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LIBERIA NATIONAL NUTRITION SURVEY

(December 4, 1975 to March 25, 1976)

SUBSAMPLE REPORT

Prepared by

The UCLA Nutrition Assessment Unit
Division of Population, Family and International Health
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In Cooperation with

The Ministry of Health and Social Welfare
Republic of Liberia

and

U.S. Agency for International Development

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I. INTRODUCTION

This report presents the methods and results of the subsample selected in the Liberia National Nutrition Survey of 1976. A previous report of the survey described the main sample throughout primarily rural areas of Liberia to assess the prevalence of acute and chronic protein-calorie malnutrition (PCM) and anemia in young children and their mothers.

The prevalence results for children in the prior report are summarized on the following page: for acute PCM 1.6%, chronic PCM 18.0%, underweight 24.0% and arm wasting 10.8%. All prevalence rates, apart from acute PCM, were higher in the more rural areas of the country - and in counties other than Bong and Montserrado. The age group of children with the highest prevalence of all forms of PCM was generally 6-23 months.

The purpose of the subsample was to examine certain conditions believed to be associated with acute or chronic PCM, such as socio-economic status, sanitation, food consumption and health status of the child.

It should be noted that a close association of any condition with nutritional status of the child does not necessarily indicate a causal relationship.

SUMMARY TABLES FROM PREVIOUS REPORT

PERCENT PREVALENCE OF MALNUTRITION ACCORDING TO POPULATION DESCRIBI AND TYPE OF PCM - CHILDREN AGED 0-59 MONTHS.

POPULATION DESCRIBED	Type of PCM: CHRONIC H/A * <90%	ACUTE W/H <80%	UNDER-WEIGHT W/A <80%	ARM WASTING AC/A <82.5%	FAT WASTING FF/A <60%	SAMPLE SIZE
Agricultural Areas [a]	20.2	1.6	25.5	12.0	18.0	2502
Non-Agricultural Areas [a]	12.4	1.5	20.1	7.7	16.9	977
RURAL LIBERIA [a]	18.0	1.6	24.0	10.8	17.7	3479
MONROVIA [b]	8.0	1.5	19.3	9.9	30.5	223
SPECIAL GROUP (LAMCO)	9.0	2.9	13.4	4.2	13.0	285
REFERENCE POPULATION [c]	1.0	1.0	3.0	3.0	3.0	

[a] Weighted values

[b] 0-23 Months

[c] Approximate estimates according to expected distribution

*H/A : Height-for-age W/H : Weight-for-height W/A : Weight-for-age

AC/A : Arm circumference-for-age FF/A : Triceps fatfold-for-age

NUTRITIONAL STATUS-PERCENT PREVALENCE OF MALNUTRITION ACCORDING TO TYPE AND AGE

TYPE OF MALNUTRITION	Age in Months: 0-1 %	2-5 %	6-11 %	12-23 %	24-35 %	36-47 %	48-59 %	TOTAL %
Chronic PCM (H/A)	12.1	7.0	12.5	22.3	21.1	20.5	24.7	100
Acute PCM (W/H)								
Mod-Severe <80%	6.2	1.6	1.9	2.4	0.7	0.4	1.1	100
Mild-Worse <85%	11.5	3.7	6.1	9.8	4.0	2.1	2.8	100
Underweight (W/A)	26.1	17.4	34.8	31.1	20.8	17.4	19.3	100
Arm Wasting (AC/A)	15.0	6.7	18.9	17.9	7.9	3.6	2.8	100
Fat Wasting (FF/A)	27.1	11.0	27.5	31.1	9.4	6.9	7.2	100
TOTAL NUMBER	(111)	(364)	(518)	(894)	(650)	(504)	(344)	(3385)

II. RATIONALE

The subsample consisted of 250 selected from the 3479 rural Liberian children in the main sample. An additional 24 children were excluded from the subsample because they were outside the age limit or their data was incomplete or questionable. The amount of information required limited the number that could be selected for the subsample.

Preliminary trials suggested that the prevalence of acute PCM would be very low and chronic PCM perhaps between 15 and 25 percent for the main survey. A systematic selection for the subsample would result in too few children with acute PCM and perhaps only 50 with chronic PCM out of the 250 total. It was necessary, therefore, to increase the number of children with acute PCM, and to a less extent, chronic PCM, in the subsample far more than would be expected from a random systematic sample.

Information acquired in a cross-sectional survey favors recent events. For those indicators requiring objective criteria or events easily recalled information in this type of survey is more relevant regarding acute rather than chronic PCM. When there is little or no objective criteria, past history data reflecting chronic PCM is dependent on the memory of the person interviewed.

It was therefore anticipated that current attributes relating to poor diet and health would more likely be associated with children having acute rather than chronic PCM when compared with the controls. It should be noted that only the control group (also termed chronic control) in the subsample had normal nutritional status.

III. METHOD OF SUBSAMPLING

At the completion of measuring a child, the team used a table of values for weight-for-height and height-for-age categories and marked the results in the appropriate box on the form. This is illustrated in the questionnaire form.

ANAL-YSIS	WT/ LENGTH/HEIGHT	1☐ Under 80%	2☐ 90-110%	*LGTH/*HT/AGE	3☐ Under 90% 4☐ 90-100%
	FOR SUBSAMPLE SELECTION	CASE A (1+4)	5☐	SUBSAMPLE SELECTED	*For LGTH/HT/AGE must be at least 1 cm from the borderline before selected.
		CASE B (2+3)	6☐	1☐ Yes	
		CONTROL (2+4)	7☐	2☐ No	
		KWASHIORKOR	8☐		
	(70-71)			(72)	

At each site the first child whose measurements satisfied any of the following categories was selected:

1. Less than 80% reference median weight-for-height; 90-100% height-for-age (acute PCM:Case A).

2. 90-110% weight-for-height; under 90% height-for-age (Chronic PCM: Case B).

3. 90-110% weight-for-height; 90-100% height-for-age (Control).

4. Clinical kwashiorkor not belonging to the above PCM categories.

The reference median values were acquired from recent surveys in the USA. These values and the meaning of categories were discussed more fully in the Liberia National Nutrition Survey Report.

The borderline measure of 81-89% weight-for-height was usually a basis of exclusion for the subsample. Children with a weight-for-height of over 110% were excluded as they may have been approaching obesity. Another group not considered had a height-for-age over 100%. A relatively tall child may have a low weight-for-height primarily due to stature rather than weight.

As a result, up to four children could be selected in a single site depending on the number satisfying the above criteria. No more than one child was selected from any one family.

After the first county, the age of the child was generally restricted to six to thirty-six months, as this reduced the variation in age distributio for each category and focused attention on the vulnerable age group.

It was considered more important to compare the association related to PCM rather than to provide a systematic subsample description of the main sample. With the latter choice, a more precise description of the total universe of the survey would have been possible, but enrichment of the numbers of children with acute and chronic PCM as discussed previously could not have been done.

The subsample chosen was random because of the nature of the random start and the direction of the main sample. Teams in general followed instructions to select the first child within the anthropometric categories listed. One team regularly selected the second child rather than the first so that the lengthy subsample procedure would not be too early in the cluster and tend to increase the work at the beginning.

Each subsample form took from 40-60 minutes to complete; each main sample form about 15 minutes. There was an average of about 2 subsample cases for each site. Many sites had no child with in the acute PCM category. The extra time required for the subsample procedure was approximately 20% of the interview time in an individual site. This may be considered too high a price to pay for the added information. No added time relating to logistics was necessary, thus the total extra time was in fact much less than 20%, perhaps 3-5%.

CONSIDERATION OF BIAS

A little over half of all the children selected for the subsample belonged to the first ten children interviewed in the site for the main sample; of these, just under half was the first or second child interviewed in the site. A selection bias may have occurred because of the method of picking the first child in a particular category. It was not considered practical to first enumerate all children within the selected categories, then do a systematic random selection within the site. This would have involved much more traveling and time, as well as the possibility that the child selected was no longer available. A later check indicated that the teams were following instructions, apart from a few exceptions.

The question of bias arises in the method of acquiring information once the nutritional status of the child was known. This possible bias is very difficult to measure and would be influenced more by the information requiring subjective judgment of the interviewer, such as dietary questions.

All teams were aware of this possible bias and hopefully took appropriate steps to minimize the problem.

The questionnaire was presented as simply as possible with sections for comments on extremes of socio-economic status indicators within the family, diet patterns and health. (page 72 and 73).

IV. DESCRIPTION BY CATEGORY

Slight changes of category definition were necessary to improve the efficiency of the analysis and presentation. The criteria used in the selection of these groups are given in Table 1. A new category for borderline chronic PCM (87.5 to 92.5% height-for-age) was introduced to take into account thoses children with height-for-age close to the chronic PCM cut off value of 90% reference median. A few cases of acute PCM (wasting) were added. These were just over the 80% weight-for-height criteria, providing they were no more than 83% weight-for-height and under 80% arm circumference-for-age.

TABLE 1

DESCRIPTION OF SUBSAMPLE CHILDREN BY GROUP AND PCM CATEGORY DEFINITION

GROUP	CATEGORY ACCORDING TO % OF REFERENCE MEDIAN		
	WEIGHT IR HEIGHT	HEIGHT FOR AGE	ARM CIRCUMFERENCE FOR AGE
1. ACUTE PCM (wasting)	< 80% r < 83%	90-110% 90-110%	- and < 80%
*2. CHRONIC PCM (Stunting)	90-110%	< 87.5%	
*3. CONTROL (Normal)	90-110%	> 92.5%	
*4. BORDERLINE CHRONIC PCM	90-110%	87.5-92.5%	

*Grouped in tables as no acute PCM or remainder when compared with acute PCM frequencies.

Table 2 indicates that in almost all instances teams selected the correct nutritional category of the child. The main differences were due to the post survey addition of the borderline chronic PCM group for analysis purposes.

TABLE 2

COMPOSITION OF SUBSAMPLE
ACCORDING TO NUTRITION GROUP AND SELECTION

SURVEY SELECTION CATEGORY	POST-SURVEY ANALYSIS CATEGORY					
	ACUTE PCM	CHRONIC PCM	CHRONIC CONTROL	BORDER-LINE CHRONIC	TOTAL	% OF TOTAL
ACUTE PCM	27	0	0	0	27	11
CLINICAL SEVERE PCM	9	1	0	0	10	4
CHRONIC PCM	4	50	1	25	80	32
CHRONIC CONTROL	2	-	72	24	98	39
RANDOM SELECTION[a]	2	6	19	4	31	12
NOT DEFINED	0	2	2	0	4	2
TOTAL	44	59	94	53	250	100%
% OF TOTAL	17	24	38	21	100%	

[a]Grand Bassa County

Table 3 shows the distribution of these groups in the subsample compared with that in the main sample. The subsample accounts for approximately 80% from the parent sample with regards to children aged 6-36 months. The remaining 20% is accounted for by children with weight-for-height of approximately 83-89% and over 110%; and those in the category for height-for-age over 100% median.

The proportional increase of both acute (4.2) and chronic (3.0) PCM indicates the degree of enrichment gained by the subsample selection.

TABLE 3

PERCENT PREVALENCE ESTIMATES OF MAIN SAMPLE AND SUBSAMPLE ACCORDING TO NUTRITIONAL CATEGORY - CHILDREN AGED 5 TO 36 MONTHS

	MAIN SAMPLE (1)	SUB-SAMPLE (2)	PROPORTION (2) ÷ (1)
ACUTE PCM	4%*	17%	4.2
REMAINDER	76%	83%	1.1
CHRONIC PCM	8%	24%	3.0
CONTROL	50%	21%	0.4
BORDERLINE CHRONIC PCM	18%	38%	2.1
OTHER GROUPS NOT SELECTED	20%	0%	0
TOTAL	100%	100%	1.0
N	(2063)	(236)	

*All Percentages Rounded

METHODS IN ANALYSIS

There were three major methods:

1. Comparison of proportions.

The proportion of children with and without PCM were compared, according to whether they or their family, had (or lacked) a selected attribute relating to socio-economic status (e.g. certain household possessions), health (e.g. presence or absence of fever in the child), diet or other variable. This was done by:

(a) Direct comparison of proportions expressed as percentages.

(b) Indirect comparison of proportions using certain statistical methods: odds ratio, chi square value and P level of significance.*

2. Comparison of the mean or median value of a selected indicator or attribute by nutritional category. This was possible for attributes with a continuous scale, such as number of rooms in household or with a scoring system. The median was selected for certain skewed distributions. Statistical testing using a Student's test for comparison of means or a modified chi square test for comparison of medians were used in indicate significant differences.

3. Case Histories.

These were included to present a more descriptive total picture of the individual children. The selected children with, and without PCM were matched by site.

A further presentation included photographs of the subsample children and mothers, to illustrate the nutritional categories.

*In most tables the percentage proportions by nutritional category were presented and the results of statistical tests where a significant or near significant was obtained.

Example of Methods

In order to clarify a frequent method of analysis in this report, a fuller description is presented in the explanatory Table 4 using the raw data from Table 8, applying to nutritional status in the presence of only one room for the household.

It should be noted that the rest of the group include all children with chronic and borderline chronic PCM and controls. All these children did not have acute PCM as defined by under 80% weight-for-height. Therefore, they are grouped together to compare with children having acute PCM. The main reason for the grouping was to increase available numbers sufficiently for statistical purposes.

In Table 4; a,b,c and d represent the frequencies of subsample children in the various cells; a+c the total number of children with acute PCM and b+d the total remaining children.

The percentage proportions listed in the table consider each of the two nutritional categories to determine what proportion have a single room only in their household. This was preferred to asking the alternate question: that is, of all the households with only one room, what was the percentage contribution of the acute PCM group compared with that for households of more than one room for the same nutritional group.

Although the results should be considered with caution, the percentage prevalence for subsample control children, who represent those with normal nutritional status in the main sample, indicates to some extent a baseline estimate according to the indicator or attribute selected.

Statistical differences by nutritional category rely in this report on the odds ratio and chi square result. The odds ratio* is simply the

*The implications of the odds ratio and prevalence percent estimation in case control studies is discussed in MacMahon, B. and Pugh, T.F. (1970). Epidemiology Principles and Methods, Little, Brown & Company, Boston, pp. 269-273.

the ratio of the cross products of the table cell frequencies (a.d/b.c). An odds ratio of equal/greater than 2.0 or equal/less than 0.5 indicate an important difference between the proportions; the more extreme this ratio the greater the difference. The method for estimation of the standard error of the odds ratio is shown in Table 4. A high standard error range suggest that the frequency of at least one of the cells in the table is low and the precision of the ratio estimate also low. In all tables of the report, the range for the odds ratio is given according to one standard error instead of two.

The odds ratio has the advantage over the direct comparison of percentage prevalences, in that a precision range is included.

The chi square test indicates whether a statistical difference between categories is present, but not the extent of the difference for the total number in the table. In some tables, the odds ratio may be relatively high, but the chi square insignificant because this total number is low. In the example given, it is concluded that there is an important difference which is statistically significant and of a reasonable magnitude. However the differences are not all that dramatic nor large and the problem of imprecision due to small numbers remains. Supporting evidence for an important difference is given in Table 8 comparing the mean values of the number of rooms in the same table. Families of children with acute PCM have a statistically significant less number of rooms in their household than those having a child without acute PCM.

It should be noted that we are dealing purely with associations and not causality; although there seems to be some relationship between this socio-economic status indicator and nutritional status, it does not mean a low number of rooms is responsible, even in part, for acute PCM.

TABLE 4

EXAMPLE C: ANALYTIC METHODS

FREQUENCY OF SUBSAMPLE CHILDREN
ACCORDING TO SINGLE ROOM HOUSEHOLD AND NUTRITIONAL CATEGORY

HOUSEHOLD	ACUTE PCM	REST OF GROUP	TOTAL
ONE ROOM ONLY	15 (a)	40 (b)	55 (a+b)
MORE THAN ONE ROOM	29 (c)	158 (d)	187 (c+d)
TOTAL	44 (a+c)	198 (b+d)	242 (N)

Proportion of Acute PCM with one room HH = $\frac{a}{a+c} = \frac{15}{44} = 34.1\%$

Proportion of Rest of Group with one room HH = $\frac{b}{b+d} = \frac{40}{198} = 20.2\%$

Odds Ratio (OR) = $\frac{a \cdot d}{b \cdot c} = \frac{15 \times 158}{20 \times 40} = 2.04$

Standard Error (S.E.) of Odds Ratio = $O.R.\sqrt{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}} = 0.74$

Odds Ratio +/- 95% confidence interval range = 2.04 +/- 2 x 0.74

Chi Square = $\frac{(ad - bc)^2 \; N}{(a+b)(c+d)(a+c)(b+d)} = 3.95$

P Value < 0.05

There is a statistically significant difference at the 0.05 level of probability.

V. RESULTS

A. Age Distribution

Almost 70% of the subsample comprised children 5-24 months of age (Table 5).

There were proportionally more children in the acute PCM and the control group and less in the chronic group at 5-18 months of age than over 25 months. Comparisons between groups embracing the full age range 5-57 months may have to take this into account. The confounding influence of age may be important for certain indicators, such as diet and health. Where relevant, reference was given to comparisons at different age ranges as well as the total subsample bearing in mind limitations of lesser numbers.

B. Sex Distribution

In the overall subsample 51% were males. There were slightly more males in the traditional agricultural areas and more females in the non-agricultural (more urbanized) rural areas (Table 6). The sex distribution was similar in children aged 5-24 months and 25-36 months, but not in the small group of 15 children over 37 months of age.

C. Nutritional Category By County

Table 7 shows the distribution of subsample children age 5-57 months according to county by type of PCM.

It should be noted that the percentage of the total, by county according to sample size, was similar to that of the main sample. The distribution of

TABLE 5

COMPOSITION OF SUBSAMPLE PERCENTAGE AGE DISTRIBUTION
ACCORDING TO NUTRITIONAL GROUP

NUTRITIONAL CATEGORY	AGE IN MONTHS 5-12	13-18	19-24	25-36	37-57	Number	%
Acute PCM	24	25	15	10	(8)	44	18
Remainder	76	75	85	90	(92)	206	82
Chronic PCM	8	11	30	38	(57)	59	23
Borderline Chronic	24	21	22	35	(21)	53	21
Chronic Control	44	43	33	17	(14)	94	38
TOTAL	100%	100%	100%	100%	100%		100%
Number	66	53	54	63	14	250	
%	26%	21%	22%	25%	6%	100%	

TABLE 6

COMPOSITION OF SUBSAMPLE PERCENT
AGE AND SEX DISTRIBUTION BY ECOLOGICAL AREA

AREA AND SEX		AGE (MONTHS) -24	25-36	37- 57	TOTAL
TRADITIONAL AGRICULTURE					
	MALE	55%	56%	(33%)	54%
	FEMALE	45%	44%	(67%)	46%
	TOTAL (n)	127	45	(12)	184
NON-TRADITIONAL AGRICULTURE					
	MALE	45%	48%	(0)	44%
	FEMALE	55%	52%	(100%)	56%
	TOTAL (n)	42	21	(3)	66
TOTAL SUBSAMPLE					
	MALE	53%	53%	(27%)	51%
	FEMALE	47%	47%	(73%)	49%
	TOTAL (n)	169	66	(15)	250

DISTRIBUTION OF SUBSAMPLE CHILDREN AGED 5-57 MONTHS
ACCORDING TO COUNTY AND AREA BY NUTRITIONAL CATEGORY

COUNTY	NUTRITIONAL CATEGORY ACUTE	CHR.	CON-TROL	BORDER-LINE CHRONIC	SUB-SAMPLE SIZE	% OF TOTAL	SAMPLE SIZE % OF TOTAL
BONG	7	11	15	7	40	16.0	19.7
GRAND BASSA	2	5	19	7	33	13.2	10.0
CAPE MOUNT	3	4	4	3	14	5.6	5.7
GRAND GEDEH	0	3	3	3	9	3.6	5.6
LOFA	8	6	8	9	31	12.4	11.0
MARYLAND	5	5	7	3	20	8.0	7.2
MONTSERRADO	8	13	22	7	50	20.0	18.6
NIMBA	9	7	12	9	37	14.8	16.5
SINOE	2	5	4	5	16	6.4	5.7
TOTAL	44	59	94	53	250	100 %	100 %
COUNTY GROUPING							
BONG & MONTSERRADO	17%	27%	40%	16%	100% (90)	36.0%	38.3%
REST	18%	22%	36%	24%	100% (160)	64.0%	61.7%
AREA							
TRADITIONAL AGRICULTURAL	20%	25%	33%	22%	100% (183)	73.2%	71.9%
NON-TRADIT. AGRICULTURAL*	12%	21%	51%	16%	100% (67)	26.8%	28.1%

*More densely populated rural areas.

type of PCM varied somewhat from county to county. In Grand Bassa for example, the number of controls were relatively greater because of the different method of selection in that county.

Bong and Montserrado contribute over one-third the sample size, both in the sample and subsample. These counties are of particular interest due to their lesser prevalence of chronic PCM in the main report.

The more agricultural areas in the subsample have proportionally more children with acute PCM and less controls than "non-agricultural" areas (more densely populated rural sites).

D. Socio-Economic Status Indicators

Because of the difficulty of inquiring about wages earned or other monies acquired due to the sensitivity of the question (such as relative to taxes), a rather broad array of socio-economic status (SES) indicators was selected using advice chiefly from the Ministry of Planning and Economic Affairs and sociologists at the University of Liberia. The basic problem was to attach some overall reckoning or score to SES.

This obviously has different implications in urban and rural areas and perhaps in different parts of the country. A further problem was the validity of the information that could be acquired in a relatively short period of time. Accordingly, an attempt was made to look at material wealth or poverty in relation to the household structure, ownership and number of rooms; types and number of possessions and animals. The definitions of the house indicators followed those from the Enumerator's Handbook of the 1974 Census of Population and Housing. For example, a permanent structure was one that would be expected to maintain its structural stability for ten years or more being built of solid

material. The number of rooms would relate only to the household being described, not to another household within the total structure.

1. Household Structure

Table 8 shows only a slight difference between acute and non-acute PCM according to a non-permanent structure. The difference is statistically significant comparing acute PCM and controls (normals). Only 4% of the total subsample had a temporary structure.

Greater differences are seen according to the number of rooms in the structure; this has already been discussed in more detail (Table 4).

TABLE 8

PREVALENCE PERCENTAGE OF PCM AND CONTROLS ACCORDING TO HOUSEHOLD STRUCTURE OF THEIR FAMILIES

	STRUCTURE NOT PERMANENT	ONLY ONE ROOM	MORE THAN FOUR ROOMS
ACUTE PCM	68.2%	34.1%	11.4%
NON-ACUTE PCM	53.9%	20.2%	23.2%
Odds Ratio	1.82+/-0.64	2.04+/-0.74	0.42+/-0.21
Chi Square	3.01	3.95	3.05
P	>0.05	< 0.05	70.05
CHRONIC PCM	52.4%	19.6%	23.2%
CHRONIC CONTROL	50.0%	19.8%	26.4%
Odds Ratio			
Chi Square			
P			

MEAN VALUES OF NUMBER OF ROOMS IN HOUSEHOLD STRUCTURE ACCORDING TO TYPE OF PCM OF THE CHILD

ACUTE PCM	2.72
NON-ACUTE PCM	3.34
P	< 0.05
CHRONIC PCM	3.41
CHRONIC CONTROL	3.34

Conclusion: Acute PCM in the child is associated with households containing less rooms.

No important differences were found according to nutritional category by ownership or employment. Of all the households approximately 65% owned their own house, 25% were rent free, about 10% were rented and only 2% owned another house. Approximately 15% of the total subsample employed others at some time. Interpretation of this was difficult because the method and payment of employment varied greatly.

2. Possessions (Table 9)

Teams were instructed to observe where possible, in the most discrete way, the possessions of the families interviewed. In the great majority of cases, the number of each possession was indicated. In those instances where the exact number was not known, but the block was marked, the final assigned number was the median number for that particular possession for the subsample nutritional group. Table 9 shows just how little difference there was in material possessions in the household according to nutritional category of the child, when individual possessions were considered. Only in the absence of large cooking pots or tables was there a slight difference between acute and non-acute PCM proportions. Other possessions were not listed in this table because of their infrequency. They are included in Table 10 and in the scoring for SES presented later.

Owning these more expensive items may be considered an index of wealth. They are fairly equally distributed throughout the nutritional groups. The frequency in most instances is so low that valid comparisons are not possible.

3. Possession of Animals

Table 11 shows there are important differences according to acute PCM and lack of animals in the household. It should be noted that this pertains to the more rural areas of the country. The reason for including this group

TABLE 9

PREVALENCE PERCENTAGE OF PCM AND CONTROLS IN FAMILIES LACKING CERTAIN POSSESSIONS

	NO RADIOS	NO LARGE COOKING POTS	NO WOODEN BEDS	NO SPRING BEDS	NO TABLES	NO CHAIRS
ACUTE PCM NON-ACUTE PCM	56.8% 57.3%	22.7% 12.4%	36.4% 35.6%	70.5% 61.2%	38.6% 22.8%	23.8% 23.2%
Odds Ratio Chi Square P		2.07+/-0.87 3.11 >0.05			2.10+/-0.74 4.64 <0.05	
CHRONIC PCM CHRONIC CONTROL	62.7% 53.2%	8.5% 15.6%	35.6% 34.0%	67.8% 57.4%	23.7% 22.3%	25.9% 21.2%
Odds Ratio Chi Square P		0.50+/-0.27 1.61 >0.05				

Conclusion: The presence of acute PCM in the subsample child is associated with a lack of large cooking pots or tables within the child's family. This does not pertain to chronic PCM.

MEAN VALUES OF CERTAIN POSSESSIONS IN FAMILIES ACCORDING TO TYPE OF PCM OF THE CHILD

	RADIOS	NO LARGE COOKING POTS	WOODEN BEDS	SPRING BEDS	TABLES	CHAIRS
ACUTE PCM NON-ACUTE PCM	0.50 0.45	2.07 2.18	1.13 1.14	0.43 0.66	1.14 1.55	2.19 2.25
P					<0.05	
CHRONIC PCM CHRONIC CONTROLS	0.39 0.47	2.12 2.10	0.97 1.12	0.51 0.77	1.53 1.79	1.91 2.36
P						

Conclusion: The only statistically significant association between the mean number of family possessions and PCM of the child is shown by number of tables and acute PCM.

TABLE 10

PERCENTAGE NUMBER OF HOUSEHOLDS OWNING POSSESSIONS
ACCORDING TO NUTRITIONAL CATEGORY OF CHILD

	ACUTE PCM	NO ACUTE PCM	CHRONIC PCM	CHRONIC CONTROL
Television	0	1.4	0	1.0
Air Conditioner	0	1.4	0	1.0
Washing Machine	0	1.4	0	1.0
Refrigerator	0	3.4	1.7	5.3
Sewing Machine	6.8	3.7	8.5	8.5
Stove (Gas, Electric)	2.3	1.5	0	2.1
Stove (Kerosene)	0	2.9	3.4	2.1
Electricity	4.5	5.3	1.7	7.4
Car (Running)	2.3	0.5	0	0
Motor Bike	0	0	0	0
Bicycle	2.3	1.0	0	2.1
Mechanized Farm Equipment	2.3	1.5	1.7	1.0
ANY OF ABOVE (excluding electricity) All areas	11.4	2.6	13.6	14.6
Traditional Agric. only	11.1	0.9	13.3	13.3
Other areas	12.5	6.9	14.3	17.6
ANY OF ABOVE (Excl. elec. or sewing machine) All areas	2.3	7.1	6.8	8.5
Traditional Agric. only	2.8	2.7	6.7	6.7
Other areas	0	11.9	7.1	11.8

TABLE 11

PREVALENCE PERCENTAGE OF PCM AND CONTROLS IN FAMILIES LACKING ANIMALS

TRADITIONAL AGRICULTURAL AREAS

	NO COWS SHEEP GOATS ETC.	NO POULTRY DUCKS	NO ANIMALS WHATSOEVER	NUMBER IN SUBSAMPLE
AC PCM	76.5%	52.9%	50.0%	34
REMAINDER	61.9%	31.3%	27.2%	134
Odds Ratio	2.00+/-0.88	2.46+/-0.96	2.68+/-1.02	
Chi Square	2.53	5.51	6.94	
p	>0.05	<0.05	<0.01	
CHRONIC PCM	65.7%	27.0%	26.7%	37
CONTROLS	63.5%	34.5%	30.0%	58

Conclusions: The presence of acute PCM in the subsample child is associated with a lack of animals in the family living in more rural areas. This does not pertain to chronic PCM.

alone was to improve the specificity of the evaluation. It is not clear whether this was purely an association relating to socio-economic status or other variables, or whether in fact, the presence of animals in the household contributed per se to less acute PCM of the young child.

E. Sanitation

The only difference in the more rural areas concerned the source of water. There was relatively a higher prevalence of chronic PCM than controls in families not acquiring their water from a well or tap (Table 12).

It is interesting to note that only approximately 15-20% of households gather their water more than 5 minutes away and less than 2% of the total subsample had to travel more than half an hour to acquire water. In all groups, it was rare for drinking water to be boiled.

When all rural areas were considered, there were no important differences in sanitation indicators.

TABLE 12

PREVALENCE PERCENTAGE OF PCM AND CONTROLS IN FAMILIES ACCORDING TO SANITATION FEATURES

TRADITIONAL AGRICULTURAL AREAS

	SOURCE WATER RIVER/STREAM	DIST. AWAY MORE THAN 5 MINUTES	DRINKING WATER UNBOILED	NO LATRINE	NUMBER IN SUBSAMPLE
ACUTE PCM	74.3%	14.3%	94.3%	65.7%	35
REMAINDER	66.9%	19.8%	91.9%	60.3%	136
CHRONIC	78.9%	15.8%	94.7%	63.2%	38
CHRONIC CONTROL	60.3%	24.1%	91.4%	51.7%	58
Odds Ratio	2.50+/-1.20				
Chi Square	3.63				
P	<0.05				

Conclusion: The presence of chronic PCM in the subsample child is weakly associated with the family acquiring water from a river or stream rather than a well or tap.

F. SCORING FOR SOCIO ECONOMIC AND SANITATION INDICATORS

The actual scores allocated to various indicators already discussed are included in the questionnaire form. The basis of the scoring was primarily related to the level of importance of the indicator and its component and the frequency in the population subsample. At times, this was relatively straightforward; for example, a family which owned a refrigerator, car or mechanised farming equipment would receive a high score for these items. On the other hand, the lack of a table or chair within the household would be considered an indication of poverty and in this survey allocated a negative score. Problems of scoring arise; for example, according to ownership of the house. On the one hand, a rented house may be associated by a slightly better off family, because they can afford to pay the rent; whereas an owned house may be purely owned by tradition and the family be very poor, or be purchased by a relatively large sum of money. The same difficulty arises where the buying and selling of rice was concerned. A household may be better off because there is no need to purchase rice or worse off when they cannot afford to purchase even though there was a need.

Comments made by the teams on the forms helped to validate the scoring. This was of particular value when extremes of socio economic status were identified.

Table 13 shows consistently higher socio economic and water/sanitation scores in households having a control (normal) child compared with the other groups.

A modified chi square test for comparing median values, however, showed no significant difference between the groups. It is likely, therefore, that the differences, although consistent, are not marked.

TABLE 13

MEDIAN AND DISTRIBUTION OF SCORES FOR SOCIO ECONOMIC AND SANITATION INDICATORS BY NUTRITIONAL CATEGORY OF CHILD

INDICATOR	CENTILE	CATEGORY: ACUTE PCM	REMAINDER	CHRONIC PCM	BORDERLINE CHR. PCM	CONTROL	RANGE OF SCOR
STATE OF HOUSE							1 to 20
	25th	6.8	8.2	8.4	7.7	8.2	
	50th	10.0	10.5	10.5	10.5	10.6	
	75th	11.8	15.4	12.1	15.5	16.1	
POSSESSIONS							-15 to 240
	25th	-4.7	-1.1	-2.5	-2.0	0.0	
	50th	5.5	9.5	6.1	9.8	11.3	
	75th	14.8	29.0	27.4	19.8	29.0	
SOCIO ECONOMIC AGGREGATE							-10 to 274
	25th	6.2	13.8	11.2	15.0	15.5	
	50th	17.8	26.5	22.5	25.8	29.0	
	75th	35.5	40.2	38.0	39.3	45.5	
WATER/ SANITATION							3 to 45
	25th	8.8	9.2	9.6	8.1	9.6	
	50th	12.5	17.4	17.5	12.5	19.4	
	75th	25.0	27.2	26.0	23.8	29.2	

G. Agricultural Indicators

About 75% of households interviewed in the subsample farmed on their own or tenured land; about the same proportion had a crop growing either on their land or within the area of their household. Although the proportion within each nutritional category was similar for farming and crop, a cash crop appeared more commonly in families having a child with chronic PCM than the controls. (Table 14).

It should be noted that almost all agricultural information was acquired by direct questioning of usually the mother. Results, therefore, must be taken with due caution. Information was acquired for the past year's duration, so that the memory of the respondent had to be relied on. One would expect that if there were differences for the agricultural indicator selected, these would relate more to the chronic PCM category rather than the acute. Cash crop may have included rubber, coffee, and sugar cane for distilling; whereas non cash products other than stapled, included certain vegetables and fruits.

The broad nature of the agricultural features were used to simplify the information as much as possible. It was obvious, that specific agricultural information regarding varieties of crops and amounts, was not possible in this type of survey. It was anticipated, however, that correlations with nutritional category of the child may be possible, at least to a limited degree.

Table 15 shows the diversity of crops grown by the households interviewed. The most striking results concern the presence of cash and non-cash crops with chronic PCM in the child. In all nutritional categories, 30-35% of the households who had a crop, grew rice and/or cassava only.

A lesser number of households having a child with acute PCM, purchased rice than those with normal child (odds ratio 0.40 +/- 0.19; chi square 3.89;

TABLE 14

PREVALENCE PERCENTAGE OF AGRICULTURAL INDICATORS
ACCORDING TO NUTRITIONAL CATEGORY

	LAND MAKE FARM	ANY CROP	CASH* CROP
ACUTE PCM	76.7	84.1	37.8
REMAINDER	77.0	77.7	39.4
CHRONIC PCM	76.0	71.3	51.1
CHRONIC CONTROL	70.0	76.3	34.3
Odds Ratio			2.00+/-0.79
Chi Square			4.47
P			<0.05

*As a proportion for those with any crop.

Conclusion: There is no association by nutritional category of the child regarding the proportion of families with a farm or crop. More families of children with chronic PCM have a cash crop compared with normal (control) children.

TABLE 15

PREVALENCE PERCENT* OF CROP DIVERSITY OF HOUSEHOLDS
ACCORDING TO NUTRITIONAL CATEGORY OF CHILD

CROP	ACUTE PCM	REMAINDER	CHRONIC PCM	CONTROL
Rice Only	2.7	13.1	8.9	11.9
Cassava Only	8.1	3.1	2.2	3.0
Non-Cash Only	0	1.3	0	1.5
Cash Only	2.7	3.1	4.4	4.5
Rice & Cassava Only	18.9	19.4	22.2	19.4
Rice +/or Cassava + Cash	29.7	21.3	31.1	17.9
Rice +/or Cassava + Non-Cash	32.5	23.7	15.6	29.9
Rice +/or Cassava + Cash + Non-Cash	5.4	15.0	15.6	11.9
TOTAL	100%	100%	100%	100%
n	37	160	45	67
Rice Any	78.4%	83.8%	84.4%	77.6%
Cassava Any	64.9%	61.3%	55.6%	65.7%
Cash Any	37.8%	39.4%	51.1%	34.3%
Non-Cash Any	37.8%	40.0%	31.1%	43.3%

*Percentage of Households producing a crop.

$P < 0.05$) or in the other non-acute groups. There was no difference within the chronic PCM groups compared with controls. (Table 16).

Any associated information in the above results did not necessarily mean a causal effect. It simply indicated an association, which may not be apparent if more precise agricultural information was available, or which may be due to other factors associated with the sale of crops.

TABLE 16

PREVALENCE PERCENTAGE OF HOUSEHOLDS WHO MAKE FARM BUYING/SELLING RICE ACCORDING TO NUTRITIONAL CATEGORY OF CHILD

RICE	ACUTE PCM	REMAINDER	CHRONIC PCM	CONTROL
Buy and Sell	3.3	7.2	5.9	8.3
Buy Only	26.7	38.4	44.1	43.3
Sell Only	20.0	15.2	11.8	15.0
Neither Buy nor Sell	50.0	39.1	38.2	33.3
TOTAL	100%	100%	100%	100%
N	30	138	34	60
Buy (TOTAL)	30.0	45.6	50.0	51.6
Sell(TOTAL)	23.3	22.4	17.7	23.3

H. FOOD INTAKE

Food intake information for each child in the subsample took 15-20 minutes. This included a 24 hour recall from the mother regarding intake frequency of milk, staple, leafy vegetables, any fruit and palm oil. A distinction was made between weaning foods and those shared with the family. In the few instances when both methods were used for a child the total frequency in the analysis was derived by summing the two, unless otherwise stated.

There was no reliable method for the frequency of breast feeding, thus results were categorized according to whether fully breast fed (i.e. regularly throughout the day), partially or not breast fed.

In ten instances (4% of the subsample) the interviewer indicated that food intake information was unavailable or unreliable; these were excluded from the analysis. Five additional children were not receiving their usual type of food at the time of interview-these were also excluded. Four of these five children had acute PCM.

Depending on the food in question, in 5-10% of the subsample, the actual frequency of intake was uncertain, although it was known the child had consumed that particular food during the past 24 hours. In the analysis the frequency was assigned to the median frequency for the age and nutritional group the child belonged.

High protein foods were considered a little differently. A three day recall was used for both the family intake and that of the child. The period would be less likely to miss the intakes of foods consumed irregularly and yet still be within the memory range of the responder. The purpose of including

family intake frequency of high protein foods was to derive an index of food availability and use by the family compared with that actually received by the child.

The food frequency methods have the advantage of brevity and are within the capabilities of recall of the respondent. The actual quantities of foods consumed were not known and whether frequency was related to amounts, even of a broad nature, cannot be assumed. Added to this were the actual problems of reliability with the 24 hour and 3 day recall methods.

The question pertaining to whether a particular food was consumed by a child was probably more reliable than actual intake frequencies and would indicate any broad dietary problems.

1. Breast Feeding

Approximately 25% of the total subsample from 5-18 months of age were not receiving breast milk (Table 17). It appeared that significantly less numbers of children with chronic and borderline chronic PCM (combined in this table to increase their number) were fully breast fed than the controls. For those children fully breast fed, there was no difference by nutritional category in this study whether they received added food or not.

Of all those children not receiving breast milk, 6/28 (21%) received some other milk; the numbers are too small to compare categories.

2. Type of Feeding

Food specially prepared for the child was almost invariably pounded rice or less often cassava; at times with palm oil added. The staple was given once to thrice daily. In only 12% of cases was any further food item included as specially prepared; as a leafy vegetable or animal protein. The low proportion may have been in part due to underreporting.

TABLE 17

PERCENT PREVALENCE BREAST FEEDING
ACCORDING TO NUTRITIONAL CATEGORY
CHILDREN 5-18 MONTHS OF AGE

BREAST FEEDIN	CUTE PCM	REMAINDER	CHRONIC AND BL CHRONIC PCM	CONTROL
No	29%	21%	27%	17%
Partial	10%(L)	23%	54%(G)	26%
Full	61%	56%	19%(L)	57%
TOTAL	00%	100%	100%	100%
n	31)	(91)	(37)	(54)
FULLY BREAST FED				
With other food	79%	80%	80%	87%
No other food	21%	20%.	20%	13%
	(19)	(51)	(20)	(31)

(G) Significantly greater than control group
(L) Significantly less than control group

TABLE 18

PERCENT PREVALENCE
TYPE OF FEEDING ACCORDING
TO NUTRITIONAL CATEGORY
CHILDREN 5-11 MONTHS OLD

TYPE OF FEEDING	ACUTE PCM	REMAINDER	CHR. AND BORDERLINE PCM	CONTROL
Specially prepared	33%	34%	21%	41%
Food shared with family	56%	52%	64%	50%
Breast milk only	11%	10%	12%	6%
Non-breast milk only	0%	4%	3%	3%
TOTAL	100%	100%	100%	100%
n	(18)	(58)	(33)	(32)

Staple foods were specially prepared for children aged 5-11 months in 21-41% of the subsample children depending on the nutritional category (Table 18). This was significantly greater in controls (normal nutritional status) than chronic and borderline chronic PCM children. From 12-18 months only 8% of the total subsample received any special food, the rest being shared with the family food.

The results suggest that some children may not receive specially prepared food at any time or the duration before family food is shared is only a month or two.

3. Consumption of certain foods.

(a) Staples, leafy vegetables, fruit and palm oil.

It was important to consider whether the subsample child had received any of these foods over the past 24 hours. In Table 19, it is evident that less children with acute PCM received a tuber (such as cassava) or leafy vegetable than the controls; in addition less children with borderline or chronic PCM received any of the listed foods apart from fruit and palm oil, than the controls.

Table 20 stratifies the groups by age category. For both the acute and chronic PCM groups the less number of children eating cereals than controls is confined to the 5-18 month age group; also about 25% with PCM were not taking milk as against 10% of the controls of this age.

In the younger age group were 13 children with a current infection as shown by a temperature over 38° C. Even though proportionally most of these children had acute or chronic PCM, 85% of these children

TABLE 19

PREVALENCE PERCENT INTAKE OF CERTAIN FOODS
BY NUTRITIONAL CATEGORY OF SUBSAMPLE CHILD
5-36 MONTHS

FOOD	ACUTE PCM	BORDERLINE CHR. PCM	CHR. PCM	CONTROL
Milk (breast or other)	57	57	45*	66
Cereal	88	84*	87	93
Tuber	12*	31	19*	34
Cereal and tuber	12*	24	15*	30
Leafy vegetables	27*	37*	45	54
Fruit	22	18	17	20
Palm oil	73	61	70	69
TOTAL SUBSAMPLE SIZE	(41)	(49)	(47)	(87)

*Significantly less than the control group by percentage difference and odds ratio and/or chi square test.

TABLE 20

PREVALENCE PERCENT INTAKE OF CERTAIN FOODS BY AGE GROUP AND NUTRITIONAL CATEGORY OF SUBSAMPLE CHILD

	5-18 months			19-36 months		
FOOD	ACUTE PCM	BORDERLINE & CHR. PCM	CONTROL	ACUTE PCM	BORDERLINE & CHR. PCM	CONTROL
Milk (breast or other)	74*	76*	89	15*	36	31
Cereal	85*	78*	92	93	92	94
Tuber	11*	19	23	14*	29*	51
Cereal and tuber	11*	19	21	14*	20*	43
Leafy vegetable	18*	27*	46	43*	49	66
Fruit	22	14	23	21	20	14
Palm oil	67	41	56	86	80	89
TOTAL	(27)	(37)	(52)	(14)	(59)	(35)

TABLE 21

PREVALENCE PERCENT INTAKE OF CERTAIN FOODS BY ECOLOGICAL AREA AND NUTRITIONAL CATEGORY OF SUBSAMPLE CHILD

	Traditional Agricultural Areas			Non-Traditional Agricultural Areas		
FOOD	ACUTE PCM	BORDERLINE & CHR. PCM	CONTROL	ACUTE PCM	BORDERLINE & CHR. PCM	CONTROL
Milk (Breast or other)	58	55	70	-	38*	61
Cereal	85*	88*	96	-	80	88
Tuber	9*	25	38	-	20	29
Cereal and tuber	9*	21	34	-	15	23
Leafy vegetable	27*	39	51	-	45	59
Fruit	12*	20	23	-	5	15
Palm oil	67	59*	75	-	50	59
TOTAL	(33)	(75)	(53)	(8)[a]	(20)	(34)

*Significantly less than the control group by percentage difference, and odds ratio and/or chi square test.

[a]Number too small to warrant percentages.

were still consuming cereals at the time. This suggests that at least some food intake of staples continues although the amounts may be less during an infection.

As expected, in the age group 19-36 months, more children consumed most of the foods listed; even so, not even half the children with PCM had any leafy vegetable.

All the differences in intake by nutritional category are apparent in the more agricultural areas (Table 21). In the more densely populated rural areas, the children belonging to the chronic PCM groups are slightly but persistently less in number eating the different foods. An exception is milk where there is a clear statistical association.

(b) High protein foods other than milk.

The percent prevalence intake of meat, fish and any high protein food was significantly less in both the acute and chronic PCM child groups when compared with the controls for children 5-18 months but not in general for those 19-36 months (Tables 22 and 23). Differences in family prevalence intake for these foods were less common.

More striking in children (5-18 months) of all nutritional categories was the difference in child prevalence intake and that of the family. This is shown by the percentage difference in the main table and the "child/family" ratio.

TABLE 22

PERCENT PREVALENCE INTAKE HIGH PROTEIN FOODS (EXCLUDING MILK) BY CHILD AND FAMILY ACCORDING TO CHILD NUTRITIONAL CATEGORY - 3 DAY RECALL

(CHILDREN 5-18 MONTHS)

FOOD	ACUTE PCM	B'LINE AND CHR. PCM	CONTROL
MEAT			
Child	28	18*	35
Family	38	37*	54
FISH			
Child	38	45	54
Family	86	74	89
POULTRY			
Child	14	5	6
Family	17	5	6
EGGS			
Child	3	2	11
Family	7	5	7
LEGUMES			
Child	10	13	15
Family	20	26	15
ANY HIGH PROTEIN FOOD			
Child	55	45*	65
Family	100	92	98
FISH ALONE AS HIGH PROTEIN FOOD			
Child	21	18	17
Family	34	32	31
n	(29)	(38)	(54)
CHILD/FAMILY RATIO			
MEAT	73%	49%	66%
FISH	44%	61%	60%
ANY HIGH PROTEIN FOOD	55%	49%	66%
FISH ALONE	62%	58%	53%

Significantly less than control group

Significant difference between child and family intake prevalence

TABLE 23

PERCENT PREVALENCE INTAKE HIGH PROTEIN FOODS (EXCLUDING MILK) BY CHILD AND FAMILY ACCORDING TO CHILD NUTRITIONAL CATEGORY - 3 DAY RECALL

(CHILDREN 19-36 MONTHS)

FOOD	ACUTE PCM	B'LINE AND CHR. PCM	CONTROL
MEAT			
Child	35	41	29
Family	35	43	29
FISH			
Child	79	78	84
Family	86	84	90
POULTRY			
Child	7	6	3
Family	7	6	3
EGGS			
Child	0	2	8
Family	0	2	[illegible]
LEGUMES			
Child	7*	13	18
Family	7*	13	21
ANY HIGH PROTEIN FOOD			
Child	80*	92	97
Family	93	99	97
FISH ALONE AS HIGH PROTEIN FOOD			
Child	47	30	53
Family	67	37	53
	(14)	63	(38)
CHILD/FAMILY RATIO			
MEAT	100%	95	100%
FISH	92%	93%	93%
ANY HIGH PROTEIN FOOD	86%	93%	100%
FISH ALONE	70%	81%	100%

* Significantly less than control group

_ Significant difference between child and family intake prevalence

The child/family ratio simply indicates the proportion of children who receive a certain food that the family itself is eating for the duration of the recall. For example in Table 22, almost all the families in the acute, chronic and control groups received some form of high protein food over the past three days (in 100%, 92% and 98% of families respectively); but the sub-sample child belonging to these families received far less (55%, 45% and 65%). The child/family ratio for any high protein food is approximately 50% for the PCM groups and 66% for the controls. This suggests that such foods are available for the child but not actually given.

It was not possible in this survey to determine the reasons for the differences, although such differences are much more apparent in the 5-18 month age group than those from 19-36 months. A few reasons were given by the mothers and include ill health, vomiting of food, insufficient teeth to chew and certain taboos. It is likely that the actual reasons are multiple and complex.

The section on fish alone as a high protein food is included to indicate the reliance on fish. The percent prevalence is based on the whole group. For example, 21% of the 5-18 month old child acute PCM group consumed only fish; the proportion of fish to any high protein food consumed (not tabulated) was however 21/55 i.e. 38%. Such a proportion varies from 30-60% depending on nutritional category and age group. One important reason for fish prominence is probably the timing of the survey, when local fishing activities were relatively high compared with the rest of the year.

The low prevalence of poultry, egg and legume intake was particularly striking throughout both age groups, all nutritional categories and in the families as well as the child. This suggests that low child intake cannot simply be a problem of taboos involving the child.

TABLE 24

PERCENT PREVALENCE INTAKE OF HIGH PROTEIN FOODS (EXCLUDING MILK) BY CHILD AND FAMILY ACCORDING TO ECOLOGICAL AREA

	TRADITIONAL AGRICULTURAL			NON-TRADITIONAL AGRICULTURAL	
FOOD	ACUTE PCM	B'LINE AND CHR. PCM	CONTROL	B'LINE AND CHR.PCM	CONTROL
MEAT					
Child	31	35	36	26	26
Family	40	42	45	35	41
FISH					
Child	46	61	62	78	74
Family	86	76	83	96	100
POULTRY					
Child	11	3	5	9	3
Family	14	3	5	9	3
EGGS					
Child	3	1	5	4	18
Family	6	1	3	9	12
LEGUMES					
Child	6	3	16	22	18
Family	14	4	16	35	21
ANY HIGH PROTEIN FOOD					
Child	60*	76	79	76	75
Family	97	95	97	100	100
FISH ALONE AS HIGH PROTEIN FOOD					
Child	22	28	31	20	31
Family	39	34	40	32	38
n	(35)	(78	58)	(23)	(34)
CHILD/FAMILY RATIO					
MEAT	77%	83%	80%	74%	63%
FISH	53%	80%	73%	81%	74%
ANY HIGH PROTEIN FOOD	62%	80%	81%	76%	75%
FISH ALONE	56%	82%	77%	62%	82%

* Significantly less than control group

_ Significant difference between child and family intake prevalence

Intake differences according to nutritional category are less evident where ecological areas are considered (Table 24). This is in part due to the reduction of sensitivity when age groups are combined due to the necessity for more adequate numbers. Comparison of chronic PCM and control groups for the two areas suggests that fish and perhaps legumes but not other foods, are more available to the family but the child/family ratios are approximately the same.

4. Semi-qualitative intake of foods.

The frequency consumption of foods can only at best give a rough estimate of intake. The assumption that similar quantities of food are ingested at each "meal" according to nutritional category of the child is obviously not necessarily true. It was not possible, however, to perform a quantitative study. Category differences in frequency intake may at least suggest that perhaps similar differences in quantitative intake may occur. A second libert taken in the presentation of results was to extrapolate both the 24 hour recall for cereals etc and 3 day recall for high protein foods to a weekly basis. This was done primarily for purposes of comparison between groups.

(a) Staples, leafy vegetables, fruit and palm oil.

There were no important differences between nutritional categories (Table 25). The low frequency of consumption of leafy vegetables should be noted; that of fruits may have been related to the season in which the survey was done.

(b) High protein foods.

The low frequency intake for poultry, eggs and legumes by child and family is apparent (Table 26). There was a great reliance on fish at the time of the survey, and there were differences in the 5-18 age group between child and family and between nutritional categories for children.

TABLE 25

MEAN INTAKE FREQUENCY OF CERTAIN FOODS
ACCORDING TO NUTRITIONAL CATEGORY
OF SUBSAMPLE CHILDREN AND AGE GROUP

FOOD AGE GROUP	ACUTE PCM	BORDERLINE CHR. AND CHR. PCM	CONTROLS
	NUMBER OF TIMES PER DAY		
CEREALS			
5-18 months	1.6	1.4	1.6
19-36 months	1.8	1.7	1.7
TUBERS			
5-18 months	0.2	0.2	0.2
19-36 months	0.2	0.4	0.6
LEAFY VEGS			
5-18 months	0.2	0.3	0.4
19-36 months	0.7	0.6	0.9
FRUIT			
5-18 months	0.2	0.2	0.2
19-36 months	0.2	0.2	0.2
PALM OIL			
5-18 months	1.0	0.6	0.8
19-36 months	1.4	1.5	1.3
	APPROXIMATE NUMBER OF TIMES PER WEEK		
CEREALS			
5-18 months	11	10	11
19-36 months	13	12	12
TUBERS			
5-18 months	1-2	1-2	1-2
19-36 months	1-2	2-3	4
LEAFY VEGS			
5-18 months	1-2	2	3
19-36 months	5	5	6
FRUIT			
5-18 months	1-2	1-2	1-2
19-36 months	1-2	1-2	1-2
PALM OIL			
5-18 months	7	4	6
19-36 months	10	10	9
SAMPLE SIZE			
5-18 months	27	37	52
19-36 months	14	59	35

TABLE 26

AVERAGE NUMBER OF TIMES PER WEEK OF
HIGH PROTEIN FOODS EATEN BY CHILD AND FAMILY
BY NUTRITIONAL CATEGORY AND AGE GROUP OF CHILD

FOOD	AGED 5-18 MONTHS			AGED 19-36 MONTHS		
	ACUTE PCM	B'LINE AND CHR. PCM	CONTROL	ACUTE PCM	B'LINE AND CHR. PCM	CONTROL
MEAT						
Child	1.1	1.0	1.6	1.8	1.5	1.0
Family	1.5	1.8	2.3	1.8	1.6	1.4
FISH						
Child	1.9	2.5	3.3	4.5	4.4	5.5
Family	4.6	5.3	5.4	4.8	5.3	5.7
POULTRY						
Child	0.3	0.2	0.2	0.2	0.2	0.1
Family	0.3	0.2	0.2	0.2	0.2	0.1
EGGS						
Child	<0.1	<0.1	0.2	<0.1	<0.1	0.3
Family	0.1	0.2	0.1	<0.1	<0.1	0.1
LEGUMES						
Child	0.2	0.3	0.5	0.2	0.2	0.6
Family	1.0	0.9	0.6	0.2	0.5	0.6
SAMPLE SIZE	29	38	54	14	62	38

5. Intake of rice water.

Children with acute PCM received rice water more frequently than those in the other nutritional categories, even allowing for children under 5 months of age. Rice water intake was usually associated with some form of breast feeding, but was not necessarily the only other "food" given. (Table 27).

It was likely that the frequency of rice water for the child was underreported.

6. Method of feeding child.

There was no important difference by nutritional category in the method of feeding the 5-18 month old child. (Table 28). When there was more than one method of feeding including the use of a plate or bowl, this method alone was tabulated.

The result does not necessarily mean there was no difference, as the method of questioning may have been insensitive.

TABLE 27

DESCRIPTION OF DIET AND NUTRITIONAL CATEGORY
OF ALL CHILDREN IN SUBSAMPLE GIVEN RICE WATER

CHILD ID	AGE IN MONTHS	RICE WATER	BREAST MILK	OTHER FOODS GIVEN	NUTRITIONAL CATEGORY
6:18	2	+	full	nil	Acute PCM
64:07	4	+	full	nil	Acute PCM
62:29	5	+	full	nil	Acute PCM
16:03	5	+	--	non-breast milk	Acute PCM
21:16	10	+	part	cereals (twice daily)	Acute PCM
24:12	14	+	part	nil	Acute PCM
56:26	16	+	full	cereals, fish (each once daily)	Acute PCM
47:25	12	+	full	nil	Chronic PCM
20:13	4	+	part	nil	Control
61:06	18	+	part	cereals, cassava and fish (each once daily)	Control

TABLE 28

PREVALENCE PERCENTAGE
METHOD OF FEEDING CHILD

5-18 months

	ACUTE PCM	BORDERLINE AND CHR. PCM	CONTROL	TOTAL
Plate/bowl	57%	59%	55%	77
Stuffing	20%	12%	18%	22
Own hand or from family pot directly	10%	12%	7%	13
Other[a]	13%	15%	22%	23
TOTAL	100%	100%	100%	
N	30	49	56	135

[a]Breast milk, cup, mother's direct assistance.

I. HEALTH INDICATORS

1. Measurements and Clinical Signs.

An array of these indicators in Table 29 and 30 showed important differences comparing both acute and chronic PCM with the controls. This was particularly the case for children 5-18 months. The presence of an acute infection as shown by fever and high respiration rate was relatively rare in the control children and up to ten times more frequent in the PCM groups. The consequences of infection, diarrhea and inadequate fluid intake were clearly seen, at least in the acute PCM group where dehydration was common. It should be noted, however, that dehydration alone contributes to a low weight and a higher probability of the child being included in the acute PCM category according to low weight-for-height.

It was not possible from this survey to specify the precise cause of the infections; presumably malaria, intestinal and respiratory conditions account for the vast majority.

In Tables 29 and 30, the odds ratio was indicated when over 2, the chi square result could only be included when all the cell numbers in the 2 x 2 table were five or more.

Differences in clinical anemia prevalence were obvious, those according to a hemoglobin estimation less than 10 gm not so marked because of the high prevalences in each group. For children aged 5-18 months the median hemoglobin was as follows: 8.9 gm% (acute PCM); 9.1 gm% (chronic PCM); 9.7 gm% (chronic borderline PCM) and 9.8 gm% (controls).

2. Malaria and Intestinal Parasites

A high degree of collection failure (especially for stools), inadequate quality of thick films and problems in reporting limit the value of these investigations. The results for those reported are indicated in Table 31.

TABLE 29

PERCENTAGE FREQUENCY OF HEALTH INDICATORS
ACCORDING TO NUTRITIONAL CATEGORY
CHILDREN 5-18 MONTHS

INDICATORS

CATEGORY	HIGH RECTAL TEMP (a)	HIGH RESP RATE (b)	CURRENT DIARRHEA (c)	DEHYDRATION (d)	CLINICAL OBVIOUS ANEMIA (e)	ANEMIA (f)	NUMBER OF CHILDREN
Acute PCM	15%	24%	26%	28%	43%	68%	25
Remainder	11%	11%	18%	1%	18%	60%	85
Chronic PCM	27%	30%	36%	10%	44%	90%	10
Borderline Chr. PCM	24%	8%	19%	0%	20%	62%	25
Control	2%	8%	14%	0%	11%	51%	50
Number of Children	113	110	115	118	102	90	
Ac vs. Remainder							
Odds Ratio	-	2.7+/-1.5	-	>10.0	3.6+/-2.4	-	
Chi Square	-	2.95	-	-	6.57	-	
P	-	>0.05	-	-	<0.01	-	
Ac vs. Control							
Odds Ratio	9.1+/-10.4	3.7+/-2.9	2.2+/-1.3	>10.0	6.2+/-3.9	2.03+/-1.1	
Chi Square	-	-	-	-	9.27	1.60	
P	-	-	-	-	<0.01	>0.05	
Chronic vs. Control							
Odds Ratio	>10.0	5.0+/-4.4	3.6+/-3.4	-	6.4+/-5.2	8.5+/-9.4	
Chi Square	-	-	-	-	-	-	
P	-	-	-	-	-	-	

(a) High Rectal Temperature : $>38^{\circ}C$ ($100^{\circ}F$)
(b) High Respiration Rate : >60/min any age; >50/min in children over 12 months
(c) Current Diarrhea : ≥5 Stools in past 24 hours
(d) Dehydration : Sunken fontanelle or loss of skin turgor
(e) Clinical Obvious Anemia : Marked and obvious to observer
(f) Anemia : < 10 Gm% by Spectrophotometer

TABLE 30

PERCENTAGE FREQUENCY OF HEALTH INDICATORS
ACCORDING TO NUTRITIONAL CATEGORY
CHILDREN 19-57 MONTHS

CATEGORY	HIGH RECTAL TEMP	HIGH RESP RATE	CURRENT DIARRHEA	DEHYDRATION	CLINICAL OBVIOUS ANEMIA	ANEMIA	NUMBER OF CHILDREN
	INDICATORS						
	(a)	(b)	(c)	(d)	(e)	(f)	
Acute PCM	13%	11%	33%	14%	50%	57%	14
Remainder	10%	9%	18%	0	8%	59%	90
Chronic PCM	18%	7%	16%	0	15%	58%	40
Borderline Chr. PCM	4%	13%	27%	0	5%	41%	20
Control	6%	8%	13%	0	3%	71%	30
Number of Children	110	102	123	123	100	100	
AC vs. Remainder							
Odds Ratio		-	2.3+/-1.4	>10	11.3+/-5.0		
Chi Square		-	2.08		17.52		
P		-	>0.05		<0.01		
AC vs. Control							
Odds Ratio	2.4+/-2.5	-	3.3+/-2.4	>10	5.3+/-6.0		
Chi Square		-	2.86		-		
P		-	>0.05		-		
Chronic vs. Control							
Odds Ratio	3.4+/-2.8	-			>10		
Chi Square		-			-		
P					-		

TABLE 31

PERCENT PREVALENCE OF MALARIA AND STOOL PARASITES OF REPORTED SUBSAMPLE CHILDREN

5 - 57 months

	MALARIA PARASITE	STOOL	
		HOOKWORM	ASCARIS
ACUTE PCM	44% (16)*	0	10% (30)
BORDERLINE AND CHRONIC PCM	39% (44)	4%	16% (50)
CONTROL	20% (30)	3%	9% (35)

*Number reported in parentheses.

TABLE 32

PERCENT FREQUENCY OF MEASLES ACCORDING TO NUTRITIONAL CATEGORY

5 - 57 months

	ACUTE PCM	BORDERLINE AND CHR. PCM	CONTROL
Measles rash present	5%	2%	1%
Recent measles stated	12%	12%	25%
TOTAL MEASLES	17%	14%	26%
Other rash seen	5%	6%	6%
TOTAL NO MEASLES	83%	86%	74%
TOTAL NUMBER	41	113	82

The acute and chronic PCM groups are associated with a lesser frequency of recent measles stated than the control group.

It is probable that the prevalence of malaria parasite positive in the thick film ranges from 20%-44% according to nutritional category; that for hookworm up to 5% and roundworm 10-15%.

Further problems, at least regarding the diagnosis of malaria, may include the presence of recent treatment and infestation without acute infection. In a community where malaria is endemic, the rapidly-changing parasite load makes a cross-sectional evaluation particularly difficult.

3. Measles frequency (Table 32)

Determining the prevalence of measles was fraught with problems. The differentiation of measles rash and a rash due to other conditions, the reliance on mother's information for recent measles and disregarding the question of severity makes interpretation difficult.

4. Health visit data

Some indication of the importance of acute infection and gastro-intestinal conditions is shown in Tables 33 and 34; where they contributed to some 60-75% of all presenting illnesses at the last health visit of the child aged 5-36 months. Specific anti-malarial treatment such as chloroquine, often by injection, was given in approximately 25% of the children. Further information regarding illnesses from this source is probably unreliable due to the reliance on memory regarding at least half the cases where no written record was available.

Table 35 suggests that children with acute PCM were making more use of available health services during the past month than those in the other nutritional categories. A hospital visit was more frequent in children with chronic PCM. It should be noted that these percent frequencies were based only

TABLE 33

PERCENTAGE OF PRESENTING ILLNESS AT LAST
EALTH VISIT ACCORDING TO NUTRITIONAL CATEGORY

ILLNESS	ACUTE PCM	REMAINDER	CHRONIC PCM	CHRONIC CONTROL
Fever/Malaria	38	33	32	33
Diarrhoea/Vomiting/ Worms	38	29	33	26
Other Illness	16	29	28	31
Check Up	8	9	2	10
TOTAL	100%	100%	100%	100%
Sample Size	(37)	(163)	(46)	(72)

TABLE 34

PERCENTAGE OF TREATMENT GIVEN AT LAST
HEALTH VISIT ACCORDING TO NUTRITIONAL CATEGORY

TREATMENT	ACUTE PCM	REMAINDER	CHRONIC PCM	CHRONIC CONTROL
Anti-Malarial	36	23	11	27
Other.	64	77	89	73
TOTAL	100%	100%	100%	100%
Sample Size	(28)	(106)	(35)	(48)

TABLE 35

PRECENT FREQUENCY OF HEALTH VISIT OR RECORD
ACCORDING TO NUTRITIONAL CATEGORY

5-57 months

	NO HEALTH RECORD	NO CLINIC RECORD	HOSPITAL VISIT*	VISIT WITHIN PAST MONTH*	ANY VIST PAST YEAR
ACUTE PCM	56.7%	75.0%	21.1%	63.9%	81.8%
REMAINDER	69.2%	72.3%	19.5%	39.1%	59.2%
Odds ratio				2.76 +/- 1.06	3.10 +/- 1.29
Chi square				7.30	7.96
P				<0.01	<0.01
CHRONIC PCM	65.8%	71.9%	33.3%	36.2%	62.7%
CONTROL	71.4%	72.7%	16.9%	38.9%	55.3%
Odds ratio			2.46 +/- 1.08		
Chi square			4.30		
P			<0.05		

*of all visits.

Conclusion: There was no association between nutritional category and the presence of a health or clinic record. Children with chronic PCM appeared to be visiting a hospital more than the controls. A recent visit to any health facility and acute PCM was significantly correlated as well as any visit the past year.

on those children with a health visit during the past year. More children with acute PCM than the other groups, also visited a health facility during the past year.

4. Immunizations (Table 36)

This information relied primarily on the memory of the respondent because no written record was available in many of the cases. The presence of a BCG scar was also noted. In approximately 20% of the children it was not clearly known, even after questioning, whether the child had been immunized or not. Results therefore should be viewed with caution and comparisons between nutritional categories are perhaps not valid. Basing the totals on those children where knowledge of immunization was available, at least half the children in all groups were not immunized against any disease and at least 80% not immunized against measles.

TABLE 36

PERCENTAGE FREQUENCY OF IMMUNIZATIONS
CHILDREN 5-59 MONTHS ACCORDING TO NUTRITIONAL CATEGORY

IMMUNIZATION	ACUTE PCM	REMAINDER	CHRONIC PCM	BORDERLINE CHRONIC PCM	CONTROL
Measles	17%	13%	12%	2%	19%
DPT	3%	13%	10%	7%	18%
BCG	25%	19%	29%	14%	17%
Other	17%	17%	23%	7%	18%
TOTAL KNOWN	36	169	48	78	43
Not immunized against any disease	50%	59%	52%	70%	58%
Immunized against only one disease*	31%	26%	35%	19%	24%
Immunized against more than one disease*	19%	15%	13%	11%	18%

*or DPT

5. Mortality Data.

(a) Mortality rates.

The mother was carefully questioned regarding child mortality within the household. Although time-consuming, it was considered the association would be of value to determine the significance of PCM within the household. All stillbirths and miscarriages are excluded from the data in Table 37, as the major interest was in deaths per 1000 live births for infants and deaths per 1000 alive at one year for children 1-5; in addition questions regarding stillbirths and miscarriage were likely to raise sensitivities of the respondents.

Within the nutritional categories, totals of live births and children alive and dead at certain age ranges were compiled. The infant mortality rate (IMR) ranged from 132.5 to 214.0 depending on nutritional category. Households which had a child with chronic PCM had a much higher IMR than those with a normal child, in the subsample.

This difference was clearly apparent for child deaths 1-12 months of age, whereas in neonates no difference in rates occurred.

The 1-5 year mortality rate varied from 23.7 to 29.3 yearly with no difference between nutritional categories.

The association between chronic PCM in the living child and a higher rate of post neonate infant mortality in the family may suggest that such families are associated with factors influencing mortality at this age range. Obviously these factors are not necessarily nutritional, but include health, socio economic and other influences. Chronic PCM in the young child, however may be an important indicator of families "at risk" for post neonate infant mortality.

TABLE 37

FREQUENCY AND RATES OF MORTALITY IN HOUSEHOLDS
ACCORDING TO NUTRITIONAL CATEGORY OF SUBSAMPLE CHILD

	FREQUENCY -- Live Children			
AGE	ACUTE PCM	REMAINDER	CHRONIC PCM	CHRONIC CONTROL
At Birth	166	896	243	401
At 1 year	144	740	191	350

	MORTALITY FREQUENCY			
AGE				
0 - 1 year (infant)	22	153	52	52
Neonates	11	56	19	26
1 - 12 months	11	97	33	26
- 5 years	14	81	18	41
1 - 5 years	36	234	70	93

	MORTALITY RATES			
AGE	ACUTE PCM	REMAINDER	CHRONIC PCM	CHRONIC CONTROL
0 - 1 year (infant)[a]	132.5	170.8	214.0	129.7[s*]
Neonates[a]	61.2	62.5	78.2	64.8
1 - 12 months[a]	61.2	108.3	135.8	64.9[s*]
1 - 5 years				
Total[b]	97.2	109.5	94.2	17.1
Yearly[c]	24.3	27.4	23.7	29.3
0 - 5 years				
Total[a]	216.9	261.2	288.1	131.9

[a] Number of deaths/1000 live births
[b] Number of deaths/1000 alive at 1 year
[c] Yearly average from 1 - 5 years
[s] Significant difference
[*] Odds ratio 1.83 ± 0.39 Chi square = 7.94 $P < 0.01$
[**] Odds ratio 2.27 ± 0.63 Chi square = 9.16 $p < 0.01$

(b) Cause of death.

There was no clear difference between nutritional groups in the cause of death of siblings in the same household. In all groups the first five in the table: fever, malaria, intestinal (usually infection or dehydration), respiratory, measles and edema contributed 70-90% of all causes.

TABLE 38

PERCENTAGE FREQUENCY OF CAUSE OF DEATH
0-5 YEAR OLDS IN HOUSEHOLDS ACCORDING TO
NUTRITIONAL CATEGORY OF SUBSAMPLE CHILD

CAUSE OF DEATH	ACUTE PCM	REMAINDI	CHRONIC PCM	CHRONIC CONTROL
Fever/Malaria	24	24	23	24
Gastro-Intestinal	38	28	23	30
Respiratory	14	11	12	8
Measles	14	11	6	10
Edema	0	4	6	6
Tetanus	10	4	3	4
Twin	0	6	9	6
Other	0	12	18	12
TOTAL	100%	100%	100%	100%
Sample Size	(21)	(109)	(34)	(52)

VII. COMPOSITE DESCRIPTIONS OF SUBSAMPLE CHILDREN

In view of the complexity of the probable associations with PCM, whether socio economic status, dietary and/or health, a brief profile of 39 children with acute, 8 with borderline or chronic PCM and 25 controls, was listed in the following pages.

The matching in columns and rows was based where possible on the same or similar site and age, according to nutritional category. All acute PCM children were listed down the left half of the presentation; those in other nutritional groups on opposite half.

The occupation of the father was farmer, unless otherwise noted. Only extremes of socio economic status (such as well off or especially poor household), and of other attributes such as sanitation (presence of a well) were indicated. Special comments by the interviewer were enclosed by inverted commas.

No firm conclusions can be derived from these descriptions; however it is apparent that well off families may include a child with acute or chronic PCM , the presence of an infection and/or poor diet was usually but not always associated with a greater likelihood of PCM. Reference to children with borderline and chronic PCM indicates a spectrum of those with an apparently adequate diet and health status to directly the opposite. It should be noted that little or no past history for all children was available.

DESCRIPTIONS OF INDIVIDUAL CHILDREN

ACUTE PCM				NO PCM			
AGE RANGE: 2 - 5 MONTHS							
CHILD ID #	AGE IN MONTHS	SEX	COMMENTS	CHILD ID #	AGE IN MONTHS	SEX	COMMENTS
06:18*	02	M	Very few possessions, no animals. Breastfed. Child has open mole. Temp. 38°C. Goes to hospital regularly for check up. "Mother does not seem to know how to care for child" Father is houseboy.	10:02	06	M	Poor family. Breastfed. Cereal, veg, oil and fish daily. No recent illness. Anemic Hb 7.5 gm%.
14:08	04	M	No apparent reason for Acute PCM.	10:04	06	F	Breastfed. Cereal, veg, oil daily. Fish once past 3 days. No recent illness.
16:03	05	F	No breast milk. Has rice water, lactogen (once daily). Stuffed feeding. In hospital for 1 month for malaria. High number of deaths in family (3 of 4 children) due to infections. Father is headman; Rubber farm.				
54:12	04	M	Well off. Child receives breast milk and fufu (3 times a day). No stuffing. Presently febrile (T = 40°C) probably pneumonia. First born. Father is rubber farmer.	52:01	03	M	Breastfed. Cereal thrice daily as rice powder. Bloody diarrhoea treated at clinic one month ago. Now well. Father is carpenter.
62:29	05	F	Very well off. Smaller twin; 8th. Order 10 Recent malaria; has been immunized for measles. Rice water fed by stuffing. Breastfed. Father is mason.				
64:07	04	M	Well off. Shares well. Breastfed. Rice water fed by stuffing. Recent cough ?whooping cough. Dehydrated.				

*Site No.6 18th Child in the site.

AGE RANGE: 2-5 MONTHS

ACUTE PCM				NO PCM			
67:16	03	M	Family shares well in locality. Bottlefed, water boiled. Child has lactogen thrice daily. No breast milk. Recent fever. Eyes now very sunken. Mother absent.	70:07	03	F	Family shares a well. Child not breastfed. Cereal; tuber daily and veg, palm oil twice daily. Fish twice in past three days. Has falciparum malariae in thick film. Hb 9.1 gm%.
				72:21	02	M	Family shares well. Child breastfed. Cereal thrice daily. Healthy. Twin.
86:24	03	F	Cleft palate. No breast milk. Fufu thrice daily; stuffed. Dehydrated. temp = 38.2° C. Very rapid respirations. Anemia Hb 8.7 gm%. First child Mother low nutritional arm measure.				

AGE RANGE: 6 - 11 MONTHS

ACUTE PCM				NO PCM			
CHILD ID #	AGE IN MONTHS	SEX	COMMENTS	CHILD ID #	AGE IN MONTHS	SEX	COMMENTS
17:27	11	M	Wealthy family. Several wives. Child has adequate diet and breastfed. Recent diarrhoea. Was at clinic. Has had a measle vaccine. Now dehydrated. Temp 37.8° C. Anemic Hb 7.2 gm%. Father is rubber farmer.	06:02	07	M	Family shares a well. Child is fully breastfed and has a varied, adequate diet including meat and fish. Fully immunised apart from measles. Anemic Hb 8.0 gm%. Father is public health nurse.
18:03	09	F	Family shares a well. Animal food and legumes available but not given as child has no teeth. Still breastfed. Cereals twice daily; stuffed. Short mother.				
39:07	08	M	Very poor; child fully breastfed also receives cereals, fish and legumes. State of compound refuse very dirty. Child has diarrhoea. Temp = 39°C. Both two prior children died of infection. Obese mother.	39:14	06		Fully breastfed; cereals thrice daily. Blood and mucous in stool. No fever. Father is diamond miner.

AGE RANGE: 6-11 MONTHS

ACUTE PCM				NO PCM			
51:10	09	F	Very poor family, compound fly ridden Child breastfed, receives rice and palm oil. Has "open mole". Temp 38°C. Diarrhoea and round worm ++++. Anemic Hb 8.4 gm%.	53:01	07	M	Breastfed; receives soft rice and oil. No animal protein. No illness. Birth order: 7. Father is a tailor.
51:17	09	M	Breastfed receives cereal daily and fish. Recent fever and generalised rash, possibly measles. Ill child.				
70:17	10	M	No food other than breast milk past three weeks due to diarrhoea. Received chloroquine at clinic yesterday. Afebrile, dehydrated and positive falciparum/malariae blood smear.	71:12	09	F	Breastfed. Receives cereals, oil and meat. No recent illness but anemic Hb 8.1 gm%.
78:15	09	M	No breast milk. Has cereals and palm oil with family thrice daily, also varied animal protein diet. Child recent fever, went to clinic one week ago, received anti-malarial liquid. Blood smear shows heavy falciparum infection. Anemic 7.4 gm%. Young mother, first child.	80:03	(13)	M	Family shares well in locality. Breastfed plus varied diet including cereals and meat. No recent illness but anemic Hb 8.4 gm%. Birth Order 9
81:06	06	F	Poor family. No breast milk, receives rice, palm butter and fish. Now diarrhoea, dehydration. Temp 37.9°C Anemia 7.5 gm%. Twin. Mother dead.	82.02	08	M	Breastfed and varied adequate diet including meat and fish. Two days ago had penicillin injection for a rash. Temp. now 37.9°C.
123:22	10	M	Family very poor but child receives breast milk and frequent varied diet. At present fever 40°C. Anemia, Hb 9.0 gm%. Source of water a long distance away.	124:01	11	F	Family well off. Running water. Partial breastfeeding but receives cereals, leafy vegs and soup thrice daily. No meat. Father is a tailor.
21:16	10	M	Poor family. Child still breastfed. Has cereal thrice daily and rice water. Heavy falciparum malaria blood film. First born.	21:06	06	M	Breastfed. Fufu daily. No recent illness.

ACUTE PCM				NO ACUTE PCM, BORDERLINE CHRONIC PCM			
AGE RANGE: 6 - 11 MONTHS CONTINUED							
43:09	08	F	Fully breastfed, occasional soft rice only other food. Recent fever, had injection for malaria. Anemic Hb 8.2 gm%	43:10	11	F	Breastfed. Receives soft rice only. "It will harm her; she's too small to eat other things." Child febrile 38.3°C. No apparent recent illness.
48:18	11	M	Clinical marasmus. Child breastfed, receives cereal, vegs, fruit and palm oil once daily. "Child should have careful diet supervision."	48:17	11	M	Poor family; share well in compound. Breastfed only.
60:08	07	M	Breastfed; soft rice thrice daily by stuffing. "Sickly since birth" never had any treatment. Severely anemic, less than 5 gm%.	59:20	07	M	Family large, well off. Have own well. Not breastfed but receives cereals, leafy vegs, poultry, fish and legumes. No recent illness.

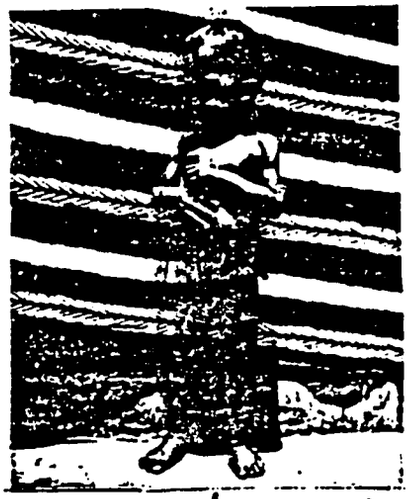
ACUTE PCM				NO ACUTE PCM, CHRONIC PCM			
AGE RANGE: 12 - 24 MONTHS							
CHILD ID #	AGE IN MONTHS	SEX	COMMENTS	CHILD ID #	AGE IN MONTHS	SEX	COMMENTS
13:01	16	F	No food apart from breast milk. "Needs to eat some food. Stated not big enough to eat food." First born.	14:13	20	F	Still fully breastfed and varied diet including fish and legumes. Healthy.
18:02	17	M	Well off. Family shares a well. Multiple immunisations. Recent clinic visit for sores in mouth and cough. First born. Father is a Gov't Agriculturalist.				
29:22	21	M	Poor, one room family. Good, varied diet. No special reason for PCM. Has had measles and BCG immunisation. Mother low nutritional arm measures.	29:02	20	F	Receives cereal thrice daily. Leafy vegs and palm oil with family food also fish. Healthy. Father is town chief.
30:17	12	F	Poor, one room family. No breast milk nor animal foods. Recent poor appetite. Has falciparum positive blood film. Mother low nutritional arm measures.	27:05	16	F	Child lives with grandparents. Parents work in Monrovia. Proprietary milk fed by bottle thrice daily. Apart from fruit, child only receives small amounts of food; usually refuses it or gets sick and vomits it. Recent fever and diarrhoea. Now dehydrated.
39:15	17	M	No breast milk; receives only cream of wheat twice daily. no animal foods, no legumes. Child dehydrated with hair changes of kwashiorkor. Blood film shows no malaria. Anemia, Hb 6.7 gm%. Has edema. Father is a diamond miner.	39:05	17	M	Family poor. Child partially breast fed, also has cereals, palm oil, meat and fish. Has falciparum malaria in blood film. Hb 9.0 gm%. Father is diamond miner.
56:26	16	F	Still breastfed. Has cereal and palm butter once daily with family. Rice water and fish also. Recent malaria and cough, was at clinic. Anemia, Hb 8.4 gm%. Birth order: 8.	56:08	(26)	M	Well off, large family. Shares a nearby well. Child has cereal, palm butter, meat and fish. Anemia, Hb 8.2 gm%. Mother absent.
106:17	14	F	Live on the hospital premises. Water boiled. Child breastfed and varied diet. Recent fever past week. Malaria film negative. Father is a carpenter (concession area).	106:09	14		Family well off; shares a pump and boils water. Child off breast, receives cereal and palm oil twice daily also poultry and fish. Treate for dehydration one month ago. Chil now looks "pre-kwashiorkor". Child a surviving twin; new twins born one month ago.

ACUTE PCM				NO ACUTE PCM, BORDERLINE CHRONIC PCM			
AGE RANGE: 12 - 24 MONTHS CONTINUED							
41:15	21	M	Poor family. Child receives only cereal and palm oil twice daily. High temp past three weeks, seen at clinic. Now 39.2 C, dehydrated and rapid respirations. Anemia, Hb 7.8 gm%. Birth order: 8.	42:04	12		mily. Partially breastfed; Has cereal, leafy vegs and palm oil daily. "Child has no teeth to eat meat" Recent convulsions and fever treated at clinic.
48:07	22	M	Family shares well in locality. Child receives cereal only once daily with family. Had meat and fish once past 3 days. Off breast. Multiple immunisations. Recent rash.	48:24	(31)	M	Child receives cereal twice daily, also has vegs, fruit, palm oil, meat and fish with family. Mother low nutritional arm measures.

ACUTE PCM				NO PCM			
AGE RANGE: 12 - 24 MONTHS CONTINUED							
32:27	14	M	Recent measles. Now dehydrated. Went to clinic one week ago. Not on breast, recent diet poor. Birth order 8.	32:06	22	M	Well off, family shares a well, child receives cereal, palm oil and fish. Immunised with DPT, BCG and for smallpox. Anemic, Hb 7.1 gm% First born. Mother undernourished.
47:24	22	F	No food apart from breast milk. "Father states child vomits food. Other child did not eat rice until age 3. No special reason for this."	47:02	21	M	Still fully breastfed. Has cereal, vegs, fruit and palm oil daily. Also frequent fish, egg and legumes. Presently diarrhoea. Looks very anemic, Hb 7.9 gm%. No malaria in blood film.
62:08	15	F	Family well off. Own well. Off breast milk but good; varied diet. Recently in hospital with fever. Anemia, Hb 7.6 gm%.	62:20	16	M	Family have own well. Child still fully breastfed; also has cereal, palm oil, and fish with family. Fully immunised. Father is taxi driver.

AGE RANGE: 12-24 MONTHS			ACUTE PCM				NO PCM
108:17	15	M	Use PUA water supply. Boil water. Child not breastfed, has rice with family thrice daily but no animal food nor legumes. One week ago was swollen (?kwashiorkor) Got treatment for worms and diarrhoea. Still unwell and dehydrated. Father is unemployed driver.	108:03	25	M	Temporary zinc house. PUA water supply; usually boils water. Child receives varied diet including fish. No recent illness. Mother low nutritional arm measure. Father is a caretaker in a private firm.
149:21	19	M	Family has running water. Child breast fed. Cereals daily, fish recently. Runny stomach past 2 days. Received worm medicine at clinic. Father is power saw worker (Concession area).	147:03	20	M	Family poor. Child still on breast and receives adequate diet including fish and legumes. Immunised for measles and DPT. Hb 8.7 gm%. Father is a cleaner. (Concession area).
				150:10	20	M	Firestone worker. Fairly well off. Shares tap. Child breastfed with cereal, leafy vegs and oil daily. Does not receive meat and fish "causes worms". Fully immunised. No recent illness. Father is a mechanic. (Concession area)
9:29	16	M	Wealthy family. Child breastfed, has cereal, oil and vegs once daily with family. Also recent poultry and fish. Child recently had measles, still has diarrhoea.	9:03	22	F	Family own a store with a refrigerator. Child breastfed; receives varied diet once daily including fish. Fully immunised. Not clinically anemic but Hb 9.0 gm%.
73:16	13	M	Family shares a well. Breastfed but not eaten past three days. Has fever and diarrhoea. Blood film for malaria negative. Anemia, Hb 5.8 gm%.				
75:22	22	M	Poor family. Shares a well. Not breastfed. Has cereal, palm oil and fish with family once daily. Still having recently treated dysentery. No malaria on film.	75:04	12	M	Family shares a well in locality. Poor. Child partly breastfed, also receives daily cereal, vegs, palm oil and fish. Anemia, Hb 8.4 gm% has falciparum malaria in film.
103:24	15	M	Very poor family in urbanised area. Child still breastfed and varied diet. Child in hospital one month ago, "legs deformed". Has had measles immunisation. first child. Father is a teacher.	103:01	13	F	Family have running water, child off breast, but has cereals thrice daily; also meat and fish. Recent diarrhoea Father is unemployed.

1



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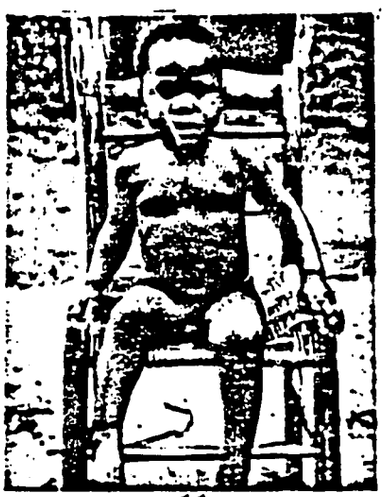

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VIII. PHOTOGRAPHS OF SELECTED SUBSAMPLE CHILDRE

A photograph of almost every subsample child was taken. An additional photograph was taken of the child or family and given to usually the mother to acknowledge cooperation.

The 15 best child photographs were grouped according to age and nutritional category and included in this report to illustrate the appearances of children (and mothers) in the categories described in the main sample and subsample.

It should be noted that those children with acute PCM are often relatively easy to recognize, particularly when edema of the feet is present as in the case of child number 1 and 4. On the other hand, children with chronic and borderline chronic PCM (Numbers 2, 5, 8, 10, 11, 12b, 14 and 15) are usually extremely difficult to detect, unless the age and stature are known.

It is particularly illustrative to inspect photograph number 12 where a male pair of twins aged 26 months may be compared.

In the accompanying table, the anthropometric profile of all photographed children is listed. The low values for weight-for-height, etc. approximate those already defined in the report; a borderline result for the present purpose is as follows:

Weight-for-height	:	80-85% of reference median
Height-for-age	:	87.5-92.5%
Weight-for-age	:	75.0-85.0%
Arm Circumference-for-age	:	80.0-85.0%
Fatfold-for-age	:	60-70%

Of the four mothers illustrated only one, number 15, is undernourished, at least for arm ($<$ 23.0 cm) and fat wasting ($<$ 7.5 mm).

NUTRITIONAL DESCRIPTIONS OF SELECTED PHOTOGRAPHED CHILDREN IN SUBSAMPLE

	Age (mths)	Sex	Acute PCM: Body Wasting	Chronic PCM: Stunting	Under-Weight	Arm Wasting	Fat Wasting	Category
1.	10	M	Yes	BL**	Yes	Yes	Yes	Acute PCM
2.	12	M	BL	Ye	Yes	BL	BL	Chronic PCM
3.	9	F	No	No	No	No	No	Control
4.	21	M	BL	BL	Yes	Yes	Yes	Acute PCM
5.	21	F	No	Ye	BL	No	No	Chronic PCM
6.	17	M	No	No	No	No	BL	Control
7.	26	F	BL	BL	Yes	BL	Yes	Acute PCM
8.	44	F	No	Ye	BL	No	No	Chronic PCM
9.	27	M	No	No	No	No	No	Control
10.	19	F	No	Ye	Yes	No	Yes	Chronic PCM
11.	28	M	No	BL	No	No	Yes	BL Chronic PCM
12a.	26	M	No	No	No	No	BL	Control
12b.	26	M	No	Ye	Yes	BL	Yes	Chronic PCM
13.	6	F	No	No	No	No	No	Control
14.	11	M	No	BL	BL	No	BL	BL Chronic PCM
15.	31	M	No	BL	No	No	No	BL Chronic PCM

Body Wasting - Low Weight-for-Height
Stunting - Low Height-for-Age
Underweight - Low Weight-for-Age
Arm Wasting - Low Arm Circumference-for-Age
Fat Wasting - Low Fatfold-for-Age

**Defined as Acute PCM according to Arm/Fat also
Borderline

NUTRITIONAL DESCRIPTIONS OF SELECTED PHOTOGRAPHED MOTHERS IN SUBSAMPLE

NUMBER	AGE (years)	HEIGHT (cm)	ARM C. (cm)	FATFOLD (mm)
9	20-40	165	26.5	9.2
13	20-40	154	25.4	11.2
14	20-40	163	28.0	23.5
15	20-40	148*	22.5*	5.8*

*Low nutritional score as defined in text.

IX. SUMMARY

Comparisons between nutritional categories according to indicator or attribute selected in the subsample are summarized in Table 39.

Clear differences were found in several health indicators, particularly denoting acute infection and more so in the 5-18 month age group. Some of the methods were objective, such as fever and high respiration rate. It should be noted that the association between PCM presence and poor health status included chronic PCM as well as acute. This may suggest that the chronically malnourished child has more frequent infections than controls; but that disproportionate soft tissue wasting (as in acute PCM) does not occur as much as perhaps a failure of linear skeletal growth.

The more recent visit to a health facility by a child with acute PCM may reflect the presence of an acute infection recognised by the mother.

The higher mortality rates from 1 to 12 months for siblings of children with chronic PCM may well indicate that the presence of chronic PCM in a young child suggests that the family is at risk of a higher mortality in their post neonate infant. This does not appear to be the case for mortality rates in neonates nor children aged one to five years.

Allowing for the limitations in collection and interpretation of diet information in the survey, already discussed in this report, there is evidence that less children with acute or chronic PCM in the 5 - 18 months age group compared with controls, consumed staples such as rice and cassava. There is less statistical evidence for disparities in the consumption of meat and fish.

A concept incorporating both family and child intake (child/family ratio), suggests that both meat and fish may often be available to the child, particularly the 5-18 month's old, but not actually received.

Less children with PCM than the controls consumed milk and leafy vegetables. Little poultry, eggs and legumes were eaten by families in all nutritional groups, as well as their young children.

Like poor health status, inadequate diet involved both the acute and chronic PCM groups.

It was far more difficult to show significant associations with PCM for other indicators, except perhaps lack of animals. Only certain items dealing with poorer socio-economic status or sanitiation suggested an association.

It should be noted that the associations considered in this discussion do not necessarily indicate a causal relationship. A lack of association, on the other hand, does not disprove such a relationship. However, in view of prior studies referred to in the main report, it is highly likely that poor health and diet have a strong connection with both acute and chronic PCM in the young child.

TABLE 39

UMMARY OF COMPARISONS BETWEEN NUTRITIONAL CATEGORIES
ACCORDING TO INDICATOR

	ACUTE vs CONTROL	B'LINE &/OR CHRONIC vs CONTROL	TABLE
HOUSEHOLD STRUCTURE			
Not Permanent	+	-	8
Less Rooms	+	-	
POSSESSIONS			
Lack of Essential Items	+/-	-	9
Having "Status" Items	-	-	10
SOCIO-ECONOMIC SCORE	+/- S	+/- S	13
LACKING ANIMALS	+	-	11
SANITATION PROBLEMS	+/-	+	12
Sanitation Score	+/- S	+/- S	13
AGRICULTURAL			
Make Farm/Crop	-	-	14
Cash Crop	-	+	14/15
Crop Diversity	-	-	15
Don't Buy Rice	+	-	16
Sell Rice	-	-	16
DIET			
Not Breast Feeding (5-18 Mths)	+/-	+/-	17
Food Not Specially Prepared (5-11 Mth)	-	+	18
Lesser Prevalence Intake (5-18 Mths)			
Milk, Cereals, Leafy Vegs,	+	+	20
Tubers	+	-	20
Lesser Prevalence Intake (19-36 Mths)			
Milk, Leafy Vegs,	+	-	20
Tubers	+	+	20
Lesser Prevalence Intake (5-18 Mths)			22
Meat	-	+	
Fish	-	-	
Poultry/Eggs/Legumes	-	-	
Any High Protein Food	-	+	
Low Child/Family Ratio (Fish)	+	-	
Lesser Prevalence Intake (19-36 Mths)			23
Meat, Fish, Poultry, Eggs	-	-	
Legumes	+	-	
Any High Protein Food	+	-	
Child/Family Ratio (Fish)	-	-	
Rice Water Intake	+	-	27
Method of Feeding Child	-	-	28

	ACUTE vs CONTROL	B'LINE &/OR CHRONIC vs CONTROL	TABLE
HEALTH INDICATORS (5-18Mths)			29
Fever, High Resp. Rate	+	+	
Diarrhea, Clinical Anemia			
Dehydration	+	-	
(19-36Mths)			30
Fever, Clinical Anemia	+	+	
Diarrhea	+	-	
(5-57Mths)			31
Malaria Parasites	+	+	
Stool Parasites	-	-	
(5-57Mths)			33
Presenting Illness to Clinic	-	-	33
Clinic/Health Record	-	-	35
Hospital Visit	-	+	35
Recent Visit to Facility	+	-	35
HOUSEHOLD CHILD MORTALITY RATES			37
Neonates	-	-	
1-12 Mths	-	+	
1-5 Years	-	-	

\+ Significant Difference by odds ratio +/or chi square testing.

+/- Significant Difference by odds ratio and/or chi square test only in certain attributes.

+/- A non-significant but consistent difference in scoring distribution.

\- No significant difference found.

SUBSAMPLE QUESTIONNAIRE*

MINISTRY OF HEALTH, GOVERNMENT OF LIBERIA
LIBERIA NATIONAL NUTRITION SURVEY

FORM 2

SITE NO (5-7) CHILD ID (12-15) NAME CHILD AGE MONTHS (22-23)

REASONS SELECTED 1 Case A 2 Case B 3 Control 4 Kwashiorkor 5 Other (state) _____ (8)

HOUSE (Household only)

STATE OF HOUSE	OWNERSHIP	EMPLOYS OTHERS	NO. ROOMS
3 6 Permanent	1 2 Owned	1 6 Yes	X 1=0 Score =X
2 4 Semi-permanent	2 1 Rent free	2 3 At times	
3 0 Temporary	3 3 Rented	3 0 No	
(9)	4 3 Own other house	4 0 Unknown	
	5 2 Unknown		
(9)	(10)	(11)	((12)

HOUSE SCORE _____
HH SIZE _____

N: Sc.	
24	0 0 / 1-2 5 / 3+ 10
25	0 -5 / 1-2 0 / 3+ 5
26	0 -10 / 1 -5 / 2+ 0 / 5+ 5

POSSESSIONS (Put number of items)

13 20 TV
14 20 Air conditioner
15 20 Washing machine
16 20 Refrigerator
17 10 Radio
18 10 Sewing machine
19 10 Stove (gas/electric)
20 10 Stove (kerosene)
21 x1 Large cooking pots (one point for each)

22 5 Electricity
23 x11 Wooden beds
*24 Spring beds
*25 Tables
*26 Chairs

27 100 Car (running)
28 20 Car (disused)
29 50 Motorbike
30 15 Bicycle
31 100 Mechanized farm equipment

POSSESSION SCORE _____

ANIMALS SCORE _____
HH SIZE _____

ANIMALS
Cows/Sheep/Goats/etc.
1 0 None
2 5 Few (5-)
3 15 Some (5+)
4 5 Unknown
(32)

Poultry/Ducks/etc.
1 0 None
2 5 Few (10-)
3 15 Some (10+)
4 5 Unknown
(33)

SOCIO-ECONOMIC STATUS COMMENTS _____

WATER

SOURCE OF WATER
1 10 Own tap
2 5 Shared tap
3 10 Own well
4 5 Shared well
5 0 River/stream
6 10 Rain-own tank
7 5 Other (state) _____
8 -1 Unknown
(34)

WATER SCORE _____

DISTANCE AWAY
1 10 In compound
2 5 5 min.-
3 3 5-30 min.
4 1 ½-2 hrs.
5 0 2 hrs+
(35)

DRINKING WATER BOILED
1 10 Usually
2 5 At times
3 0 No
4 2 Unknown
(36)

LATRINE
1 0 None
2 10 Pit (open)
3 10 Pit (closed)
4 10 Pit (shared)
5 15 Other (state)
(37) _____

IF LATRINE, IS IT
1 6 Clean
2 2 Dirty
3 0 Very dirty
4 3 Unknown
(38)

STATE OF COMPOUND REFUSE
1 4 Clean
2 2 Dirty
3 0 Very dirty
4 2 Unknown
(39)

SANITATION SCORE _____

FEEDING No. times past 24 hrs.

40 Breastmilk
41 Other milk
42 Cereal
43 Tuber
44 Leafy vegs.
45 Fruit
46 Palm oil
47 Other oil

(Do If Food Shared)

No. times past 3 days

	CHILD	FAMILY	
Meat			(58-59)
Poultry			(60-61)
Fish			(62-63)
Egg			(64-65)
Legume			(66-67)

(Do Always)

DO IF FOOD PREPARED FOR CHILD ONLY (WEANING FOOD)
Type of food _____ (No. of times past 24 hrs) (CODED AS FOR FEEDING-50-57)
Where some contents _____
Kindred from actual size

FORM 2 Page 2

FEEDING (continued)

IS THIS USUAL FOOD FOR CHILD? 1[ ] Yes 2[ ] No 3[ ] Unknown (68)

If no, state reason why _____

METHOD OF FEEDING CHILD (69)

1[ ] Cup 3[ ] Bottle 5[ ] Other(state) 6[ ] Nil
2[ ] Plate/bowl 4[ ] Stuffing _____ 7[ ] Unknown

LAND MAKE FARM 1[ ] Yes 2[ ] No 3[ ] Unknown (70)

RICE(past year) BUY ANY ? 1[ ] Yes 2[ ] No 3[ ] Unknown (71)
SELL ANY ? 4[ ] Yes 5[ ] No 6[ ] Unknown (72)

CROP 1[ ] Rice 2[ ] Cassava 3[ ] Other(non-cash)
4[ ] Other(cash) 5[ ] None 6[ ] Unknown (73-7

HEALTH RECORD PRESENT
1[ ] Yes
2[ ] Yes(recent)
3[ ] No(unavailable)
4[ ] No
5[ ] Unknown
(75)

TYPE
1[ ] Under 5's
2[ ] Clinic
3[ ] Hospital
4[ ] Private
5[ ] Other
6[ ] Unknown
(76)

IMMUNIZATIONS

FROM RECORD
1[ ] Measles
2[ ] DPT(No.)
3[ ] BCG
4[ ] Other
5[ ] Nil
6[ ] Unknown
(77-78)

STATED/SEEN
1[ ] Measles
2[ ] DPT(No.)
3[ ] BCG
4[ ] Other
5[ ] Nil
6[ ] Unknown
(79-80)

NUMBER OF MONTHS SINCE LAST VISIT (6-7)

1.Local _____ 2.Clinic _____ 3.Hospital _____ (8)

Reason _____ _____ _____ (9-10)

Treatment _____ _____ _____ (11-12)

BIRTH INTERVAL [ ] Years [ ] First Child (20)

MORTALITY

1. Total number of living children..... [ ] (21-22)
2. Total number of children died (inc. Stillbirths)..... [ ] (23-24)
3. Total number of miscarriages (abortions)(? if unknown). [ ] (27)
4. Approx. age of death of each child Child No. 1 __ 4 __
(Put N for 0-1mth, 0 for 1 mth-1 yr, 2 __ 5 __
1 for 1-2yr, 2 for 2-3yrs, 3 for 3-4 (U=Unk) 3 __ 6 __
4 for 4-5...Exclude stillb. & misses)
5. CAUSE OF DEATH (children dying past 5 years)
a. _____ age _____ (28-30)
b. _____ age _____ (31-33)
c. _____ age _____ (34-36)
d. _____ age _____ (61-63)

CLINICAL EXAMINATION Time _____ am/pm (38)

TEMPERATURE _____ rectal _____ axilly. _____ oral (39-41)

RESP. RATE _____ /min. (if too slow, write 10) (42-43)

RASH: 1__ Measles 2__ Measles-fading 3__ Not measles
4__ Uncertain 5__ Mother states recent measles 6__ None (44)

HYDRATION

Skin Turgor 1[ ] Poor 2[ ] Normal 3[ ] Uncertain (45)
Fontanelle 4[ ] Depressed 5[ ] Normal 6[ ] Uncertain (46)
Eyes sunken 7[ ] Yes, very 8[ ] Normal 9[ ] Uncertain (47)

STOOL MORE THAN 4/DAY [ ] Yes [ ] No (48)

INSPECTION: 1[ ] Watery 2[ ] Semi-watery 3[ ] Soft 4[ ] Hard (49)
5[ ] Blood and mucous(white threads) 6[ ] Not done (50)

STOOL COLLECTED [ ] Yes [ ] No

(Result- H.W. 0 1+ 2+ 3+ R.W. 0 1+ 2+ 3+
G.L. 0 1+ 2+ 3+ Other _____

MARKED CLINICAL ANEMIA [ ] Yes [ ] No [ ] Uncertain (51)

BLOOD COLLECTED

1[ ] Hb (Unopette) (52-54)
2[ ] THICK FILM MP RESULT 0 1+ 2+ 3+
3[ ] THIN FILM MP RESULT _____

4[ ] THIN FILM (General) RESULT _____

CONDITION OF CHILD:- Urgent care _____ (55)

Emergency care _____ (56)

Comments: