FAUCET CORRODED 1 Yes 2 No
27	FAUCET DIRTY 1 Yes (soiled with dirt, food particles, other foreign matter) 2 No
28-32	COLI-TESTER COUNT OF WATER FROM FAUCET
33	SAMPLE TAKEN FROM DOMESTIC WATER CONTAINER 1 Yes 2 No 3 No container present at the home
34	COVER ON DOMESTIC WATER CONTAINER 1 Yes (cover present and in place on the container) 2 No (no cover available or cover not in use)
35	TYPE OF CONTAINER 1 Metal 2 Nonmetal

Columns	Description
36	CONDITION OF CONTAINER 1 Good (no leaks, not chipped, finish intact) 2 Poor
37	DIRT IN CONTAINER 1 Dirt or other foreign matter on bottom 2 None
38	STORAGE OF CONTAINER 1 Stored on ground (soil) 2 Stored off ground
39-43	COLI-TESTER COUNT OF DOMESTIC WATER CONTAINER
44-59	NOT USED
60-65	DATE SURVEY COMPLETED 1 Day 2 Month 3 Year
66-67	IDENTIFICATION OF SURVEYOR
68-69	FORM NUMBER
70-72	IDENTIFICATION OF FAMILY (FAMILY NUMBER)
73-76	NOT USED

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
DIVISION BIOMEDICA. SECCION DE ESTUDIOS GASTROINTESTINALES
CONTROL DE CALIDAD DE AGUA

Forma 26

Col

1-5	

6-10	

CODIFICACION: No = 0 Si = 1 No hay = 3

11		Pozo
12		Tapadera Colocada
13		Brocal Sólido o Llanta
14		Cuerda Depositada en el Suelo
15		Recipiente Depositado en el Suelo
16		Interior Sucio
17		Interior Protegido
18-22		Conteo

33		Depósito Domestico
34		Tapadera Colocada
35		Depósito de Metal
36		Depósito Deteriorado
37		Suciedad en el Fondo
38		Colocado en el Suelo
39-43		Conteo

23		Grifo
24		Gotea Cerrado
25		Altura Arriba de la Cintura
26		Grifo deteriorado
27		Sucio
28-32		Conteo

44-59		
60-65		Fecha
66-67		Inspector
68-69	2 6	Tarjeta
70-72		No. de Fa...
73-76		

Protocol

FORM 32

Title:	Environmental sanitation survey.
Purpose:	To evaluate the sanitation and environment within the home.
No. of versions:	2
Form history:	Version 1 was introduced in July 1973; version 1 was replaced with 2, starting in September 1973. Version 2 is version 1 with 12 items deleted. There was no reordering of the remaining items so that there were no column changes for items covered in version 1 and 2.
Coverage:	The form was used for longitudinal sample families only from July of 1973 until February of 1974. All the families in the longitudinal samples were to be visited monthly. For the months of March and May of 1974 (no field activities in April) every home in the community was surveyed. Starting in June of 1974, 33% of the homes in the community, including 33% of the longitudinal sample families, were surveyed each month. This meant that the same families were to be visited at quarterly intervals. The three groups were chosen according to geographic location for the convenience of the field workers.

INSTRUCTIONS FOR THE USE OF FORM 32

First issue of instructions: July 1973.

Form version 1: July 1973 - August 1973.

1. This form was filled out once a month for each house in the longitudinal sample.

2. Never leave a blank space on the form. If for some reason the question cannot be answered, put the number 9 in the space.

Columns	Description
1-5	**Address of home being visited:**
	1: Village number — 1 = Florida Aceituno; 2 = Guanagazapa
	2-3: Block number
	4-5: House number
7-8	**Family position:** of the informant
	01 Male head of family 02 Female head of family 03-19 Son or daughter 20-29 Father or mother of head of family 30-39 Sibling of head of family 40-49 Cousin of head of family 50-59 Grandchild of head of family 60-69 Relation-in-law or step-relation 70-79 With no familiar relationship
10	**Sex:** of the informant 1 = male; 2 = female.
11-14	**General information:**
	11 Is the informant wearing shoes?: The informant in this case means the female head-of-household. The answer should be "yes" for any footwear worn that would protect the sole of the foot from infection by parasites i.e.: shoes, sandals, whether of leather, rubber or plastic.
	12 State of informant's clothes: Again the informant is to be taken as the female head of household. The definition of what constitutes clean and dirty clothes is left to the discretion of the surveyor. The surveyor, who is familiar with the overall conditions of the community, should have a fair idea if the informant's clothes are dirty by village standards or are clean.
	13 Observation about the family: Based on the surveyor's familiarity with the general conditions of personal cleanliness prevalent in the village, the surveyor is asked to state the general impression that the household members give.

Columns	Description
14	Observation about the house: Based on the surveyor's familiarity with the general conditions of household cleanliness prevalent in the village, the surveyor is asked to state the general impression that the cleanliness of the house gives.
15-24	State of cleanliness of the kitchen: If there is no kitchen or they do not use it, the reply to the following 7 questions should be "not applicable" = 8.
15	Garbage on the floor: This refers to any type of refuse, both vegetable and non-vegetable. Only if the floor is entirely devoid of any litter, the answer should be "no". Utensils stored on the floor are not counted as refuse.
16	Fecal matter on the floor: This refers to any fecal material from any sort of animal or poultry.
17	Barrier against animals: Is there an effective way of keeping all animals and fowl out of the kitchen? Obviously, if it is effective there will be no animals or poultry of any sort in the kitchen. If there is a barrier but it is not being used, the answer is "no".
18	Presence of animals: The answer is "no" if there are no animals or poultry of any sort in the kitchen at the time that the survey is being made and if there is no visible animal or poultry fecal matter or feathers to be seen.
19	Is there cooked food in the kitchen? Of major interest is prepared food to be eaten by the family that day.
20	Is there flies or other insects walking on the food? This applies to any prepared food that is not covered.
21	Are there flies or other insects walking on the food? This applies to any prepared food that is not covered.
22	Are the plates and kitchen utensils protected against animal contamination? For the answer to be "yes" both the plates and the kitchen

Columns	Description
	utensils have to be stored in such a manner that if poultry or animals come into the kitchen, they would not touch these items. Generally they may be considered to be safe from contamination if they are stored at a level higher than that of the hearth or if they are hung.
	23 Are the water containers covered? This applies to all containers, including tubs, that are used for storing drinking water. This does not apply to the barrels used to collect water off the roof unless they are used to store drinking water.
	24 Are the glasses and cups stored mouth-down? This applies to all containers, including tubs, that are used for storing drinking water. This does not apply to the barrels used to collect water off the roof unless they are used to store drinking water.
25-31	State of cleanliness of the outside.
	25 Is there a compound for animals? The answer is "no" if there are no means of keeping animals so that they do not wander around the yard at will. It does not matter what sort of animals are kept in these compounds or cages.
	26 Are there animals in the yard, etc.? If there are animals or fowl wandering at will in the yard, the answer is "0". If there are some animals or fowl in cages or compounds but there are also other animals or fowl wandering at will in the yard, the answer is "1". If there are no animals or fowl seen on the property (none in the buildings either) or all the animals are in cages or compounds then the answer is "2".
	27 Presence of garbage: This refers to refuse, especially vegetable in nature, that is an attractant for flies and rodents. For the answer to be "0" there should be no visible vegetable waste anywhere on the property. Litter such as paper should be considered as vegetable waste.
	28 Is there evidence that the garbage has been recently burned? This may be indicated by

Columns	Description
	a sizeable heap of ashes.
	29 Yard recently swept? This refers to the section of the yard nearest to the house that is devoid of vegetation. The obvious signs are brush marks and the absence of any litter.
	30 Is the latrine clean? Is the cover correctly on the seat? There should be no offensive smell or litter except paper for toilet use. If a latrine is clean and properly maintained there is no bad smell. There should be no brown or black smears visible. If there is a latrine but it is not used, the code to use is "8".
	31 Presence of flies in the latrine? Are there flies anywhere in the latrine at the time of inspection? Their presence indicates unclean conditions. If there is no latrine on the property, the answer is "8".
32-35	Hygienic habits (observation):
	32 Did you see soap? This refers to toilet soap. If necessary, ask to see the soap.
	33 The hands are washed before beginning to cook: If you were there at a time when they were starting to prepare food and you did not see them wash their hands, the answer is "0". If they did not begin to prepare food while you were there, the answer is "8".
	34 Condition of the well: If there is no well on the property the answer is "8".
	35 Is the well-bucket on the ground? If there is no well on the property, the answer is "8". If the bucket used to get water from a well is not placed on the ground but is still placed on a dirty place, the answer should still be "1".
36	Quarterly question: The following question is to be asked every four months:
	What do you do with the excrement from children's diapers? If there are no children of diaper using

Columns	Description
	age, the code to use is "8".
60-65	Date of survey, day, month and last 2 digits of year.
66-67	Surveyor identification number.
68-69	Form/card number: 32
70-72	Family identification number.

Second issue of instructions: September 1973

FORM VERSION 2: September 1973 - present

1. This survey is to be done once a month for each home.

2. Do not leave blank spaces. If the question cannot be answered, put the number 9 in the respective space.

Columns	Description
1-10	d the address and characteristics of the nant (family position and sex).
11-13	al information:
	s the informant wearing shoes? The informant, as often as possible, should be the female head of household. The family position and sex of the informant has to be noted in the columns 7, 8 and 10. The reply is "yes" (=1) if the informant is wearing footwear: shoes, plastic sandals, sandals, etc.
	12 State of informant's clothes: There are three categories: dirty (=0), regular (=1), clean (=2). The surveyor has to decide according to his or her own criterion.
	13 Observation about the family: In the same form as the preceeding question, only this time about the family.
15-23	State of cleanliness of the kitchen: If there is no kitchen or they do not use it, the reply to the following 7 questions should be "not applicable" (=8).

Columns	Description
	15 Garbage on the floor: This refers to any type of refuse, both vegetable and non-vegetable. Only if the floor is entirely devoid of it should the reply be "no" (=0). Utensils stored on the floor are not counted as refuse.
	*16 Fecal material on the floor: This refers to any type of fecal material (animal and human).
	17 Barrier against animals: Only if there exists an effective means of keeping animals out of the kitchen. If barriers are not used, the response has to be "no" (=0).
	18 Presence of animals: The reply is "no" (=0) if there are no animals of any type in the kitchen at the time of the visit and if there is no fecal material or feathers that indicate their presence.
	20 Is the cooked food covered? The reply is "yes" (=1) only if the food is really protected from insects and animals.
	21 Are there flies or other insects walking on food? This applies to any type of prepared food that is not covered.
	23 Are the water containers covered? This question refers to all containers with drinking water. It does not apply to containers used to collect rainwater off the roof.
27-29	State of cleanliness of the exterior:
	27 Presence of garbage: This refers to refuse, especially vegetable in nature, that is an attractant for flies and rodents. Paper should be considered as being in this class of refuse.
	29 Yard recently swept: This refers to that part of the yard nearest to the house that is generally devoid of vegetation. The obvious signs are brush marks and the absence of any litter.
30	Is the latrine clean? It is correctly covered?

*Change in interpretation from previous version.

Columns	Description
	There should not be soiled paper, only clean toilet paper or its equivalent. There should not be marks or smears of fecal material, and no flies. If there is a latrine, but it is not used, the code to be used is "8".
36	This question is put to the female head of household once every 3 months, the other months column 36 should be filled with an "8".
60-72	Complete as for all other study forms.

Third issue of instructions: June 1974

FORM VERSION 2: September 1973 - present

1. This survey was designed in such a manner as to avoid the necessity of asking direct questions and is part of the activities done during the monthly visit. The survey, then, is to be done for each family in the population once every quarter.

2. To avoid problems with the computer, please do not leave blank spaces. If it is not possible to reply to the question, write a "9" in the respective space.

3. The use of code "3" is not permitted.

Columns	Description
1-5	Address
7-10	Family position of the informant used for the other surveys (morbidity and census) and the sex of the informant.
11-13	General information:
	11 Is the informant wearing shoes? The reply is "1" if the informant has footwear: shoes, plastic sandals, caites, etc. Codes permitted: 0, 1.
	12 State of informant's clothes: According to the state of clothes of the informant, the survey-taker has to decide using his or her own criterion between 3 categoreis: dirty, regular and clean. Permitted codes are: 0, 1, 2 respectively.

Columns	Description
	*13 Observation about the family: What is sought here is the total impression that the home makes with respect to cleanliness. It is left up to the survey taker, according to his or her knowledge of the conditions in all the homes in the community, to decide according to his or her criterion on one of the 3 categoreis: dirty, regular and clean. Codes permitted: 0, 1, 2 respectively.
15-23	State of cleanliness of the kitchen: If there is no separate kitchen, use the area where the family does its cooking. Only use code "8" if they do their cooking in another house.
	15 Garbage on the floor: This refers to any type of refuse, both vegetable and non-vegetable. Use as a criterion the conditions that would be expected in a very clean home in the city. Only in case the floor is completely free of refuse should the reply be "0". Utensils stored on the floor are not counted as refuse. Codes permitted: 0, 1.
	16 Fecal material on the floor: This refers to any type of fecal material (animal and human). Codes permitted: 0, 1.
	17 Barrier against animals: Control of the entry of animals is part of the sanitary education program. Only if there exists an effective way of keeping animals out of the kitchen should the reply be "1". If there are barriers but they are not used, the reply should be "0". Codes permitted: 0, 1.
	18 Presence of animals: The reply is "0" only if there are no animals of any type in the kitchen at the time of the visit. If there are no animals during the visit but there is fecal material or feathers that indicate their presence, the reply is "1". If the family does not have any animals the reply is"0". Codes permitted: 0, 1.

*Note that this is a radical change in interpretation from previous instructions. Interpretation now corresponds with that of column 14, form version 1.

Columns	Description
	20 Is cooked food covered? The cooked food is considered to be covered only if the food is truly protected against insects and animals. Of principal interest is the food that will be consumed by the family on that day. Codes permitted: 0, 1, 8.
	21 Are there flies or other insects walking on the food? If there is any prepared food that is not covered and on which flies are present that could get into the food, the reply is "0". Codes permitted: 0, 2.
	23 Are the water containers covered? This question refers to all containers containing drinking water. It does not apply to containers used to collect rainwater off the roof. In homes that do not use containers but use their water directly from the tap or well, the reply should be "8". Codes permitted: 0, 1, 8.
27-29	State of cleanliness of the exterior:
	27 Presence of garbage: this refers to refuse, especially vegetable in nature, that is an attractant for flies and rodents. Paper should be considered as being in this class of refuse. Codes permitted: 0, 1.
	29 Yard recently swept: this refers to the part of the yard nearest to the house that is generally devoid of vegetation. The obvious signs are brush marks and the absence of any litter. Codes permitted: 0, 1.
30	Is the latrine clean? To consider the latrine clean, there must not be any soiled paper, nor marks or smears of fecal material. If there is no latrine or it is not used, the answer is "8". Codes per-tted: 0, 1, 8.
36	is question is put to the mother. If she has small children the reply is "8". de 5 = the dogs eat it de 6 = other response (specify) des permitted: 1, 2, 3, 4, 5, 6, 8.
60-72	mplete as for all other study forms.

Simplified Protocol

Monthly Sanitation Survey

FORM 32 ORIGINAL

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY IDENTIFICATION 1 Block Number 2 House Number
7-8	FAMILY POSITION OF THE INFORMANT 1 Male head of house 2 Female head of house 3 Son or daughter 4 Father or mother of the head of house 5 Sibling of head of house 6 Cousin of head of house 7 Grandchild of head of house 8 Relation-in-law or step-relation 9 No familial relationship
10	SEX OF INFORMANT 1 Male 2 Female
11	INFORMANT WEARING SHOES 1 No (no protection from soil parasites) 2 Yes (protection from soil parasites)
12	STATE OF INFORMANT'S CLOTHES 1 Dirty by village standards 2 Clean by village standards
13	PERSONAL HYGIENE OF FAMILY 1 Poor (based on personal cleanliness prevalent in village) 2 Good (based on the same standard)
14	CLEANLINESS OF THE HOME 1 Poor (based on level of cleanliness prevalent in the village) 2 Good (based on the same standard)
15	GARBAGE ON FLOOR OF KITCHEN 1 No (no litter of any kind present) 2 Yes (vegetable or non vegetable)

Columns	Description
16	FECAL MATTER ON FLOOR OF KITCHEN 1 No 2 Yes
17	BARRIER AGAINST ANIMALS ENTERING KITCHEN 1 No (effective barrier not present or not being used) 2 Yes (no animals in kitchen)
18	PRESENCE OF ANIMALS IN KITCHEN 1 No (none present and no evidence of their presence) 2 Yes
19	COOKED FOOD IN THE KITCHEN 1 No 2 Yes
20	COOKED FOOD COVERED 1 No (not fully protected against flies, insects and rodents) 2 Yes (fully protected against flies, insects and rodents)
21	FLIES OR INSECTS ON COOKED FOOD 1 No (none seen on uncovered food) 2 Yes
22	PLATES AND KITCHEN UTENSILS PROTECTED 1 No (stored in such a manner that animals coming into the kitchen could contaminate them) 2 Yes (completely protected from animals)
23	WATER CONTAINERS IN THE KITCHEN COVERED 1 No 2 Yes
24	GLASSES AND CUPS INVERTED DURING STORAGE 1 No 2 Yes
25	PRESENCE OF A COMPOUND FOR RESTRAINING ANIMALS 1 No 2 Yes
26	ANIMALS IN THE YARD OF THE HOUSE 1 No 2 Yes

Columns	Description
27	PRESENCE OF GARBAGE ON THE PROPERTY 1 No (nothing which would attract insects or rodents) 2 Yes
28	BURNING OF GARBAGE 1 No (no evidence that garbage has been or is being burned) 2 Yes (burning in progress or ashes present)
29	YARD RECENTLY SWEPT 1 No 2 Yes
30	CLEANLINESS OF LATRINE 1 D. ty (poor maintenance, litter or odors) 2 Clean
31	FLIES IN THE LATRINE 1 No 2 Yes
32	PRESENCE OF SOAP IN THE HOUSE OR AT THE LATRINE 1 No 2 Yes
33	COOK WASHES HANDS BEFORE PREPARING MEALS 1 No (food preparation observed and hands not washed) 2 Yes 8 Not applicable (no food prepared during visit)
34	CONDITION OF THE WELL 1 Not protected (surface contamination) 2 Protected
35	WELL BUCKET STORED ON GROUND 1 No 2 Yes
36	DISPOSAL OF EXCREMENT FROM BABY's DIAPER 1 Throw in the yard 2 Bury 3 Put in latrine 4 Throw in the river
37-59	NOT USED
60-65	DATE OF SURVEY 1 Day 2 Month 3 Year

Columns	Description
66-67	SURVEYOR IDENTIFICATION NUMBER
68-69	FORM NUMBER
70-72	FAMILY IDENTIFICATION NUMBER

Simplified Protocol

Monthly Sanitation Survey

FORM 32 REVISED

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY IDENTIFICATION 1 Block Number 2 House Number
7-8	FAMILY POSITION OF THE INFORMANT 1 Male head of house 2 Female head of house 3 Son or daughter 4 Father or mother of the head of house 5 Sibling of head of house 6 Cousin of head of house 7 Grandchild of head of house 8 Relation-in-law or step-relation 9 No familial relationship
10	SEX OF INFORMANT 1 Male 2 Female
11	INFORMANT WEARING SHOES 1 No (no protection from soil parasites) 2 Yes (protection from soil parasites)
12	STATE OF INFORMANT'S CLOTHES 1 Dirty by village standards 2 Clean by village standards
13	PERSONAL HYGIENE OF FAMILY 1 Poor (based on personal cleanliness prevalent in the village) 2 Good (based on the same standard)
15	CLEANLINESS OF THE HOME 1 Poor (based on level of cleanliness prevalent in the village) 2 Good (based on the same standard)
16	GARBAGE ON FLOOR OF KITCHEN 1 No (no litter of any kind present) 2 Yes (vegetable or non-vegetable)

Columns	Description
17	FECAL MATTER ON FLOOR OF KITCHEN 1 No (animal or human) 2 Yes
18	BARRIER AGAINST ANIMALS ENTERING THE KITCHEN 1 No (effective barrier not present or not in use) 2 Yes (no animals in kitchen)
20	PRESENCE OF ANIMALS IN KITCHEN 1 No (none present and no evidence of their presence) 2 Yes
21	COOKED FOOD COVERED 1 No (not fully protected against flies, insects and rodents) 2 Yes (fully protected against flies, insects and rodents)
23	FLIES OR INSECTS ON COOKED FOOD 1 No (none seen on uncovered food) 2 Yes
27	WATER CONTAINERS COVERED IN KITCHEN 1 No 2 Yes
28	PRESENCE OF GARBAGE ON PROPERTY 1 No (nothing which would attract insects or rodents) 2 Yes
29	YARD RECENTLY SWEPT 1 No 2 Yes
30	CLEANLINESS OF LATRINE 1 Dirty (Poor maintenance, litter or odors) 2 Clean
36	DISPOSAL OF EXCREMENT FROM BABY'S DIAPER 1 Throw in yard 2 Bury 3 Put in latrine 4 Throw in river
37-59	NOT USED

Columns	Description
60-65	DATE OF SURVEY 1 Day 2 Month 3 Year
66-69	FORM NUMBER
70-72	FAMILY IDENTIFICATION NUMBER
73-75	NOT USED

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
División Biomédica - Sección de Estudios Gastrointestinales
ENCUESTA DE SANEAMIENTO AMBIENTAL

Forma 32

CODIGO:	No 0	Si 1	No hay 3	No aplicable 8

1-5	___	Ubicación
6		Bloqueado
7-8	___	Posición en la familia
9		Bloqueado
10	___	Sexo

INFORMACION GENERAL

11	___	INFORMANTE ¿Tiene puestos los zapatos?
12	___	Estado de su ropa Sucia - 0 Regular - 1 Limpia - 2

13	___	Observación sobre la familia Sucia - 0 Regular - 1 Limpia - 2

ESTADO DE LIMPIEZA DE LA COCINA

15	___	Basura en el piso
16	___	Materia fecal en el piso
17	___	Barrera contra animales
18	___	Presencia de animales
20	___	¿Está la comida cocinada cubierta?
21	___	¿Hay moscas u otros insectos parados sobre la comida?
23	___	Los recipientes con agua para beber ¿estan cubiertos? Algunos - 1, Todos - 2, Ninguno - 0

ESTADO DE LIMPIEZA DEL EXTERIOR

27	___	Presencia de basura
29	___	Patio recientemente barrido

(PREGUNTA TRIMESTRAL)

30	___	¿Está la letrina limpia? No aplicable - 8
36	___	¿Que hacen con el papá de los pañales y/o calzones de los niños? 8 - No aplicable 1 - Lo tira al monte 2 - Lo tira fuera de la puerta 3 - Llevan a la letrina 4 - Lavan con el resto de la ropa 5 - Otros

37-59		Bloqueado
60-65	___	Fecha
66-67	___	Empadronador
68-69	3 2	No. tarjeta
70-72	___	No. familia
73-76		Bloqueado

Protocol

FORM 37

Title: Monthly survey of domestic water consumption.

Purpose: To estimate the average daily per capita consumption of water at home in litres and the types of use to which the water is put.

No. of versions: 3

Form history: Version 1 printed but never used. Version 2 was used beginning in November 1973. The data from a preliminary survey carried out in August of 1972 was transferred to the form in January of 1974. For the 1972 data forms, certain columns (7-13) were coded for missing data since some information had not been collected in the 1972 survey that was to be collected on the form introduced in November of 1973. Version 3 was used beginning in May 1974. The only difference between the versions is that version 3 had 3 columns added (28, 29 and 30) which give the average daily per capita consumption of water. In version 2, the section titled "consumption" stopped at column 27 "No. inhabitants". However, the average daily per capita consumption was written in on the form of version 2 and key-punched onto cards in columns 28-30. The computer print-outs of form 37 are the same for both versions 2 and 3.

Coverage: The form was designed to be used only for the families in the longitudinal sample. However, the coverage has had a varied history.

a) Guanagazapa: from November of 1973 until the end of March 1974, 50 families out of the total longitudinal sample (=76) were to be visited each month, i.e. the same 50 families. Beginning in April 1974, these 50 families were to be visited once every 3 months. To fulfill this cycle meant visiting 17 families for 2 months and the remaining 16 families in the 3rd month of the cycle. The monthly group of families did not change, that is to say that the same 17 or 16 families were to be visited at quarterly intervals. The groups were chosen by ordering the longitudinal sample families by block and house number and then splitting the sample into thirds so that the house in any one group lay in the same geographical zone for the convenience of the survey-taker. In January of 1975, all the 76 families in the longitudinal

sample were to be visited every 2 months, i.e. 50% of the total sample to be visited each month. Again the same families were to be visited each two months.

b) The history of the families visited in Florida Aceituno is identical to that in Guanagazapa with the exception that the visiting of the 50 families out of the longitudinal sample every 3 months began in November of 1973 and not in April of 1974 as occurred in Guanagazapa. Beginning in January of 1975, all 80 of the longitudinal sample families were to be visited every 2 months.
Note: the 50 families surveyed in each community in August 1972 did not correspond with the longitudinal sample families chosen later. In Guanagazapa, 27 were in the longitudinal sample and in Florida Aceituno, 32.

INSTRUCTIONS FOR THE USE OF FORM 37

1. The survey on water consumption was to be completed during the same visit used to test bacteriological water quality using the colitester.

2. The homes to be visited each month were specified in a Memorandum written by the Sanitation Consultant.

3. Courtesy and politeness are to be shown to the people visited. Permission to enter the property must always be requested. Permission to measure the containers must be requested. The right to take measurements must never be taken for granted.

Columns	Description
1-5	Address of home being visited: 1: Village number 1 = Florida Aceituno 2 = Guanagazapa 2-3: Block number 4-5: House number
6	Type of source: indicate by one of the letter codes whether the water supply for the family is a well, piped-supply, carried or other, such as roof run-off. If other, specify by writing on the form. In case the family being surveyed does not have a well or faucet on its property but does have access to either one of these sources elsewhere, it should be considered that the family carries the water to the home.

Columns	Description
	In the case where several homes form a compound, i.e. several homes look out into a shared patio, and there is a well or faucet in the patio, then each family comprising the compound should be considered as having the well or the faucet. However, if a family forming part of a compound is either not allowed to use the facility or is allowed only limited access to it, i.e., only for small quantities of water such as for food preparation and is denied use of the water for clothes washing or bathing, then such a family should be considered as one having to carry water to the home. Check by questioning in cases of ambiguity of source to be able to decide which source type to ascribe the family being surveyed.
7-13	Type of consumption: the female head of household should be asked whether she does each of the activities listed under the section "type of consumption". If the reply is affirmative, place a "1" in the appropriate column, if negative, place a "0" there. Whether the answer is "yes" or "no", find out and note down where the activity takes place and what containers are used if any. For columns 12 and 13, find out if other people use the water source on the property. If so, identify them, and if she uses water for other activities not included in columns 7-11, specify.
14-30	Consumption:
14-18	Consumption in litres per day: this line is for information from informants who do not have a metered water supply. Using the information previously obtained on the containers used in water activities, ask how many times each one was filled during the last 24 hours. The containers, thus identified, are measured using a 30 cm. ruler. Sketches giving the dimensions of each container are drawn on the form and the number of times each was used. The containers may be: buckets, bowls, jugs, tins, jars, oil-drums, or cement sinks. When the form comes to the central office, the dimensions are used to calculate the volume of each container. Knowing the volume of the containers and the number of times each was filled during the past day, an estimate can be made of the daily domestic water consumption of the household, i.e., the survey-taker does not use columns 14-18, these are computed at the central office. Where people use the water directly from a well or private faucet in such a manner that it is not possible to identify containers used solely for water transport and usage, or where the informant will not give the number of times a container was used, then columns 14-18 are to be filled with 9's, the code for missing information.

Columns	Description
	If the home has a metered water supply, then columns 14-18 are filled by the code for non-applicability, 8's.
19-23	Meter reading: this gives the quantity of water used during a given number of days from a metered house connection, i.e., this only applies to households meriting the code E in Column 6. For families having another code in column 6, columns 19-23 are to be filled by 8's. The quantity of water consumed is determined from the meter-reading logs kept by the municipal plumber in Guanagazapa. The meter readings are generally taken at the end of a month to measure the consumption for that month. The readings may be taken during the first few days of the following month. The consumption data presented in columns 19-23 will correspond to the month in which the survey is made to make consumption data comparable in both communities. It will be the survey-taker's responsibility to get the meter reading record from the municipal plumber and bring it to the central office so that a copy can be made.
24-25	Days between readings: this refers to the number of days between meter readings for houses with a metered connection and is calculated at the central office. For houses without a metered connection, in which the 24 hour recall method is used, columns 24-25 are filled by 01.
26-27	Number of inhabitants: this is the total number of people using the domestic water supply. If the water is carried or comes from a well on the property, note the number of persons in the family who use the water. In the case of wells, where the family allows other households to use the well, do not include those families here. If the water source is a metered-supply, indicate all the people using it. Thus, if several families use the faucet, identify these other families (using the census lists, one can then estimate the number of people using the faucet water). Including other families only occurs when the family being surveyed has the code letter E in column 6.
28-30	Litres per person per day: this is a calculation made at the central office and is the quantity of water, as represented by columns 14-18 or columns 19-23, divided by the number of days shown in columns 24-25. That sum is then divided by the number of water users enumerated in columns 26-27.
60-65	Date survey completed: day, month, and last two digits of the year.

olumns	Description
66-67	Identification code of the survey-taker.
68-69	Card/form number: 37
70-72	Identification number of the family
	Note: It is helpful to write the name of the head of the family at the top of the form at the beginning of the interview.

Simplified Protocol

Monthly Survey of Domestic Water Consumption
FORM 37

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY IDENTIFICATION 1 Block Number 2 House Number
6	SOURCE OF WATER 1 Well 2 Piped supply 3 Carried to house 4 Rain-barrel
7-13	WATER USES 1 Personal hygiene 2 Food preparation 3 Dish washing 4 Clothes washing 5 Bathing 6 To other families 7 Other uses
14-18	WATER CONSUMPTION - UNMETERED HOUSE
19-23	WATER CONSUMPTION - METERED HOUSE
24-25	DAYS BETWEEN METER READINGS 1 Unmetered house 2 Metered house
26-27	NUMBER OF WATER USERS
28-30	WATER CONSUMPTION PER PERSON PER DAY
31-59	NOT USED
60-65	DATE OF SURVEY 1 Day 2 Month 3 Year
66-67	IDENTIFICATION OF SURVEYOR

Columns	Description
68-69	FORM NUMBER
70-72	IDENTIFICATION OF FAMILY
73-76	NOT USED

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
Sección de Estudios Gastrointestinales - División Biomédica

ENCUESTA MENSUAL DE CONSUMO DE AGUA DOMICILIARIA

Forma 37

Códigos:	0 = No	1 = Sí	8 = No aplicable

1-5	___ ___ ___ ___ ___	Ubicación

TIPO DE FUENTE

6	___	P Pozo E Entubada A Acarreada O Otros

TIPO DE CONSUMO

7	___	Aseo personal
8	___	Elaboración alimentos
9	___	Lavado de trastes
10	___	Lavado de ropa
11	___	Baño
12	___	A otras viviendas
13	___	Otros

CONSUMO

14-18	___ ___ ___ ___ ___	Consumo en litros/día
19-23	___ ___ ___ ___ ___	Contador
24-25	___ ___	Días lectura
26-27	___ ___	No. habitantes
28-30	___ ___ ___	Litros/día/persona

60-65	___ ___ ___ ___ ___ ___	Fecha
66-67	___ ___	Inspector
68-69	3 7	Tarjeta
70-72	___ ___ ___	No. de familia

Protocol

FORM 38

Title:	Rapid housing survey.
Purpose:	To evaluate housing conditions and determine amount of land cultivated, crops cultivated, and animals owned by the family.
No. of versions:	1
Form history:	The form was used once in December of 1973.
Coverage:	The survey was carried out on all the families comprising the longitudinal samples in both communities.

INSTRUCTIONS FOR THE USE OF FORM 38

Columns	Description
1-5	Address of family surveyed:
	1: Community identification 1 = Florida Aceituno 2 = Guanagazapa
	2-3: Block number
	4-5: House number
7-9-11	Construction materials: indicate the predominant materials used in the roof, exterior walls and floor of the principal structure.
13-14	Number of rooms used for living and sleeping.
19	Kitchen: if kitchen is part of a room, code = 3. If the kitchen is a separate room or building, code = 2.
20	Hearth: low hearth refers to one at floor level.
24-35	Animals: Indicate the number of each type of animal the family has, and place the figure in the column headed "quantity". Under the column headed "corral", indicate with a 1 or 0, if each type of animal is kept in a compound or not.

Columns	Description
44-61	Cultivation of crops: give the amount of land, dedicated to each crop in cuerdas, to the nearest whole number. Specify the type of cuerda by the number of varas, e.g.: cuerda of 40 varas 2 cuerda of 25 varas 2
62-65	Date of survey: 62-63: Month 64-65: Last 2 digits of year
66-67	Identification of survey-taker.
68-69	Form/card identification = 38
70-72	Identification of family surveyed.

INCAP - UNC STUDY

Development and Evaluation of Measures to Reduce Food Waste Caused by Intestinal Disease

Rapid Housing Survey

FORM 38

Columns		Description
1-5	_ _ _ _ _	LOCATION
6	_	DO YOU OWN YOUR PROPERTY 1 = Yes 0 = No
7	_	ROOF MATERIAL 2) Palm fronds 3) Straw 4) Tile 5) Metal 8) Other
8	_	CONDITION OF ROOF 2) Good 3) Average 4) Poor
9	_	WALL MATERIALS 2) Wood 3) Concrete and Wood 4) Brick and Wood 5) Palm canes 6) Adobe with wood 7) Cement blocks with wood
10	_	CONDITION OF WALLS 2) Good 3) Average 4) Poor
11	_	FLOOR MATERIALS 2) Wood 3) Mosaic tile 4) Terra cotta tile 5) Brick 6) Cement 8) Other

Columns	Description
12 _	CONDITION OF FLOOR 2) Good 3) Average 4) Poor
13-14 _ _	NUMBER OF ROOMS
15-16 _ _	NUMBER OF PERSONS PER ROOM
17-18 _ _	NUMBER OF PERSONS PER BEDROOM
19 _	SEPARATE ROOM FOR KITCHEN 2 = Yes 3 = No
20 _	POSITION OF HEARTH OR STOVE 2 = Above floor 3 = On the floor
21 _	SOURCE OF WATER 2) Indoor plumbing 3) Faucet in the yard 4) River, lake, stream 5) Well 8) Other
22 _	METHODS OF SOLID WASTE DISPOSAL 2) Used as fertilizer 3) Buried 4) Burned 5) Throw into yard 8) Other
23 _	DISPOSAL OF FECAL WASTES 2) None 3) Bathroom 4) Septic tank 5) Latrine 6) Toilet without a drain 7) Toilet without a drain 8) Other
24-37	POSSESSION OF DOMESTIC ANIMALS

In pen	Free in yard	
24 _	25 _	2) None
26 _	27 _	3) Horses
28 _	29 _	4) Goats
30 _	31 _	5) Pigs
32 _	33 _	6) Chickens
34 _	35 _	7) Others
36 _		8) Dogs
37 _		9) Cats

Columns	Description
38-43	LAND OWNERSHIP
38-40 _ _ _	Amount rented (cuerdas)
41-43 _ _ _	Amount owned (cuerdas)
44-61	CROPS CULTIVATED (cuerdas)
44-46 _ _ _	2) Corn
47-49 _ _ _	3) Beans
50-52 _ _ _	4) Coffee
53-55 _ _ _	5) Vegetables
56-58 _ _ _	6) Flowers
59-61 _ _ _	7) Other
60-65 _ _ _ _ _	DATE (day, month, year)
66-67 _ _	INTERVIEWER IDENTIFICATION
68-69 _ _	FORM NUMBER
70-72 _ _ _	FAMILY NUMBER

Protocol

FORM 39

Title:	Annual sanitation survey (Interview Section).
Purpose:	To evaluate hygiene knowledge and behaviors.
No. of versions:	1
Form history:	Second version of the annual sanitation survey completed during January of 1974. A previous version, completed in August of 1972, is described under forms 04, 05, 06, 07, and 08.
Coverage:	The survey included all the families in the longitudinal samples in both communities.

INSTRUCTIONS FOR THE USE OF FORM 39

Version 1: January 1974

1. This survey is for each family in the longitudinal sample in both communities.
2. The person interviewed should be the female head of household.
3. Interview done at the same time as form 40 (observation on section).

Columns	Description
1-5	Address of home visited:
	1: Community identification 1 = Florida Aceituno 2 = Guanagazapa
	2-3: Block number
	4-5: House number
7-8	Family position of person interviewed:
	01 Head of family (male) 02 Head of family (female) 03-19 Children of head of family 20-29 Father or mother of head of family 30-39 Sibling of head of family 40-49 Cousins of head of family

Columns	Description
	50-59 Grandchildren of head of family 60-69 Other step- or in-law relations 70-79 Without familia relationship
10	Sex of person interviewed: 1 = male; 2 = female.
13	Use of flatware at the table: if everyone at the table does not use the same spoons, forks or knives, does each individual have his own setting?
14	Special bowl for dishwashing: a bowl that is not used for any other activity, such as storage of water, softening corn, etc.
16-21	Handwashing: ask the question "when do you wash your hands" and place a 1 for the items in columns 16-21 that are mentioned in the answer, and a 0 for those items that are not mentioned.
22	Bowl for handwashing: do they have a bowl set aside for handwashing and facewashing?
25	Bathing of child: if there is no young child in the family, the code to use is 8.
29	Use of sleeping area: do the children sleep in the same bedroom as the parents? If so, the reply is "yes" (=1) if not, "no" (=0). Describe what the arrangements are.
30	Do the babies or young children have separate beds (=1) or do they sleep with the parents or older siblings (=0)?
31	Cause of diarrhea in children: place the reply received from the informant in one of the 3 groups of responses and place the group number in column 31. Indicate by underlining the actual response received.
33	Cause of diarrhea in adults: same instructions and response groups as for the question corresponding to column 31.
34	Treatment for diarrhea in adults: use same alternatives as used for question related to column 33.
37	Liking to use latrines: if the person will not give a reply or does not know, the code is 9.
38	Animals in home at night: if the family has no animals, the code is 8.

Columns	Description
60-65	Date interview completed: 60-61: Day 62-63: Month 64-65: Last 2 digits of the year
66-67	Identification of interviewer.
68-69	Form/card number: 39
70-72	Identification of family surveyed.

Simplified Protocol

Annual Sanitation Survey

FORM 39

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY ADDRESS IDENTIFICATION 1 Block number 2 House number
7-8	FAMILY POSITION (OF INTERVIEWEE)
10	SEX (OF INTERVIEWEE)
11	IN GENERAL, WHAT TYPE OF LIGHTING DO YOU USE IN THE HOUSE? 1 Candles 2 Kerosene lamps (candil) 3 Gas lamps 4 Electric
12	IS THERE ANYONE IN THE HOUSE WHO HAS A RADIO? 0 No 1 Yes
13	DO ALL THE PEOPLE LIVING IN THE HOUSE USE THE SAME FLATWARE FOR EATING? 0 Yes 1 No IF NOT, HOW IS THE FLATWARE USED?
14	DO YOU HAVE A BASIN USED ONLY FOR CLEANING PLATES? 0 No 1 Yes
15	WHAT DO YOU USE NORMALLY FOR CLEANING THE PLATES AND KITCHEN THINGS? 1 Ashes 2 Water only 3 Water and sand 4 Water and soap

Column	Description
16-21	WHEN DO YOU WASH YOUR HANDS? 0 Not contained in response 1 Contained response 1 Every now and then 2 In the morning, on getting up 3 After dirtying my hands 4 Before eating 5 After defecating 6 Before preparing food
22	DO YOU HAVE A BASIN USED ONLY FOR HAND-WASHING? 0 No 1 Yes
23	AFTER WASHING THEM, WITH WHAT DO YOU DRY THEM? 1 A cloth 2 Apron 3 Towel
24	HOW OFTEN DO YOU BATHE YOURSELF COMPLETELY? 1 Once or twice a month 2 Once or twice a week 3 Daily
25	DID YOU HAPPEN TO GIVE YOUR YOUNGEST CHILD A COMPLETE BATH YESTERDAY?
26	DOES YOUR HUSBAND WEAR SANDALS OR SHOES WHEN HOME? 0 No 1 Yes 8 Not applicable
27	DO YOUR CHILDREN WEAR SHOES OR SANDALS WHEN THEY GO TO SCHOOL? 0 No 1 Yes 8 Not applicable
28	DO THEY WEAR THEM WHEN AT HOME? 0 No 1 Yes 8 Not applicable
29	ARE THE BEDROOMS USED EQUALLY BY ALL MEMBERS OF THE FAMILY? 0 No 1 Yes IF NOT, HOW ARE THEY DISTRIBUTED AMONG THE BEDROOMS?

Columns	Description
30	DO THE BABIES OR YOUNG CHILDREN SLEEP BY THEMSELVES? 0 No 1 Yes
31	WHAT DO YOU THINK IS THE PRINCIPAL CAUSE OF DIARRHEA IN YOUNG CHILDREN? (FOR CODING, USE THE NUMBER OF THE GROUP WITHIN WHICH THE RESPONSE FALLS) 1 Have bad blood, lacking blood, suffering from fright, cold weather, hot or cold liver, because of the heat, much cold in the stomach, dampness, anaemia, faulty care of the mother 2 Worms, ate something that didn't agree with them, bad digestion, bad foods, overate, didn't chew well, tooth loss, overhunger, ate too late, ate fruits 3 Microbes, fecal matter on the floor, comes from other homes, dirt on the hands, picking up things from the floor and eating them 9 Doesn't know, no response, other reply
32	WHAT DO YOU USUALLY DO WHEN YOUNG CHILDREN HAVE DIARRHEA? 1 Home remedies 2 Buy medicines at the pharmacy or store 3 Take them to the doctor, ask for medicines at the health post
33	WHAT DO YOU THINK IS THE PRINCIPAL CAUSE OF DIARRHEA IN ADULTS? (FOR CODING, USE SAME RESPONSES AS FOR CHILDREN QUESTION)
34	WHAT DO YOU USUALLY DO WHEN ADULTS HAVE DIARRHEA? (FOR CODING, USE SAME RESPONSES AS FOR CHILDREN QUESTION)
35	WHERE DO YOU "GO TO THE BATHROOM" WHEN YOU ARE AT HOME? 1 In the bushes, yard, gully, etc. 2 In a latrine (public) 3 In a latrine (private)
36	WHERE DO YOU "GO TO THE BATHROOM" IF YOU NEED TO DO IT IN THE MIDDLE OF THE NIGHT? 1 Don't go out 2 Near the house, in the bushes, yard 3 In a chamber-pot 4 In a latrine
37	DO PEOPLE LIKE TO USE LATRINES? 0 No 1 Yes
38	DO YOUR ANIMALS REMAIN IN THE HOUSE DURING THE NIGHT? 0 Yes 1 No

Columns	Description
39-59	NOT USED
60-65	DATE OF SURVEY 1 Day 2 Month 3 Year
66-67	SURVEYOR IDENTIFICATION
68-69	FORM NUMBER
70-72	FAMILY IDENTIFICATION

University of North Carolina
Nutrition Institute of Central America and Panama
Division of Gastrointestinal/Biomedical Studies
Annual Sanitation Survey Revised
Interview Section

FORM 39

Code not applicable = 8 Not answered = 9

Columns		Description
1-5	_ _ _ _ _	LOCATION
6	_	
7-8	_ _	POSITION IN THE FAMILY
9	_	
10	_	SEX
11	_	GENERALLY, WHAT TYPE OF LIGHT DO YOU USE IN YOUR HOME? 1) Candles 2) Kerosene Lamp 3) Gasoline Lantern 4) Electricity
12	_	DOES ANYONE IN YOUR HOME OWN A RADIO? 0 = No 1 = Yes
13	_	DO ALL THE PEOPLE WHO LIVE IN YOUR HOUSE USE THE SAME UTENSILS TO EAT? IF NOT, IN WHAT FORM ARE THEY USED?
14	_	DO YOU HAVE ONE SPECIAL BASIN FOR WASHING DISHES? 0 = No 1 = Yes
15	_	NORMALLY, WHAT DO YOU USE TO CLEAN PLATES AND KITCHEN UTENSILS? 1) Ashes 2) Water only 3) Water and sand 4) Soap and water

Columns	Description
16-21	WHEN DO YOU WASH YOUR HANDS 0 = No 1 = Yes _ 16 Every once in a while. _ 17 When I get up in the morning. _ 18 After getting them dirty _ 19 Before eating _ 20 After defecating _ 21 Before preparing meals
22 _	DO YOU HAVE ONE SPECIAL BASIN FOR HANDWASHING? 0 = No 1 = Yes
23 _	AFTER WASHING YOUR HANDS, WHAT DO YOU USE TO DRY THEM? 1) Rag 2) Apron 3) Towell
24 _	HOW OFTEN DO YOU BATHE YOURSELF COMPLETELY? 1) Once or twice each month 2) Once or twice each week 3) Daily
25 _	BY THE WAY, DID YOU GIVE YOUR SMALLEST CHILD A FULL BATH YESTERDAY? 0 = No 1 = Yes
26 _	DOES YOUR HUSBAND WEAR CAITES OR SHOES WHEN HE IS IN THE HOUSE. 0 = No 1 = Yes 8 = Not Applicable
27 _	DO YOUR CHILDREN WEAR SHOES OR CAITES WHEN THEY GO TO SCHOOL? 0 = No 1 = Yes 8 = Not Applicable
28 _	DO THEY WEAR THEM WHEN THEY ARE AT HOME? 0 = No 1 = Yes 8 = Not applicable
29 _	ARE THE BEDROOMS USED EQUALLY BY ALL OF THE MEMBERS OF THE FAMILY GROUP? 0 = No 1 = Yes IF NOT, IN WHAT FORM ARE THE BEDROOMS DISTRIBUTED?

Columns	Description
30 _	DO THE BABIES OR LITTLE CHILDREN SLEEP ALONE? 0 = No 1 = Yes
31 _	WHAT DO YOU THINK IS THE PRINCIPLE CAUSE OF DIARRHLA AMONG CHILDREN? 1) They have bad blood, they lack blood, they suffer from fright, cold weather, hot liver, cold liver, because of the heat, cold stomach, dampness, anemia, maternal negligence. 2) Worms, eating something which does not agree with them, bad digestion, bad food, eating a great deal, not chewing well, something coming out of the teeth, enduring hunger, eating very late, eating fruit. 3) Microbes, feces on the ground/floor. It comes from other houses, filth on the hands. They pick up things from the floor and eat them. 9) Don't know Did not Respond Other
32 _	WHAT DO YOU USUALLY DO WHEN YOUR CHILDREN HAVE DIARRHEA? 1) Home Remedies 2) Buy medicine in the pharmacy or the store. 3) Take them to the doctor, ask for medicine at the Health Post.
33 _	WHAT DO YOU THINK IS THE PRINCIPAL CAUSE OF DIARRHEA AMONG ADULTS? same as question #31.
34 _	WHAT DO YOU USUALLY DO WHEN AN ADULT HAS DIARRHEA? same as question #32.
35 _	WHERE DO YOU DEFECATE WHEN YOU ARE AT HOME? 1) In the woods, on patio, ravine. 2) In the public latrine. 3) In a private latrine.
36 _	WHERE DO YOU DEFECATE IF YOU MUST GO IN THE MIDDLE OF THE NIGHT? 1) They don't leave house. 2) Near the ranch, on the patio, in woods. 3) In the chamber pot. 4) In the latrine.

Columns	Description
37 _	DO PEOPLE LIKE TO USE THE LATRINES? 0 = No 1 = Yes
38 _	DO THE ANIMALS SPEND THE NIGHT IN THE HOUSE? 0 = Yes 1 = No
60-65 _ _ _ _ _ _	DATE Day Month Year
66-67 _ _	CENSUS TAKER (identification)
68-69 _ _	CARD NUMBER
70-72 _ _ _	FAMILY IDENTIFICATION

Protocol

FORM 40

Title:	Annual sanitation survey (observation section).
Purpose:	To evaluate the sanitation environment of the home.
No. of versions:	1
Form history:	Second version of the annual sanitation survey used during January 1974. A previous version completed in August of 1972 is described under forms 04, 05, 06, 07, and 08.
Coverage:	The survey included all families in the longitudinal samples in both communities.

INSTRUCTIONS FOR THE USE OF FORM 40

Version 1: January 1974.

1. This survey is for each family in the longitudinal sample in both communities.
2. Survey is done at the same time as form 39 (interview section).

Columns	Description
1-5	Address of home visited:
	1: Community identification 1 = Florida Aceituno 2 = Guanagazapa
	2-3: Block number
	4-5: House number
11-41	A. Characteristics of the house
11-13	Number of rooms:
	11 Bedrooms: indicate the number of rooms used as bedrooms, even though they might have other uses, such as a living-room, kitchen or storeroom.
	12 Dining-rooms or living-rooms: indicate the number of rooms used exclusively as a dining-room or living-room.

13 Storeroom: indicate the number of rooms used exclusively as storerooms. Areas of the main room or bedroom used for storage of corn and beans are not considered as storerooms unless they are proper rooms.

14 Arrangement of sleeping area and kitchen area:
1) bedroom and kitchen in one room, there is no physical separation between the areas.
2) there is a division, some type of formal or informal wall.
3) the kitchen forms part of the principal structure, is attached to an exterior wall or is a room within the principal structure that has direct access to the sleeping area.
4) the kitchen is completely separated from the sleeping area.

15-27 Construction materials (principal structure): If the material is present, put a "1" in the corresponding column, if it is not present, a "0".

28-32 Number and type of furniture items: note the number of each item. If an item is not present, put a "0" in the corresponding column.

33-35 Quality of furniture items: check which of the qualities any of the items of furniture have. 1 indicates that there is item with that quality and 0 that no items have that quality. Pullman and semi-pullman refer to chairs, sofas and armchairs that are padded and covered with a fabric (textile or plastic) in part or whole.

36-41 Number and type of beds: note the number of each type of bed. If one type is not present, put a 0 in the corresponding column.

37 Category "tapexco" is to include all types of rustic beds. Wooden bed refers to modern style beds of wood.

41 If some beds have mattresses and others do not, then the response follows the majority, e.g., if more beds do not have mattresses than those that do, place "0" in column 41.

42-55 B. Characteristics of the kitchen

42-54 Construction materials: if the material is present,

Columns	Description
	put a "1" in the corresponding column, if it is not present, a "0".
	55 Cooking equipment: indicate the equipment principally used.
56-59	C. Hygiene
	56 Cupboard for storing utensils: plates, flatware, cups, and saucers.
	57 Storage of corn: within the home. "Without protection" means the corn is not kept in a closed metal container. If some corn is protected but some is not put "0" in column 57. If there is no corn stored at all, the code is "8".
	58 Storage of water: in containers within the house. If only some containers are covered and some are uncovered, put "1" in column 58. If no storage containers are used, the code is "8".
	59 Source of water: for activities in the home.
60-65	Date of survey: 60-61: day 62-63: month 64-65: last 2 digits of year
66-67	Identification of survey-taker.
68-69	Form/card number: 40
70-72	Identification number of family visited.
77	Code indicating first card for form 40 = 1.

SURVEY CONTINUES ON A NEW CARD

0-10	Blank
11-19	C. Hygiene (Continued)
	11 Facilities for cleaning utensils: used for eating plates and flatware.

Columns	Description
12	Storage of food: if it is covered with a cloth, it is considered to be protected against flies. If it is stored in a container with a lid or cover so that it is not likely that a rodent could push it aside or knock it off, then the container can be considered to be protected from flies and rodents. If it is stored in a cupboard, it still has to be protected against cockroaches and other insects that might be inside.
13	Bathing facilities: indicate if there is some type of facility for completely bathing oneself at home with privacy.
14	Sanitary facilities: latrine consists of a platform and concrete seat placed over an absorption pit. Toilet without drain consists of a platform and a seat made of wood or of solid material, such as brick, adobe, etc., placed over an absorption pit. Toilet with drain, has a connection to a sewer system, septic tank or absorption pit. Flush toilet has drainage and a flush-water system. Note: if the code is "0", the code for columns 15-19 is "8".
15	Use of sanitary facilities: is there evidence of proper use of the facility, for example, clean paper, clean interior.
16	Construction: provisional structure means that it is constructed with scrap materials or materials in poor condition. A formal structure is constructed with materials of good quality and durability or a structure that shows good maintenance and privacy.
17	Seat material: refers to the "bowl" and not the cover.
18	Platform material: platform has to be above the surrounding ground level.
19	Door: made of wood, sticks or cane that offer adequate privacy. Curtains of cloth or plastic should not be considered to be doors.
60-65	Date of survey: Day month, last 2 digits of year.

Columns	Description
66-67	Identification of survey-taker.
68-69	Form/card number: 40
70-72	Identification number of family visited.
77	Code indicating second card of form 40 = 2

Simplified Protocol

Annual Sanitation Survey

FORM 40 - CARD 1

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY IDENTIFICATION 1 Block Number 2 House Number
11-13	HOUSE AND ENVIRONS NUMBER OF ROOMS 1 Bedrooms 2 Dining rooms or living rooms 3 Storerooms
14	SEPARATION OF SLEEPING AND KITCHEN AREAS 1 Bedroom and kitchen in same room 2 Bedroom and kitchen separated by a partition 3 Kitchen attached to main structure with direct access to sleeping areas 4 Kitchen completely separated from the sleeping areas
15-18	CONSTRUCTION MATERIALS-MAIN STRUCTURE-ROOF 1 Thatch 2 Tin 3 Asbestos 4 Tile
19-22	CONSTRUCTION MATERIALS-MAIN STRUCTURE-WALLS 1 Cane 2 Sticks 3 Irregular planks 4 Complete planks 5 Adobe 6 Concrete blocks
23-27	CONSTRUCTION MATERIALS-MAIN STRUCTURE-FLOOR 1 Earth 2 Mud brick 3 Concrete

Columns	Description
28-32	NUMBER AND TYPE OF FURNITURE 1 Stools 2 Boxes 3 Benches 4 Chairs 5 Tables
33-35	QUALITY OF FURNITURE 1 Wood/unfinished 2 Wood/finished, metal or plastic 3 Upholstered
36-40	NUMBER AND TYPE OF BEDS 1 Rustic beds 2 Hammocks 3 Wood frame beds 4 Metal frame beds
41	DO A MAJORITY OF BEDS HAVE MATTRESSES 0 No 1 Yes
42-45	CONSTRUCTION MATERIALS-KITCHEN-ROOF 1 Thatch 2 Tin 3 Asbestos 4 Tile
46-69	CONSTRUCTION MATERIALS-KITCHEN-WALLS 1 Cane 2 Sticks 3 Irregular planks 4 Complete planks 5 Adobe 6 Concrete blocks
50-55	CONSTRUCTION MATERIALS-KITCHEN-FLOOR 1 Hearth on floor 2 Hearth on table 3 Charcoal or wood stove 4 Kerosene stove 5 Propane or electric stove
56	STORAGE CUPBOARDS PROVIDED FOR UTENSILS IN KITCHEN 1 Plates 2 Flatward 3 Cups 4 Saucers
57	STORAGE OF CORN 0 Not all corn stored in a closed metal conta 1 All corn stored in a closed metal container 2 No corn present

Columns	Description
58	STORAGE OF WATER-CONTAINERS IN HOUSE 0 All containers covered 1 Some containers not covered 8 No storage containers used
59	SOURCE OF WATER FOR HOUSEHOLD USES 1 Faucet in patio 2 Well 3 Neighbor 4 River 5 Other
60-65	IDENTIFICATION OF SURVEYOR
68-69	FORM NUMBER
70-72	IDENTIFICATION OF FAMILY
77	CARD NUMBER

Simplified Protocol

Annual Sanitation Survey

FORM 40 - CARD 2

Columns	Description
1-10	NOT USED
11	FACILITIES FOR CLEANING UTENSILS 1 River 2 Basin 3 Pila with drain
12	STORAGE OF FOOD 1 Protected from flies - cloth or other cover 2 Protected from rodents - lid or cover which is not easily dislodged 3 Protected from cockroaches - sealed in a tight container
13	BATHING FACILITIES-AT HOME-WITH PRIVACY 0 None 1 Latrine 2 Toilet without drain to sewer 3 Toilet with drain to sewer 4 Flush toilet
14	MAINTENANCE OF SANITARY FACILITIES 0 Poorly maintained (full pit, no toilet paper, not kept clean) 1 Properly maintained
15	USE OF SANITARY FACILITIES
16	LATRINE CONSTRUCTION 0 Provisional structure (scrap materials, in poor condition) 1 Formal structure (good quality materials, durable and properly maintained)
17	LATRINE SEAT 0 Poor quality 1 Good quality and durable
18	LATRINE RISER 0 Poor quality 1 Good quality

Columns	Description
19	LATRINE DOOR 0 Poor quality with little privacy 1 Good quality (made of wood, sticks or cane with adequate privacy)
20-59	NOT USED
60-65	DATE OF SURVEY 1 Day 2 Month 3 Year
66-67	SURVEYOR IDENTIFICATION
68-69	FORM NUMBER
70-72	FAMILY IDENTIFICATION
77	CARD NUMBER

U. of N. Carolina at Chapel Hill
Nutrition Institute of Central America and Panama
Sanitation, Health and Malabsorption Study
Annual Sanitation Survey
Observation Section

FORM 40

Code: Not Applicable - 8 Other - 9

Columns	Description
1-5 _ _ _ _ _	LOCATION
6-10	BLOCKED
	A. CHARACTERISTICS OF THE HOME Number of rooms
11 _	BEDROOMS
12 _	LIVING OR DINING
13 _	BOOEGAS (STORAGE)
14 _	ARRANGEMENT OF BEDROOM AND KITCHEN: 1) Bedroom and kitchen in one room. 2) Division between sleeping area and kitchen. 3) Kitchen is a part of the principal structure. 4) Bedroom and kitchen are separate structures.
15-27	CONSTRUCTION MATERIALS - PRINCIPAL STRUCTURE: 0 = Not present 1 = Present
	ROOF:
	_ 15 Palm and/or straw
	_ 16 Sheet metal (tin)
	_ 17 Straw
	_ 18 Roofing tile
	WALLS:
	_ 19 Cane
	_ 20 Chips (wood)
	_ 21 Planks, Heavy boards
	_ 22 Whole planks
	_ 23 Adobe
	_ 24 Block

Columns		Description
		FLOOR
	_	25 Earth
	_	26 Brick
	_	27 Cement
28-32		NUMBER AND TYPE OF FURNISHINGS
	_	28 Wooden blocks
	_	29 Boxes
	_	30 Benches
	_	31 Chairs
	_	32 Tables
33-35		QUALITY OR CONSTRUCTION OF FURNISHINGS
	_	33 Simple wood
	_	34 Finished wood, plastic, metal etc.
	_	35 Pullman or semi-pullman?
36-41		NUMBER AND TYPE OF BED
	_	36
	_	37
	_	38 Hammocks
	_	39 Metal beds
	_	40 With mattress - 1
	_	41 Without mattress - 0
		B. CHARACTERISTICS OF THE KITCHEN: CONSTRUCTION MATERIALS 0 = Not present 1 = Present
42-45		ROOF
	_	42 Palm and/or straw
	_	43 Sheet metal (tin)
	_	44 Straw
	_	45 Roofing tiles
46-51		WALLS
	_	46 Cane
	_	47 Chips (wood)
	_	48 Planks
	_	49 Whole planks
	_	50 Adobe
	_	51 Block
52-54		FLOOR
	_	52 Earth
	_	53 Brick
	_	54 Cement

Columns	Description
55 _	KITCHEN 1) Low cooking stove. 2) Stone bench 3) Stove (firewood, coal) 4) Stove (gas) 5) Stove (electric)
	C. HYGIENE
56 _	SPECIAL CUPBOARD TO KEEP UTENSILS 0 = No 1 = Yes
57 _	CORN STORAGE 0 = Without protection 1 = In metal container
58 _	WATER STORAGE 1) Uncovered receptacles 2) Covered receptacles 3) Tap in the house
59 _	WATER SOURCE 1) Public well or 2) Well or 3) Well with 4) Tap in the patio 5) Tap in the house
60-65 _ _ _ _ _	DATE
66-67 _ _	CODE
68-69 _ _	CARD NUMBER
70-72 _ _ _	FAMILY NUMBER

SURVEY CONTINUES WITH NEW CARD

1-10	NOT USED
11 _	FACILITIES FOR CLEANING UTENSILS 1) Washed in river or tap 2) In a basin 3) In a trough or basin with a drain (sink)

Columns	Description
12 _	FOOD STORAGE 1) Unprotected receptacles 2) Protected against flies 3) Protected against flies and rodents
13 _	BATHING FACILITIES 0 = None 1 = Bath house
14 _	SANITARY FACILITIES 0 = None 1 = Latrine 2 = Toilet with drain (outlet, sewerage) 3 = Toilet without drain (outlet, sewerage) 4 = Water closet (toilet)
15 _	DO YOU BELIEVE THAT THEY USE IT? 0 = No 1 = Yes
16 _	CONSTRUCTION OF LATRINE 1) Provisional booth (stall) (small house) 2) Formal booth (stall) (small house)
17 _	SEAT CONSTRUCTION IN LATRINE 1) Wood 2) Brick 3) Cement
18 _	PLATFORM MATERIAL 0) There is none 1) Earth 2) Brick 3) Cement
19 _	DOOR 0) There is none 1) One present
60-66 _ _ _ _ _	DATE
66-67 _ _	CODE
68-69 _ _	CARD NUMBER
70-72 _ _ _	FAMILY NUMBER

Simplified Protocol

Evaluation of Sanitary Health Education

FORM 41

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY ADDRESS IDENTIFICATION 1 Block number 2 House number
6-9	NOT USED
10	SEX OF THE INFORMANT
11	WHAT IS THE DIFFERENCE BETWEEN TAP WATER AND WATER FROM OTHER SOURCES? 1) Water from the well or river is better or preferred 2) There is no difference; water from the tap and from the well or river is the same 3) Water from the tap has better taste, color, clarity; it is closer or more convenient 4) Water from the tap cleaner is potable 5) Tap water is filtered, treated or disinfected. It is better to drink because it is healthier; it has chlorine 6) Tap water does not contain microbes. Other sources have microbes 7) Tap water causes fewer diseases
12	DOES THE HOUSE HAVE A TAP? 1 Yes 2 No
13	HOW MUCH WATER DOES THE INFORMANT BELIEVE HE HAS A RIGHT TO USE EACH DAY WITHOUT PAYING AN EXCESS CHARGE? 0) Less than one drum 1) One drum 2) Two drums 3) ...three drums etc. 7) Seven drums or more (one drum = 200 liters)
14	HOW MUCH WATER DOES THE INFORMANT BELIEVE HE HAS THE RIGHT TO USE EACH MONTH WITHOUT PAYING AN EXCESS CHARGE? 0) Less than 10,000 liters 1) 10,000 to 19,999 liters 2) 20,000 to 29,999 liters

Columns	Description
	3) 30,000 to 39,999 liters 4) 40,000 to 49,999 liters 5) 50,000 to 59,999 liters 6) 60,000 to 69,999 liters
15	FOR WHAT REASON DO YOU THINK IT IS USEFUL TO HAVE A LATRINE? 0) It is not useful to have a latrine because the informant has a well 1) It is not useful for any reason 2) It is used primarily to go to the bathroom in; it's useful when it rains or when one is sick so that one does not have to go far 3) For reasons of cleanliness and to avoid filth 4) To avoid flies or insects 5) To avoid microbes 6) To avoid diseases 7) Other
16	HOW CAN A PERSON GET A LATRINE? 1) Make one himself 2) Health post or INCAP 0) Any other manner
17	HOW MUCH DOES A LATRINE COST? 1) One dollar 0) Any other value
18	WHAT DOES ONE HAVE TO DO BEFORE THEY WILL SELL YOU A LATRINE AT THE HEALTH POST? 1) Select or arrange the site 2) Speak with Health Post or INCAP personnel 3) Dig a hole with a stone collar 0) Other response
19-20	HOW OFTEN DOES THE INFORMANT BATHE EACH DAY? 1) Daily 2) Every two days; three times per week 3) Every three days; twice per week 4) Every four days 5) Every five days 6) Every six days 7) Every seven days 8) Every eight days 15) Every fifteen days 30) Once per month
21	DID YOU BATHE YESTERDAY? 1 Yes 2 No

Columns	Description
22	DID YOU BATHE YOUR YOUNGEST CHILD YESTERDAY? 1 Yes 0 No
23	WHEN ARE YOU ACCUSTOMED TO WASHING YOUR HANDS? 0 Every now and then 1 Upon rising 2 After getting hands dirty 3 Before preparing, serving or eating a meal 4 After going to the bathroom 5 After eating, preparing or touching food 6 After changing the baby 7 After doing housework 8 Other
24-27	NOT USED
28	WITH WHAT DO YOU DRY YOUR HANDS AFTER WASHING THEM? 0 Does not dry them 1 Towel 2 Rag 3 Clothing 4 Other
29	WHEN WAS THE LAST TIME TODAY THAT YOU WASHED YOUR HANDS? 0 Less than one hour 1 One hour 2 Two hours 3 ... Three hours etc. 5 Five hours 6 More than five hours
30-31	WHY DID YOU WASH THEM? 1 Upon rising 2 After getting them dirty 3 Before preparing, serving and touching food 4 After going to the bathroom 5 After eating or preparing food 6 After changing the baby 7 After touching garbage or doing housework 9 Other
32	THE LAST TIME YOU WASHED YOUR HANDS DID YOU USE SOAP OR DID YOU WASH ONLY WITH WATER? 0 Only with water 1 With soap
33	DO YOU HAVE SOAP IN YOUR HOUSE RIGHT NOW OR HAVE YOU RUN OUT? 0 Do not have soap 1 Have soap

Columns	Description
34-35	DO YOU THINK THERE ARE SOME DISEASES THAT YOU COULD AVOID ONLY THROUGH PERSONAL CLEANLINESS? IF YES, WHICH DISEASES? 0 No diseases 1 All diseases 5 Non specific respiratory diseases 6 Fever, chills 7 Flu or colds 8 Coughing or sore throat 9 Other specified respiratory disease 10 Non specific stomach diseases 11 Diarrhea 12 Worms or parasites 13 Vomiting 14 Others; specified from the stomach 20 Serious diseases 30 Diseases that are not serious
36-42	NOT USED
43	DO YOU THINK THAT HAVING ANIMALS IN THE KITCHEN IS HARMFUL? 1 Yes 2 No because they do not enter 3 No because they do not own any animal 0 No
44	WHAT HARM DO ANIMALS CAUSE IF THEY ENTER IN THE KITCHEN? 1 They are bothersome 2 They steal food 3 They leave hair or live 4 They leave feces or filth 5 They bring microbes 6 They bring diseases, they hurt health
45	DO YOU THINK FLIES ARE HARMFUL TO YOU? 0 No 1 Yes
46	WHAT HARM DO THEY CAUSE? 0 They cause no harm 1 They are bothersome 2 They land on the food 3 They leave dirt on the food 4 They leave microbes on the food 5 They produce diseases 6 Other

Columns	Description
47	HOW DO YOU CONTROL FLIES? 0 Nothing 1 Shoo them 2 Use a fly-swatter 3 Cover food 4 Use disenfectants or fly paper 5 Through cleanliness and hygiene
48	IF YOU HAVE TO GO TO THE BATHROOM IN THE MIDDLE OF THE NIGHT, WHERE DO YOU GO? 1 Do not go 2 In the chamber pot 3 Near the house 4 In the latrine
49	WHAT DO YOU THINK IS THE MAIN CAUSE OF DIARRHEA IN CHILDREN? 1 Microbes, feces on the floor, lack of cleanliness 3 Intestinal parasites, bad food, bad digestion 4 Having bad blood, suffering from fright, due to "hot" or "cold"
50	WHAT DO YOU THINK IS THE MAIN CAUSE OF DIARRHEA IN ADULTS? 1 Microbes, feces on the floor, dirt on hands 3 Intestinal parasites, bad food, bad digestion 4 Having bad blood, suffering from fright due to "hot" or "cold"
51-52	WHAT ARE MICROBES? 1 Animals 2 Lack of cleanliness 3 That which is found in dirt, feces, or garbage 4 Parasites or worms 5 Diseases 6 Something which produces or carries disease
53	WHAT SIZE ARE MICROBES? 1 They cannot be seen 2 They can be seen only with a microscope or in agar plates 0 Other responses
54-55	WHICH DISEASES HAVE MICROBES CAUSED IN YOUR FAMILY? 0 No diseases 1 All diseases 5 Respiratory diseases, non-specified 6 Fever or chills 7 Flu or colds 8 Sore throat or coughs

Columns	Description
	9 Other specified respiratory disease 10 Non specific stomach disease 11 Diarrhea 12 Parasites or worms 13 Vomiting 14 Other specific diseases of the stomach 20 Serious diseases 30 Diseases that are not serious
60-61	DAY OF INTERVIEW
62-63	MONTH OF INTERVIEW
64-65	YEAR OF INTERVIEW
66-67	INTERVIEWER NUMBER
68-69	FORM NUMBER (41)
70-72	FAMILY IDENTIFICATION
73-76	INDIVIDUAL IDENTIFICATION

Instituto de Nutricion de Centra America y Panama

Gastrointestinal Section

Biomedical Division

Evaluation of Health Education

FORM 41

Columns	Description
1-5 _ _ _ _ _	ADDRESS OF FAMILY
6-9 _ _ _ _	IDENTIFICATION OF FAMILY
10 _	SEX OF INFORMANT
11 _	WATER: DIFFERENCE BETWEEN POTABLE AND NON-POTABLE WATER: (values 1-9) 1) Water from the well or river is better or preferred. 2) There is no difference; water from the tap, well or river is the same. 3) Water from the tap has a better taste, color, clarity, or comes in tubes, is closer, more convenient, or better without giving reason. 4) Water from the tap is cleaner, is potable, does not have animals. Other sources are dirtier, carried with animals, or are used for washing or bathing. 5) Tap water is filtered, treated, or desinfected. It is better to drink, it is healthier; it has chlorine. Other sources do not have the above. 6) Tap water does not contain microbes without mentioning health or diseases. The other has microbes without mentioning health or diseases. 7) Tap water causes fewer diseases. Other sources cause diseases.
13 _	QUANTITY OF WATER THAT CAN BE USED DAILY: (values 0-9) 0) Less than one drum 1) One drum 2) Two drums, etc. 7) Seven drums or more (1 drum = 200 liters)
14 _	RIGHT TO WATER MONTHLY: (values 0-6, 8, 9) 0) Less than 10,000 liters 1) 10,000 - 19,999 liters 2) 20,000 - 29,999 liters 3) 30,000 - 39,999 liters (half paja) 4) 40,000 - 49,999 liters 5) 50,000 - 59,999 liters 6) 60,000 - or more (one paja)

Columns	Description
15 _	LATRINE: WHY IS IT USEFUL: (values 0-9) 0) It is not convenient due to the wells. 1) It is not convenient for any other reason; it is good and bad. 2) To go to the bathroom; to avoid going to the bush or going far away; or going close to the house; to avoid bad odors and nausea; to avoid animals; because it is private; it is good when it rains or when one is sick so that one does not have to go far; general reasons. 3) Cleanliness; to avoid filth; so the animals do not eat nor scatter the feces; to avoid contamination. 4) To avoid flies or insects. 5) To avoid microbes without mentioning diseases. 6) To avoid diseases or intestinal worms; to avoid microbes that produce diseases; because it is healthier.
16 _	HOW DOES ONE GET A LATRINE: (values 0-2) 1) To make one oneself. 2) Health Post, INCAP or personnel from INCAP. 0) Any other manner.
18 _	BEFORE THEY WILL SELL YOU THE LATRINE: (values 0-4) 1) Select or arrange the site (without mentioning the hole or the stone collar) 2) To speak with personnel from INCAP, Health Post or INCAP. 3) To make the hole and the stone collar. 4) To speak with another person (specify). 0) Other responds.
19-20 _ _	BATHING (values 01-99) 01) Daily 02) Every 2 days, three times per week, four times per week. 03) Every 3 days, twice a week. 04) Every 4 days 05) Every 5 days 06) Every 6 days 07) Every 7 days, once a week 08) Every 8 days, once a week, etc. 15) Every 15 days 30) Every month
23-27 _ _ _ _	WHEN DO YOU WASH YOUR HANDS: (values 0-9) 0) Every little while 1) After getting up 2) After getting hands dirty 3) Before preparing, serving or eating a meal

Columns	Description
	4) After going to the bathroom 5) After eating, preparing or touching food 6) After changing the baby or after cleaning him 7) After doing housework or touching garbage 8) Other
28 _	DRYING THE HANDS: (values 0-4) 0) Do not dry them 1) Towel 2) Rag 3) Dress or apron 4) Other
29 _	THE LAST TIME YOU WASHED THEIR HANDS: (values 0-9) 0) Less than one hour 1) One hour 2) Two hours 3) Three hours 4) Four hours 5) Five hours 6) Six hours or more then six hours
30-31 _ _	WHY DID YOU WASH THEM: (values 01-07, 09) 01 Upon raising 02 After dirty them for whatever reason. 03 Before preparing, serving or touching food, before touching water or dishes. 04 After going to the bathroom 05 After eating, preparing or touching food 06 After changing the baby or after cleaning him 07 After touching garbage, or after doing housework 09 Others
35-36 _ _	DISEASES: (use values indicated below) 00 None 01 All 02 Many, whatever 03 The microbes Respiratory diseases: 05 Non specific or not specified respiratory diseases. 06 Fevers or chills. 07 Cold, flu or the gripe. 08 Coughing, throat problems. 09 Other respiratory specified. Diseases of the stomach: 10 Not specified of the stomach or intestines. 11 Diarrhea, dysentery or the "trots".

Columns	Description
	12 Parasites, intestinal worms 13 Vomiting 14 Other specified from the stomach 20 Serious diseases such as: anemia, typhoid fever, malaria cancer, infection, urine diseases or kidney mumps, tuberculosis, diseases 30 Diseases that are not serious such as: alergies headaches, body aches, toothaches pimples irritations of the skin or body
44 _	ANIMALS IN THE KITCHEN: HARM THEY CAUSE (values 1-6, 8, 9) 1) They are bad, they are bothersome, they bite or make noises, general reasons. 2) Steal the food 3) Leave hair or lice, attract flies. 4) Leave feces or filth. 5) Bring microbes, without mentioning diseases. 6) Bring one or more diseases; hurt the health.
46 _	FLIES: WHAT HARM DO THEY DO? (values 0-6, 8, 9) 0) Do no harm; there are no flies; do not do anything. 1) Are bothersome, bite, make one nauseas. 2) They land on the food. 3) They leave dirt on the food. 4) Leave microbes on the food. 5) Produce diseases; leave things on the food that produce diseases. 6) Other.
47 _	HOW DO YOU AVOID FLIES: (values 0-5, 8, 9) 0) Do nothing. 1) Shoo them with smoke or with a fling shot. 2) Use fly swatter. 3) Cover the food. 4) Use desinfectant, pesticide, or fly paper. 5) Use cleanliness.
49-50 _ _	CAUSE OF DIARRHEA IN CHILDREN AND ADULTS: (values 1, 3-5, 8, 9) 1) Microbes, feces on the floor, dirt on the hands, lack of cleanliness, taking things from the floor and eating them. 3) Due to intestinal parasites, bad food, bad digestion, eating too much, not chewing well, tooth eruption, eating very late, eating fruits, eating cold or hot food.

Columns	Description
	4) Having bad blood, lacking blood, suffering from fright, coldness of the temperature, cold or hot liver, due to heat or cold, much coldness in the stomach, due to the negligence of the mother. 5) Other.
51-52 _ _	MICROBES: WHAT ARE THEY: (values 01-06, 88, 99) 01) Animals or small animals, insects, eggs or other specified animal, something not specified. 02) Lack of cleanliness, not being clean, not washing the hands, dirt, dust, mud, earth, garbage, or dirty things, something left by flies. 03) That what is found in dirt, feces, non potable water, garbage. 04) A type of disease; diseases; something which harms the health. 05) Intestinal parasites. 06) Something which brings, produces or carries diseases.
53 _	WHAT SIZE ARE THEY: (values 0-2, 8, 9) 1) Something which cannot be seen. 2) Something which can be seen only with a microscope, or in agar plates. 0) Other responses.
54-55 _ _	DISEASES: 00 No diseases. 01 All diseases. 02 Many of whatever disease. 03 The microbes. Respiratory diseases: 05 Non specified respiratory disease. 06 Fevers or chills. 07 Colds, flu or the gripe. 08 Sour throat or cough. 09 Other specific respiratory disease. Diseases of the stomach: 10 Non specified disease of the stomach or the intestines. 11 Diarrhea, dysentery, the "trots" 12 Intestinal parasites. 13 Vomiting 14 Other specified diseases of the stomach. Serious diseases such as: anemia typhoid fever malaria cancer infection urinary or kidney mumps tuberculosis problems 30 Diseases that are not serious such as:

Columns	Description
	alergies headaches, body aches, muscle aches, toothaches pimples irritations on the body or skin eye irritations lazyness body lice
60-65 _ _ _ _ _	DATE OF VISIT (Day, Month, Year)
66-67 _ _	IDENTIFICATION OF SURVEYOR
68-69 _ _	FORM NUMBER
70-72 _ _ _	FAMILY IDENTIFICATION

Protocol

FORM 42

Title:	Annual sanitation survey (observation section)
Purpose:	To evaluate the sanitation environment of the home.
No. of versions:	1
Form history:	Third version of the annual sanitation survey. This form was used during the months of February and March of 1975. Previous versions of the annual sanitation form are to be found under the description of 04, 05, 06, 07, 08, and forms 39, 40.
Coverage:	The survey covered all the families in the longitudinal samples in both communities.

INSTRUCTIONS FOR THE USE OF FORM 42

Version 1: February and March, 1975

Instructions:

The survey consists of two parts (form 41 and form 42). It is completed by two people at the same time and in the same home. The procedure is to ask permission for both interviewers to enter; after an introduction and explanation of the type of questions in the forms, one may start the questioning. The person responsible for form 42 (observation) is seated during the first few minutes of the interview and then asks permission to visit the rest of the house and yard. One should take into account that the person being interviewed usually stays with the visitor and that in this case will possibly be nervous and worried at not being able to accompany the person who is doing the observation section to see what they are doing.

With this new form, there is a possibility that the person doing the observation section will have to ask some direct questions about things that are not obvious from pure observation.

1. This survey is for each family in the longitudinal sample in both communities.

2. The person interviewed should be the female head of household.

Columns	Description
1-5	Address of the family being surveyed.
	1: Community identification 1 = Florida Aceituno 2 = Guanagazapa
	2-3: Block number
	4-5: House number
7-11	A. Characteristics of the house
	Number of rooms:
	7 Bedrooms: indicate the number of rooms used as bedrooms even though they might have other uses, such as a living-room, kitchen or store room. These should be continually in use as bedrooms and not occasionally. For example, if a room appears to be used as a storeroom and bedroom, one should confirm its use as a bedroom. If this is so, one should classify it only as a bedroom and not as a storeroom. If it is used only occasionally, as a bedroom, it should be classified as a storeroom.
	8 Dining-rooms or living-rooms: indicate the number of rooms used exclusively as a dining-room or living-room.
	9 Storeroom: indicate the number of rooms used exclusively as storerooms (except as discussed under column 7 above). A storeroom needs to have complete walls and a door. Areas of the main room or bedroom used for storing corn and beans are not considered as storerooms unless they are proper rooms.
	11 Arrangement: indicate the arrangement of cooking and sleeping areas. a) bedroom and kitchen in one room, there is no physical separation between the areas. b) there is a division; some type of formal or informal wall. c) the kitchen forms part of the principal structure. It is attached to an exterior wall or is a room within the principal structure that has direct access to the sleeping area.

Columns	Description
	d) separate structuares. The kitchen is completely separated from the sleeping area.
13-27	B. CHARACTERISTICS OF THE PRINCIPAL STRUCTURE: Principal structure refers to the most formal and substantial structure. Usually this has bedrooms, living-rooms and storerooms. Each alternative gives a way of fulfilling a necessary function. The first alternative always gives the most primitive way and the fifth the most sophisticated.
13-15	Construction of the roof, exterior walls and fluor: indicate the material that predominates.
17	Lighting: indicate which is the principal source of light. It is necessary to make this a direct question; 4) refers to a naked electric bulb.
18-26	Furniture: note presence with "1" and absence with "0". If there is more than 1 of an item, indicate the quantity. A dining-room set includes a table and chairs. If there is only a table or only chairs use columns 21 or 22. Note: this list does not include rustic items but only manufactured items or of fine quality, i.e. wood should be varnished not painted.
27	Transport: indicate the most sophisticated alternative the family has even though only one person such as the head of the family uses it. It is necessary to ask this to the person being interviewed.
29-38	C. CHARACTERISTICS OF THE KITCHEN:
29	Means of cooking: if they use more than one mean, indicate the most sophisticated alternative unless it is obvious that they do not use more than one of the means.
30	Fuel for cooking: it is necessary to ask this, indicate the principal fuel.
32	Storage of water: 1) refers to containers inside or outside the house; 2) a specialized container inside the house; 3) large and specialized container that is not portable; 4) a cement or duralite tank or container for water; 5) it is automatic only when water is used directly from the faucet without putting it into a container for storage.

Columns	Description
	33 Transportation of water to the house: it is necessary to check your observations with a direct question.
	34 Preservation of perishable food: check your observation with a direct question. 2) refers to window boxes, cabinet with mesh sides, clay jar and nets used for storing fruits and fast-spoiling vegetables, usually hung from the roof beam inside the home. The small suspended shelves usually seen outside on the porth and generally used for tortillas should not be taken as a means of perishable food perservation.
	35 Table place-settings: it is only necessary for you to get the information on the number of spoons, forks and knives used at the table when the family eat. Also ask the number of people eating at the table. The calculations needed to fill in column 35 will be done at the central office. If the people have flatware but do not use it at the table, one may put "1" in column 35.
	37 Means of cleaning the floors: inside the home, ask and see what they use.
	38 Facilities for cleaning utensils used for eating (plates, flatware).
40-48	D. SANITARY FACILITIES:
	40 Disposal of human wastes: latrine consist of a platform and concrete seat placed over a permeable pit. Toilet consists of a platform with a seat made of wood or of solid material such as brick, adobe, etc. over a perm pit. Latrine with drainage a device for disposal of excrement, with porcelain or rough concrete seats. There is a connection to a sewer system, septic tank or absorption pit. Flush-toilet equal to the latrine with drainage, with the addition of a flush-water system. Note: if they use the monte the code for columns 41-46 should be "8".
	42 Use of latrine, etc.: is there evidence of the proper use of the facility, for example, clean paper, clean interior.
	43 Construction of the latrine, etc.: provisional structure means it is constructed with scrap

Columns	Description
	materials or materials in poor condition. A formal structure is constructed with materials of good quality and durability or a structure that shows good maintenance and privacy.
	44-45 Material of the seat, platform: indicate the material that predominates.
	46 Door of the latrine, etc.: provisional refers to type of curtains made from cloth or plastic sheets. Formal refers to complete doors., made from wood, sticks or cane, that offer adequate privacy.
	48 Bathing facilities: indicate if there is some type of facility for bathing oneself completely at home with privacy.
50	Wastewater drainage: refers principally to the waste water from the common-sinks, especially in Guanagazapa. Channel: pit or ditch or rustic tubing used to take the water away from the place of use. Absorption pit: absorbing pit or other system for the subterranean disposal on the home-site. Public sewer: sewer or public drain that removes the water without public nuisance.
60-65	DATE OF VISIT 60-61 Day 62-63 Month 64-65 Last two digits of year
66-67	IDENTIFICATION OF SURVEY TAKER
68-69	FORM/CARD NUMBER: 42
70-72	IDENTIFICATION OF FAMILY VISITED

Simplified Protocol

Annual Sanitation Survey

FORM 42

Columns	Description
1	COMMUNITY 1 Florida Aceituno 2 Guanagazapa
2-5	FAMILY ADDRESS 1 Block Number 2 House Number
6	NOT USED
7-9	A. CHARACTERISTICS OF THE HOUSE NUMBER OF ROOMS 1 Bedrooms 2 Dining rooms or living rooms 3 Storerooms
10	NOT USED
11	SEPARATION OF SLEEPING AND KITCHEN AREAS 1 Bedroom and kitchen in same room 2 Bedroom and kitchen separated by a partition 3 Kitchen attached to main structure 4 Bedroom and kitchen are separate structures
12	NOT USED
13	B. CHARACTERISTICS OF THE PRINCIPAL STRUCTURE CONSTRUCTION MATERIALS-ROOF 1 None, roof with big holes 2 Straw, palm, grass 3 Sign-board, pieces of metal 4 Sheets of laminated tin 5 Tile, asbestos-cement, concrete
14	CONSTRUCTION MATERIALS-WALLS 1 None, palm, leaves, plastic, grass 2 Cane, sticks, irregular planks, sign-boards, wooden siding with open joints 3 Unpainted wood, complete planks, wooden siding with covered joints, adobe, bajareque

Columns	Description
15	CONSTRUCTION MATERIALS-FLOOR 1 Earth 2 Wood with open joints 3 Unpolished hard or soft-woods with tongue-and-groove 4 Painted or polished soft-woods, cement capping 5 Painted or polished hard-woods, cement tile, concrete
16	NOT USED
17	LIGHTING 1 Candles, open hearth 2 Rustic lamp, candle 3 Manufactures gas or oil lamp, lantern 4 Electric bulb 5 Neon-light, lighting fixtures
18-26	FURNITURE (TYPE AND QUANTITY) 1 Dining room set of metal or well-finished wood 2 Wardrobe of unfinished wood 3 Wardrobe of varnished wood 4 Upholstered or well-finished chairs 5 Metal table 6 Sewing machine 7 Phonograph 8 Television 9 Refridgerator
27	TRANSPORT 1 By foot, by public facilities 2 Bicycle, horse or mule 3 Wagon, horse-and-buggy 4 Motorcycle or any other small vehicle with motor 5 Rented or own car, truck
28	NOT USED
29	C. CHARACTERISTICS OF THE KITCHEN MEANS OF COOKING 1 On the ground, on three stones, low hearth 2 Table hearth, adobe stove 3 Manufactured wood or charcoal stove 4 Electric hotplate, small gas or kerosene stove 5 Electric or gas range

Columns	Description
30	COOKING FUEL 1 Dung, grass, leaves 2 Sticks, scrap wood 3 Charcoal 4 Oil, Kerosene 5 Electricity, gas
31	NOT USED
32	WATER STORAGE 1 Basins, buckets 2 Large plastic or ceramic vessel 3 Large vessel used only for water, well, oil-drum 4 Cistern 5 Automatic (faucet)
33	TRANSPORT OF WATER TO THE HOME 1 Carried more than 30 meters 2 Well or stream in yard 3 Well with pulley in yard 4 Hand pump, faucet in yard 5 Faucet within the house
34	FOOD PRESERVATION 1 None, at room temperature 2 Simple box, jug, hanging basket or net 3 Cellar, pantry with outside window 4 Ice-box 5 Gas or electric refridgerator
35	TABLE SERVICE 1 Number of people 2 Number of spoons 3 Number of forks 4 Number of knives 5 Total number of flatware
36	NOT USED
37	ADEQUACY OF TABLE SERVICE 1 None, use hands 2 Less flatware than persons 3 One piece of flatware or more per person but less than one set per person 4 One to 1.9 sets of flatware per person 5 More than 2 sets of flatware per person
38	FLOOR CLEANING UTENSILS 1 None 2 Rustic broom or mop

Columns	Description
	3 Manufactured broom or mop 4 Mechanical sweeper 5 Vacuum-cleaner
39	NOT USED
40	KITCHENWARE CLENAING FACILITIES 1 Wash them in the river, faucet, table inside the kitchen, at a tapezco without a basin 2 In a basin, pot or large jug, in a sink without a faucet 3 In a sink outside the house, with a faucet and drain 4 In a sink inside the house with hot and cold water and formal plumbing 5 Automatic dishwasher
41	NOT USED
42	D. SANITARY FACILITIES DISPOSAL OF HUMAN WASTES 1 In the yard, bushes 2 Privy with open pit 3 Latrine without drainage to sewer 4 Latrine with drainage to sewer 5 Flush-toilet
43	USE OF LATRINE OR PRIVY Does the surveyor think that they use it? 0 No 1 Yes
44	LATRINE CONSTRUCTION 1 Provisional structure (plastic, cloth, etc.) 2 Formal structure (cement-block, adobe, cane, etc.)
45	LATRINE SEAT MATERIAL 1 No seat 2 Wooden 3 Adobe 4 Cement 5 Porcelain
46-47	NOT USED
48	LATRINE FLOOR MATERIAL 1 None 2 Earth 3 Wood 4 Adobe 5 Cement

Columns	Description
49	NOT USED
50	LATRINE DOORTYPE 1 No door 2 Provisional (plastic, cotton, etc.) 3 Formal (wood, cane)
51	BATHING FACILITIES 0 None 1 Shower, bath-house, sprinkler
52	WASTEWATER DRAINAGE 1 None, on to the ground 2 Ditch, channel off the property 3 Absorption well, piped to the street 4 Public drainage system
53-59	NOT USED
60-65	DATE OF SURVEY 1 Day 2 Month 3 Year
66-67	SURVEYOR IDENTIFICATION
68-69	FORM NUMBER
70-72	FAMILY IDENTIFICATION

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
Sección Gastrointestinal - División Biomédica

FORMA 42: ENCUESTA ANUAL DE SANEAMIENTO

Códigos especiales: 8 = No aplicable, 9 = Falta información

Columnas		Rubro
1 - 5	_____	Ubicación
6		Bloqueado
		A. CARACTERISTICAS DE LA CASA
		i) Número de cuartos
7	_____	Dormitorios
8	_____	Comedores o salas
9	_____	Bodegas
10	_____	Bloqueado
		ii) Presentación
11	_____	1) Dormitorio y cocina en un cuarto 2) Hay división entre el área de dormir y cocinar 3) La cocina es parte de la estructura principal 4) Dormitorio y cocina son estructuras separadas
12	_____	Bloqueado
		B. CARACTERISTICAS DEL EDIFICIO PRINC.
		i) Construcción del techo
13	_____	1) Ninguno, techo con hoyos grandes 2) Paja, palma, sacate 3) Letrero, pedazos de lámina 4) Lámina 5) Teja, asbesto-cemento, terraza
		ii) Construcción de las paredes ext.
14	_____	1) Ninguna, paja, hojas, plástico sacate, manaco 2) Caña, rajas, tablones, letreros, madera con grietas 3) Madera sin pintar, tablones completos, adobe, bajareque, madera sin grietas 4) Asbesto-cemento 5) Ladrillo, block, madera bien acabada y pintada

Columnas		Rubro
		iii) Construcción del piso
15	—	1) Tierra 2) Madera con grietas 3) Maderas blandas o duras sin pulir con unión machi-hembra, ladrillo de barro 4) Madera blanda y pulida o pintada, torta de cemento 5) Madera dura y pulida, mosaico, ladrillo de cemento, concreto
16		Bloqueado
		iv) Alumbrado
17	—	1) Candela, hogar abierto, fuego 2) Lámpara rústica, candil 3) Lámpara manufacturada de gas o aceite, linterna 4) Bombilla eléctrica 5) Lámpara de gas-neón, accesorios eléctricos
		v) Mobiliario (Nota tipo y número)
18	—	Juego para el comedor de metal o de madera bien terminada
19	—	Guardarropa de madera sencilla
20	—	Guardarropa de madera barnizada
21	—	Sillas tapizadas o bien terminadas
22	—	Mesa de metal
23	—	Máquina de coser
24	—	Tocadiscos
25	—	Televisión
26	—	Refrigeradora
		vi) Transporte
27	—	1) Anda a pie, por facilidades públicas 2) Bicicleta, caballo o burro 3) Carretón con caballo o calesa 4) Motocicleta u otro vehículo pequeño y motorizado 5) Automóvil propio o arrendado, camión
28		Bloqueado
		C. CARACTERISTICAS DE LA COCINA
		i) Medios para cocinar
29	—	1) En el suelo, tres piedras, fogon bajo 2) Poyo alto informal o formal de adobe 3) Estufa de leña o carbón (manufacturada) 4) Hornillo eléctrico, estufa pequeña de gas o kerosina 5) Estufa grande de electricidad o gas

Columnas		Rubro
		ii) Combustible para cocinar
30	___	1) Estiércol, hierba, hojas 2) Palitos, madera desechada 3) Carbón 4) Aceite, kerosina 5) Electricidad, gas
31		Bloqueado
		iii) Almacenaje del agua
32	___	1) Palangganas, cubetas 2) Tinaja grande de barro o plástico 3) Tinajón especialmente para agua, pozo, tonel 4) Cisterna 5) Automática (en el grifo)
		iv) Transporte del agua a la casa
33	___	1) Acarreada más de 30 metros 2) Pozo o arroyo en el patio 3) Pozo con polea en el patio 4) Bomba de mano, grifo en el patio 5) Grifo dentro de la casa
		v) Preservación de alimentos
34	___	1) Ninguna, al aire libre 2) Caja simple, red o canasta colgada, tinaja 3) Sótano, despensa con ventana 4) Hielera 5) Refrigeradora (de gas o electricidad)
		vi) Servicio de la mesa
		No. de personas ..... ___ ___
		No. de servidoras ..... ___ ___
		No. de tenedores ..... ___ ___
		No. de cuchillos ..... ___ ___
		Total de cubiertos ..... ___ ___
35	___	1) Ninguno, usan las manos 2) Menos cubiertos que personas 3) Un cubierto o más por persona pero menos que un juego de cubierto por persona 4) Uno a 1.9 juegos de cubierto por persona 5(Más de dos juegos de cubierto por persona
36		Bloqueado
		vii) Utensilios para limpiar los pisos
37	___	1) Ninguno 2) Escoba o trapeador rústico, del monte 3) Escoba manufacturada (de palma, raíz), trapeador manufacturado 4) Barredora mecánica 5) Aspirador

Columnas		Rubro
		viii) Facilidades para limpiar utensilios
38	___	1) Los lavan en río, grifo, mesa dentro de la cocina, en tapezco sin palangana 2) En palangana, caldera o tina, pila sin grifo 3) En pila fuera de la casa con grifo y dren 4) En pila dentro de la casa con agua fria y caliente y drenaje formal 5) Lavaplatos automatico
39		Bloqueado
		D. FACILIDADES SANITARIAS
		i) Disposición de excretentos humanos
40	___	1) En el patio, monte 2) Excusado con foso abierto 3) Excusado sin desague 4) Excusado con desague 5) Inodoro
41		Bloqueado
		ii) Uso de la letrina o excusado
42	___	¿Cree el encuestador que lo usan? 0 = No, 1 = Si
		iii) Construcción de la caseta
43	___	1) Caseta provisional (plástico, tela, etc.) 2) Caseta formal (block, adobe, caña, etc.)
		iv) Material de la tasa
44	___	1) Ninguna tasa 2) Madera 3) Adobe 4) Cemento 5) Porcelana
		v) Material de la plancha
45	___	1) Ninguna 2) Tierra 3) Madera 4) Adobe 5) Cemento
		vi) Puerta de la caseta
46	___	1) No hay 2) Provisional: plástico, lona, tela, etc. 3) Formal: madera, caña
47		Bloqueado

Columnas		Rubro
		vii) Facilidades de baño
48	__	0 = ninguna 1 = ducha, casota de baño, regadera
49		Bloqueado
		viii) Drenaje de agua negra
50	__	1) Ninguno, al suelo 2) Cunota, canal fuera de la propiedad 3) Pozo de absorción, tubería a la calle 4) Drenaje público
51 - 59		Bloqueado
60 - 65	__ __ __ __ __ __	Fecha de la visita
66 - 67	__ __	Empadronador
68 - 69	4 2	Número de tarjeta
70 - 72	__ __ __	Número de la familia

Protocol

FORM 48

Title:	Home Survey - Number of Rooms
Purpose:	To enumerate the number of living- and bedrooms used by each family. This information is then used for the calculation of crowding indices for that family.
Number of Versions:	1
Form History:	Data on the number of living-rooms and bedrooms are to be found in the annual sanitation surveys of 1972, 1974, 1975 and 1976. Form 48 was introduced in August, 1975 and was to be completed at the same time as was Form 32, that is, every three months. In fact, the surveys were done in August and October of 1975, and January and May of 1976.
Coverage:	The survey was done on all available families in both communities.

Columns	Description
1	Description Community Identification 1 Florida Aceituno 2 Guanagazapa
2-5	Family Address Identification
2-3	Block number
4-5	House number
11-12	Number of bedrooms in the home
13-14	Total number of rooms in the house. Do not include rooms used solely for storage.
60-65	Date of survey
60-61	Day
62-63	Month
64-65	Year
66-67	Surveyor Identification Number
68-69	Form Number

Columns	Description
70-72	Family Identification Number

DEFINITIONS

Room:	A room is defined as a division of the internal space of the house. It has to have four complete walls and the walls have to go from floor to ceiling.
Bedroom:	Any room used for sleeping.
Example:	If a room is used for sleeping and for the storage of grains, it is classified as a bedroom.

INSTRUCTIONS

The survey is to be done every three (3) months for all the population.

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
Sección Gastrointestinal - División Biomédica

INDICE DE HACINAMIENTO

Forma 48

Col.	
1-5	_ _ _ _ _.....Identificación
6-10	Bloqueado
11-12	_ _.....Número de dormitorios
13-14	_ _.....Número de cuartos
15-59	Bloqueado
60-65	_ _ _ _ 7 5.....Fecha
66-67	_ _ .....Encuestadora
68-69	4 3
70-72	_ _ _.....Número de familia
73-80	Bloqueado

OBSERVACIONES:

_____

_____

_____

_____

Protocol

Control of Latrine Sales

FORM 49

Justification:

This survey tracks the process of latrine installation from the time it is solicited until the time it is completely installed. This form can be used to determine the method used for the latrine installation, materials used, problems and obstacles which can exist in programs of this type.

This information was used to evaluate the impact of the sanitary education program with respect to latrinization activities.

Application:

One form was filled out for each latrine. Each phase of the installation of a latrine corresponds to a part of the survey form. The person in charge of this form will continue to fill out the form as long as the family maintains interest in constructing a latrine. The form will be handed in when the family completes the latrine or when they no longer have interest in building one.

Instructions:

Name of the head of the family: Use the name of the masculine head or in his absence, the feminine head, or the person who solicited the latrine.

Pay: List the amount paid for the latrine. If the latrine has not been paid for, leave the space blank.

Column 1-5	Address: The address of the hosue at which the latrine will be located Date of the first visit: Date of the first visit to the house and recommendations made to the family. (This information is not coded for keypunching.)
Column 12	Ask if the house has potable water: Yes = 1, No = 0. Hole and curbstone: Date of the approval of the hole and the curbstone, observations and recommendations made on each visit.
Column 13-15	Hole: The measurement of the diameter or if it is a square hole, one of the sides. All measurements are made in centimeters.

Column 16-18	Hole: If the hole is rectangular or square, record the length of the side in centimeters. If the hole is round, note 888 because it is not applicable.
Column 19-20	Hole: Record the depth, in meters, in column 19 and in fractions of a meter in column 20. For example, column 19 and 20 read together 3. 5 would mean 3 meters and one half.
Column 21-26	The date of the delivery of the latrine no matter who or how it was delivered.
Column 27-29	What materials were provided on the date indicated in columns 21-26: the platform, the seat, and the cover. If the family already had one of these materials and did not need new ones, the code '2' is used. '2' = No because they already have one. If an item has not been delivered for any other reason and there is no intention of making such a delivery, use the code '0', which = No. If materials have not been delivered, but will be delivered in the future, leave the column blank until they are delivered.
Column 30-34	Using the code, indicate the materials of the house, the roof, the floors, the walls, the door, and the shelf. If one of these is missing, use the code '0'. If they use materials which are not in the code, specify the item and use '9' which means "other". If the outhouse has not been finished, leave the section blank until the outhouse is finished or until the people have definitely decided they will not use an outhouse.
Column 35-40	The day, month, and year on which the outhouse was completed, according to the information given by the family.
Column 41-42 43-44	Money spent by the family to build their latrine. The cost is in quetzals in columns 41 and 42 and in cents in columns 43 and 44.
Column 45	The number of families who use the latrine, counting the family indicated at the beginning of this form.
Column 46-54	Indicate that more persons than just the family indicated on the first page of this form use the latrine. Note the name and the family number of the additional families using latrine.
Column 55-56	The total number of persons who use the latrine.

Column 57-62	Note the date on which delivery of the hygiene package was made, but only in the case that those materials were actually delivered. If they were not delivered, but there is the intention to delivery them, leave the section blank until they are delivered. If the family gets these materials by another means, note the date and use code 2 for columns 63-67.
Column 68-69	Form number
Column 70-72	Family identification number

Simplified Protocol

Control of Latrines

FORM 49

Columns	Description
2-3	BLOCK
4-5	HOUSE
6-11	DATE FIRST REQUEST WAS MADE FOR A LATRINE (day, month, year)
12	DOES THE HOUSE HAVE A WATER TAP? 1 Yes 0 No
13-18	HOLE: diameter or side measured in centimeters Other side measurement in centimeters
19-20	PIT: Depth in meters
21-26	DATE LATRINE WAS INSTALLED
27-29	MATERIALS PROVIDED BY THE PROJECT 27 Platform 1 Yes 0 No 2 No, because they already own one 28 Seat 1 Yes 0 No 2 No, because they already own one 29 Cover 1 Yes 0 No 2 No, because they already own one
30-34	MATERIALS USED TO CONSTRUCT THE OUTHOUSE 30 ROOF 31 WALLS 32 FLOOR 33 DOOR 34 SHELF

Columns	Description
	0 Does not have one 1 Plastic or nylon 2 Adobe (mud brick) 3 Straw, thatching 4 Bamboo or cane 5 Wood 6 Block or cement 7 Tin 8 Other material, please specify
35-40	DATE OUTHOUSE WAS COMPLETED
41-44	TOTAL COST OF LATRINE IN DOLLARS
45	NUMBER OF FAMILIES USING THE LATRINE
46-54	FAMILY IDENTIFICATION NUMBERS OF ADDITIONAL FAMILIES USING THE LATRINE
55-56	NUMBER OF PERSONS ACTUALLY USING THE LATRINE
57-62	DATE SANITARY PACKAGE WAS DELIVERED
63-67	MATERIALS DELIVERED 1 Yes 0 No 63 WASH BASIN 64 SOAP 65 SOAP HOLDER 66 TOWEL 67 NEWSPAPER
68-69	FORM NUMBER (49)
70-72	FAMILY IDENTIFICATION NUMBER OF FAMILY BUILDING THE LATRINE

Sección Gastrointestinal - División Biomédica
CONTROL DE LETRINAS

Forma 49
(I - 76)

Nombre Jefe de familia _____ Pagó Q _____

1-5	____	Ubicación

6-11	____	Primera solicitud (día, mes, año)
		Fecha primera visita ____
		Observaciones y recomendaciones:
		_____
		_____
		_____
12	____	Tiene la casa agua del chorro? Sí = 1 No = 0

POZO Y BROCAL

		Fecha aprobación de pozo y brocal ____
		Observaciones y recomendaciones: _____
		_____
13-15	____	Hoyo: diámetro o lado centímetros
16-18	____	otro lado si es aplicable centímetros
19-20	____	Hoyo: profundidad metros

ENTREGA DE LA LETRINA

21-26	____	Fecha de entrega (día, mes, año)
27	____	Plancita Sí = 1 No = 0 No porque ya tiene = 2
28	____	Taza Sí = 1 No = 0 No porque ya tiene = 2
29	____	Tapadera Sí = 1 No = 0 No porque ya tiene = 2

CASETA - MATERIALES

			Código:			
30	____	Techo				
	____	Paredes	No hay	= 0	Madera	= 5
32	____	Piso	Plástico, nylon	= 1	Block/cemento	= 6
33	____	Puerta	Adobe	= 2	Lámina	= 7
34	____	Tablero	Teja	= 3	Otro	= 9
			Bambú, caña	= 4	Especifique _____	

APROBACION FINAL

35-40		Caseta terminada (día, mes, año)
44	.	Costo total en quetzales
45		Cantidad de familias que usan letrina:
		Anote el nombre de jefe de familia y No. de cada familia adicional:
46-48		
49-51		
52-54		
55-56		Número de personas que usan la letrina

57-62		Entrega de materiales higiénicos (día, mes, año)
63		A. Palangana Si = 1 No = 0 No porque ya la habían recibido = 2
64		B. Jabón
65		C. Jabonera
66		D. Toalla
67		E. Papel periódico
		Hecho por:
		Observaciones:

Fecha: Visita adicional
Hecho por:
Observaciones:

68-69	4 9	Número de tarjeta
70-72		Número de familia

Revisada:
Revisada:

Notas y
Observaciones:

Simplified Protocol

Summary of Participation In Health Education Programs

FORM 51

This form was used to record individual participation in sanitary education classes, workshops and meetings. It was only used in Guanagazapa since no health education program was instituted in Florida Aceituno.

Columns		Description
1		Village Name of participant (not coded but written on form by field staff)
10		Sex of participant
11-22		First Education Activity
	11-13	Code 100 - Regular Community Improvement session 101 - Training as a health promoter 102 - Teacher in the health promotion program 103 - Major assistant in the extension program 104 - Attended a health promotion session 105 - Directed a session of the village cooperation program 106 - Date registered in co-op program 200 - Regular female health education course 201 - Sewing course 202 - Cooking course 203 - Care of children 204 - Midwifery
	14-17	Month, Year
	18-19	Number of times attended
	20-21	Time (hours)
	22	Attitude
23-34		Second Education Activity (see columns 11-22 for codes)
35-46		Third Education Activity (see columns 11-22 for codes)
47-58		Fourth Education Activity (see columns 11-22 for codes)

Columns	Description
60-65	Date of summary (day, month, year)
66-67	Identification of teacher
68-69	Form number
70-72	Identification of family
73-73	Identification (number) of participant

1 2

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
Sección Gastrointestinal - División Biomédica
RESUMEN DE PARTICIPACION EN EDUCACION SANITARIA

Forma 51
(4-76)

10 Sexo Nombre _____

	ACTIVIDAD (clase)	Código	mes, año	TOTALES Asistencia	TOTALES Tiempo (horas)	Carácter esp.	Observaciones
11-22							
23-34							
35-46							
47-58							

60-65 Fecha del resumen

66-67 Encuestador

68-69 51 No. de tarjeta

70-72 No. de familia

73-76 No. de individuo

CODIGOS

100-Comité pro-mejoramiento sesiones regulares (d=directiva)
101-Adiestramiento de promotores (g=gradu6)
102-Promotores enseñando en el programa de extensión
103-Gente asistiendo en la extención (p=palangana)
104-Promotores: sesiones de asesoría
105-Sesiones de cooperativa (d=directiva)
106-Fecha de inscribirse en la cooperativa

200-Sesiones femeninas regulares (d=directiva)
201-Cursillo de costura (d=directiva)
202-Cursillo de cocina (d=directiva)
203-Cursillo de cuidado de niños (d= directiva)
204-Adiestramiento de comadronas (c=carnet)

Protocol

School Health Evaluation

FORM 56
FORM 57

These forms are tests for elementary school children (Form 56- Grades 1-3, Form 57- Grades 4-6). They were used to determine the impact of the sanitary education program in the elementary school in Guanagazapa.

FORM 56

Questions:	1 -20	Identification of the student
	21-24	Hygiene in the school
	25-35	Conditions in your home
	36-43	Water Quality
	44-52	Causes of disease
	53-58	Microbiology
	59-62	Digestive system

FORM 57

Questions:	1 -20	Identification of the student
	21-26	Hygiene in the school
	27-35	Conditions in your home
	36-42	Water quality
	43-46	Science
	47-52	Digestive system
	53-63	Causes of disease
	64-74	Microbiology

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
Sección Gastrointestinal - División Biomédica

PROGRAMA ESCOLAR
Grados 1-3

School Health Evaluation
Grades 1-3
FORM 56

Nombre: _____

Maestro: _____ Grado: _____

Fecha: _____ Calificación: _____

INSTRUCCIONES:

Lee despacio cada pregunta de las que están escritas a continuación. Para cada pregunta hay varias respuestas, de las cuales tu debes poner un círculo y subrayar la que creas que es la correcta. Marca solamente una respuesta, si hay dos que te parecen, selecciona la mejor. Las primeras te servirán de ejemplo:

I. Cuál de los siguientes animales da la leche:

1. la lagartija
2. la gallina
3. la vaca

II. Cuál de las siguientes personas trabaja en el Puesto de Salud:

1. maestro
2. enfermera
3. sacerdote
4. policía

El próximo te servirá para practicar y para ver si has comprendido como se debe hacer. Tu maestro te dirá si lo hiciste correctamente.

III. El 15 de septiembre celebramos:

1. el día del trabajo
2. la fiesta de la independencia de nuestro país
3. navidad
4. no celebramos nada

PROGRAMA ESCOLAR
Grados 1-3

Nombre: _____ _____

Maestro: _____ Grado: _____

Fecha: _____ Calificación: _____

PREGUNTAS SOBRE HIGIENE EN LA ESCUELA

21. Dónde consigues papel higiénico cuando vas a ir al inodoro en la escuela:

    1. el maestro lo da
    2. lo tomas de la clase
    3. lo traes de tu casa
    4. no lo puedes conseguir

22. Después de que usas el inodoro en la escuela, dónde tiras el papel higiénico sucio:

    1. en el inodoro
    2. en la canasta de la basura
    3. cerca del inodoro
    4. en el patio

23. Qué tipo de jabón se usa en los baños de tu escuela:

    1. jabón en bola
    2. jabón en polvo
    3. jabón líquido
    4. no hay jabón en la escuela

24. Después de ir al baño en la escuela, debes de:

    1. salir de la clase
    2. lavarte las manos
    3. regresar a tu casa
    4. regresar a la clase sin lavarte

PREGUNTAS SOBRE COMO VIVES EN LA CASA

25. Qué deben hacer con la basura en tu casa:

    1. tirarla al suelo
    2. botarla en el patio
    3. quemarla o enterrarla

26. No deben haber animales en la cocina porque:

1. se ve muy feo
2. dejan popó o suciedad
3. se les cae el pelo

27. Por qué crees tu que las moscas no deben de estar en la cocina:

1. llevan suciedad cuando se paran en la comida
2. producen paludismo muchas veces
3. no hacen ningún daño

28. Una letrina es un lugar para:

1. jugar futbol
2. ensuciar
3. guardar comida
4. estudiar

29. Dónde puede conseguir tu papá la letrina:

1. en la iglesia
2. en la tienda
3. en el centro de salud
4. en la escuela

30. Por qué crees que es más saludable usar la letrina y no el monte:

1. la letrina es más cómoda
2. no tienes que salir por la noche
3. en el monte el popó puede dañar a otras personas

31. Después de usar la letrina, dónde tienes que tirar el papel higiénico sucio o las hojas sucias:

1. en el suelo
2. en una caja cerca de la taza
3. dentro de la taza
4. fuera de la letrina

32. El popó de los perros, cerdos y gallinas es dañino porque contiene:

1. arañas y alacranes
2. microbios y parásitos
3. desperdicios

33. Cada cuántos días tomas un baño completo:

1. cada 15 días
2. cada 8 días
3. 2 veces por semana
4. cada día

34. Con la comida de tu casa, tu mamá debe:

1. guardarla fuera de moscas y polvo
2. dejarla en la mesa
3. tirarla
4. usarla como abono

35. Cuál es la cosa más pequeña que tu conoces:

1. mosca
2. mosquito
3. microbio
4. pulga

PREGUNTAS SOBRE AGUA

36. Qué sabes tu del agua clara que viene del río:

1. no es dañina
2. debe ser hervida antes de beberla
3. es agua pura y buena para beber
4. es agua corrida, por eso es buena

37. La tinaja del agua la tapamos para:

1. que no le entre polvo yl agua
2. para conservarla fría
3. para que noose caiga
4. para que no le de el sol

38. Cuál es el mejor lugar para lavarte las manos:

1. en el pozo
2. en una palangana
3. en el río
4. en el cántaro

39. Qué es lo mejor para secarte las manos:

1. un delantal
2. una toalla sucia
3. la ropa que tienes puesta
4. un trapo limpio

40. Cuál es la hora más importante para lavarte las manos

1. cuando estás jugando
2. cuando vas a la escuela
3. antes de comer
4. cuando vas a la tienda
5. después de comer

41. Qué debes hacer con los alimentos que comes crudos:

1. lavarlos bien con agua limpia
2. limpiarlos con la ropa
3. lavarte las manos después de comerlos

42. Para qué crees que se le agrega cloro al agua:

1. para cambiarle sabor
2. para matar los microbios
3. para ensuciarla
4. para que llegue más rápido al chorro

43. Debes de lavarte las manos:

1. siempre antes de comer
2. solamente si están sucias
3. solamente cuando has estado trabajando en la tierra

PREGUNTAS SOBRE LAS ENFERMEDADES

44. Conoces el microscopio, sabes para qué se usa:

1. para ver cosas muy pequeñas
2. para ver cosas muy grandes
3. para medir la distancia entre las estrellas
4. para medir el agua del chorro

45. Cuál es la causa más común que provoca las enfermedades:

1. los microbios
2. bañarte mucho
3. el ojo
4. el agua potable

46. La forma más común de contraer un catarro es por:

1. aire en los pies
2. bañarse mucho o bañarse cuando hace frío
3. contagio de una persona que tiene catarro

47. Qué enfermedad es producida por las hecos del cerdo:

1. lombrices
2. tos ferina
3. anemia
4. gripe

48. A la diarrea la llamamos también:

1. paludismo
2. asientos
3. frío en el estómago

49. Qué enfermedad puede transmitir el mosquito:

1. infección
2. lombrices
3. paludismo
4. tuberculosis

50. Cuando tienes catarro, qué debes hacer para no contagiar a los demás personas:

1. tomar té
2. bañarte
3. usar yerbas
4. taparte la boca

51. Cómo se pueden prevenir las lombrices:

1. cuidando al niño
2. comiendo temprano
3. usando zapatos
4. no se pueden prevenir

52. En qué parte del cuerpo viven los parásitos que causan enfermedades:

1. en el estómago
2. en los huesos
3. en los intestinos
4. en el hígado

PREGUNTAS SOBRE LOS MICROBIOS

53. Qué sabes acerca de los microbios:

1. son pequeños animalitos que no se pueden ver
2. son animales grandes que hay en el monte
3. son pescados que viven en el agua
4. son plantas del monte

54. Dónde se encuentran los microbios:

1. en las cosas limpias
2. en el agua del chorro
3. en la suciedad

55. A los microbios los llamamos también:

1. letrinas
2. gérmenes
3. ojos
4. huevos

56. Cómo se pueden destruir los microbios:

1. cocinando
2. por refrigeración
3. agarrándolos

57. Qué producen los microbios:

1. no producen nada
2. producen calentura solamente
3. producen muchas enfermedades

58. Cuando te lavas correctamente las manos, el número de microbios:

1. aumenta
2. disminuye
3. permanece igual

PREGUNTAS SOBRE LA DIGESTION:

59. De lo siguiente, cuál forma parte del aparato digestivo:

1. el corazón
2. los pulmones
3. los intestinos
4. los músculos

60. Lo que no se puede digerir sale de nuestro cuerpo como:

1. sudor
2. popó
3. lágrimas

61. La comida es absorbida por medio de:

1. el estómago
2. los intestinos
3. el hígado
4. la boca

62. Los parásitos nos roban nuestra comida. Dónde viven ellos?

1. en el estómago
2. en los intestinos
3. en el hígado
4. en el pecho

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
Sección Gastrointestinal - División Biomédica

PROGRAMA ESCOLAR
Grados 4-6

School Health Evaluation
Grades 4-6
FORM 57

Nombre: _____

Maestro: _____ Grado: _____

Fecha: _____ Calificación: _____

INSTRUCCIONES:

Lee despacio cada pregunta de las que están escritas a continuación. Para cada pregunta hay varias respuestas, de las cuales tu debes poner un círculo y subrayar la que creas que es la correcta. Marca solamente una respuesta, si hay dos que te parecen, selecciona la mejor. Las primeras te servirán de ejemplo:

I. Cuál de los siguientes animales da la leche:

1. la lagartija
2. la gallina
3. la vaca
4. ninguno de todos

II. Cuál de las siguientes personas trabaja en el Puesto de Salud:

1. médico
2. enfermera
3. todos los anteriores
4. ninguno de los anteriores

El próximo te servirá para practicar y para ver si has comprendido como se debe hacer. Tu maestro te dirá si lo hiciste correctamente.

III. El 15 de septiembre celebramos:

1. el día del trabajo
2. la fiesta de la independencia de nuestro país
3. navidad
4. no celebramos nada

PROGRAMA ESCOLAR
Grados 4-6

Nombre: _____

Maestro: _____ Grado: _____

Fecha: _____ Calificación: _____

PREGUNTAS SOBRE HIGIENE EN LA ESCUELA

21. Dónde consigues papel higiénico cuando vas a ir al inodoro en la escuela:

    1. el maestro te lo da
    2. lo tomas de la clase
    3. lo traes de tu casa
    4. no lo puedes conseguir

22. Después de que usas el inodoro en la escuela, dónde tiras el papel higiénico sucio:

    1. en el inodoro
    2. en la canasta de la basura
    3. cerca del inodoro
    4. en el patio

23. Qué tipo de jabón se usa en los baños de tu escuela:

    1. jabón en bola
    2. jabón en polvo
    3. jabón líquido
    4. no hay jabón en la escuela

24. Tienes un cepillo de dientes para tí en la escuela:

    1. SI
    2. NO
    3. no sabes

25. Cuántas veces por semana te lavas los dientes en la escuela:

    1. 1 ó 2 veces por semana
    2. 3 ó 4 veces por semana
    3. todos los días

26. Al ir al baño cuándo debes lavarte las manos:

    1. sólo después de ensuciar
    2. sólo después de orinar
    3. después de orinar o después de ensuciar
    4. sólo cuando lo dice el maestro

PREGUNTAS SOBRE COMO VIVES EN LA CASA

27. Qué deben hacer con la basura en tu casa:

1. tirarla al suelo
2. botarla en el patio
3. quemarla o enterrarla
4. llevarla lejos de la casa

28. La razón más importante por la que no deben de haber animales en la cocina es:

1. se roban la comida
2. tienen pulgas
3. dejan suciedad que puede contaminar la comida
4. se les cae el pelo

29. La razón más importante por la que no deben de haber moscas en la cocina es:

1. se paran en la comida
2. producen paludismo
3. llevan microbios a la comida
4. no hacen ningún daño

30. Cuál es el ser vivo más pequeño que tú conoces:

1. mosca
2. mosquito
3. microbio
4. pulga

31. Por qué crees que es más saludable ensuciar en la letrina y no en el monte:

1. la letrina es más cómoda
2. no tienes que salir por la noche
3. en el monte el popó puede contaminar a otras personas
4. la letrina no es limpia

32. Después de usar la letrina, dónde tienes que tirar el papel higiénico sucio o las hojas sucias:

1. en el suelo
2. en una caja cerca de la taza
3. dentro de la taza
4. fuera de la letrina

33. Después de salir de la letrina hay que:

1. tapar bien la taza
2. dejarla destapada
3. dejar abierta la puerta
4. dejar sucia la letrina

34. En tu casa debes de lavarte las manos después de:

1. usar la letrina
2. ir al monte
3. usar la letrina o ir al monte
4. no hay que lavarlas

35. Dónde puede conseguir tu papá la letrina:

1. en la carretera
2. el gobierno se la da
3. en el centro de salud
4. en una tienda

PREGUNTAS SOBRE AGUA

36. Qué sabes tú del agua clara que viene del río:

1. no es dañina
2. debe de ser hervida antes de beberla
3. es agua pura y buena para beber
4. es agua corrida, por eso es buena

37. Qué sabes tú del agua del chorro:

1. es agua contaminada
2. es agua que contiene cloro
3. es agua que no contiene nada
4. es agua del río que llega a la casa por las cañerías

38. La tinaja del agua la tapamos para:

1. que el agua no se contamine
2. para conservarla fría
3. para que no se caiga
4. para que no le de el sol

39. Qué cantidad de agua pueden usar en tu casa sin que cobren más:

1. 10,000 litros por mes
2. 20,000 litros por mes
3. 30,000 litros por mes
4. 40,000 litros por mes

40. Cuál es la hora más importante para lavarte las manos:

1. después de jugar
2. cuando vas a la escuela
3. antes de comer
4. después de comer

41. Para qué crees que se le agrega cloro al agua.

1. para cambiarle sabor
2. para quitar la suciedad
3. para ensuciarla
4. para que llegue más rápido al chorro

42. Debes de lavarte las manos:

1. siempre antes de comer
2. solamente si están con tierra
3. solamente cuando se ven sucias

PREGUNTAS SOBRE CIENCIAS

43. Qué has aprendido acerca del protoplasma:

1. es la parte blanca de un huevo
2. es la substancia que se encuentra en una célula
3. es una clase de tinto que se usa en la clase de Ciencias
4. es una substancia dañina

44. Cómo se reproduce una célula:

1. se divide por la mitad
2. se desarrolla como las flores por las semillas
3. pone huevos
4. no se reproducen

45. Qué función desempeña el núcleo de una célula:

1. controla las funciones de la célula
2. es el lugar donde se guarda la comida
3. es una saco con substancias dañinas
4. es un saco para agua

46. Qué sabes de los microbios:

1. son pequeños seres vivos que no se pueden ver a simple vista
2. son animales que se ven en el monte
3. es una clase de pescado que se encuentra en el agua
4. ninguno de los anteriores

PREGUNTAS SOBRE LA DIGESTION

47. Al llevarte la comida a la boca, cuál es el primer paso de la digestión?

1. deglución
2. absorción
3. masticación
4. defecación

48. Los alimentos son transformados por ciertos jugos que se segregan en:

1. el corazón y los pulmones
2. los músculos
3. el páncreas y el hígado
4. el bazo

49. La comida se absorbe en:

1. el intestino grueso
2. el intestino delgado
3. el estómago
4. el hígado

50. Los alimentos que no se absorben salen del cuerpo por:

1. el popó
2. el jugo gástrico
3. el protoplasma
4. la bilis

51. Las vellosidades se encuentran en:

1. la boca
2. el intestino delgado
3. el intestino grueso
4. el hígado

52. De lo siguiente, cuál forma parte del aparato digestivo:

1. la tráquea
2. la vejiga
3. los riñones
4. la boca

PREGUNTAS SOBRE LAS ENFERMEDADES

53. Cuál crees que es la causa fundamental de la diarrea:

1. la suciedad
2. comer algo que sae mal
3. las lombrices
4. los microbios

54. La forma más común de contraer un catarro es por:

1. aire en los pies
2. bañarse mucho
3. contagio de una persona que tiene catarro

55. Nos enfermamos cuando las lombrices:

1. salen de un saco que está en el pecho
2. salen de un saco que está en el estómago
3. entran en el cuerpo por los pies
4. bebemos agua limpia

Best Available Document

56. Debes vacunarte contra sarampión, difteria, y:

1. poliomelitis
2. paperas
3. resfrío
4. paludismo

57. Qué enfermedades causan los microbios:

1. catarro
2. diarrea
3. sarampión
4. todas las anteriores
5. ninguna de las anteriores

58. Qué enfermedad es producida por el popó de cerdos:

1. lombrices
2. tos ferina
3. anemia
4. gripe

59. A la diarrea la llamamos también.

1. empacho
2. paludismo
3. asientos
4. frío en el estómago

60. Qué enfermedad puede transmitir el mosquito:

1. infección
2. lombrices
3. paludismo
4. tuberculosis

61. Cuando tienes catarro, qué debes hacer para no contagiar a las demás personas:

1. tomar té
2. bañarte
3. usar yerbas
4. taparte la boca

62. Cómo se pueden prevenir las lombrices:

1. cuidando al niño
2. comiendo temprano
3. usando zapatos
4. no se pueden prevenir

63. En qué parte del cuerpo viven los parásitos que causan enfermedades:

1. en el estómago
2. en los huesos
3. en los intestinos
4. en el hígado

PREGUNTAS SOBRE LOS "MICROBIOS

64. Dónde se encuentran los microbios:

1. en el popó
2. en el agua del río
3. en la tierra
4. en todos los anteriores

65. Cómo se pueden destruir los microbios:

1. cocinando
2. por refrigeración
3. agarrándolos

66. Qué problemas causan los microbios:

1. sólo gripe y catarro
2. sólo calentura
3. muchas enfermedades
4. ninguna enfermedad

67. Cuál es la diferencia entre "microbio" y "suciedad":

1. no hay diferencia, son la misma cosa
2. la suciedad produce enfermedades y los microbios no
3. la suciedad se encuentra dentro de los microbios
4. los microbios que producen enfermedades se encuentran en la suciedad

68. Cuando te lavas correctamente las manos, el número de microbios:

1. aumenta
2. disminuye
3. permanece igual

69. De los siguientes, cuáles son microbios:

1. bacteria
2. virus
3. gérmenes
4. todos los anteriores
5. ninguno de los anteriores

70. Cómo se reproducen las lombrices o parásitos:

1. se dividen por la mitad
2. se desarrollan como las flores por las semillas
3. ponen huevos
4. no se reproducen

71. En qué cosa abundan los microbios:

1. en el aire
2. en el popó
3. en el agua limpia
4. en los frijoles

72. En tu clase has cultivado microbios, qué usaste:

1. agua del chorro
2. un médico
3. un microscopio
4. una placa roja de agar

73. Cuando tu dices que te cayó mal la comida, en realidad lo que pasa es que:

1. te pasó la hora de comer
2. comiste alimentos contaminados
3. comiste muy rápido
4. comiste muy tarde

74. Cuando ves los microbios en el microscopio se nota:

1. solamente una clase
2. varias clases
3. todos parecen igual
4. no se ve más de un microbio

APPENDIX IX

ANTHROPOMETRIC SURVEYS

Protocol

Anthropometry

FORM A06

This form was used to record anthropometric data in village surveys and at the metabolic ward. The names of the individual being studied is inserted on the top of the form.

Columns	Description
1	Village
2-5	Location
6	Not used
7-8	Family position of the subject
9	Not used
10	Sex of the subject
11-14	Age of the subject
15-19	Weight of subject in kilograms (1st measurement)
20-24	Weight of subject in kilograms (2nd measurement)
25-28	Height of subject in centimeters (1st measurement)
29-32	Height of subject in centimeters (2nd measurement)
33-41	Arm circumference of subject in centimeters, three measurements
42-50	Tricipital skinfold of subject in millimeters, three measurements
51-59	Head circumference of subject in centimeters, three measurements
60	Not used
60-65	Date

Columns	Description
66-67	Code number of surveyor
68-69	Form number (A06)
70-72	Family identification number
73-76	Individual identification number

There is a space for pertinent observations on the form.

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ANTHROPOMETRY

Form A06

Name: _____

COL.	CONTENT	
1	Community	_
2-3	Block	_ _
4-5	House	_ _
6	Blank	
7-8	Family position	_ _
9	Blank	
10	Sex	_
11-14	Age	_ _ _ _
15-19	Weight 1 (Kg)	_ _ _ _ _
20-24	Weight 2 (Kg)	_ _ _ _ _
25-28	Height 1 (cm)	_ _ _ _
29-32	Height 2 (cm)	_ _ _ _
33-35	Arm circumference 1 (cm)	_ _ _
36-38	Arm circumference 2 (cm)	_ _ _
39-41	Arm circumference 3 (cm)	_ _ _

COL.	CONTENT	
42-44	Tricipital skin-fold 1 (mm)	_ _ _
45-47	Tricipital skin-fold 2 (mm)	_ _ _
48-50	Tricipital skin-fold 3 (mm)	_ _ _
51-53	Head circumference 1 (cm)	_ _ _
54-56	Head circumference 2 (cm)	_ _ _
57-59	Head circumference 3 (cm)	_ _ _
	Blank	
60-65	Date	_ _ _ _ _ _
66-67	Surveyor's code	_ _
68-69	Form number	0 6
70-72	Family number	_ _ _
73-76	No. of individual	_ _ _ _

OBSERVATIONS

Protocol

Anthropometry

FORM A06 (1) - COMPUTER PRINTOUT

This form was used to summarize the anthropometric data from Form A06. It was generated by computer from computer cards keypunched with the date from Form A06.

Columns	Description
1-15	Identification of the subject
16-21	Date of survey
22-23	Not used
24-25	Form number
26	Sex of subject
27-30	Age of subject in months
31-35	Average weight of subject in kilograms
36-39	Average height of subject in centimeters
40-42	Average arm circumference of subject in centimeters
43-45	Average tricipital skinfold of subject in millimeters
46-48	Average head circumference of subject in centimeters
49-51	Arm circumference corrected for skinfold in centimeters
52-56	Weight-age index
57-61	Height-age index
62-80	Not used

APPENDIX X

DIETARY, FOOD CONSUMPTION AND FOOD COSTS SURVEYS

Simplified Protocol

Summary of Food Intake by Individual

FORM 07

This form was used to record the total food intake by individual family member on a given day.

Columns	Description
1	COMMUNITY
2-5	LOCATION OF HOUSE
6	NOT USED
7-8	POSITION IN FAMILY
9	NOT USED
10	SEX
11-14	AGE (years)
15-19	WEIGHT (kilograms)
20-23	INDIVIDUAL PRESENCE AT MEALS
24-27	FAMILY PRESENCE AT MEALS
28	DAY (Monday=1, Tuesday=2, etc)
29-38	CONSUMPTION OF FOOD ITEM 1 29 Meal (B, L, S) 30-32 Food item (See form 80 for code) 33-38 Weight of food item in grams
39-48	CONSUMPTION OF FOOD ITEM 2 (format same as that given above)
49-58	CONSUMPTION OF FOOD ITEM 3
59	NOT USED
60-65	DATE (day, month, year)

Columns	Description
66-67	SURVEYORS NUMBER
68-69	FORM NUMBER
70-72	FAMILY NUMBER
73-76	INDIVIDUAL NUMBER

(Use as many forms as necessary to cover all food items consumed by an individual on a given day)

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FINAL SUMMARY OF INTAKE PER INDIVIDUAL

Form 7

Village Block House

Family position

Sex

Age

Weight

Individual attendance

Family attendance

Day

MEAL	FOOD ITEM	GRAMS	MEAL	FOOD	GRAMS

Date

Surveyor's code

0 7
Form

Family number

No. of individual

Simplified Protocol

Dietary and Food Consumption Surveys

FORM 44

This survey was made using three forms: Detailed Dietary Survey (D1, D2), and Summary of Dietary Intake (D3).

Detailed Dietary Survey (D1) - General Information

Columns	Description
1	COMMUNITY
2-5	LOCATION OF HOUSE
6	NOT USED
7-35	IDENTIFICATION NUMBER OF EACH FAMILY MEMBER; SEX; AGE (years, months); WEIGHT (lbs, kgms); HEALTH STATUS; PRESENT AT BREAKFAST - LUNCH - SUPPER; and PERCENT OF FAMILY FOOD CONSUMED PER DAY. The following format was used for each family member:

7-10	Individual member
11	Not used
12	Sex
13	Not used
14-15	Age (years)
16-17	Age (months)
18	Not used
19-21	Weight (lbs)
22-23	Weight (kgms)
24	Not used
25	Health status
26	Not used
27	Present at breakfast (1=Yes, 0=No)
28	Present at lunch (1=Yes, 0=No)
29	Present at supper (1=Yes, 0=No)
30	Not used
31-34	Percent of food consumed
35	Not used

36-64	SECOND FAMILY MEMBER (Use above format)

Columns	Description
65	NOT USED
66-67	SURVEYORS NUMBER
68-69	FORM NUMBER
70-72	FAMILY NUMBER

-CARD NO. 2-

1-6	NOT USED
7-35	THIRD FAMILY MEMBER
36-64	FOURTH FAMILY MEMBER
65	NOT USED
66-67	SURVEYORS NUMBER
68-69	FORM NUMBER
70-72	FAMILY NUMBER

(Continue with as many forms as necessary to cover all family members)

Detailed Dietary Survey (D2) - Specific Meal Information

Columns	Description
1	COMMUNITY
2-5	LOCATION OF HOUSE
6	NOT USED
7-61	FOOD ITEM; TOTAL AMOUNT PREPARED; NUMBER OF PORTIO AND NUMBER OF PORTIONS CONSUMED BY EACH FAMILY NUMBER. THE FOLLOWING FORMAT WAS USED FOR EACH FOOD ITEM: 7 Meal (1=breakfast, 2=lunch, 3=supper) 8-10 Food item 11-14 Amount of food item prepared 15-16 Measurement unit

Columns	Description
	17-19 Number of portions of food item 20-23 Number of individual family member (first) 24-26 Portions eaten by individual (20-23) 27-33 Number of second family members and portions consumed 34-40 Third family member 41-47 Fourth family member 48-54 Fifth family member 55-61 Sixth family member
62-65	NOT USED
66-67	SURVEYOR NUMBER
68-69	FORM NUMBER
70-72	FAMILY NUMBER

(Continue with as many forms as necessary to cover all food items consumed at each meal for one complete day)

Summary of Dietary Intake (D3)

Columns	Description
1	COMMUNITY
2-5	LOCATION OF HOUSE
6	NOT USED
7-30	SUMMARY OF FAMILY INTAKE BY FOOD ITEM 7-9 Food item 10-12 Family intake of food item at breakfast 13-15 Family intake of food item at lunch 16-18 Family intake of food item at supper 19-22 Total daily intake of food item (weight) 23-26 Total waste of food item (percent) 27-30 Net intake of food item (weight)
31-36	INTAKE OF FOOD ITEM BY INDIVIDUAL FAMILY MEMBER (first) 31 Sex of family member 32-33 Age of family member 34 Present at breakfast 35 Present at lunch 36 Present at supper

Columns	Description
37	NOT USED
38-43	INTAKE OF FOOD ITEM BY SECOND FAMILY MEMBER
44	NOT USED
45-50	INTAKE OF FOOD ITEM BY THIRD FAMILY MEMBER
51	NOT USED
52-57	INTAKE OF FOOD ITEM BY FOURTH FAMILY MEMBER
58	NOT USED
59-64	INTAKE OF FOOD ITEMS BY FIFTH FAMILY MEMBER
65	NOT USED
66-67	SURVEYOR NUMBER
68-69	FORM NUMBER
70-72	FAMILY NUMBER

(Continue with as many forms as necessary to cover all food items for each family member for one complete day)

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FIELD FORM D1 - DETAILED DIETERY SURVEY (Family-Individual)

Form 46 (D1)

1-5 ___ Location Head of the family: _____

GENERAL CHARACTERISTICS OF FAMILY MEMBERS

NAME	No. of Indi-vidual	Sex	Age		Weight		Health status	Attendance			
			Age	Ms.	Lbs	Kg		B*	L*	S*	%

___ Date 4 4 Form number

___ Surveyor's code ___ Family number

Food	Measure	Weight	Unit of Measure	Price/unit

Abbreviations in Spanish

¢ - cent
u - unit
bt - bottle
cd - table spoon
cr - table spoon
ct - tea spoon
lb - pound
lt - liter
oz - ounce
pc - mug
pl - dish
rj - slice
tr - piece
tz - cup
vs - glass
cna - cucharón de aluminio*
cnm - cucharón de morro*
cnp - cucharón de peltre*

*No English translation

OBSERVATIONS: _____

*B = Breakfast

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FIELD FORM D2 - DETAILED DIETARY SURVEY (FAMILY-INDIVIDUAL)

FORM 44(D2)

1-5 ___ ___ ___ ___ ___ Location

Name of the male head of the family: _____

MEAL	FOOD CODE	FOOD ITEM	AMOUNT	AMOUNT IN UNITS	CODE OF UNIT	NUMBER OF PORTIONS	PORTIONS/INDIVIDUAL						

___ ___ ___ ___ ___ ___ Date of survey

___ ___ Surveyor code

___ ___ Form number

___ ___ ___ Family number

FORM 44 (D3)

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FIELD FORM D3 - DIETARY SURVEY (SUMMARY OF INTAKE)
(Family-Individual)

Community: ______________________

Name, head of the family: ______________________

Period: ______________ Date: __________

Location: ______________________

Family number: ______________________

Date of survey: ______________________

	FAMILY DAILY INTAKE			TOTAL INTAKE			Name:			Name:			Name:			Name:			Name:			Total day	
				Weight	% waste	Net weight	Sex:	Age:	Att:	Sex:	Age:	Att:	Sex:	Age:	Att:	Sex:	Age:	Att:	Sex:	Age:	Att:	Net weight	
FOOD ITEM	B	L	S				B	L	S	B	L	S	B	L	S	B	L	S	B	L	S		

Att: = Attendance
B = breakfast
L = Lunch
S = Supper

Simplified Protocol

Cost of Food

FORM 80 (PARTS A and B)

This form was used to record the prices of food items in the local market.

Columns	Description
1-5	LOCATION OF MARKET WHERE FOOD PRICES WERE OBTAINED
6-10	NOT USED

(the cost per kilogram of each food item is entered on the form opposite the name of the food)

59	DAY OF WEEK
60-65	DATE (day, month, year)
66-67	SURVEYORS NUMBER
68-69	FORM NUMBER
70-72	FAMILY NUMBER
73-76	NOT USED

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Form NO A

COST OF FOOD

Columns 1 to 5 [ ][ ][ ][ ][ ] Location

Columns 6 to 10 [redacted] Blocked Head of family: _____

	FOOD	No.	COST		FOOD	No.	COST		FOOD	No.	COST
	DAIRY PRODUCTS				Crab	111			Avote flor*	225	
	Sour cream	001			Fish (sea)	128			Avote puntas*	226	
	Cream	002			Sardine	131			Avote maduro*	227	
	Cow's milk	005			Fish (river)	137			Avote tierno*	228	
	Squimed milk	006			Pork's skin	138			Miltomate*	231	
	Dried milk	007			Chorizo*	143			Onion (head)	232	
	Cheese	015			Longaniza*	145			Onion (stalk)	233	
	Cheese (cream)	017			Moronga*	147			Culantro*	235	
	Cheese (dried)	020			Small shrimp	151			Cabbage	236	
					Jutes*	153			Cauliflower	239	
					Animal de monte*	155			Guisquil*	241	
					Dried fish	162			Parulero*	241	
	EGGS				Pescadito preparado*	163			Puntas de guisquil*	242	
	Hen	030							Chipilín*	243	
	Iguana*	033							Chufle*	244	
	Duck	034							Apazote*	245	
	Turtle	035			LEGUMES				Pea	252	
					Chickpea	165			String bean	259	
					Haba (harina)*	170			Loroco*	267	
					Haba tostado*	171			Yellow corn	269	
	MEAT				Lentil	178			White corn	270	
	Armado*	037			Peanut	186			Jilote*	271	
	Bazo de cerdo*	038			Ajonjolí*	192			Turnip	274	
	Spleen (cattle)	039			Pepitoria*	193			Pacaya*	276	
	Pork	045			Semilla ayote*	194			Cucumber	278	
	Pork's heart	049			Achiote semilla*	198			Pito*	281	
	Chicharrones*	052			Achiote pasta*	199			Leek	282	
	Liver (pork)	058			Bean (white)	201			Radish	285	
	Liver (cattle)	060			Bean (black)	202			Beet	286	
	Iguana*	061			Bean (piligua)*	203			Tomato	297	
	Panza de res*	069			Bean (red)	204			Carrot	298	
	Duck	072			Bean (raw)	260			Onion	300	
	Turkey	073							Chile diente de perro*	302	
	Chicken or hen	074							Chile pimiento*	303	
	Beef	082							Chile guaque verde*	305	
	Kidney (pork)	085			VEGETABLES				Chile verde picante*	308	
	Kidney (cattle)	087			Chile seco*	211			Chile pimiento (lata)	309	
	Bacalao seco*	102			Garlic	212			Güicoy maduro*	313	
	Shrimp (fresh)	109			Celery	215			Marañón*	314	

*No English translation.

FORM 80 (Side B)

	FOOD	No.	COST		FOOD	No.	COST		FOOD	No.	COST
	Tomatillo*	320			Guineo manzano*	461			FATS		
	Tomato juice	323							Oil	596	
	Chile pana*	712							Manteca de cerdo*	597	
					ROOTS				Manteca vega*	598	
					Potatoes	475					
	FRUITS				Yuquilla*	477			MISCELLANEOUS		
	Avocado	209			Yuca*	478			Beer	607	
	Pineapple	331							Coffee	611	
	Caimito*	334							Incaparina*	612	
	Coconut (maduro)*	341			CEREALS				Vinegar	618	
	Coconut (tierno)*	342			Corn-starch	481			Chocolate	628	
	Peach	352			Rice flour	483			Milk ice cream	632	
	Granadilla*	358			Barley	488			Pineapple ice cream	633	
	Jocote amarillo*	365			Yellow corn	495			Chile relleno*	665	
	Jocote rojo*	366			White corn	496			Enchiladas*	666	
	Lima limón*	367			Wheat flour	511			Tamal de cerdo*	635	
	Lime	368			Paste	515			Liquor	666	
	Lemon	370			Rice	516			Jocan	667	
	Mamey*	372			Oats	518			Coca Cola	670	
	Zapote*	373			Cereals flour	519			Refrescos embacados*	686	
	Mango maduro*	376			Cookies	524			Chicken soup	693	
	Mango verde*	377			Loaf bread	526			Wine	706	
	Apple	379			Sweet rolls	528			Milo*	707	
	Melon*	384			Bread	535			Cerelac*	714	
	Nance*	386			Quesadilla*	541			S.C.M.	715	
	Orange	389			Yellow tortilla*	545					
	Papaya*	395			White tortilla*	549					
	Watermelon	403			Black tortilla*	553					
	Sunza*	406			Wheat	565					
	Tamarindo*	407			Soda cracker	494					
	Coconut juice	422									
	Cushin*	423									
	Guayaba*	426			SUGARS						
	Jocote tronador*	432			Caña de azúcar*	573					
	Apple juice	447			Sugar	574					
	Marañon*	381			Honey	575					
	Patasta*	713			Panela*	578					
					Candies	581					
					Coconut dessert	584					
	MUSACEAS				Milk dessert	586					
	Banana	455			Marshmallows	592					
	Plátano maduro*	457			Syrup	593					
	Guineo majoncho*	459									
	Guineo morado*	460									

Col.	Description	
59	[ ]	Day
60-65	[ ][ ][ ][ ][ ][ ]	Date
66-67	[ ][ ]	Survey [illegible] code
68-69	[8][0]	Form
70-72	[ ][ ][ ]	Family number
73-76	[redacted]	Block [illegible]

*No English translation

APPENDIX XI

FOOD ABSORPTION STUDIES

Protocol

FORM 10

This form was used to record the results of d-Xylose absorption tests and side-effects. The form was used in field tests and at the metabolic ward.

Columns	Description
1	Community: Florida Aceituno = 1; Guanagazapa = 2.
2-3	Block number where a given house is located.
4-5	House number.
6	Not used.
7-8	Position of the Individual within the family. (See the description on form 01)
9	Not used.
10	Sex: Male = 1; Female - 2.
11-14	Age: Expressed in years and months: Col 11-12: Years. Col 13-14: Months. The age was calculated from the date of birth given on form 01. This data was usually taken from official documents (birth certificate, etc.)
15	Site of test: Done in the field = 1; Done at the metabolic ware = E; Done at the Mariscal Zavala = M.
16-20	Correlative number of the test.
21-22	Dose given: For d-Xylose, in g with no decimals.
23-26	Urinary volume collected in 5 hours: Expressed in g; no decimals.
27-30	d-Xylose present in 100 ml of urine: Expressed in mg; no decimals.
31-35	Total amount of d-Xylose excreted in 5 hours: Expressed in mg; no decimals.
36-39	Total amount of d-Xylose excreted in 5 hours: Expressed as % of the dose given with 2 decimals.

Columns	Description
40-47	Used to record side-effects experienced by a subject during or within the first 24 hours after the test. Allowed codes are: 0=absent, 1-present. Col 40: Diarrhea Col 41: Nausea and Vomits Col 42: Skin rash Col 43: Edema Col 44: Parotid swelling Col 45: Metalic taste in the mouth Col 46: Sore throat Col 47: Dizziness
48-59	Not used.
60-65	Date: Col 60-61: Day Col 62-63: Month Col 64-65: Year (last 2 digits)
66-67	Observer's code: Person in charge of the subject during the test.
68-69	Form number: 10.
70-72	Not used.
73-76	Census correlative number of the individual studied.

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d-XYLOSE

Form 10

Name of individual: _____

Code: No - 0 Yes - 1

Col	CONTENT	
1-5	Location	
6	Blocked	
7-8	Family position	
9	Blocked	
10	Sex	
11-14	Age	
15	Test	
16-20	Test number	
21-22	Oral dose	
23-26	5 hour urine volume	
27-30	Urinary d-Xylose mg/100 ml	
31-34	% absorption	
35	Diarrhea	
36	Nausea-vomits	
37	Skin rash	
39	Swelling	

Col.	CONTENT	
40	Blank	
41	Metalic taste	
42	Sore throat	
43	Dizziness	
60-65	Date	
66-67	Survevor's code	
68-69	Form	1 0
70-72	Blocked	
73-76	No. of individual	

Observations:

Protocol

FORM E41

This form was used to record general information about each subject in the detailed absorption studies (four forms were used: E41, E42, E43 and E44).

Columns	Description
1	E. This letter identifies those forms containing data from the rural metabolic ward
2-3	Identifies the number of the form or card.
4	Identifies the village of the study individual: Florida Aceituno = 1 Guanagazapa = 2
5-7	Census correlative number of the study subject: This number was generated from the census and corresponds to this subject at all times.
8-10	Metabolic number: Follows a correlative sequence depending on the number of studies performed. Since such studies were carried out every year in the same group of individuals, a person (identified by his census correlative number) will have several metabolic numbers. Example: Individual 312 (census correlative number) has had 2 metabolic studies identified as "115" in 1973 and "213" in 1974.
11-13	Balance period number: Follows a sequential system. Each balance period covers 6 to 8 subjects (the largest number of individuals that can be hospitalized in the metabolic ward at one time). Balance period 20 (1974) contained metabolic studies 129, 130, 131, 132, 133, and 134. Balance period 30 (1974) contained metabolic studies 189, 190, 191, 192, 193, and 194.
14	A metabolic study might be divided into several parts depending on the time covered. Thus, in 1973 only one 72-hour balance was performed. In 1974, on the contrary, two consecutive 72-hour balances were performed. The classification was: 1 = identifies the first of two consecutive 72-hour balances. 2 = identifies the second of two consecutive 72-hour balances.

Columns	Description
15-17	Date when the study was performed: Col 15-16: Month Col 17: Last digit of the year
18-20	Age: Expressed in years and months: Col 18-19: Years Col 20: Months
21-23	Initial weight: The weight of the study individual when admitted to the metabolic ward. Defined as that weight obtained at 6 a.m. of day 2, after voiding. Expressed in kg with one decimal.
24-26	Height: Expressed in cm, no decimals.
27-29	Arm circumference: Expressed in cm, one decimal.
30-32	Arm skinfold: Expressed in mm, one decimal.
33-34	Weight/Height: Expressed in %, no decimals.
35-37	Body surface: Expressed in cm^2, no decimals.
38-41	Arterial blood pressure: Expressed as follows: Sistolic pressure = first two digits of the pressure recorded. Diastolic pressure = first digit of the pressure recorded. Example: 120/ 80 = 12 08 180/110 = 18 11
42-44	Radial pulse: Expressed in beats per min.
45-46	Respirations: Expressed per min.
47	Nutritional status: 1 = Satisfactory 2 = Poor nutritional status
48	Physical examination: 1 = Satisfactory 2 = Abnormal
49	Urine analysis: 1 = Normal 2 = Abnormal
50-52	Hemoglobin: Expressed as gm/100 ml of blood, one decimal.
53-54	Proteins: Either in serum or plasma, expressed as gm/100 ml of serum or plasma, no decimals.

Columns	Description
55-57	Final weight: 6 a.m. weight recorded during the last day of a given balance (with empty bladder). Expressed in kg, one decimal.
58-61	72 hours stool volume: Expressed in grams, no decimals.
62-63	Number of bowel movements in 72 hours.
64-66	Change in body weight during a given balance: Initial weight - final weight = change in body weight (kg). Col 64: Used to express the actual gain or loss in weight. Gain = + (if the final weight is higher than the initial one). Loss = - (if the final weight is less than the initial one). Col 65-67: Used to record the magnitude of the change in kg and fractions Col 65: kg Col 66-67: fractions of kg Example: 55.40 kg - 56.10 kg = + 0.70 kg.
67-69	Average weight during a given balance: Expressed in kg, one decimal - fraction of kg.
70-71	Hematocrit: Expressed as units/100 ml, no decimals.
72-73	Albumin: Expressed as gm/100 ml of serum or plasma, one decimal.
74-76	Vitamin B12 (serum levels): Expressed as pg/ml of serum, no decimals.
77-78	Folates blood level: Expressed as ng/ml of blood, no decimals.
79	Stool culture: 0 = Negative 1 = Postivie for Shigella 2 = Positive for Salmonella
80	Not used.

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Division Biomédica - Sección Estudios Gastrointestinales
DATOS GENERALES DE BALANCE

FORM E41

Col	Descripción	
1	E	Estudio metabólico
2-3	4 1	Tarjeta
4		Pueblo
5-7		No. de individuo
10		No. metabólico
	BALANCE	
11-13		No. correlativo
14		Tipo I = 1 II = 2
15-17		Fecha
18-20		Edad: Años, Mes
21-23		Peso inicial
24-26		Talla
27-29		Circunferencia de brazo
30-32		Pliegue
33-34		Peso/Talla
35-37		Superficie corporal
38-41		Presión arterial
44		Pulso

Col.	Descripción	
45-46		Respiraciones
47		Estado nutricional
48		Examen físico
49		Examen de orina
50-52		Hemoglobina
53-54		Proteínas
55-57		Peso final
58-61		Volumen de heces en 72 horas
62-63		Número de evacuaciones
64-66		Cambio de peso
67-69		Peso promedio
70-71		Hematocrito
72-73		Albúmina
74-76		Vitamina B12
77-78		Folatos
79		Coprocultivo 0 - Negativo 1 - Shigella 2 - Salmonella
80		

Protocol

FORM E42

Thid form was used to record general information about each subject in the detailed absorption studies (Four forms were used: E41, E42, E43 and E44).

Columns	Description
1	The letter "E" identifies those forms containing data from the metabolic ward.
2-3	Identifies the form number.
4	Identifies the community or the study individual: Florida Aceituno = 1 Guanagazapa = 2
5-7	Census correlative number.
8-10	Metabolic study number.
11-13	Balance number.
14	Kind of balance
15	Not used.
16-18	Concentration of creatinine in 100 ml of urine (not corrected)* Expressed as mg, no decimals.
19-22	Urinary volume collected in 72 hours: Expressed in ml, no decimals.
23-26	Amount of creatinine excreted in the urine in 72 hours (not corrected)*: Expressed in mg, no decima
27-30	Amount of creatinine excreted in the urine in 24 hours (not corrected)*: Expressed in mg, no decimals. Calculated by dividing the 72-hour creatinine (col 23-26) 3.
31-33	Concentration of creatinine in 100 ml of serum: Expressed in mg, no decimals.
34-36	Creatinine clearance: Expressed in mg, no decimals.

Columns	Description
37	Results of direct stool examination: 1 = Positive for parasites 2 = Negative for parasites
	PROTOZOA
39-49	Used to report the presence or absence of different species of protozoa in the stools: Col 38: Used to report if the stool examination was negative for "all protozoa" 1 = negative for all protozoa 2 = protozoa present in the stools Col 39-49: Used to report the different species of protozoa present in the stools: 1 = Positive 0 = Negative The coding for different species was: Col 39: 1001 Col 40: 1002 Col 41: 1003 Col 42: 1005 Col 43: 1006 Col 44: 1008 Col 45: 1009 Col 46: 1010 Col 47: 1011 Col 48: 1012 Col 49: 1016
	HELMYNTHS: Reported in a similar fashion as Protozoa.
50-56	Used to report the different species of helmynths present in the stools: 1 = Positive 2 = Negative
50	Used to report if the stool examination was negative for "all helmynths": 1 = Negative for all helmynths 2 = Helmynths present in the stools Col 51: 1021 Col 52: 1022 Col 53: 1023 Col 54: 1025 Col 55: 1026 Col 56: 1044

Columns	Description
	STOLL
57-72	Helmynth's egg counts performed by the Stoll's concentration method expressed as the number of eggs present in 1 g of feces (the last 2 figures of the final count). Thus, 1,000,000 eggs of ascaris was reported as 1000; 1000 was reported as 10. Col 57-60: Number of eggs of ascaris present. Col 61-63: Number of eggs of T. Trichiura present. Col 64-66: Number of eggs of Hookworm present. Col 67-69: Number of eggs of Taenia present. Col 70-72: Number of eggs of other helmynths prese
73	Total number of species of protozoa present.
74	Total number of species of helmynths present.
75-76	Total number of species of parasites present.
77-80	Not used.

---

* Since these data were used to calculate creatinine clearance, they were not corrected for the amount of creatinine produced from the meat ingested by the individual. This correction was made in Form E-49. Since the amount of creatinine in the urine was used to calculate muscle mass, it is important to substract from the total amount of urinary creatinine, that produced by meat.

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DATOS GENERALES DE BALANCE FORM E42

Col.	Descripción		Col	Descripción	
1	E	Estudio	2-3	4 2	Tarjeta
4		Pueblo	5-7		No. de individuo
8-10		No. metabólico	11-13		No. de balance
14		Tipo I = 1 II = 2			
15		Bloqueado			
16-18		Creatinina/100 ml	19-22		Vol. orina/72 hrs.
23-26		Creatinina/72 hrs.	27-30		Creatinina/24 hrs.
31-33		Creatinina en sangre	34-36		Depuración creatinin.

EXAMEN DIRECTO

37		Positivo = 1 Negativo = 0

PROTOZOOS

38-49	neg.	1001	1002	1003	1005	1006	1008	1009	1010	1011	1012	1016

HELMINTOS

50-56	neg.	1021	1022	1023	1025	1026	1044

STOLL (No. de huevos x 100)

57-60		Ascaris (1021)	61-63		Tricocéfalos (1022)
64-66		Uncinaria (1023)	67-69		(1026)
70-72		Otros (1044)			

TOTALES

73		Protozoos	74		Helmintos
75-76		Total			

Protocol

FORMS E43 and E44

Columns	Description
1	E. This letter identifies those forms containing data from the rural metabolic ward.
2-3	Identifies the number of the form or card.
4	Identifies the village of the study individual: Florida Aceituno = 1 Guanagazapa = 2
5-7	Census correlative number of the study subject: This number was generated from the census and corresponds to this subject at all times.
8-10	Metabolic number: Follows a correlative sequence depending on the number of studies performed. Since such studies were carried out every year in the same group of individuals, a person (identifi by his census correlative number) will have several metabolic numbers.
11-13	Balance period number: Follows a sequential system. Each balance period covers 6 to 8 subjects (the largest number of individuals that can be hospitalized in the metabolic ward at one time).
14	A metabolic study might be divided into several parts depending on the time covered. The classification was: 0 = when only one 72-hour balance period was perform 1 = Identifies the first of two consecutive 72-hour balance period performed. 2 = Identifies the second of two consecutive 72-hour balance period performed.
15-17	Results of the d-Xylose absorption test performed during the metabolic study. It is expressed as a percent with one decimal.
18-20	Nitrogen intake: Expressed in grams with one decima
21-23	Nitrogen Fecal Loss: Expressed in grams with one decimal.

Columns	Description
21-23	Nitrogen Fecal Loss: Expressed in grams with one decimal.
24-26	Nitrogen present in the Urine: Expressed in grams with one decimal.
27-29	Total Nitrogen Loss: Nitrogen fecal loss + nitrogen present in the urine. Expressed in grams with one decimal.
30-33	Nitrogen Balance: Nitrogen intake minus total nitrogen loss, expressed in grams with one decimal.
34-36	Nitrogen Absorption: Percent of nitrogen intake absorbed, calculated as follows: $\frac{\text{Nitrogen intake - N lost in the stools}}{\text{Nitrogen intake}} \times 100$ It is expressed as percent with one decimal.
37-40	Nitrogen Retention: Percent of nitrogen intake retained, calculated as follows: $\frac{\text{Nitrogen intake - total nitrogen lost}}{\text{Nitrogen intake}} \times 100$ It is expressed as percent with one decimal.
41-45	Caloric intake: Measured by bomb calorimetry, expressed in Kcalories with no decimals.
46-49	Caloric Fecal Loss: Measured by bomb calorimetry expressed in Kcalories with no decimals.
50-52	Calorie loss in the Urine: This is an approximate measurement. It is based on the following calculation: mg of Urea present in the urine x 2.59* = Kcal present in the urine. It is expressed as Kcals with no decimals. *2.59 is a factor used to transform Urea into calories.
53-56	Total calorie Loss: Calorie fecal loss + calories lost in the urine, expressed as Kcals with no decima
57-59	Absorption of Calories: Calculated as follows: $\frac{\text{calorie intake - calorie fecal loss}}{\text{Calorie intake}} \times 100$ It is expressed in percent with one decimal.

Columns	Description
60-62	Retention of calories: Calculated as follows: $\frac{\text{Caloric intake - total caloric loss}}{\text{Caloric intake}} \times 100$ It is expressed in percent with one decimal.
63-66	Fat Intake: It is expressed in grams with one decimal.
67-69	Fat Lost In Feces: It is expressed in grams with one decimal.
70-72	Absorption of fat: Calculated as follows: $\frac{\text{Fat intake - fat lost in feces}}{\text{Fat intake}} \times 100$

*Both forms (E43 and E44) contain the same type of data except:

Form E43: Contains data obtained from a 24-hour balance period.
Form E44: Contains data from a 24-hour balance period. The data for a 24-hour balance is calculated by dividing the data from a 72-hour balance by three.

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
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FORM E43

DATOS GENERALES DE BALANCE

72 HORAS

Col.	Descripción	
1	E	Estudio metabólico
2-3	4 3	Tarjeta
4	⊔	Pueblo
5-7	⊔⊔⊔	No. de individuo
8-10	⊔⊔⊔	No. metabólico
11-13	⊔⊔⊔	No. de balance
14	⊔	Tipo I = 1 II = 2
15-17	⊔⊔.⊔	D-Xilosa

NITROGENO

Col.	Descripción	
18-20	⊔⊔.⊔	Ingesta
21-22	⊔⊔	Excreta en heces
23-25	⊔⊔.⊔	Excreta en orina
26-28	⊔⊔.⊔	Excreta total
29-32	⊔⊔⊔.⊔	Balance
33-35	⊔⊔.⊔	Absorción
36-38	⊔⊔.⊔	Retención
39-40	⊔⊔	Excreta en heces corregida

Col.	Descripción	
41-43	⊔⊔⊔	Excreta total corregida
44-45	⊔⊔	Balance corregido
46-48	⊔⊔.⊔	Absorción corregida
49-51	⊔⊔.⊔	Retención corregida

CALORIAS

Col.	Descripción	
52-56	⊔⊔⊔⊔⊔	Ingesta (bomba) colorimétrica)
57-60	⊔⊔⊔⊔	Excreta en heces
61-63	⊔⊔⊔	Excreta en orina
64-67	⊔⊔⊔⊔	Excreta total
68-69	⊔⊔	Absorción
70-71	⊔⊔	Retención

GRASA

Col.	Descripción	
72-74	⊔⊔.⊔	Ingesta
75-77	⊔⊔.⊔	Excreta heces
78-80	⊔⊔.⊔	Absorción

INSTITUTO DE NUTRICION DE CENTRO AMERICA Y PANAMA
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FORM E44

DATOS GENERALES DE BALANCE

24 HORAS

Col.	Descripción	
1	E	Estudio metabólico
2-3	4 4	Tarjeta
4	␣	Pueblo
5-7	␣␣␣	No. de individuo
8-10	␣␣␣	No. metabólico
11-13	␣␣␣	No. de balance
14	␣	Tipo I = 1 II = 2
15-17	␣␣.␣	D-Xilosa

NITROGENO

18-20	␣␣.␣	Ingesta
21-22	␣␣	Excreta en heces
23-25	␣␣.␣	Excreta en orina
26-28	␣␣.␣	Excreta total
29-32	␣␣␣.␣	Balance
33-35	␣␣.␣	Absorción
36-38	␣␣.␣	Retención
39-40	␣␣	Excreta en heces corregida

Col.	Descripción	
41-43	␣␣␣	Excreta total corregida
44-45	␣␣	Balance corregido
46-48	␣␣.␣	Absorción corregida
49-51	␣␣.␣	Retención corregida

CALORIAS

52-56	␣␣␣␣␣	Ingesta (bomba) calorimétrica
57-60	␣␣␣␣	Excreta en heces
61-63	␣␣␣	Excreta en orina
64-67	␣␣␣␣	Excreta total
68-69	␣␣	Absorción
70-71	␣␣	Retención

GRASA

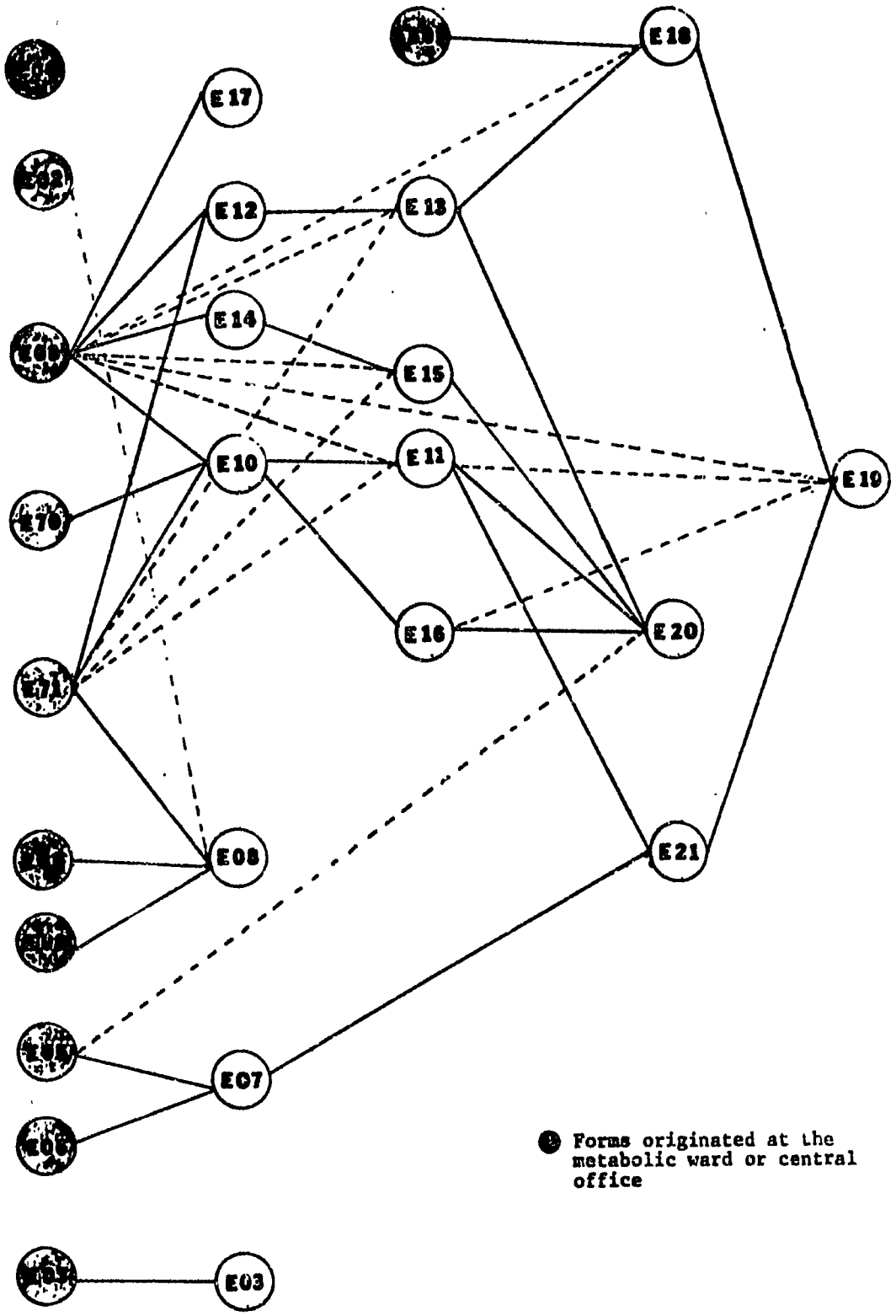
72-74	␣␣.␣	Ingesta
75-77	␣␣.␣	Excreta heces
78-80	␣␣.␣	Absorción

Forms Used To Record Food Absorption Data

Number Form	Title
E01	Identification of study subjects
E02	Intake and output control
E03-1	Anthropometry
E03-2	Anthropometry
E04-1	Admission, physical check-up and intestinal parasite
E04-2	Results of stool cultures
E05	Record of weight changes during a balance period
E06	Record of weight changes during a balance period
E07	Summary of weight measurements during a period of balance.
E08	Measurement related to creatinine production and muscle mass
E09	Weights of food items ate by study subjects during a period of balance
E10	Content of nitrogen of food items present in the total intake of study subjects/balance period
E11	Balance of nitrogen
E12	Caloric content of food items present in the total intake of study subjects/balance period
E13	Caloric balance
E14	Caloric content of food items present in the total intake of study subjects
E15	Caloric balance
E16	Protein content of food items ate by study subjects during a period of balance
E17	Fiber content of food items present in the total intake of study subjects/balance
E18	Cost of the calories content of each food item present in the total intake of subjects/balance
E19	Cost of proteins content of each food item present in the total intake of subjects/balance
E20	Total intake and fecal excretion during balance expressed as per Kg of body weight
E70	Results of laboratory determination in food items of the rural metabolic diet
E71	Results of laboratory determinations in biological samples (stools and urine)

(see flow chart next page for forms control and data flow)

Origin and Flow of Forms Related To Detailed Food Absorption Studies



Protocol

Identification of Study Subjects

FORM E01

Used to identify each metabolic ward subject, with balance number and date.

Columns	Description
1	Identification of the study
2-3	Card number = 01
4	Community
5-8	Subject's correlative number
9-11	Subject's metabolic number
12-14	Number of the balance period
15	Type of balance
16-23	Dates when the balance was done 16-17 First day 18-19 Last day 20-21 Month 22-23 Year
24-27	Age 24-25 Year 26-27 Month
28-35	d-Xylose absorption test 28-31 g of xylose present in 5 hour urine 32-35 % of xylose absorption
36-37	Subject's average weight/balance (Kg)
41-44	Height (cm)

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DIVISION OF BIOLOGY AND HUMAN NUTRITION

IDENTIFICATION

FORM E01

(1-11) E Study | 0 1 Form | Village | No. of subject | Metabolic number

(12-23) Balance number | Type | From: Day | Day | Month | Year

AGE

(24-27) Years | Months

D-Xylose

(28-35) R. in 5 hour urine | % of absorption

ANTHROPOMETRY

(36-44) Average weight | Height

Protocol

Intake and Output Control

FORM E02

Columns	Description
1-15	Identification
16-19	First 24 hours 16-19 Stools (grams) 20-23 Urine (grams) 24-27 Oral Fluids (grams) 28-29 Number of bowel movements
30-43	Second 24 hours 30-33 Stools (grams) 34-37 Urine (grams) 38-41 Oral fluids (grams) 42-43 Number of bowel movements
44-57	Third 24 hours 44-47 Stools (grams) 48-51 Urine (grams) 52-55 Oral fluids (grams) 56-57 Number of bowel movements
58-73	Total intake and output source 58-61 Stools (grams) 62-66 Urine (grams) 67-71 Oral fluids (grams) 72-73 Number of bowel movements

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Division of Biology and Human Nutrition
FLUID INTAKE AND EXCRETA CONTROL

FORM E02

(1-11) E 0 2 ___ ___ ___ ___ ___ ___ ___ ___
Study · Form · Village · No. of subject · Metabolic number

(12-15) ___ ___ ___ ___
Balance number · Type

	STOOLS	URINE	ORAL FLUIDS	No. OF EMs
24 hours (16-29)	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___
48 hours (30-43)	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___
72 hours (44-57)	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___
TOTAL (58-73)	___ ___ ___ ___	___ ___ ___ ___ ___	___ ___ ___ ___ ___	___ ___

Protocol

Anthropometry

FORM E03-1

This form consists of two parts (E03-1, E03-2) containing all the anthropometric data recorded by the M.D. during the metabolic ward admission check-up.

Columns	Description
1-15	Identification
16-19	Age 16-17 Year 18-19 Month
20-25	Weight on admission (grams)
26-29	Height (cms)
30-32	Arm circumference
33-35	Tricipital skinfold
36-37	Weight for height
38-40	Body circumference
41-44	Corrected arm circumference
45-76	Blank
77	Number 1

Protocol

Anthropometry

FORM E03-2

This form is the second of two parts (E03-1, E03-2) containing all the anthropometric data recorded by the M.D. during the admission check-up.

Columns	Description
1-15	Identification
16-19	Age 16-17 Year 18-19 Month
20-27	Shoulder circumference 20-23 First measurement 24-27 Second measurement
28-31	Mean shoulder circumference
32-39	Thoracic circumference 32-35 First measurement 36-39 Second measurement
40-43	Mean thoracic circumference
44-51	Abdominal circumference 44-47 First measurement 48-51 Second measurement
52-55	Mean abdominal circumference
56-63	Girdle circumference 56-59 First measurement 60-63 Second measurement
64-67	Mean girdle circumference
68-76	Blank
77	Number 2

Note: Mean circumference was calculated by computer, taking into consideration the first and second measurements recorded by the M.D. in the columns corresponding to each circumference.

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Division of Biology and Human Nutrition

ANTHROPOMETRY

FORM E03-1

(1-19) E (Study) 0 3 (Form) ___ (Village) ___ (No. of subject) ___ (Metabolic number)

___ ___ ___ (Balance number) ___ (Type) ___ ___ ___ ___ (Age)

20-25	___ ___ ___ ___ ___	Initial weight	26-29	___ ___ ___ ___	Height
30-32	___ ___ ___	Arm circumference	33-35	___ ___ ___	Tricipital skin-fold
36-37	___ ___	Weight/Height	38-40	___ ___ ___	Body surface
41-44	___ ___ ___ ___	Arm circumference (corrected)	77	1	Type of form

(1-19) Duplicate the top of the form

FORM E03-2

20-27	___ ___ ___ ___	Shoulder circumfer-ence 1	44-47	___ ___ ___ ___	Abdominal circumfer-ence 1
24-27	___ ___ ___ ___	Shoulder circumfer-ence 2	48-51	___ ___ ___ ___	Abdominal circumfer-ence 2
28-31	___ ___ ___ ___	Shoulder circumfer-ence average	52-55	___ ___ ___ ___	Abdominal circumfer-ence average
32-35	___ ___ ___ ___	Thoracic circumfer-ence 1	56-59	___ ___ ___ ___	Hip circumference 1
36-39	___ ___ ___ ___	Thoracic circumfer-ence 2	60-63	___ ___ ___ ___	Hip circumference 2
40-43	___ ___ ___ ___	Thoracic circumfer-ence average	64-67	___ ___ ___ ___	Hip circumference average

77	2	Type of form

Protocol

Admission, Physical Check-up and Intestinal Parasites

FORM E04-1

This form was completed in part at the rural metabolic ward and in part by the computer which transferred information from Form 11 (microbiology-parasitology). For a detailed description of Form 11 and bacteria and protozoa classification, see Appendix VI.

Columns	Description
1-15	Identification
16-19	Blood pressure
20-22	Cardiac frequency
23	Nutritional status
24	Result of physical check-up
25	Urine analysis
26-28	Hemoglobine
29-30	Hematocrite
31-32	Serum proteins
33	Serum albumine
34-36	Serum vitamin B12 levels
37-38	Blood folate levels
40	Result of parasitological exams
41	Presence of absence of protozoa
42	Presence of E. histolytica (1001)
43	Presence of E. hartmanni (1002)
44	Presence of E. coli (1003)
45	Presence of E. nana (1005)
46	Presence of I. butschlii (1006)

Columns	Description
47	Presence of T. heminis (1008)
48	Presence of E. hominis (1009)
49	Presence of C. mesnili (1010)
50	Presence of G. lamblia (1011)
51	Presence of B. coli (1012)
52	Others (1016)
53	Result of helmynths
54	Presence of A. lumbricoides (1021)
55	Presence of T. trichiuris (1022)
56	Presence of hookworm (1023)
57	Presence of E. vermicularis (1025)
58	Presence of Taenia spp (1026)
59	Others (1044)
60-75	Helmynth ova count (Stoll's) 60-63 A. lumbricoides (1021) 64-66 T. trichiuris (1022) 67-69 Hookworm (1023) 70-72 Taenia spp (1026) 73-75 Others (1044)
76	Total number of protozoa species found
77	Total number of helmynth species found
78-79	Total number of species of parasites found
80	Number 1

Protocol

Results of Stool Cultures

FORM E04-2

This form was used to record the results of stool cultures carried out in all study subjects. It was generated by computer using information from Form 11. A detailed description of Form 11 and the classification used can be found in Appendix VI.

Columns	Description		
1-15	Identification		
16	Result of stool culture (+ -)		
17-26	Shigella, Subgroup A (dysenteriae)		
	17	Code 2001:	Subgroup A1
	18	Code 2002:	Subgroup A2
	19	Code 2003:	Subgroup A3
	20	Code 2004:	Subgroup A4
	21	Code 2005:	Subgroup A5
	22	Code 2006:	Subgroup A6
	23	Code 2007:	Subgroup A7
	24	Code 2008:	Subgroup A8
	25	Code 2009:	Subgroup A9
	26	Code 2010:	Subgroup A10
27-34	Shigella, Subgroup B (flexneri)		
	27	Code 2021:	Subgroup B1, B1a, B1b
	28	Code 2022:	Subgroup B2, B2a, B2b
	29	Code 2023:	Subgroup B3
	30	Code 2024:	Subgroup B4, B4a, B4b
	31	Code 2025:	Subgroup B5
	32	Code 2026:	Subgroup B6
	33	Code 2027:	Subgroup x
	34	Code 2028:	Subgroup y
35-49	Shigella, Subgroup C (boydii)		
	35	Code 2041:	Subgroup C1
	36	Code 2042:	Subgroup C2
	37	Code 2043:	Subgroup C3
	38	Code 2044:	Subgroup C4
	39	Code 2045:	Subgroup C5
	40	Code 2046:	Subgroup C6
	41	Code 2047:	Subgroup C7
	42	Code 2048:	Subgroup C8
	43	Code 2049:	Subgroup C9
	44	Code 2050:	Subgroup C10

Columns	Description
	45 Code 2051: Subgroup C11
	46 Code 2052: Subgroup C12
	47 Code 2053: Subgroup C13
	48 Code 2054: Subgroup C14
	49 Code 2055: Subgroup C15
50	Shigella, Subgroup D (sonnei) (2061)
51	Shigella, S.N.D.* (2070)
52	Shigella, Subgroup A,*(2071)
53	Shigella, Subgroup B,*(2072)
54	Salmonella, Subgroup A,*(2131)
55	Salmonella, Subgroup B,*(2132)
56	Salmonella, Subgroup C1,*(2133)
57	Salmonella, Subgroup C2,*(2134)
58	Salmonella, Subgroup D,*(2135)
59	Salmonella, Subgroup E1,*(2136)
60	Salmonella, Subgroup E2,*(2137)
61-65	Number of the sample (microbiology lab)
66	Salmonella, Subgroup E3,*(2138)
67	Salmonella, Subgroup E4,*(2139)
68-69	Blank
70	Salmonella, Subgroup F,* (2140)
71	Salmonella, Subgroup G,*(2141)
72	Salmonella, Subgroup H,*(2142)
73	Salmonella, Subgroup I,*(2143)
74	Salmonella, Other Subgroups (2144)

*Serotype not determined.

Columns	Description
75-78	Blank
79	Total number of groups of bacteria identified
80	Number 2

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EXAMEN FISICO Y DE LABORATORIO

FORM E04-1

(1-15) E 0 4 — Estudio, Tarjeta; ___ Pueblo; ___ ___ ___ ___ Número individuo; ___ ___ ___ Número metabólico; ___ ___ ___ Número balance; ___ Tipo

16-19	___ ___ ___ ___	Presión arterial	20-22	___ ___ ___	Pulso
23	___	Estado nutricional	24	___	Examen físico
25	___	Examen orina	26-28	___ ___ ___	Hemoglobina
29-30	___ ___	Hematocrito	31-32	___ ___	Proteínas
33	___	Albúmina	34-361	___ ___ ___	Vitamina B12
37-38	___ ___	Folatos	39	___	Coprocultivos

EXAMEN DIRECTO

40	___	Positivo = 1 Negativo = 0

FORM E04-2

PROTOZOOS

41-52	Neg.	1001	1002	1003	1005	1006	1008	1009	1010	1011	1012	1016

HELMINTOS

53-59	Neg.	1021	1022	1023	1025	1026	1044

STOLL (No. de huevos x 100)

60-63	___ ___ ___ ___	Ascaris (1021)	64-66	___ ___ ___	Tricocefalos (1022)
67-69	___ ___ ___	Uncinaria (1023)	70-72	___ ___ ___	(1026)
73-75	___ ___ ___	Otros (1044)			

TOTALES

76	___	Protozoos	77	___	Helmintos
78-79	___ ___	Total			

Protocol

Record of Weight Changes During a Metabolic Balance Period

FORM E05

This was one of two forms (E05, E06) used to record changes in weight in study subjects during the three day balance period. The information was recorded in kilograms at the metabolic ward.

Columns	Description
1-15	Identification
16-21	Day 1: 12 hours (hour 0)
22-27	Day 1: 18 hours (hour 6)
28-33	Day 1: 21 hours (hour 9)
34-39	Day 1: 6 hours (hour 18)
40-45	Day 1: 12 hours (hour 24)
46-51	Day 2: 18 hours (hour 30)
52-57	Day 2: 21 hours (hour 33)
58-63	Day 2: 6 hours (hour 42)
64-69	Day 2: 12 hours (hour 48)
70-80	Blank

FORM E06

Columns	Description
1-15	Identification
16-21	Day 3: 18 hours (hour 54)
22-27	Day 3: 21 hours (hour 57)
28-33	Day 3: 6 hours (hour 66)
34-39	Day 3: 12 hours (hour 72)
40-45	Day 4: 18 hours (hour 78)

Columns	Description
46-51	Day 4: 21 hours (hour 81)
52-57	Day 4: 6 hours (hour 90)
58-63	Day 4: 12 hours (hour 96)
64-80	Blank

INSTITUTE OF NUTRITION OF CENTRAL AMERICA AND PANAMA
Program of Nutrition and Gastrointestinal Function
Division of Biology and Human Nutrition
WEIGHT CONTROL

FORM E05

(1-15) E 0 5
Study Form Village No. of subject Metabolic number

Balance number Type

16-21		Day 1 12:00 hrs. Hour 0	46-51		Day 2 18:00 hrs. Hour 30
22-27		Day 1 18:00 hrs. Hour 6	52-57		Day 2 21:00 hrs. Hour 33
28-33		Day 1 21:00 hrs. Hour 9	58-63		Day 2 6:00 hrs. Hour 42
34-39		Day 1 6:00 hrs. Hour 18	64-69		Day 2 12:00 hrs Hour 48
40-45		Day 1 12:00 hrs. Hour 24			

FORM E06

(1-3) E 0 6
Study Form

(4-15) Duplicate the top of the form

16-21		Day 3 18:00 hrs. Hour 54	40-45		Day 4 18:00 hrs. Hour 78
22-27		Day 3 21:00 hrs. Hour 57	46-51		Day 4 21:00 hrs. Hour 81
28-33		Day 3 6:00 hrs. Hour 66	52-57		Day 4 6:00 hrs. Hour 90
34-39		Day 3 12:00 hrs. Hour 72	58-63		Day 4 12:00 hrs. Hour 96

Summary Record

Summary of Weight Measurements During A Period of Balance

FORM E07

This record was prepared by computer, using information from Forms E05 and E06.

Columns	Description
1-15	Identification
16-21	Average weight during period of balance
22-80	Statistical information on weight parameters for data analysis

Summary Record

Creatinine Production and Muscle Mass

FORM E08

This record, prepared by computer, contains measurements of the muscle mass of each individual and the urinary excretion of creatinine of the same subjects during each balance period. Input data was recorded on forms E01, E02, E09, and E71.

Columns	Description
1-15	Identification
16-18	Grams of meat eaten during balance
19-22	Milligrams of creatinine derived from meat
23-26	Urinary creatinine/balance
27-30	Urinary creatinine/balance corrected for meat creatinine
31-34	Twenty four hour urinary creatinine excretion (corrected)
35-37	Milligrams of creatinine/Kg of body weight
38-40	Milligrams of creatinine/cm of height
41-43	Muscle mass (Kg)
44-46	Muscle mass as % of body weight
47-50	Muscle mass/cm of height
51-80	Blank

Calculations Used To Originate This Information

Data In Columns	Source of Data
16-18	From E09:23-25
19-22	From E08:16-18 x 0.7001*
23-26	From $\frac{(E71\text{-}72\text{-}74) \times (E02:62\text{-}66)}{100}$

Data In Columns	Source of Data
27-30	From (E08:23-26) - (E08:19-22)
31-34	From $\frac{(E08:27-30)}{3}$
35-37	From $\frac{(E08:31-34)}{(E01:36-41)}$
38-40	From $\frac{(E08:31-44)}{(E01:42-44)}$
41-43	From (E08:31-34) x 0.020**
44-46	From $\frac{(E08:41-43) \times 100}{(E01:36-41)}$
47-50	From $\frac{(E08:41-43)}{(E01:42-44)}$

* Amount of creatinine produced by each gram of meat eaten

** Amount of urinary creatinine produced by a Kg of muscle/day

Protocol

Weights of Food Items Eaten By Study Subjects During A Metabolic Balance Point

This information was recorded from work sheets (see attachments) at the Gastrointestinal Section Office. Information on stool and urine output for a given individual during a period of balance was also computed.

Columns	Description
1-15	Identification
16-20	Cooked black beans (grams)
21-22	Boiled egg (grams)
23-25	Meat (grams)
26-29	Tortilla (grams)
30-32	Bread (grams)
33-35	Sweet rolls (grams)
36-38	Rice (grams)
39-41	Cheese (grams)
42-44	Guicoy (grams)
45-47	Guisquil (grams)
48-50	Carrot (grams)
51-53	Consumme (grams)
54-56	Banana (grams)
57-59	Mashed black beans (grams)
60-62	Black bean soup (grams)
63-65	Sugar (grams)
66-69	Total amount of stools (grams)
70-73	Total amount of urine (grams)
74-80	Blank

Metabolic Ward Worksheet

INSTITUTE OF NUTRICION OF CENTRAL AMERICA AND PANAMA
PROGRAM OF NUTRITION AND GASTROINTESTINAL FUNCTION
SUMMARY OF INTAKE

Metabolic Number _____ Balance No. _____

Name _____ Correlative number _____ Date _____

DAY 1				DAY 2				DAY 3				DAY 4			
				Breakfast	S	L	I	Breakfast	S	L	I	Breakfast	S	L	I
				Beans				Beans				Beans			
				Egg				Cheese				Cheese			
				Tortilla				Tortilla				Tortilla			
				Sweet roll				Sweet roll				Sweet roll			
				Coffee				Coffee				Coffee			
				Snack				Snack				Snack			
				Banana				Banana				Banana			
Luch	S	L	I	Lunch				Lunch							
Meat				Meat				Meat							
Rice				Rice				Rice							
Tortilla				Tortilla				Tortilla							
Guisquil				Guisquil				Guisquil							
Guicoy				Guicoy				Guicoy							
Carrot				Carrot				Carrot							
Tomatoe sauce				Tomatoe sauce				Tomatoe sauce							
Lemonade				Lemonade				Lemonade							
Supper				Supper				Supper							
Beans				Beans				Beans							
Cheese				Cheese				Cheese							
Tortilla				Tortilla				Tortilla							
Bread				Bread				Bread							
Sweet roll				Sweet roll				Sweet roll							
Coffee				Coffee				Coffee							

Age _____

Height _____

Initial weight _____

Last weight * _____

* (6am weight of Day 3)

Metabolic Ward Worksheet

DIFFERENT FOODS SERVED DURING MEALS OF A 72 HOURS BALANCE PERIOD

DAY 1		DAY 2		DAY 3		DAY 4	
			BREAKFAST				
		Cooked Beans	160*	Mashed Beans	120	Cooked Beans	160
		Cheese	44	Egg	42	Cheese	44
		Tortilla	124	Tortilla	126	Tortilla	124
		Sweet Bread	17	Sweet Bread	17	Sweet Bread	17
		Coffee	240	Coffee	240	Coffee	240
		Bean Soup	60	Bean Soup	60		60
			SNACK				
		Banana	85	Banana	85	Banana	85
			LUNCH				
Meat	85*	Meat	85	Meat	85		
Chicken Soup	200	Chicken Soup	200	Chicken Soup	200		
Rice	200	Rice	200	Rice	200		
Guisqul	100	Guisquil	100	Guisquil	100		
Carrot	66	Carrot	66	Carrot	66		
Tomato Sauce	55	Tomate Sauce	55	Tomato Sauce	55		
Tortilla	296	Tortilla	296	Tortilla	296		
Lemonade	240	Lemonade	240	Lemonade	240		
			SUPPER				
Cooked Beans	200	Cooked Beans	200	Cooked Beans	200		
Cheese	44	Cheese	44	Cheese	44		
Tortilla	150	Tortilla	150	Tortilla	150		
Bread	45	Bread	45	Bread	45		
Sweet Bread	34	Sweet Bread	34	Sweet Bread	34		
Coffee	240	Coffee	240	Coffee	240		
Bean Soup	60	Bean Soup	60	Bean Soup	60		

Summary Record

Nitrogen Content of Food Items Present in the Total Intake of Study Subjects Per Balance Period

FORM E10

This record was prepared by computer using information from forms E09 and E70. The grams of each food item ingested was multiplied by the Nitrogen content recorded on form E70.

Columns	Description
1-15	Identification
16-20	Nitrogen content of cooked black beans
21-24	Nitrogen content of boiled eggs
25-29	Nitrogen content of meat
30-34	Nitrogen content of tortilla
35-38	Nitrogen content of bread
39-42	Nitrogen content of sweet rolls
43-46	Nitrogen content of rice
47-51	Nitrogen content of cheese
52-55	Nitrogen content of consumme
56-59	Nitrogen content of banana
60-63	Nitrogen content of mashed black beans
64-67	Nitrogen content of black bean soup
68-80	Blank

Summary Record

Nitrogen Balance

FORM E11

This record summarizes all the information related to the nitrogen balance of a given subject. It was prepared by computer using information from forms E08, E10 and E71.

Columns	Description
1-15	Identification
16-19	Total N2 intake/balance
20-23	Total N2 intake/day
24-27	Fecal excretion of N2/balance
28-31	Fecal excretion of N2/day
32-35	Amount of N2 absorbed
36-39	% absorption of N2
40-43	Urinary excretion of N2/Bal
52-55	Urinary excretion of N2/day
48-51	Total excretion of N2/Bal
52-55	Total excretion of N2/day
56-60	Balance of N2/Balance
61-65	N2 Balance/day
66-70	N2 retained/Bal
71-75	% retention of N2
76-80	Blank

Calculations Used To Compute the Information On This Form:

Data In Columns	Source of Data
16-19	From of N2 contents of each food item present in E10
20-23	From $\frac{(E11:16\text{-}19)}{3}$
24-27	From $\frac{(E09:66\text{-}69) \times (E71:49\text{-}53)}{100}$
28-31	From $\frac{(E11:24\text{-}27)}{3}$
32-35	From (E11:16-19) - (E11:24-27)
36-39	From $\frac{(E11:32\text{-}35)}{(E11:16\text{-}19)} \times 100$
40-43	From $\frac{(E71:63\text{-}67) \times (E09:70\text{-}73)}{100}$
52-55	From $\frac{(E11:40\text{-}43)}{3}$
48-51	From (E11:24-27) ÷ (E11:40-43)
52-55	From $\frac{(E11:48\text{-}51)}{3}$
56-60	From (E11:16-19) - (E11:48-51)
61-65	From $\frac{(E11:56\text{-}60)}{3}$
66-70	From (E11:16-19) - (E11:48-51)
71-75	From $\frac{(E11:66\text{-}70)}{(E11:16\text{-}19)} \times 100$

Summary Record

Caloric Content of Food Items Present In the Total Intake of Study Subjects Per Balance Period

FORM E12

This record summarizes the caloric content of each food item that a given subject ate during a balance period. This information was calculated by computer using the data from Forms E09 and E70. The calculation consists of multiplying the grams of each food item recorded on Form E09 by the caloric content reported on Form E70.

Columns	Description
1-15	Identification
16-21	Caloric content of cooked black beans
22-25	Caloric content of boiled eggs
26-30	Caloric content of meat
31-36	Caloric content of tortilla
37-40	Caloric content of bread
41-46	Caloric content of sweet rolls
47-52	Caloric content of rice
53-57	Caloric content of cheese
58-61	Caloric content of consumme
62-66	Caloric content of banana
67-71	Caloric content of mashed black beans
72-75	Caloric content of black bean soup
76-80	Caloric content of sugar

Summary Record

Caloric Balance

FORM E13

This record summarizes all information related to caloric balance. It was prepared by computer using data from forms E09, E12 and E71.

Columns	Description
1-15	Identification
16-22	Total caloric intake/Bal
23-28	Total caloric intake/day
29-34	Fecal excretion of calories/Bal
35-39	Fecal excretion of calories/day
40-45	Amount of calories absorbed/Bal
46-49	% absorption of calories
50-54	Urea present in the Urine/Bal
55-59	Calories-present in the urine/Bal
60-65	Total excretion of calories/Bal
66-70	Total excretion of calories/day
71-76	Amount of calories retained/Bal
77-80	% retention of calories

Calculations Used To Originate Information For This Form:

Data In Columns	Source of Data
16-22	From Caloric contents of food items (E12)
23-28	From $\frac{(E13:16-22)}{3}$

Data In Columns	Source of Data
29-34	From $\frac{(E09:66\text{-}69) \times (E71:54\text{-}58)}{100}$
35-39	From $\frac{(E13:29\text{-}34)}{3}$
40-45	From (E13:16-22) - (E13:29-34)
46-49	From $\frac{(E13:40\text{-}45)}{(E13:16\text{-}22)} \times 100$
50-54	From $\frac{(E71:68\text{-}71) \times (E09:7073)}{100}$
55-59	From (E13:50-54) x 2.598
60-65	From((E13:29-34) + (E13:55-59))
66-70	From $\frac{(E13:60\text{-}65)}{3}$
71-76	From (E13:16-22) - (E13:60-65)
77-80	From $\frac{(E13:71\text{-}76)}{(E13:16\text{-}22)} \times 100$

*Factor used to transform urea into calories.

Summary Record

Caloric Content of Food Items Present In the Total Intake of Study Subjects

FORM E14

This record summarizes the fat content of each food item that a given subject ate during a balance period. This information was calculated by computer using the data from Form E09 and E70. The calculation consists of multiplying the grams of each food item recorded on Form E09 by its fat content reported on Form E70.

Columns	Description
1-15	Identification
16-19	Fat content of cooked black beans
20-22	Fat content of boiled eggs
23-26	Fat content of meat
27-30	Fat content of tortilla
31-34	Fat content of bread
35-38	Fat content of sweet rolls
39-42	Fat content of rice
43-46	Fat content of cheese
47-49	Fat content of consomme
50-52	Fat content of banana
53-56	Fat content of mashed black beans
57-80	Blank

Summary Record

Caloric Balance

FORM E15

This record summarizes all the information related to fat balance. It was prepared by computer using data from Forms E09, E14 and E71.

Columns	Description
1-15	Identification
16-20	Total fat intake/Bal
21-25	Total fat intake/day
26-30	Fecal excretion of fat/Bal
31-34	Fecal excretion of fat/day
35-39	Amount of fat absorbed/Bal
40-43	% absorption of fat
44-80	Blank

Calculations Used To Originate Information For This Form:

Data In Columns	Source of Data
16-20	Frc.. Fat contents of Food items (E14)
21-25	From $\frac{(E15:16\text{-}20)}{3}$
26-30	From $\frac{(E71:59\text{-}62) \times (E09:66\text{-}69)}{100}$
31-34	From $\frac{(E15:26\text{-}30)}{3}$
35-39	From (E15:16-20) - (E15:26-30)
40-43	From $\frac{(E15:35\text{-}39)}{E15:16\text{-}20)} \times 100$

Summary Record

Protein Content of Food Items Ate By Study
Subjects During A Balance Period

FORM E16

This record summarizes the amount of protein in each food item in the rura metabolic diet. It was calculated by computer using information from Form E10.

Columns	Description
1-15	Identification
16-19	Amount of protein present in cooked black beans
20-23	Amount of protein present in boiled eggs
24-27	Amount of protein present in meat
28-32	Amount of protein present in tortilla
33-36	Amount of protein present in bread
37-40	Amount of protein present in sweet rolls
41-44	Amount of protein present in rice
45-48	Amount of protein present in cheese
49-52	Amount of protein present in banana
53-56	Amount of protein present in mashed black beans
57-61	Total intake of protein/Bal
62-66	Total intake of protein/day
67-80	Blank

Calculations used to originate information for this form:

Data From Form E10	Factor Used	Data In Columns
16-20	6.25	16-19
21-24	6.25	20-23
25-29	6.25	24-27
30-34	6.25	28-32
35-38	5.70	33-36
39-42	5.70	37-40
43-46	5.95	41-44
47-51	6.38	45-48
56-59	6.25	49-52
60-63	6.25	53-56
57-61		From (All protein contents of food i
62-66		From $\frac{(E16:57\text{-}61)}{3}$

Summary Record

Fiber Content of Food Items Present In the Total Intake of Study Subjects Per Balance

FORM E17

This record was prepared by computer using information from Form E09. The information on Form E09 was multiplied by a specific factor obtained from INCAP's food table.

Columns	Description
1-15	Identification
16-19	Fiber content of cooked black beans
20-23	Fiber content of tortilla
24-27	Fiber content of bread
28-31	Fiber content of sweet rolls
32-35	Fiber content of rice
36-39	Fiber content of guicoy
40-43	Fiber content of guisquil
44-47	Fiber content of carrot
48-51	Fiber content of banana
52-55	Fiber content of mashed black benas
56-61	Total fiber intake/Bal
62-67	Total fiber intake/day
68-80	Blank

Calculations Used To Originate Information For this Form:

Data From Form E09	Factor Used	Data In Columns
16-20	0.24 x 4.1	16-19
26-29	0.7	20-23
30-32	0.8	24-27
33-35	0.6	28-31
36-38	0.3 x 0.4	32-35
42-44	1.05 x 1.7	36-39
45-47	1.16 x 0.6	40.43
48-50	1.13 x 0.8	44.47
54-56	0.4	48-51
57-59	0.24 x 1.4	52-55
56-61	From (All fiber contents of food items)	
62-67	From $\frac{(E17:56\text{-}61)}{3}$	

Note: Not all the food items present in the rural diet contained fiber. The list above summarizes the factors that were used for these food items, especially vegetables present in the diet.

Summary Record

Cost Of The Calories Present In Each Food Item
In The Total Intake Of Subject Per Balance

FORM E18

Columns	Description
1-15	Identification
16-19	Cost of cooked black beans
20-23	Cost of boiled eggs
24-27	Cost of meat
28-31	Cost of tortilla
32-35	Cost of bread
36-39	Cost of sweet rolls
40-43	Cost of rice
44-47	Cost of cheese
48-51	Cost of banana
52-55	Cost of mashed black beans
56-59	Cost of sugar
60-63	Cost of total intake/Bal
64-67	Cost of total intake/day
68-71	Cost of calories lost through stools/Bal
72-75	Cost of calories lost through stools/day
76-80	Blank

Summary Record

Cost of Protein Content of Each Food Item In the Total Intake of Subjects Per Balance

FORM E19

This record was calculated by computer using information from Forms E09, E16 and E18.

Columns	Description
1-15	Identification
16-19	Cost of cooked black beans
20-23	Cost of boiled eggs
24-27	Cost of meat
28-31	Cost of tortilla
32-35	Cost of bread
36-39	Cost of sweet rolls
40-43	Cost of rice
44-47	Cost of cheese
48-51	Cost of banana
52-55	Cost of mashed black beans
56-59	Cost of total protein intake/Bal
60-63	Cost of total protein intake/day
64-67	Cost of the nitrogen lost through stools/Bal.
68-71	Cost of the nitrogen lost through stools/day.
72-80	Blank

Summary Record

Total Intake and Fecal Excretion During Each Balance Expressed Per KG of Body Weight

FORM E20

The record was calculated by computer using the information from Forms E11, E13, E15, E16 and E05.

Columns	Description
1-15	Identification
16-20	Nitrogen intake/Bal/Kg
21-25	Caloric intake/Bal/Kg
26-29	Fat intake/Bal/Kg
30-34	Protein intake/Bal/Kg
35-39	Nitrogen intake/day/Kg
40-44	Caloric intake/day/Kg
45-48	Fat intake/day/Kg
49-52	Protein intake/day/Kg
53-56	Nitrogen fecal excretion/Bal/Kg
57-60	Caloric fecal excretion/Bal/Kg
61-63	Fecal fat excretion/Bal/Kg
64-67	Nitrogen fecal excretion/day/Kg
68-71	Fecal calorie excretion/day/Kg
72-75	Fecal fat excretion/day/Kg
76-80	Blank

Protocol

Results of Laboratory Analysis of Food Items Used In The Rural Metabolic Diet

FORM E70

Columns	Description
1-3	Form number (E70)
4	Community
5-15	Blank
16-17	Code of food item
18-26	Balance study number in which the food item was used* 18-20 Balance study number 21-23 Balance study number 24-26 Balance study number
27-48	Blank
49-52	% dry matter
53-58	N2 content per 100g of food
59-63	Calorie content per 100 g of food
64-67	Fat content per 100 g of food
68-80	Blank

*Most of the food items were bought in sufficient quantities to feed 24 subjects, 8 in each balance, during consecutive balance periods.

Protocol

Results of Laboratory Analysis of Stools and Urine
FORM E 71

Columns	Description
1-15	Identification
16-17	Code of biological sample (1-stools; 2-urine)
18-21	Total weight of sample/Bal
22-25	Total weight of sample + water (stools)
26	Dilution factor (stools)
27-44	Blank
45-48	% dry matter
49-53	Nitrogen content per 100 g of stools
54-58	Caloric content per 100 g of stools
59-62	Fat content per 100 g of stools
63-67	Nitrogen in 100 ml of urine
68-71	Urea per 100 ml of urine
72-74	Creatinine per 100 ml of urine
75-80	Blank