

**HOMES FOR THE MIGRANTS: THE PUEBLOS JOVENES OF LIMA--
A STUDY OF SOCIOECONOMIC DETERMINANTS OF CHILD
MALNUTRITION¹**

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SUMMARY

The family ecology of 68 preschool children attending a health care center in a *pueblo joven* (low-income peripheral settlement) of Lima, Perú, was investigated to determine its bearing on their nutritional status. Some of the variables studied included family income, income available to mothers, household composition, migratory history of mothers, child feeding practices and housing conditions. Nutritional status of the children was assessed through anthropometric and dietary means. Results indicated that chronic malnutrition was widespread. Breast-feeding was common, but the weaning diets had little diversity and low-caloric value. The family diet relied heavily on soups and starchy foodstuffs, and children participated fully in the family meals by the age of two. Child growth was negatively correlated with the number of preschool children and birth order, and positively correlated with income spent on water. In its turn, the children's diet was positively correlated with the income available to the mothers and the income spent on food.

RURAL-URBAN MIGRATION IN PERU

Urbanization is occurring at a rapid rate in the developing countries.

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The growth of cities is an alarming phenomenon, as the population is increasing at a faster rate than can be adequately absorbed. Perú is an example of a country that is quickly becoming urbanized. In 1961 its population was just under 10 million, and 5.2 million (over 50^o/o) lived in the rural areas. Twenty years later, its population was over 17 million and 6 million (about 35^o/o) lived in the rural areas (1). (Figure 1).

The capital city of Lima, with a population estimated at 4.6 million in 1981 (1) is the most frequent destination of the country's internal migrants. Greatly as a result of this influx, the city's population increased five-fold between 1940 and 1973 (2). Lima is an "overurbanized" city in the sense that it cannot provide more than the most minimal public services to a majority of its residents, and job opportunities are insufficient. In 1978, for example, it was estimated that only 52^o/o of the city work force was adequately employed (3).

Perhaps the most obvious sign of the city's inability to satisfy the basic needs of many of its residents has been the expansion of squatter settlements or shanty-towns, termed *pueblos jóvenes*, in and around the city. No public services are provided and living conditions are very unsanitary, but these must be the homes of half of the city population (4) unable to afford more conventional housing. The first homes of *pueblo joven* residents were made of *esteras* (reed mats) and poles (Figures 2, 3). Over a number of years and as each family's economic situation allows, the building of homes of sturdier materials is being carried out. Improvement of the physical conditions of the *pueblos jóvenes*, such as the construction of roads, the building of schools and community buildings, and the installation of electricity, potable water and sewerages, occurs mainly through community self-help projects.

GOALS, SETTING, AND METHODOLOGY OF THE STUDY

In environments characterized by poverty and unsanitary conditions such as the *pueblos jóvenes*, the health and nutritional status of preschool children is frequently compromised and found to be negatively affected. Nevertheless, to fully understand why malnutrition occurs, knowledge of the preschoolers' family environment is necessary. The purposes of this study were to assess the nutritional status of a sample of preschool children from the *pueblos jóvenes* through anthropometric and dietary means and after doing so, identify the demographic and socioeconomic characteristics of families that were most strongly associated with poor nutritional status among their preschool children. Only after understanding the family ecology can community interventions directed to improve the nutritional status of preschool children be successful. The demographic and socioeconomic characteristics of the families that were hypothesized to be associated with the growth and food intake of the children were the following:

father's occupation	mother's educational level
family income	mother's occupation
income available to the mother	mother's migratory status
income spent on food	housing conditions
household size	infant and child feeding practices
number of independents	home-raising of animals and food
number of preschool children	birth order of child

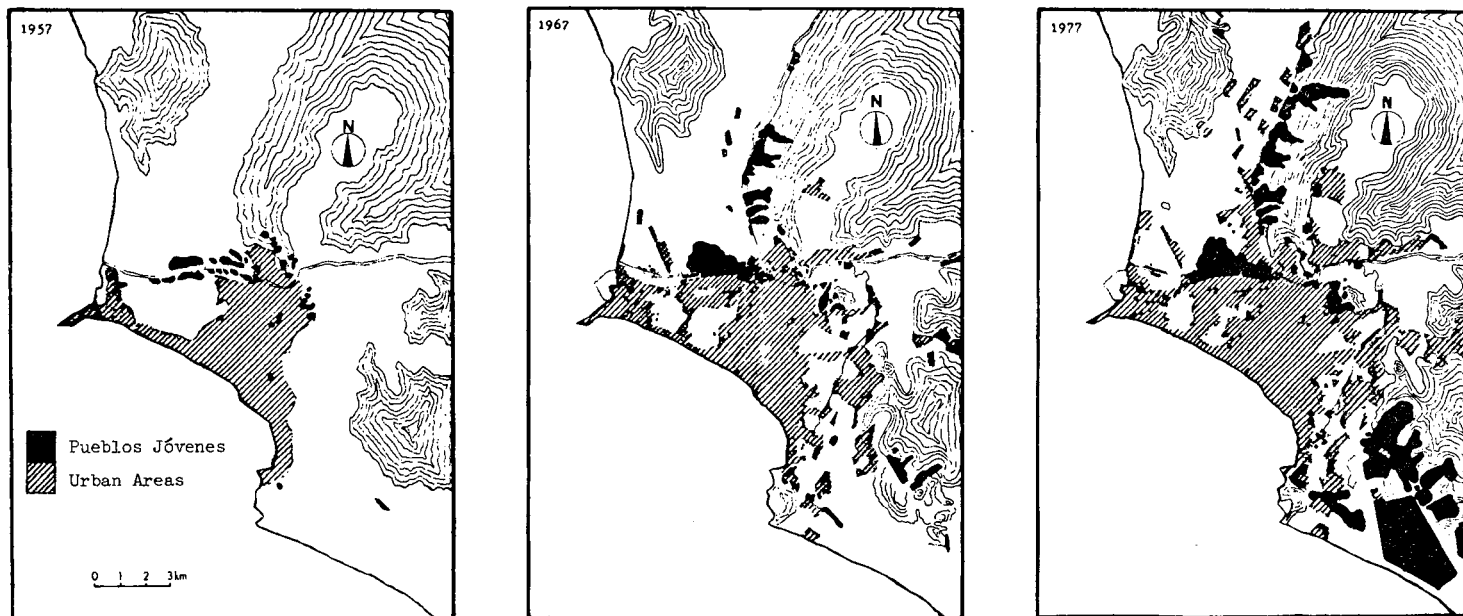
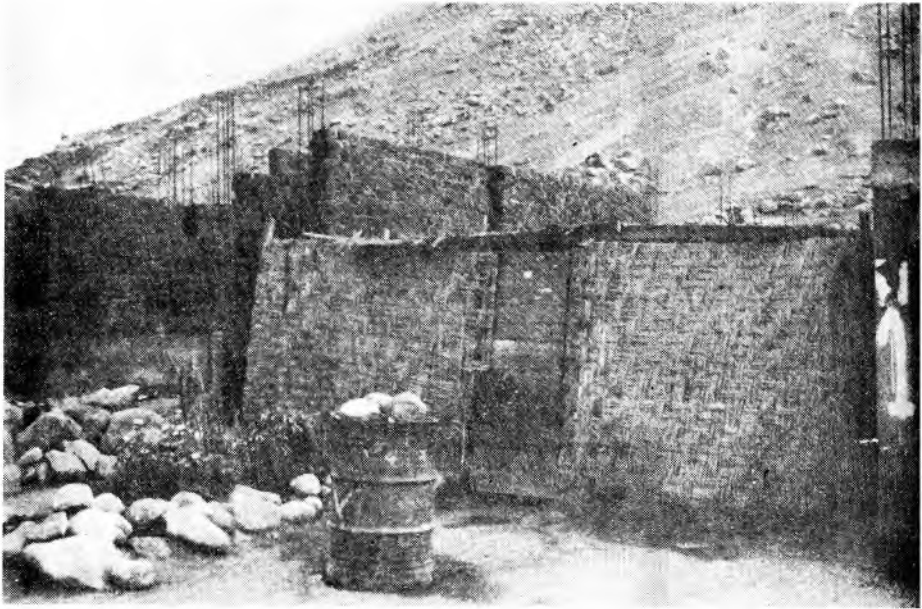


FIGURE 1

THE PUEBLOS JOVENES OF LIMA, 1957, 1967, 1977*

*Reproduced from: José Matos Mar, *Las Barriadas de Lima*, 1957. 2nd. ed., Instituto de Estudios Peruanos, Lima, Perú, 1977

FIGURE 2

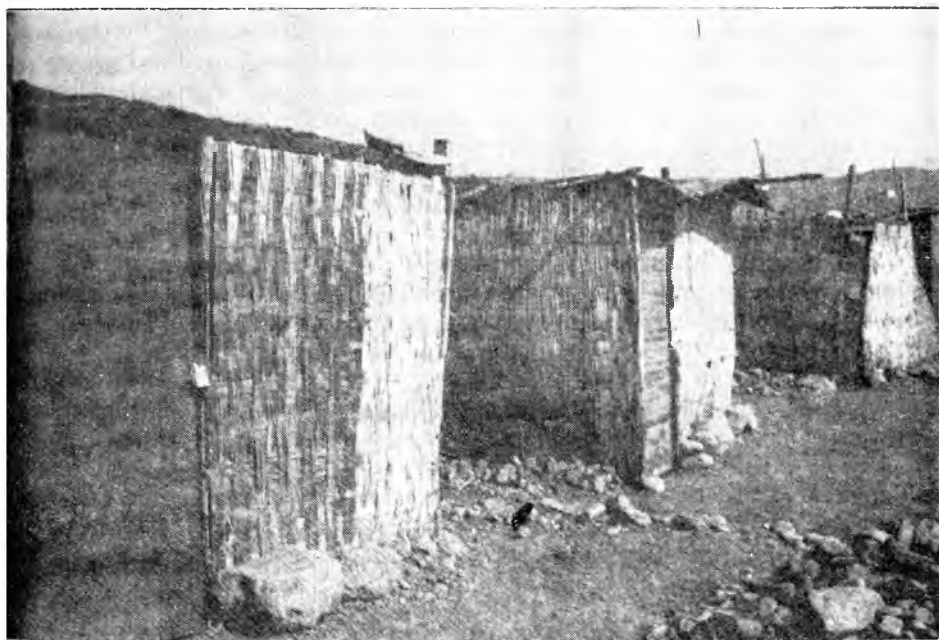


Families improve their homes as their economic situation allows. Home construction continues over many years



Public services such as electricity, water, sewerage and roads often take many years to be installed in *pueblos jóvenes*. To supply themselves with water, dwellers purchase it from tanker-trucks which have regular routes in the *pueblos jóvenes*. Water is stored in oil drums or in brick tanks.

FIGURE 3



Shacks made of *esteras* (reed mats) and wood poles are the first homes in a *pueblo joven*. This *pueblo* has formed as a result of government authorization. Each shack is built on the family's assigned lot.

The study was carried out in a health care center in a *pueblo joven* located northeast of Lima. There was little physical development in the area. No public services had been installed and there were no paved roads. About half of the homes were still made of *esteras*.

The sample was made up of 68 preschool children. These were randomly selected among those brought to the health care center by their mothers between June and August 1981.

The research tool used to gather data on family demographic and socioeconomic characteristics was a questionnaire. This was administered to mothers of the children included in the sample, in private interviews and after obtaining the mothers' consent to participate.

The 24-hour food recall was the research method chosen to collect dietary intake data. With this information, the children's diet was evaluated on a qualitative basis to measure its diversity and quality. Each diet was given a score, called the *Food Diversity Score*, based on the variety of foods consumed. Previous studies (5,6) have shown that the greater the diversity of food eaten, the greater the nutrient intake and the greater the likelihood of meeting the body's nutritional needs. To calculate the Food Diversity Scores all the foods recorded on all the 24-hour recalls were entered on tally sheets to calculate how many individuals in the sample consumed each food. Foods that were found to have been consumed by 15% or more of the sample made up what could be called the "diversity list". Each individual in the sample was assigned one point for each food on the "diversity list" eaten in the period under study. The total number of points (equal to the total number of foods on the list consumed) was the child's Food Diversity Score. The dietary quality, on the other hand, was evaluated on the basis of the extent to which the child's diet in the period under study satisfied the four-food group pattern. This score, termed the *Dietary Quality Score*, was high when the child's diet included food groups not frequently consumed by others in the sample (7). The highest score was given when a child consumed foods from all food groups. Thus, methodologically, the use of these techniques is justified, since one measures one dimension — *food complexity*, while the other measures *food quality*.

For the anthropometric assessment of nutritional status, measurements of weight and height were taken. Among children aged less than 24 months, recumbent length was measured instead of height. Children were barefoot or in stocking-clad feet with all outer clothing removed. The youngest children were weighed on an infant scale accurate to the nearest 100 grams; the older ones were also weighed, but on a bathroom scale accurate to the nearest 500 grams. Measurements of recumbent length were taken using an infantometer accurate to the nearest 0.5 cm.; height was measured to the nearest centimeter using a metric tape glued to a wall.

Each mother was asked her child's birth date. This information was verified on the health care center records. Each child's age was then calculated, estimated to the nearest month.

Nutritional status of the children, as assessed by their growth, was classified according to the Gómez (8) and the Waterlow (9) classifications (Table 1) using the NCHS growth standards of comparison (10).

A sub-sample of 15 homes was chosen randomly for visits. These were

TABLE 1
GOMEZ AND WATERLOW CLASSIFICATION OF MALNUTRITION

A Gómez Classification of Malnutrition — Weight for Age

Classification	Per cent standards*	N	o/o
BOYS N = 27			
Normal	≥ 90	2	7
First degree	89.75	12	44
Second degree	74.60	11	41
Third degree	< 60	2	7
GIRLS N = 39			
Normal	≥ 90	7	18
First degree	89.75	26	67
Second degree	74.60	4	10
Third degree	< 60	2	5

*Based on per cent of the 50th percentile of the NCHS growth standards for weight for age.

B Waterlow Classification of Malnutrition

Grade of stunting	Grade of wasting			
	0	1	2	3
A. BOYS N = 23				
0	1 (4 ^o /o)	0	0	0
1	2 (8 ^o /o)	4 (17 ^o /o)	1 (4 ^o /o)	0
2	9 (39 ^o /o)	3 (13 ^o /o)	0	0
3	2 (8 ^o /o)	0	1 (4 ^o /o)	0
B. GIRLS N = 23				
0	2 (9 ^o /o)	3 (13 ^o /o)	0	0
1	13 (56 ^o /o)	0	0	0
2	5 (22 ^o /o)	0	0	0
3	0	0	0	0

Grading: Wasting 0 = $> 90^{\circ}$ /o weight for length or height
1 = 90-80^o/o weight for length or height
2 = 79-70^o/o weight for length or height
3 = $< 70^{\circ}$ /o weight for length or height

(NCHS 50th percentile for weight for length or height as standard)

Stunting 0 = $> 95^{\circ}$ /o height for age
1 = 95-90^o/o height for age
2 = 89-85^o/o height for age
3 = $< 85^{\circ}$ /o height for age

(NCHS 50th percentile for weight for length or height as standard)

done to unobtrusively observe the living conditions so as to verify information provided during the interview. In no case was there found to be any discrepancy.

Data were analyzed on a DEC computer using the SCSS conversational system (11). Part of the analysis was done using descriptive univariate statistical procedures. Other statistical methods used included chi-square analysis, Kendall Tau-c analysis, Student's T-test, analysis of variance, and correlational analysis using the Pearson product moment correlation coefficient.

RESULTS

Demographic and Socioeconomic Characteristics of the Families

Various demographic and socioeconomic characteristics of the families of the children included in the sample, are summarized in Table 2. In addition to the characteristics listed, the responses to the questionnaire revealed that the grave problems of under- and unemployment in the city of Lima were reflected in the situation of the families. The fathers of the children held a variety of jobs, in the service or construction sectors. About half of the men were self-employed and could be classified as being in the informal service sector. Among other occupations, they worked as street vendors, shoe shiners, carpenters, painters, porters or electrical or mechanical handymen. The other half of the fathers were employees, and their most frequent occupations were as construction workers or unskilled factory laborers. A third of the fathers had had their current job for less than six months or were employed as construction workers whose job exists only for the duration of the construction project.

The father's employment was the principal, and when the mother did not work, the only source of family income. In a few of the families, school-aged children, adolescents or young adults also earned some income through employment. Twenty mothers stated that they did not know what their husband or partner earned and, thus, a weekly family income figure could not be calculated. Instead, they provided information on the amount of money they received regularly from their husbands or partners. To this was added income earned by the mother if she worked outside the home, and the weekly amount available to the mothers was calculated.

The weekly amount spent on food was compared to the weekly family income and the weekly income available to the mother. It was equal on average to 77⁰/o of the weekly family income, and 83⁰/o of the weekly income available to the mother. Adding the expenditure for food, water (which due to the inexistence of a home potable water service had to be bought from tanker trucks) and kerosene (the principal cooking fuel), it was found that on the average, these amounted to 88⁰/o of the weekly family income and to 96⁰/o of the money available to the mother.

Anthropometry

The sample was composed of 68 children, 28 boys and 40 girls with ages ranging from two to 75 months. The mean age of the boys was 25.9 months (\pm 19.1 months), while the girls tended to be older, having a mean

TABLE 2
DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS OF FAMILIES
(N = 68)

I. Mothers:		
Age:	29.2 ± 6.4 yrs	
Years of schooling:	None	18°/o
	Incomplete primary	35°/o
	Complete primary	25°/o
	Incomplete secondary	17°/o
	Complete secondary	5°/o
Occupation:	Housewives	73°/o
	Part-time ^a	12°/o
	Full-time	15°/o
Migratory status:	City natives	18°/o
	Migrants	82°/o
	Age of arrival in Lima	16.4 ± 7.7 yrs
	Length of time in Lima	13.5 ± 7.1 yrs
II. Household size and Composition		
Household size (N = 67)	<u>Mean ± SD</u>	<u>Range</u>
Number of household members	6.7	4 - 13
0-14 yrs (N = 67)	4.0	2 - 9
Number of household members, 0-5 yrs	2.5	1 - 5
Birth order of child:	First-born	12°/o
	Second or third-born	48°/o
	Fourth or fifth-born	31°/o
	Sixth or seventh-born	3°/o
	Eighth or ninth-born	3°/o
	Tenth-born	3°/o
III. Living conditions:		
Home construction materials:	<u>Esteras</u>	57°/o
	<u>Brick and esteras</u>	10°/o
	Brick and cement	19°/o
	Other materials	14°/o
Floor:	Dirt	82°/o
	Cement	18°/o
Latrine:	Yes	47°/o
	No	53°/o
IV. Income:		
Weekly family income ^b	Median (in soles)	Range
	10499	4400-18900
Weekly income available to mothers	6995	3500-14000
V. Weekly expenditures		
	<u>Mean ± SD (in soles)</u>	<u>Range</u>
water ^c	500	110-1540
Kerosene ^d	387	170- 770
Food	6946	2000-17500

^a Defined as less than 8 hrs/day of work outside the home.

^b In the period during which the interviews were conducted, the Peruvian currency dropped in value from US\$1 - 418 soles, to US\$1 - 434 soles. For conversions from one monetary unit to another, US\$1 - 425 soles is used as the exchange rate.

^c Being home potable water service inexistente, it was bought from tanker trucks and stored in oil drums or brick tanks outside the home.

^d Cooking fuel used by families.

age of 39.7 months (\pm 18.1 months). Anthropometric data for 66 children were available; for two of them (one boy and one girl) data were found to be misrecorded and thus, were discarded.

Table 1-A shows the results attained following the Gómez classification of nutritional status using the NCHS 50th percentile as standards. Less than 10% of the boys and 20% of the girls included in the sample could be classified as being in a normal state of nutrition; a little less than half of the boys and two-thirds of the girls had first-degree malnutrition; over a third and a tenth, respectively, had second-degree malnutrition and about 5% of both boys and girls had third-degree malnutrition.

The results corresponding to the Waterlow classification and the NCHS 50th percentile as standards are shown in Table 1-B. The NCHS tables of weight for height have 90 cm as the lowest value for height. Some of the children in the sample (4 boys and 16 girls) on whom such a measurement was taken, had a height of less than 90 cm. Thus, they were not included in this analysis. As observed, among both sexes there was a predominance of children with marked deficits in height for age and normal weight for length or height, suggesting a high prevalence of chronic malnutrition.

Child Feeding Practices

Breast-feeding — A child was considered to have been breast-fed when he or she had received breast milk for a week or more after birth, either exclusively or along with other foods. Children who had received breast milk for less than a week were classified as not having been breast-fed. Using this classification, 56 (82%) of the mothers had breast-fed their child, while 12 (18%) had not done so.

The length of the breast-feeding period (either exclusively or along with other foods) ranged from half a month to 42 months, the mean period being 8.9 months (\pm 8.2 months). While a quarter of the mothers had breast-fed for less than three months, almost half of them had done so for a year or more.

The use of breast milk as the sole food for infants was discontinued at an earlier age. Six of the mothers who had breast-fed had given their infants other foods since their birth. Among the other 50 mothers, the mean age at which exclusive breast-feeding stopped was 4.4 months (\pm 3.1 months). The age at which this occurred ranged from less than a month to 12 months. A third of the mothers had stopped feeding their infants exclusively breast milk by three months of age. On the other hand, another third of them stated to have fed their infants solely breast milk for more than six months.

The 12 mothers who had not breast-fed their children gave various reasons for not doing so. The most common reason given by five of them was that they had not had any milk or they had had insufficient quantities to satisfy their child's hunger. Other reasons were that the child had not wanted the mother's breast, the mother had had a breast infection, the mother or the child had been hospitalized after the child's birth, or the child had been unable to suckle properly causing milk secretion to stop.

The Kendall Tau-c analysis showed that there was no association between the practice of breast-feeding and the mother's ages (Kendall

Tau-c = -0.107 ; not statistically significant at the $p \leq 0.05$ level) and educational level (Kendall Tau-c = 0.036 ; not statistically significant at the $p \leq 0.05$ level). No association was seen either between the practice of breast-feeding and two variables related to the mother's migratory status, the age upon arrival in Lima and the number of years in Lima (Kendall Tau-c = -0.068 and 0.013 respectively; neither statistically significant at the $p \leq 0.05$ level).

Among the breast-feeding mothers, the relationships between the duration of the breast-feeding period and the mother's ages, educational level and migratory status were also analyzed. No significant differences in the duration of the breast-feeding period were found between mothers older or younger than the median age of 28 ($T = 0.8331$, not statistically significant at the $p \leq 0.05$ level) or mothers with varying educational levels ($F = 0.5953$; not statistically significant at the $p \leq 0.05$). In regard to migratory status, city natives and mothers who had arrived to Lima before or after the age of 14, had breast-fed their children for periods that were not significantly different ($F = 2.2995$; not statistically significant at the $p \leq 0.05$ level). However, as Table 3-A shows, migrant mothers who had lived for varying numbers of years in the city breast-fed their infants for periods that were significantly different. Mothers who were natives to the capital city breast-fed their infants over two months less than mothers who had lived in Lima for more than 14 years. This group, in turn, breast-fed their infants for an average of six months less than did the group of mothers who had arrived in Lima 14 years or less before.

The relationships between mother's age, educational level, migratory status and the period of exclusive breast feeding were similar to the above findings for breast feeding, with or without administering them other foods. Again, mothers who had lived for varying numbers of years in Lima had fed their infants exclusively breast milk for periods that were significantly different (see Table 3-B). Those who had lived in the city for less than 14 years fed their infants solely breast milk for, on the average, about three months longer than did mothers who had been in the city for more than 14 years and those that were city natives. Since breast feeding until a child is a year or more is customary in the rural areas of Perú, these findings suggest that among the lifestyle changes women gradually make upon arriving in the city, is a decrease in the period they breast-feed their infants rather than an abandonment of the practice altogether.

Weaning foods — A variety of liquid and semi-solid foods were given to the children as weaning foods (see Table 4). Half of the mothers gave powdered or canned milk to their children as their first weaning food. Another fifth of the mothers gave them milk, as well as other foods such as broths, pureed vegetables, fruits and porridges. In total, over 70% of the mothers stated to have given their child milk, either alone or along with other foods as the first weaning foods. The rest of the children were given broths, pureed vegetables, fruits, porridges or herbal teas.

With the exception of milk, weaning foods were generally not foods that were bought or prepared especially for the infant. Rather, among the foods consumed by the entire family, mothers would select some to feed their infants. For this purpose, broths would be separated from soups, and fruits would be mashed or sliced into tiny pieces.

TABLE 3

**A LENGTH OF BREAST FEEDING AMONG MOTHERS WHO HAVE LIVED
FOR VARYING NUMBERS OF YEARS IN LIMA^a**

(one-way analysis of variance)

	Number of Years Mother Has Lived in Lima			Total
	Born in Lima	> 14 yrs	≤ 14 yrs	
Months of breast-feeding	4.3 ± 3.9 N = 9	6.6 ± 6.5 N = 20	12.8 ± 9.0 N = 21	8.9 ± 8.2 N = 50

F = 5.4512; significant at the p < 0.05 level

^a Mothers who had not breast-fed or were still breast feeding their child at the time of the interview were not included in the analysis.

**B LENGTH OF EXCLUSIVE BREAST FEEDING AMONG MOTHERS WHO
HAVE LIVED FOR VARYING NUMBERS OF YEARS IN LIMA^a**

(one-way analysis of variance)

	Number of Years Mother Has Lived in Lima			Total
	Born in Lima	> 14 yrs	≤ 14 yrs	
Months of breast feeding	2.9 ± 2.5 N = 9	3.4 ± 2.6 N = 20	6.0 ± 2.8 N = 21	4.4 ± 3.1 N = 50

F = 5.7914; significant at the p < 0.05 level

^a Mothers who had not breast-fed or were still breast feeding their child at the time of the interview were not included in the analysis.

When comparing the use of milk as a weaning food, it was more common for mothers native to Lima to use it than for mothers who were migrants. The chi-square analysis showed that this difference had a significance barely over p = 0.05. Because milk is a relatively high-cost product, one could propose that the difference merely reflected family income levels. Among those families of which income was known, however, no significant differences in income and in income available to the mothers

TABLE 4
WEANING FOODS
(N = 67)

Foods	Number of mothers who used the foods
Milk (powdered or canned)	34 (51 ^o /o)
Broth	8 (12 ^o /o)
Pureed vegetables	2 (3 ^o /o)
Milk and broth	5 (7 ^o /o)
Milk, broth and pureed vegetables	5 (7 ^o /o)
Milk, pureed vegetables, fruit and porridges	4 (6 ^o /o)
Broth, fruit	4 (6 ^o /o)
Broth, pureed vegetables	2 (3 ^o /o)
Pureed vegetables, porridges	2 (3 ^o /o)
Herbal tea	1 (1 ^o /o)

were found between families where the mother was a native and families where she was a migrant ($T = -1.49$; not significant at the $p \leq 0.05$). It is possible that migrant mothers were using foods that are the customary weaning foods of the rural areas, where milk is less readily available. Indeed, a few of the migrant mothers mentioned that they had fed their children as was usually done in the highlands. Mothers born in Lima, on the other hand, might have been more familiar with the use of powdered and canned milk for feeding infants, and so chose to use it.

Feeding during illness – It was more common for mothers to state that they fed their children differently when he or she had diarrhea than in cases of fever. Less than a third of them stated that they varied their pattern of child feeding when he or she had a fever, while over three-fourths of the mothers did so when the child had diarrhea.

During times of fever, a majority of mothers limited the foods given their child to liquids of solid or semi-solid foods considered to be *suaves* (literally, soft). These foods included teas and “waters”, broths and porridges. Other mothers stated that the child’s diet remained much the same with only selected foods being withdrawn. These included milk, fatty foods and vegetables.

When a mother varied her habits of child feeding because her child had diarrhea, it was most common for her to restrict the child’s intake to *panetela*, a liquid made by boiling water with toasted rice and bread, carrots and cinnamon. The mixture is cooled and strained before giving it to the child. Over a third of the mothers stated that this was the only food their child received while ill with diarrhea. In addition, eight of them stated that their children’s diet remained much the same, with only selected foods being withdrawn. The food that most commonly was not given to the child while ill with diarrhea was milk.

In *pueblos jóvenes*, where environmental sanitation conditions are so often very poor, children are prone to suffer a high incidence of fevers

and diarrhea. The widely-practiced custom of limiting their intake to low-nutritive value liquid and semi-solid foods can easily negatively affect the children's growth and development, and probably makes recovery from their illnesses more prolonged.

Family Food Acquisition

Food purchases — It was the mothers' practice to shop daily for the family food at markets or small stores in the *pueblos jóvenes*. Nevertheless, in many of the families, due to the unstable nature of the father's employment or his variable earnings, there were frequent economic constraints to food purchasing. On occasions, mothers could not follow their habit of going regularly to the market, but only went when they had enough money. For the same reasons, their expenditures on food could vary greatly. Thus, expenditures on food discussed above and the "market basket" described below, should be considered to be that occurring during times when family incomes were relatively more plentiful, rather than the actual practice at all times.

Mothers were asked to recall foods they commonly bought at the market and their frequency of purchase. From the responses of all them, a "typical market basket" was developed.

Beef, the preferred and most expensive source of animal protein, was consumed frequently by very few of the families. Only two respondents mentioned buying it daily, and 12 (18^o/o) bought it at least once a week. Those women who did buy it, bought only small amounts. *Poultry*, bought in the same small quantities, was consumed by a greater number of families (51^o/o bought it at least once a week). Some varieties of ocean fish were relatively inexpensive and were the most common animal protein source, with 63^o/o buying fish at least once a week.

Meals began with soups twice a day; the minimal and essential components of soups were the "soup vegetables": carrots, celery, *zapallo* (a type of squash), leeks and turnips⁴. All these foods were bought daily by more than half of the mothers while two-thirds of them bought them at least once a week. These vegetables can be considered the most indispensable purchases; mothers mentioned that when they had little money and not enough to make a complete meal, they at least made a soup to feed their families.

A variety of vegetables were purchased for other purposes. Tomatoes and onions, which are used in the *aderezo* (seasoning) of many dishes, were the vegetables most frequently purchased. About 25^o/o bought both of them at least once a week. Other vegetables included broad beans, cauliflower, cabbage, spinach, string beans, peas and lettuce.

Among the starchy products, rice, noodles, and potatoes were the food items most frequently purchased. Over two-thirds of the respondents bought the three foodstuffs at least once a week. These foods were eaten as the bulkiest part of the *segundo* (the course of a meal following the soup), or as an ingredient in soups.

4 Other ingredients that could be added were noodles, rice, potatoes, chicken and additional vegetables.

Dry legumes were purchased occasionally by a small number of mothers. Their relatively high cost and the long cooking period they require were mentioned as reasons for not consuming them more often.

Bananas, an inexpensive fruit available year round, was the fruit purchased by the greatest number of mothers; about a third of them bought some at least once a week. Other fruits mentioned less frequently to have been bought included oranges, tangerines and apples. Fruits were considered by most of the mothers as "extras", or as treats for their children to be bought whenever there was a little additional money. Many stated to be unable to ever buy fruit.

Gardening and raising of animals — Home-growing of vegetables or fruits was done by only one of the families interviewed. Mothers cited the difficulties for obtaining water, the inadequate soil (the *pueblo joven* was located on a sandy plain) and the small size of their lots, as reasons for not practicing gardening.

On the other hand, two-thirds of the families kept animals: ducks and/or chickens were raised by almost all of them. Comments made by mothers regarding the raising of animals suggested that this practice made a significant contribution to the family diet. For many, the raising of animals was a kind of "food insurance": "at times when we do not have enough income to purchase all the needed food, one of the animals can be killed to include in the day's meals". Thus, the infrequent purchasing of animal products seen above may not have reflected the actual consumption of the families.

Child Food Intake — Analysis of the 24-hr Food Recalls

Children up to one year of age — Thirteen children included in the sample were aged 12 months or less. Four of these were being breast-fed at the time of the interview, but all were being fed other foods as well. Breast milk was given on demand during day or night. All other foods were fed in three daily meals.

Liquid foods predominated in the diet of children of one year or less (Table 5-A). Milk, in either a powdered or canned form, was the food most commonly fed. Over three-fourths of the mothers stated to have fed it to their children at least once in the 24 hours previous to the interview. The frequent consumption of milk in this and other age groups was because, as the children were clinic patients, their mothers periodically received powdered milk free.

For the non-breast feeding child in this age range, the morning meal consisted of either milk or sugared tea, fed with a bottle or a cup and spoon. At noontime or in the early afternoon the child was fed a cupful of broth and small pieces of the solid ingredients in the soup. From the family's *segundo*, several tablespoons of rice or a mashed piece of potato or *zapallo* may also be given or bite-size pieces of chicken or fish. But exactly what foods are fed to the child depends on what the family meal is.

Seven food categories (1. milk (powdered or canned); 2. broths; 3. fish, poultry or beef; 4. potatoes; 5. teas and herbal teas; 6. Sugar; 7. breast milk) were consumed by at least 15% of the children and were used to calculate the children's Food Diversity Scores. Out of a possible

Food Diversity Score of seven, the children's scores ranged from one to six ($\bar{x} = 3.4 \pm 1.6$).

The Dietary Quality Scores and the classification of foods used to calculate them are shown in Table 6-A. Breast-fed children were not included in this tabulation because it was impossible to know how much breast milk they received and, therefore, to what extent it compensated for a lack of one or more of the food groups in the diet. None of the children had consumed vitamin C-rich foods. Only one child had consumed food from the four main groups and had had, among these foods, a vitamin A-rich one.

Children between one and two years of age — Fourteen of the children included in the sample were between one and two years of age. Two of them were still being breast-fed. In this age range, boiled rice and broths or soups were found to be the foods most commonly fed (see Table 5-B). Several of the children were given only the broths of the family soups, but a majority were fed soups with all the solid ingredients.

Ten food categories (1. milk (powdered or canned); 2. soups or broths, 3. fish, poultry or beef, 4. rice, 5. potatoes, 6. tomatoes, 7. bread, 8. margarine, 9. teas and herbal teas, 10. sugar, were consumed by at least 15% of the children and were used to calculate the children's Food Diversity Scores. From a possible Food Diversity Score of ten, the children's score ranged from one to ten with half the children having a score of six or more ($\bar{x} = 5.4 \pm 2.7$). Thus, compared to the younger children, those in this age range received a more diversified diet.

The Dietary Quality Scores and the classification of foods used to calculate them are shown in Table 6-B. Vitamin C-rich foods were not consumed by any of the children, only one child had had foods from the four main food groups and among the fruits and vegetables eaten, one rich in vitamin A. Over three-fourths of the children had had foods from all food groups but one. Thus, comparing their intake to that in the younger group, an improvement in the quality of the diet is seen.

Children above the age of two — Forty-one of the children were over the age of two. Teas, boiled rice, soups and bread had been fed to over three-fourths of the children and milk, sugar and fish, poultry or beef had been fed to over half of them (Table 5-C).

Twelve food categories (1. milk (powdered or canned), 2. soups, 3. fish, poultry or beef, 4. rice, 5. potatoes, 6. bread, 7. teas and herbal teas, 8. sugar, 9. rolled oats, 10. bananas, 11. eggs, 12. beans) had been consumed by over 15% of the children and were used to calculate the Food Diversity Scores. Out of a maximum Food Diversity Score of 12, the children ranged from one to 11 and had a median score of seven ($\bar{x} = 6.5 \pm 2.0$). The data reveal, compared to the other two age groups, this one had the greatest dietary diversity.

The children's Dietary Quality Scores are shown in Table 6-C. In contrast to the younger ones, three of those in this age range obtained the maximum quality score. About a third of them had consumed foods from the four food groups, and among them a vitamin A-rich fruit or vegetable. In this age range, children received the diet of highest quality.

Overview of dietary changes with age — The collection of 24-hour food recalls shows that as children grow, their diets become more diversified and of better quality due to the inclusion of solid foods. Apparently,

TABLE 6

DIETARY QUALITY SCORES

A. Dietary Quality Scores of Non-Breast Feeding Children Twelve Months of Age or Less. N = 9

Dietary quality level	Score	No. of children receiving score	% of children receiving score
1. Present in 24-hour recall: Four food groups ^a and a vitamin C-rich fruit, or vegetable ^b , and a vitamin A-rich fruit or vegetable ^c	6	0	0
2. Four food groups and a vitamin A-rich fruit or vegetable	5	1	11
3. Four food groups	4	2	22
4. Milk, cereal, fruits, and vegetables	3	1	11
5. Milk, cereal	2	3	33
6. Milk	1	2	22
7. None of the groups	0	1	11

B. Dietary Quality Scores of Non-Breast Feeding Children Between One and Two Years
N = 12

1.		6	0	0
2.	Same	5	1	8
3.	levels	4	6	50
4.	as	3	4	33
5.	above	2	0	0
6.		1	0	0
7.		0	1	8

C. Dietary Quality Scores of Children Above the Age of Two Years
N = 41

1.		6	3	7
2.	Same	5	14	34
3.	levels	4	10	24
4.	as	3	10	24
5.	above	2	2	5
6.		1	1	2
7.		0	1	2

^a These are the following: 1. dairy products; 2. cereals; 3. beef, poultry, fish, eggs, dry beans; 4. fruits and vegetables.

^b Defined as a fruit or vegetable containing at least 30 mg of ascorbic acid per 100 g edible portion (Perú, Ministerio de Salud, Instituto de Nutrición, *La Composición de los Alimentos Peruanos*, 1974).

^c Defined as a fruit or vegetable containing at least 1666 IU of vitamin A per 100 g edible portion (Perú, Ministerio de Salud, Instituto de Nutrición, *La Composición de los Alimentos Peruanos*, 1974).

as children grow, mothers feel that more and more of the foods consumed by the rest of the family are appropriate for them. By the age of two, most of the children appear to be eating the majority of foods served to other members of the family.

Children under the age of one who are not receiving breast milk seem to be receiving a diet that could be insufficient to cover their nutritional needs. Foods customarily given to children of that age are mostly of low-caloric density. If milk is not provided daily, and during times it was not provided by the clinic, —as it appears was the case— the only other source of animal protein are small bits of chicken or fish. This age appears to be the most nutritionally vulnerable.

The scarcity of fruits and vegetables in the diet of preschoolers of all ages may also be cause for concern. Apparently, the main source of vegetables (other than potatoes) are those used in soups, but the custom of boiling these for long periods of time and feeding the children only the broths, may decrease the vitamins available to them. As stated above, fruits were not purchased often by the mothers, and their children seemed to receive them only infrequently.

Relationships between family characteristics and child growth and food intake — In this analysis, the indices of child growth used are height-for-age (in children under the age of two, length for age) and weight-for-height (in children under the age of two, weight for length) using the NCHS 50th percentiles as standards. The measures of the children's food intake used are food diversity and dietary quality. Because in computing the Food Diversity Scores, the children were divided into three age groups and each of these had different "diversity lists", it was necessary to standardize their scores before grouping the children together to perform the analysis. This was done by converting each child's Food Diversity Score to its "Z" value, using as mean and standard deviation that of its age group. The three age groups of children had a very similar ordering of food groups for the dietary quality scoring so no standardization of these scores was done.

Family characteristics and child growth — Associations between economic characteristics of the families such as father's occupation, family income, income available to the mother, food expenditures and per cent income spent on food and child growth were examined. The growth of children whose fathers were self-employed at the time of the interview, was compared to that of those whose fathers were employees. Children of self-employed men had lower mean height-for-age and weight-for-height values, but the differences were not significant at the $p \leq 0.05$ level (T values equal to 0.9418 and 0.0283 respectively).

The correlations between other economic characteristics of the family and child growth are shown in Table 7. There are no statistically significant correlations in the expected direction. Perhaps this was not seen due to the frequently changing earnings of the father (see above) which made the economic characteristics of the family learned during the interview, unrepresentative of the long-term economic situation of the families.

Relationships between selected family socio-demographic characteristics and growth of the children were also examined. As Table 2 shows, among the variables related to family size and composition, only the

TABLE 7

**FAMILY ECONOMIC CHARACTERISTICS CORRELATED WITH INDICES
OF CHILD GROWTH**

(Expressed as Pearson product moment correlation coefficients;
absolute numbers in parentheses)

Economic characteristics	(Per cent of NCHS 50th percentile)	
	Height for age ^c	Weight for height ^d
Weekly family income	0.096 (37)	-0.034 (37)
Weekly family income <i>per capita</i>	-0.006 (36)	-0.076 (36)
Weekly income available to mother	-0.437 ^e (20)	0.298 (20)
Weekly income available to mother <i>per capita</i>	-0.426 ^e (20)	0.361 (20)
Weekly income spent on food	-0.052 (63)	-0.029 (63)
Per cent income spent on food	-0.028 (37)	-0.020 (37)
Per cent income available to mother spent on food	0.248 (20)	0.281 (20)

Household size	-0.011 (64)	0.054 (64)
Number of household members less than 14 years of age	-0.113 (64)	0.037 (64)
Number of household members less than five years of age	-0.227 ^h (64)	0.011 (64)
Birth order of child	-0.198 ^h (65)	0.036 (65)
Mother's education	0.191 (62)	0.029 (62)
Income spent on water	0.220 ^h (51)	-0.039 (51)
Length of breast-feeding period (Children who were not breast-fed are excluded)	0.158 (47)	0.230 (47)

^c With children under the age of two, the index was length for age.

^d With children under the age of two, the index was weight for length.

^e Significant at the $p < 0.05$ level.

^h Significant at the $p < 0.05$ level.

number of household members less than five years of age and the child birth order were significantly negatively correlated to height-for-age. This suggests that large families *per se* may not increase the nutritional risks to preschool children. On the contrary, they may be of nutritional benefit to young children for in them there may be more members contributing economically. Families in which there are several non-economically contributing preschool children, however, may be in a very different situation. In addition to a deteriorating economic situation, there could be less maternal care devoted to the child.

As far as the mother's education and occupation is concerned, Table 8 shows that the first of these variables was not significantly correlated with child growth. The growth of children whose mothers worked part-time and full-time away from their homes and the children of housewives was compared using one-way analysis of variance. In spite of difficulties of child care encountered by working mothers, no significant differences in height-for-age and weight-for-height were found ($F = 0.3640$ and 1.5040 respectively; both not significant at the $p \leq 0.05$ level).

TABLE 8

GROWTH OF CHILDREN AND FAMILY SOCIAL CHARACTERISTICS
(Student's T test)

	(Per cent of NCHS 50th percentile)	
	Height for age	Weight for height
Existence of latrine ^a	T = 0.8679	T = 1.6351
Breast-feeding ^b	T = 0.1296	T = 1.1025
Change of feeding during diarrhea ^c	T = 0.9089	T = 1.2655
Change of feeding during fever ^d	T = 0.1241	T = 1.0089
Raise animals	T = 0.8786	T = 1.0105

^a Respondents were asked whether or not they had a latrine.

^b Respondents were asked whether or not the child had been breast-fed for a period greater than one week.

^c Respondents were asked whether or not they changed their child's feeding during episodes of diarrhea.

^d Respondents were asked whether or not they changed their child's feeding during times of fever.

^e Significant at the $p \leq 0.05$ level.

Poor environmental conditions may play a significant role in growth retardation. As shown in Table 7, the income spent weekly on water was found to be positively correlated in a statistically significant way with height for age. All mothers bought water at the same price per volume, so that income spent on water is a proxy for amount of water purchased. The association of increasing family expenditure on water and improved child growth can be explained by the fact that families who purchase more water have more available for tasks such as washing and bathing,

lessening the risks of contamination and infections.

Using one-way analysis of variance to compare the growth of children whose mothers differed in migratory status, no statistically significant differences in height-for-age and weight-for-height were found between children of city natives and of mothers who arrived in Lima before or after the age of 14 ($F = 0.6386$ and 2.2639 respectively; both not statistically significant at the $p \leq 0.05$ level). A similar result was obtained when the growth of children of native mothers and migrant mothers who had lived for different numbers of years in the city was compared.

Neither the breast-feeding practice (Table 8) nor its duration (Table 7) had any significant relationship with the measures of child growth. A similar result was found for the practice of varying child feeding patterns at time of illness and the raising of animals for consumption (Table 8).

Family characteristics and child food intake — Relationships between economic characteristics of the families and the diversity and quality of the children's diet were examined. Children of fathers who were self-employed and those of fathers who were employees consumed diets of similar diversity and quality ($T = 0.8857$ and 0.5880 respectively, both not significant at the $p < 0.05$ level). Table 9 lists other family economic characteristics and their correlation with child food diversity and dietary quality. A significant correlation with family income was not found; yet, a positive one did exist between the income available to the mother and food diversity. This suggests that it is the income available to the mother rather than the family income *per se* which more closely determines child food intake and through that, perhaps child well-being. The weekly income spent on food was also positively correlated in a statistically significant way with child food diversity and dietary quality.

The relationships between selected family socio-demographic characteristics and the food intake of the children were also examined, as Table 9 depicts. Characteristics related to family composition were not associated in a statistically significant way with child food intake, but indicate a tendency for there to be less diversity and quality in the children's diet with greater family size and greater number of children.

Mother's occupational status was not associated in a significant way with child food diversity nor dietary quality ($F = 2.1446$ and 1.8842 ; both not statistically significant at the $p \leq 0.05$ level). Food intake of children of native mothers, and mothers who arrived in Lima early or later in life, were not found to be significantly different in either diversity or quality ($F = 0.6235$ and 2.2168 respectively; not statistically significant at the $p \leq 0.05$ level). Neither did the children of families who raised animals have significantly different food diversity and dietary quality, compared to those of families who did not to do so ($T = 0.6084$ and 0.2958 respectively; neither statistically significant at the $p \leq 0.05$ level).

TABLE 9

**FAMILY ECONOMIC CHARACTERISTICS CORRELATED WITH
MEASURES OF CHILD FOOD INTAKE**
(Expressed as Pearson product moment correlation coefficients;
absolute numbers in parentheses)

Economic characteristics	Food diversity (Food diversity score converted to its Z value)	Dietary quality (Dietary quality score)
Weekly family income	0.169 (37)	0.070 (37)
Weekly family income <i>per capita</i>	0.172 (36)	0.038 (36)
Weekly income available to mother	0.368* (20)	0.322 (20)
Weekly income available to mother <i>per capita</i>	0.110 (20)	0.042 (20)
Weekly income spent on food	0.215* (65)	0.241* (65)
Per cent income spent on food	0.094 (37)	0.243 (37)
Per cent income available to mother spent on food	-0.316 (20)	0.136 (20)
Household size	-0.022 (67)	0.004 (67)
Number of household members less than 14 years of age	-0.123 (67)	-0.048 (67)
Number of household members less than five years of age	-0.017 (67)	-0.085 (67)
Child birth order	-0.105 (68)	-0.175 (68)
Mother's education	0.094 (65)	0.059 (65)

* Significant at the $p < 0.05$ level.

DISCUSSION

This study reveals that families of the *pueblos jóvenes* of Lima live in situations that can easily compromise their health and nutritional status. Their low income forces an average of nearly 80% of it to be spent on food. It has been stated that when food expenditures constitute such a large proportion of family income, it is not possible to make

a varied selection of foods for the diet to be quantitatively and qualitatively adequate. Instead, earnings are used to buy food that will best satisfy feelings of hunger (12). It seems to be occurring among these families, since ingredients for soups and bulky, starchy foods are the main purchases. As family income increases, a smaller proportion of it is spent on such food, and food diversity and dietary quality improve.

The nutritional status of children was found to be poor; various factors put them at great nutritional risk. Firstly, there is a decline in the duration of breast-feeding after mothers arrive in Lima. Many of the more commonly fed weaning foods are of low caloric density and animal products, vegetables and fruits are only fed in small amounts or infrequently. It is only by the age of two that children receive a more diversified and better-quality diet that includes a majority of the foods served in the family meals. Therefore, it would be beneficial to promote the continuation of breast feeding (while supplementing the diet with other foods) until past the first year of life, when sufficient animal protein, solid and calorie-dense foods start to be given.

Instructing mothers about low-cost nutritious foods that would be more appropriate as weaning foods would also be beneficial. Nevertheless, because mothers choose foods for their infants from those included in the family meal, the weaning foods must be ones that can also be included as part of the meal for the entire family. Perhaps a nutrient-rich food that could be added to soups so as to enhance their flavor for the rest of the family members while dissolving in the broth fed to the youngest child might be beneficial. The need to supplement a breast-feeding infant's diet after the age of six months should also be expressed to avoid having infants fed solely breast milk until a later age, as it was found a group of mothers stated to have done. Any efforts at nutrition education must take into consideration the mothers' educational level as well as other aspects of their social and economic milieu.

The poor sanitary conditions in the *pueblos jóvenes* bring about infections and illnesses, and are an additional risk to the children. It is noteworthy that child height-for-age is positively correlated to income spent on water, a proxy variable for the amount of water purchased.

Poor sanitary conditions are likely to continue to be one of the main factors having a negative effect on child growth for a long time to come. Installation of potable water services for Lima's *pueblos jóvenes* present formidable problems. Many *pueblos jóvenes* have formed at such far distances from the city or on such steep hills, that supplying them with water has a prohibitive cost. Even if the costs were not as great as they are, it would still be impossible to establish the service because the city water supply is insufficient (13). Currently, a vast project to supply water to the city by diverting it from the highland Mantaro river is underway. Water from that source will begin to be available in 1986 but the urban area's growing needs will only years later surpass its capacity (14).

In determining child food intake, a greater importance of the income available to the mother rather than family income was seen. Thus, measures that would increase mothers' purchasing power could perhaps more directly enhance child well-being than could measures directed to increase family income.

Children of families with a greater number of non-economically con-

tributing members seem to be at greater nutritional risk. Limiting family size through an easier availability of effective birth control methods may be a way to improve the nutritional status of children.

The raising of animals appears to increase the availability of animal products to the family and can provide meals when there are economic constraints to food purchasing. No benefit to the nutritional status of the children, as assessed by their growth and food intake, is seen. The association with nutritional status needs to be investigated more closely. Studies such as that of Immink, Sanjur and Colón (15) have shown that home gardens play a role in improved child nutritional status and intuitively, it seems the raising of animals could have the same effect.

The above measures, valuable as they may be in helping to meet the nutritional needs of children in the *pueblos jóvenes*, do not address the ultimate cause of their malnutrition: the poverty of their families. This will only be alleviated through an increase in the employment opportunities in the city, and more fully, through improvements in the living conditions throughout Perú, so as to decrease Lima's attractiveness to migrants. That will ultimately require profound social and economic changes in Peruvian society.

RESUMEN

HOGARES PARA LOS MIGRANTES: LOS PUEBLOS JOVENES DE LIMA — UN ESTUDIO DE LOS FACTORES SOCIOECONOMICOS DETERMINANTES DE LA DESNUTRICION INFANTIL

Se investigó la ecología familiar de un grupo de 68 niños preescolares que asistían a un centro de salud en un *pueblo joven* de Lima, Perú, con miras a determinar su influencia en el estado nutricional de esos niños de escasos recursos económicos. Algunos de los parámetros sometidos a estudio incluían el ingreso familiar, el ingreso disponible a las madres de los niños, la composición familiar, la historia de migración de las madres, las prácticas alimentarias de los niños, y las condiciones de la vivienda familiar. El estado nutricional de los niños fue evaluado a través de la antropometría nutricional y la dieta acostumbrada. Los resultados sugieren la existencia de desnutrición generalizada. Si bien la práctica de la lactancia materna se acostumbraba, una vez ocurría el destete, las dietas de los niños eran pobres en calorías y poco variadas. La dieta familiar se caracterizaba por sopas y alimentos ricos en carbohidratos, y los niños participaban de ella por completo al alcanzar la edad de dos años. Su crecimiento se encontró asociado negativamente con el número de preescolares y su orden de nacimiento, y positivamente asociado con la cantidad de ingreso gastado en la compra de agua. Se encontró que la dieta de los niños, a su vez, estaba positivamente asociada con el ingreso disponible a las madres, así como con el ingreso empleado en la adquisición de alimentos.

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