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NUTRITIONAL STATUS IN LATIN AMERICA AND THE CARIBBEAN:

REVIEW OF THE CURRENT SITUATION AND ITS EVOLUTION WITH SUGGESTIONS FOR A COURSE OF ACTION FOR THE AGENCY FOR INTERNATIONAL DEVELOPMENT

January 1986
Raleigh, North Carolina

Sigma One Corporation

Nutritional Status in Latin America and the Caribbean:

Review of the Current Situation and its Evolution with Suggestions for a Course of Action for the Agency for International Development

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prepared by:

Marielouise W. Harrell, M.S.
and
David L. Franklin, Ph.D.

in collaboration with:

Isabel Vial de Valdes, Lic. S.
and
Cutberto Parillon, M.D.,M.S.,M.P.H.

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TABLE OF CONTENTS

Section		Page
EXECUTIVE SUMMARY		i
1.0	ASSESSMENT OF NUTRITIONAL STATUS IN LATIN AMERICA AND THE CARIBBEAN	1
1.1	The Current Nutritional Situation in Latin America and the Caribbean	4
1.1.1	Measurements of Nutritional Status in Latin America and the Caribbean	12
1.1.2	Correlates of Malnutrition	22
1.2	Assessment of the Trends in Health Status in Latin America and the Caribbean	29
1.2.1	Mortality Information	29
1.2.2	Micronutrient Deficiencies	39
1.2.3	Environmental Health	47
1.3	The Food Situation in Latin America and the Caribbean	52
1.3.1	Food Consumption and Food Expenditure	61
1.3.2	Composition of the Diet	68
1.4	Population Groups Most Seriously Affected by the Nutritional Situation in Latin America and the Caribbean	81
1.4.1	The Urban Population	83
1.4.2	The Rural Population	85
.0	A FRAMEWORK FOR RECOMMENDATIONS FOR POLICY AND STRATEGIC ACTIONS TO ADDRESS THE NUTRITIONAL PROBLEMS IN LATIN AMERICA AND THE CARIBBEAN	89
2.1	The Policy Environment for Health	92
2.2	Health Strategy and Plan of Action	98
2.3	The Policy Environment for Food and Agriculture	100
2.4	Food and Agriculture Strategy and Plan of Action	107

		Page
BIBLIOGRAPHY	.....	113
Appendix A: Data Development	.....	125
Appendix B: Anthropometric Indicators	.....	179
Appendix C: Nutritional Status of Preschoolers in Central America and Panama by Age	.....	203

LIST OF FIGURES

Figure		Page
1	Causal Model of Nutritional Status	5
2	Plot of "Predicted Values" for the Prevalence of Malnutrition from Regression Model versus the Observed Prevalence for Countries with Available Data	28
3	Trends in General Mortality and Child Mortality for Selected AID Assisted Countries in Latin America and the Caribbean	31
4	Trends in the Coverage of Safe Water by Urban and Rural Areas in Latin America (selected countries)	48
5	Trends in Income, Food Production and Calorie Availability for Selected Latin American and Caribbean Countries	53
6	Composition of the Diets in Selected Countries	72

LIST OF TABLES

Table		Page
1	Trends in Welfare Indicators for Selected Countries within Latin America and the Caribbean between 1965 and 1984	6
2	Health Indicators for Selected Countries in Latin America and the Caribbean in the 1980's	10
3	Percentage of Preschool Children by Degree of Malnutrition According to the Gomez Classification for Selected Countries Within the LAC Region, 1970's to 1985	15
4	Percent of Children with Chronic or Acute Malnutrition in Selected Countries in the LAC Region (1965 to 1985)	20
5	Correlation Coefficients of Economic and Health Indicators with the Prevalence of Moderate and Severe Malnutrition in Latin America and the Caribbean	24
6	Correlation Coefficients of Economic and Health Indicators with the Incidence of Child Mortality and Low Birth Weight in Latin America and the Caribbean	26
7	Female Life Expectancy at Age 5 in Selected Countries in Latin America and the Caribbean (1950's to 1970's)	40
8	Percentage of Women in Selected Latin American and the Caribbean Countries with Hemoglobin Levels Below the WHO Norm of 12mg/ml.	41
9	Incidence of Vitamin A Deficiency in Children Under 5 Years of Age and in the Total Population in Selected Countries in Latin America and the Caribbean	44
10	Incidence of Vitamin A Deficiency in Children Under 5 Years of Age in Selected Central American Countries During the 1960's and 1976-1980	45

11 Proportions of Populations Consuming Less than FAO/WHO Calorie Recommendations (with Projections to 1990) 62

12 Measures of Food Consumption for Urban and Rural Households by Income Food Strata in Panama in 1980 64

13 Variation in Per Capita Calorie Consumption in Peru for Several Years between 1950 and 1980 65

14 Food Consumption Data for Urban and Rural Areas in Ecuador in 1975 67

15 Percentage of Total Expenditures Spent on Major Food Groups by Consumers in the Dominican Republic at Different Levels of Expenditure (1977/78) 69

16 Percentage of Total Expenditures Spent on Major Food Groups by Poor Households in the Dominican Republic, Ecuador and Peru During the 1970's 70

17 Composition of the Diet for Selected Countries in the Caribbean in 1980 80

18 Estimates of Net Protection of Rice and Maize for Selected Countries in Latin America and the Caribbean from 1970 to 1982 103

EXECUTIVE SUMMARY

This report presents the results of a review and analysis of the current situation and recent evolution of nutritional status and some of its determinants and correlates for Latin America and the Caribbean. The purpose of the report is to assist the Division of Health and Nutrition of the Bureau for Latin America and the Caribbean of The Agency for International Development in identifying and formulating strategic approaches towards the solution of nutritional problems that have been identified or might be forecasted to evolve.

The report is based on reviews of extant data and documentation from various official sources and on interviews with representatives of AID/Washington, the World Bank, PAHO, USDA, CFNI, INCAP, various USAID missions and ROCAP. The data consists of aggregated time series data from official statistical sources, published reports on cross-sectional (within country) studies and on assorted documentation regarding specific studies, evaluations and programs.

The approach of the effort was to relate the available recent data on nutritional status to contemporaneous information on factors which are generally accepted as determinants or correlates of nutritional status. In these analyses nutritional status is represented by the prevalence of acute and chronic malnutrition as given by anthropometric indicators. Childhood mortality and the prevalence of low birth weights were used as auxiliary dependent variables in the analyses. All other factors considered are treated as determinants or correlates of one or

more of the measures of outcome. Importantly, food availability, composition of diets and food consumption are viewed as determinants of nutritional outcomes and not as measures of nutritional status themselves. The assessment of the evolution of the nutritional situation is thus based on a retrospective review of the available historical (time indexed) information on measures of nutritional status, and of factors known to be causally (determinants) or statistically (correlates) associated with nutritional status. The interpretations of the evolution of the interrelationships are not based on direct statistical estimation, but rather on what are generally accepted to be causal relationships as given by the recent literature on nutrition and its relationship to food and feeding and to economic, health and social factors.

The principal findings are:

o Three in every 100 preschoolers in the Latin America and Caribbean region are severely underweight (Gomez grade III); an additional 20 percent are moderately underweight (Gomez grade II);

o Almost half of the children in Central and South America are suffering from chronic malnutrition as evidenced by short stature for their ages; the risk of chronic malnutrition is twice as great in rural areas. All this implies that chronic malnutrition continues to be an important problem in Latin America, whereas it does not appear as important in the Caribbean sub-region.

o Anemia is widespread in the under five age group and in adult women; it is more prevalent in the Caribbean and Central America than in South America. Endemic goiter continues to be an important problem in the Andean countries. Obesity is a major problem in the Caribbean sub-region, particularly among adult women.

o On a national level, the availability of calories in most countries in Central and South America is below the recommended nutritional norm, whereas availability of calories in the Caribbean varies between 100 and 130 percent of the

recommended norm. In Latin America and the Caribbean, supplies of protein tend to be well above the required norms and in general there would not be a problem with micronutrient deficiency if energy levels were adequate.

o The distribution of the available nutrients is, however, inequitable. A large proportion of households, estimated to be as high as 40% do not get adequate supplies of food energy. The food intake problems are not problems of starvation but problems of persistent undernutrition aggravated by household and country level economic, political and climatic crises on a recurrent basis.

o The maldistribution of nutrients has been associated with the skewed distribution of incomes and with the composition of households. The poor and the large families are the most underfed. Poverty also falls with a disproportionate incidence on women. The incidence of poverty in rural areas is more than twice that of urban areas, but close to one fourth of urban dwellers live in absolute poverty.

o Low income families in rural and urban areas rely heavily on the market for food purchases; since their incomes are also highly unstable they are exposed to repeated risks of under nutrition.

o The average infant mortality rates in 1983 for countries in South America varied between 36 and 123 deaths per 1000 live births. In Central America the average infant mortality rate is high at 67 deaths per 1000 live births.The average infant mortality rates in the Caribbean vary between 10 and 107 deaths per 1000 live births.

o For the countries of the region the prevalence of severe and moderate malnutrition (Gomez criteria applied to weight for age measurements) was shown to be statistically correlated with measures of public and private coverage of health services, sanitation and calorie availability on a cross country basis.

o For those countries with active USAID missions, low per capita income is also an important correlate of the prevalence of malnutrition and the relationship of malnutrition to health and food availability indicators is stronger than for the countries of the LAC region taken as a whole.

o Certain countries exhibit nutritional problems of greater magnitude than those predicted by the country level socio-economic indicators, specifically Haiti, Honduras, Guatemala, Brazil and Mexico; other countries have experienced substantial improvement, such as Chile, Costa Rica, Colombia, Jamaica and Panama. Within this latter group, malnutrition and poverty persist for significant population groups.

Policy and Strategy Recommendations

Malnutrition continues to be an important problem in the AID assisted countries of the Latin American and Caribbean region, particularly in Central America and the Andean sub-regions. There is much that can be done through policy initiatives and significant programmatic activities are required. In fact, specific project activities are required in the area of nutrition to facilitate and enhance the possibilities of success of ongoing initiatives in economic, agricultural and private sector policy reform.

A nutritional policy in the AID assisted countries of the Latin American and Caribbean region should focus primarily on two aspects - income generation through off-farm employment and health service provision. Only secondarily should a nutritional policy focus on increased food output. The focus on agricultural policy would be to remove the distortions impeding optimal resource allocation in the rural sector. An important caveat is that optimal resource allocation may imply accelerated rural-to-urban migration and in some countries higher food costs in the short run.

The nutritional problems of the region have been diagnosed to be amenable to improvement through:

1. Increasing the consumption of food of all types by low income rural and urban households;

2. Increasing the effective demand (income) of poor households by improving employment opportunities of workers in service occupations (e.g. marketing) in rural and urban areas and by increasing labor productivity (investments in human capital) in small and large scale agriculture;

3. Improvement in coverage of private and public health services and water and sanitation services with particular emphasis in rural areas.

4. Providing nutrition related health services to women of child bearing age and mothers of young children in addition to the ongoing child survival initiatives. These programmatic actions must be designed to account for the very long working hours of many women in rural and urban areas.

The Spanish speaking countries and Haiti require assistance in all four areas. From a nutritional point of view, the rest of the Caribbean requires assistance primarily in the fourth area--maternal and child health cum nutrition assistance.

The policy reforms being undertaken in several countries will greatly improve the labor income situation (item number 2), but the effects will be seen in the long run. In the area of health care, the AID assisted countries are already spending a large share of their fiscal budgets on public health services; private financing and cost sharing alternatives must be developed to extend the coverage of basic services. Finally, as the countries of the region respond to the debt crises, and as they seek more neutral structures of incentives, the food consumption situation of low income urban dwellers and some rural households will be placed at even greater risk. For all of these reasons, it is important that specific nutritional activities be included in AID assistance. Some of the approaches that should be considered in the areas of health and food and agriculture include the following:

Health

1. Reorient existing curative services to prevention of disease and towards education in the management and prevention of infectious disease at the household level.

2. Involve private sector professional and traditional service providers in preventive care through prepaid and other incentive approaches that create incentives for households to take the initiative in preventive care and improving household sanitary conditions.

3. Strengthen immunization programs, particularly to emphasize continuity of coverage.

4. Encourage the establishment of private clinics near or at market places in urban and rural areas; use market places to disseminate nutrition and health self-help information.

5. Enter into policy dialogue to eliminate or reduce subsidies and price controls on curative medicines (e.g. there is probably an excessive use of antibiotics);

6. Use resources to promote community based health and nutrition practices. In selected cases, PL480 Title II foods of high economic value could be used to compensate participants for the value of their time used in such activities.

7. Re-structure water and sewerage tariffs in urban areas to eliminate subsidies to higher income areas and extend coverage to marginal urban and rural areas on a cost sharing basis. Local currency generations of PL480 sales could be used to finance the labor costs of such activities and financing should be provided for the foreign exchange components.

Agriculture and Food

1. Assist country leaders to recognize that the problems of nutrition are problems of poverty and that these problems are concentrated in rural areas and rural dwellers need assistance in increasing the productivity of their labor as farmers, laborers and marketers.

2. Maintain or increase the emphasis on neutral structures of incentives such as exchange rate reform; these efforts will generally tend to favor agricultural labor and the production of commodities that the poor produce and consume.

3. Increase the support to agricultural research for small scale agriculture, particularly labor saving innovations, such as weed control and minimum tillage techniques.

4. Provide assistance for improving the agricultural marketing systems with an emphasis on increasing the productivity of small scale traders and retailers; with small scale operating capital and improved communications as priority areas.

5. Use PL480 Title I and III resources to finance roads, communications, small scale marketing infrastructure, agricultural research and extension. Also, in selected cases, consideration should be given to the use of PL480 (all titles) food assistance to specific population groups to facilitate the transition to market oriented policies for the country as a whole.

1.0 ASSESSMENT OF NUTRITIONAL STATUS IN LATIN AMERICA AND THE CARIBBEAN

The Latin American and Caribbean region consists of countries which vary substantially in climatic conditions, indigenous populations, economic conditions, and political maturity. The rapid economic growth of countries in the Latin American and Caribbean region during the postwar years brought benefits to many population groups, but the growth process was uneven, among countries and within countries. The rate of economic growth of the region varied annually up to 5 percent during the decade of the 1970's, but since the late 70's and throughout the 80's the economies of the region have tended to stagnate and even the oil exporting countries are suffering severe economic problems. Today large distributional inequalities exist both within and among most countries of the region for various indicators: income, health and food consumption as stated by Novek in 1982:

> "Impressive growth in GNP, in per capita income, in literacy, in education, in health, and in longevity represent human goods of great value to Latin America. But such figures also mask inequality, uneven distribution and widespread suffering."

There is wide disparity in terms of socioeconomic indicators by subregion as well as within each country. On almost all indicators, Central America exhibits poorer conditions than the other two subregions (South America and the Caribbean). Within the subregions there is also great inter-country variance; Haiti stands out for its problems within the Caribbean and Honduras and Guatemala within Central America. Within the South American sub-region, three AID assisted countries Bolivia, Ecuador and Peru,

rank the lowest among the Andean and South American countries as measured by various socioeconomic indicators.

Some countries have been making great progress on socio-economic indicators (if not on incomes) e.g. Costa Rica, Colombia, Panama and Chile. Even for these, the current economic and political crises place further progress at risk. Furthermore, in almost all of the countries there exists great variance in the distribution of income, in the coverage of public services, and in the attainment of other basic goods and services. For example, the adult literacy rate ranges from 47% in Guatemala to 90% in Costa Rica and Mexico (PAHO, 1982). Less than forty percent of households in eight countries (Bolivia, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Paraguay and Peru) have access to adequate water supply (PAHO, 1982). On the other hand, over 90 percent of the population have access to potable water in Costa Rica, Panama, Jamaica, Chile, Brazil, and Argentina. These drastic differences within countries and between countries of the region suggest strongly that there remain significant and large pockets of poverty for which malnutrition is one of the consequences.

As early as the 1940's, malnutrition, anemias associated with iron deficiency, vitamin A deficiencies and iodine deficiency were identified as the most pressing nutritional problems o. the region (ICNND, 1959). Currently, many of these problems persist in a high proportion of the population of the region, and while the prevalence of nutrition problems varies greatly by country, all AID assisted countries have at least one

significantly large population group with substantial nutritional problems. For example, the Caribbean as a whole has a lower rate of malnutrition as measured by anthropometric indicators, but a higher prevalence of iron deficiency anemia and obesity than Central or South America.

The nature and magnitude of the nutritional problems differ within and between the sub-regions; generally, chronic malnutrition affects nearly half of the children in the AID assisted countries of the Andean and Central American sub-regions, whereas most countries of the Caribbean (except for the island of Hispaniola) report low prevalences of underweight children. In the Caribbean the nutritional problems are obesity in women, iron deficiency anemia and other problems associated with inappropriate maternal nutrition.

The diets of the poor are inadequate in calories and other nutrients and even the diets of the middle income persons are occasionally inadequate. The foods that are available for the diets in different parts of the region are varied; in most cases, diets with sufficient energy would be sufficient in most or all other nutrients. In particular in 1973, a joint FAO/WHO Expert Committee found that in most parts of the world, adequate intakes of traditional diets (in terms of energy) could almost always provide enough protein, especially when the diets consist of high cereal intake which is characteristic of diets in Latin America and the Caribbean. Reutlinger and Alderman (1980) estimated that in 1973 approximately 37% of the population of the region had diets below 90% of the recommended energy levels. Poor health and sanitary conditions further aggravate the food consumption

situation for poor households throughout the region. The Reutlinger and Alderman study also stated that income growth would have to proceed at an annual average of 4% per year to eliminate the calorie deficits in the region by 1990; only three countries (Paraguay, Ecuador and Brazil) have experienced rates of growth of this size and several countries have experienced negative growth in the per capita incomes (El Salvador, Jamaica, Chile and Nicaragua). Food inadequacy continues to be an important problem for many persons throughout the Latin American and Caribbean region.

1.1 The Current Nutritional Situation in Latin America and the Caribbean

The nutritional well-being of persons has been recognized to be the result of complex interactions between biological, behavioral, social, economic, environmental and political factors. At the individual and clinical level, the disequilibrium between biological use of nutrients and the ingestion of nutrients results in specific syndromes. This disequilibrium has been shown to generally be the result of broader social and economic processes (except in pathological cases, e.g. anorexia nervosa). Figure 1 presents a schematic diagram of the relationship between these proximal and more distal processes that affect nutritional status. This diagram has been used to guide the data and information gathering efforts (Appendix A) and the analysis for this report.

Table 1 presents information that is available on an aggregate basis for various socioeconomic and health indicators for selected countries in the Latin American and Caribbean region

Figure 1. CAUSAL MODEL OF NUTRITIONAL STATUS

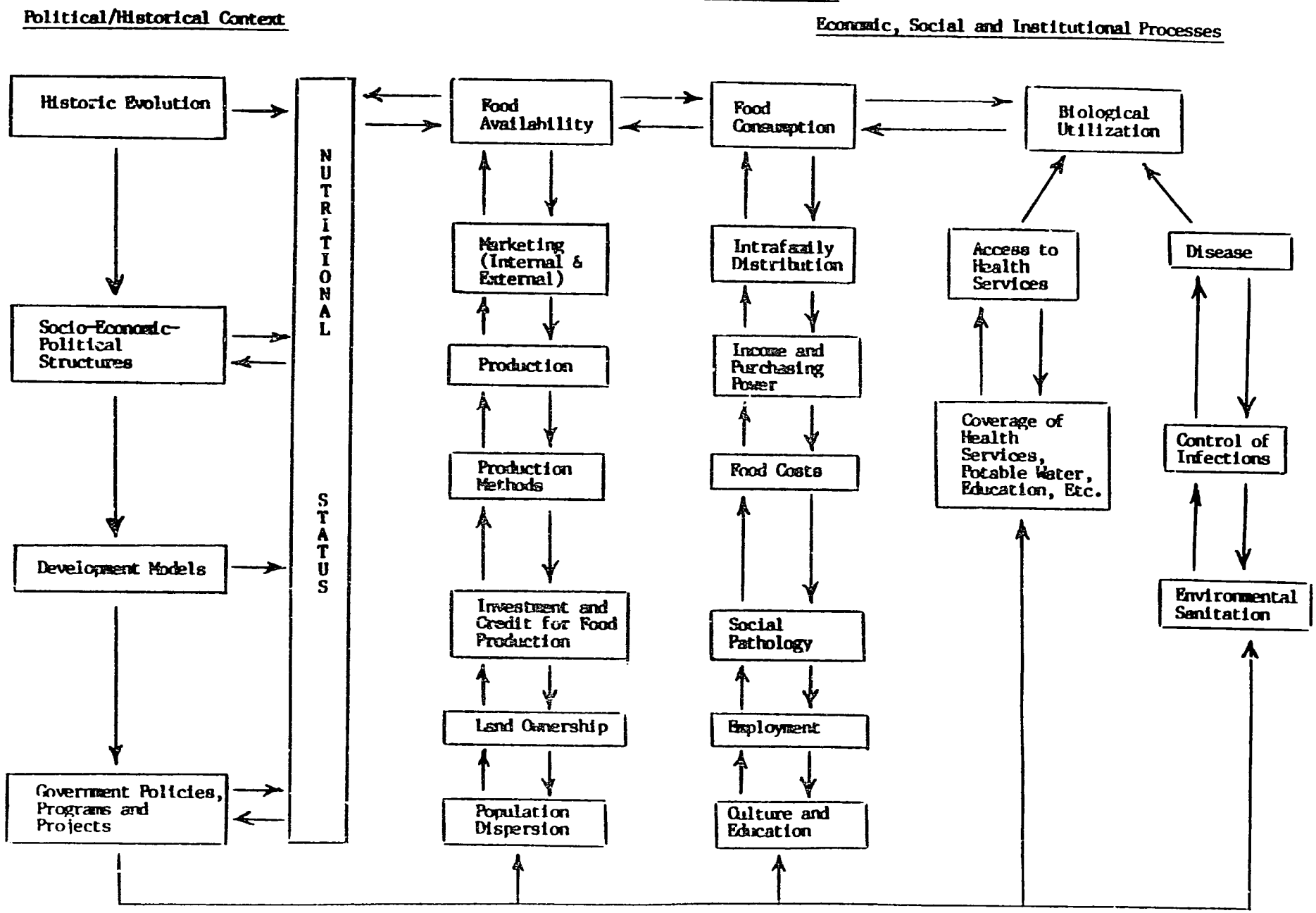

Table 1. Trends in Welfare Indicators for Selected Countries within Latin America and the Caribbean between 1965 and 1984

	Population (millions) Mid-1983	GNP per cap. $	Av.ann. growth rate	Av.ann.rate of inflation		Life expectancy at birth (years)		Population per Physician		Daily calorie supply per cap. Total	(%) of reqmt.	Infant Mortality rate		Child death rate (1-4 years)	
		1983	1965-83	1965-73	1973-83	1965	1983	1965	1980	1982	1982	1965	1983	1965	1983
A. LOW INCOME ECONOMIES															
*Haiti	5.3	300	1.1	4.0	7.8	46	54	12,580	8,200	1,903	84	160	107	37	15
B. MIDDLE-INCOME ECONOMIES															
1. LOWER															
*Bolivia	6.0	510	0.6	7.5	36.2	44	51	3,310	-	2,158	90	161	123	37	21
*Honduras	4.1	670	0.6	2.9	8.6	49	60	5,450	3,120	2,156	95	131	81	24	8
*El Salvador	5.2	710	-0.2	1.6	11.7	54	64	4,630	3,220	2,060	90	120	70	20	6
Nicaragua	3.0	880	-1.8	3.4	16.5	50	58	2,490	1,800	2,268	101	129	84	24	9
*Grenada[a]	0.1	880	-	-	-	-	-	-	-	2,166	96	-	21	-	-
*St. Vincent[a]	0.1	900	-	-	-	-	-	-	-	2,234	99	-	40	-	-
*Costa Rica	2.4	1020	2.1	4.7	23.2	64	74	2,040	1,460	2,635	118	74	20	8	1
*Peru	17.9	1040	0.1	10.1	52.3	50	53	1,620	1,390	1,114	90	131	98	24	12
*Dominica[a]	0.1	1080	-	-	-	-	-	-	-	2,018	90	-	13	-	-
*Guatemala	7.9	1120	2.1	1.9	9.9	50	60	3,830	8,610	2,115	97	109	67	16	5
*St. Lucia[a]	0.1	1130	-	-	-	-	-	-	-	2,390	102	-	27	-	-
*Belize[a]	0.2	1150	-	-	-	-	-	-	-	2,714	-	-	20	-	-
*Jamaica	2.3	1300	-0.5	5.9	16.9	65	70	1,930	2,830	2,489	111	51	28	4	2
*Dominican Rep.	6.0	1370	3.9	2.7	8.5	54	63	1,720	2,410	2,179	96	103	63	14	5
*St. Kitts/Nevis[a]	-	1390	-	-	-	-	-	-	-	2,038	91	-	46	-	-
*Paraguay	3.2	1410	4.5	4.3	12.6	58	65	1,840	1,310	2,820	122	74	45	7	3
*Ecuador	8.2	1420	4.6	6.2	16.6	53	63	3,020	760	2,072	91	124	76	22	7
*Colombia	27.5	1430	3.2	10.8	24.0	56	64	2,530	1,710	2,551	110	80	53	8	3
Cuba	9.8	-	-	-	-	67	75	1,550	720	2,997	130	54	20	4	1

Table 1. (cont.) Trends in Welfare Indicators for Selected Countries within Latin America and the Caribbean between 1960 and 1984

	Population (millions) Mid-1983	GNP per cap. $	Av.ann. growth rate	Av.ann.rate of inflation		Life expectancy at birth (years)		Population per Physician		Daily calorie supply per cap.		Infant Mortality rate		Child death rate (1-4 years)	
										Total	(%) of reqmt.				
		1983	1965-83	1965-73	1973-83	1965	1983	1965	1980	1982	1982	1965	1983	1965	1983
2. UPPER															
*Antigua and Barbuda[a]	0.1	1840	-	-	-	-	-	-	-	1,979	88	-	11	-	4
Chile	11.7	1870	-0.1	50.3	66.2	59	70	2,060	1,930	2,669	109	103	40[b]	14	2
*Brazil	129.7	1880	5.0	23.2	63.9	57	63	2,180	-	2,623	110	104	40	14	6
Argentina	29.6	2070	0.5	24.1	167.8	66	69	640	430	3,363	127	59	36	4	1
*Panama	2.0	2120	2.9	2.4	7.1	63	71	2,170	980	2,498	108	59	26	4	1
*Mexico	75.0	2240	3.2	4.8	28.2	59	66	2,060	-	2,976	128	82	52	9	3
*Montserrat[a]	-	2440	-	-	-	-	-	-	-	2,118	94	-	-	-	-
*Uruguay	3.0	2490	2.0	51.7	51.0	69	73	870	540	2,754	103	47	38	3	2
*Venezuela	17.3	3840	1.5	3.3	11.7	60	68	1,270	990	2,557	104	71	38	6	2
*Barbados[a]	0.3	4340	-	-	-	-	-	-	-	3,020	134	-	24	-	-
Trinidad & Tobago	1.1	6850	3.4	5.7	15.6	65	68	3,820	1,360	3,083	127	47	28	3	1

*AID assisted countries.

Source: World Bank, 1985.

[a]Sources: AID Bureau for Latin America and the Caribbean, Division of Health and Nutrition, 1985. Caribbean Food and Nutrition Institute(CFNI), 1984.

[b]Castaneda (1985) reports Infant Mortality Rate for Chile in 1983 equal to 21 deaths per 1000 live births.

for two time periods: 1965 and 1983. The factors presented are: per capita GNP, inflation, life expectancy, population per physician, aggregate calorie availability (per capita), infant mortality and children's death rates. With the exception of Haiti, the region consists of middle income countries as defined by the World Bank with respect to per capita income. The Central American and the Caribbean sub-region are almost exclusively lower middle income countries and South America is evenly divided between lower and upper middle income countries. Most of the countries assisted by AID fall in the lower categories of per capita income (Panama and Barbados being notable exceptions).

The AID assisted countries have lagged substantially in per capita income growth from the rest of the region in the period 1965-1983, with the exception of Ecuador, which enjoyed a petroleum exporting boom. Since 1983, most of the countries have further stagnated in terms of income growth. In the last decade most of the countries in the Latin American and Caribbean region experienced accelerating inflation. To the extent that the poor in these countries may suffer more from inflation, then the incomes of the poor in many of these countries would have declined in real terms. The processes by which the poor suffer more from inflation are many. The poor have little physical and financial capital; frequently their only assets are their time. They are thus less able to invest in inflation-proof assets, e.g. land. During inflationary periods, the real fiscal resources available for public services usually decline, and this reduction tends to affect the poor more, because they are more dependent on public services than the middle and upper income groups.

Inflation tends to worsen distortions to food prices; as a result, traditional foods that the poor eat become relatively more expensive than imported foods (Franklin, Leonard and Valdes, 1985).

Good nutritional status and health are inseparable; Mason et al. (1984) has stated that: "adequate, preventive, and curative health measures are of themselves essential for good nutrition; access to adequate food is essential for good health". The national health status indicators recommended by WHO (1981a) to define health outcome are: nutritional status of children; infant mortality rate; child mortality rate (ages 1-4 inclusively); life expectancy at birth and maternal mortality rate. Table 2 presents other health indicators available from WHO (PAHO, 1985) in recent years for selected countries in Latin America and the Caribbean. These include: percentage of newborns weighing less than 2500 grams; percentages of deaths due to infections of parasitic diseases; immunization coverage; health expenditure at the national levels and expressed in per capita terms; percentage of the national budget spent on health; and adequate coverage of water and sanitation.

Table 2 shows that on average, the AID assisted countries tend to be substantially behind the rest of the region in terms of health indicators; there are, of course, exceptions on both sides (e.g. Nicaragua, a non-AID assisted country, exhibits high proportion of low birth weight, poor vaccination coverage, and poor water and sanitation coverage and Costa Rica, an AID assisted country, has high coverage of vaccinations and good sanitation). The coverage of potable water, sanitation services

Table 2. Health Indicators for Selected Countries in Latin America and the Caribbean in the 1980's

	% newborn wt.-2,500 g.	% deaths1	Immunization		% Pop. Potable water	% Pop. Sanitary waste disp.	Consult. inhab./ year	Health Expend. per cap.$	Total health expend.2	% Nat'l budget health
			DPT3	Measles						
A. LOW INCOME ECONOMIES*										
*Haiti	17.0	19.4	8.7	-	32.0	19.0	20.0	9.0	3.0	10.0
B. MIDDLE-INCOME ECONOMIES										
1. LOWER										
*Bolivia	10.0	16.6	16.6	62.0	36.0	18.0	-	2.0	6.0	18.3
*Honduras	9.2	27.4	70.0	66.0	69.0	44.0	100.0	43.0	7.0	13.0
*El Salvador	8.7	11.0	45.0	41.3	58.8	50.8	1.1	14.0	-	8.7
Nicaragua	15.0	-	23.9	23.0	43.8	19.6	210.0	-	-	-
*Grenada[a]	-	-	76.0	31.0	85.0	26.0	-	-	-	-
*St. Vincent[a]	8.0	-	86.0	92.0	95.0	95.2	-	-	-	-
*Costa Rica	9.6	4.4	77.9	79.2	92.8	94.8	2.6	71.3	5.7	28.0
*Peru	9.9	45.9	27.8	34.7	49.0	36.0	60.0	15.0	4.5	4.1
*Dominica[a]	10.0	-	-	-	91.1	50.0	-	-	-	-
*Guatemala	10.0	29.6	55.0	38.0	49.8	33.6	40.0	21.8	3.7	13.5
*St. Lucia[a]	-	-	83.0	60.0	70.0	62.0	-	-	-	-
*Belize[a]	-	-	54.0	44.0	63.2	91.8	-	-	-	-
*Jamaica	-	-	54.0	47.0	90.0	94.5	1.6	46.0	3.6	8.9
*Dominican Rep.	-	10.9	24.4	23.4	65.0	27.5	0.9	7.0	3.7	11.8
*St. Kitts/Nevis[a]	10.5	-	97.0	85.0	95.0	88.3	-	-	-	-
*Paraguay	6.5	12.5	67.0	62.0	25.0	87.8	70.0	12.0	4.9	5.2
*Ecuador	-	17.4	31.5	35.1	38.2	42.9	80.0	34.0	6.0	6.9
*Colombia	3.4	16.3	60.0	52.0	64.6	47.7	50.0	50.0	5.4	7.7
Cuba	8.5	2.0	86.1	72.0	61.2	31.0	5.2	-	-	21.0

Table 2. Health Indicators for Selected Countries in Latin America and the Caribbean in the 1980's (cont.)

	% newborn wt.-2,500 g.	% deaths[1]	Immunization		% Pop. Potable water	% Pop. Sanitary waste disp.	Consult. inhab./ year	Health Expend. per cap.$	Total health expend.[2]	% Nat'l budget health
			DPT3	Measles						
2. UPPER										
*Antigua and Barbuda[a]	3.8	-	94.0	73.0	100.0	90.0	-	-	-	-
Chile	6.8	3.6	92.3	90.8	99.0	80.0	125.0	95.0	6.0	12.4
*Brazil	-	14.8	65.0	87.5	93.7	60.4	1.5	-	-	-
Argentina	8.2	2.0	100.0	-	95.0	100.0	-	184.0	6.2	11.8
*Panama	8.2	6.7	56.0	57.0	90.0	80.8	150.0	98.0	10.1	14.1
*Mexico	15.0	20.3	-	-	71.0	50.7	140.0	5.0	5.7	0.7
*Montserrat[a]	12.4	-	-	-	100.0	-	-	-	-	1.1
*Uruguay	8.3	2.6	55.0	90.0	75.0	40.0	350.0	-	-	7.8
Venezuela	9.1	8.2	71.8	45.0	90.3	78.2	180.0	130.0	3.0	9.1
*Barbados[a]	10.2	-	83.0	84.0	100.0	-	-	-	-	-
Trinidad & Tobago	10.2	4.7	60.0	60.0	71.5	53.7	-	245.0	1.6	-

*AID assisted countries.

Source: Pan American Health Organization, 1985.

[a]Sources: AID, Bureau for Latin America and the Caribbean, Division of Health and Nutrition, 1985.
Caribbean Food and Nutrition Institute (CFNI), 1984.
(for these countries, vaccination coverage is for children under 1 year of age.)

[1]Percentage of deaths due to infections of parasitic diseases.

[2]Total health expenditure as a percentage of the GDP.

and health services is remarkably lower for the AID assisted countries than for the rest of the region. Jamaica and Panama are notable exceptions which reflect previous AID investments there and the commitment of governments to improve those conditions. Although the average health expenditures per capita for AID assisted countries is one third that of the non-AID assisted countries, the percentage of the fiscal budget spent on health is 40% greater for the AID assisted countries. This suggests that the AID assisted countries rely primarily on publicly funded health care services rather than on a combination of private and public services.

1.1.1 Measurements of Nutritional Status in Latin America and the Caribbean

Nutritional status, whether measured by anthropometric, biochemical, clinical, morbidity, or mortality data, represents a biological integration of all the factors and processes that determine the ingestion and use of nutrients by the body. Nutritional status can serve as an important indicator of the development process for a country as well as a manifestation of specific problems related to food consumption, health status and poverty. According to the World Health Organization (Mason et al., 1984), "nutritional status of children is now regarded as a central indicator for monitoring progress towards health for all at program, national and global levels".

Anthropometric indicators are considered to be the most direct measures of nutritional status, because one of the less ambiguous results from a process of malnutrition is its impact on body size and development. No one anthropometric measure has

been accepted as the optimal indicator of nutritional status, but weight for age measures in children have continued to be used for inter-country comparisons across time*. (Appendix B presents a detailed description of anthropometric indicators used to measure nutritional status). Stunting of linear growth (low height for age) is indicative of chronic malnutrition perhaps arising from repeated illnesses caused by the child's environment, i.e. infections, lack of food availability, poor water, etc. (Habicht et. al, 1974; Wray and Aguirre, 1969). Stunting is therefore said to measure the effect of persistent or recurring problems (Seoane and Latham, 1975). On the other hand, weight loss is a short term response to unfavorable environmental conditions, and thus an indicator of acute cases of malnutrition. Weight loss has been the most generally used indicator because it is relatively easy to measure. Throughout the 1970's, the Gomez criteria applied to weight for age measurements were the standards for international comparisons. Today the basis for analyzing anthropometric measurements is based on the WHO recommendations of 1980 which include measurements of height for age, weight for height and weight for age. Where these measures were available, they have been used in the data tabulations of this report; the Gomez criterion applied to weight for age measurements has been used for countrywide comparisons since it is generally the only measure reported for the 1960's and 1970's.

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*For the purpose of this report, the nutritional status of children is used as an indicator of poor consumption, health and other socio-economic conditions for the population groups to which the children belong. That is, if children are malnourished it is most likely that all members of the household are at risk.

Fairly complete information on nutritional status as measured by anthropometry is available for many countries of Latin America and the Caribbean. National nutrition surveys which used appropriate sampling techniques exist for many countries in the Latin American and Caribbean region for selected years in the 1960's, 1970's, and early 1980's. More recent data are currently either being analyzed (e.g. Peru: 1984 National Health and Nutrition Survey) or being collected (e.g. Ecuador 1986: National Nutrition Survey).

Table 3 presents the estimates of malnutrition in children as measured by the conventional Gomez criterion applied to weight for age measurements in the 1960's through the early 1980's. The variation among countries has remained somewhat constant in the past decades with some countries exhibiting prevalences in the 5 to 10% range for moderate and severe malnutrition and others as high as 35% for these two grades of malnutrition as measured by weight for age (e.g. Guatemala, Honduras, Haiti). Where the data are available to compare rural versus urban areas, they suggest that the relative risk of malnutrition is twice as great in rural areas. During the past two decades, there has been significant decline in malnutrition in selected countries in the Latin American and Caribbean region, for example malnutrition in Costa Rica has declined from 14 to 3 percent, and Colombia has seen a 50 percent decline between 1965 and 1980 (Mohan, Wagner, and Garcia, 1981). On the other hand, other countries have shown little or no improvement in levels of malnutrition (e.g. Bolivia, Peru, Haiti, Guatemala). Malnutrition of infants and

Table 3. Percentage of Preschool Children by degree of Malnutrition According to the Gomez Classification for Selected Countries Within the LAC Region, 1970's to 1985

Country	Year	Number in Sample	Gomez criterion of malnutrition: Mild First Degree	Moderate Second Degree	Severe Third Degree	Second and Third Degree
Antigua	1970[a]	322	27.6	2.1	0.3	2.4
	1975[a]	535	35.5	6.8	0.8	7.6
	1981[j]	-	9.0	-	-	-
Argentina	1970[b]	-	-	-	-	9.3
Bahamas	1974[a]	321	14.6	0.6	0.9	1.5
Barbados	1969[c]	248	-	15.3	1.2	16.5
	1975[a]	3650	36.1	3.1	0.3	3.4
	1981[j]	-	8.8	-	3.4	-
Belize	1973[a]	3546	40.0	18.0	1.2	19.2
	1979[j]	-	20.7	5.5	0.7	6.2
Bolivia	1966-69[a]	968	29.0	10.2	0.7	10.9
	1981[d]	-	-	-	-	21.6
Brazil	1968[a]	569	48.4	17.2	2.7	19.9
Cayman Is.	1970[c]	-	-	-	-	19.9
	1975[c]	537	14.1	2.0	-	-
	1979[j]	-	2.3	-	-	-
Chile	Curico					
	1966[c]	1540		-		34.6
	1974[a]	547709	11.5	3.1	0.8	3.9
	Santiago					
	1971[c]	50839	-	13.2	0.2	13.4
	1977[a]	1070767	11.9	2.5	0.5	3.0
Colombia	1965-68	-	-	-	-	15.7
	1968[b]	3378	-	19.3	1.7	21.0
	1977[b]	-	-	-	-	19.5
	1979	-	-	-	-	8.3
Costa Rica	1967[c]	738	-	12.2	1.5	13.7
	1977[a]	-	-	-	-	12.3
	1982[e]	-	-	-	-	4.8
Cuba	-	-	-	5.0	0.5	5.5

Table 3. (cont.) Percentage of Preschool Children by degree of Malnutrition According to the Gomez Classification for Selected Countries Within the LAC Region, 1970's to 1985

Country	Year	Number in Sample	Gomez criterion of malnutrition: Mild First Degree	Moderate Second Degree	Severe Third Degree	Second and Third Degree
Dominica	1970[a]	117	19.7	5.1	3.4	8.5
	1976[a]	396	38.6	10.3	1.8	12.1
Dominican Republic	1970[c]	1100	-	23.0	4.0	27.0
	1977[b]	-	-	-	-	24.0
Ecuador	1965-69[a]	9000	28.9	9.6	1.2	10.8
	Guayaquil urban[c]	426	-	-	-	11.7
	1968-69	-	-	-	-	27.5
	Guayaquil suburban[c]	-	-	25.7	2.9	28.6
	1965 rural	578	45.8	18.7	2.1	20.8
	1985[f]	-	-	-	-	13.3
El Salvador	1967[e]	574	-	22.9	3.1	26.0
	1976 rural[e]	782	51.9	18.4	3.6	22.0
	1977[e]	-	-	-	-	22.1
	1978 rural[e]	1108	42.8	10.0	0.5	10.5
Grenada	1972[a]	-	44.0	10.0	0.0	10.0
	1975[a]	1102	29.1	9.0	1.6	10.6
	1979[j]	-	19.2	4.4	1.3	5.7
Guatemala	1967[c]	763	-	26.5	5.9	32.4
	1975[a]	-	47.5	29.5	5.4	34.9
	1976 rural[e]	571	45.7	31.9	4.9	36.8
	1978 rural[e]	649	47.8	26.0	3.2	29.2
Guyana	1971[a]	964	43.0	16.0	1.7	17.7
	1971 urban[c]	262	-	19.5	0.4	19.9
	1971 rural[c]	702	-	35.0	1.7	36.7
	1983[j]	-	44.8	9.6	1.1	10.7
Haiti	1961-65[a]	-	43.0	27.2	7.0	34.2
	1975[a]	1542	28.9	35.6	17.4	53.0
	1978[g]	5353	46.0	24.1	3.2	27.3
Honduras	1967[c]	633	-	27.2	2.3	29.5
	1977[e]	-	-	-	-	38.0

Table 3. Percentage of Preschool Children by degree of Malnutrition (cont.) According to the Gomez Classification for Selected Countries Within the LAC Region, 1970's to 1985

Country	Year	Number in Sample	Gomez criterion of malnutrition: Mild First Degree	Moderate Second Degree	Severe Third Degree	Second and Third Degree
Jamaica	1970[a]	490	39.0	9.0	1.4	10.4
	1970[c]	489	-	18.0	1.4	19.4
	1970 urban[c]	168	-	13.6	0.5	14.1
	1970 rural[c]	322	-	20.1	1.8	21.9
	1970 rural[c]	576	-	8.0	1.0	9.0
	1978[j]	-	31.1	7.0	0.9	7.9
Montserrat	1971[a]	372	28.0	3.5	0.0	3.5
	1975[a]	1258	19.8	2.3	0.2	2.5
	1976[j]	-	25.9	2.5	0.4	2.9
Mexico	1958-68					
	rural[c]	5576	-	27.5	3.4	30.9
	urban[c]	-	-	14.8	1.3	16.1
	1970[b]	-	-	-	-	23.5
Nicaragua	1967[c]	708	-	13.2	1.8	15.0
	1975[a]	-	-	-	-	22.6
Panama	1967[c]	624	-	10.8	1.1	11.9
	1980[h]	3316	37.7	-	-	11.6
Paraguay	1973[a]	41750	4.9	2.2	0.7	2.9
	1977[d]	-	-	-	-	5.0
Peru	1965-71[a]	83165	32.8	10.9	0.8	11.7
	Puno 1966[c]	3313	-	4.4	0.5	4.5
	1972	11000	31.0	11.0	2.0	12.0
	1978 urban	-	19.5	5.7	2.4	8.1
	1978 rural	-	23.3	26.7	15.1	41.8
	Puno 1983[i]	-	40.0	33.0	0.0	33.0
St. Kitts/ Nevis	1974[a]	1209	33.3	5.4	0.1	5.5
	1980[j]	-	34.2	7.8	0.4	8.2
St. Lucia	1974[a]	363	33.0	9.0	1.9	10.9
	1980[j]	-	19.7	3.1	0.3	3.4
St. Vincent	1983[j]	-	32.1	5.1	0.9	6.0

Table 3. Percentage of Preschool Children by degree of Malnutrition (cont.) According to the Gomez Classification for Selected Countries Withi : the LAC Region, 1970's to 1985

Country	Year	Number in Sample	Gomez criterion of malnutrition: Mild First Degree	Moderate Second Degree	Severe Third Degree	Second and Third Degree
Trinidad-Tobago	1965[a]	-	-	-	-	15.0
	1976[j]	1585	36.8	11.1	1.4	12.5
Venezuela	1966[c]	16223[1]	-	3.5	1.1	4.6
	1965-68	-	-	-	-	19.0
	1971[c]	57804[2]	-	14.5	0.9	15.4
	1974[a]	23271	35.3	12.2	1.4	13.6

[1] 0 - 2 years
[2] 1 - 6 years

*Most data sources were derived from national nutrition surveys that did not provide details about sampling procedures, method of data collection, validity and reliability of the data, growth standards used in the analyses or data processing procedures. These different methodologies may be a reason for a discrepancy in national figures though it cannot be the only reason for a change in rate across time. Unless noted elsewhere, the surveys are of children aged 0-60 months of age.

Sources:
[a]Pan American Health Organization, 1976.

[b]UNICEF, 1979.

[c]Bengoa and Donoso, 1974.

[d]Bolivia, 1981.

[e]Valverde, et al., 1985c.

[f]Community Systems Foundation, 1985.

[g]Haiti, 1979.

[h]Parillon, et al., 1982.

[i]Franklin, et al., 1983.

[j] Caribbean Food and Nutrition Institute(CFNI), 1984.

children has declined in most countries in the Caribbean region during the past decade with the exception of Haiti and the Dominican Republic. In some Caribbean countries, malnutrition has declined substantially in certain geographical areas while the national decline in malnutrition has been minimal. For example, the proportion of children under 3 years of age in the Parish of St. James in Jamaica suffering from moderate to severe malnutrition (Gomez grades II and III) declined from 14 to 4% in the 1970's though the national figures only showed a small decline (Marchione, 1981; Fox et al., 1979).

The prevalences of chronic malnutrition as measured by height for age indicators and the prevalences of acute malnutrition are presented in Table 4 for some Central and South American countries (height measurements were not available in the data collected in the Caribbean countries with the exception of the 1978 Haiti National Nutrition Survey). The prevalence of chronic (severe and moderate) malnutrition ranges from a low of 6.4% for Costa Rica to as high as 56.3% for Guatemala. With the exception of Panama and Costa Rica, the table indicates that nearly half of the children in the Spanish-speaking AID assisted countries have exhibited (recently) the growth retardation effects of chronic malnutrition. Table 4 also shows that, with the exception of Costa Rica, the prevalence of chronic malnutrition has not significantly declined in the last two decades, and that chronic malnutrition is twice as prevalent in rural than in urban areas. Finally Table 4 indicates that acute malnutrition is of relatively low prevalence, except perhaps for selected rural areas in Central America.

Table 4. Percent of Children with Chronic* or Acute** Malnutrition in Selected Countries in the LAC Region (1965 to 1985)

Country	Year	Number in sample	Chronic* malnutrition moderate[1]	Chronic* malnutrition severe[2]	Acute malnutrition[3]
Bolivia[a]					
Urban					
High Plains	1981	896	32.6	13.2	0.3
Valley	1981	890	18.2	10.4	1.1
Plains	1981	885	18.6	8.0	0.9
Total Rural	1981	3092	30.2	19.4	0.7
Costa Rica[b]	1966	794	16.5	7.6	2.9
	1982	1889	5.3	1.1	
1st grade sample	1979	52327	16.1	4.2	-
	1980	53993	12.5	2.5	-
	1981	59426	10.6	2.0	-
Ecuador[c]	1985	1176	29.6	12.2	1.4
El Salvador[b]	1966	633	26.4	23.5	3.7
Rural Areas only	1965	551	27.0	26.0	3.8
	1976	758	27.2	16.5	5.5
	1978	1086	28.4	15.7	1.1
Guatemala[b]	1966	791	27.1	29.2	2.1
(Rural Areas only)	1965	709	28.3	31.7	2.9
	1976	537	29.6	27.4	6.5
	1978	619	27.9	31.8	3.3
Haiti[d]	1978	5353	23.6	-	2.9
Honduras[b]	1966	580	23.3	23.4	3.9
Nicaragua[b]	1966	777	22.9	13.3	1.3

Table 4. Percent of Children with Chronic* or Acute** Malnutrition (cont.) in Selected Countries in the LAC Region (1965 to 1985)

Country	Year	Number in sample	Chronic* malnutrition moderate[1]	Chronic* malnutrition severe[2]	Acute malnutrition[3]
Panama	1966[b]	609	16.4	7.1	2.5
	1980[e]	3314	22.0[4]	-	6.4
Urban	1980[e]		9.9[4]	-	6.4
Rural	1980[e]		27.0[4]	-	6.4
Peru[f] (Puno)	1983	-	34.0	23.0	0.0

*defined as low height for age
**defined as low weight for height

[1]Height-for-age is between 2 and 3 standard deviations below the reference population median.
[2]Height-for-age is more than 3 standard deviations below the reference population median.
[3]Weight-for-height is more than 2 standard deviations below the reference population median.
[4]Sum of moderate and severe.

Sources:
[a]Bolivia, 1981.
[b]Valverde et al., 1985c.
[c]Community Systems Foundation, 1985.
[d]Haiti, 1979.
[e]Parillon, et al., 1982.
[f]Franklin et al., 1983.

These data all suggest that the key nutrition problem for South and Central America is chronic malnutrition that persists over long periods of time. Malnutrition is concentrated among the rural populations of the subregions. The low prevalence of acute malnutrition suggests that there are few situations of widespread starvation such as in Africa. Rather the patterns of malnutrition suggest that the malnourished children live under marginal environmental conditions that may only occasionally result in acute malnutrition (perhaps as a result of illnesses, seasonal shortages of food or shortages resulting from climatic disasters as in Peru and Ecuador in the early 1980's). Children from urban areas would thus appear to recover from episodes of acute malnutrition or not to have been so severely exposed. The prevalence of malnutrition by age shows that over the first few years of life these conditions lead to permanent growth retardation for nearly half of the children from rural areas. The data presented in Appendix C reveal that this growth retardation begins in the second year of life.

1.1.2 Correlates of Malnutrition

The country level data of Tables 1 through 3 were subjected to a series of correlation and regression analyses to measure some of the causal linkages illustrated by Figure 1. The purpose of the analyses was to identify gross relationships between indicators of nutritional well being and its correlates and determinants at the country aggregate level. Three outcome variables were used as indicators of nutritional status or nutritionally mediated health status: the prevalence of moderate

and severe malnutrition (Gomez criterion applied to weight for age measurements), child mortality and the percentage of low birth weights.

Table 5 presents the bivariate relationships estimated by conventional correlation coefficients for all the countries included in Tables 1 through 3 and for the subset of countries currently receiving AID assistance. The stronger correlations, overall, are given by health system factors, although higher aggregate calorie availability is significantly associated with lower prevalences of malnutrition for all countries and for the AID assisted countries. Broad based factors such as health system coverage (population per physician), health expenditures, and sanitation would appear significantly associated with improved nutritional status for all the countries. Additionally, for the AID assisted countries, higher per capita incomes and higher levels of aggregate food availability would also seem to be significantly associated with lower levels of malnutrition.

If only this information were available, it could be interpreted to suggest that the nutrition problems in the higher income countries of the region would be addressed primarily through health sector initiatives e.g. extension of coverage of health, water and sanitation services. For the AID assisted countries, these efforts would also yield significant improvements, but there would still be much to be gained from improved incomes and increased food availability. These results would also suggest that improvements in income and food availability are insufficient without concomitant improvements in public and private health services.

Table 5. Correlation Coefficients of Economic and Health Indicators with the Prevalence of Moderate and Severe Malnutrition in Latin America and the Caribbean

Indicator*	All LAC Countries	Current AID Assisted Countries[1]
Population per Physician	+.66	+.82
Health Expenditures per Capita	-.54	-.29
DPT Immunization	-.48	-.08
Sanitation	-.48	-.49
Calorie Availability	-.36	-.50
Percentage National Budget Spent of Health	-.34	+.20
Per Capita Income	-.24	-.56
Good Water	-.20	-.28
Measles Immunization	+.11	-.08

Absolute values above 0.35 are significant at p=.1

*As defined in Tables 1 and 2 and presented here in order of the absolute magnitude of the correlation coefficients of the given indicator with the prevalence of malnutrition when data for all the LAC countries were included in the analysis.

[1]defined in Table 1.

Table 6 presents the correlations of the indicators with the countries' childhood mortality rates. The association with income and food availability appears stronger for this outcome than for malnutrition per se, as does the indicator for coverage of potable water. Regarding low birth weights, broad health system variables appear to be the principal correlates particularly in the higher income countries. It is important to note that while health expenditures per capita are lower for the AID assisted countries, these countries already spend a higher proportion of the fiscal budget on health services. This suggests a need for finding alternatives to public sector financing of health care.

The three outcome variables were also used as dependent variables in multiple regression analyses with the health and socio-economic factors as predictors. The malnutrition indicator was regressed on per capita income, population per physician, calorie availability and coverage of potable water for all the countries in the region. The results indicated that two thirds of the variance across countries was explained by these factors, and of the variance explained, broad health coverage as measured by population per physician was the most important factor; calorie availability was also a significant factor. Aggregate income was significant only when entered first in the statistical model. Potable water exhibited no significant independent contribution in the aggregate data.

The model for child mortality explained approximately 70% of the variance and the significant factors were calorie availability, DPT immunizations, and income. The model for low

Table 6. Correlation Coefficients of Economic and Health Indicators with the Incidence of Child Mortality[a] and Low Birth Weight[b] in Latin America and the Caribbean

Indicator*	All LAC Countries	AID Assisted Countries[1]
Correlates of Child Mortality		
DPT Immunization	-.83	-.62
Calorie Availability	-.72	-.56
Per Capita Income	-.67	-.80
Good Sanitation	-.62	-.84
Population per Physician	+.55	+.26
Good Water	-.53	-.76
Health Expenditures per Capita	-.42	-.673
Measles Immunization	-.34	+.09
Correlates of Low Birth Weight		
Percentage of National Budget Spent on Health	-.57	-.04
Health Expenditures per Capita	-.51	-.32
Population per Physician	+.41	+.55
DPT Immunization	-.39	-.56

Absolute values above 0.35 are significant at p=.1

[a]Deaths of children aged 1-4 per 1000 population aged 1-4 years.

[b]Percentage of newborns weighing less than 2500 grams.

*As defined in Tables 1 and 2 and presented here in order of the absolute magnitude of the correlation coefficients of the given indicator with the prevalence of malnutrition when data for all the LAC countries were included in the analysis.

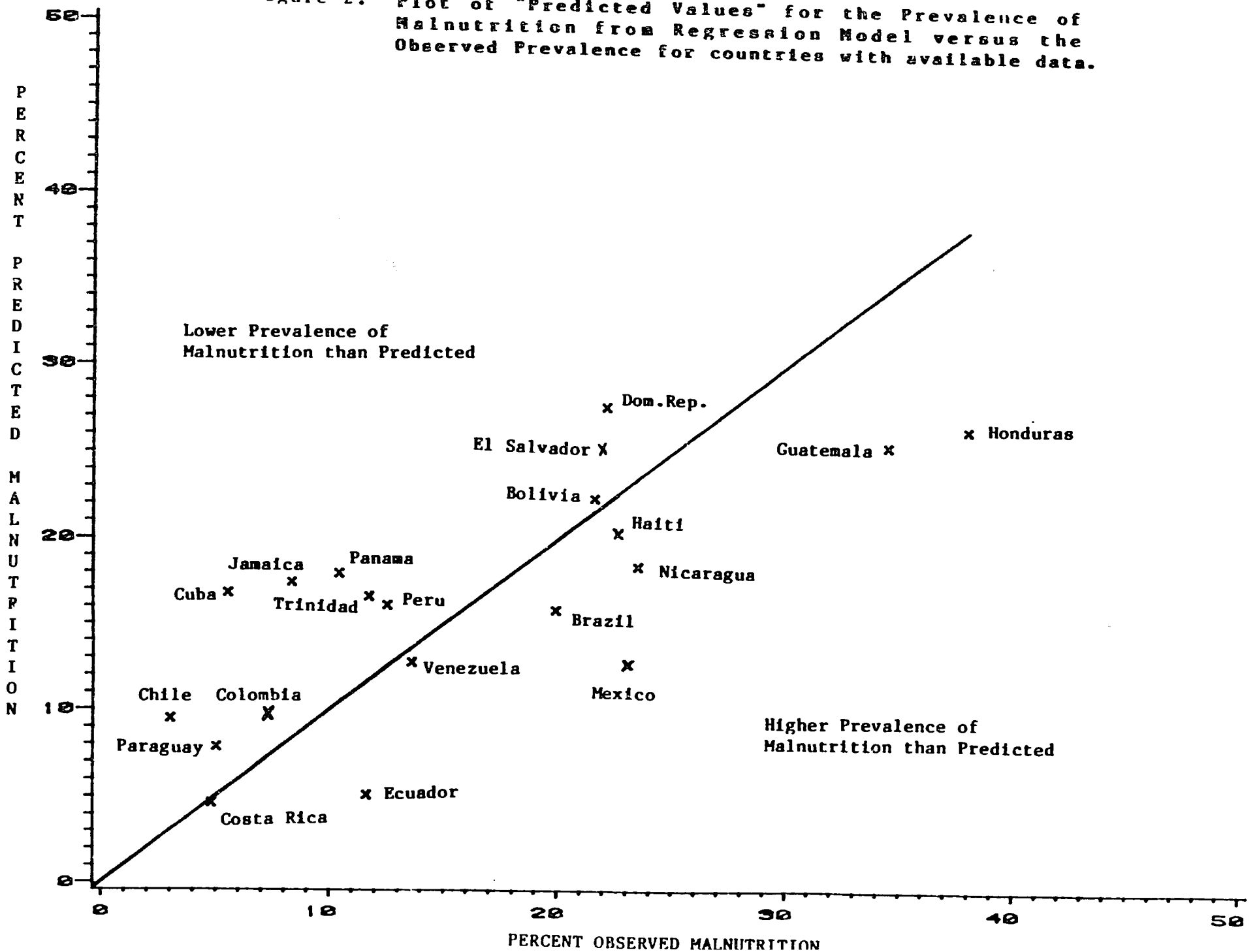
[1]defined in Table 1.

birth weights did not yield any significant predictors. These results indicate that the differences in nutritional status and child mortality which have been observed recently among the countries of the region are significantly (and independently) associated with measures of broad coverage of the health system, aggregate calorie availability and to a lesser degree differences in per capita incomes. Health variables are more important for the higher income countries of the region and food availability and incomes become more important for the lower income countries.

Analyses of the residuals from these regression models (Figure 2) suggested also that there are important individual differences between countries which are not captured by the variables studied. In particular, Ecuador, Guatemala and Honduras seem to have other specific problems beyond those reflected in these data. Their actual levels of malnutrition are higher than those predicted by the model. On the other hand, Jamaica, Panama, Cuba and Chile have lower levels than those predicted by the model. Perhaps, this suggests that specific nutrition oriented policies of these countries have had significant impacts at the national level. The model seems to best describe the processes for the South American countries. All this suggests that the natures of the problems are different for each of the three subregions.

The foregoing analyses indicated that health, food and income variables determine the prevalence of nutrition related problems at the country level. The following sections present data on the evolution of these factors: health, food and income in the past two decades.

Figure 2. Plot of "Predicted Values" for the Prevalence of Malnutrition from Regression Model versus the Observed Prevalence for countries with available data.



1.2 Assessment of the Trends in Health Status in Latin America and the Caribbean

Certain health status indicators are reported at regular intervals in almost every country in the Latin American and Caribbean region. For example, infant and child mortality rates are analyzed on a monthly basis in Colombia (by cause of death at the municipal level) and in other countries these data are available at the national and regional levels on an annual or biannual basis. Mortality rates at one point in time are useful to allow comparisons between countries and areas within countries. On the other hand, data measuring micronutrient deficiencies, e.g. iron deficiency anemia, vitamin A deficiency, iodine deficiency are measured principally from sample surveys and thus not available on a regular basis or at the national level.

Other health measurements related principally to environmental health are available at regular intervals. For example, the adequacy of potable water coverage and adequate sanitary disposal systems are regularly collected by Ministries of Health within each country and consolidated by the Pan American Health Organization (PAHO, 1985). The following sections assess the trends in the above measures of health status based on the available data.

1.2.1 Mortality Information

Infant and childhood mortality indicators reveal indirect information about malnutrition and are valuable indicators of general well-being, also. Malnourished children are at higher risk of death from the diseases of infancy and childhood than are

well nourished children, and the conditions that lead to increased mortality are also conditions that cause nutrient wastage in children. Therefore higher infant and childhood mortality rates are strong indicators that children, mothers, families and communities are at nutritional risk and living under poor general conditions.

Mortality data must be interpreted in reference to the world wide trend of declining mortality in the post war era. Antibiotics, improvement in curative and diagnostic processes as well as world wide improvement in sanitation, vaccination, prophylaxis and eradication of smallpox have all contributed to the decline of all types of mortality. When a country lags in the decline of mortality, this condition probably reflects a lag in the performance of its public health systems and/or a high prevalence of poor nutrition. Failure to improve child survival rates along international standards can be interpreted as patent evidence that the conditions that cause malnutrition persist.

General mortality declined by as much as 40% in certain countries (Brazil, Chile, Colombia, Venezuela, Peru) between 1960 and 1980. As seen in Figure 3, infant[a] and child[b] mortality rates have declined more sharply than general mortality rates in every country in the region. In Chile and Colombia, a 75% decline in child mortality occurred between 1960 and 1975; Panama experienced a 60% decline in child mortality in this period. Within South America, Bolivia currently has the highest rate of infant and child mortality; (123 and 21 per 1000 respectively)

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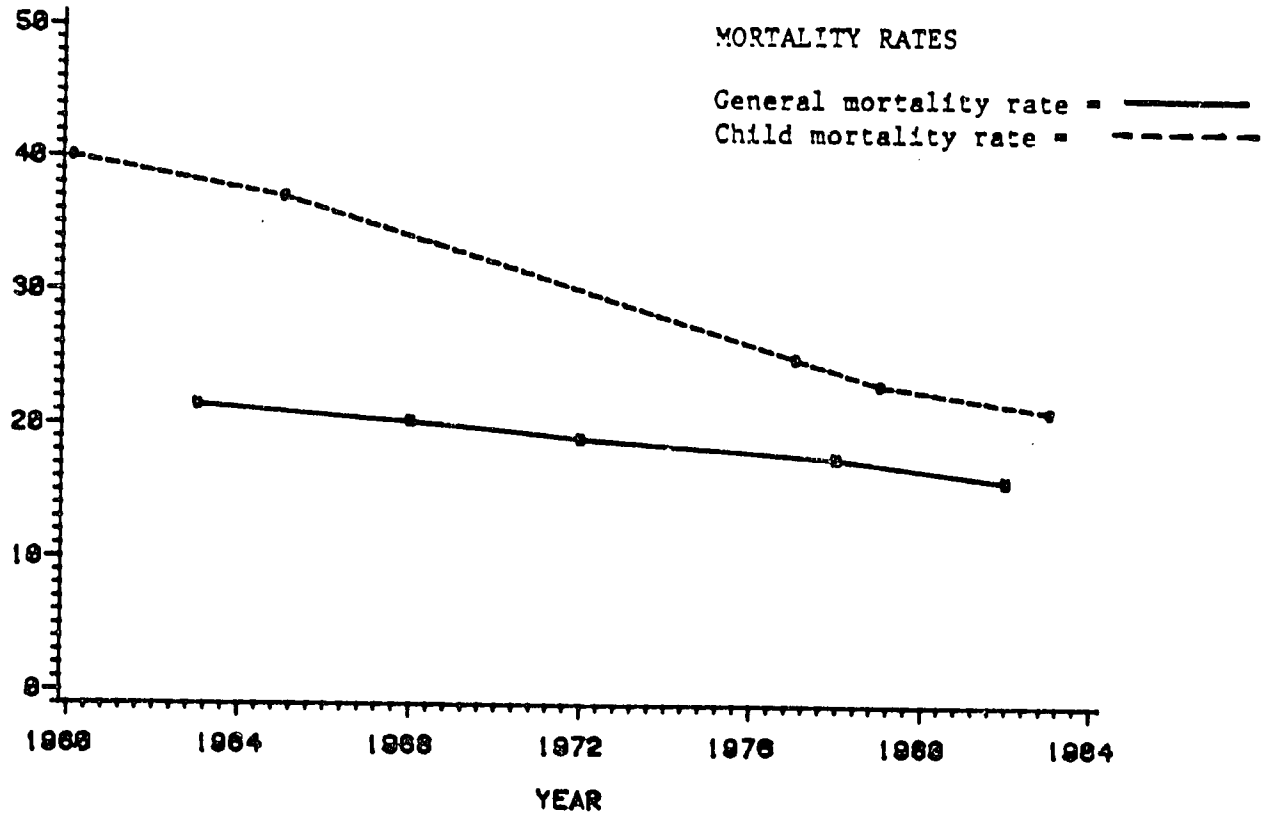
[a] defined as deaths per 1000 live births.
[b] defined as deaths per 1000 population aged 1-4 years.

FIGURE 3. TRENDS IN GENERAL MORTALITY AND CHILD MORTALITY
For Selected AID Assisted Countries
in Latin America and the Caribbean.

BOLIVIA



BRAZIL

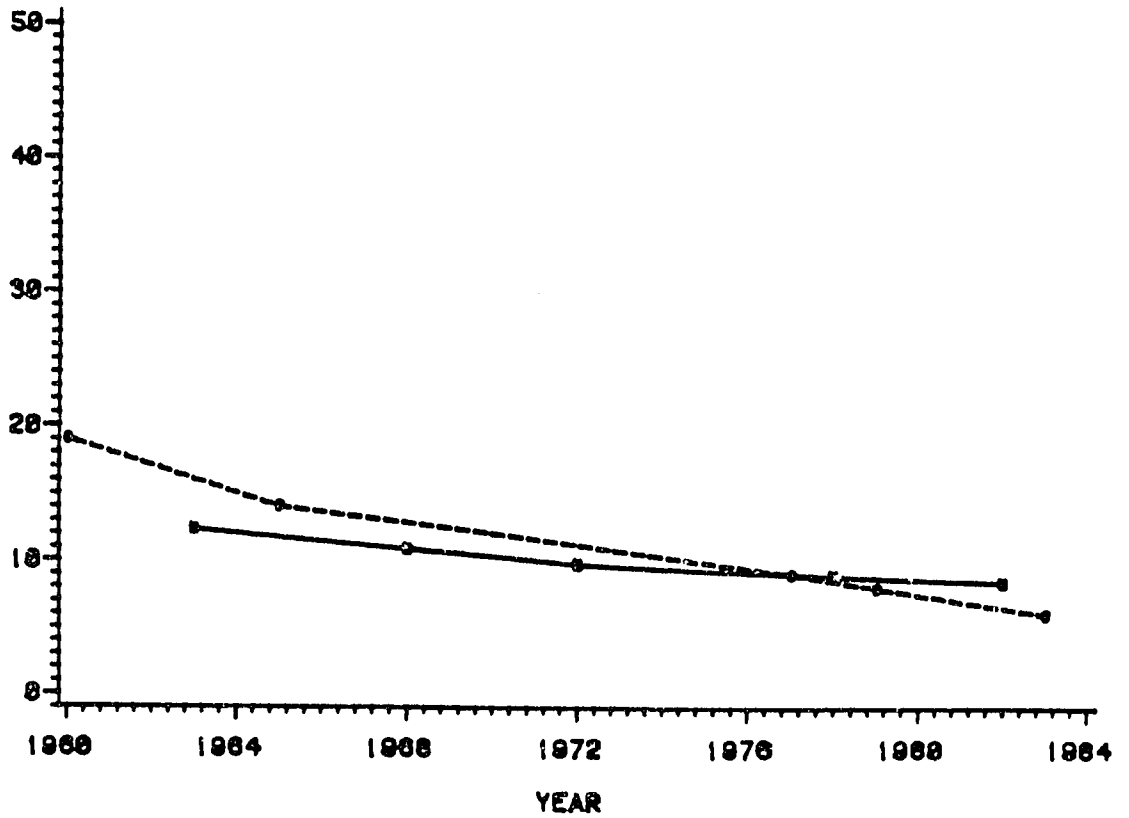


FIGURE 3. TRENDS IN GENERAL MORTALITY AND CHILD MORTALITY
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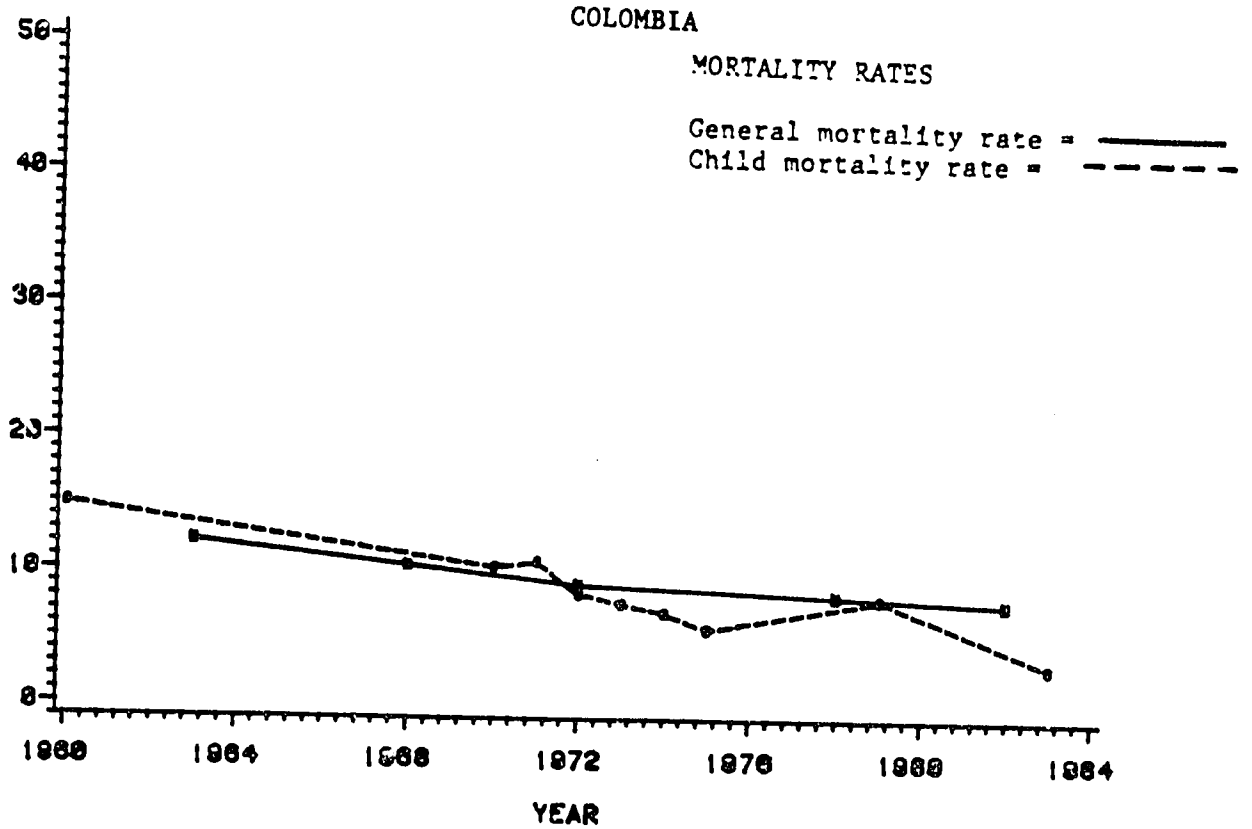
in Latin America and the Caribbean.



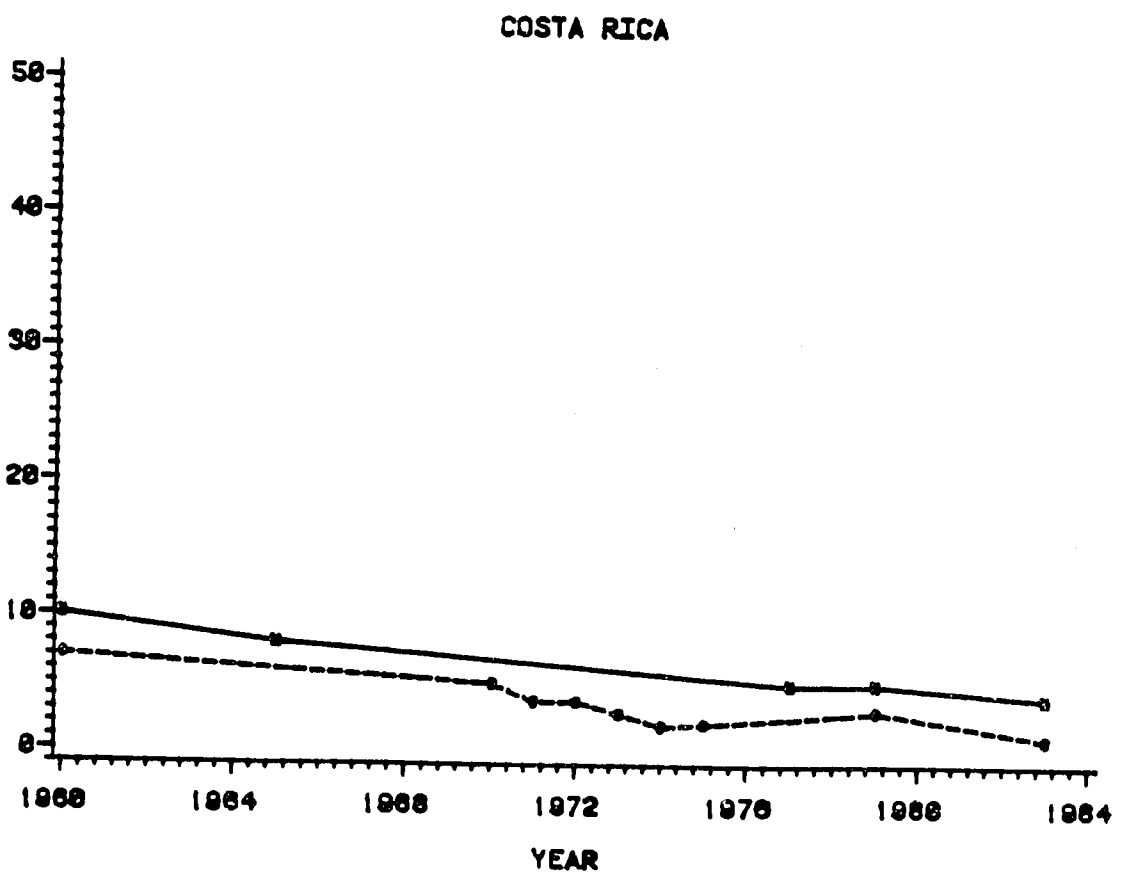
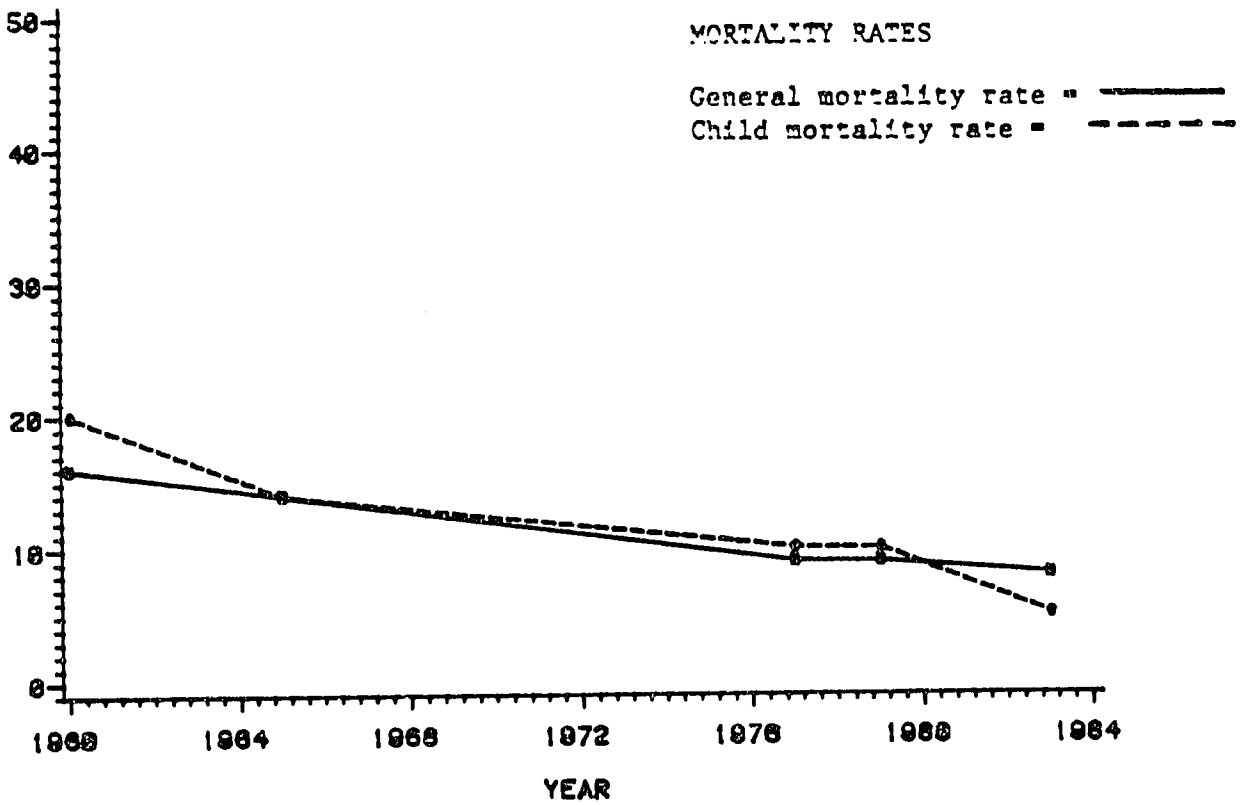


FIGURE 3. TRENDS IN GENERAL MORTALITY AND CHILD MORTALITY
For Selected AID Assisted Countries
in Latin America and the Caribbean.

DOMINICAN REPUBLIC



ECUADOR

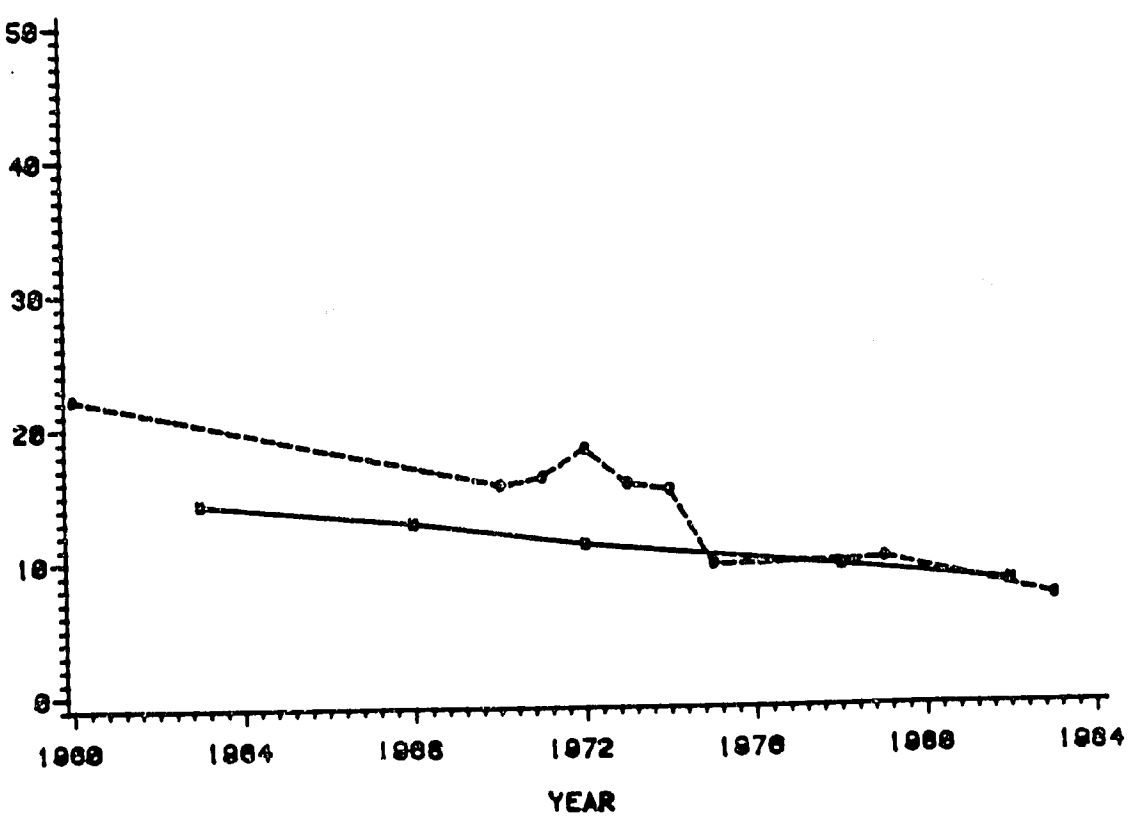
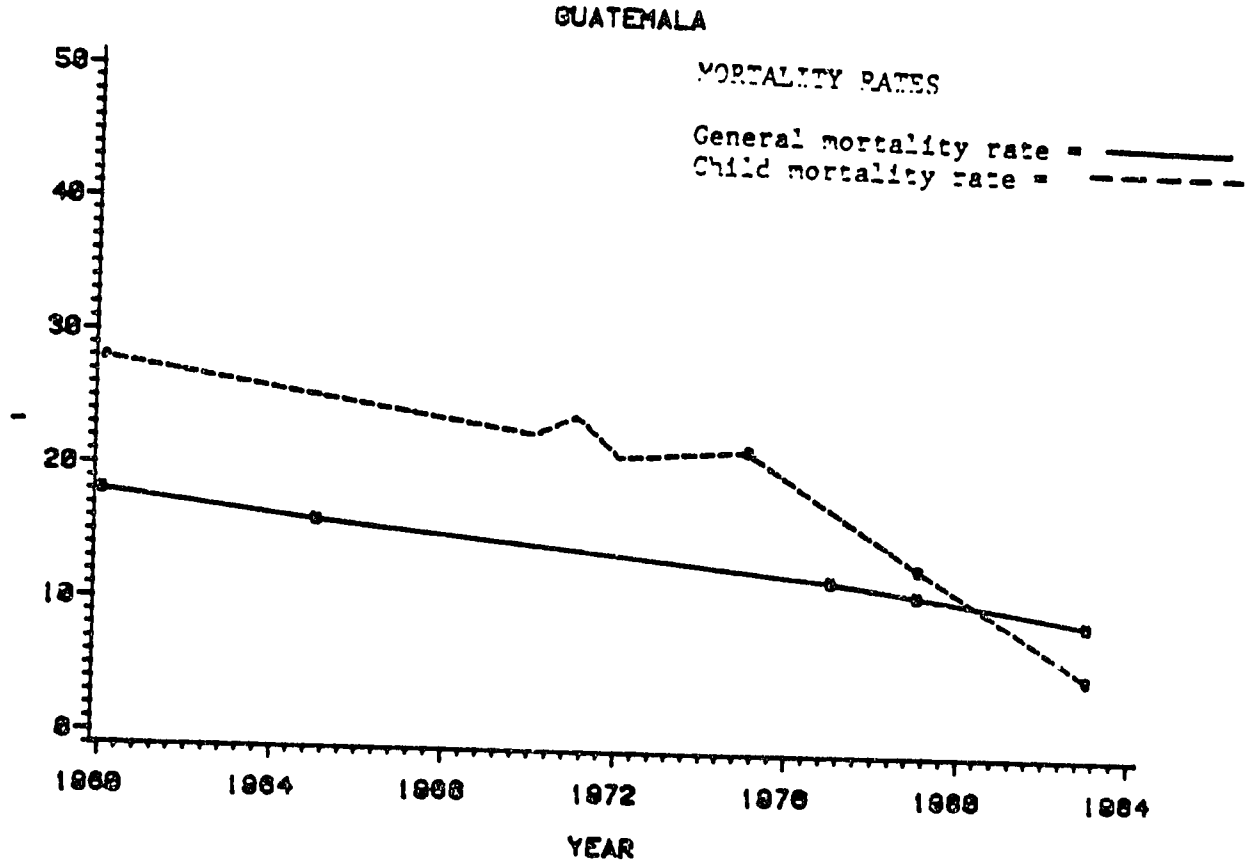


FIGURE 3. TRENDS IN GENERAL MORTALITY AND CHILD MORTALITY
For Selected AID Assisted Countries
in Latin America and the Caribbean.



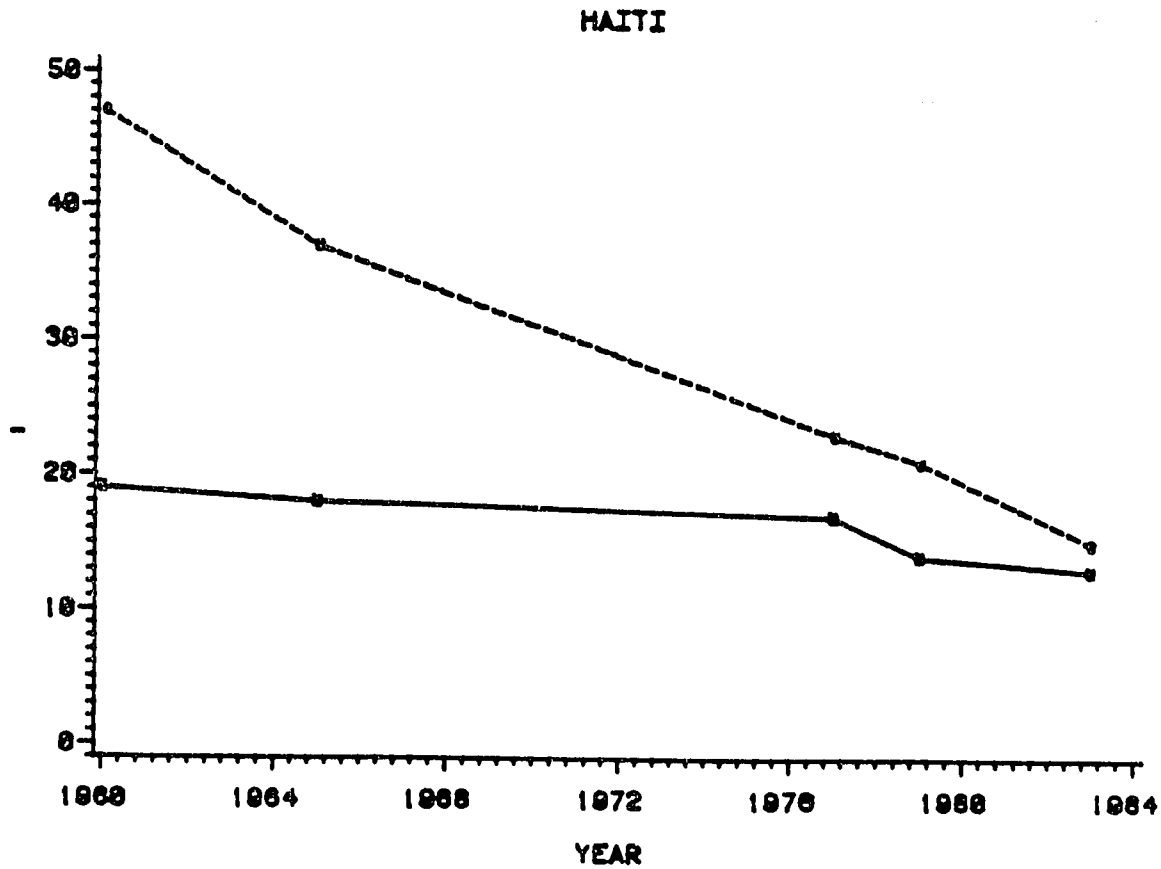
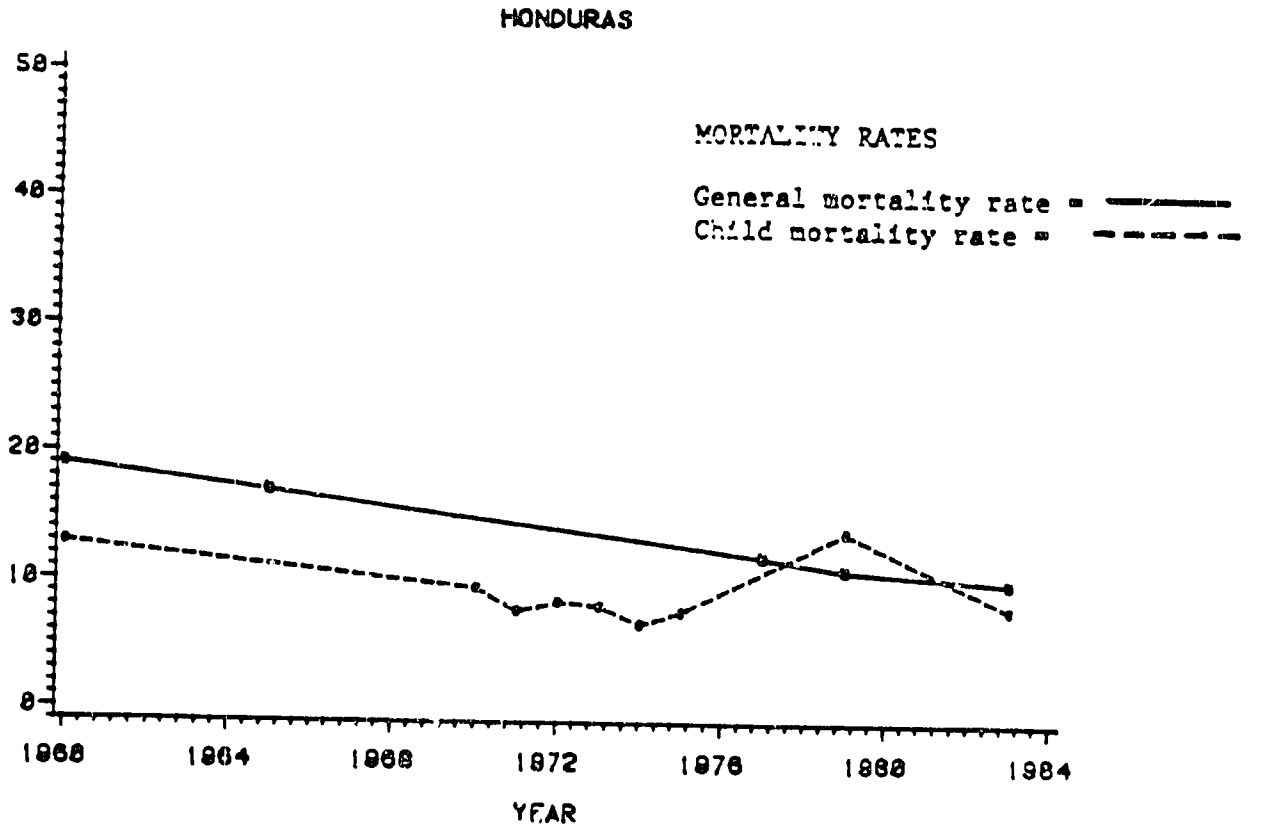


FIGURE 3. TRENDS IN GENERAL MORTALITY AND CHILD MORTALITY
For Selected AID Assisted Countries
in Latin America and the Caribbean.



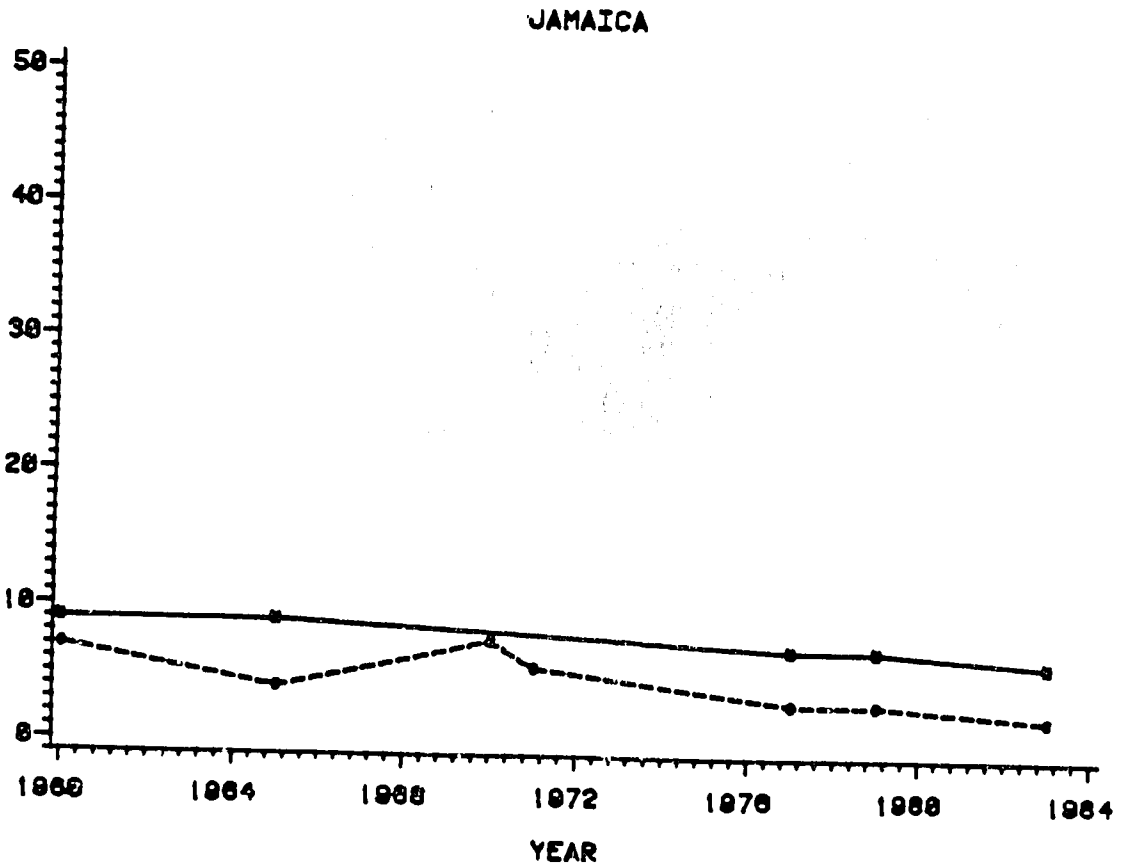
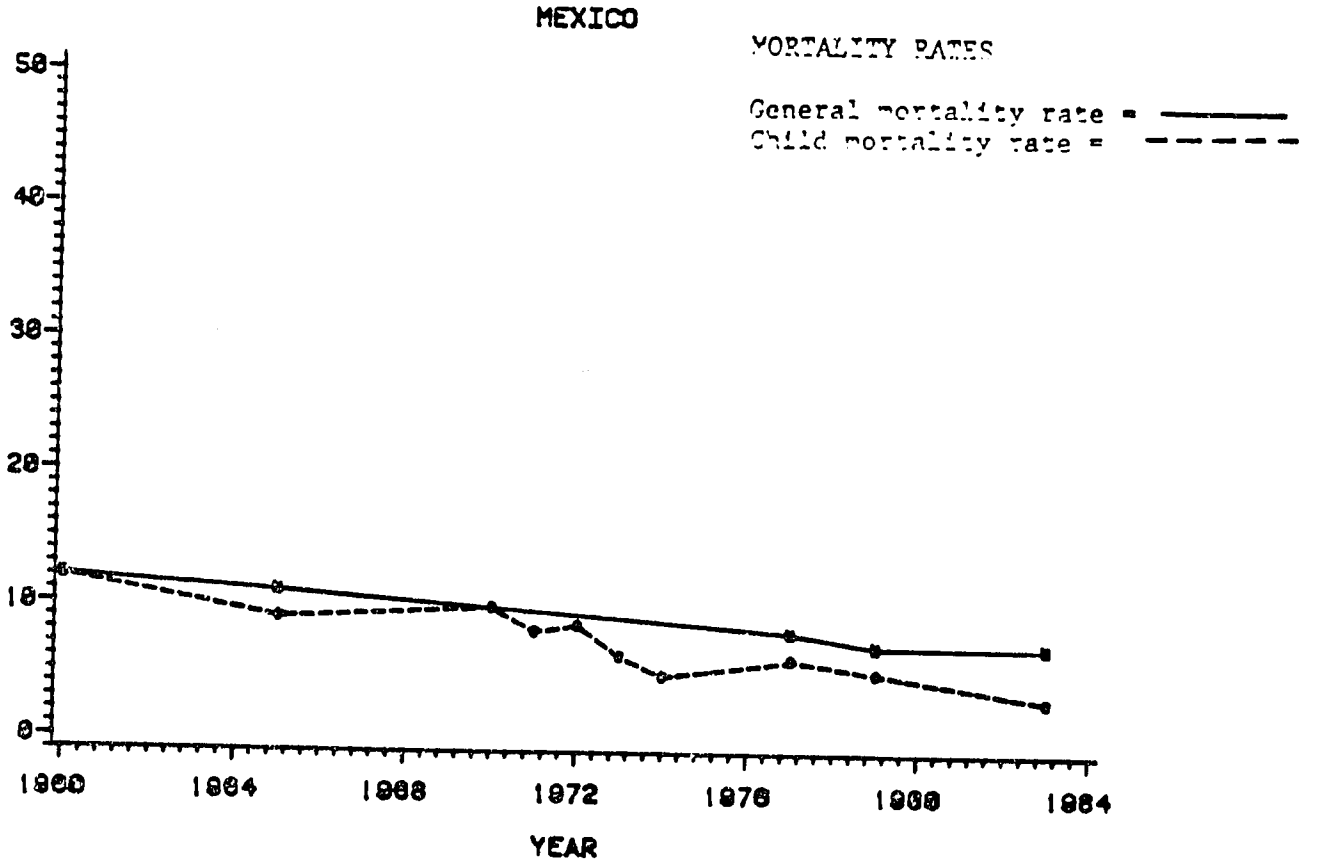


FIGURE 3. TRENDS IN GENERAL MORTALITY AND CHILD MORTALITY
For Selected AID Assisted Countries
in Latin America and the Caribbean.



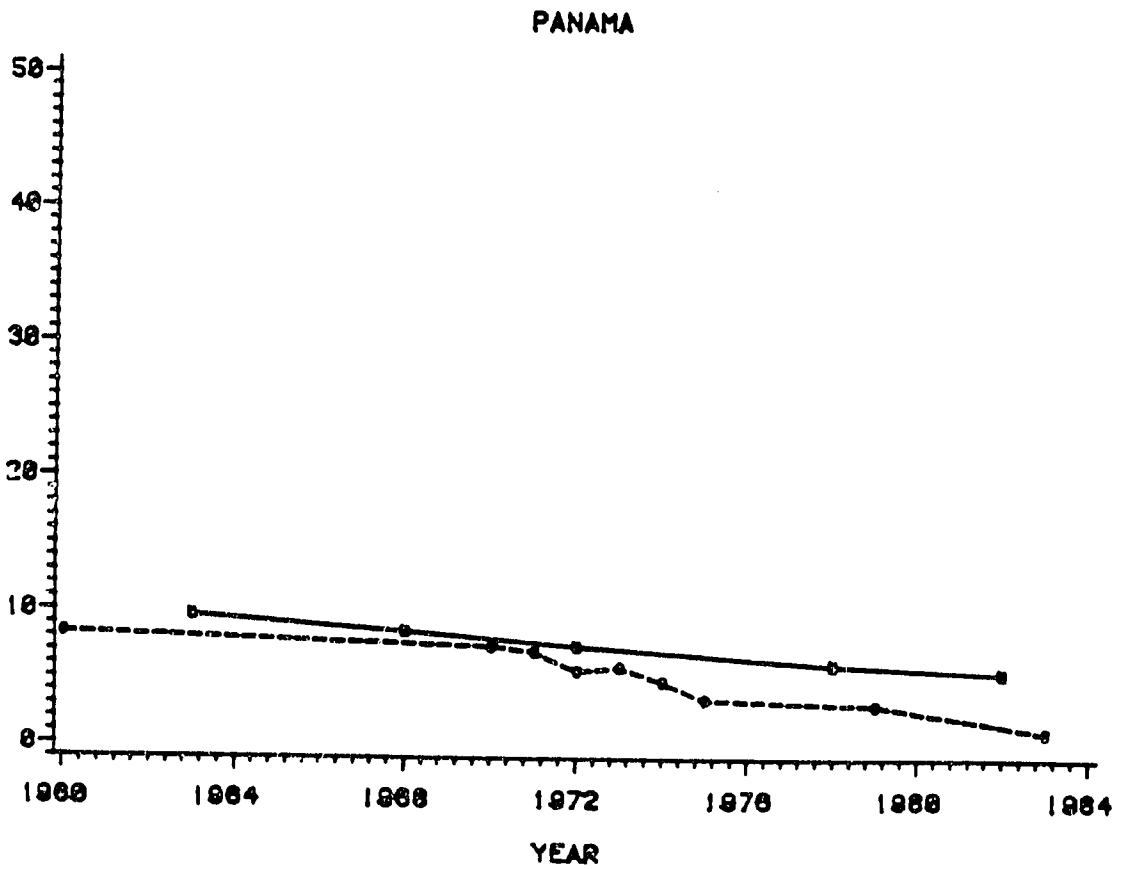
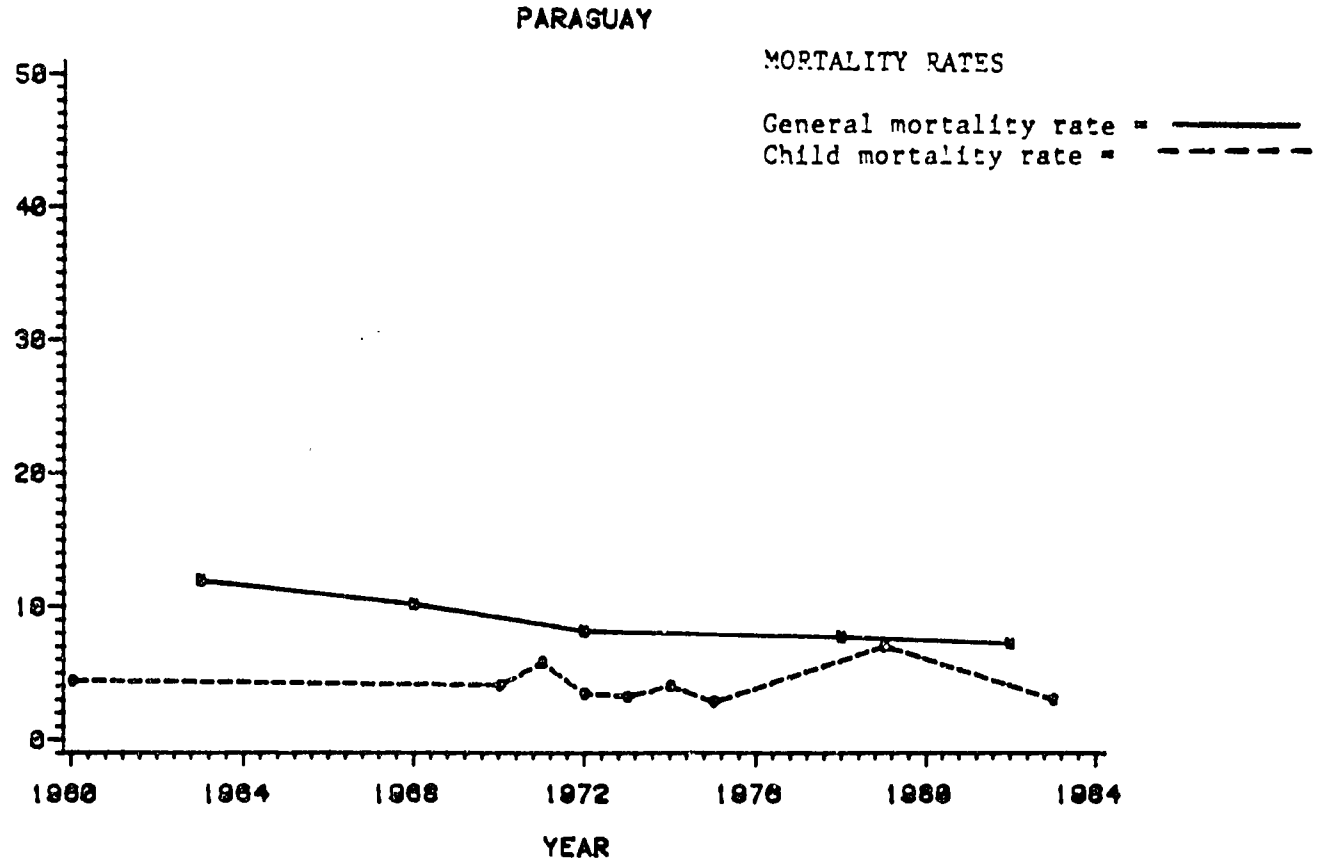


FIGURE 3. TRENDS IN GENERAL MORTALITY AND CHILD MORTALITY
For Selected AID Assisted Countries
in Latin America and the Caribbean.



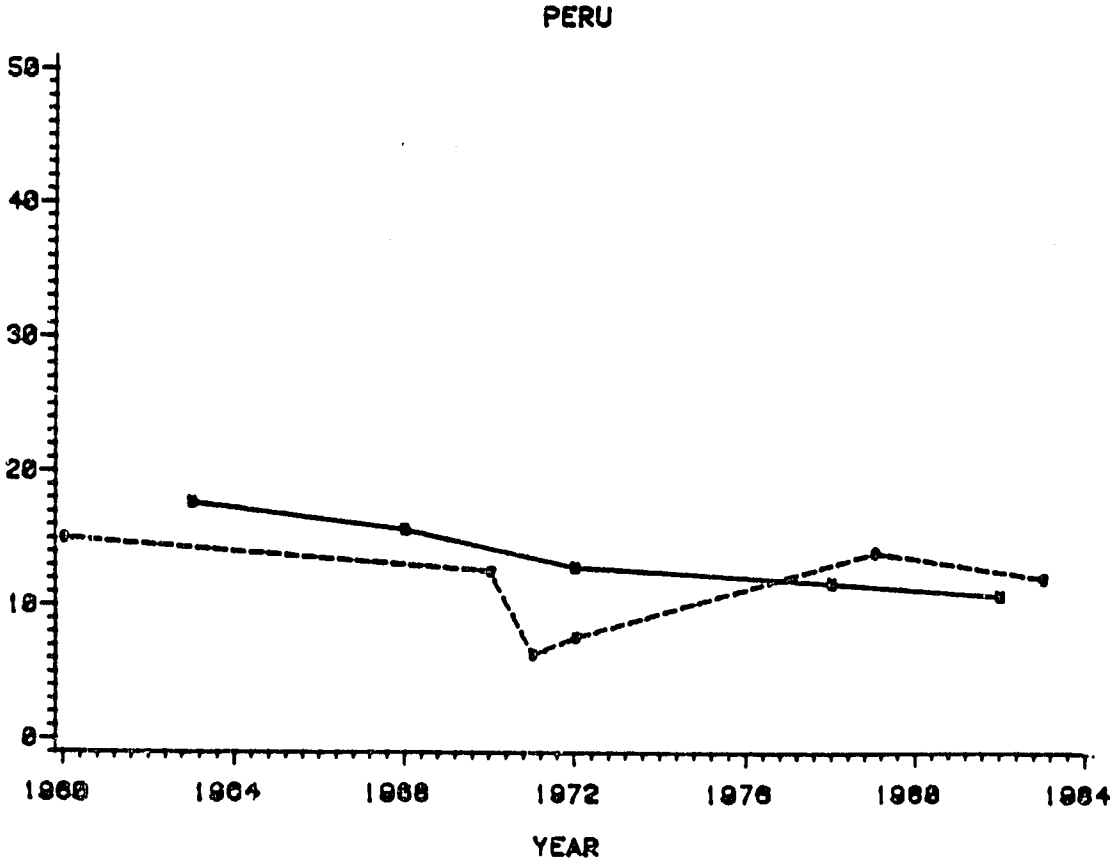
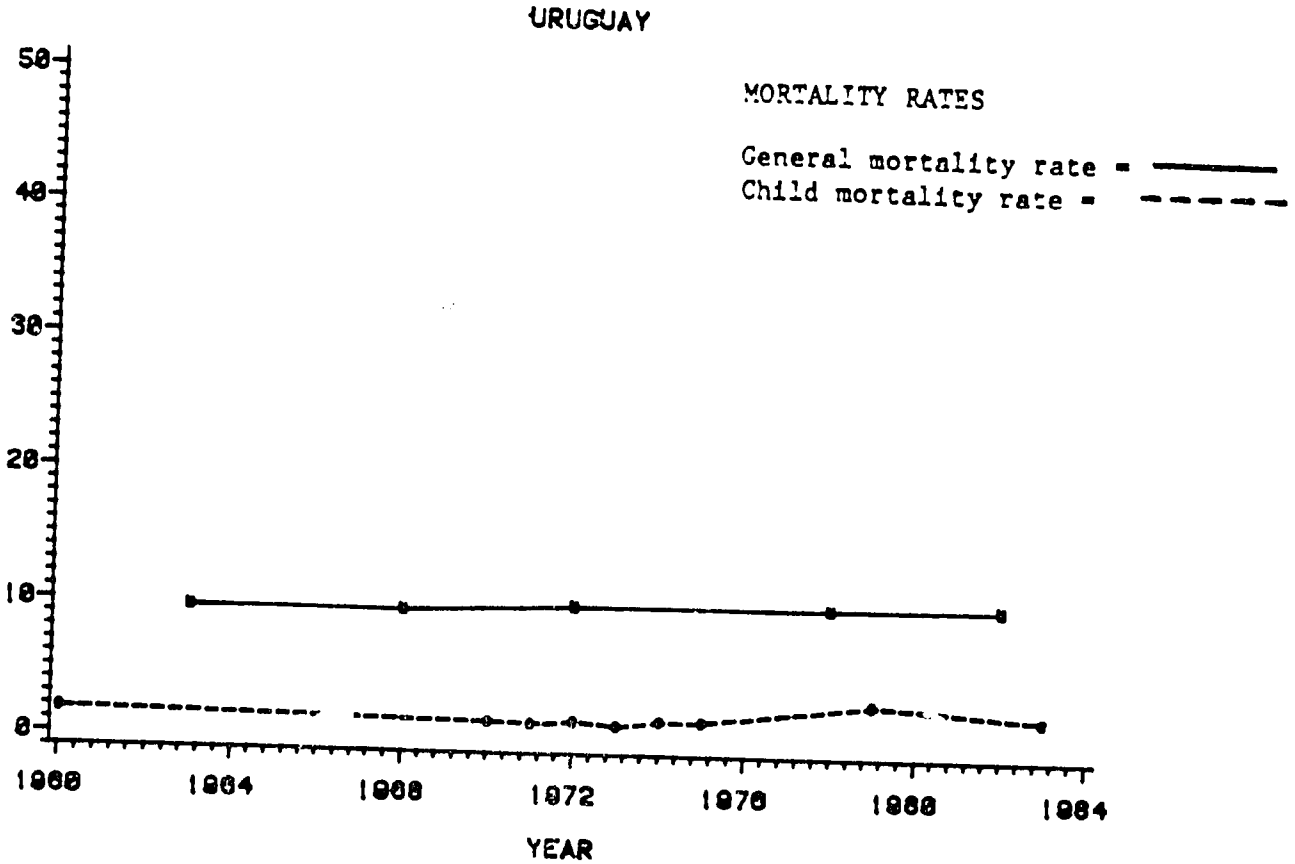


FIGURE 3. TRENDS IN GENERAL MORTALITY AND CHILD MORTALITY
For Selected AID Assisted Countries
in Latin America and the Caribbean.



Haiti, St. Vincent and St. Kitts-Nevis have the highest mortality rates in the Caribbean, and Honduras leads the Central American countries in infant mortality (81 per 1000).

Table 7 shows that female life expectancy has improved in most countries within the Latin America and Caribbean region in the past two decades. Almost all countries show substantial improvement which reflects the general improvement in health throughout the world. On the other hand, the increased survival of infants and children due to improved medical systems may imply that more children live under marginal nutritional conditions. Thus, while progress in survival statistics is necessary, it is insufficient as an indicator of nutritional improvements.

1.2.2 Micronutrient Deficiencies

Table 8 shows that the prevalence of anemia has declined in the past two decades though anemia is still widespread throughout the Latin American and Caribbean countries, especially in the under five year old group and in adult women. According to the World Health Organization in 1979 (WHO 1979a; 1979b), 17 percent of women in Latin America were anemic. Iron deficiency anemia is more prevalent in the Caribbean countries than in South American countries, for example, in Barbados in 1973 more than half (55%) of children under five years of age had hemoglobin levels below 10.9 mg per ml (38% in Grenada). In selected countries in the Caribbean (e.g. Trinidad and Tobago), half of the pregnant women had hemoglobin levels below the WHO norm of 12 mg per ml. In Central America, an INCAP survey conducted in the 1970's found that over 40 percent of pregnant women in Costa Rica and Honduras

Table 7. Female Life Expectancy at Age 5 in Selected Countries in Latin America and the Caribbean (1950's to 1970's)

	1950's	1960's	1970's
Middle Income Economies			
Bolivia	51.6	-	58.0
Honduras	-	52.8	60.2
Costa Rica	61.4	67.1	69.6
Peru	-	57.2	61.8
Guatemala	49.2	56.4	59.5
Jamaica	61.0	66.9	68.6
Colombia	53.9	58.0	62.0
Guyana	57.9	62.6	-
Cuba	63.8	-	69.2
Upper Income			
Chile	58.9	63.1	66.0
Brazil	57.6	60.3	63.3
Argentina	64.2	68.8	69.4
Panama	55.0	62.3	65.4
Mexico	57.9	62.9	65.2
Uruguay	-	70.0	71.0
Trinidad/Tobago	61.0	65.0	65.8
Barbados	64.4	68.2	69.4

Source: Hill, 1984.
Countries not quoted were not available from this source.

Table 8. Percentage of Women in Selected Latin American and Caribbean Countries with Hemoglobin Levels Below the WHO Norm of 12mg/ml.

Region/ Country	Survey Year	Altitude (m)	n	% Women below WHO Norm			
				Pregnant	Lactating	Not Pregnant	All
Central America							
Costa Rica	1969	800	124	44	0	30	-
El Salvador	1969	<750	93	15	-	-	-
Guatemala	1968	1850	95	34	-	-	-
Mexico	1957	2250	9951	-	-	-	35
	1960	-	148	-	-	-	25
	1966	2060	157	-	-	-	23
	1966	Sealvl.	320	-	-	-	33
	1968	1600	600	80	-	-	-
	1968	2500	495	38	-	-	-
Nicaragua	1969	<750	89	20	-	-	-
Panama	1969	-	90	-	-	6	-
Caribbean							
Barbados	1969	-	121	-	-	45	-
Dominican Republic	1969	-	229	46	-	60	-
Haiti	1958	-	150	22	-	17	-
	1970	-	102	64	-	-	-
Jamaica	1962/66	-	798	-	-	33	-
	1967	-	1000	24	-	-	-
	1968	-	205	-	-	17	-
St. Kitts/Nevis	1962	-	41	-	-	54	-
St. Lucia	1962	-	36	-	-	43	-
Trinidad/ Tobago	1962	-	114	-	-	41	-
	1964	-	93	-	30	-	-
	1967	-	555	56	-	-	-
	1968	-	116	57	-	21	-

Table 8. Percentage of Women in Selected Latin American (cont.) and Caribbean Countries with Hemoglobin Levels Below the WHO Norm of 12mg/ml.

Region/ Country	Survey Year	Altitude (m)	n	% Women below WHO Norm			
				Pregnant	Lactating	Not Pregnant	All
South America							
Argentina	1968	-	125	61	-	34	-
Bolivia	1964	2500	126	-	-	15	-
Brazil	1963	-	127	-	-	-	67
	1968	750	78	20	-	8	-
Chile	1961	-	166	-	-	22	-
Colombia	1968	1500	148	22	-	6	-
Ecuador	1960	2000	59	-	-	-	35
Guyana	1971	-	642	55	41	41	-
Peru	1965	1300	283	-	-	-	50
	1968	-	200	35	-	22	-
Uruguay	1962	-	265	-	3	7	-
Venezuela	1964	-	194	-	30	20	-
	1964	-	307	-	-	-	20
	1968	900	217	54	-	24	-
	1974	-	176	10	-	-	-

Source: World Health Organization, 1979b.
Countries not listed were not available from this source.

had iron deficiency anemia compared to 15 and 20 percent in El Salvador and Nicaragua, respectively (Valverde et al., 1983). A PAHO collaborative study which analyzed results from Argentina, Guatemala and Mexico showed that iron deficiency anemia was high in both the lower and higher socioeconomic classes. The study found approximately one quarter to one third of the women had hemoglobin levels at or below the WHO norm of 12mg/ml. (Valverde et al., 1983).

Tables 9 and 10 show that deficiencies in vitamin A (defined as cases with serum retinol below 20 ug/dl) in children have declined drastically between the 1960's and 1976 to 1980 for many countries (INCAP/CDC, 1972; INCAP/MSPAS, 1977; Valverde et al., 1983). However, the proportions of the total population exhibiting vitamin A deficiency in Bolivia and Brazil are still extremely high, 45.1% and 43.0% respectively. In addition, the national nutrition survey in Bolivia in 1981 reported an incidence of night blindness of 2.1% in children 6 to 59 months of age. The marked decline in deficiency of vitamin A is generally attributable to initiation of programs to fortify sugar with vitamin A which were initiated in the 1970's in Honduras, El Salvador, Guatemala, Costa Rica and Panama.

Recent reports documenting the incidence of iodine deficiency as defined by incidence of endemic goiter in the total population show that Bolivia, Ecuador, El Salvador, Peru, Paraguay, Brazil, Guyana, Venezuela, Honduras, and Guatemala have rates over 10%, whereas Colombia and Costa Rica have rates of 2 and 4% respectively. In Suriname,Mexico and Panama, the recent evidence shows figures between 5 and 10 percent. The average

Table 9. Incidence of Vitamin A Deficiency in Children Under 5 Years of Age and in the Total Population in Selected Countries in Latin America and the Caribbean

Country	Year	Incidence (%)
Children		
Costa Rica	1981	1.6
Honduras*	1980	2.8
Guatemala	1977	9.2
Panama	1967	18.4
Nicaragua	1966	19.8
El Salvador	1976	33.3
Total population		
Venezuela	-	4.9
Paraguay	-	6.6
Guyana	-	9.5
Colombia	1977-1980	12.4
Brazil	-	43.0
Bolivia	-	45.1

Source: Valverde et. al, 1983

*The latest information from Honduras reported a percentage of cases below 30 ug/dl of 2.8%. Therefore, no more than 2.8% of cases are below 20 ug/dl.

Table 10. Incidence of Vitamin A Deficiency in Children Under 5 Years of Age in Selected Central American Countries During the 1960's and 1976-1980

Country	Period	Incidence (%) Previous Survey (1960's)	Latest Survey (1976-80)	Average Annual Reductions
Honduras	1967-1980*	39.5	2.8	2.82
Costa Rica	1966-1981	32.5	1.6	2.06
El Salvador	1966-1976	50.0	33.3	1.67
Guatemala	1965-1977	26.2	9.2	1.42

*For 1967, information from INCAP/CDC (1972).

Source: Valverde et. al, 1983.
Other countries not available from source.

decline in the past decade in endemic goiter in Latin America has been between 1 and 5 percent annually with the exception of Brazil and Paraguay which show little or no decline between 1965 and 1976 (Valverde et al., 1983).

Tables 30 through 35 in Appendix A show that based on national figures derived from food availability data, persons living in the Andean countries and Brazil suffer from deficiencies in calcium, niacin and riboflavin. In general, however, overall specific nutrient deficiencies do not seem to be the major health problems associated with food intake. It is widely reported (and believed) that the indigenous diets of all the countries in the region would be adequate in all nutrients if they were also adequate in calories. Exceptions to this general belief are the concerns for iodine deficiency in the Andean countries and the concern of iron deficiency in the Caribbean.

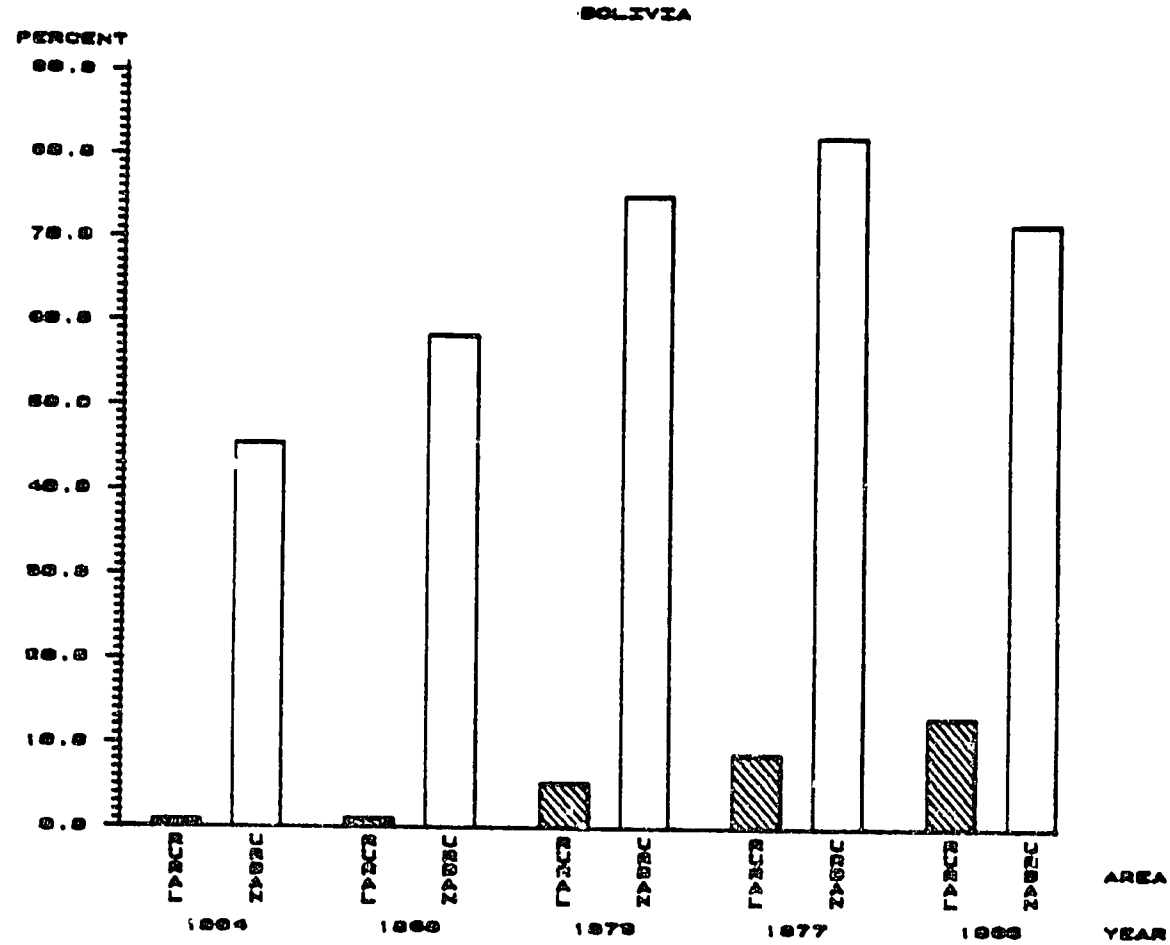
In addition to the specific health problems associated with specific nutrient deficiencies - anemia, goiter, night blindness, etc., malnutrition contributes to higher morbidity and eventually to mortality from a number of diseases which are preventable through public health initiatives or through other private sector preventive measures. Measles, upper respiratory infections, diarrheas and parasitic infections are the types of diseases which are aggravated by poor nutrition and can lead to premature death. The principal causes of death from these problems are poor coverage and access to health care services, poor coverage by water and sanitation services, and lack of continuity or coverage in vaccination programs for childhood diseases.

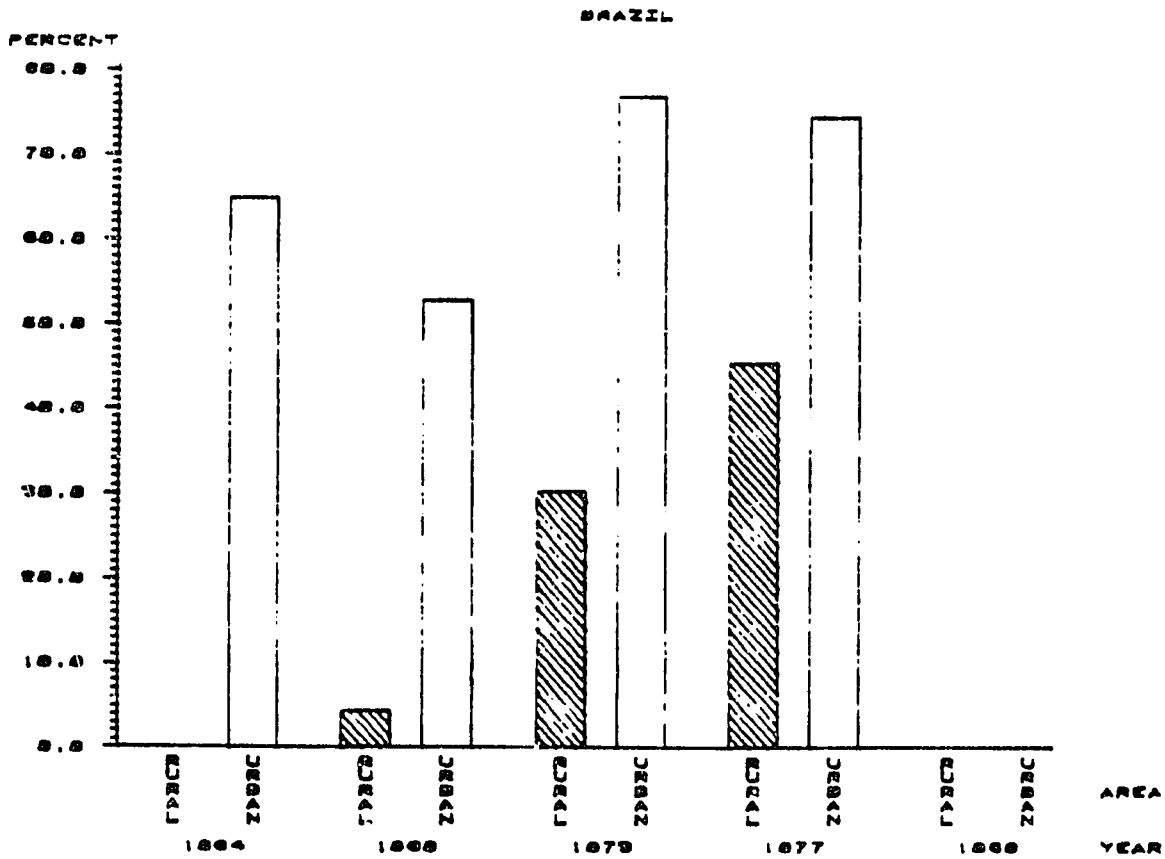
1.2.3 Environmental Health

Clean water for drinking and cleansing and adequate sanitation are essential to good health. The absence of safe water and good sanitation causes diseases which are wasteful of consumed nutrients. In many countries in Latin America and the Caribbean more than half of the total population lives in dwellings that are not connected to a potable water system. This is particularly true in Bolivia, Ecuador, Guatemala, Paraguay, Peru and Haiti (Table 2). As seen in Figure 4, no more than 30 percent of the rural population in Bolivia, Colombia, Ecuador, Paraguay, Peru and Uruguay had access to potable water in 1980. On the other hand, the percentage of the urban populations in these countries having access to adequate water was well over 80 percent (with the exception of Paraguay).

In the previous section, Table 2 contains the percentage of the population in countries within the Latin American and Caribbean region with adequate sanitation facilities for disposal of human wastes. In some countries (e.g. Bolivia, Haiti, Dominican Republic, Nicaragua), less than 30 percent of the population have adequate sanitary facilities. The picture is even worse in the urban areas alone. For example in urban Peru, eleven of the 24 departments had less than 10 percent of their households connected to a sewerage system in 1983 and even in metropolitan Lima, over 40 percent of the households were not connected to a sewerage system. It is not surprising, therefore, that morbidity and mortality are associated with communicable diseases. In addition, marginal diets in such settings are rendered inadequate since the nutrients are wasted to diseases.

FIGURE 4. TRENDS IN COVERAGE OF SAFE WATER
By Urban and Rural Areas
in Latin America. (selected countries)





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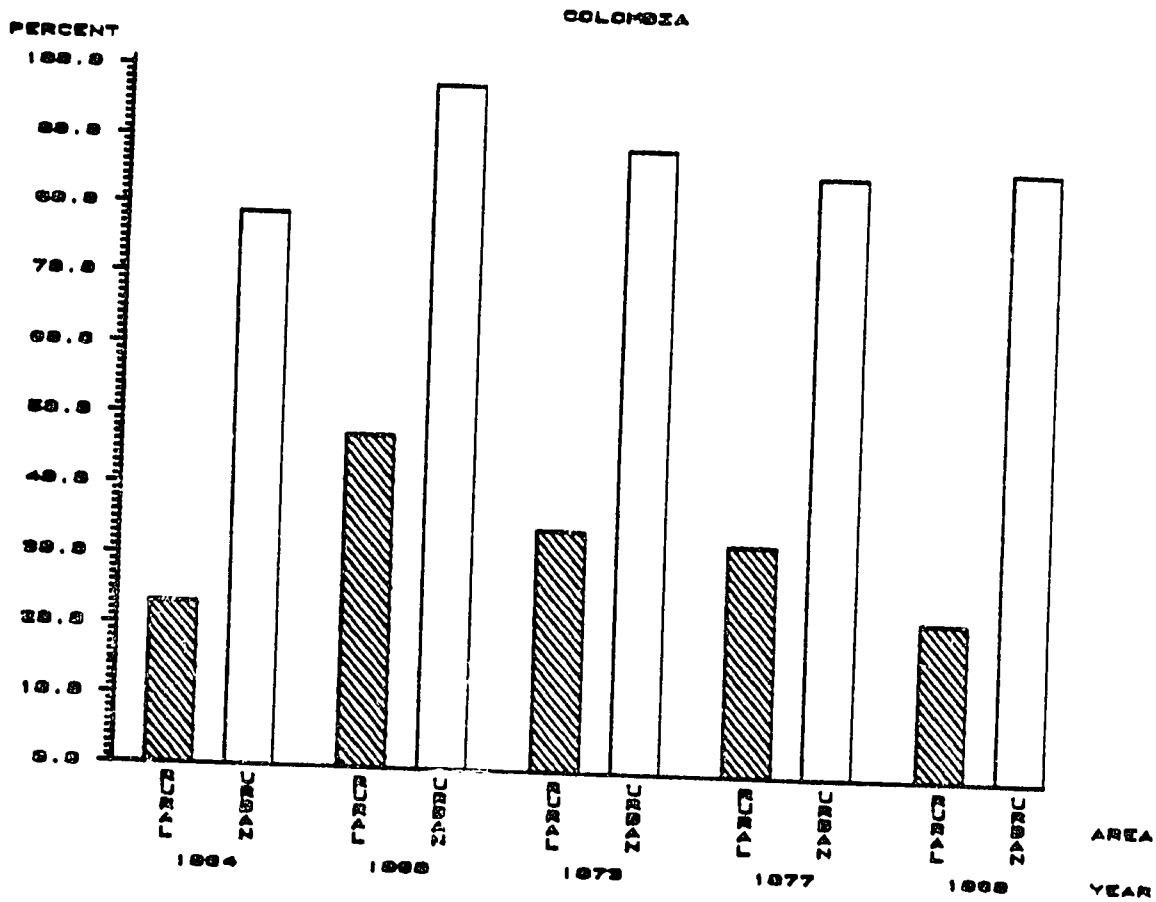


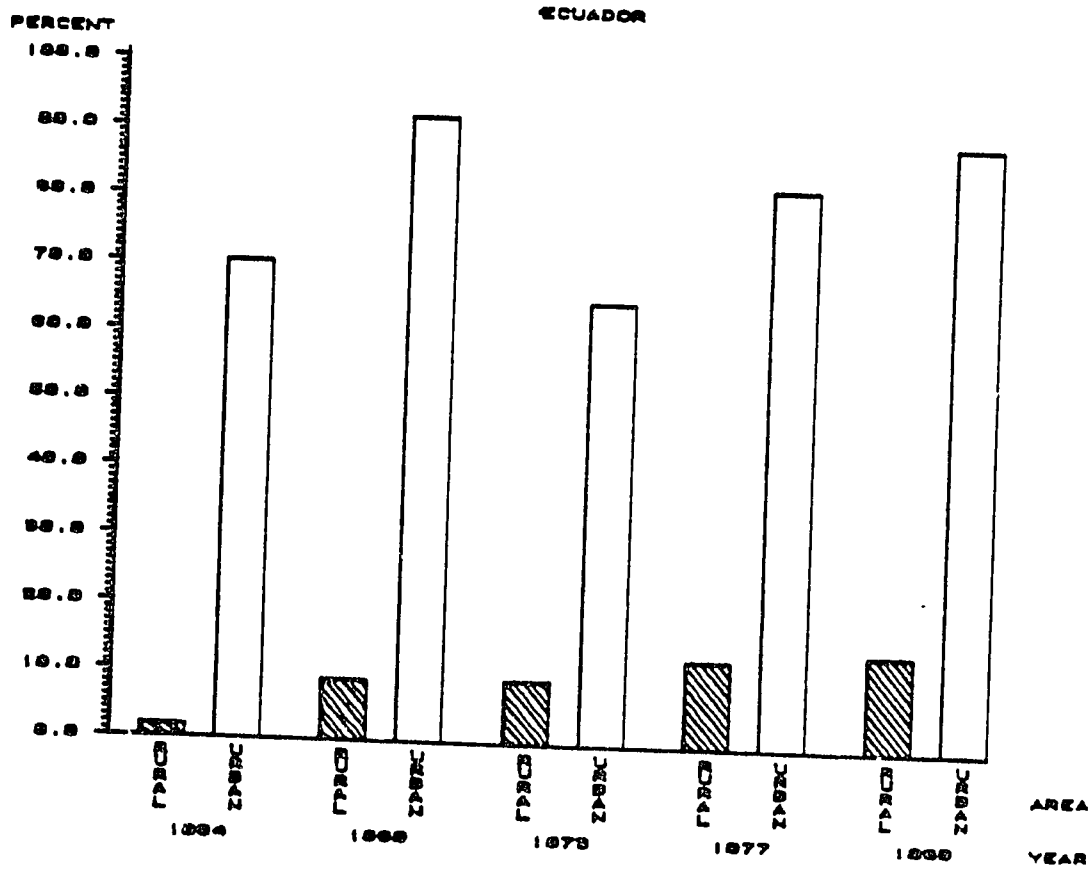
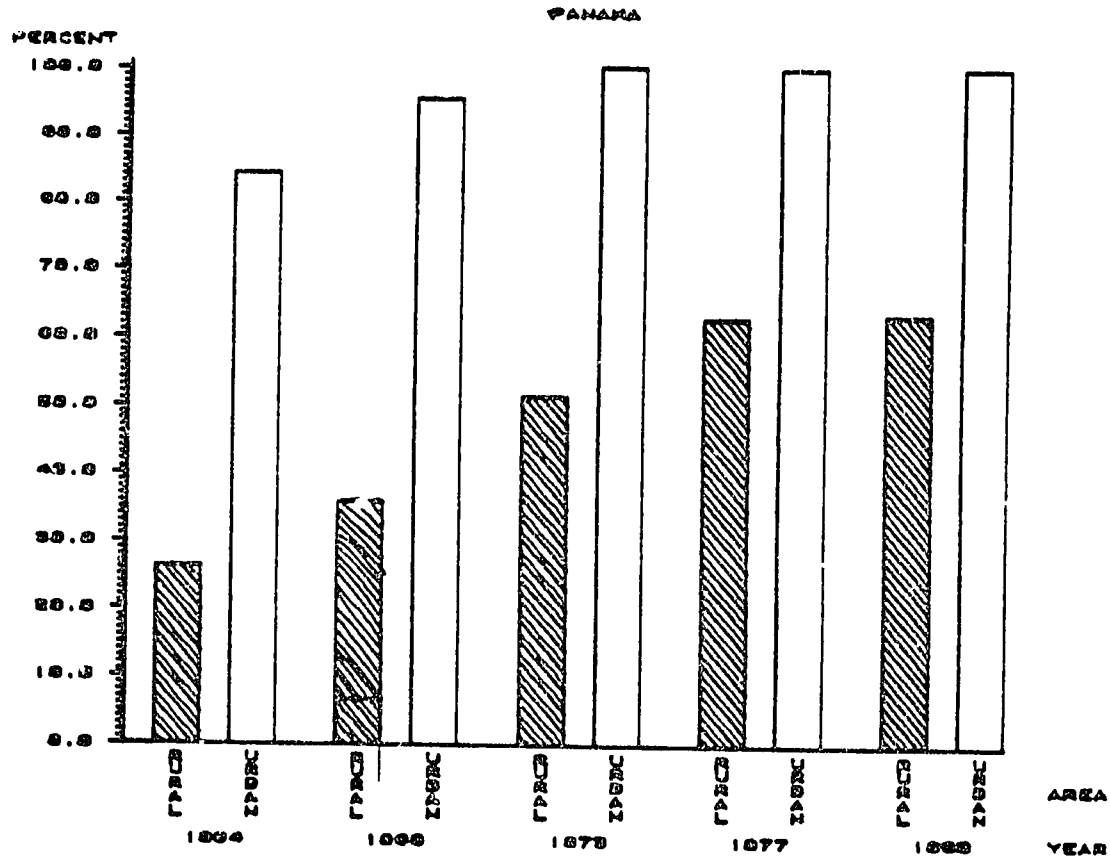


FIGURE 4. TRENDS IN COVERAGE OF SAFE WATER
By Urban and Rural Areas
in Latin America. (selected countries)



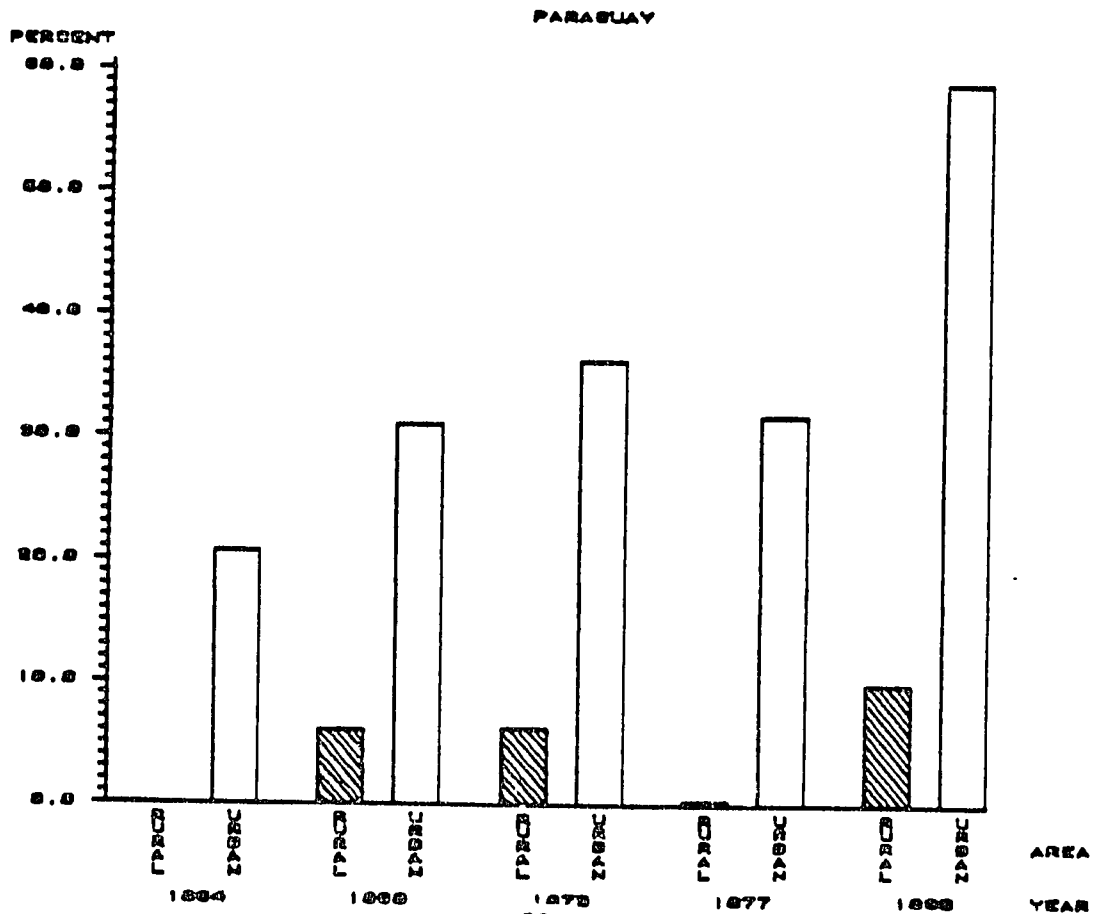
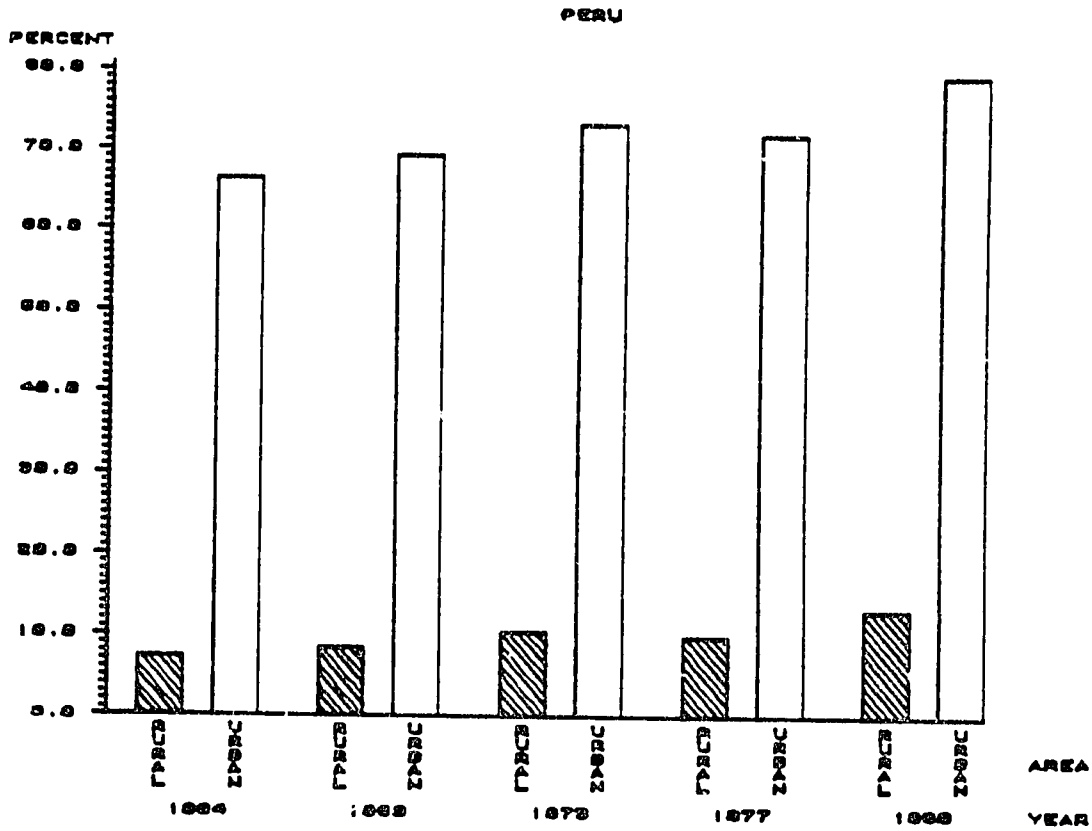
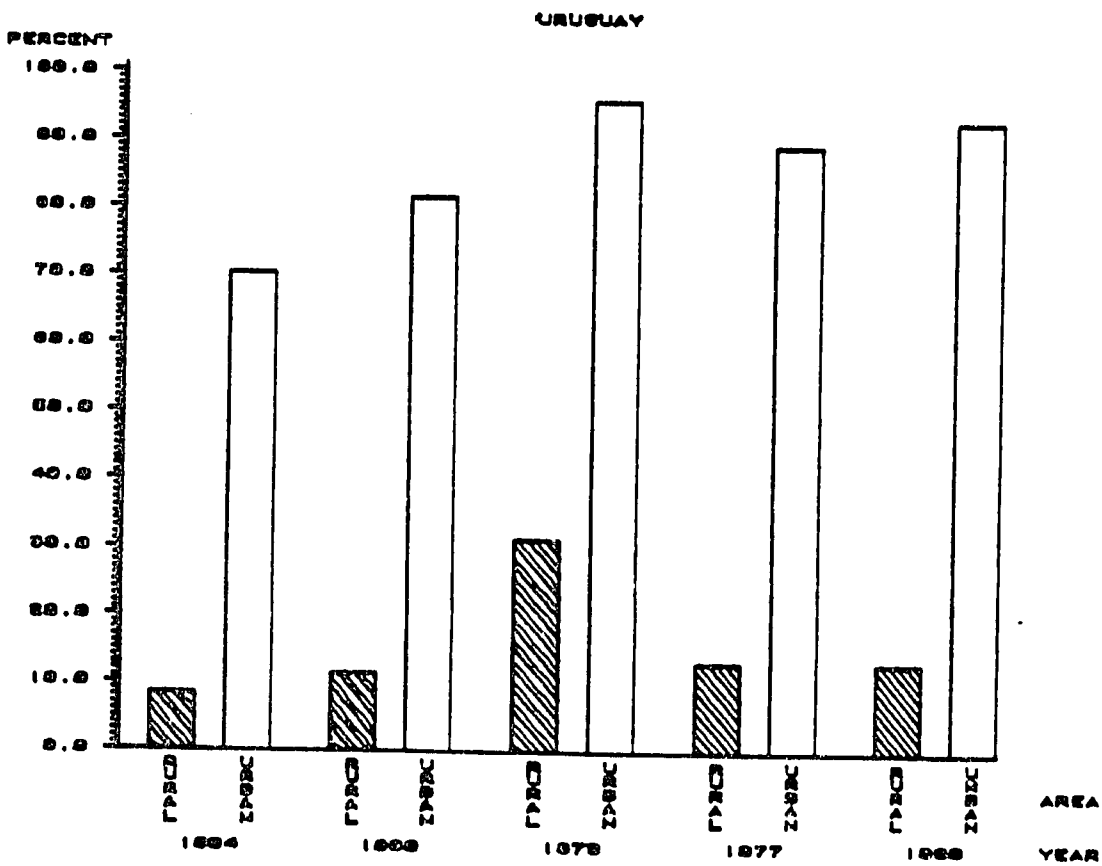


FIGURE 4. TRENDS IN COVERAGE OF SAFE WATER
By Urban and Rural Areas
in Latin America. (selected countries)





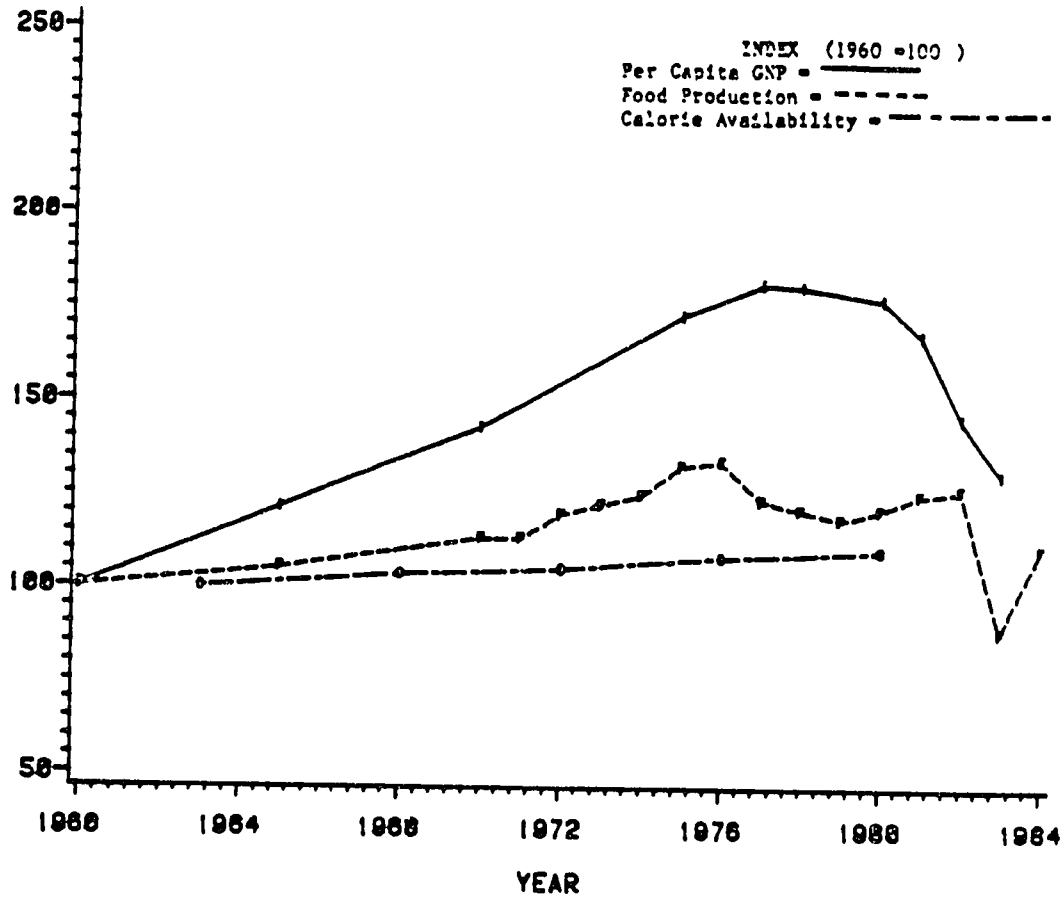
An additional issue regards the direct ingestion of contaminated foods. Zoonotic processes, improper handling and improper storage can lead to unsafe foods of both animal and vegetable origin. In some countries in Latin America and the Caribbean, there is an inadequate system for controlling the safety of marketed foods, and contaminated fresh and prepared foods can be an important medium for the transmission of disease. For example, unsafe foods are one of the principal means for transmission of typhoid fever. Peru experienced an epidemic of this disease in 1979. Dairy products and seafood are considered the principal sources of contamination through marketed food, but unsafe eating establishments in urban areas and zoonotic diseases are also important health problems which would contribute to poor nutrition among the population.

1.3 The Food Situation in Latin America and the Caribbean

In general, food availability and domestic production in Latin America and the Caribbean has lagged the growth of incomes; in some cases food availability has deteriorated. Figure 5 presents plots of the evolution of per capita incomes, per capita food production and per capita food availability on an annual basis for selected AID assisted countries. One basic limitation of these data is that the distribution of the food over households, persons and time (seasons within years) is unknown. Nevertheless, such food balance sheet data is useful to compare countries and the evolution of food supplies over the years. For the period under review, the level of food energy available for most countries has ranged from 90 to 110% of the level of 2,400

FIGURE 5. TRENDS IN INCOME, FOOD PRODUCTION, AND CALORIE AVAILABILITY For Selected Latin American and Caribbean Countries

BOLIVIA



BRAZIL

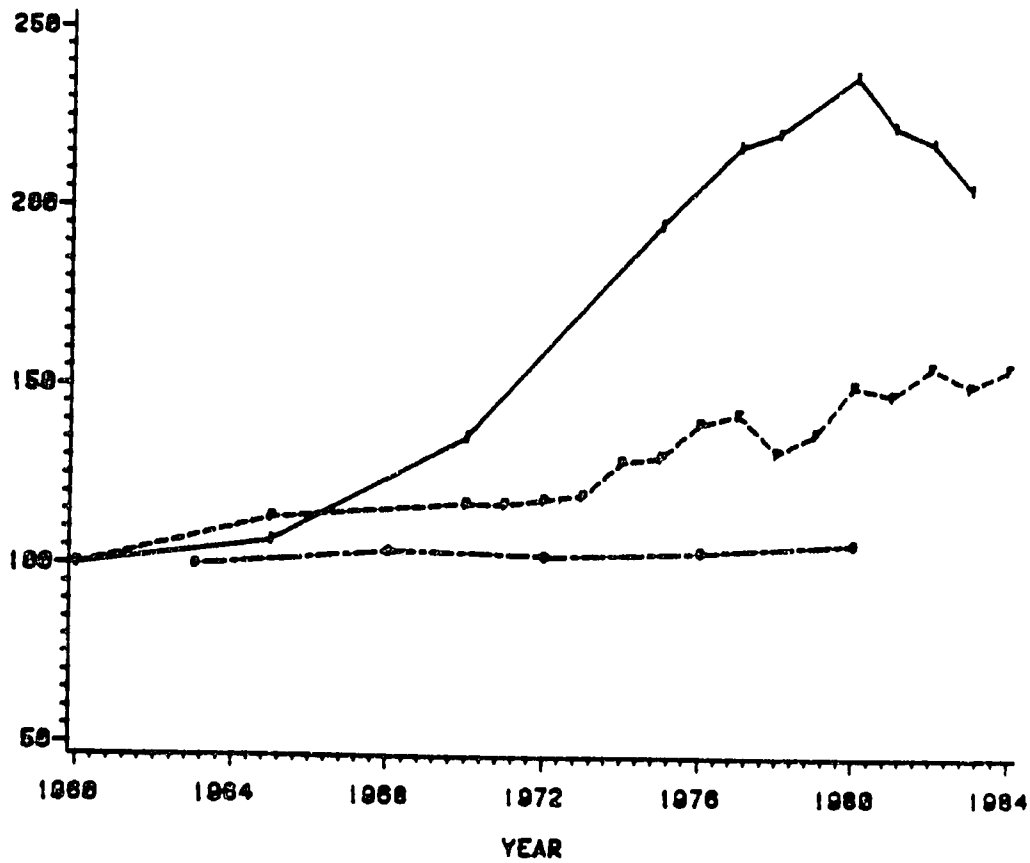
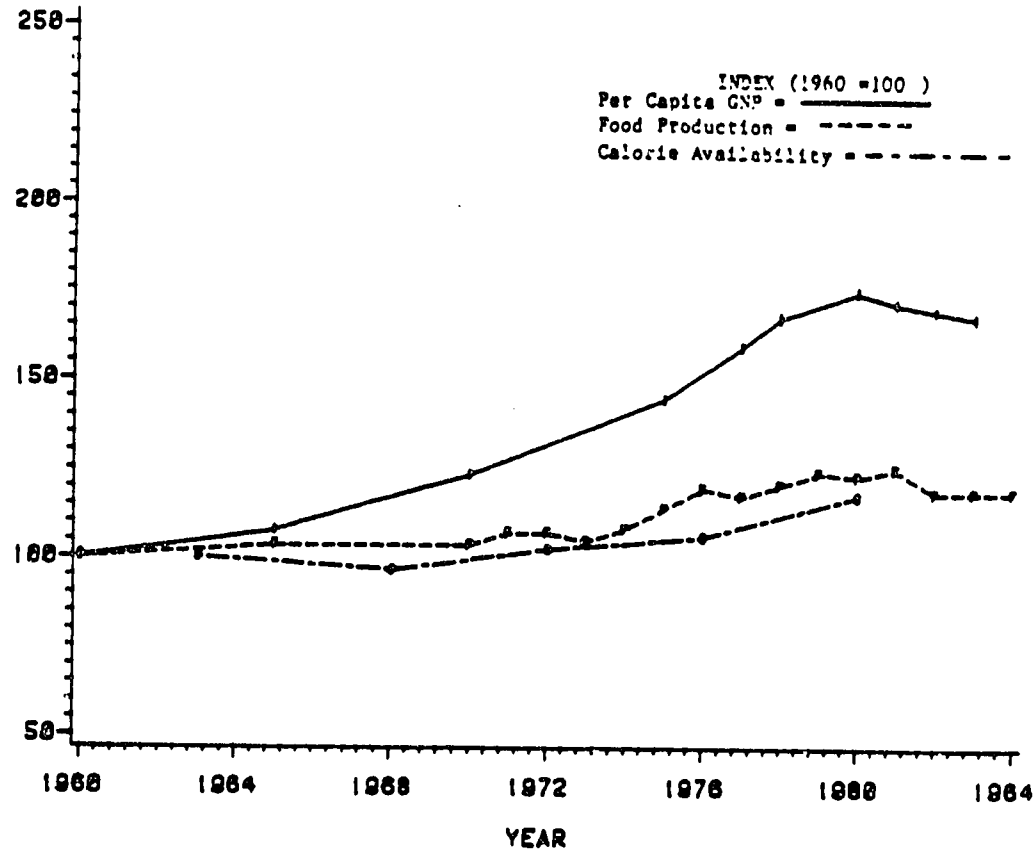


FIGURE 5. TRENDS IN INCOME, FOOD PRODUCTION, AND CALORIE AVAILABILITY
For Selected Latin American and Caribbean Countries

COLOMBIA



COSTA RICA

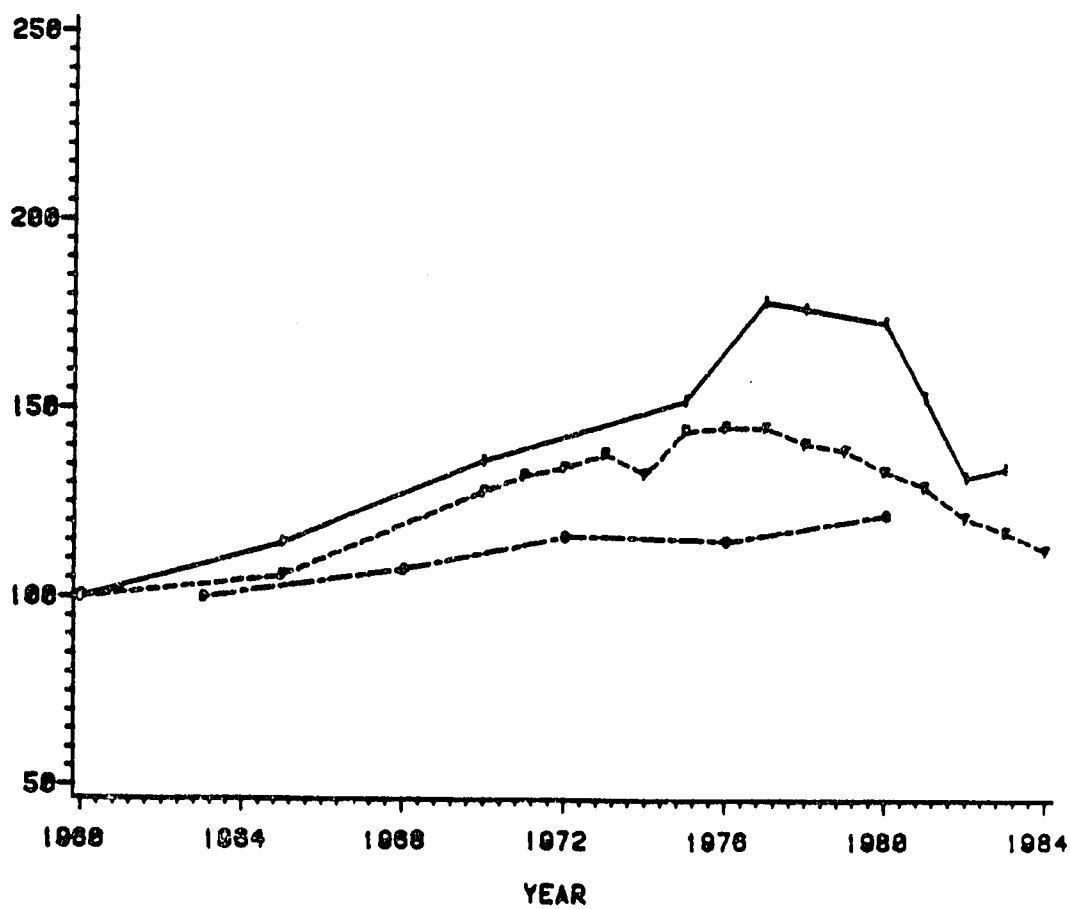
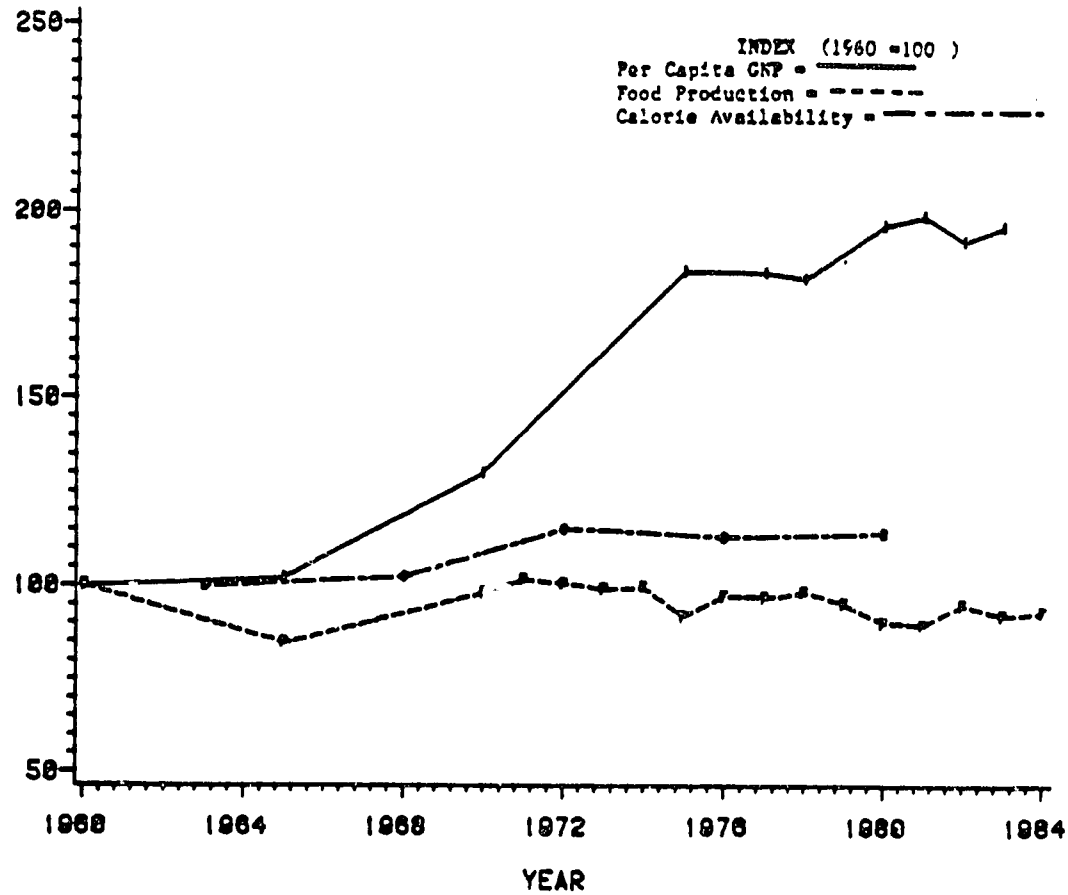


FIGURE 5. TRENDS IN INCOME, FOOD PRODUCTION, AND CALORIE AVAILABILITY
For Selected Latin American and Caribbean Countries

DOMINICAN REPUBLIC



ECUADOR

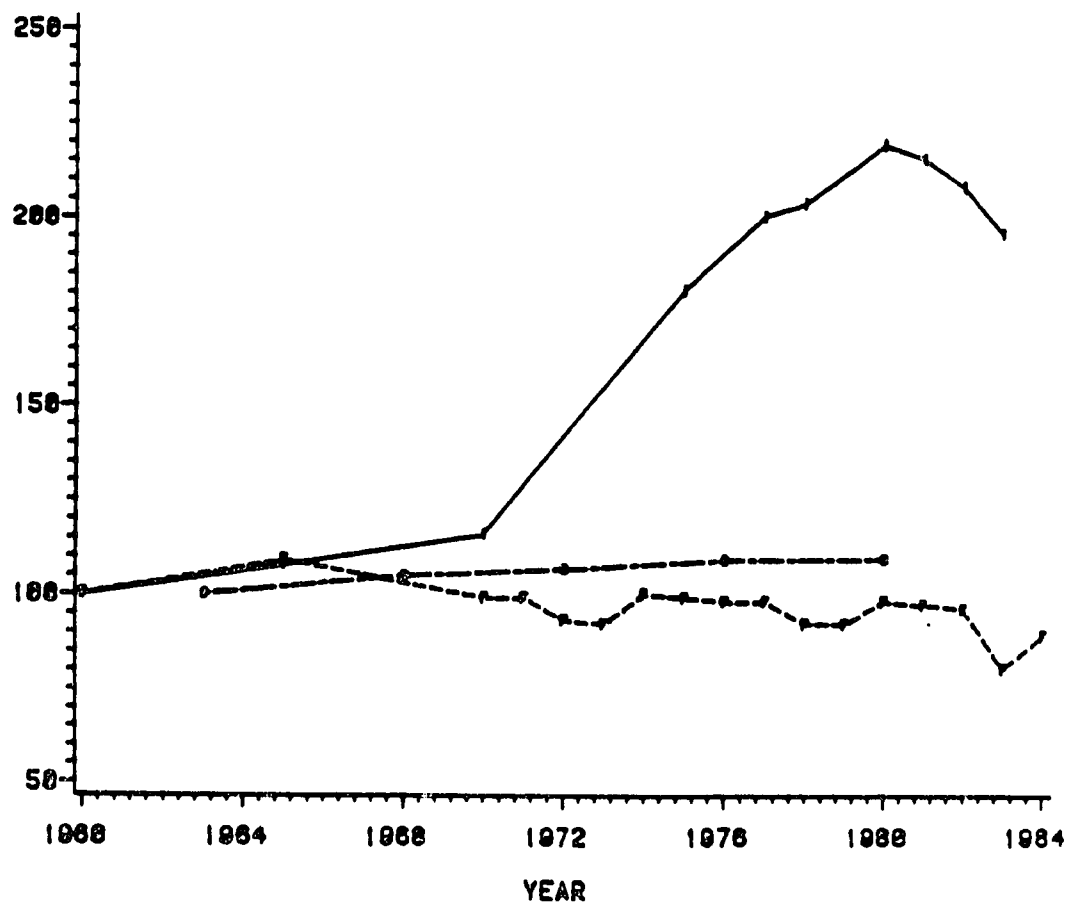
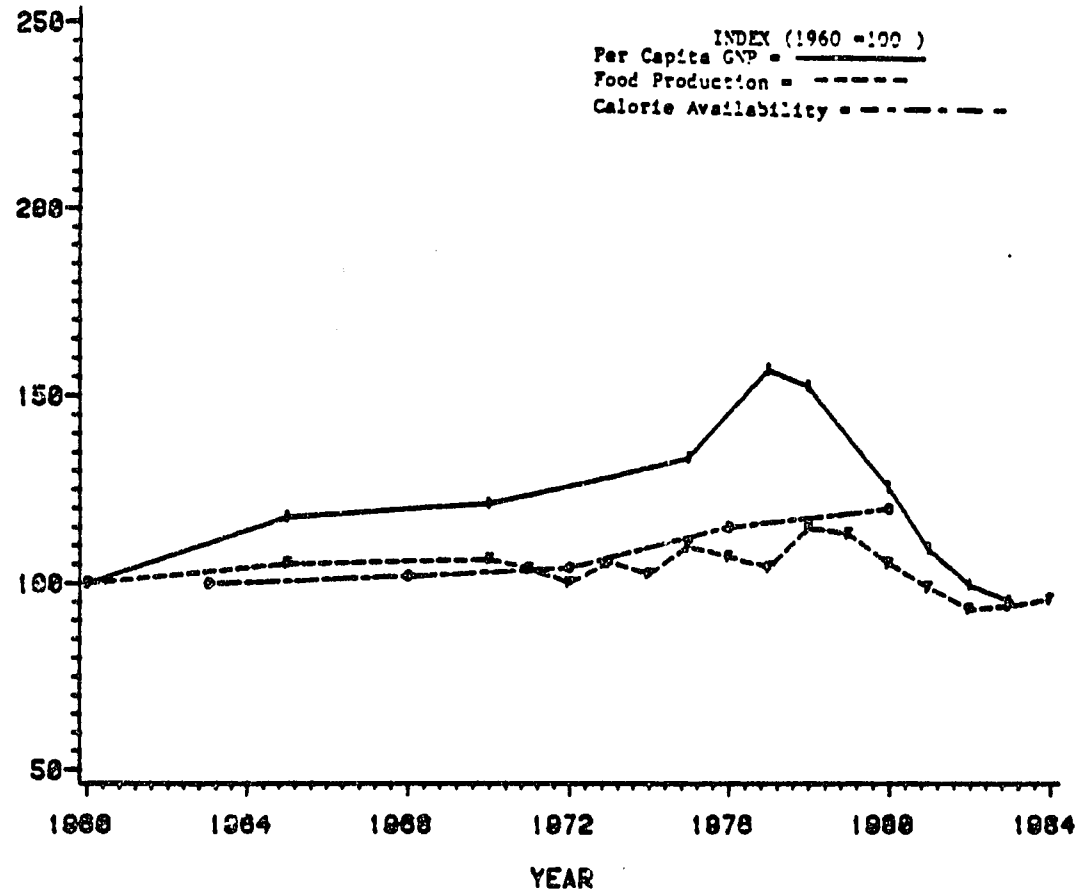


FIGURE 5. TRENDS IN INCOME, FOOD PRODUCTION, AND CALORIE AVAILABILITY
For Selected Latin American and Caribbean Countries

EL SALVADOR



GUATEMALA

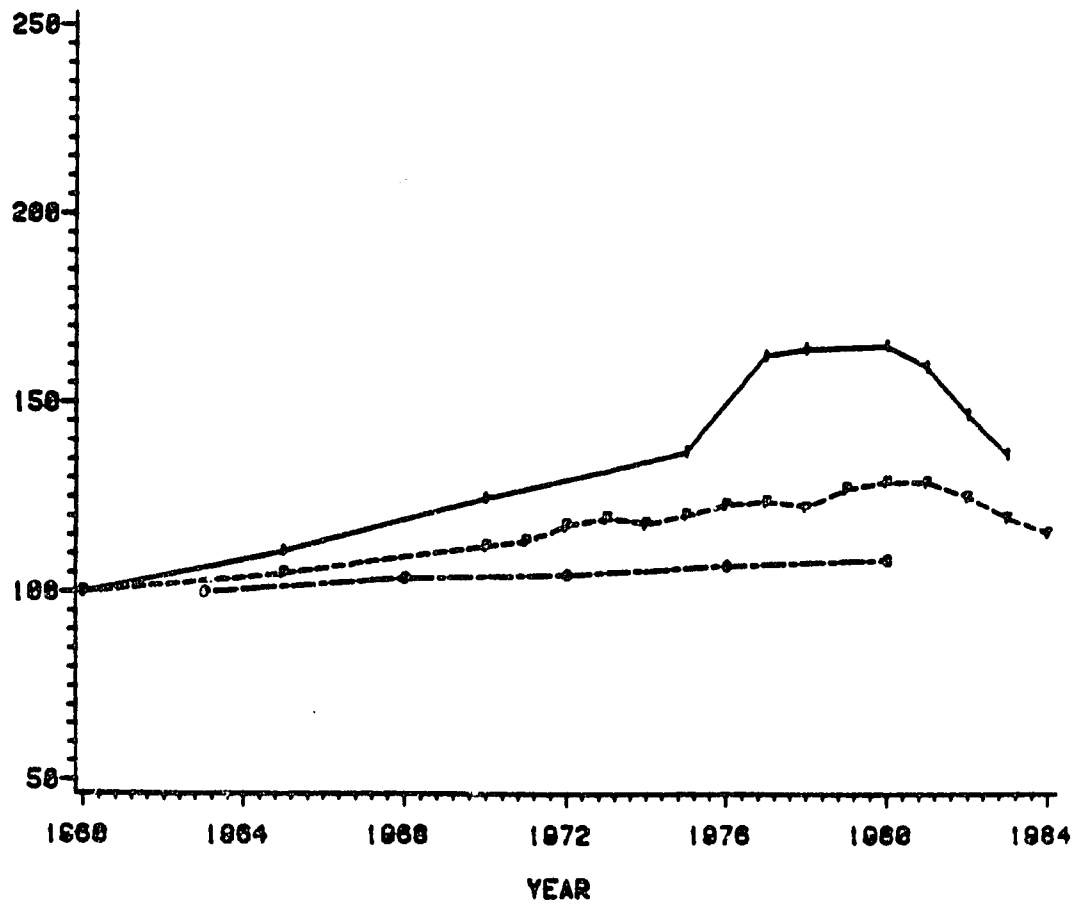
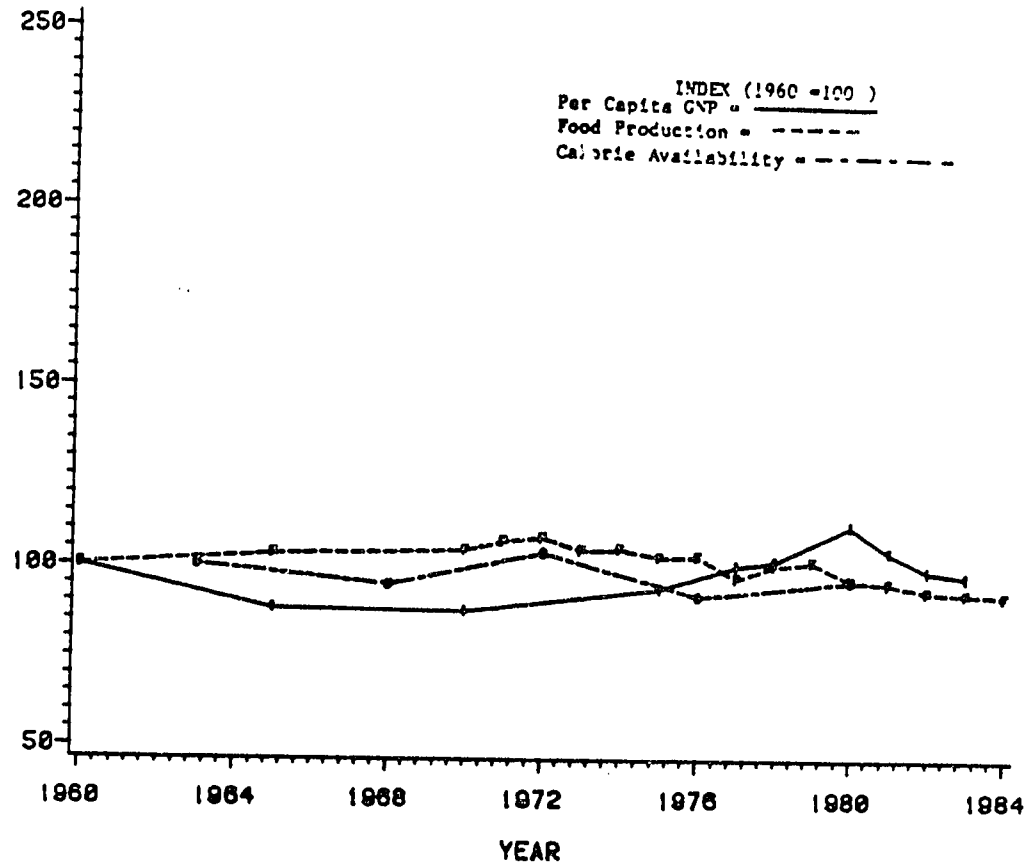


FIGURE 5. TRENDS IN INCOME, FOOD PRODUCTION, AND CALORIE AVAILABILITY
For Selected Latin American and Caribbean Countries

HAITI



HONDURAS

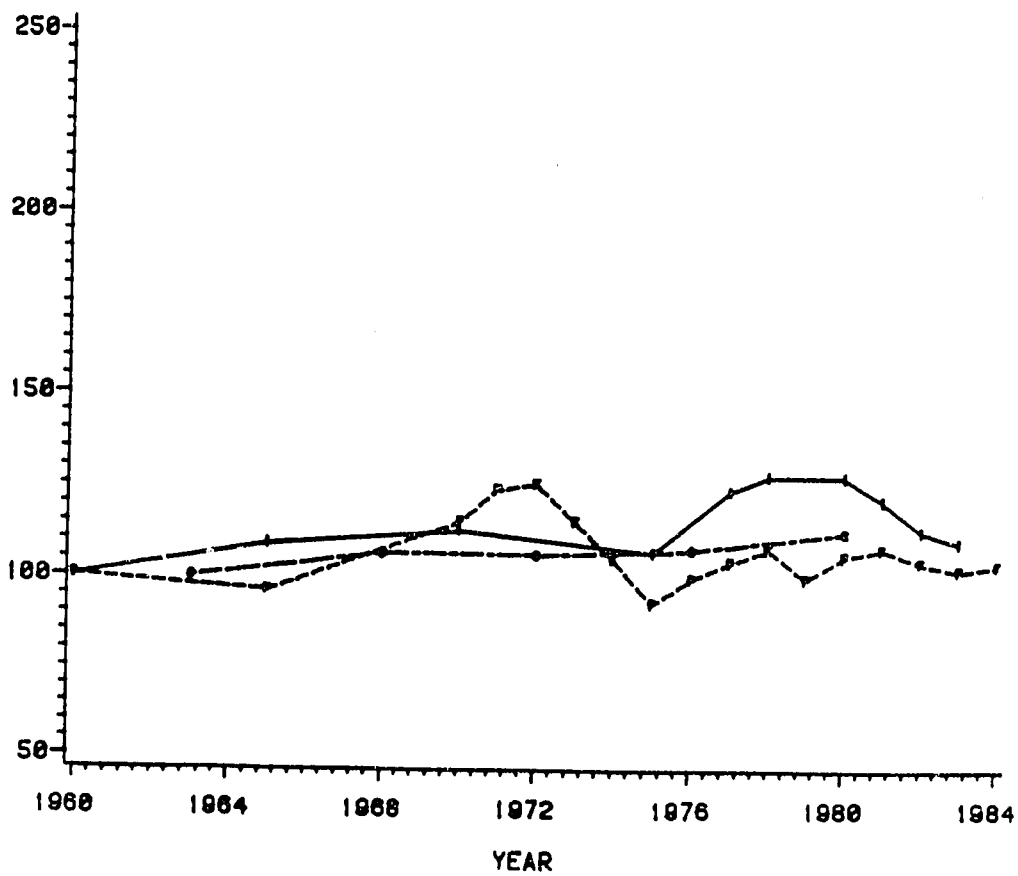
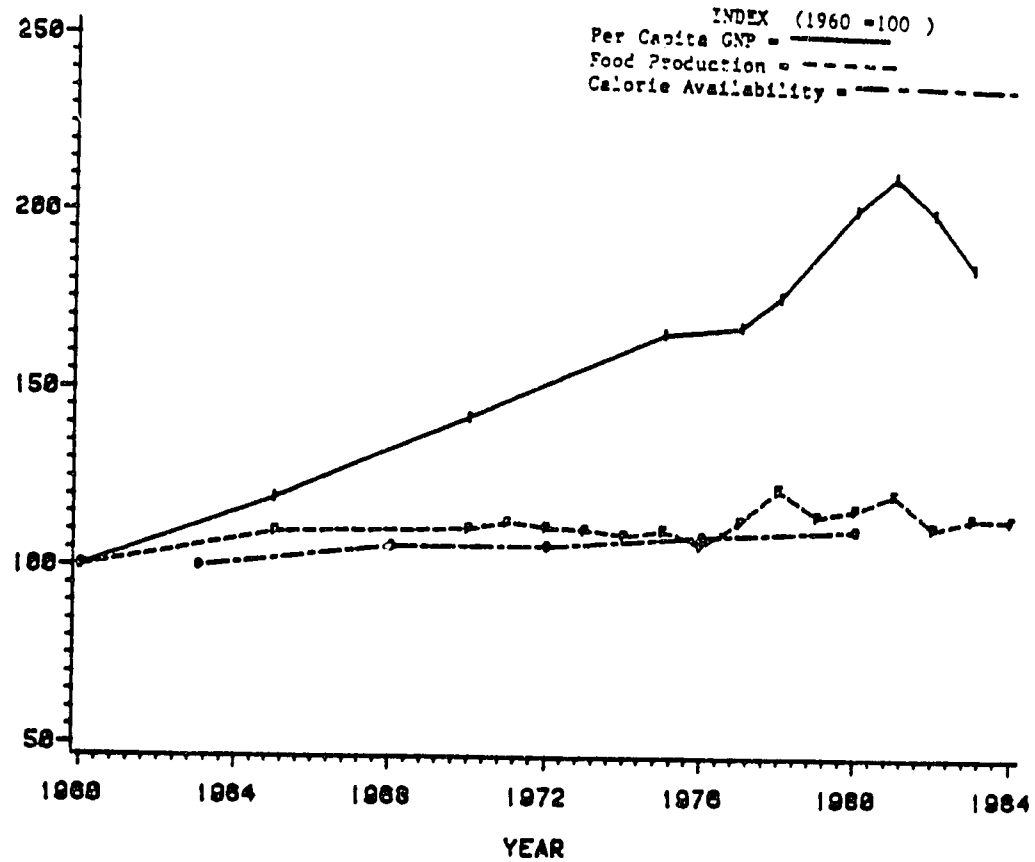


FIGURE 5. TRENDS IN INCOME, FOOD PRODUCTION, AND CALORIE AVAILABILITY
For Selected Latin American and Caribbean Countries

MEXICO



PANAMA

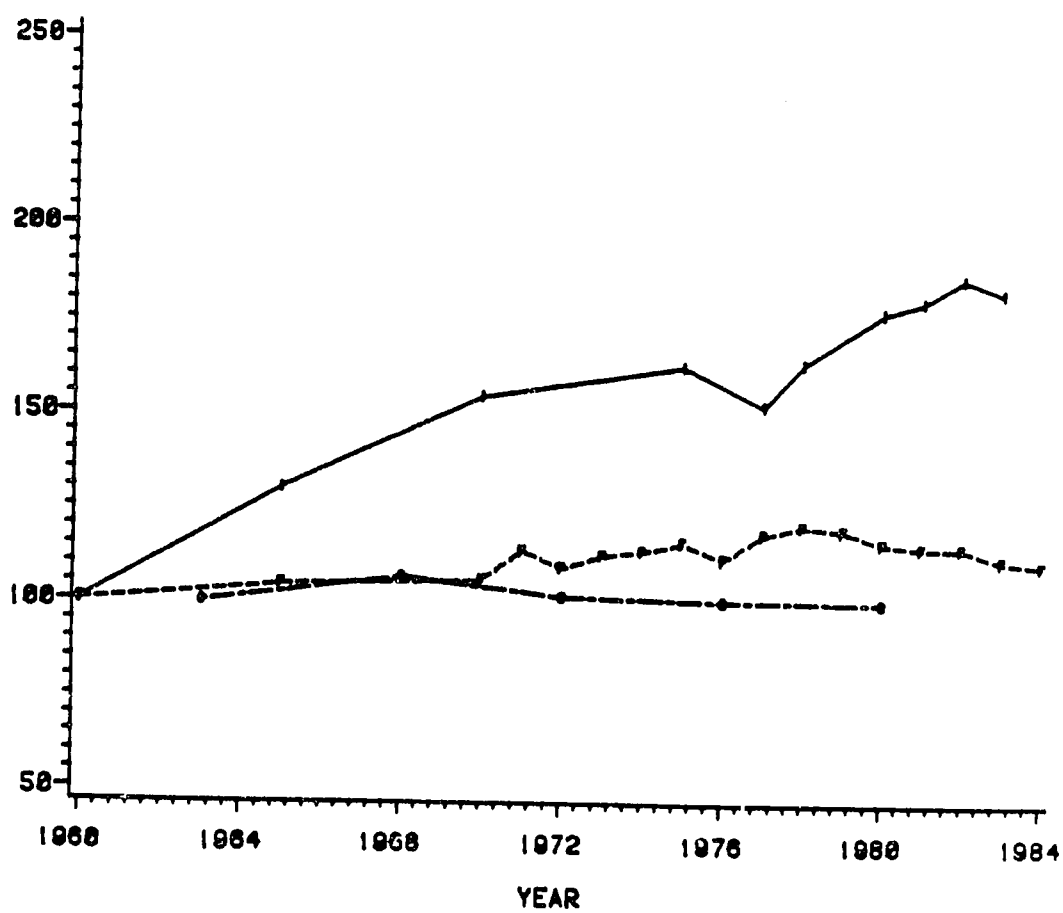
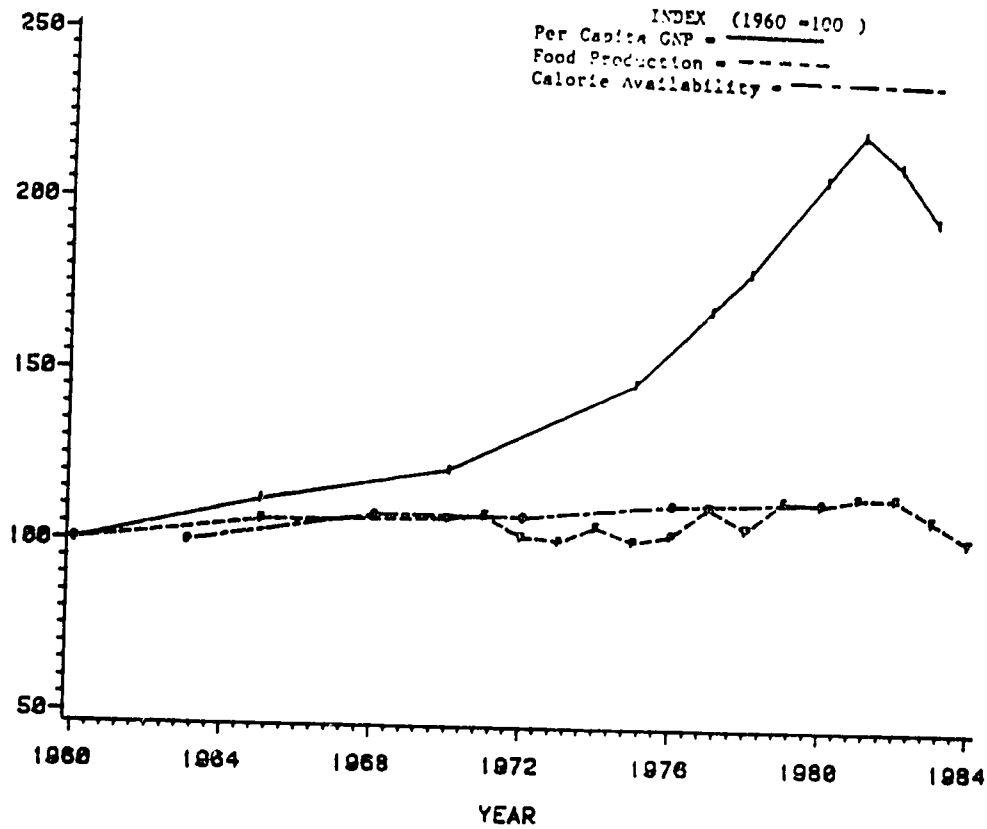


FIGURE 5. TRENDS IN INCOME, FOOD PRODUCTION, AND CALORIE AVAILABILITY For Selected Latin American and Caribbean Countries

PARAGUAY



PERU

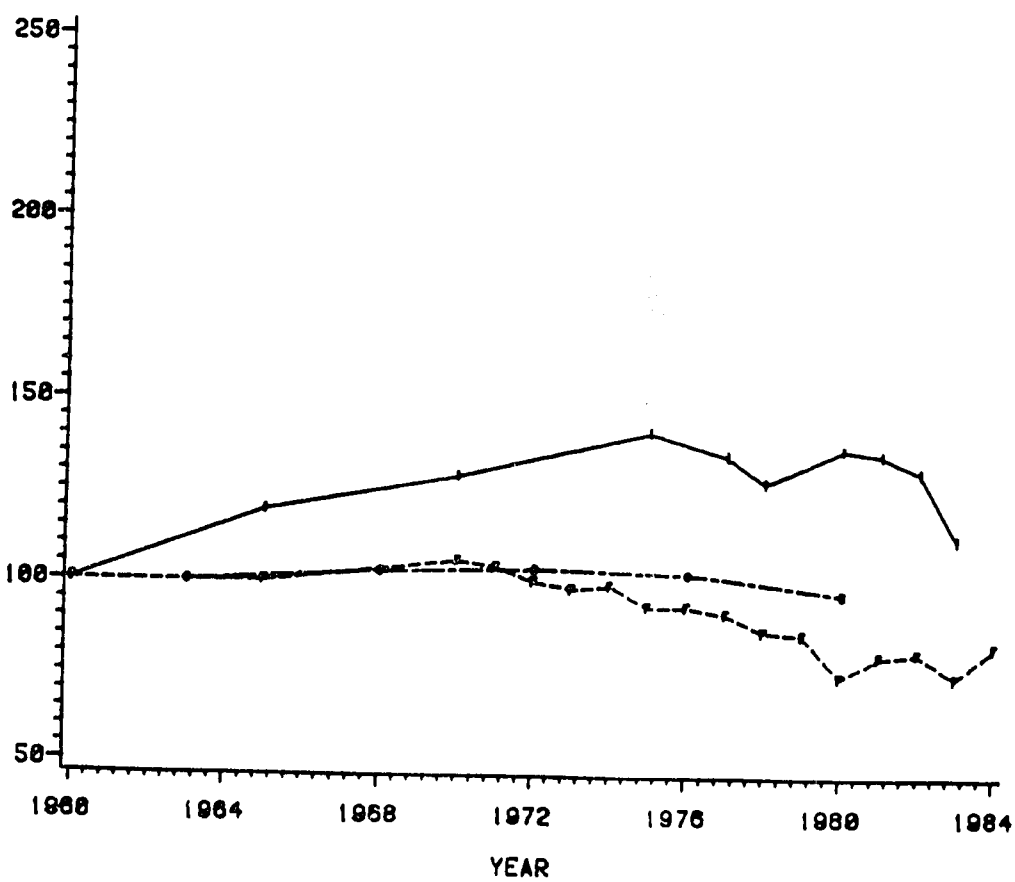
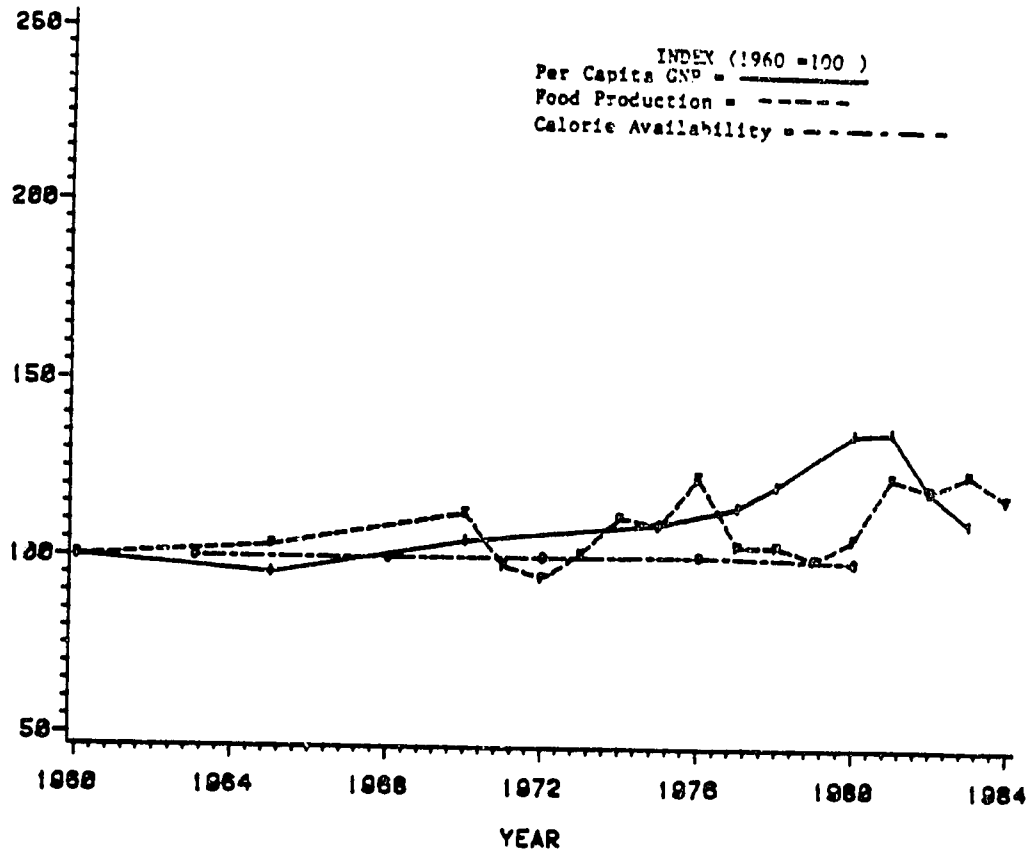


FIGURE 5. TRENDS IN INCOME, FOOD PRODUCTION, AND CALORIE AVAILABILITY For Selected Latin American and Caribbean Countries

URUGUAY



calories per capita per day which the Food and Agriculture Organization of the United Nations recommends as adequate for Latin America and the Caribbean (Table 1). The AID assisted countries average 93% of the FAO recommendation for per capita calorie availability in the national food supplies, compared to 115% for the non AID assisted countries.

These aggregate data mask the true nature of the food problem -- the maldistribution of food energy. The income distribution in the countries in the region has been sufficiently skewed (See Musgrove, 1978 for examples) that even with relatively high levels of average availability (say 110% of requirements) substantial numbers in the population would be significantly below recommended energy intake levels. Reutlinger and Alderman (1980) reported that in the sixties and early seventies approximately half of the population of the region was eating below recommendations and that approximately 37% were at 90% of the standard or below in 1973 (Table 11).

1.3.1 Food Consumption and Food Expenditure

To illustrate the problem of maldistribution of food within countries, data from surveys from a few countries are presented in this section. The available data from food consumption and expenditure surveys has not been reported in a consistent format, yet the data from Panama, Peru, Brazil, Ecuador and the Dominican Republic serve to illustrate the problems associated with the maldistribution of food and income.

Data from Panama in 1980 (Table 12) show that the levels of consumption of food varied significantly by income level, with

Table 11. Proportions of Populations
Consuming Less than FAO/WHO Calorie Recommendations
(with Projections to 1990)

	Mid 1960's		1973	Projected 1990 Deficits at Constant Food Prices and Income Growth	
	Per Capita Calories as % of Rec's.	Share of Population with Deficits	Share of Population with Deficits	Low	High
Middle Income Economies					
Honduras	85%	64%	60%	53%	49%
El Salvador	82	70	72	62	57
Costa Rica	100	52	34	23	6
Peru	96	57	53	37	30
Guatemala	89	67	69	44	42
Jamaica	100	50	30	21	18
Dominican Republic	89	65	58	34	24
Ecuador	81	77	70	53	43
Colombia	95	61	61	41	32
Upper Income					
Chile	106	46	33	15	13
Brazil	106	46	-	-	-
Argentina	122	25	45	19	12
Panama	105	52	51	28	19
Mexico	113	41	34	17	10
Uruguay	114	34	33	26	22
Venezuela	97	56	56	43	35

Source: Reutlinger, S. and H. Alderman, 1980.
Countries not listed were not available from the source.

the higher income groups consuming 112 percent of the recommended calories and the lower income groups consuming 90 percent of the recommended calories. The data in Table 12 for Panama is stratified according to an estimate of the per person food costs necessary to obtain a nutritionally adequate diet from the typical food pattern in Panama. This cost is known as the cost of the "basic food basket" and was used to stratify the data from the 1980 National Nutrition Survey according to an income criterion suggested by the Economic Commission for Latin America (ECLA). This criterion establishes three income cut-off points for defining levels of poverty; incomes below the cost of a basic food basket are said to reflect extreme poverty, incomes greater than the cost of one basic basket but lower than twice the monetary value of two basic baskets are said to reflect poverty, incomes at levels between twice and three times the cost of the basic basket are considered low but adequate, and income levels above three times the cost of the basic basket are considered as not poor.

Table 12 indicates that low incomes are associated with low levels of food expenditure and food consumption. The table also highlights the great disparity between urban and rural incomes; 23 percent of the urban sample households were judged to be in extreme poverty whereas 54 percent of the rural households were judged to be in extreme poverty according to the ECLA criterion.

As another illustration, Table 13 shows that there has been large variation in the diets across regions within Peru in the past two decades. As early as the 1950's, reports of dietary

Table 12. Measures of Food Consumption for Urban and Rural Households by Income Food Strata[a] in Panama in 1980

Poverty Levels*	% of sample	Daily Calories	Daily Protein (grams)
Urban Households			
Extreme Poverty	23	2,126	66.2
Poverty	19	2,671	10.9
Adequate	14	2,586	83.6
Non-Poor	44	2,490	83.4
Rural Households			
Extreme Poverty	54	2,230	61.8
Poverty	21	2,403	69.4
Adequate	9	2,667	88.5
Non-Poor	16	2,696	89.1

[a]Cost of monthly basic food basket = household calorie-equivalent-person x $1.06/day x 30.4 days/month.

$1.06 = daily cost of basic food basket from "Determinacion y Costo de la Canasta Basica de Alimentos para Panama," Ministerio de Salud, Panama.

*Extreme Poverty: gross income $<$ 1 basic food basket
*Poverty: 1 basic basket $\leq$ gross income $<$ 2 basic food baskets
*Adequate: 2 basic baskets $\leq$ gross income $<$ 3 basic food baskets
*Non-Poor: gross income $\geq$ 3 basic food baskets

Source: Franklin and Leonard, 1983.

Table 13. Variation in Per Capita Calorie Consumption in Peru for Several Years between 1950 and 1980

	Year			
	1950[a]	1972[b]	1976[c]	1979[c]
COASTAL REGION				
Coastal Cities	-	2,051	2,277	2,203
Lima	-	1,945	1,933	1,872
Tumbes	2,228	-	-	-
Tacna	2,658	-	-	-
Coastal Towns	-	2,051	2,211	2,141
Pampa Grande	1,577	2,278	-	-
San Nicolas	1,944	-	-	-
Carquin	2,095	-	-	-
Rural Coast	-	1,978	2,037	1,986
Pachia	2,577	-	-	-
Calama	2,680	-	-	-
SIERRA REGION				
Northern Sierra	-	2,075	1,914	1,856
Hacienda Vicos	1,788	-	-	-
Recuayhuanca	1,925	-	-	-
Southern Sierra	-	1,838	1,926	1,860
Chacan	1,467	-	-	-
Puno	2,204	-	-	-
Pancarolla	1,818	-	-	-
SELVA REGION				
Low Jungle	-	1,798	1,941	1,880
Iquitos	1,627	-	-	-
Mendoza	2,722	-	-	-
High Jungle	-	2,436	-	-
Yurimaguas	1,833	-	-	-

[a]Collazos, et al., 1959

[b]Amat y Leon, 1972.

[c] Estimated values from income data, World Bank, 1981.

patterns (Collazos et al., 1959) indicated that the diets varied greatly as a function of locally available foods. However, not one location appears to be exceptionally better or worse off than any other. These data show that the diets of the Peruvian population have remained on average well below the recommended norms for food energy (calories) for the past thirty years. The disparity of the distribution of food consumption in Peru can be further illustrated with data for Lima in 1978, where the upper half of the income distribution consumed 143% of the calorie recommendations and the lower half consumed 92% of the daily calorie recommendations (World Bank, 1981; Franklin, et al., 1983). These data imply that the remainder of the Peruvian population (primarily rural) was consuming little more than 80% of the recommendations.

In Brazil in 1975, the rural households consumed 102% of the recommendation whereas households in the metropolitan and urban areas consumed 95% of the recommended calories. Households in Northeast Brazil consumed only 84% of their daily requirements (Ahluwalia, et al., 1978; Thomas, 1982).

Food consumption data from Ecuador reveal that for 1975, most of the urban population were meeting their protein requirements but not consuming the recommended calories (Table 14) (Szretter, 1984). The poorest diets in terms of calories and protein were found in the highland rural areas (Immink, 1984). Earlier data reported by Musgrove (1978) indicated that Quito and Guayaquil had the worst distribution of income and expenditure of the cities in South America.

Table 14. Food Consumption Data for Urban and Rural Areas in Ecuador in 1975

	Daily Calories		Daily Protein	
	Kcal	% of requirement	grams	% of requirement
Urban				
Quito	2430	101	71.9	133
Guayaquil	1980	82	57.6	106
Other urban	2000	83	52.6	97
Total Urban	2090	87	58.4	108
Rural				
Highlands	1780	74	37.3	70
Coast	2310	96	45.7	85
Oriente	2670	111	52.8	98
Total Rural	2060	86	48.6	90
National	2060	86	48.6	90

Source: Szretter, 1984.

Food Consumption surveys undertaken in the Caribbean in the mid 1970's showed that over half of the households did not meet their energy needs and approximately 40 percent of these consumed only 84% of daily requirements. In addition, over half of the households did not consume the protein recommended for the Caribbean by the World Health Organization (Gurney, 1975). For example, approximately 70% of Guyana and St. Lucia households failed to meet calorie requirements in 1975 whereas 65 percent of the Guyana households did not meet their protein needs in comparison to 30 percent in St. Lucia.

Another commonly used criterion for assessing poverty and the risk of malnutrition is the concept that when a household spends more than half of its income on food it is poor and at nutritional risk. Food Expenditure data from the Dominican Republic (Musgrove, 1983a) from the late 1970's showed that 31% of the rural households were at extreme poverty and 13% of the urban households were at extreme poverty (Table 15). The Dominican Republic had more than 75% of the urban households in poverty conditions and more than 90% of the rural households in poverty conditions. Table 16 further illustrates the maldistribution of food for selected population groups in the Dominican Republic, Ecuador and Peru. Similar conditions, particularly the concentration of poverty in rural areas have been widely reported for other Central American and Andean zone countries (Flinn and Vaughn, 1983; Amat y Leon, 1972).

1.3.2 Composition of the Diet

In the last two decades, with the exception of Colombia, the

Table 15. Percentage of Total Expenditures Spent on Major Food Groups by Consumers in the Dominican Republic at Different Levels of Expenditure (1977/78)

Item	Household Expenditure Level (RD$/Month)			
	100	200	400	800
All Foods and Beverages	61.0%	71.7%	61.0%	44.2%
Cereals	22.2	19.0	12.4	7.1
Rice	17.7	14.6	8.8	4.5
Bread	0.3	0.9	1.1	1.0
Other	-	-	-	-
Cumulative percentage for number of individuals below the expenditure level				
Urban	13	40	74	91
Rural	31	70	91	99

Sources: Del Rosario (1982); Musgrove (1983).

Table 16. Percentage of Total Expenditures Spent on Major Food Groups by Poor Households in the Dominican Republic, Ecuador and Peru during the 1970's

Country	% of Total Expenditures Spent on Food	% of Total Expenditures Spent on Cereals	% of Total Expenditures Spent on Roots and Tubers
Dominican Republic[a]			
Poorest Quartile[b]	68.4	25.6	7.5
Ecuador:[c]			
Urban Poor			
Highland	59.7	20.1	5.9
Coastal	58.5	36.8	3.6
Highland Farmers[d]	54.2	40.4	24.0
Coastal Farmers[d]	60.2	38.9	5.0
Peru[e]			
Urban Poor	56.2	16.5	6.9
Rural	65.6	22.6	17.8

[a]Musgrove, 1983.

[b]Represents poorest 27 percent of population.

[c]Immink, 1984.
Note: For Ecuador, rice and bread represent cereal products and potatoes represent roots and tubers.

[d]Represents farmers with one hectare and less.

[e]Amat y Leon, 1972.

composition of the diet has shifted away from traditional foods such as tubers and legumes towards other foods. In Brazil and Peru the shift has been towards carbohydrates, and towards animal sources in other countries (Panama, Bolivia and Argentina). Figure 6 presents the composition of the diet in the past two decades for selected AID assisted countries in South America. Over the years, fruits, vegetables and potatoes play a slightly smaller role in providing the available energy.

As seen in Table 17, the diet of the English-speaking Caribbean countries is principally composed of cereal products which provide as much as fifty percent of the available energy in Jamaica and forty percent of the available protein. Most of the cereal consumption in Barbados, St. Lucia, Trinidad and Tobago and Jamaica in the early 1980's was derived from wheat products in comparison to Guyana where rice is the predominant cereal product. Meat products provided approximately 10 to 20 percent of the available protein in these Caribbean countries and from 5 to 12 percent of available energy. Fish products contributed little to the available energy for these Caribbean countries though they constituted 10 to 15 percent of available protein. Starchy fruits, roots and tubers constituted approximately 15 percent of the available energy in the diet. These fruits and tubers were predominantly bananas and sweet potatoes which contributed up to 10 percent of the available protein. Oils and fats also play an important role in the Caribbean; for example, in Trinidad and Tobago, 17 percent of the available energy was derived from oils (the predominant oil in the diet is coconut oil).

FIGURE 6. COMPOSITION OF THE DIETS IN SELECTED COUNTRIES

PERCENTAGE SHARE OF CALORIES FROM CEREALS, MEATS, AND TUBERS

BOLIVIA

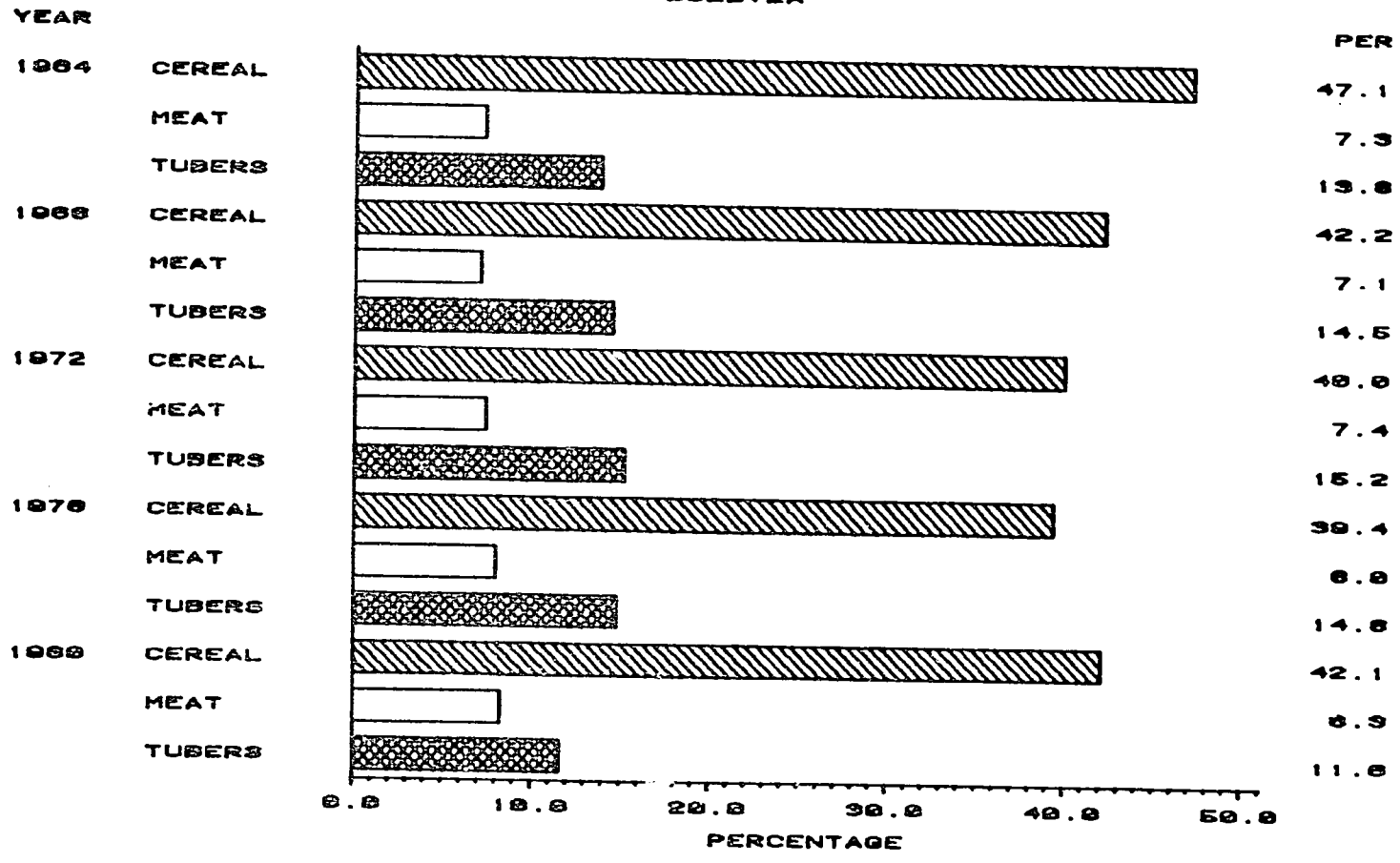


FIGURE 6. COMPOSITION OF THE DIETS IN SELECTED COUNTRIES

PERCENTAGE SHARE OF CALORIES FROM CEREALS, MEATS, AND TUBERS

BRAZIL

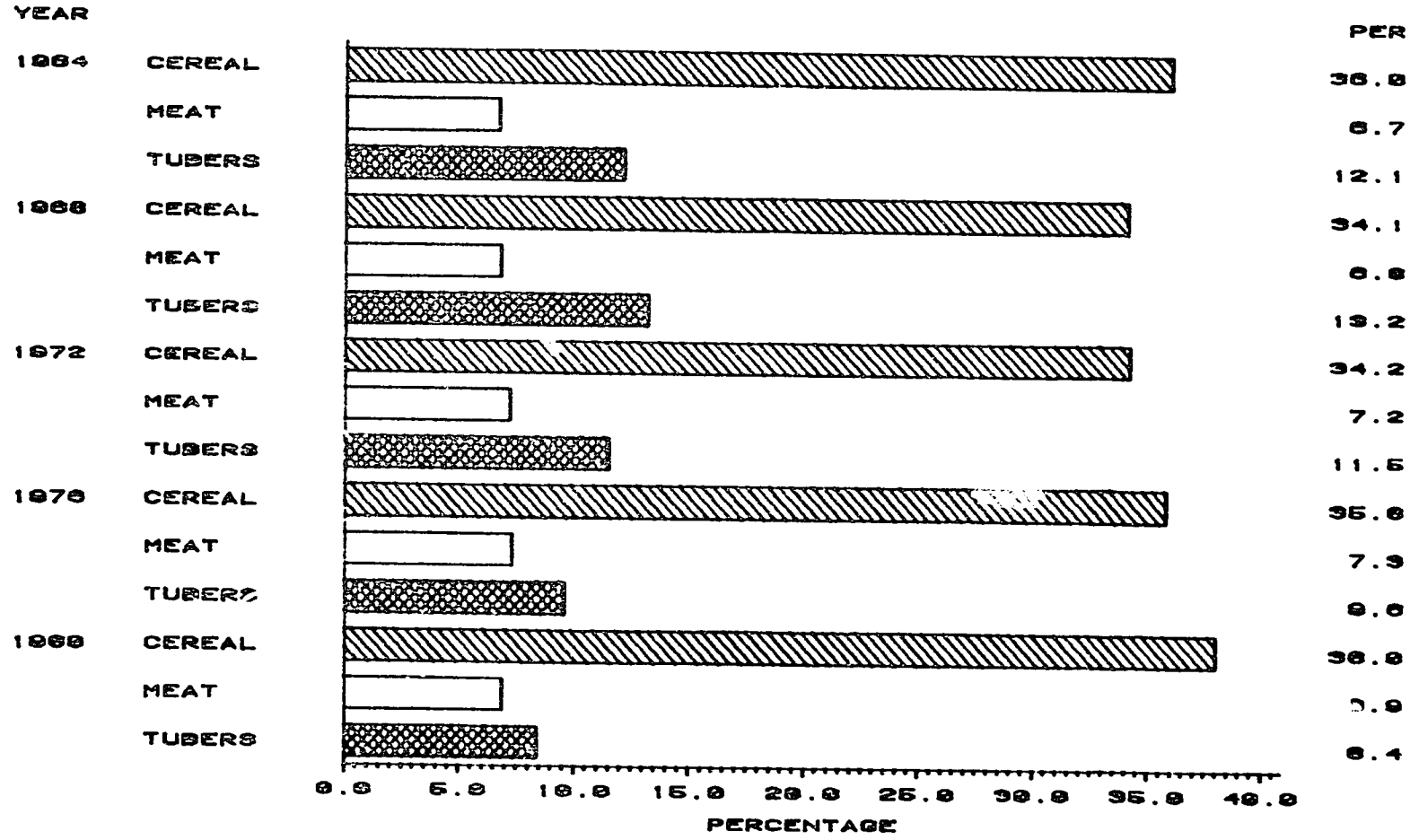


FIGURE 6. COMPOSITION OF THE DIETS IN SELECTED COUNTRIES

PERCENTAGE SHARE OF CALORIES FROM CEREALS, MEATS, AND TUBERS

COLOMBIA

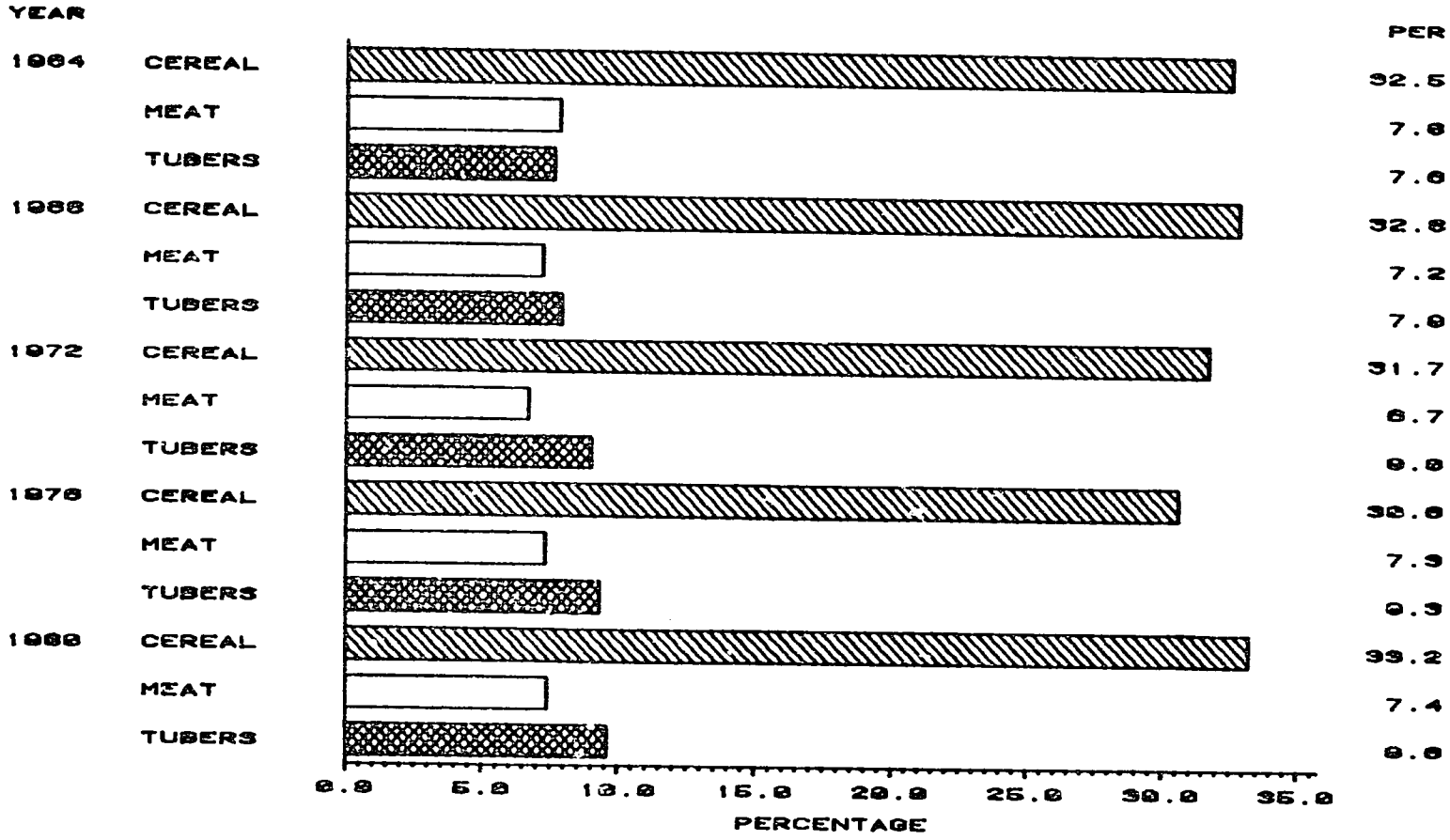


FIGURE 6. COMPOSITION OF THE DIETS IN SELECTED COUNTRIES

PERCENTAGE SHARE OF CALORIES FROM CEREALS, MEATS, AND TUBERS

ECUADOR

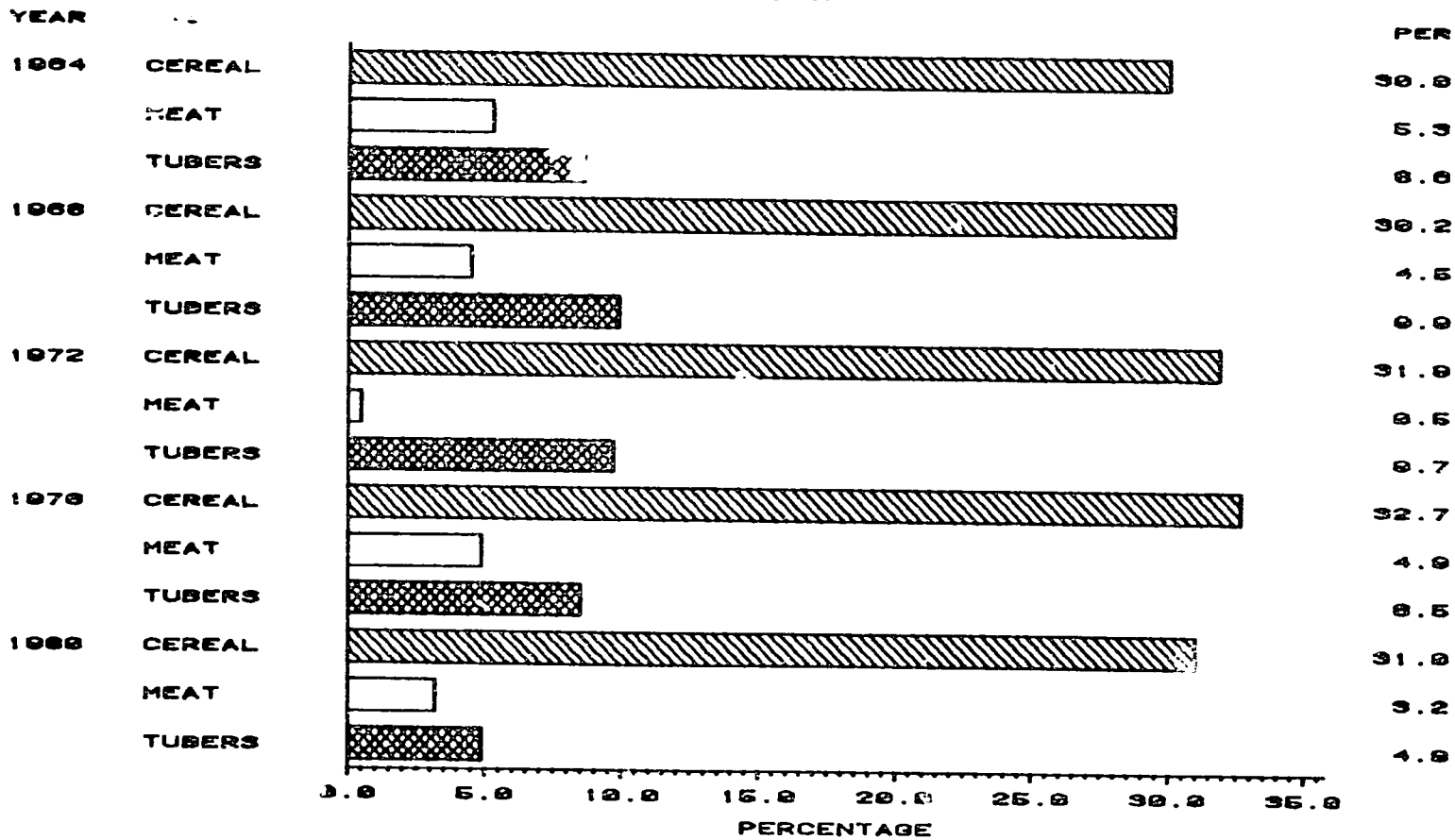


FIGURE 6. COMPOSITION OF THE DIETS IN SELECTED COUNTRIES

PERCENTAGE SHARE OF CALORIES FROM CEREALS, MEATS, AND TUBERS

PANAMA

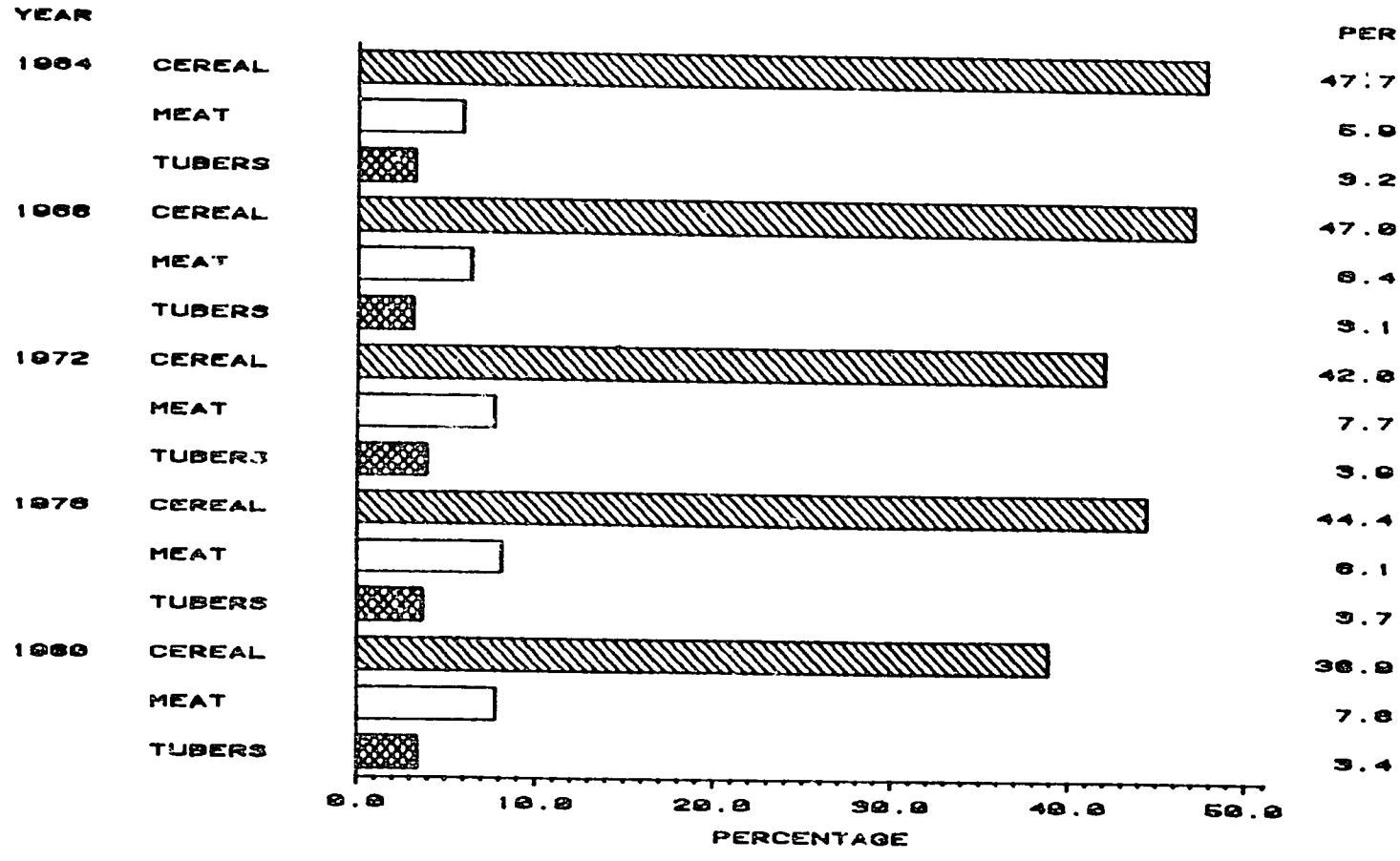


FIGURE 6. COMPOSITION OF THE DIETS IN SELECTED COUNTRIES

PERCENTAGE SHARE OF CALORIES FROM CEREALS, MEATS, AND TUBERS

PARAGUAY

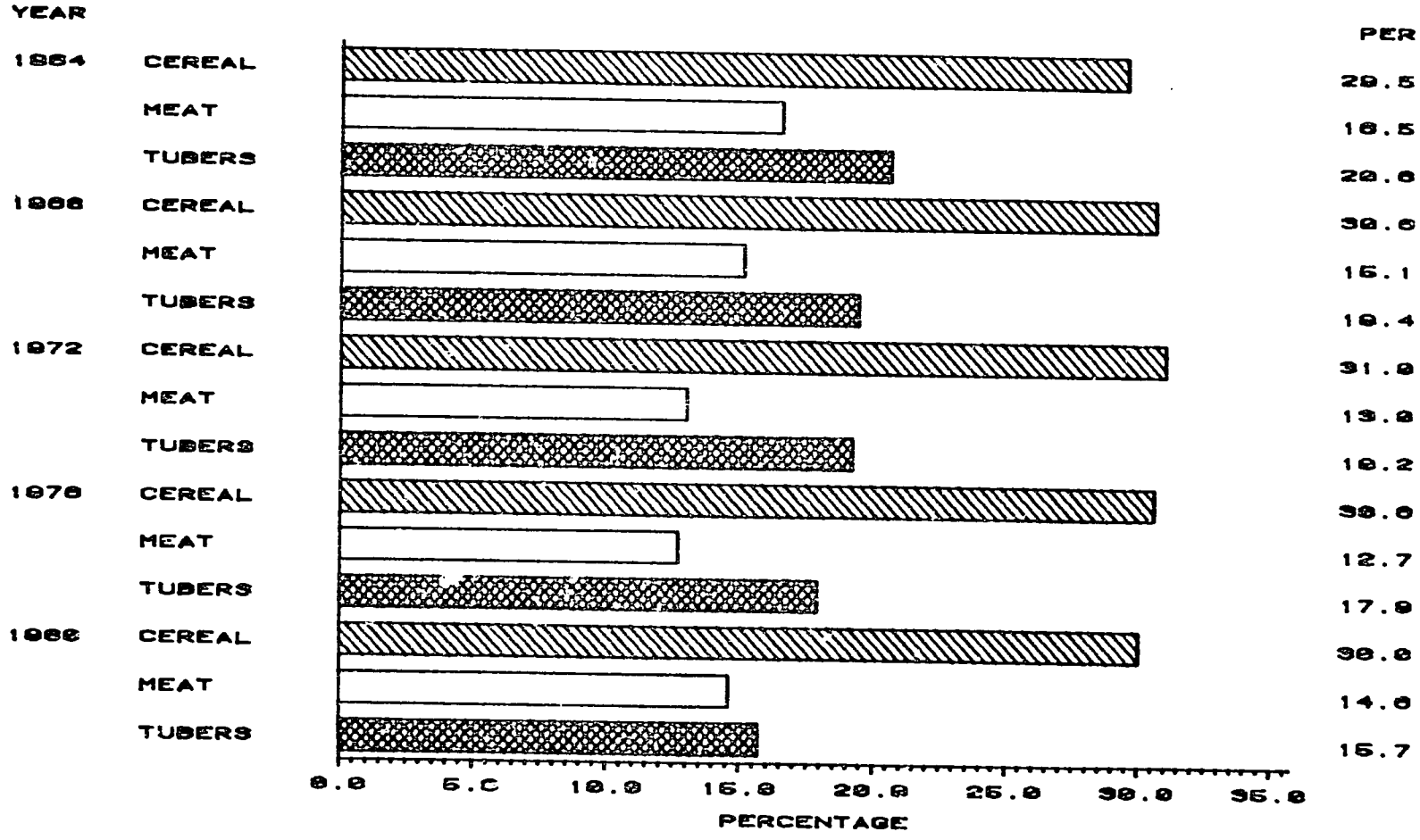


FIGURE 6. COMPOSITION OF THE DIETS IN SELECTED COUNTRIES

PERCENTAGE SHARE OF CALORIES FROM CEREALS, MEATS, AND TUBERS

PERU

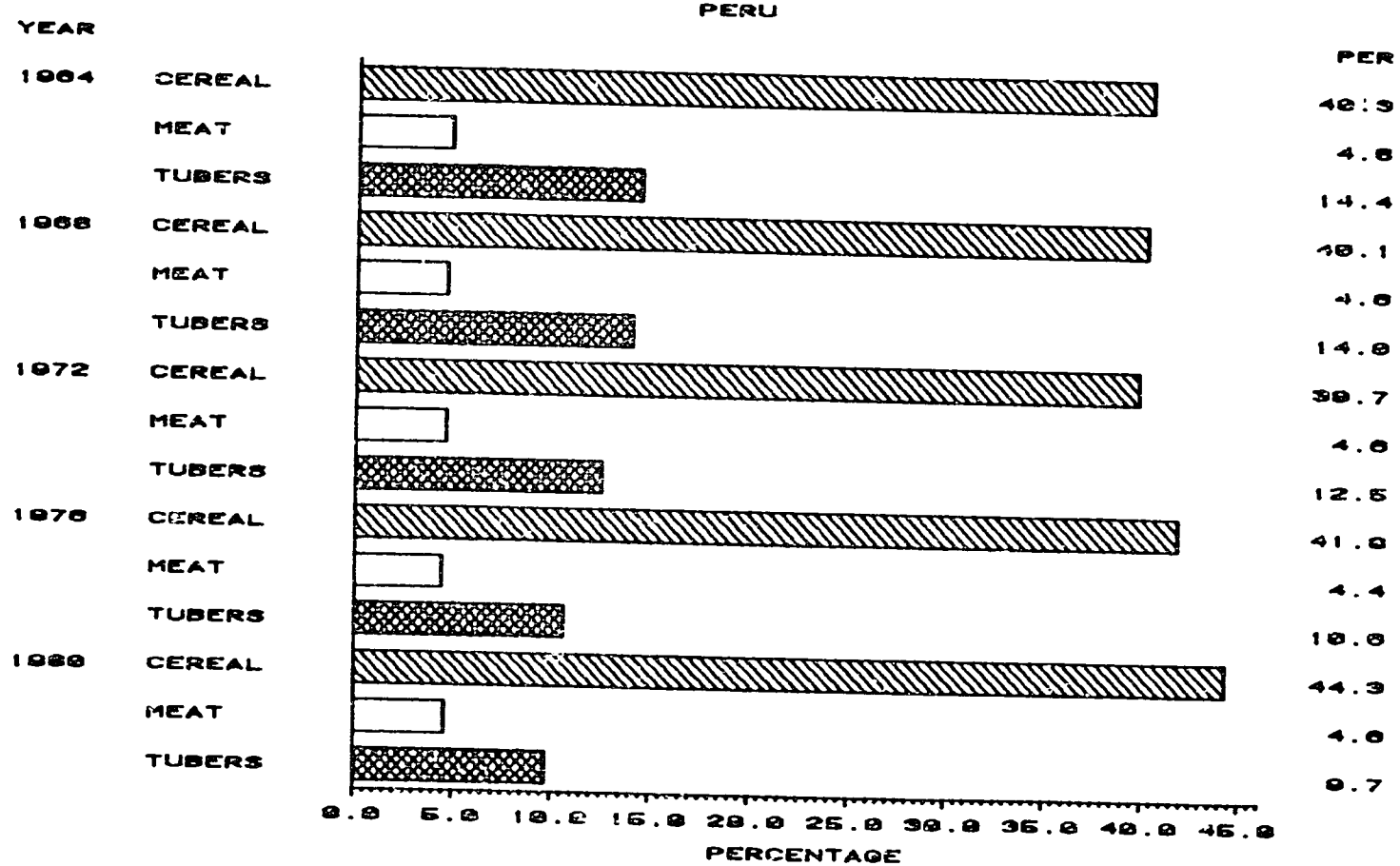


FIGURE 6. COMPOSITION OF THE DIETS IN SELECTED COUNTRIES

PERCENTAGE SHARE OF CALORIES FROM CEREALS, MEATS, AND TUBERS

URUGUAY

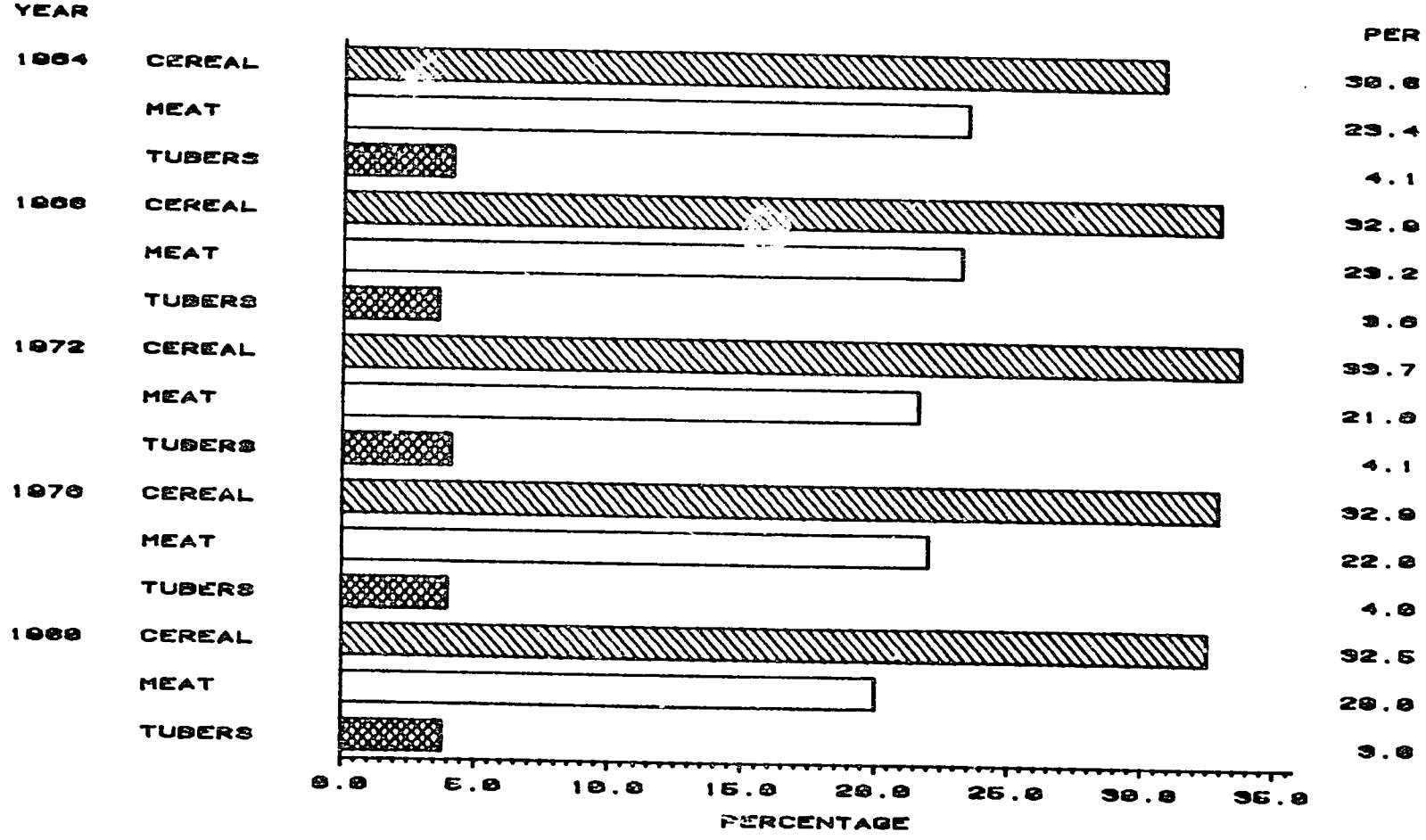


Table 17. Composition of the Diet for Selected Countries in the Caribbean in 1980

	Percentage of Calories from Various Food Groups						
	Cereal	Legumes	Roots	Sugar	Fats	Milk	Meat and Fish
Barbados[1]	38	4	6	11	12	9	4
Belize[1]	44	6	-	7	14	6	3
Guyana[2]	59	4	6	5	7	6	5
Jamaica[2]	31	3	15	17	11	7	10
St. Lucia[2]	28	2	16	15	11	4	11
Trinidad/Tobago[1]	39	5	4	11	13	10	7

	Percentage of Protein from Various Food Groups						
	Cereal	Legumes	Roots	Milk	Eggs	Meat	Fish
Barbados	30	9	3	13	3	38*	
Belize	39	13	-	8	2	12	7
Guyana	49	8	3	14	2	10	12
Jamaica	38	4	9	12	2	16	14
St. Lucia	33	4	11	9	2	19	14
Trinidad/Tobago	34	12	2	16	2	17	8

[1]Food Consumption Surveys

[2]Food Balance Sheets

Source: Caribbean Food and Nutrition Institute(CFNI), 1982.

*Includes fish

Analyses of household expenditure surveys in the Caribbean reveal large differences in dietary patterns among different income groups. For example in Jamaica in 1972, wheat and rice were the principal source of protein in the lowest expenditure group and chicken and beef were the predominant source of protein in the upper income groups. The protein consumption in the form of bread, salted cod, yams and green bananas varied little among the income groups. The prime source of energy in the low income Jamaican households was dark sugar and cereal products; the energy sources for the upper income households were predominantly rice and oil (McIntosh and Manchew, 1982).

The above analyses indicate that many low income households in Latin America and the Caribbean are consuming monotonous diets with the principal sources of energy being cereal products, other carbohydrate sources and oils. The other food groups contribute little to the energy content of the diets. Nevertheless, the diets are sufficiently varied that if adequacy of energy were achieved, the diets would be adequate in most nutrients, particularly protein. As a result of the skewed distribution of food energy arising from the maldistribution of income, the diets of the poor throughout the region are deficient in both quantity and quality.

1.4 Population Groups Most Seriously Affected by the Nutritional Situation in Latin America and the Caribbean

Central America and the AID assisted countries of the Andean zone of South America exhibit persistent problems of chronic malnutrition which are associated with poor coverage by national health systems, low levels of aggregate food availability and low

and poorly distributed national incomes. The countries with higher levels of nutritional problems have remained behind the rest of the region even after substantial improvements in the 1960's and 1970's. The recent economic, political and ecological crises have halted or reversed some of the gains. Even before the recent problems, the lagging countries were failing to catch up and were at best only holding their own relative to the rest of the region.

The aggregate data reveal problems of major proportions in some of the countries. For example, Haiti, Honduras, Guatemala, Bolivia and Peru are countries for which the aggregate data clearly indicate the presence of nutritional problems of major proportions for large segments of their populations. Other apparently better off countries like Panama, Ecuador, and most of the Caribbean have important pockets of their population with nutritional problems of significant proportions.

The nature of the problem in all cases is not a problem of starvation, except perhaps in isolated instances (e.g. the 1983 droughts in Southern Peru); the problems are problems of poverty which imply poor access to food and health services. These problems are made acute when diseases, seasonal or cyclical food scarcities, and other recurring events upset the fragile equilibrium at which most of the poor of the region live. The poor countries of the region require assistance to help them implement private and public sector means for increasing the margin of safety for meeting these recurring crises. Even if income growth alone could solve the problems, the prospects for the near future are not good.

Several studies undertaken in Latin America and the Caribbean have identified some major population groups as likely to have important nutritional problems (Valverde et al,, 1978, Franklin, Harrell and Parillon, 1985, CFNI, 1978). Persons belonging to these groups usually represent the majority of households in their country. In the urban areas informal and unskilled workers, and the unemployed suffer primarily from low effective demand for food and an inability to procure private health care services. These persons' incomes are in the lowest part of the income distribution in their countries and are likely to be not employed in the formal economy and suffer from unstable incomes. In addition to their income problems, they may also suffer from crowded and unsanitary living conditions in established neighborhoods, or if they live in the shanties of the urban periphery, from unsanitary conditions, poor housing, lack of potable water and difficult access to the health care system. For all of these --even the unemployed-- time is a very scarce resource because the distances to work or job search are very long through crowded and complex public transport systems. They also spend much time queuing for public health services when they are ill.

1.4.1 The Urban Population

Most of the poor urban dwellers of Latin America buy their food in public or makeshift markets near their dwellings, often paying higher prices for food commodities than do their better-off neighbors in other urban areas. They spend most of their meager incomes on food but must also spend a significant

proportion of their income for fuel, transport, and sometimes water. Water in the shanty towns and in some established neighborhoods can be very expensive if bought from tank trucks; this water can also be a source of infections since it is frequently stored in unprotected vessels. The high costs of water and fuel inhibit the use of hygienic practices in cooking and personal grooming and thus contribute to disease.

As much as one half of the urban labor force in some countries (e.g. Peru) is under-employed, i.e. earns less than a minimum wage on a monthly basis (Franklin et al., 1983). These households attempt to solve this problem by participating in the informal sector as self-employed craftsmen or as petty vendors. The working day for these persons is very long and often the food consumption for each day is dependent on the day's earnings.

Such conditions for the urban poor have been documented in detail for Bogota in a recent study for the World Bank (Mohan and Hartline, 1984). The poor of Bogota have high levels of unemployment and each worker in each household must support four other persons. When food or medical costs absorb a large share of the earnings any crisis can have deep and long lasting effects on all household members. The Bogota study also bears out findings from other cities (Cali, Panama City, Quito, Kingston, etc.) (Franklin and Valdes, 1979; Parillon, et al., 1982; Wallace, 1985; Gurney, 1978) that urban poverty is concentrated among women; women workers earn two thirds to three fifths of the income of male workers in poverty areas. Many women are self-employed or engaged in commerce as petty traders and over 20% of women workers earn less than a minimum wage.

For nutrition such findings are important, particularly since the number of women headed households is high in urban Latin America. Research has found that urban malnutrition tends to concentrate in households headed by women and that when mothers of young children enter the labor force their meager earnings are insufficient to make up the loss in nurturing that ensues (Franklin, 1981). In Ecuador 80% of the petty traders in urban areas are women (Wallace, 1985). Frequently these low paying service occupations are the only ones open to poor women. Similar conditions have been observed in Guatemala and Peru (Valverde et al., 1985a; Franklin, et al., 1980, 1983).

The men in poor urban households tend to have slightly more stable employment; about a third are employed as production workers. A large percentage, however, are engaged in unstable occupations as service workers, unskilled construction and transport workers, etc. Thus urban life for the poor is unstable, regardless of the sex of the head of household, but women's households are poorer and less stable economically.

1.4.2 The Rural Population

In the rural areas, the more serious problems are centered on agricultural workers without land and operators of small holdings and some cooperative members whose earnings are insufficient to purchase even minimally adequate diets. For example in Panama in 1980, more than half of the children exhibiting chronic malnutrition were children of parents employed in the agricultural sector (Franklin, Harrell and Parillon, 1985). These groups also suffer from almost non-existent or

ineffective public health, water and sewerage services. For many that have access to land, agricultural production is risky since much of low scale agriculture is rainfed and water yields in many irrigated areas depend on annual rainfall in the highland watersheds. A significant number of farmers do not have access to credit and agricultural services since "de-facto" if not "de-jure" these services are rationed by non price mechanisms that favor better off farmers, e.g. Panama and Ecuador. Many cooperative members and small farmers are highly dependent on the market for their food because they must also work off the farm as laborers to improve their income (e.g. Peru, Guatemala, Panama) (Franklin, et al., 1983; Valverde, et al.,1985a,1985b; Franklin, Harrell and Parillon, 1985). Diets are therefore highly specialized to products purchased in the market. In Peru for example, approximately 36% of the working age population represents landless agricultural workers who depend on agricultual labor markets for their income and on agricultural product markets for their food (Franklin, et al., 1983).

Life in the highlands of the Andean countries is made precarious because the cold climates contribute to crowding and unsanitary living conditions as well as demand a higher level of caloric intake. Information is a very scarce resource and its lack adds to the riskiness of all economic activity. Transport and communications are costly and difficult. It is widely reported that even Andean diets have become dependent on market supplies such as rice and imported wheat products. These highland rural populations have historically exhibited the most serious nutritional and income problems. Most of the population

in these areas is consuming grossly inadequate diets that fill only a one-half to two-thirds of energy needs. From a half to three-fourths of the highland populations in the Andes depend directly on agriculture for their livelihood. The problems of low agricultural productivity and improved agricultural incentives must be a priority effort to address the nutritional problems of these population groups. Because of the high market dependence in both labor and product markets, agricultural output and marketed surplus must both rise to ameliorate the conditions of extreme poverty that prevail throughout the highland areas. Agricultural promotion and marketing services must be greatly increased in the short run to assist these populations to produce and market more food. These services must be delivered hand in hand with an improved structure of incentives regarding the prices of highland food crops and animal species.

In the rural areas of Central America and Panama, subsistence farmers and landless agricultural workers are suffering the most. Many households in these groups have responded to the crisis with the outmigration of their working age males. For example, in Guatemala many of the malnourished children are living in households of landless agricultural workers (Valverde, et al., 1985a) and in Costa Rica in the late 1970's, 17 to 20 percent of the children of laborers in sugar cane and banana plantations were malnourished. Another study conducted in El Salvador in the late 1970's showed that more than half of the malnourished children were children of subsistence farmers (Valverde, et al., 1978).

The population groups more vulnerable to malnutrition in the Caribbean are preschool children, pregnant and lactating women and the rural agricultural workers with little or no land, who are remote from urban areas. For example, in some rural communities in Antigua, approximately 50 percent of the preschool children are malnourished as measured by weight for age (Sinha, 1985). There is also evidence that agricultural workers in the Caribbean of both sexes, but especially males, have a deficient energy intake and, to a lesser degree, a deficient protein intake (CFNI, 1978). In the long run, this underfed working population can greatly affect national productivity (Selowsky, 1980).

2.0 A FRAMEWORK FOR RECOMMENDATIONS FOR POLICY AND STRATEGIC ACTIONS TO ADDRESS THE NUTRITION PROBLEMS IN LATIN AMERICA AND THE CARIBBEAN

Since the publication of the World Food and Nutrition Study in 1975 and the publication by Reutlinger and Selowsky of "Malnutrition and Poverty" in 1976, it has been widely accepted that malnutrition is not a food problem but a poverty problem. More specifically, Mason et al. (1984) stated that "the major cause of malnutrition in the world is poverty ... (which) causes malnutrition through inadequate food availability and through unsanitary living conditions and inadequate access to health services". As such, the fundamental amelioration of nutritional problems is seen as that based on policy initiatives which should be directed at reducing the levels of absolute poverty and at contributing to general economic growth. As the above authors pointed out, however, economic growth *per se*, would be insufficient to reduce the levels of poverty in a sufficient time to cause a substantial reduction in malnutrition. This is particularly so, because of the existing maldistribution of income throughout the region.

The World Food and Nutrition Study called for numerous programmatic approaches across economic sectors and a number of very specific activities. These were based on the recognition that even with appropriate economy wide and sectoral policies, significant numbers of people in diverse socioeconomic and geographic circumstances would remain in conditions of poverty and malnutrition. Poverty will persist for some because of lack of access to public goods and services, and in other cases poverty will persist because lack of skills, among other things,

prevent the response by individuals to improved incentives arising in policy reforms. Furthermore, even if successful, policy reforms and the promotion of technical efficiency that usually goes with reform would not proceed at a sufficiently rapid pace. This would leave people in poverty because the policy reform process itself takes time. Also policy reforms generate gains and losses to different members of a society; and frequently the poor are less able and slower to adjust to the new opportunities that economic growth and improved technical efficiency produce.

Nevertheless, in the last decade the thrust has been to avoid palliative interventions particularly those that can become institutionally embedded (such as generalized subsidy schemes and food price controls) because these are difficult to eliminate once they are initiated. The last ten years, however, began with many institutions and policies in place that ostensibly had been designed to respond to the world food crisis of the early seventies. Concerns for food security and food price stability in those years (1973-1975) led to the intensification of policy and programmatic interventions which sought to provide basic needs, particularly food, on a wide scale basis to the populations of the countries of the Latin America and Caribbean region. Wide scale approaches towards cheap foods through price controls or subsidies have now been shown to have been of high costs at best and often deleterious to the nutritional situation of important population groups in poverty conditions.

Other programmatic initiatives that were pursued have not

exhibited the beneficial impact that was expected or desired from them. As a result of the lack of impact, many international institutions and domestic policy makers have become skeptical as to the possibility of addressing the problems of poverty and malnutrition through programmatic and policy approaches that center on nutrition. This is particularly true in Latin America which has few obvious cases of mass starvation such as the recent experiences in Ethiopia and Sudan, but rather has problems of persistent poverty and marginality. The problems of the persistence of poverty and malnutrition are more difficult to identify and therefore to address because the causes and the solutions are often not obvious.

The disappointing impact of the initiatives that have been tried can in part be attributed to a lack of a strategy which has prevented such efforts from having their full impact. The recommendations to be presented here are centered on the concept of strategic initiatives which unlike the early global nutrition planning approaches do not call for multifaceted and multisectoral concurrent actions on many fronts (which in turn require sophisticated institutional environments), but rather the strategic approach seeks to find key interventions that facilitate or complement policy initiatives. Specifically, the approach seeks to avoid actions which are inconsistent with an overall policy framework. For example, if the policy reform effort were to remove negative incentives to agriculture arising out of price controls there may exist short run impacts which result in higher prices for some foods. These higher prices for foods may impinge significantly on the cost of diets for specific

population groups. The strategic approach, in such an instance, would seek to find specific solutions towards the problems of those specific groups. For example, existing public support mechanisms such as school feeding and maternal child health feeding programs could be used to target foods to specific population groups. In rural areas, programs such as "food-for-work" could facilitate the transition to new technologies and new cropping systems that evolve in response to the new agricultural incentives. Such a strategic approach should be based on policy reform with specific programmatic actions which facilitate or complement, in the short run, the longer run policy reform process. To help motivate this strategic approach an overview of recent policy experience regarding health, food and agriculture is presented in the following section as a setting for the specific recommendations.

2.1 The Policy Environment for Health

In the Latin American and Caribbean region, millions of humans live under precarious or life threatening conditions related to food inadequacy and insecurity as aggravated by poor environmental health. The magnitude is such that the solution of problems must be based on policy rather than palliative interventions. In the area of health, policy efforts must be aimed at redirecting the operations of the health systems towards prevention and self help. Presently in many countries the health systems are demand driven by contacts initiated by the poor after they become ill. In addition to curative health care, the services need to include preventive care such as immunization

programs, health education, nutrition education, prenatal care, family planning, tuberculosis testing, sanitation programs and literacy programs. For example, in Haiti family planning was found to have a significant impact in the overall effect of the Integrated Development Assistance Project which provides assistance in agriculture, family health and malnutrition as stated by M. Alexandre, Director for program support and nutrition of the Seventh Day Adventist World Service: "You really can't separate it (family planning) from nutrition". (Atkins, 1985).

Improvement in nutrition by way of access to health care, safe water, sanitation and vaccination programs can result from long term national commitments; Colombia, Costa Rica, Chile and Panama among a few others are examples where such commitments have led to significant improvement in spite of halting or low economic growth. The cases of Panama and Chile serve as partial illustration.

In the case of Panama, there is a long tradition of attention to health matters. Because of the construction of the Panama Canal and the failure of the French attempt in the late 1800's (1880-1903), which was due in large part to Yellow Fever, Malaria, and Chagas disease (Tripanosomiasis Americana), early efforts by Americans in the Canal Zone were directed at environmental sanitation and the construction of the water supplies for Panama City and Colon. Collaborative efforts with American institutions like the Rockefeller Foundation resulted in campaigns against tuberculosis and organization of health inspectors. With the founding of Ministry of Health Affairs and

Public Works in 1941 and the establishment of the Social Security system, the government began taking a greater role in public health. In 1955 sanitary responsibility for Panama City and Colon passed from the Panama Canal Company into Panamanian hands. In the 1970's there was rapid change to an integrated health system based satellite health centers, sub-centers and health posts, to thus extend the primary health care system over a wider area to provide better coverage of distant locales. In the post World War II era, the infant mortality rate was more than halved in Panama and during the 70's the mortality of infants in rural areas declined from around 50 per 1000 to less than 30 per thousand. During this period the number of health service facilities doubled on a national basis, and satellite facilities (health centers, sub-centers and posts) tripled. The smaller facilities were nonexistent in the mid sixties and there were over 200 by 1979. The emphasis in decentralization and prevention is further emphasized by the growth in coverage of potable water systems; in 1968 less than 10% of the rural population was covered by safe water, and by 1980 the coverage had risen to more than 60%. One of the most notable aspects about this is the fact that these efforts were achieved with a <u>declining</u> share of GDP (1.5%) being allocated to public health expenditures and the per capita expenditures being held nearly constant. Essentially the gains came about as a result of policy and programmatic commitment to disease prevention and institutional decentralization (Franklin, R.,1984).

During the last few decades, Chile achieved a notable

reduction in the level of infant mortality. With infant mortality above 100 in the 1950's and at 79.3/1000 in 1970, it was reduced to 39.1/1000 by 1978. Causes for the reduction of the IMR cannot be found in the economic changes of the two decades. No consistent improvements in quality of life arising from economic development parallel this consistent decrease in infant mortality. Dramatic changes in the IMR do not demonstrate conclusively that Chile has experienced an improvement in nutritional status, though the rate of infant mortality directly attributable to malnutrition declined from 2.91/1000 in 1968 to 0.79/1000 in 1978, which represents an appreciable decline.

The marked improvements in welfare that appeared in the 1970's had their roots in the public sector's expansion of health services which was begun in the mid-1960's. Much of this growth occurred in spite of halting or erratic growth in the Gross Domestic Product. Nevertheless, the share of GDP contributed by public expenditures grew from 30.7% in 1964 to 35.8% in 1968 to 43.0% in 1970. The National Health Service, for example, experienced a doubling in real expenditures from 1964 to 1970. By virtue of its expansion, the National Health Service was better equipped to serve formerly excluded portions of the population. Improvements focused on infra-structure and personnel, which had been seen as limiting factors in enlarging health care coverage. The total number of practicing physicians rose 26% from 4,812 in 1964 to 6,096 in 1970(Franklin and Michaels, 1981). Even more important in its impact on primary care was the increase in the number of nurses and nurse auxiliaries. In 1963 there were 14,916; in 1968, 29% more and by

1972 a total increase of 46.5%. Because nurses and nurse auxiliaries constitute the bulk of all public health workers, this increase signified an advance in the outreach of Chile's health care system (Franklin, R.,1985).

The increase in public expenditures in the 1960's eventually began to pay off in another relevant area, sanitation. A decline in potable drinking water availability in urban areas from 90% to 67% between 1962 and 1970 was partially countered by a 1970-75 increase to 78%. The majority of rural areas continued without potable drinking water facilities but coverage did rise from 13 to 28% between 1970 and 1975.

The degree to which public health services and sanitation facilities grew in the latter 1960's and 1970's seems to indicate that they contributed significantly to the reduction of infant mortality. Preventable and treatable diseases declined rapidly in the 1964-69 period. The incidence of measles fell from 38.6 to 3.5/100,000; typhoid fever, 2.1 to 0.9, and tuberculosis, 48.8 to 29.6. Hakim and Solimano (1979) found in food availability and childhood growth trends little reason for the IMR decline and instead suggested that public health and sanitation were largely responsible for reductions in infant mortality. Evidence of an improved health care system reaching the mother and child population and a more extensive potable water system supports their hypothesis.

The public sector share of total spending on health averages approximately 51 percent in the Latin America and Caribbean region whereas public expenditure as a percentage of the fiscal

budget averaged 8.2 percent in 1980 for the Latin American and Caribbean region as a whole. The distribution of government subsidies on health has been found not to be progressive, that is, it is proportionately higher for individuals in the lower socioeconomic groups because:

- income determines consumption,
- costs are higher for the poor because they lack access to credit and insurance markets because they live in remote areas, and
- subsidies are largest for the services most often used by the higher income groups (e.g. private rooms in hospitals). (Jimenez, 1986)

In many countries, the provision of services by the public health system is free, in principle, but rationed by queuing and inaccessibility. The implementation of preventive care is deficient since the public and private delivery systems are oriented towards curative services; both sectors require a re-structuring of incentives so that preventive health becomes the focus. There is a populist notion that these services should be "free" for the poor. It should be noted that many times the way in which the poor pay for "free" services causes the poor to pay more than the not poor. "To benefit from public services, a household has to incur some private costs, such as the purchase of transport and complementary services, and the opportunity cost of its time. For poor people, these costs are real constraints and a major investment. To take advantage of health services, people have to get to clinics, wait there (sometimes for hours) and then may have to spend money on drugs" (Jimenez, 1986; de Ferranti, 1985; Musgrove, 1983b).

Improving the access to health services, safe water and sanitation can have large payoffs for the groups vulnerable to malnutrition in the form of saved time and resources that would have been consumed by illnesses. Health investments are likely to have high payoffs in low income settings since the poor are less able than those not poor to shift the time incidence of sickness away from their productive times. For example, in farming households, those that are not as poor may be able to hire farm labor to substitute for the time of sick persons within the family. Sickness for the poor semi-subsistence household could imply totally foregoing productive activities or producing at much lower levels. Prevention and curative interventions that reduce the amount of "sick time" could have large private and social payoffs in these very low income settings. The time released from "sickness" can be used directly in production or in acquiring skills and information regarding improved production technologies, e.g. participating in agricultural extension activities, etc.

2.2 Health Strategy and Plan of Action

The nutrition problems of the Latin American and Caribbean region have been diagnosed to be amenable to improvement through the following health activities:

1. Improvement in coverage of private and public health, water and sanitation services on a broad base, but with emphasis in rural areas, and

2. Providing nutrition related health services to women of child bearing age and mothers of young children in addition to the ongoing child survival initiatives. These actions must be designed to account for the very long working hours of many women in rural and urban areas.

The Spanish speaking countries and Haiti require assistance in both areas. The remainder of the Caribbean requires assistance primarily in the second area--maternal and child health cum nutrition assistance.

In the area of health, including water and sanitation, the AID assisted countries are already spending a large share of their fiscal budgets on public health services; private financing and cost sharing alternatives must be developed to extend the coverage of basic services. For all of these reasons, it is important that specific nutrition activities be included in project assistance. Some of the approaches that should be considered include the following:

1. Reorient existing curative services to prevention of disease and towards education in the management and prevention of infectious disease at the household level.

2. Involve private sector professional and traditional service providers in preventive care through prepaid and other incentive approaches that create incentives for households to take the initiative in preventive care and improving household sanitary conditions.

3. Strengthen immunization programs, particularly to emphasize continuity of coverage.

4. Encourage the establishment of private clinics near or at market places in urban and rural areas; use the market places to disseminate nutrition and self help information.

5. Enter into policy dialogue to eliminate subsidies and price controls on curative medicines (e.g. there is probably an excessive use of antibiotics).

6. Use resources for community based promotion of health and nutrition practices. In selected cases, PL480 Title II foods of high economic value should be used to compensate participants in the above activities for the value of their time used in such activities.

7. Re-structure water and sewerage tariffs in urban areas to eliminate subsidies to higher income areas and extend coverage to marginal urban and rural areas on a cost sharing basis. Local currency generations of PL480 sales

could be used to finance the labor costs of such activities and financing should be provided for the foreign exchange components.

2.3 The Policy Environment for Food and Agriculture

Within the policy arena for agriculture, it is clear that the priority must be towards improving labor productivity in all sectors with the highest priority given to increasing labor productivity and output in the food production sectors. The emphasis should be on improving incomes rather than food production, *per se*. In many cases, labor saving agricultural technologies (e.g. weed control) can paradoxically lead to improved incomes and nutrition for the rural poor (Franklin and Harrell 1985). Improved agricultural technologies can also lead to lower cost food supplies for consumption by the households. As such, the thrust requires that each country and geographic area within each country be assisted at identifying and producing those crops for which it has economic advantage relative to other countries or regions.

There has not been a clear focus for food policy in many countries within the region. The food problems are viewed principally as problems of dependence on imports and different analysts blame different forces as the cause. Some blame market imperfections and monopoly control by the food processing industry, others blame the weather, others blame the lack of credit and still others blame inefficient public sector institutions. There is little analysis of policy alternatives. Proposals by different public sector offices frequently conflict with each other and may also be internally inconsistent. For example, calls for self sufficiency do not recognize that self

sufficiency may come at higher domestic resource costs than acquiring imports through the sale of those commodities in which the countries have international comparative advantage. An important aspect of official pronouncements on food policy is that the problem is viewed principally as one of supply and increased output. Only occasionally is concern expressed for rural incomes and seldom are effective demand (consumption) or nutritional issues considered.

Many of the countries of the region have pursued (to a greater or lesser degree) policies which sought to promote industrial development and import substitution. Coincident with, if not an integral part of such a development strategy, have been a number of policies which affected the structure of relative prices for agricultural commodities. For example, many countries in the Latin American and Caribbean region pursued cheap food policies for urban consumers throughout the 1970's. The motivation for these included control of the effect of food prices on real wages and the cost of living for urban workers. This is widely reported to have led to an increased dependence on imports (wheat, vegetable oil, and in some cases rice) to fulfill urban food needs. In Jamaica, for example, wheat provides 32 percent of the daily calories and 25 percent of daily proteins. Some countries (e.g. Panama, Ecuador, Peru, Dominican Republic), have recently attempted to reverse this process since 1980 through positive protection of domestically produced grains so that market prices have risen significantly above world market prices. These efforts have led to inefficient use of domestic

resources in some cases and the rural poor have not benefitted while urban food costs have risen.

In other cases, explicit and implicit taxes on agricultural exports have been convenient ways of obtaining fiscal resources and foreign exchange for use in fomenting the industrialization and import substitution development strategy. These two concepts--cheap food policies and the taxation of agricultural exports--do not produce a clear explanation for agricultural stagnation because their application has not been systematic across countries, time or commodities. Table 18 illustrates this latter point with estimates of net protection for rice and maize for a number of countries.

Costa Rica and its Central American neighbors, the Dominican Republic, Ecuador and Peru have tended to tilt the structure of economic incentives against agriculture through direct price interventions in product markets and through trade and monetary policies which have induced deterioration of the real exchange rate. The progressive effects were small within the urban area and these were realized at high cost, with the cost often being borne by low income rural dwellers. The issues are not solely those of low real prices for agriculture, regardless of their origin; rather, the issue centers more on divergence from equilibrium (above or below market clearing or international prices). Whether these occur in factor or product markets, these divergences generate excess demands in the affected market directly or in closely related markets.

Domestic markets that are connected to international prices are those that are easiest to intervene through tariffs, quotas

Table 18. Estimates of Net Protection* of Rice and Maize for Selected Countries in Latin America and the Caribbean from 1970 to 1982

	Costa Rica		Dominican Republic	Ecuador	Peru	
Year	Rice	Maize	Rice	Rice	Rice	Maize
1970	-.11	+.09	+.53	_	+.08	+.12
1971	-.01	+.42	+.71	_	+.19	+.21
1972	-.35	+.47	+.13	-.20	-.16	+.29
1973	-.74	-.15	-.22	-.67	-.55	-.26
1974	-.56	-.33	-.19	-.76	-.69	-.45
1975	-.29	+.41	-.05	-.59	-.37	+.08
1976	+.11	+.51	+.20	-.30	-.34	+.05
1977	-.30	+.80	+.29	-.42	-.11	_.27
1978	-.05	+.72	+.18	-.56	+.07	+.33
1979	-.20	+.67	-.17	-.66	+.19	+.28
1980	-.15	-	-.14	-.57	+.13	+.48
1981	-	-	-	-	+.11	+.15
1982	-	-	-	-	+.18	+.60

*Net protection is the proportional difference between the landed world price (border price) and the comparable domestic price adjusted for exchange rate distortions; negative numbers imply taxation of domestic producers relative to the world market.

Source: Sigma One Corporation estimates, Franklin, 1985.

and direct public sector participation. Those that are not traded internationally, on the other hand, by their nature are difficult to control. These latter must therefore provide the adjustments which are required by the distortions. It is these traditional sectors in which the poor are usually employed and, in agriculture, where the foods of the urban and rural poor are produced. The involvement of the poor in these sectors is principally through their labor effort. When adjustments are required by changing economic conditions, these will usually imply labor migration. Such migration is costly and often made more difficult by rationing of jobs or productive factors in the other sectors which are being favored by the overall economic policies.

Even when product and factor market interventions would appear to favor agriculture, the distortions frequently imply rationing e.g. of credit, of subsidized inputs or differential access to high support prices being paid by marketing parastatals. The better off members of the society appear to have better opportunities to respond to the disequilibria induced by the price distortions. Even within a given subsector "high" support prices can have perverse income and nutritional effects on farmers engaged in the production of the affected commodity (Franklin and Harrell, 1985).

Price interventions would, therefore, appear as blunt instruments for transferring income to the poor; they can result in high costs for little impact and the costs could be borne by other poor persons. For agriculture, market information and

other support services such as agricultural research and extension can have high pay off where prices are not distorted. Market price stabilization is an area for generating social benefits if the instruments applied are directed at stabilization goals rather than income transfer goals. Even where direct parastatal involvement is called for, the rules for stabilization need not require persistent transfers from producers to consumers or vice versa. The social gains from stabilization justify the use of fiscal resources for such a purpose, but such parastatals should not be given conflicting roles, e.g. they should not be asked to help stabilize prices and make profits and transfer income.

It also appears that conpensatory distortions are not very effective. They, of course, also add to fiscal and administrative burdens. Clear neutral incentives with uniform taxation across sectors with public expenditure and investment in areas of true externalities would appear to be better approaches to growth and equity. Regrettably, few examples of this strategy exist, as yet.

In the past two decades the reliance on food imports increased substantially throughout the Latin American and Caribbean region and in many countries direct subsidies have been imposed on imported foodstuffs. For example, in 1980 the value of the subsidies on imported foods in Peru was 180 million U.S. dollars which were allocated to wheat, sugar, rice, vegetable oils and dairy products. Food subsidies as an instrument for providing nutritional assistance to low income consumers have been demonstrated to be of low cost effectiveness (Reutlinger and

Selowsky, 1976) and perhaps regressive (World Bank, 1981 ; Franklin, 1983; Franklin, Leonard and Valdes, 1985). Analysts, therefore, call for targetted approaches such as food stamp programs or self targetting by selecting commodities that only the poor will eat (Berg, 1981); implicitly these latter tend to have low income and price elasticities of demand. Perrin and Scobie (1981) showed that it is very difficult to achieve significant nutritional impact with such schemes. In their example for Colombia, maize was the cost efficient commodity, and low income consumers would have had to be bribed to consume enough to close the observed calorie gaps. The above not withstanding, many countries rely on explicit and implicit subsidies on food as a matter of public policy to favor urban consumers (Amat y Leon and Curonisy, 1981). In certain urban areas, the population with the highest incomes are receiving a disproportional share of the food subsidies. This arises because income and price elasticitites are high for the foods that are easy to control through parastatals e.g. cereals, powdered milk, vegetable oils. For example, in 1980 a World Bank team found that in Metropolitan Lima the lowest 25% of the income distribution was receiving only 20% of the subsidies going to Lima (World Bank, 1981). Furthermore, Lima received a disproportionate share of the subsidized commodities: with less than 30% of the population, Lima received more than 50% of the consumer subsidies. In the Dominican Republic and Ecuador, implicit subsidies arising from over valued exchange rates tended to benefit the richer urban dwellers. Efforts at reform have met

with high resistance in the Dominican Republic and are currently underway in Ecuador (Franklin, 1983; Sigma One Corporation, 1985).

Neither a food subsidy policy nor a food supply policy can alone address the nutritional needs of the majority of the population in Latin America and the Caribbean. Obviously under present conditions more food is better than less, particularly if it can be purchased with the incomes of the urban and rural poor. A pure food supply policy may be aggravating the income problems of the rural poor farmers and agricultural workers. Furthermore, the structure of incentives in other sectors could also be impeding the solution of nutritional problems of the urban and rural poor.

The existence of diverse food assistance programs also serve to divert attention from the central problem since they contribute to the notion that nutrition and food are synonymous. This should not be interpreted to mean that the nutrition problem is not a food problem but an income problem. It is both and more! Food policy and income and employment policies each have important roles to play, but each will be limited in their impact.

2.4 Food and Agriculture Strategy and Plan of Action

Malnutrition continues to be an important problem in the AID assisted countries of the Latin American and Caribbean region, particularly in Central America and the Andean sub-regions. There is much that can be done through policy initiatives and significant project activities are required in the area of nutrition to facilitate and enhance the possibilities of success

of ongoing initiatives in economic, agricultural and private sector policy reform. What is required is a multiple front attack to increase labor productivity in all sectors, but particularly in agriculture, and public and private actions to make maximum use of the available food resources through improvements in the marketing system.

Throughout the region, the long term solution to these problems involves economic recovery and employment generation. There is great need for in-depth analysis of the urban labor markets and the incentive structure for employment generation in labor legislation and in industrial promotion policies. Furthermore, there is a need to create incentives for the poor to invest in skill acquisition and human capital accumulation.

In the short run, there is also a need to review the low impact of food subsidies and price controls on the diets of the poor,and to seek more effective alternatives for increasing the food consumption levels of these poor households. This is particularly true in countries that are attempting economic reforms to improve agricultural incentives e.g. Costa Rica, Ecuador, Dominican Republic. An accelerated effort at providing safe water at reasonable cost must also be sought. Finally, the important role of women in the labor force, particularly, as vendors and petty traders must be recognized, and programs to facilitate these productive activities through credit and transportation systems must be considered.

Therefore the nutrition problems of the region could be improved through two major activities:

1. Increasing the consumption of food of all types by low income rural and urban households,

2. Increasing the effective demand (income) of poor households by improving employment opportunities of workers in service occupations (e.g. marketing) in rural and urban areas and by increasing labor productivity in small and large scale agriculture.

The policy reforms currently being undertaken in several countries (e.g. Ecuador) will greatly improve the labor income situation (item number 2), but the effects will be seen in the long run rather than the short run. The first item is particularly important because as the countries of the region respond to the debt crises and as they seek more neutral structures of incentives, the food consumption situation of low income urban dwellers and some rural households will be placed at even greater risk.

Some of the approaches which should be considered are:

1. Assist country leaders to recognize that the problems of nutrition are problems of poverty and that these problems are concentrated in rural areas and rural dwellers need assistance in increasing the productivity of their labor as farmers, laborers and marketers.

2. Maintain or increase the emphasis on neutral structures of incentives such as exchange rate reform; these efforts will generally tend to favor agricultural labor and the products that the poor produce and consume.

3. Increase the support to agricultural research for small scale agriculture, particularly labor saving innovations, such as weed control and minimum tillage techniques.

4. Provide assistance for improving the agricultural marketing systems with an emphasis on increasing the productivity of small scale traders and retailers; with small scale operating capital and improved communications as priority areas.

5. Use PL480 Title I and III resources to finance roads, communications, small scale marketing infrastructure, agricultural research and extension. Also, in selected cases, consideration should be given to the use of PL480 (all titles) food assistance to specific population groups to facilitate the transition to market oriented policies for the country as a whole.

List of Persons Contacted During the Effort

Liliana Ayalde, USAID, Guatemala

Elena Brineman, ROCAP

R. Campbell, CFNI

Clara Carr, USAID, Guatemala

John Coury, USAID, Jamaica

Carlos Daza, PAHO

Kenneth Farr, USAID, Ecuador

Paula Feeney, AID/Washington, LAC/DR/HN

John Haaga, Rand Corporation (formerly Cornell Nutrition Surveillance Program)

Abraham Horowitz, PAHO

Judith McGuire, Resources of the Future, (formerly AID/PPC)

John McKigney, AID/S & T, Office of Nutrition

Jose Obdulio Mora, Office of International Health, DHHS

Philip Nieberg, CDC

Adeline Patterson, CFNI

Shirley Pryor, USDA/OICD

Scholmo Reutlinger, World Bank

Marcelo Selowsky, World Bank

A. Sinha, CFNI

Norman Stahling, CDC

Alberto Valdes, IFPRI

Victor Valverde, INCAP

Roberta van Haeften, USDA/OICD

Audrey Wight, USAID, Ecuador

Henry Wing, USAID, Guatemala

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APPENDIX A

Data Development

LIST OF TABLES

Table		Page
1	GNP at Constant Market Prices (in Millions of U.S. Dollars)	133
2	Per Capita GNP at Constant Market Prices (in 1970 U.S. Dollars)	134
3	Increase in Per Capita GNP (1960 = 100)	135
4	GDP Per Capita GNP at Constant Market Prices (in 1970 U.S Dollars)	136
5	Contributions of Agriculture, Forestry, Fishing and Hunting to the GNP at 1970 Constant Prices	137
6	Agricultural Production Index (1974-1976 = 100)	138
7	Food Production Index 1974-1976 = 100)	139
8	Food Production Per Capita Index (1974-1976 = 100)	140
9	Daily Availability of Calories (Per Capita)	141
10	Daily Availability of Proteins (Per Capita)	142
11	Protein and Calorie Adequacy Index	143
12	Protein Density of Average Diets (Averages 1961-1965; 1967-1970; 1971-1974; 1975-1977; 1979-1981)	144
13	Availability of Total Calories by Food Groups for South America	145
14	Daily Availability of Calories (Per Capita) by Food Groups-by Countries (Average 1961-1965)	146
15	Daily Availability of Calories (Per Capita) by Food Groups-by Countries (Average 1967-1970)	147

16 Daily Availability of Calories (Per Capita) by Food Groups-by Countries (Averages 1971-1974) 148

17 Daily Availability of Calories (Per Capita) by Food Groups-by Countries (Averages 1975-1977) 149

18 Daily Availability of Calories (Per Capita) by Food Groups-by Countries (Averages 1979-1981) 150

19 Daily Availability of Proteins (Per Capita) by Food Groups for South America 151

20 Daily Availability of Proteins (Per Capita) by Food Groups-by Countries (Average 1961-1965) 152

21 Daily Availability of Proteins (Per Capita) by Food Groups-by Countries (Average 1967-1970) 153

22 Daily Availability of Proteins (Per Capita) by Food Groups-by Countries (Average 1971-1974) 154

23 Daily Availability of Proteins (Per Capita) by Food Groups-by Countries (Average 1975-1977) 155

24 Daily Availability of Proteins (Per Capita) by Food Groups-by Countries (Average 1979-1981) 156

25 General Mortality 157

26 Latin America and the Caribbean Mortality 158

27 Latin America and the Caribbean: Child Mortality Rate (1-4 yrs. old) 1960, 1970, 1975 159

28 Percentage of Urban and Rural Population Having Potable Water 160

29 Percentage of the Total Urban Population Served with Sewer Systems 161

30 Index of Nutrient Adequacy 162

31 Nutrient Density 164

32 Daily Availability of Calcium Per Capita 166

33 Daily Availability of Iron Per Capita 167

34 Daily Availability of Thiamin Per Capita 168

35 Daily Availability of Riboflavin Per Capita 169

36 Daily Availability of Niacin Per Capita 170

37 Daily Availability of Fats Per Capita 171

38 Public Sector Health Expenditures 172

39 Hospital Beds Per 1000 Population 173

40 Population Per Physician 174

41 Index of Quality of Life 175

42 Life Expectancy at Birth (in Years) 176

43 Infant Mortality Rates for South America (1960-1983) 177

TABLE 1

GNP AT CONSTANT MARKET PRICES (IN MILLIONS OF 1970 U.S.DOLLARS)

COUNTRY	1960	1965	1970	1975	1977	1978	1980	1981	1982	1983
Argentina	19438,6	24232,4	29466,4	33970,9	35550,3	34380,9	37440,8	34056,9	31259,6	31854,7
Bolivia	746,5	1013,9	1344,5	1839,4	2029,1	2074,3	2143,1	2083,4	1856,3	1710,0
Brazil	26078,5	32358,7	46747,7	75922,2	88592,6	92218,2	103540,7	99682,3	99856,9	96208,5
Colombia	7435,6	9304,1	12251,5	16003.	18414,4	19783,0	21536,9	21590,1	21795,2	21985,8
Chile	5630,9	6720,6	8858,0	7188,0	8042,2	8627,8	9714,2	10092,6	7869,8	7793,0
Ecuador	1558,0	1961,3	2472,2	4490,1	5279,3	5524,7	6298,4	6375,4	6338,0	6134,9
Paraguay	553,2	704,0	864,7	1230,0	1508,7	1661,6	2040,6	2239,7	2212,3	2111,9
Perú	4998,7	6892,1	8562,3	10785,8	10857,0	10543,5	11908,1	12089,6	11977,8	10586,5
Uruguay	2636,1	2672,4	3056,3	3221,4	3396,7	3596,2	4087,2	4182,2	3655,0	3396,4
Venezuela	7981,8	9984,7	12584,6	20707,4	23163,2	22976,5	26210,6	25869.	24211,0	22631,1
Panamá	632,5	954,7	1014,8	1587,6	1560,4	1719,2	1986,0	2064,7	2183,2	2185,7

SOURCE: Data obtained from the numbers of total GNP, effect related to exchange rate and net consideration of payments made to the rest of the world (CEPAL, Annual Statistical Report for Latin America)

TABLE 2

PER CAPITA GNP AT CONSTANT MARKET PRICES (IN 1970 U.S.DOLLARS)

Country	1960	1965	1970	1975	1977	1978	1980	1981	1982	1983
Argentina	942.9	1.087.4	1,230.	1,304.	1,321.	1,257.2	1,325.9	1,186.9	1,072.1	1,075.2
Bolivia	217.8	264.0	310.9	375.8	393.9	392.5	384.8	364.2	316.0	283.4
Brazil	359.2	383.9	487.7	702.8	782.6	796.0	853.7	803.4	786.9	741.4
Colombia	478.5	513.6	588.9	690.5	761.2	800.5	835.0	819.2	809.3	799.0
Chile	740.0	784.1	936.8	695.4	754.9	798.4	873.0	893.1	685.5	668.1
Ecuador	353.0	380.0	408.6	638.3	708.2	720.4	775.4	762.5	736.5	692.7
Paraguay	311.1	348.7	377.6	457.9	525.5	559.6	644.1	685.3	656.7	608.3
Perú	503.3	601.0	649.0	711.4	679.	642.3	688.5	680.9	657.2	565.9
Uruguay	1.038.7	992.4	1,088.4	1,138.7	1,189.7	1,252.2	1,405.5	1,410.4	1,240.2	1,144.3
Venezuela	1.064.0	1.113.1	1,186.8	1,635.0	1,704.4	1,632.9	1,744.6	1,670.6	1,518.9	1,380.5
Panamá	572.4	744.1	884.2	931.7	871.2	936.9	1,015.3	1,032.9	1,068.6	1,046.8

SOURCE: The figures in Table 1 were divided by the annual population of each country.

TABLE 3

INCREASE IN PER CAPITA GNP (1960 = 100)

Year	Argentina	Bolivia	Brazil	Colombia	Chile	Ecuador	Paraguay	Perú	Uruguay	Venezuela	Panamá
1960	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
1965	115,3	121,2	106,9	107,3	106,0	107,6	112,1	119,4	95,5	104,6	130,0
1970	130,4	142,7	135,8	123,1	126,6	115,8	121,4	128,9	104,8	111,5	154,5
1975	138,3	172,5	195,7	144,3	94,0	180,8	147,2	141,3	109,6	153,7	162,8
1977	140,1	180,9	217,9	159,1	102,0	200,6	168,9	134,9	114,5	160,2	152,2
1978	133,3	180,2	221,6	167,3	107,9	204,1	179,9	127,6	120,6	153,5	163,7
1980	140,6	176,7	237,7	174,5	118,0	219,7	207,0	136,8	135,3	164,0	177,4
1981	125,9	167,2	223,7	171,2	120,7	216,0	220,3	135,3	135,8	157,0	180,5
1982	113,7	145,1	219,1	169,1	92,6	208,6	211,1	130,6	119,4	142,8	186,7
1983	114,0	130,1	206,4	167,0	90,3	196,2	195,5	112,4	110,2	129,7	182,9

SOURCE: Per Capita GNP from Table 2.

TABLE 4

G.D.P. PER CAPITA GNP AT CONSTANT MARKET PRICES (IN 1970 U.S.DOLLARS)

Year	Argentina		Bolivia		Brazil		Colombia		Chile		Ecuador		Paraguay		Perú		Uruguay		Venezuela		Panamá	
	US$	Ind	US$	Ind	US$	Ind	US$	Ind	US$	Ind.	US$	Ind	US$	Ind	US$	Ind	US$	Ind	US$	Ind	US$	Ind
1960	944,8	100	231,1	100	361,7	100	480,6	100	786,4	100	357,0	100	312,0	100	535,8	100	1041,0	100	972,2	100	565,2	100
1965	1083,1	115	265,2	115	388,3	107	518,8	108	839,5	107	390,6	109	346,1	111	631,3	111	1023,1	98	1165,4	120	722,7	128
1970	1241,3	131	316,7	137	494,2	137	597,6	124	957,6	124	413,4	116	383,1	123	659,1	211	1097,3	105	1238,9	127	903,6	160
1975	1314,9	139	371,5	161	716,9	198	706,6	147	782,9	100	608,9	171	460,5	148	717,5	230	1176,4	113	1319,7	136	992,8	176
1977	1347,7	143	390,2	169	793,7	219	738,5	154	863,6	110	668,6	187	512,6	164	693,6	222	1226,4	118	1427,7	147	970,8	172
1978	1281,5	136	393,1	170	814,4	225	784,1	163	921,6	117	692,6	194	552,0	177	672,3	215	1283,3	123	1408,3	145	1040,3	184
1979	1345,8	142	390,0	169	846,8	234	808,8	168	983,7	125	708,8	199	594,8	191	682,0	219	1354,0	130	1380,0	142	1062,4	188
1980	1334,3	141	382,0	165	887,3	245	824,1	171	1044,6	133	722,6	202	642,0	206	689,9	221	1426,3	137	1310,0	135	1174,4	208
1981	1231,2	130	368,4	159	853,9	236	824,8	172	1085,5	138	729,7	204	676,6	217	698,2	224	1444,0	139	1267,2	130	1197,2	212
1982	1149,8	122	327,4	142	842,6	233	814,5	169	917,9	117	721,3	202	649,8	208	682,6	219	1295,0	124	1239,4	127	1235,7	219
1983	1166,4	123	294,5	127	797,9	221	805,2	168	897,0	114	677,5	190	611,6	196	592,8	190	1225,8	118	1147,3	118	1213,9	215

SOURCE: Annual Statistical Report from AL.CEPAL, 1984.

TABLE 5

CONTRIBUTIONS OF AGRICULTURE, FORESTRY, FISHING AND HUNTING TO THE GNP AT 1970 CONSTANT PRICES (PERCENTAGES)

Country	1960	1965	1970	1975	1980	1981	1982	1983
Argentina	15,6	15,3	13,2	13,1	12,7	13,8	15,6	15,3
Bolivia	24,0	22,2	19,3	19,0	17,9	19,3	20,7	17,5
Brazil	15,2	16,6	11,7	9,8	8,8	9,4	9,1	9,6
Colombia	30,7	27,9	26,5	24,6	23,8	23,7	23,1	23,2
Chile	9,3	7,8	7,5	8,6	7,1	7,1	7,8	7,8
Ecuador	28,2	26,3	24,6	19,4	15,1	15,3	15,1	13,2
Paraguay	40,5	39,3	34,3	34,0	27,9	28,2	28,6	28,7
Perú	18,5	16,7	17,5	13,2	11,9	12,7	12,9	12,9
Uruguay	11,2	12,6	12,9	11,2	10,1	10,4	10,3	11,1
Venezuela	7,4	7,3	7,5	6,8	6,4	6,2	6,5	6,7
Panamá	18,2	17,0	14,4	11,8	9,5	9,8	9,3	9,6

SOURCE: Annual Statistical Report A.L.CEPAL.

TABLE 6

AGRICULTURAL PRODUCTION INDEX
(1974-1976 = 100)

Country	TOTAL					PER CAPITA				
	1961	1965	1971	1975	1981	1961	1965	1971	1975	1981
Argentina	77	79	85	98	115	95	92	89	98	105
Bolivia	53	62	78	102	110	74	78	86	102	94
Brazil	66	79	87	100	130	95	102	96	100	114
Chile	81	87	96	103	117	105	105	102	103	106
Colombia	65	74	87	101	126	94	94	95	101	111
Ecuador	66	82	88	99	117	100	110	99	99	98
Guayana	83	85	100	98	109	111	103	109	98	96
Paraguay	62	74	88	98	137	92	98	101	98	113
Perú	77	85	99	98	101	114	113	111	98	86
Surinam	51	72	84	102	131	62	79	82	102	137
Uruguay	87	91	91	95	112	95	96	91	96	108
Venezuela	58	71	88	108	113	95	102	102	108	92
	69	79	87	100	123	99	102	96	100	107
Panamá	61	71	90	102	117	90	93	101	102	102

SOURCE: 1975-81 FAO production yearbook Vol. 38, 1984
1971 FAO production yearbook Vol. 36, 1982
1961, 65 FAO country tables, 1985

TABLE 7

FOOD PRODUCTION INDEX
(1974-1976 = 100)

Country \ Year	1961	1965	1970	1971	I 1972	N 1973	D 1974	I 1975	C 1976	E 1977	S 1978	1979	1980	1981	1982	1983	1984
Argentina	74	77	89	86	83	89	98	97	104	106	113	119	112	119	124	120	125
Bolivia	55	64	77	79	86	89	93	102	105	100	100	100	106	112	116	84	107
Brazil	52	66	78	80	83	86	94	98	107	112	107	113	127	128	137	136	144
Chile	80	87	101	96	89	83	97	103	100	111	101	102	108	117	116	111	122
Colombia	61	71	82	86	88	88	93	100	107	106	113	118	120	125	121	124	126
Ecuador	67	82	87	89	86	88	98	100	102	105	101	105	115	118	120	103	119
Guayana	83	85	93	100	93	89	103	98	98	98	110	101	99	108	106	101	106
Paraguay	66	78	89	93	90	92	99	98	103	116	112	126	129	134	139	136	132
Perú	71	80	96	98	97	98	101	98	101	101	98	100	90	98	102	96	110
Surinam	50	71	86	84	80	97	98	102	99	98	103	122	135	131	137	143	139
Uruguay	79	86	98	85	81	88	97	95	108	90	91	89	94	111	109	113	107
Venezuela	55	70	91	88	88	93	94	107	100	103	111	116	115	115	115	116	116
S. América	63	73	87	84	85	88	96	99	105	108	108	113	118	122	127	125	131
Panamá	60	70	82	90	89	94	97	102	101	105	113	115	114	115	118	118	119

SOURCE : FAO production yearbook Vol. 38, 1984
FAO " " Vol. 36, 1982
FAO country tables, 1985

TABLE 8

FOOD PRODUCTION PER CAPITA INDEX (1974-1976 = 100)

Country \ Year	61	65	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
Argentina	92	90	97	91	86	92	100	97	103	102	107	111	103	108	111	106	108
Bolivia	77	81	87	87	92	94	96	102	103	95	93	91	93	96	97	68	85
Brazil	75	85	88	88	89	90	97	98	105	107	99	103	113	111	117	113	117
Chile	105	104	110	102	94	86	98	103	99	107	96	101	99	105	103	97	105
Colombia	88	91	91	94	94	92	95	100	105	103	106	109	108	110	104	104	104
Ecuador	101	110	100	100	94	93	101	100	99	99	93	93	99	98	97	81	90
Guayana	111	103	102	109	99	92	105	98	96	94	104	93	89	96	92	85	88
Paraguay	97	103	104	105	99	98	102	98	100	108	102	110	109	111	111	105	99
Perú	105	105	111	109	105	103	104	98	98	96	91	90	78	84	85	78	87
Suriname	61	78	85	82	79	96	98	102	100	100	106	126	140	137	143	149	145
Uruguay	87	90	98	85	82	88	97	95	107	90	90	87	92	107	104	108	102
Venezuela	92	100	109	101	98	100	97	107	96	96	100	100	97	94	90	88	85
S. América	91	94	98	93	91	92	98	99	103	103	101	104	105	106	109	104	107
Panamá	88	92	93	100	96	99	100	102	98	104	106	105	102	101	101	98	97

SOURCE: FAO Production yearbook Vol. 38, 1984
FAO " " Vol. 36, 1982
1970 FAO country tables, 1985.

TABLE 9

DAILY AVAILABILITY OF CALORIES (PER CAPITA)
(Triennial Averages/In Number)

Country	CALORIES 1961-1963	1964-1966	1966-1968	1969-1971	1972-1974	1975-1977	1977-1979	1978-1980	1979-1981	1980-1982	1964-1966 % calories[2] Veget	Anim	1969-1971 % calories Veget	Anim	1975-1977 % calories Veget	Anim	1980-1982 % calories Veget	Ani
Argentina	3237	3201	3252	3354	3290	3362	3345	3386	3380	3368	70.9	20.1	70.3	29.7	68.2	31.8	67.3	32
Bolivia	1630	1840	1915	1972	2103	2042	2090	2086	2082	2116	85.6	14.4	85.2	14.8	84.8	15.2	83.4	16
Brazil	2381	2430	2488	2491	2478	2492	2498	2517	2580	2574	85.7	14.3	86.0	14.0	83.5	16.5	85.5	14
Colombia	2161	2154	2084	2133	2235	2346	--	2473	2494	2536	83.2	16.8	83.6	16.4	84.6	15.4	85.5	14
Chile	2553	2651	2744	2696	2694	2615	2662	2738	2759	2706	83.6	16.4	82.3	17.7	84.7	15.3	83.6	16
Ecuador	1842	1924	1924	1938	2064	2087	--	2092	2114	2081	82.8	17.2	82.8	17.2	83.0	17.0	82.0	18
Guayana	2358	2377	2312	2311	2296	2456	2444	2483	2359	2329	86.3	13.7	85.3	14.7	88.4	11.6	88.2	11
Paraguay	2462	2611	2658	2778	2713	2774	2891	2902	2839	2824	78.1	21.9	79.5	21.5	81.2	18.8	80.0	20
Perú	2230	2261	2225	2258	2303	2209	2106	2166	2195	2141	85.6	14.4	86.1	13.9	85.9	14.1	86.5	13
Surinam	--	2354	2372	2407	--	2464	--	2468	2524	2470	88.8	11.2	87.6	12.4	86.9	13.1	86.8	13
Uruguay	2916	2816	2837	2982	3039	2918	2822	2868	2886	2809	62.2	37.8	60.8	39.2	63.5	36.5	62.9	37
Venezuela	2160	2282	2316	2336	2349	2538	2625	2649	2649	2557	83.3	16.7	83.3	16.7	80.6	19.4	78.8	21
S. America[1]		2463	2504	2523	--	2551	--	2588	--	2609	82.1	17.9	82.2	17.8	81.0	19.0	81.9	18
Panamá	2312	2298	2427	2448	2322	2396	2331	2290	2338	2388	83.9	16.1	84.0	16.0	83.1	16.9	81	19

SOURCE: Yearly Statistical Report A.L.CEPAL, 1984.
1980-1982 FAO, Production Yearbook, Vol. 38, 1984.

1) Figures obtained from FAO, Production Yearbook, Vol. 36& 38
2) The distribution of animal and vegetable calories from FAO, Production Yearbook, Vol. 38

TABLE 10

DAILY AVAILABILITY OF PROTEINS (PER CAPITA)
(Triennial Averages)

COUNTRY	Daily Proteins per Cap (in grams)										Source of Daily Protein per Cap(%)[2]							
	1961-1963	1964-1966	1966-1968	1969-1971	1972-1974	1974-1976	1977-1979	1978-1980	1979-1981	1980-1982	1964-1966		1969-1971		1974-1976		1980-1982	
											Veget	Anim	Veget	Anim	Veget	Anim	Veget	An
Argentina	108.4	100.8	104.9	106.1	101.1	108.0	109.9	111.9	112.7	112.8	39.8	60.2	37.0	63.0	34.7	65.3	33.4	66
Bolivia	44.8	49.8	50.0	50.2	55.4	53.0	53.2	52.8	54.6	56.1	73.4	26.6	72.7	27.3	70.8	29.2	68.6	3
Brazil	61.6	61.0	63.9	61.2	61.4	59.5	58.1	59.4	59.4	60.4	68.6	31.4	67.5	32.5	63.4	36.6	64.6	35
Colombia	50.5	50.2	48.9	49.0	48.6	49.6	-	55.0	55.3	56.1	54.4	45.6	54.1	45.9	56.8	43.2	57.4	42
Chile	65.8	71.2	73.5	70.8	73.2	71.8	68.4	75.0	75.7	73.1	65.6	34.4	63.7	36.3	64.5	35.5	62.6	37
Ecuador	45.9	50.7	50.2	49.7	48.4	48.5	-	48.7	50.1	47.3	63.0	37.0	61.0	39.0	58.8	41.2	51.6	48
Guayana	56.5	59.6	59.4	58.2	54.0	57.5	52.5	58.8	57.5	53.2	60.0	40.0	56.2	43.8	61.8	38.2	41.8	58
Paraguay	72.1	70.9	73.7	74.8	75.4	73.2	79.6	81.3	79.9	79.4	52.3	47.7	55.2	44.8	60.7	39.3	62.5	37
Perú	61.6	60.8	61.0	60.2	59.6	57.7	51.8	56.3	58.7	58.6	65.0	35.0	65.6	34.4	64.9	35.7	57.4	42
Surinam	-	60.7	60.9	59.5	54.5[3]	60.3	-	58.1	62.0	60.1	50.0	40.0	59.4	40.6	56.2	43.8	35.1	64
Uruguay	97.8	83.9	85.2	90.4	90.3	88.7	82.4	86.8	86.6	84.5	35.7	64.3	35.0	65.0	36.1	63.9	48.5	51
Venezuela	56.8	59.1	58.9	59.8	60.0	60.9	67.5	70.8	71.7	69.5	55.8	44.2	55.5	44.5	52.0	48.0	56.0	44
S. América[1]	–	65.3	67.2	65.7	64.9[3]	64.7	–	66.2	–	66.8	59.6	40.4	58.4	41.6	56.1	43.9	56.0	44
Panamá	57.3	58.5	59.5	59.8	56.8	58.7	54.4	56.1	56.4	63.1	59.2	40.8	59.2	40.8	54.7	45.3	47.4	52

SOURCE: Yearly Statistical Report, A.L.CEPAL, 1984.
1980-1982 FAO, Production Yearbook, Vol. 38

1) Figures obtained from FAO, Production Yearbook Vol 36, Vol. 38
2) Percentages calculated from FAO figures, Production Yearbook, Vol. 38, 1984.
3) Average obtained from FAO, Food Balance Sheet. Rome, 1980.

TABLE 11

PROTEIN AND CALORIE ADEQUACY INDEX

COUNTRY	CALORIES						PROTEINS					
	MINIMUM[1] REQUIREMENTS	INDEX OF CALORIE ADEQUACY[3]					MINIMUM[2] REQUIREMENTS	INDEX OF ADEQUACY[3]				
		1961 1965	1967 1970	1971 1974	1975 1977	1979 1981		1961 1965	1967 1970	1971 1974	1975 1977	1979 1981
Argentina	2650	122	125	124	127	128	43,3	240	249	233	255	260
Bolivia	2390	79	82	83	86	87	41,3	125	123	124	129	132
Brazil	2390	101	105	104	105	108	40,2	152	158	154	151	148
Colombia	2320	92	88	94	97	108	40,8	123	116	117	119	136
Chile	2440	105	111	111	108	113	42,0	160	170	172	167	180
Ecuador	2290	84	89	90	92	92	40,8	122	125	120	123	123
Guayana	2270	103		101	107	104	-	-	-	-	-	-
Paraguay	2310	109	118	117	122	123	40,4	175	187	185	198	198
Perú	2350	95	98	98	97	92	41,1	150	152	145	142	143
Uruguay	2670	109	109	109	110	108	43,4	207	204	200	202	200
Venezuela	2470	89	93	94	99	107	40,9	140	146	146	159	174
Panamá	2310	101	108	103	102	101	41,4	137	147	138	140	136

SOURCE: Tables 9 and 10

1/ Daily minimum calorie requirements per capita were obtained by applying the FAO?OMS rules to the estimated population for each country by sex and age, around 1970 (Yearly Statistical Report, CEPAL, 1984).

2/ Daily minimum protein requirements per capita were obtained by applying the FAO/OMS rules (estimating done by O.Altimir "La Dimension de le pobreza en America Latina", CEPAL, 1979.

3/ Adequacy Index = $\frac{\text{daily availability per capita}}{\text{minimum requirements}}$

TABLE 12

PROTEIN DENSITY[1] OF AVERAGE DIETS
(Averages 1961-1965; 1967-1970; 1971-1974; 1975-1977; 1979-1981)

(Percentages)

COUNTRY	1961 1965	1967 1970	1971 1974	1975 1977	1979 1981
Argentina	12.8	13.0	12.3	13.1	13.3
Bolivia	10.9	10.4	10.4	10.4	10.5
Brazil	10.1	10.1	10.0	9.7	9.2
Chile	10.5	10.5	10.7	10.6	11.0
Colombia	9.5	9.3	8.8	8.7	8.9
Ecuador	10.3	10.0	9.5	9.5	9.5
Guayana Fr	10.4	11.1	11.0	11.2	12.7
Guayana	9.7	10.2	10.2	9.7	9.7
Paraguay	11.3	11.1	11.0	11.4	11.3
Perú	11.1	10.9	10.4	10.2	10.8
Surinam	10.2	9.7	9.3	8.9	9.8
Uruguay	12.4	15.3	11.9	12.0	12.0
Venezuela	10.4	10.3	10.3	10.7	10.8
Panamá	9.7	9.7	9.7	9.9	9.6

1/ It is derived by multiplying the average of the daily protein availability per capita (in grams) by a factor of 4, and taking this as a percentage of the average calorie availability per capita. The protein density is a nutritional indicator of the quality of the diet.

TABLE 13

AVAILABILITY OF TOTAL CALORIES BY FOOD GROUPS FOR SOUTH AMERICA

Year	Total Calories	%	Cereals		Roots & Tubers		Sugars		Meats		Fats		Other Foods	
			Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%
1961-65	2465	100	885	35.9	240	9.7	390	15.8	233	9.5	182	7.4	535	21.7
1967	2507	100	872	34.8	259	10.3	373	14.9	232	9.3	199	7.9	572	22.8
1968	2549	100	883	34.6	263	10.3	391	15.3	241	9.5	202	7.9	569	22.3
1969	2535	100	870	34.3	269	10.6	393	15.5	247	9.7	207	8.2	549	21.7
1970	2541	100	879	34.6	264	10.4	395	15.5	241	9.5	209	8.2	553	21.8
1971	2539	100	874	34.4	263	10.4	399	15.7	223	8.8	212	8.3	568	22.4
1972	2512	100	850	33.8	247	9.8	416	16.6	220	8.8	217	8.6	562	22.4
1973	2495	100	889	35.6	225	9.0	412	16.5	225	9.0	216	8.7	528	21.1
1974	2539	100	892	35.1	219	8.6	432	17.0	237	9.4	218	8.6	541	21.3
1975	2541	100	884	34.8	214	8.4	431	17.0	245	9.7	220	8.6	547	21.5
1976	2547	100	921	36.2	206	8.1	435	17.1	242	9.5	214	8.4	529	20.8
1977	2579	100	912	35.4	211	8.2	449	17.4	246	9.5	214	8.3	547	21.2

SOURCE: Food Balance Sheet FAO, Rome 1980.

TABLE 14

DAILY AVAILABILITY OF CALORIES (PER CAPITA) BY FOOD GROUPS-BY COUNTRIES

(Average 1961-1965)

COUNTRY	TOTAL CALORIES	INDEX	CEREALS		ROOTS & TUBERS		SUGARS		MEATS		FATS		OTHER FOODS	
			Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%
Argentina	3236	122	1062	32,8	178	5,5	395	12.2	633	19.6	337	10,4	631	19.5
Bolivia	1894	79	893	47,1	261	13,8	205	10.8	138	7,3	123	6.5	274	14,5
Brazil	2421	101	873	36,0	292	12,1	401	16.6	161	6.7	155	6.4	539	22.2
Chile	2565	105	1211	47.2	117	4.6	359	14.0	180	7.0	195	7,6	503	19,6
Colombia	2123	92	691	32,5	161	7,6	512	24,1	166	7.8	95	4,5	498	23,5
Ecuador	1932	84	580	30.0	167	8,6	299	15,5	102	5,3	146	7.6	638	33,0
Guayana Fr.	2337	-	862	36,9	144	6,2	220	9.4	259	11,1	175	7,5	677	28.9
Guayana	2346	103	1099	46,8	124	5,3	389	16,6	86	3,7	209	8,9	439	18,7
Paraguay	2511	109	740	29,5	517	20,6	186	7,4	415	16.5	164	6,5	489	19,5
Perú	2231	95	900	40,3	321	14,4	291	13,1	107	4,8	201	9,0	411	18,4
Surinam	2155	-	1151	53,4	33	1,5	303	14,2	72	3.3	259	12,0	337	15,6
Uruguay	2911	109	898	30,8	119	4,1	381	13,1	681	23,4	262	9.0	570	19,6
Venezuela	2209	89	773	35,0	122	5,5	354	16,0	166	7.6	204	9.2	590	26,7
S. América	2465	-	885	35,9	240	9,7	390	15,8	233	9.5	182	7,4	535	21,7
Panamá	2337	101	1115	47,7	73	3,2	381	16,3	139	5.9	184	7,9	445	19,0

SOURCE: FAO, Food Balance Sheet 1980

TABLE 15

DAILY AVAILABILITY OF CALORIES (PER CAPITA) BY FOOD GROUPS-BY COUNTRIES

(Average 1967-1970)

COUNTRY	TOTAL CALORIES	INDEX	CEREALS		ROOTS & TUBERS		SUGARS		MEATS		FATS		OTHER FOODS	
			Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%
Argentina	3323	125	998	30.0	201	6.0	397	12.0	694	20.9	395	11,9	638	19.2
Bolivia	1959	82	827	42.2	284	14,5	258	13,2	139	7,1	142	7,2	309	15,8
Brazil	2518	105	859	34.1	333	13,2	402	16,0	172	6,8	173	6,9	579	23,0
Chile	2705	111	1275	47,1	95	3,5	374	13,8	205	7,6	243	9,0	513	19,0
Colombia	2047	88	671	32,8	162	7,9	455	22,2	148	7,2	126	6,2	485	23,7
Ecuador	2027	89	612	30,2	200	9,9	326	16,1	91	4,5	169	8,3	629	31,0
Guayana Fr.	2622	-	924	35,2	135	5,2	266	10,1	332	12.7	184	7,0	781	29.8
Guayana	2331	103	1076	46,2	86	3,7	385	16,5	103	4.4	208	8,9	473	20,3
Paraguay	2716	118	830	30,6	526	19.4	199	7,3	410	15,1	188	6,9	563	20,7
Perú	2293	98	920	40,1	320	14,0	287	12.5	105	4.6	214	9,3	447	19,5
Surinam	2473	-	1312	53,0	28	1,1	333	13,5	96	3,9	299	12,1	405	16,4
Uruguay	2911	109	956	32,9	105	3,6	383	13,2	678	23,2	265	9,1	524	18,0
Venezuela	2308	93	867	37,6	106	4,6	375	16,3	187	8,1	195	8,4	578	25,0
S. América	2533	-	876	34,6	264	10,4	388	15,3	240	9,5	204	8.1	561	22,1
Panamá	2492	108	1172	47,0	77	3,1	364	14,6	159	6,4	221	8.9	499	20,0

SOURCE: FAO, Food Balance sheet 1980

TABLE 16

DAILY AVAILABILITY OF CALORIES (PER CAPITA) BY FOOD GROUPS-BY COUNTRIES

(Average 1971-1974)

COUNTRY	TOTAL CALORIES	INDEX 1/	CEREALS		ROOTS & TUBERS		SUGARS		MEATS		FATS		OTHER FOODS	
			Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%
Argentina	3296	124	1013	30,7	171	5,2	419	12,7	586	17,8	412	12,5	695	21,1
Bolivia	1984	83	794	40,0	301	15,2	269	13,6	148	7,4	147	7,4	325	16,4
Brazil	2488	104	851	34,2	287	11,5	423	17,0	178	7,2	189	7,6	560	22,5
Chile	2705	111	1322	48,9	93	3,4	358	13,2	199	7,4	226	8,3	507	18,7
Colombia	2173	94	686	31,7	196	9,0	504	23,2	146	6,7	154	7,1	485	22,3
Ecuador	2062	90	657	31,9	200	9,7	381	18,5	94	0,5	174	8,4	556	27,0
Guayana Fr.	2554	-	911	35,7	123	4,8	259	10,1	295	11,6	186	7,3	780	30,5
Guayana	2293	101	1076	46,9	83	3,6	417	18,2	107	4,7	200	8,7	410	17,9
Paraguay	2709	117	840	31,0	519	19,2	223	8,2	352	13,0	187	6,9	588	21,7
Perú	2307	98	916	39,7	288	12,5	348	15,1	107	4,6	218	9,5	430	18,6
Suriname	2383	-	1298	54,5	28	1,2	290	12,2	108	4,5	306	12,8	353	14,8
Uruguay	2914	109	981	33,7	119	4,1	399	13,7	631	21,6	266	9,1	518	17,8
Venezuela	2311	94	857	37,1	84	3,6	416	18,0	204	8,8	194	8,4	556	24,1
S. América	2521	-	876	34,7	239	9,5	415	16,5	226	9,0	216	8,6	549	21,7
Panamá	2368	103	994	42,0	93	3,9	395	16,7	182	7,7	233	9,8	471	19,9

SOURCE: FAO Food Balance Sheet, 1980.

1/ Index of calorie adequacy = $\frac{\text{Daily availability of calories per capita}}{\text{minimum requirements}}$

TABLE 17

DAILY AVAILABILITY OF CALORIES (PER CAPITA) BY FOOD GROUPS-BY COUNTRIES

(Average 1975-1977)

Country	Total Calories	Index[1]	Cereals		Roots & Tubers		Sugars		Meats		Fats		Other Foods	
			Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%
Argentina	3358	127	997	29,7	143	4,3	398	11,8	712	21,2	383	11,4	725	21,6
Bolivia	2049	86	808	39,4	304	14,8	279	13,6	163	8,0	147	7,2	348	17,0
Brazil	2521	105	903	35,8	243	9,6	464	18,4	182	7,2	117	4,6	612	24,3
Chile	2644	108	1361	51,5	89	3,4	327	12,4	197	7,5	218	8,2	452	17,0
Colombia	2246	97	688	30,6	209	9,3	535	23,8	165	7,3	173	7,7	476	21,2
Ecuador	2111	92	690	32,7	180	8,5	405	19,2	104	4,9	168	8,0	564	26,7
Guayana Fr.	2481	-	879	35,4	114	4,6	248	10,0	301	12,1	197	7,8	752	30,3
Guayana	2431	107	1286	52,9	58	2,4	397	16,3	115	4,7	175	7,2	400	16,5
Paraguay	2808	122	858	30,6	503	17,9	205	7,3	358	12,7	198	7,1	686	24,4
Perú	2284	97	955	41,8	242	10,6	364	15,9	100	4,4	213	9,3	410	18,0
Surinam	2284	86	1291	56,5	22	1,0	259	11,3	101	4,4	328	14,4	283	12,4
Uruguay	2927	110	963	32,9	116	4,0	398	13,6	644	22,0	273	9,3	533	18,2
Venezuela	2436	99	852	35,0	81	3,3	444	18,2	237	9,7	216	8,9	606	24,9
America	2556	—	906	35,4	210	8,2	438	13,1	244	9,5	216	8,6	541	21,2
Panamá	2346	102	1042	44,4	86	3,7	336	14,3	191	8,1	230	9,8	461	19,7

SOURCE: FAO, Food Balance Sheet, 1980.

1/ Index of calorie adequacy

TABLE 18

DAILY AVAILABILITY OF CALORIES (PER CAPITA) BY FOOD GROUPS-BY COUNTRIES

(Average 1979-1981)

Country	Total Calories	Index[1]	Cereals		Roots & Tubers		Sugars		Meats		Fats		Other Foods	
			Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%	Cal.	%
Argentina	3380	128	987	29.2	150	4.4	404	12.0	749	22.1	390	11.5	700	20.8
Bolivia	2082	87	877	42.1	242	11.6	318	15.3	172	8.3	163	7.8	310	14.9
Brazil	2578	108	980	38.0	216	8.4	516	20.0	177	6.9	211	8.2	478	18.5
Chile	2759	113	1343	48.7	93	3.4	380	13.8	186	6.7	220	8.0	534	19.4
Colombia	2494	108	827	33.2	239	9.6	556	22.3	184	7.4	178	7.1	510	20.4
Ecuador	2114	92	655	31.0	103	4.9	456	21.6	68	3.2	242	11.4	590	27.9
Guayana Fr.	2718	-	927	34.1	141	5.2	241	8.9	458	16.9	193	7.1	758	27.9
Guayana	2360	104	1255	53.2	32	1.4	394	16.7	104	4.4	176	7.4	399	16.9
Paraguay	2839	123	851	30.0	446	15.7	212	7.5	415	14.6	223	7.8	692	24.4
Perú	2165	92	960	44.3	210	9.7	323	14.9	99	4.6	175	8.1	398	18.4
Suriname	2529	-	1306	51.6	41	1.6	353	14.0	157	6.2	292	11.5	380	15.0
Uruguay	2886	108	938	32.5	109	3.8	399	13.9	578	20.0	281	9.7	581	20.1
Venezuela	2646	107	971	36.7	66	2.5	446	16.8	251	9.5	264	10.0	648	24.5
S. América	-	-	-	-	-	-	-	-	-	--	-	-	-	-
Panamá	2338	101	909	38.9	80	3.4	445	19.0	183	7.8	255	11.0	466	19.9

SOURCE: FAO, Food Balance Sheets, 1985 (provisional figures).

1/ Index = $\frac{\text{Availability of calories}}{\text{minimum requirements}} \times 100$

TABLE 19

DAILY AVAILABILITY OF PROTEINS (PER CAPITA) BY FOOD GROUPS FOR SOUTH AMERICA

(Daily grams per capita)

YEAR	TOTAL PROTEIN	%	CEREALS		VEGETABLES		MEATS		MILK		OTHER FOODS	
			Prot.	%	Prot.	%	Prot.	%	Prot.	%	Prot.	%
1961-65	66.0	100.0	21.5	32.6	8.7	13.1	16.9	25.6	7.5	11.4	11.4	17.3
1967	67.5	100.0	21.1	31.3	10.1	15.0	16.8	24.9	7.6	11.3	11.9	17.5
1968	68.2	100.0	21.4	31.4	9.1	13.3	17.5	25.7	7.8	11.4	12.4	18.2
1969	67.0	100.0	21.1	31.5	8.2	12.2	18.0	26.9	7.6	11.3	12.1	18.1
1970	66.6	100.0	21.3	32.0	8.2	12.3	17.5	26.3	7.6	11.4	12.0	18.0
1971	66.1	100.0	21.2	32.1	9.4	14.2	16.0	24.2	7.5	11.3	12.0	18.2
1972	64.7	100.0	20.6	31.8	9.2	14.2	15.9	24.6	7.3	11.3	11.7	18.1
1973	64.3	100.0	21.6	33.6	7.5	11.7	16.2	25.2	7.4	11.5	11.6	18.0
1974	65.6	100.0	21.7	33.1	7.3	11.1	17.1	26.1	7.8	11.9	11.7	17.8
1975	65.8	100.0	21.4	32.5	7.3	11.1	17.7	26.9	8.0	12.2	11.4	17.3
1976	65.2	100.0	22.3	34.2	6.3	9.7	17.6	27.0	8.3	12.7	10.7	16.4
1977	66.6	100.0	22.0	33.0	7.5	11.3	17.8	26.7	8.1	12.2	11.2	16.8

SOURCE: FAO, Food Balance Sheets. Rome, 1980.

1/ Index of protein adequacy

TABLE 20

DAILY AVAILABILITY OF PROTEINS (PER CAPITA) BY FOOD GROUPS-BY COUNTRIES

(Daily grams per capita)

(Average 1961-1965)

Country	Protein (in grams)	Index[1]	Cereals Prot.	Cereals %	Vegetables Prot.	Vegetables %	Meats Prot.	Meats %	Milk Prot.	Milk %	Other Foods Prot.	Other Foods %
Argentina	103,9	240	27,9	26,9	1,5	1,4	48,5	46,7	11,3	10,9	14,7	14,1
Bolivia	51,8	125	24,1	46,5	1,4	2,7	11,1	21,4	2,2	4,3	13,0	25,1
Brazil	61,2	152	19,5	31,9	14,0	22,8	11,2	18,3	6,1	10,0	10,4	17,0
Chile	67,3	160	32,6	48,4	3,5	5,2	11,0	16,4	8,6	12,8	11,6	17,2
Colombia	50,3	123	16,5	32,8	2,7	5,4	12,1	24,0	9,5	18,9	9,5	18,9
Ecuador	49,7	122	14,5	29,2	8,9	17,9	8,0	16,1	6,4	12,9	11,9	23,9
Guayana Fr.	60,7	-	22,8	37,6	4,3	7,1	15,8	26,0	5,0	8,2	12,8	21,1
Guyana	57,0	-	26,1	45,8	3,2	5,6	7,0	12,3	6,8	11,9	13,9	24,4
Paraguay	70,9	175	19,1	26,9	6,7	9,5	27,8	39,2	4,4	6,2	12,9	18,2
Perú	61,8	150	24,9	40,3	6,0	9,7	10,2	16,5	4,9	7,9	15,8	25,6
Suriname	55,0	-	25,2	45,8	2,8	5,1	7,6	13,8	5,0	9,1	14,4	26,2
Uruguay	89,9	207	23,4	26,0	1,4	1,6	38,2	42,5	18,2	20,2	8,7	9,7
Venezuela	57,4	140	20,5	35,7	4,9	8,6	11,9	20,7	9,2	16,0	10,9	19,0
S. América	66,0	-	21,5	32,5	8,7	13,2	16,9	25,6	7,5	11,4	11,4	17,3
Panamá	56,6	137	26,0	45,9	4,5	8,0	11,8	20,8	5,6	9,9	8,7	15,4

SOURCE: FAO, Food Balance Sheets, Rome, 1980.

1/ Index of protein adequacy

TABLE 21

DAILY AVAILABILITY OF PROTEINS (PER CAPITA) BY FOOD GROUPS-BY COUNTRIES

(Daily grams per capita)

(Average 1967-1970)

COUNTRY	TOTAL PROTEIN	INDEX	CEREALS.		VEGETABLES		MEATS		MILK		OTHER FOODS	
			Prot.	%	Prot.	%	Prot.	%	Prot.	%	Prot.	%
Argentina	107.7	249	26,2	24,3	1.0	0,9	53,1	49.3	12.6	11.7	14.8	13.8
Bolivia	50.8	123	22.3	43,9	1,2	2,4	11.1	21.9	2.2	4.3	14.0	27.5
Brazil	63.7	158	19,3	30,3	14,6	22,9	12.0	18.8	6.3	9.9	11.5	18.1
Chile	71,3	170	34,4	48,2	4,0	5,6	12.7	17.8	8,5	11.9	11.7	16.5
Colombia	47,5	116	16,0	33,7	2.4	5.1	10.8	22.7	8.9	18.7	9.4	19.8
Ecuador	50.9	125	15,4	30,3	7.6	14.9	7.1	13.9	9.3	18.3	11.5	22.6
Guayana Fr.	72.5	-	24,4	33.7	3.5	4.8	22.2	30.6	7.1	9.8	15.3	21.1
Guayana	59.5	-	25,6	43.0	3.4	5.7	8.6	14.5	7.4	12.4	14.5	24.4
Paraguay	75.4	187	21.3	28,2	7.3	9.7	27.8	36.9	3.8	5.0	15.2	20.2
Perú	62,3	152	[illegible]	40.6	5.4	8.7	9.6	15.4	6.2	9.9	15.8	25.4
Suriname	60.1	-	28,8	47.9	2.7	4.5	8.6	14.3	5.1	8.5	14.9	24.8
Uruguay	88.4	204	24,9	28,2	1.3	1.5	38.0	43.0	16.3	18.4	7.9	8.9
Venezuela	59,7	146	22,8	38.2	4.8	8.0	13.4	22.4	8.0	13.5	10.7	17.9
S. América	67,3	-	21,2	31.5	8.9	13.3	17.5	26.0	7.7	11.4	12.0	17.8
Panamá	60,7	147	27,1	44.6	4.6	7.6	13.3	21.9	6.3	10.4	9.4	15.5

SOURCE: FAO, Food Balance Sheets, Rome , 1980.

1/ Index of protein adequacy

TABLE 22

DAILY AVAILABILITY OF PROTEINS (PER CAPITA) BY FOOD GROUPS-BY COUNTRIES

(Daily grams per capita).
(Average 1971-1974)

Country	Protein (in grams)	Index[1]	Cereals Prot.	Cereals %	Vegetables Prot.	Vegetables %	Meats Prot.	Meats %	Milk Prot.	Milk %	Other Foods Prot.	Other Foods %
Argentina	101,0	233	26,5	26,2	1,0	1,0	44,4	44,0	13,5	13,4	15,6	15,4
Bolivia	51,4	124	21,4	41,6	1,3	2,5	11,6	22,6	2,2	4,3	14,9	29,0
Brazil	62,0	154	19,2	31,0	13,8	22,2	12,4	20,0	5,8	9,4	10,8	17,4
Chile	72,4	172	35,7	49,3	4,1	5,7	12,4	17,1	9,0	12,4	11,2	15,5
Colombia	47,9	117	16,1	33,6	2,6	5,4	10,8	22,5	8,4	17,6	10,0	20,9
Ecuador	48,9	120	16,4	33,5	4,7	9,6	7,3	14,9	8,8	18,1	11,7	23,9
Guayana Fr.	70,5	-	23,8	33,8	2,7	3,8	20,2	28,6	7,3	10,4	16,5	23,4
Guyana	58,4	-	25,1	43,0	2,8	4,8	8,8	15,1	5,8	9,9	15,9	27,2
Paraguay	74,7	185	21,4	28,6	9,7	13,0	23,7	31,7	3,7	5,0	16,2	21,7
Perú	59,8	145	25,1	42,0	4,1	6,9	9,6	16,0	6,6	11,0	14,4	24,1
Suriname	55,2	-	28,3	51,3	1,9	3,4	8,8	15,9	4,8	8,7	11,4	20,7
Uruguay	86,7	200	25,4	29,3	0,9	1,0	35,7	41,2	15,6	18,0	9,1	10,5
Venezuela	59,6	146	22,5	37,7	3,7	6,2	14,7	24,7	8,5	14,3	10,2	17,1
S. América	65,2	-	21,3	32,7	8,4	12,9	16,3	25,0	7,5	11,5	11,7	17,9
Panamá	57,2	138	22,8	39,9	3,1	5,4	15,8	27,6	6,1	10,7	9,4	16,4

SOURCE: FAO, Food balance sheets, 1980 Rome.

1/ Index of protein adequacy

TABLE 23

DAILY AVAILABILITY OF PROTEINS (PER CAPITA) BY FOOD GROUPS-BY COUNTRIES

(Daily grams per capita)

(Average 1975-1977)

Country	Protein (In grams)	Index[1]	Cereals Prot.	Cereals %	Vegetables Prot.	Vegetables %	Meats Prot.	Meats %	Milk Prot.	Milk %	Other Foods Prot.	Other Foods %
Argentina	110,2	255	26,1	23,7	1,1	1,0	54,5	49,5	13,6	12,3	14,9	13,5
Bolivia	53,4	129	21,5	40,3	1,7	3,2	12,7	23,8	2,0	3,7	15,5	29,0
Brazil	60,9	151	20,5	33,7	10,7	17,6	12,7	20,9	7,2	11,8	9,7	15,9
Chile	70,3	167	36,6	52,1	3,4	4,8	12,0	17,1	8,7	12,4	9,6	13,6
Colombia	48,6	119	15,9	32,7	2,7	5,6	12,1	24,9	7,4	15,2	10,5	21,6
Ecuador	50,1	123	17,0	33,9	4,3	8,6	8,0	16,0	8,7	17,3	12,1	24,2
Guayana Fr.	69,4	-	22,7	32,7	2,8	4,0	21,4	30,8	7,6	11,0	14,9	21,5
Guyana	59,2	-	29,5	49,8	3,1	5,2	9,3	15,7	5,3	9,0	12,0	20,3
Paraguay	80,1	198	21,6	27,0	14,7	18,4	23,1	28,8	4,0	5,0	16,7	20,8
Perú	58,5	142	26,0	44,4	3,8	6,5	9,1	15,6	6,1	10,4	13,5	23,1
Surinam	50,8	-	27,9	54,9	0,6	1,2	8,1	15,9	4,0	7,9	10,2	20,1
Uruguay	87,5	202	24,8	28,3	1,1	1,3	36,1	41,3	16,7	19,1	8,8	10,0
Venezuela	64,9	159	22,1	34,1	4,7	7,2	16,9	26,1	10,6	16,3	10,6	16,3
Panamá	57,8	140	23,8	41,2	2,5	4,3	17,1	29,6	5,6	9,7	8,8	15,2

SOURCE: FAO, Food Balance Sheets, 1980

1/ Index of protein adequacy

TABLE 24

DAILY AVAILABILITY OF PROTEINS (PER CAPITA) BY FOOD GROUPS-BY COUNTRIES

(Daily grams per capita)

(Average 1979-1981)

Country	Total Prot. (In grams)	Index[1]	Cereals Prot.	Cereals %	Vegetables Prot.	Vegetables %	Meats Prot.	Meats %	Milk Prot.	Milk %	Other Foods Prot.	Other Foods %
Argentina	112,7	260	26,0	23,1	0,9	0,8	57,6	51,1	13,8	12,2	14,4	12,8
Bolivia	54,6	132	23,6	43,2	1,8	3,3	12,9	23,7	2,9	5,3	13,4	24,5
Brazil	59,4	148	22,4	37,7	9,7	16,3	11,9	20,1	6,2	10,4	9,2	15,5
Chile	75,7	180	36,1	47,7	3,6	4,8	11,8	15,5	9,9	13,1	14,3	18,9
Colombia	55,3	136	19,0	34,4	3,3	6,0	13,5	24,4	7,0	12,8	12,5	22,6
Ecuador	50,1	123	15,7	31,3	2,8	5,6	10,7	21,4	8,2	16,4	12,7	25,3
Guayana Fr.	86,6	–	23,5	27,1	3,7	4,3	34,5	39,8	8,8	10,2	16,1	18,6
Guayana	57,5	–	28,6	49,7	2,9	5,0	7,9	13,7	6,6	11,6	11,5	20,0
Paraguay	79,9	198	21,5	26,9	12,0	15,0	15,8	23,3	4,7	5,9	15,9	19,9
Perú	58,7	143	25,8	44,0	3,4	5,8	8,5	14,5	5,6	9,5	15,4	26,2
Surinam	62,2	–	28,8	46,3	2,3	3,7	13,2	21,2	5,0	8,1	12,9	20,7
Uruguay	86,6	200	24,2	27,9	1,4	1,6	32,5	37,5	17,7	20,4	10,8	12,5
Venezuela	71,2	174	24,9	35,0	5,1	7,2	17,8	25,0	12,8	18,0	10,6	14,9
Panamá	56,4	136	21,1	37,4	2,9	5,1	16,8	29,8	6,5	11,5	9,1	16,2

SOURCE: FAO, Food Balance Sheets, 1985.

1/ Index of protein adequacy

TABLE 25

GENERAL MORTALITY

(Death rate per 1000 pop.)

Country	1960 1965	1965 1970	1970 1975	1975 1980	1980 1985
Argentina	8.8	9.1	9.0	8.9	8,7
Bolivia	21.4	20,2	18,9	17.5	15.8
Brazil	12,3	10.8	9.7	8.9	8.4
Colombia	12,2	10.4	9.0	8.2	7.7
Chile	11.8	10.0	8.6	7.1	6.7
Ecuador	14.3	12.8	11,2	9.5	8.1
Guyana	8.9	7,3	5,9	5.5	5.2
Paraguay	11.9	10,1	8,1	7,7	7,2
Perú	17.6	15.6	12,8	11.7	10.7
Surinam	10.3	8.8	7,5	6.9	6.1
Uruguay	9.6	9,6	10,0	10.1	10.2
Venezuela	9,2	7,7	6.5	5,9	5.6
Panamá	9.6	8.4	7.3	6.0	5.4

Source: Annual Statistics, CEPAL, 1984. (Table 8)

TABLE 26

LATIN AMERICA & THE CARIBBEAN: MORTALITY
(DEATH RATE)[a]

Country	1950-1956	1955-1960	1960-1965	1965-1970	1970-1975[b]
Argentina	9,2	8,7	8,6	8,6	8,8
Barbados	-	-	-	7,8	7,5
Bolivia	23,2	21,8	20,4	19,0	18,0
Brazil	12,2	11,2	10,2	9,5	8,8
Colombia	16,3	13,1	11,7	10,3	8,8
Costa Rica	11,9	10,7	9,2	7,3	5,9
Cuba	10,5	9,2	8,3	6,6	6,6
Chile	13,6	12,8	11,9	10,0	9,2
Ecuador	18,5	15,3	12,9	11,0	9,5
El Salvador	21,3	18,8	15,5	13,0	11,1
Guatemala	22,9	20,2	17,8	15,5	13,6
Guayana	-	-	-	7,7	6,6
Haití	25,6	23,8	21,7	19,7	17,2
Honduras	28,5	24,4	20,7	17,5	14,6
Jamaica	-	-	-	7,0	6,2
México	15,4	12,5	10,6	9,7	8,6
Nicaragua	22,5	20,1	17,8	15,7	13,9
Panamá	12,5	10,8	9,4	8,1	7,1
Paraguay	15,8	13,5	11,7	9,9	8,9
Perú	23,4	20,6	18,2	15,9	14,0
Rep. Domicana	20,3	17,0	14,1	12,3	11,0
Trinidad y Tobago	-	-	-	6,7	6,0
Uruguay	9,5	9,4	9,2	9,1	9,3
Venezuela	13,4	11,3	9,5	7,9	7,0

SOURCE: CELADE, Boletin Demogrfico, # 7 & 17
a) Rates per thousand inhabitants

b) According to the hypothesis of "fecundidad media"

TABLE 27

LATIN AMERICA AND THE CARIBBEAN: CHILD MORTALITY RATE (1-4 yrs. old)

1960, 1970, 1975

Country	Mortality Rate (1-4 yrs.)							Variation %	
	1960	1970	1971	1972	1973	1974	1975	1960-70	1970-75
Argentina	4,3	3,3	—	—	—	—	—	-23,3	—
Colombia	14,9	10,3	10,7	8,3	7,6	6,9	5,7	-30,9	-44,7
Costa Rica	7,0	5,0	3,7	3,7	2,8	1,9	2,1	-28,6	-58,0
Cuba	2,0	1,2	0,9	1,0	1,2	1,2	1,1	-40,0	- 8,3
Chile	9,7	3,8	3,2	3,0	2,5	2,8	2,3	-60,8	-39,5
Ecuador	22,2	15,6	16,2	18,3	15,7	15,2	9,6	-29,7	-38,5
Guatemala	27,9	22,7	24,1	21,1	—	—	21,7	-18,7	- 4,4
Honduras	12,9	9,5	7,7	8,4	8,1	6,7	7,7	-26,4	-18,9
México	12,5	9,8	8,0	8,5	6,2	4,7		-21,6	— c
Panamá a/	8,3	7,3	6,9	5,5	5,8	4,7	3,4	-12,0	-53,4
Paraguay b/	4,4	4,0	5,8	3,4	3,2	4,0	2,8	- 9,1	-30,0
Perú	15,0	12,5	6,3	7,6	—	—	—	-16,7	— c
Uruguay	1,8	1,3	1,2	1,4	1,1	1,5	1,5	-27,8	+15,4
Venezuela	5,4	5,1	4,8	5,1	4,8	3,6	3,6	- 5,6	-29,4
Barbados	4,1	2,1	1,1	1,1	1,3	1,2	0,9	-48,9	-56,5
Guyana	6,2	3,5	3,0	4,0	3,0	3,5	—	-44,5	— c
Jamaica	9,1	7,5	5,5	—	—	—	—	-17,6	— c
Trinidad y Tabago	4,4	2,1	2,3	1,7	2,0	1,6	—	-52,3	— c
Estados Unidos						0,7			

a) Excludes indigenous population; b) only area of information; c) incomplete data

SOURCE: United Nations, Demographic Yearbook, 1974, 1975. Questionaires for the Anuario Demografico, Of. Sanitaria Panamericana, Las Condiciones de salud en las Americas, 1969-1972, CELADE, Boletines Demograficos Nos. 5,7, and 19.

TABLE 28

PERCENTAGE OF URBAN AND RURAL POPULATION HAVING POTABLE WATER[1]

Country	Around 1964 [2]			1969		1973		Around 1977			Around 1979		
	Year	Urban [3]	Rural [4]	Urban	Rural	Urban	Rural	Year	Urban	Rural	Year	Urban	Rural
Argentina	1963	78,6	5,5	70,3	12,0	78,3	19,8	1977	77,5	30,3	1979	69,3	15,8
Bolivia	1964	45,5	0,8	58,3	1,0	74,8	5,3	1976	81,9	8,7	1977	71,6	13,1
Brazil	1964	64,8	-	52,9	4,4	77,0	30,3	1976	74,6	45,6	--	--	--
Colombia	1960	78,8[5]	23,2	97,5	47,6	88,8	34,5	1977	85,5	33,0	1979	86,9	22,6[2]
Chile	1964	70,7	1,8	80,6	7,4	93,7	8,2	1977	92,4	30,3	1979	92,9	20,2
Ecuador	1964	70,4	1,8	92,0	8,9	65,2	9,3	1977	82,4	12,9	1979	89,3	14,2
Guayana	--	--	--	96,5	36,5	92,3	70,5	1977	98,5	97,5	1979	97,1	91,1
Paraguay	1964	20,7	--	31,0	6,0	36,2	6,2	1975	31,8	0,3	1979	59,1	9,9
Perú	1964	66,3	7,3	69,1	8,4	73,0	10,4	1976	71,8	9,8	1979	79,0	13,2
Surinam	--	--	--	--	--	--	--	--	--	--	1979	100,0	66,1
Uruguay	1964	70,4	8,4	81,6	11,4	95,9	31,3	1977	89,4	13,2	1979	93,2	13,2
Venezuela	1964	60,2	8,5	100,0	55,5	87,9	42,2	1976	94,1	46,9	--	--	--
Panamá	1960	84,2	26,3	95,2	56,7	100,0	51,4	1976	100,0	63,1	1977	100,0	63,8

SOURCE: Yearly Statistical Report, CEPAL. 1984

1) This refers to the population either with water connected to the home or with easy access.
2) Population with the home connected to water.
3) The term urban refers generally to localities with 2000 or more inhabitants.
4) In some cases the number refers to localities with fewer than 2000 inhabitants and not to the total rural population.
5) Includes localities with 5000 or more inhabitants.

TABLE 29

PERCENTAGE OF THE TOTAL URBAN POPULATION SERVED WITH SEWER SYSTEMS

Country	Around 1964 Year	Around 1964 % urban 1/	1969 % urban	1973 %urban	Around 1977 Year	Around 1977 % urban	Around 1979 Year	Around 1979 % urban
Argentina	1963	45.0	33.7	35.7	1977	39.8	1979	33.4
Bolivia	1964	40.4	21.7	23.3	1976	46.3	1977	42.4
Brazil	1964	54.5	25.1	29.0	1976	34.3	--	--
Colombia	1960	61.4 2/	71.7	64.3	1977	65.0	1979	67.8
Chile	1964	44.8	33.8	39.9	1977	66.7	1979	62.4
Ecuador	1964	52.8	53.5	58.2	1977	63.0	1979	71.7
Guyana	--	--	39.0	--	1977	43.4	1979	42.8
Paraguay	1964	22.8	13.7	16.0	1975	15.1	1979	23.6
Perú	1964	57.3	61.9	55.4	1976	49.9	1979	54.9
Surinam	--	--	--	--	--	--	1979	36.3
Uruguay	1964	47.7	52.1	51.2	1977	57.9	1979	61.7
Venzuela	1964	42.6	48.8	46.8	1976	52.3	--	--
Panamá	1964	59.0	64.5	70.6	1976	97.2	--	--

SOURCE: CEPAL, Yearly Statistical Report , 1984.

1/ The term urban is used to refer to cities with 2000 or more inhabitants.

2/ Under urban denomination, they include cities with 5000 or more inhabitants.

TABLE 30

INDEX OF NUTRIENT ADEQUACY[1]

(Triennial Averages)
(Percentages)

COUNTRY	CALCIUM					IRON					THIAMIN				
	1964 1966	1969 1971	1974 1976	1978 1980	1980 1982	1964 1966	1969 1971	1974 1976	1978 1980	1980 1982	1964 1966	1969 1971	1974 1976	1978 1980	1980 1982
Argentina	130.0	136.6	141.0	137.0	139.8	219.3	238.1	233.1	236.8	236.8	128.8	136.5	131.7	129.8	131.7
Bolivia	44.5	48.4	52.0	51.6	53.9	114.7	120.2	127.5	125.7	129.4	129.4	130.4	134.3	128.4	139.2
Brasil	90.6	85.9	87.4	79.6	79.8	125.0	125.9	112.1	117.6	113.1	108.8	109.8	99.0	103.9	98.0
Chile	100.9	96.8	100.2	107.9	108.1	155.1	153.3	158.9	158.9	158.9	164.0	161.2	164.1	168.9	171.8
Colombia	99.3	95.6	88.5	93.7	94.6	149.0	135.0	140.6	149.0	151.8	104.0	99.0	100.1	111.9	113.9
Ecuador	100.9	98.6	94.0	93.6	90.3	120.0	114.4	107.8	103.0	100.2	108.0	105.0	102.0	100.0	91.0
Guayana	85.8	85.0	72.4	77.7	71.4	100.0	104.7	114.2	96.2	91.5	85.0	87.0	92.0	89.0	83.0
Paraguay	94.9	98.0	101.2	110.6	108.9	182.9	192.4	192.0	203.8	197.2	168.0	181.0	194.0	204.0	197.0
Perú	76.3	79.3	74.0	68.1	70.3	127.0	125.1	115.6	116.6	108.1	121.0	122.0	114.0	115.0	105.0
Uruguay	149.4	144.3	145.7	153.2	145.9	157.9	175.4	169.2	166.7	164.2	112.7	120.6	119.6	115.7	111.8
Venezuela	96.3	91.3	95.7	126.1	118.6	119.1	114.4	109.6	122.9	120.0	102.0	101.0	103.0	113.9	109.9
Panamá	75.0	79.2	75.9	71.7	81.1	133.3	133.3	125.0	122.2	131.5	99.0	100.0	91.3	91.3	95.1

1/Index of Adequacy: Calculated by dividing the per capita daily availability of nutrients by the recommended consumption nutrient intake (defined as the three year average of 1972-74 WHO Recommendations) accounting for the age-sex distribution of each country.

Source: Department of Nutrition, University of Chile, Draft, 1985.

TABLE 30-A

INDEX OF NUTRIENT ADEQUACY[1]

(Triennial Averages)
(Percentages)

COUNTRY	RIBOFLAVIN					NIACIN				
	1964 1966	1969 1971	1974 1976	1978 1980	1980 1982	1964 1966	1969 1971	1974 1976	1978 1980	1980 1982
Argentina	104,2	112,6	114,0	113,3	116,1	117,5	128,1	128,1	132,6	133,3
Bolivia	53,6	56,4	60,0	58,6	62,1	80,1	82,5	87,1	85,4	90,6
Brasil	64,5	63,0	65,2	67,4	63,8	66,6	69,0	62,5	73,7	66,6
Chile	81,6	80,1	82,3	84,4	86,5	97,6	98,8	99,4	104,1	108,8
Colombia	78,4	75,5	72,7	78,4	79,1	70,6	68,2	73,6	83,1	84,3
Ecuador	77,4	74,5	70,8	72,3	69,3	66,0	66,0	65,4	69,0	64,8
Guayana	62,8	64,2	59,1	63,5	58,4	73,0	77,9	82,7	84,5	80,9
Paraguay	87,7	89,1	87,0	95,7	92,0	110,2	113,3	107,2	115,7	110,2
Perú	67,4	69,6	65,9	62,3	62,3	81,0	83,4	79,8	85,2	82,2
Uruguay	112,1	116,3	113,5	116,3	112,1	100,7	114,9	110,8	106,0	104,9
Venezuela	77,9	77,1	80,7	102,1	97,9	68,0	69,2	71,6	85,3	85,3
Panamá	65,0	69,2	67,8	65,7	74,1	76,4	81,2	80,0	76,4	89,5

1/Index of Adequacy: Calculated by dividing the per capita daily availability of nutrients by the recommended consumption nutrient intake (defined as the three year average of 1972-74 WHO Recommendations) accounting for the age-sex distribution of each country.

Source: Department of Nutrition, University of Chile, Draft, 1985.

TABLE 31

NUTRIENT DENSITY[1]

(milligrams/1000K. Calories)

COUNTRY	CALCIUM					IRON					THIAMIN				
	1964 1966	1969 1971	1975 1977	1978 1980	1980 1982	1964 1966	1969 1971	1975 1977	1978 1980	1980 1982	1964 1966	1969 1971	1975 1977	1978 1980	1980 1982
Argentina	202.4	203.0	207.3	201.7	206.9	5.5	5.7	5.6	5.6	5.6	0.42	0.42	0.40	0.40	0.40
Bolivia	128.8	130.8	135.2	131.8	135.6	6.8	6.6	6.9	6.6	6.7	0.72	0.67	0.56	0.63	0.68
Brasil	197.1	182.3	184.6	167.3	163.9	5.6	5.5	5.3	5.1	4.8	0.46	0.45	0.44	0.42	0.40
Chile	192.4	181.4	190.4	199.1	201.8	6.3	6.1	6.4	6.2	6.3	0.64	0.62	0.64	0.64	0.65
Colombia	238.2	231.6	199.1	195.7	192.8	7.4	6.2	6.5	6.5	6.4	0.49	0.47	0.44	0.46	0.47
Ecuador	271.8	257.0	237.7	231.8	224.9	6.6	6.1	5.5	5.2	5.1	0.56	0.53	0.51	0.48	0.43
Guayana	178.8	182.2	173.0	155.1	152.0	4.5	4.8	5.0	4.1	4.2	0.36	0.38	0.39	0.36	0.33
Paraguay	190.3	184.7	197.5	199.5	201.8	7.4	7.3	7.5	7.4	7.4	0.64	0.65	0.72	0.70	0.68
Perú	176.0	183.3	164.3	163.4	171.4	5.9	5.8	5.7	5.7	5.3	0.43	0.54	0.54	0.53	0.48
Uruguay	261.4	238.4	247.1	263.2	256.0	4.5	4.7	4.6	4.6	4.7	0.41	0.41	0.41	0.41	0.40
Venezuela	219.5	203.3	222.2	247.6	241.3	5.5	5.2	5.0	4.9	5.0	0.45	0.44	0.44	0.43	0.42
Panamá	170.6	169.1	168.6	163.8	177.6	6.3	5.9	5.7	6.2	5.9	0.44	0.42	0.40	0.41	0.43

1/ Nutrient Density: the daily quantities per capita of a nutrient per 1000 calories. It is an indicator of the adequacy of the diet in fulfilling nutrient requirements as related to caloric intake.

SOURCE: Tables 32,33,34,35,36 and 9.

TABLE 31-A

NUTRIENT DENSITY[1]

(milligrams/1000 K. Calories)

COUNTRY	RIBOFLAVIN					NIACIN				
	1964 1966	1969 1971	1975 1977	1978 1980	1980 1982	1964 1966	1969 1971	1975 1977	1978 1980	1980 1982
Argentina	0.46	0.48	0.48	0.48	0.49	6.28	6.53	6.57	6.67	6.77
Bolivia	0.41	0.40	0.41	0.39	0.41	7.45	7.15	7.35	7.00	7.33
Brasil	0.37	0.35	0.39	0.37	0.34	4.65	4.70	4.94	4.97	4.35
Chile	0.43	0.42	0.43	0.43	0.45	6.26	6.23	6.27	6.46	6.84
Colombia	0.51	0.47	0.44	0.44	0.43	5.48	5.34	5.46	5.62	5.56
Ecuador	0.55	0.51	0.47	0.47	0.46	5.67	5.48	5.37	5.44	5.14
Guayana	0.36	0.38	0.34	0.35	0.34	5.09	6.58	5.78	5.64	5.75
Paraguay	0.46	0.44	0.45	0.45	0.45	6.93	6.70	6.56	6.55	6.41
Perú	0.41	0.43	0.40	0.40	0.40	5.97	6.16	6.47	6.56	6.40
Uruguay	0.56	0.55	0.55	0.57	0.56	6.04	6.84	6.31	6.24	6.30
Venezuela	0.48	0.46	0.49	0.54	0.54	5.00	4.97	5.20	5.40	5.59
Panamá	0.40	0.40	0.41	0.41	0.44	5.61	5.60	5.59	5.63	6.32

1/ Nutrient Density: the daily quantities per capita of a nutrient per 1000 calories. It is an indicator of the adequacy of the diet in fulfilling nutrient requirements as related to caloric intake.

SOURCE: Tables 32,33,34,35,36 and 9.

TABLE 32

DAILY AVAILABILITY OF CALCIUM PER CAPITA

(Triennial Averages in Milligrams)

COUNTRY	TOTAL DAILY CALCIUM PER CAPITA							CALCIUM FROM VEGETABLES PER CAPITA							CALCIUM FROM ANIMAL PRODUCTS PER CAP.						
	1964-66	66-68	69-71	74-76	75-77	78-80	80-82	64-66	66-68	69-71	74-76	75-77	78-80	80-82	64-66	66-68	69-71	74-76	75-77	78-80	80-82
Argentina	648	664	681	703	697	683	697	228	228	237	226	227	213	214	420	436	444	477	470	471	483
Bolivia	237	249	258	277	276	275	287	158	166	170	183	181	174	174	79	83	88	94	95	102	114
Brasil	479	484	454	462	460	421	422	230	235	229	196	191	182	188	249	248	225	266	269	240	234
Chile	510	521	489	506	498	545	546	195	199	187	190	188	192	192	315	323	301	317	310	353	354
Colombia	513	499	494	457	467	484	489	204	197	192	206	208	218	224	308	302	302	251	259	266	265
Ecuador	523	529	511	487	496	485	468	226	214	199	184	187	173	173	296	316	312	303	309	313	295
Guayana Fr.	429	403	476	471	430	443	592	188	178	201	192	170	174	242	241	225	276	279	255	269	350
Guayana	425	422	421	359	425	385	354	145	135	135	150	151	133	119	280	287	286	208	215	253	236
Paraguay	497	505	513	530	548	579	570	332	341	351	365	373	381	373	165	164	161	165	174	198	197
Perú	398	400	414	386	363	354	367	184	186	185	165	162	157	139	214	214	229	221	200	196	228
Suriname	337	351	354	356	365	308	354	126	135	133	127	134	134	138	211	217	221	229	231	173	216
Uruguay	735	680	711	718	721	755	719	145	139	149	154	156	155	154	591	541	562	565	566	601	565
Venezuela	501	479	475	498	564	656	617	144	149	131	118	129	132	128	358	329	344	380	435	524	489
Sud-América	502	503	488	489	490	477	327	215	217	212	194	192	186	188	287	286	276	295	298	291	289
Panamá	392	416	414	397	404	375	424	172	186	177	161	161	154	152	220	229	237	236	243	221	272

SOURCE FAO, Production yearbook. Vol. 38, 1984 (yrs.64-66; 69-71; 74-76; 80-82)
FAO, Production yearbook. Vol. 36, 1982 (yrs.66-68; 75-77; 78-80).

TABLE 33

DAILY AVAILABILITY OF IRON PER CAPITA

(Triennial Averages in Milligrams)

COUNTRY	DAILY IRON PER CAPITA							IRON FROM VEGETABLE PRODUCTS							IRON FROM ANIMAL PRODUCTS						
	1964 1966	1966 1968	1969 1971	1974 1976	1975 1977	1978 1980	1980 1982	1964 1966	1966 1968	1969 1971	1974 1976	1975 1977	1978 1980	1980 1982	1964 1966	1966 1968	1969 1971	1974 1976	1975 1977	1978 1980	1980 1982
Argentina	17.5	18.5	19.0	18.6	18.9	18.9	18.9	9.5	9.5	9.9	9.4	9.4	9.2	9.0	8.1	9.0	9.1	9.3	9.6	9.7	9.8
Bolivia	12.5	13.3	13.1	13.9	14.0	13.7	14.1	10.4	10.9	10.8	11.2	11.2	10.7	11.2	2.2	2.4	2.3	2.6	2.8	2.9	3.0
Brasil	13.6	15.1	13.7	12.2	13.1	12.8	12.3	12.1	12.5	12.0	10.5	10.3	10.0	10.4	1.5	2.6	1.6	1.7	2.8	2.9	1.9
Chile	16.6	17.2	16.4	17.0	16.7	17.0	17.0	13.6	14.0	13.2	13.8	13.7	13.8	13.9	3.0	3.3	3.2	3.2	3.0	3.2	3.1
Colombia	16.0	15.1	14.5	15.1	15.3	16.0	16.3	12.9	12.1	11.5	12.1	12.0	12.5	12.8	3.1	2.9	3.0	3.1	3.3	3.5	3.5
Ecuador	12.7	12.7	12.1	11.4	11.5	10.9	10.6	11.0	10.8	10.2	9.5	9.3	8.2	8.3	1.7	1.9	1.8	1.9	2.2	2.7	2.3
Guayana Fr.	14.7	14.1	15.7	15.4	14.1	15.0	20.0	10.1	9.8	10.9	11.0	9.9	10.0	13.7	4.7	4.3	4.9	4.4	4.2	5.0	6.3
Guyana	10.6	10.6	11.1	12.1	12.2	10.2	9.7	8.2	8.0	8.4	9.8	9.9	8.0	7.7	2.4	2.6	2.7	2.2	2.2	2.2	2.0
Paraguay	19.3	20.2	20.3	20.3	20.9	21.5	20.8	12.4	13.1	13.7	15.0	15.3	15.5	15.0	6.9	7.1	6.6	5.3	5.6	6.0	5.8
Perú	13.4	13.9	13.2	12.2	12.6	12.3	11.4	11.2	11.4	11.1	10.2	10.3	10.0	9.1	2.2	2.6	2.1	2.0	2.3	2.3	2.3
Surinam	10.4	10.9	10.8	10.5	11.3	11.5	11.8	7.7	8.1	8.1	7.7	8.3	8.8	8.7	2.7	2.7	2.7	2.9	2.9	2.7	3.1
Uruguay	12.6	12.8	14.0	13.5	13.4	13.3	13.1	6.0	5.7	6.5	6.4	6.3	6.5	6.3	6.6	7.0	7.6	7.2	7.0	6.8	6.8
Venezuela	12.6	12.8	12.1	11.6	12.6	13.0	12.7	9.3	9.4	8.5	7.9	8.6	8.6	8.4	3.4	3.4	3.5	3.7	4.0	4.4	4.3
Sud. América	14.4	15.3	14.4	13.6	14.2	14.0	13.7	11.5	11.7	11.3	10.5	10.4	10.2	10.4	2.9	3.6	3.1	3.2	3.8	3.8	3.3
Panamá	14.4	15.2	14.4	13.5	13.6	13.2	14.2	11.4	12.1	11.1	9.7	9.6	9.2	9.5	2.9	3.0	3.3	3.8	4.0	4.0	4.6

SOURCE: FAO, Production Yearbook, Vol. 38, Rome, 1984 (yrs. 1964-66, 1969-71, 1974-76, 1980-82).
FAO, Production Yearbook, Vol. 36, Rome, 1982 (yrs. 1966-68, 1975-77, 1978-80).

TABLE 34

DAILY AVAILABILITY OF THIAMIN PER CAPITA

(In Milligrams)

Country	TOTAL PER CAPITA							OF VEGETABLE ORIGIN							OF ANIMAL ORIGIN						
	1964-1966	66-68	69-71	74-76	75-77	78-80	80-82	1964-1966	66-68	69-71	74-76	75-77	78-80	80-82	1964-1966	66-68	69-71	74-76	75-77	78-80	80-82
Argentina	1,34	1,43	1,42	1,37	1,36	1,35	1,37	0,91	0,89	0,95	0,86	0,87	0,86	0,87	0,43	0,47	0,47	0,49	0,49	0,49	9,50
Bolivia	1,32	1,33	1,33	1,37	1,34	1,31	1,42	1,20	1,23	1,20	1,21	1,17	1,13	1,24	0,12	0,13	0,13	0,16	0,16	0,18	0,18
Brasil	1,11	1,23	1,12	1,01	1,09	1,05	1,00	0,98	1,02	0,98	0,86	0,83	0,80	0,84	0,13	0,25	0,14	0,15	0,25	0,26	0,16
Chile	1,69	1,66	1,66	1,69	1,68	1,74	1,77	1,47	1,50	1,42	1,46	1,46	1,49	1,52	0,23	0,24	0,24	0,23	0,21	0,24	0,26
Colombia	1,05	1,00	1,00	1,02	1,04	1,13	1,15	0,84	0,81	0,80	0,82	0,83	0,91	0,94	0,21	0,20	0,20	0,20	0,21	0,21	0,21
Ecuador	1,08	1,13	1,05	1,02	1,07	1,00	0,91	0,95	0,95	0,92	0,88	0,86	0,76	0,76	0,13	0,19	0,13	0,13	0,20	0,24	0,14
Guayana Fr.	1,05	1,05	1,13	1,10	1,03	1,09	1,40	0,79	0,77	0,83	0,82	0,76	0,77	0,99	0,26	0,26	0,29	0,29	0,27	0,33	0,42
Guayana	0,85	0,88	0,87	0,92	0,97	0,89	0,83	0,70	0,69	0,71	0,77	0,81	0,73	0,68	0,15	0,16	0,17	0,15	0,15	0,16	0,15
Paraguay	1,68	1,76	1,81	1,94	2,00	2,04	1,97	1,26	1,31	1,36	1,48	1,52	1,49	1,43	0,43	0,45	0,45	0,46	0,48	0,55	0,54
Perú	1,21	1,29	1,22	1,14	1,19	1,15	1,05	1,09	1,12	1,11	1,03	1,03	1,00	0,94	0,11	0,17	0,11	0,11	0,16	0,15	0,11
Suriname	0,80	0,85	0,82	0,82	0,88	0,88	0,87	0,68	0,72	0,68	0,65	0,70	0,72	0,70	0,12	0,13	0,14	0,17	0,18	0,16	0,17
Uruguay	1,15	1,14	1,23	1,22	1,19	1,18	1,14	0,64	0,63	0,69	0,69	0,68	0,69	0,67	0,50	0,51	0,53	0,53	0,51	0,49	0,47
Venzuela	1,03	1,04	1,02	1,04	1,12	1,15	1,11	0,80	0,82	0,79	0,76	0,83	0,80	0,78	0,23	0,22	0,24	0,28	0,30	0,35	0,33
Sud America	1,18	1,26	1,19	1,12	1,17	1,16	1,13	0,98	1,0	0,98	0,90	0,90	0,83	0,90	0,20	0,27	0,21	0,22	0,27	0,28	0,23
Panamá	1,02	1,12	1,03	0,94	0,97	0,94	0,98	0,88	0,94	0,86	0,78	0,77	0,75	0,79	0,14	0,17	0,16	0,16	0,20	0,20	0,19

SOURCE: Yearly Statistical Report for Latin America, CEPAL.

SOURCE: FAO, Production Yearbook, Vol 38, Rome, 1984 (yrs. 1964-66, 1969-71, 1974-76, 1980-82).
FAO, Production Yearbook, Vol 36, Rome, 1982 (yrs. 1966-68, 1975-77, 1978-80).

TABLE 35

DAILY AVAILABILITY OF RIBOFLAVIN PER CAPITA

(In Milligrams)

COUNTRY	TOTAL PER CAPITA							OF VEGETABLE ORIGIN							OF ANIMAL ORIGEN					
	1964 66	66 68	69 71	74 76	75 77	78 80	80 82	64 66	66 68	69 71	74 76	75 77	78 80	80 82	64 66	66 68	69 71	74 76	75 77	78 80
Argentina	1.49	1.59	1.61	1.63	1.62	1.62	1.66	0.45	0.44	0.47	0.44	0.43	0.43	0.43	1.04	1.12	1.14	1.18	1.18	1.20
Bolivia	0.75	0.79	0.79	0.84	0.84	0.82	0.87	0.49	0.52	0.51	0.53	0.52	0.49	0.51	0.26	0.27	0.28	0.31	0.32	0.33
Brasil	0.89	0.97	0.87	0.90	0.97	0.93	0.88	0.45	0.46	0.44	0.41	0.40	0.40	0.41	0.44	0.52	0.42	0.49	0.56	0.53
Chile	1.15	1.18	1.13	1.16	1.12	1.19	1.22	0.51	0.52	0.49	0.50	0.50	0.50	0.51	0.65	0.66	0.64	0.66	0.63	0.69
Colombia	1.09	1.06	1.05	1.01	1.03	1.09	1.10	0.48	0.46	0.45	0.47	0.48	0.50	0.52	0.62	0.66	0.60	0.53	0.56	0.58
Ecuador	1.06	1.07	1.02	0.97	0.99	0.99	0.95	0.54	0.51	0.48	0.44	0.44	0.39	0.39	0.51	0.55	0.54	0.53	0.55	0.60
Guayana Fr.	1.06	1.03	1.17	1.13	1.05	1.13	1.49	0.46	0.46	0.50	0.47	0.45	0.46	0.62	0.60	0.57	0.67	0.66	0.61	0.67
Guayana	0.86	0.88	0.88	0.81	0.84	0.87	0.80	0.32	0.31	0.31	0.33	0.35	0.31	0.29	0.53	0.57	0.57	0.48	0.49	0.56
Paraguay	1.21	1.24	1.23	1.20	1.25	1.32	1.27	0.55	0.57	0.59	0.63	0.64	0.64	0.61	0.66	0.67	0.64	0.58	0.61	0.67
Perú	0.93	0.95	0.96	0.91	0.89	0.85	0.86	0.50	0.51	0.51	0.47	0.47	0.45	0.41	0.42	0.44	0.45	0.44	0.42	0.41
Suriname	0.70	0.73	0.74	0.76	0.80	0.73	0.82	0.31	0.34	0.33	0.30	0.32	0.34	0.35	0.39	0.40	0.41	0.46	0.48	0.39
Uruguay	1.58	1.53	1.64	1.60	1.60	1.64	1.58	0.29	0.29	0.33	0.32	0.32	0.32	0.32	1.29	1.25	1.32	1.28	1.28	1.31
Venezuela	1.09	1.06	1.08	1.13	1.25	1.43	1.37	0.40	0.41	0.39	0.37	0.40	0.39	0.39	0.69	0.65	0.69	0.76	0.86	1.03
S. Am.	1.04	1.08	1.03	1.04	1.08	1.07	1.05	0.46	0.46	0.45	0.43	0.43	0.42	0.43	0.58	0.62	0.58	0.61	0.65	0.65
Panamá	0.93	1.00	0.99	0.97	0.99	0.94	1.06	0.45	0.49	0.46	0.41	0.40	0.39	0.40	0.47	0.51	0.53	0.57	0.59	0.56

SOURCE: FAO, Production Yearbook, Vol. 38, Rome, 1984 (yrs. 1964-66, 1969-71, 1974-76, 1980-82).
FAO, Production Yearbook, Vol. 36, Rome, 1982 (yrs. 1966-68, 1975-77, 1978-80).

TABLE 36

DAILY AVAILABILITY OF NIACIN PER CAPITA

(In Milligrams)

Country	TOTAL PER CAPITA							OF VEGETABLE ORIGEN							OF ANIMAL ORIGEN						
	1964 1966	66 68	69 71	74 76	75 77	78 80	80 82	1964 1966	66 68	69 71	74 76	75 77	78 80	80 82	1964 1966	66 68	69 70	74 75	75 77	78 80	80 82
Argentina	20.1	21.3	21.9	21.9	22.1	22.6	22.8	8.7	8.4	9.1	8.3	8.1	8.0	8.0	11.4	12.8	12.9	13.6	14.0	14.6	14.7
Bolivia	13.7	14.4	14.1	14.9	15.0	14.6	15.5	11.0	11.3	11.4	11.7	11.4	10.8	11.8	2.7	3.1	2.8	3.3	3.6	3.8	3.7
Brasil	11.3	13.7	11.7	10.6	12.3	12.5	11.2	9.5	9.8	9.5	8.1	7.9	7.8	8.1	1.8	3.9	2.2	2.4	4.4	4.7	3.0
Chile	16.6	17.5	16.8	16.9	16.4	17.7	18.5	12.3	12.7	11.9	12.1	12.1	12.3	13.2	4.3	4.8	4.9	4.8	4.3	5.4	5.3
Colombia	11.8	11.4	11.4	12.3	12.8	13.9	14.1	7.9	7.7	7.8	8.5	8.8	9.6	9.7	3.8	3.7	3.7	3.8	4.0	4.3	4.4
Ecuador	10.9	11.4	10.9	10.8	11.2	11.4	10.7	8.6	8.8	8.4	8.2	8.2	7.1	7.1	2.3	2.6	2.4	2.6	3.1	4.3	3.1
Guayana Fr.	15.5	15.3	17.5	17.1	15.9	17.2	22.0	8.4	8.3	9.2	8.7	7.9	8.0	11.1	7.1	7.0	8.3	8.5	8.1	9.1	10.9
Guayana	12.1	12.4	12.9	13.7	14.2	14.0	13.4	8.0	8.0	8.0	8.8	9.4	9.0	8.9	4.0	4.5	4.9	4.9	4.9	5.0	4.5
Paraguay	18.1	16.8	18.6	17.6	13.2	19.0	18.1	9.9	10.2	10.6	10.9	11.2	11.3	10.8	8.2	8.5	8.0	6.7	7.0	7.6	7.4
Perú	13.5	15.0	13.9	13.3	14.3	14.2	13.7	10.0	10.7	10.4	9.7	10.0	9.8	9.1	3.5	4.3	3.5	3.6	4.3	4.4	4.6
Surinam	13.2	14.1	14.0	14.1	14.8	15.3	15.8	8.7	9.3	9.1	8.6	9.2	9.6	9.8	4.5	4.7	4.9	5.5	5.5	5.7	6.0
Uruguay	17.0	17.5	19.4	18.7	18.4	17.9	17.7	6.1	5.9	6.7	6.5	6.5	6.5	6.1	10.8	11.6	12.7	12.2	11.9	11.4	11.5
Venezuela	11.4	11.9	11.6	12.0	13.2	14.3	14.3	6.5	7.0	6.5	6.3	7.0	7.2	7.1	4.9	4.9	5.1	5.7	6.2	7.0	7.2
S. Amer.	13.2	14.7	13.6	13.0	14.1	14.4	13.8	9.2	9.4	9.2	8.5	8.4	8.4	8.6	4.0	5.3	4.3	4.5	5.6	6.0	5.2
Panamá	12.9	13.8	13.7	13.5	13.4	12.9	15.1	8.8	9.5	9.2	8.7	8.6	7.8	8.1	4.1	4.3	4.4	4.8	4.9	5.0	7.0

SOURCE: FAO, Production Yearbook, Vol. 38, Rome, 1984 (yrs. 1964-66, 1969-71, 1974-76, 1980-82).
FAO, Production Yearbook, Vol. 36, Rome, 1982 (yrs. 1966-68, 1975-77, 1978-80).

TABLE 37

DAILY AVAILABILITY OF FATS PER CAPITA

(Triennial Averages in Grams)

	TOTAL PER CAPITA				OF VEGETABLE ORIGEN				OF ANIMAL ORIGEN			
	1964 1966	1969 1971	1974 1976	1980 1982	1964 1966	1969 1971	1974 1976	1980 1982	1964 1966	1969 1971	1974 1976	1980 1982
Argentina	100.0	113.3	116.0	121.8	33.9	42.5	41.8	43.7	66.0	70.8	74.6	78.1
Bolivia	35.6	38.0	41.1	44.2	13.7	13.8	15.9	15.3	21.9	24.3	25.1	28.8
Brasil	45.2	48.4	49.4	50.2	20.1	23.0	21.7	22.9	25.1	25.5	27.7	27.3
Chile	54.8	59.8	53.4	58.7	23.8	24.8	22.8	28.4	31.0	35.0	30.6	30.3
Colombia	40.9	42.7	45.2	48.4	16.7	19.4	20.9	22.9	24.3	23.3	24.3	25.4
Ecuador	41.6	45.2	48.3	52.5	18.7	21.3	24.4	26.6	22.9	24.0	24.0	25.9
Guayana Fr	56.1	61.1	60.6	79.0	17.5	19.6	20.1	20.8	38.6	42.5	40.6	58.2
Guayana	45.4	48.2	46.4	42.8	25.9	27.5	28.7	25.5	19.5	20.6	17.7	17.3
Paraguay	70.6	74.3	72.0	77.6	26.4	30.4	34.0	34.1	44.2	43.9	38.0	43.5
Perú	43.2	42.4	41.1	41.6	20.1	20.7	22.2	23.0	23.1	21.6	18.8	18.6
Surinam	41.9	44.9	49.0	52.6	29.0	28.6	29.9	33.0	12.9	16.4	19.0	19.6
Uruguay	101.8	110.4	109.1	105.3	19.0	17.8	24.3	25.0	82.8	92.6	84.8	80.3
Venezuela	56.0	57.4	61.3	68.5	31.1	31.5	31.6	33.1	24.9	25.9	29.7	35.4
S America	53.8	57.4	58.0	59.9	22.2	25.2	24.8	26.3	31.6	32.2	33.2	33.6
Panamá	47.7	53.3	56.7	60.4	21.1	25.2	28.4	29.9	26.6	28.1	28.3	30.6

SOURCE: FAO, Production yearbook Vol. 38 1984.

TABLE 38

PUBLIC SECTOR HEALTH EXPENDITURES

(% of GDP at current prices in local currency)

Country	1974	1975	1976	1977	1978	1979	1980	1981
Argentina	0,6	0,5	0,7	0,4	0,4	0,3	0,3	-
Bolivia	1,0	1,0	1,0	1,0	1,1	1,1	-	-
Brasil	1,1	1,1	1,3	1,4	1,5	1,4	1,3	-
Colombia	0,7	0,8	0,7	0,7	0,8	0,8	0,9	-
Chile	2,5	2,4	2,1	2,2	2,2	1,9	2,1	2,0
Ecuador	0,9	0,9	0,9	0,9	0,9	0,9	1,1	1,1
Guyana	2,0	2,2	2,6	-	-	-	-	-
Paraguay	0,3	0,3	0,3	0,3	0,3	0,4	0,4	-
Perú	0,9	0,9	1,0	1,0	0,9	0,9	0,8	-
Uruguay	1,4	0,9	0,9	0,9	1,2	0,9	1,0	0,9
Venezuela	1,8	2,1	2,2	2,2	2,1	1,8	1,9	-
Panamá	4,2	4,6	4,2	4,6	4,5	4,6	-	-

SOURCE: Yearly Statistical Report for Latin America, CEPAL.

TABLE 39

HOSPITAL BEDS PER 1000 POPULATION

Country	1960	1965	1970	1975	1980	1981
Argentina	6,4	6,4	5,6	-	5,4	-
Bolivia	1,8	2,4	2,2	2,2	1,8	-
Brasil	3,2	3,4	3,7	3,9	4,2	-
Colombia	2,8	2,6	2,3	1,9	-	-
Chile	3,7	4,2	3,8	3,7	3,4	3,3
Ecuador	1,9	2,3	2,3	1,9	-	-
Guyana	5,9	6,4	4,8	5,0	-	-
Paraguay	2,5	2,1	1,7	1,2	1,0	1,0
Perú	2,4	2,5	2,2	2,2	1,7	-
Uruguay	5,5	5,1	5,9	4,2	6,0	-
Venezuela	3,5	3,2	3,1	2,8	2,7	2,8
Panamá	3,8	3,5 1/	3,3 1/	3,7 1/	3,8 1/	3,7 1/

SOURCE: CEPAL, Yearly Statistical Report, 1984.

1/ Includes beds for newborn infants.

TABLE 40

POPULATION PER PHYSICIAN

Country	1960	1965	1970	1975	1980	1981
Argentina	681 1/	-	528	535	388	-
Bolivia	5218 2/	-	2018	3387 3/	1952	-
Brasil	2214	2392 2/	2081	-	1278 4/	-
Colombia	2603	2478	2237	2017	1773	1727
Chile	1647 3/	1731 3,2/	2149 3/	2342 3/	1141 5/	2738 3/
Ecuador	2665 4/	3040 4/	2906 4/	2144 4/	-	-
Guyana	3710	-	-	6592 6/	-	-
Paraguay	3606 1/	1668 2/	892	1207 6/	-	-
Perú	1962 1/	2118 2/	1643	1391	1311	1236
Uruguay	2180 3/	873 2/	915	710	-	534
Venezuela	1487	1316 2/	1120	931	925	889
Panamá	2756	2125 2/	1735	1362	1074	1012

SOURCE: CEPAL, Yearly Statistical Report, 1984

1/ Calculated on the number of physicians registered, even though not all of them reside or work in the country.

2/ Corresponds to 1964.

3/ Calculated on the number of physicians in the Ministry of Health only.

4/ Calculated on the number of physicians that work in health establishments.

5/ Calculated on the number of physicians inscribed in the Colegio Medico and that work in the country.

6/ Physician's figures unknown.

TABLE 41

INDEX OF QUALITY OF LIFE[1]

Country	Index 1970	Index 1980	Variation % (1980 ÷ 1970)- 100
Argentina	85	88	3,5
Bolivia	45	51	13,3
Brasil	64	69	7,8
Colombia	71	71	0,0
Chile	75	85	13,3
Ecuador	67	72	7,7
Guyana	79	85	7,6
Paraguay	69	74	7,2
Perú	68	69	1,5
Uruguay	88	88	0,0
Venezuela	77	81	5,2
Panamá	79	83	5,1

SOURCE: UNICEF, Dimension of poverty in L.A. and the Caribbean.

1/ Function of infant mortality rate, life expectancy, and the literacy rate on a scale of 1-100, with equal weighting for each indicator.

TABLE 42

LIFE EXPECTANCY AT BIRTH (IN YEARS)

Country	1960 1965	1965 1970	1970 1975	1975 1980	1980 1985
Argentina	65,5	66,0	67,3	68,7	69,7
Bolivia	43,5	45,1	46,7	48,6	50,7
Brasil	55,9	57,9	59,8	61,8	63,4
Colombia	56,2	58,4	60,4	62,2	63,6
Chile	58,0	60,6	63,8	67,6	69,7
Ecuador	54,7	56,8	58,9	61,4	64,3
Guyana	62,4	65,2	67,9	69,1	70,5
Paraguay	56,6	59,6	63,1	64,1	65,1
Perú	49,1	51,5	55,5	56,9	58,6
Suriname	61,5	63,6	65,5	67,2	68,8
Uruguay	68,4	68,6	68,8	69,6	70,3
Venezuela	61,0	63,8	66,2	67,7	69,0
Panamá	62,0	64,3	66,3	69,2	71,0

SOURCE: Yearly Statistical Report, CEPAL, 1984 (Table 8).

TABLE 43

INFANT MORTALITY RATES** FOR SOUTH AMERICA
(1960-1983)

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Argentina	62.4	59.4	59.1	61.7	60.0	56.9	53.5	58.3	59.6		56.0		
Bolivia	170.0(b)				76.7	76.5	77.3			138.2	154.0*		161(f)
Brasil	120.0(b)										110*		
Chile	125.1	111.2	114.6	111.0	114.2	101.7	102.8	91.6	91.6	87.5	78.8	77.8	76.5
Colombia	99.8	89.6	89.6	88.2	83.3	82.4	80.0	78.3	70.4	91.3	70.0*	45.3	53.5
Ecuador	100.0	96.2	95.9	94.6	89.9	93.0	90.4	87.3	87.9	91.0	76.6	78.5	81.9
Paraguay	90.7				40.3	41.5	39.9	36.7	51.8	32.9	33.3	38.6	84.0
Perú	92.1	93.2	84.9	88.5	83.5	74.0	67.0	61.9	135(g)		65.1*	53.8	58.2
Uruguay	47.4				44.6	49.8	43.3	50.0	53.9	48.7	42.6	40.6	45.4
Venezuela	53.9	52.9	47.0	47.9	49.3	47.7	46.5	41.4	45.5	46.9	48.7	49.7	52.6

**deaths of children under 1 year of age per 1000 live births.

Ref.: Demographic Yearbook. Annuarie Demographique 1983. United Nations (1961-1983). Department of International Economic and Social affairs. Statistical Office Thirthy Fifth issue.

* Dimensiones de la pobreza en América Latina y El Caribe. Sanfuentes, A., Lavados, H. Editor Galdames, Francisco. UNICEF, 1982.

(a) World Statistics in brief United Nations Statistical packetbook. Eighth edition United Nations New York 1983; (b) Estado Mundial de la Infancia 1986. Grant J. Director Ejecutivo UNICEF, USA; (c) Statistics on Children in UNICEF. Assisted Countries. UNICEF April, 1985; (d) Statistics on children in UNICEF Countries UNICEF. Mayo 1984; (e) La Mortalidad Infantil en Bolivia CELADE, Naciones Unidas, Serie OI N°38, Stgo., Chile 1985; (f) CELADE La mortalidad en los primeros años de vida en países de la América Latina, Bolivia 1971/72. Serie A N° 1025, Feb. 1977; (g) Behm H. La mortalidad en los primeros años de vida en países de la América Latina Perú 1967/1968, CELADE Serie A N° 1029, Mayo 1977.

TABLE 43 cont).

INFANT MORTALITY RATES** FOR SOUTH AMERICA
(1960-1983)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982[a]	1983
Argentina					44.6	40.8	38.5	33.2	44(d)	47.0	36(b)
Bolivia				153(e)	151.0	158.0*		130(c)	130	138.0	125(b)
Brasil					95.0	92.0*		79.0	62.2	82.0	70(b)
Chile	65.8	65.2	55.6	59.6	52.8	40.1	37.9	37.9	33.0	27.0	23.6
Colombia	52.9	50.1	46.7	46.6	39.5	98.0*	59.0	59.4	60(d)	59.0	50(b)
Ecuador	75.8	70.2	65.8	72.1	70.9	34.8	86.8	86.0	9.0(d)		70(b)
Paraguay	84.3	87.0	84.9		53.0	84.0*	96.6	48.6	46(d)	49.0	45(b)
Perú					107.0		93.5	104.9	90(d)	95.2	140.6
Uruguay	50.2	48.1	48.8	45.9	48.5	46.0*	).6	37.6	33.4	30.2	30(b)
Venezuela	53.8	46.0	43.7	43.0	39.4	35.5	33.7	45.0	41(d)	45.0	39(b)

**deaths of children under 1 year of age per 1000 live births.

Ref.: Demographic Yearbook. Annuarie Demographique 1983. United Nations (1961-1983). Department of International Economic and Social affairs. Statistical Office. Thirthy Fifth issue.

* Dimensiones de la pobreza en América Latina y El Caribe. Sanfuentes, A., Lavados, H. Editor Galdames, Francisco, UNICEF, 1982.

(a) World Statistics in brief United Nations Statistical packetbook. Eighth edition United Nations New York 1983; (b) Estado Mundial de la Infancia 1986. Grant, J. Director Ejecutivo UNICEF, USA; (c) Statistics on Children in UNICEF. Assisted Countries. UNICEF April, 1985; (d) Statistics on children in UNICEF Countries UNICEF. May 1984; (e) La Mortalidad Infantil en Bolivia CELADE, Naciones Unidas, Serie OI N°38, Stgo., Chile 1985; (f) CELADE La mortalidad en los primeros años de vida en países de la América Latina, Bolivia 1971/72. Serie A N° 1025, Feb. 1977; (g) Behm, H. La mortalidad en los primeros años de vida en países de la América Latina Perú 1967/1968, CELADE Serie A N° 1029, Mayo 1977.

APPENDIX B

Anthropometric Indicators

Anthropometric Indicators

Since nutrition programs are aimed at improving the nutritional status of groups of persons, indicators of nutritional status must be selected that can be widely used, and that allow comparisons between the impact of different interventions. A causal model specifies that a change in a causal factor should in some finite time period lead to a change in an individual's nutritional status, all other things equal. But, changes in nutritional status are difficult to measure because they cannot be observed directly. According to Habicht et al. (1979) "nutritional status is the expression of nutriture* in a specific variable." Therefore, the variable or variables that reflect nutritional status must always be specified (e.g., nutritional status as reflected in height, or in growth, etc.). The difference between nutritional status and its indicator is that the indicator also reflects the influences of nonnutritional factors (e.g., genetics). An indicator is not necessarily a direct measurement of a phenomenon, but rather a practical way of evaluating its magnitude (Behar, 1973).

The following sections are an overview of indicators of nutritional status as they may be used within an evaluation method.

Indicators of Nutritional Status

Attempts to evaluate nutritional status have used a number of methods and measurements, many of which are still subject to criticism, partial acceptance, refinements, and continuous evaluations. No one method has been accepted as an optimum indicator of nutritional status, in particular for mild-moderate cases of malnutrition, and investigators are still searching for indicators which are adequate, simple, precise, and low cost.

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*Nutriture: The state resulting from the balance between supply of nutrition on the one hand and the expenditure of the organism on the other.

Nutrition: The process by which the organism uses food, or anything normally ingested through digestion, absorption, transport, storage metabolism and elimination for purposes of producing and maintaining life, growth, normal functioning of organs and producing energy (Habicht et al., 1979).

Up to now, the measurements most commonly used to evaluate nutritional status have been direct measurements, including anthropometry, clinical signs, and biochemical tests; and indirect measurements, including food intake or food disappearance, food balance sheets, and vital statistics.

Balance sheets and vital statistics are gross estimates of a population's possible nutritional status, and are not useful in determining an individual's nutritional status. As these data are being based on aggregate statistics, they may mask changes in nutritional status of the population. They are important, nevertheless, because they may reveal the overall magnitude of nutritional problems.

Vital statistics most frequently used in nutrition include age-specific and general mortality rates, proportion of low-birthweight babies, population growth rate, life expectancy at birth, and coverage of health services. The interpretation of vital statistics, however, is often complicated by non-nutritional factors. It is further complicated by questions about accuracy of the data and how representative (i.e., how much underreporting is there?). In Panama, for example, one finds relatively low mortality rates, yet past nutritional surveys accuse a level of preschool malnutrition in the range of 50-70 percent. According to Beaton and Bengoa (1976), low mortality rates do not necessarily mean that the survivors are healthy.

Food balance sheets use national data, and do not account for unequal distribution among regions, cities, households and individuals.

Food intake data are also a rough estimate of nutritional status. Even if food intake data were quite accurate in reflecting an individual's intake, they are not an exact measurement of nutritional status because individual requirements vary due to differences in metabolism, level of physical activity, and incidence of infections and diseases. An intake which is adequate for one person may not be adequate for another, and may not be adequate for the same person at all times. According to Wolanski (1974), the same level of nutrient intake for one person can produce more than one nutritional state depending on the ecological situation of the person at different times. In addition, procedures to obtain data on food intake are subject to measurement errors, and thus are recommended mainly for use with groups of people rather than individuals.

Biochemical tests can provide objective information about an individual's nutritional status and can frequently detect deficiencies in the pre-clinic

stages. However, a number of procedural, logistic and cost difficulties are involved in biochemical tests.

First, most tests must be conducted in a sophisticated laboratory. Second, most biochemical tests are done on urine or blood samples and, aside from the problems of transporting samples to the laboratory, variations in the sample collection procedures may affect results of the tests. For example, the concentration of nutrients and metabolites in the urine may vary depending on the time of the day, the last time a meal was eaten, the amount of liquid drunk, etc. In addition, blood levels of nutrients tend to reflect recent food intake rather than actual nutritional status. The presence of infection or other conditions may also confound the results. There is, in addition, a lack of data on the degree to which specific cut-off levels of biochemical variables are related to the prevalence and incidence of health-related conditions (Nichaman, 1980). Lastly, when a deficiency is mainly related to total energy, and is therefore balanced, biochemical changes rarely become apparent (Gurney, 1979).

Eleven clinical signs, suggestive of protein-calorie malnutrition of early childhood have been listed (Jelliffe, 1966):

> Oedema, dyspigmentation of the hair, easy pluckability of the hair, thin sparse hair, straight hair, muscle wasting, depigmentation of the skin, psychomotor change, moon-face, hepatomegaly, flaky-paint dermatosis.

All have the disadvantage of being subjective and difficult to standardize and express quantitatively. Most are not completely specific to protein-calorie malnutrition and may appear only after the malnutrition has reached a certain level of severity. In addition, these signs are not constantly present, especially in mild and moderate protein-calorie malnutrition, and vary in prevalence from one part of the world to another, depending on the interaction of many ecological factors, and whether the kwashiorkor or the marasmus is the main abnormality in the community (Jelliffe, 1966).

Physical signs of nutritional deficiency are often unreliable. Fomon (1976) described an example of the low reliability of specific physical signs of nutritional deficiency: "In Panama in 1967 two well-trained individuals examined 895 adult subjects. Incidence of abnormal hair, filiform papillary atrophy, follicular hyperteratosis, swollen red gums, angular lesions, glossiti

and goiter was noted by each examiner. With respect to subjects classified as having abnormal hair, agreement between the two examiners occurred in only 31 percent of the cases. Agreement between examiners with respect to other clinical signs was generally not better than 50%."

There is widespread belief that the preschool child adapts to an inadequate nutrient intake by slowing his growth, thereby, in the early stages, maintaining normal values for the other measurable characteristics, such as biochemical or physical changes (Wray and Aguirre, 1969). Therefore, anthropometry is considered the most useful indicator of nutritional status in young children, and in certain adult populations as well. Anthropometry as the foundation of nutrition assessment is dependent on the availability of reference population data with which to compare the results in individuals and communities. Such reference values are often misused as norms or as the bases for absolute cut-off points to classify individuals as malnourished. Furthermore, different types of anthropometric measurements and norms have been used by different investigators in several countries without any agreement having been reached on interpretation of the ideal measurement or even the plausibility of the existence of norms. There is controversy among experts with respect to the sensitivity of the indicators used to classify mild or moderate cases of malnutrition, and to detect small changes in nutritional status. Care is needed in the interpretation of data. Although nutritional differences between individuals or populations may lead to anthropometric differences, the existence of anthropometric differences between individuals or populations does not necessarily imply nutritional differences (Goldstein, 1974).

The following sections discuss different anthropometric measurements, their usefulness as indicators of nutritional status, and some considerations in selecting indicators of nutritional status for evaluating the nutritional impact of interventions.

A. Anthropometric Measurements Commonly Used as Indicators of Nutritional Status

1. Weight for Age

The classification of nutritional status based on the adequacy of the child's present weight for the "expected" weight for his age* was suggested

* The "expected" weight for a specific age is the 50th percentile of the values obtained from a sample of a population in good health whose distribution is assumed to be the normal probability distribution.

by Gomez, (Gomez, et al. 1956). The classification is based on clinical symptoms and the realization that those children with severe malnutrition never had weights above 60 percent of the expected weight for age. Kielmann and McCord (1978) have also observed that in children aged 1-36 months, child mortality doubled with each 10 percent decline below 80 percent of the Harvard weight median.

The Gomez classification groups children into four categories:

a) Normal or obese (weights above 90 percent of the reference for their age);

b) Grade I malnutrition (weights between 90 percent and 76 percent of the reference for that age);

c) Grade II malnutrition (weights between 75 percent and 61 percent of the reference for that age); and

d) Grade III malnutrition (weights fall below 61 percent of the reference for that age).

The advantage of this classification is that it allows one to establish certain priorities, based on the severity of the nutritional problem (which is obtained from the adequacy of the child's weight with respect to the norm for that age). However, the classification also runs into the following problems:

a) It does not distinguish between normal and obese children, a factor of growing interest in recent times. However, this can be readily solved by adding a fifth category, obese or overweight (weights above 110 percent of the reference for their age).

b) It assumes that all children of the same age should weigh the same, no matter what their size. Consequently, those children who weigh less simply because they are shorter (no matter why they are short) are classified as malnourished in some degree (false positives); conversely, those children who weigh more because they are taller may be classified as obese.

c) It assumes that all ethnic groups should weigh the same at the same age, regardless of different body builds. However, with wider bony frame and greater proportion of trunk length to leg length will have higher relative body weights for the same stature (Buzina and Uemura, 1974).

d) The daily variation in an individual's weight is large (Dean, 1965). For this reason, some experts argue that weight may be an adequate indicator for extreme cases of malnutrition, but that it is not sensitive enough to detect mild or moderate cases of malnutrition, or small changes in nutritional status.

e) Many times the exact age of the child is not known, particularly in developing countries where registry of birth is still not widely spread

f) It does not indicate whether the malnutrition is of recent origin (acute), or more long term (chronic). Neither does it indicate whether the child is presently consuming an inadequate diet, or whether the weight loss was due to a severe infection or a previous inadequate diet that has recently been corrected.

g) The limits dividing the different degrees of nutritional status automatically establish that, in a statistically normal population, a certain percentage of the population will be classified as having some degree of malnutrition. More specifically, statistical normality dictates that 75 percent of the norm (that is, of the 50th percentile) is equal to the 3.75th percentile, that is, 3.75 percent of a normal population will have weights below 75 percent of the norm--and consequently, will be classified as either grade II or grade III malnutrition. This means a lot of care should be used in the interpretation of data to void false conclusions.

h) Using this classification it might be very difficult to demonstrate statistically significant changes in nutritional status of individuals (or populations)for evaluation purposes.

The Gomez classification has received some slight modifications in recent years: Bengoa, in 1970, suggested that any child with edema should be classified as grade III, no matter what the child's weight; Wellcome and his working party also utilized a combination of percentage of weight for age and presence of edema, as detailed in Table 1. However, none of these modifications have any bearing on the problems discussed above.

Table 1

CLASSIFICATION OF SEVERE PROTEIN-CALORIE MALNUTRITION
ACCORDING TO WELLCOME WORKING PARTY

Weight (% of Reference)	Presence of Edema	
	Yes	No
80-60	Kwashiorkor	Undernourished
<60	Marasmus-Kwashiorkor	Marasmus

SOURCE: Waterlow, 1972.

In recent years, weight-for-age has been receiving increased recognition as an indicator of nutritional status for longitudinal individual evaluations, and losing its roll as an indicator of actual mild to moderate nutritional status in a cross-sectional sample.

2. Height for Age

The classification of nutritional status according to "expected" height for age is based on the concept that socioeconomic and environmental factors have a greater impact on an individual's height than genetic factors, particularly during the preschool period. This is illustrated by the secular trend towards increased heights. For example, comparisons among preschool children who were presumably well-nourished but of different ethnic backgrounds indicated a difference of about 3 percent in height measurements. Comparisons between these children and others, some of whom had similar ethnic backgrounds, but who lived in the poor, urban and rural regions of developing countries indicated differences in height measurements approaching 12 percent (Habicht, et al., 1974). Furthermore, Vahlquist (1979) states that length at birth is poorly correlated to height in adult life (for boys, $r = .25$), whereas at 2 years of age the correlation is much higher (for boys, $r = .79$). This must mean that during the first few years of life there is considerable "crossing over" between different growth channels, which subsequently diminishes. Since height, once attained, cannot be lost, height is considered a more stable measurement of growth than weight.

The effect of unfavorable conditions on growth seems to depend upon the duration and the severity of the insult and the age at which it occurs. A child who suffers for a short period of time from an illness or starvation is able to return to, or at least approach, his regular course of growth when conditions improve. In doing this, his initial growth velocity upon recovery is above that normally to be expected for children of his age, or even his skeletal maturity. This higher-than-normal velocity has been named catch-up growth. Catch-up growth may or may not restore the child's condition to normal. When treatment is incomplete or not very effective, the child may resume growth at a normal but not supranormal velocity (Eveleth and Tanner, 1976). Therefore, the magnitude of the deficit of height for age can be considered a measure of the duration of the bout of malnutrition.

However, there are limitations to the practical application of this classification, for the following reasons:

a) Changes in height in periods of less than 6 months are very small, making it difficult to obtain accurate information with respect to reduction in growth.

b) A significant reduction in height (about 10 percent) tends to occur when a child's weight is already 25 percent below the norm.

c) Children's body measurements tend to have a marked resemblance to the parent's body measurements after the age of 2 years, showing more the effect of their own genes than the effect of the uterine environment in which they grew (Eveleth and Tanner, 1976). From 3 to 9 years, correlation coefficients of height between parents and offspring are slightly under 0.5 and have been made the basis of standards for childhood height allowing for height of parents, according to Tanner, Goldstein and Whitehouse, 1970 These authors note that a short child with short parents should be viewed as being less at risk than a child who is short but whose parents are tall. Even though nutritional and environmental factors may be important determinants of growth, the organism may impose its own limits.

d) A child's length at birth also seems to be important. Longitudinal studies on white children have shown that infants who were short at birth remained short (Garn and Shaw, 1977).

e) Often a child's exact age is not known, which makes it difficult to classify the child precisely.

Seasonal variations in the rate of increase in children's height and weight occurs in both temperate and tropical climates and is considerable in some tropical regions. These seasonal differences should be recognized because they are significant in terms of evaluating impact of interventions (Eleveth and Tanner, 1976).

3. Weight for Height

Weight as a percentage of expected weight for height, offers several advantages, such as not requiring knowledge of a child's exact age. Thus this measure offers a good indication of the actual nutritional status of the child. Weight for height seems to be nearly independent of age between 1 and 10 years; at a given height, both median weight and range of weight are

independent of the age of the children concerned. Weight for height also may be relatively independent of ethnic group, particularly between 1 and 5 years. At ages of less than 1 year, an older child tends to be heavier than a younger child of the same height (Waterlow et al. 1977). Nevertheless, classification errors may occur if different body builds are not considered separately, in particular in persons more than 5 years old, since people with longer leg length relative to trunk length will have smaller body weights for the same stature (Buzina and Uemura, 1974)

The fact that two measurements, height and weight, are involved in this classification, each with its own requirements for precise instruments and measuring techniques, slightly reduces the simplicity and reliability of this indicator. Further, this classification does not identify those children who suffered past or chronic malnutrition and, therefore, may have low weight and low height, although proportional.

4. Weight for Height and Height for Age

The comparison between these two indicators may help solve some of the identification problems mentioned previously. For example, the joint use of weight for height and height for age allows children to be classified into several categories that differentiate between past and actual malnutrition:

a) Normal children (or obese).

b) Children who do not presently suffer from malnutrition but who once did (as evidenced by their low height for age, stunted).

c) Children who are presently malnourished, but whose heights are adequate for their age, which indicates a recent onset of malnutrition (acute malnutrition). These children may be classified as underweight.

d) Children who are presently malnourished and have low height for age, which indicates a long duration of malnutrition (acute and chronic)

Table 2 illustrates the four categories identified above. In terms of program evaluation, it should be noted that no matter how successful an intervention is in improving the nutritional status of a population, it will not be able to change stunted children into normal children.

Naturally, the values for normal and low used for the relationship weight/height and height/age should be some percentage of the reference values.

Table 2

CLASSIFICATION OF NUTRITIONAL STATUS

Weight for Height	Height for Age	
	Normal	Low
Normal	Normal	Past Malnutrition (Stunted)
Low	Acute Malnutrition (Underweight)	Acute and Chronic Malnutrition (Stunted and Underweight)

Seoane and Latham, 1971.

For example, 90 percent of the reference value for height for age, and 80 percent of the reference value for weight for height could be the limit between normal and low. Several grades, such as above normal, grade I, grade II, etc., for each of the relationships could also be used, thus creating a multi-cell table as illustrated in Table 3.

The biggest problem with this classification is its reliability. Not only are there two measurements involved, (weight and height), with their respective measurement errors, but there is also the difficulty of obtaining the child's exact age.

5. Weight for Height, Weight for Age, and Height for Age

The World Health Organization and the Pan American Health Organization have recently recommended that a combination of all three indicators be used. They note that there are only 9 meaningful indicators out of the 27 possible combinations (Table 4). However, none of the 9 recommended combinations allows for all low values, that is, a child who is presently underfed or malnourished, in addition to having a past history of malnutrition. Furthermore, the recommendations stress that:

- all children with a normal weight for height are not malnourished whatever the classification of the other two indicators;
- all children with a low weight for height are underfed, some more than others depending on the values of the other two indicators, and
- all children with a high weight for height are overfed in varying degrees depending on the values of the other two indicators.

However, the ultimate shape and size a child attains will be the result of the continuous interaction between environmental and genetic factors. In some instances, genetics and physiological factors place an upper limit on the effects of an optimum environment on the growth of a child, as for example, a child who has two short parents.

For these reasons, a child's absolute position with regards to the reference values of weight for age, height for age, and even weight for height is of secondary importance compared with the magnitude and direction of the child's growth. Only sequential measurements for some months or even years will indicate whether the child is achieving his growth potential. For example,

Table 3

EXAMPLE OF 4x4 CLASSIFICATION ACCORDING TO DEGREES OF MALNUTRITION AND RETARDATION (REDUCTION IN RATE OF GROWTH)

(Number of Children)

		Retardation			
	Grade	0	1	2	3
	% Expected Height for Age	>95%	95-90%	90-85%	<85%
Grade Malnutrition	% Expected Weight for Height				
0	>90				
1	90-80				
2	80-70				
3	<70				

SOURCE: Waterlow, 1972.

Table 4

WHO/PAHO RECOMMENDATIONS FOR COMBINATIONS OF ANTHROPOMETRIC INDICATORS

Combinations of indicators	Interpretation of nutritional status
1. Normal wt/ht + low wt/age + low ht/age.	Normally fed with past history of malnutrition.
2. Normal wt/ht + normal wt/age + normal ht/age	Normal.
3. Normal wt/ht + high wt/age + high ht/age	Tall, normally nourished.
4. Low wt/ht + low wt/age + high ht/age	Presently underfed ++
5. Low wt/ht + low wt/age + normal ht/age	Presently underfed +
6. Low wt/ht + normal wt/age + high ht/age	Presently underfed
7. High wt/ht + high wt/age + low ht/age	Obese ++
8. High wt/ht + normal wt/age + low ht/age	Presently overfed with past history of malnutrition
9. High wt/ht + high wt/age + normal ht/age	Overfed but not necessarily obese

SOURCE: World Health Organization/Pan American Health Organization, 1979.

a child below the tenth percentile point in weight for age might be thought of as undernourished, but as many as one in 10 normal children will be below this level (Stuart et al., 1959). A low-birthweight baby will probably always remain small and underweight for his age, and yet have an adequate growth pattern. A child whose weight is well below the mean for his age but who is gaining steadily will not be a cause of concern, while on the other hand, a child whose weight is above the mean but who has been "fattened" for 9 months may require admission to a hospital for incipient kwashiorkor (Morley, 1976).

6. Mid-upper Arm Circumference

There is still a lot of controversy regarding the usefulness of this measurement as an indicator of nutritional status. The measurement is relatively independent of age in children 1-5 years old (i.e., it changes little with age); requires no difficult, heavy, or expensive equipment; and is quite simple to carry out. It has been shown to be useful in the quick screening of those children who are malnourished but whose exact age is not known (Gurney, 1966; Burgess and Burgess, 1969). However, its sensitivity for identifying mild to moderate cases of protein-calorie malnutrition has not been fully established, although Brozek (1974) claims that it is a more dependable criterion than weight in detecting changes in nutritional status. However, because the measurement is so small, the allowable margin of error is also quite small, which reduces its statistical reliability.

The relationship of arm circumference to height has been suggested, because it is also independent of age. It offers, however, the same information as weight/height, although it is less sensitive and less exact (Waterlow, 1972).

7. Head Circumference

This measurement has been suggested by some experts as an indicator of nutritional status, because of the rapid growth of the head during the first year of life, in order to accommodate the rapid growth of the brain.

A variation of this measurement includes the relationship between head and chest circumference: in a well-nourished child under 6 months of age, the chest circumference is usually smaller than the head circumference. At 6 months of age, the relationship changes, and the chest circumference becomes greater than the head circumference. Jelliffe (1966) has suggested that a ratio less than 1 between chest and head circumference could be used as an indicator of malnutrition in children over 6 months of age.

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APPENDIX C

Nutritional Status of Preschoolers in Central America and Panama by Age

Table C-1. Nutritional Status of Preschoolers in Central America and Panama by Age of Preschoolers

Age in Months	Under-Weight*	Chronic**	Malnutrition***		
			mild	moderate	severe
		Guatemala: 1965			
0-5	4.5	12.3	21.2	6.1	1.5
6-11	27.6	33.4	38.8	20.4	5.1
12-23	46.3	68.9	48.2	24.4	4.2
24-35	38.2	55.8	53.3	17.4	5.4
36-47	31.8	62.8	50.8	23.8	1.1
48-59	32.9	68.8	56.9	17.2	1.1
Total	32.7	56.3	48.4	19.6	3.0
		Costa Rica: Urban and Rural			
0-5	3.8	4.0	15.4	5.8	0.0
6-11	13.2	13.2	31.3	7.2	1.2
12-23	20.2	31.5	39.6	10.4	0.7
24-35	18.6	20.8	37.8	6.4	0.6
36-47	16.3	24.3	35.2	9.7	0.6
48-59	15.8	31.7	42.1	9.3	1.1
Total	16.3	24.1	36.4	8.5	0.8
		Panama: 1967			
0-5	0.0	7.3	17.8	0.0	0.0
6-11	12.0	18.2	33.3	5.8	1.4
12-23	17.3	28.2	45.7	10.3	0.0
24-35	13.3	16.6	34.2	6.1	0.9
36-47	11.8	29.7	48.8	4.7	0.8
48-59	17.0	24.8	44.2	7.5	0.0
Total	13.5	23.5	40.5	6.5	0.5

*defined as low weight for age (below 2 standard deviations of WHO recommendation)

**defined as low height for age (below 2 standard deviations of WHO recommendation)

***defined by Gomez criterion of weight for age

Table C-1. (cont.) Nutritional Status of Preschoolers in Central America and Panama by Age of Preschoolers

Age in Months	Under-Weight*	Chronic**	Malnutrition***		
			mild	moderate	severe
El Salvador: Urban and Rural, 1965					
0-5	3.5	10.3	29.8	5.3	0.0
6-11	25.0	29.5	45.0	8.3	10.0
12-23	42.6	57.6	41.9	27.9	2.3
24-35	36.1	53.6	44.8	20.9	0.7
36-47	21.2	51.1	46.2	13.6	0.8
48-59	23.6	62.1	50.0	14.9	2.0
Total	27.7	49.9	44.4	17.0	2.1
Honduras: 1966					
0-5	6.3	12.8	27.1	6.3	0.0
6-11	22.9	32.1	44.3	16.4	1.6
12-23	36.2	53.1	34.5	25.9	1.7
24-35	32.1	46.5	46.4	12.5	1.8
36-47	28.0	47.1	43.4	21.7	1.4
48-59	30.0	46.7	53.1	18.5	0.8
Total	28.5	46.7	43.1	18.4	1.3
Nicaragua: 1966					
0-5	2.6	2.8	12.8	0.0	2.6
6-11	12.0	25.1	29.3	6.7	2.7
12-23	23.2	43.6	45.7	10.6	2.0
24-35	23.7	39.5	45.6	10.6	0.0
36-47	17.8	44.9	34.2	11.8	0.0
48-59	14.3	39.2	41.1	10.0	0.5
Total	19.1	36.2	37.7	9.3	1.0

*defined as low weight for age (below 2 standard deviations of WHO recommendation)
**defined as low height for age (below 2 standard deviations of WHO recommendation)
***defined by Gomez criterion of weight for age

Source: Valverde et al. . 1985