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CHILD SURVIVAL IN BOLIVIA
CURRENT STATUS
AND
PRIORITIES FOR ACTION

USAID/La Paz

NOVEMBER 1987

**Resources for
Child Health
Project**

REACH



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ACRONYMS

ADD:	Acute Diarrheal Disease
ARI:	Acute Respiratory Infections
BCL:	Bolivian Confederation of Labor
BHRSC:	Bolivian Human Reproduction Consultant's Survey
CHC:	Community Health Committees
CHICOLAC:	Child Milk Centers
CHR:	Community Health Representatives
CPI:	Consumer Price Index
CS:	Child Survival
DWH:	Department Worker's Headquarters
EAP:	Economically Active Population
EPI:	Expanded Program on Immunization
GPR:	Gross participation Rate
HAP:	Health Area Program
IBRD:	International Bank for Reconstruction and Development
IMR:	Infant Mortality Rates
INAN:	National Institute of Food and Nutrition
MLW:	Minimum Living Wage
MPS:	Medicine Prevalance Survey
MPSSSP:	Ministry of Social Welfare and Public Health
MSWPH:	Ministry of Social Welfare and Public Health
NCHS:	National Center for Health Statistics (United States)
NDS:	National Demographic Survey
NGO:	Non-Government Organization
NPHC:	National Population and Housing Census
NSI:	National Statistics Institute
ORS:	Oral Rehydration Salts
ORU:	Oral Rehydration Unit
ORU-C:	Oral Rehydration Unit-Community
ORU-I:	Oral Rehydration Unit-Institutional
ORU-P:	Oral Rehydration Unit-Popular
PAHO:	Pan American Health Organization
RNM:	Revolutionary Nationalist Movement
TFR:	Total Fertility Rate
WFP:	World Food Program
WHO:	World Health Organization
UDS:	Urban Demographic Survey
UNFPA:	United Nations Family Planning Association
UNICEF:	United Nations Children's Fund
USAID:	United States Agency for International Development

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I. EXECUTIVE SUMMARY

Bolivia is a landlocked country located in the center of South America. Its land area is 1.1 million Km.² and its estimated population for 1987 was 6.8 million inhabitants. The population is young, with 53% less than 20 years of age.

Inhabitants residing in localities larger than 2,000 persons are called urban, and constitute 48% of the population. Rural inhabitants constitute 52% of the population, and are widely dispersed.

Together with all countries of the Andes, Bolivia is a multicultural and multilingual country, in which the Spanish-speaking sector, the Quechua and Aymara groups representing 62% of the population, stand out. There are many other ethnic minorities, and indigenous groups occupy a vast area of the country, but participate only marginally in its economic and political life.

In Bolivia, today's poverty, malnutrition, and mortality are the result of a group of structural causes sustained throughout recent decades. The world economic recession and the decline in tin prices are having negative repercussions in the country, accentuating the crisis and reversing economic growth. From 1980 to 1984 the gross national product declined 16%, the total public debt grew 29%, and overdue payments on the foreign debt grew in 1984 to 700 million U.S. dollars, which is equal to 20% of the gross national product. Other factors, such as the uneven distribution of wealth, unsatisfactory use of financial resources, and particularly, the marginalization of large sectors of the population which are excluded from access to basic social services, contribute to the aggravation of problems of health and well-being, particularly for Bolivian children.

Although the country has made important efforts to reduce the level of illiteracy, the proportion of illiterates in the population is still close to 30%. These efforts have not been translated into the integration of indigenous groups, because education takes place exclusively in Spanish, which has caused maladaptation and early dropouts.

The data available on housing and basic services are from the 1976 Census, which showed a prevalence of inadequate housing and overcrowded conditions. 77% of the urban population had access to a public or private water system, and in rural areas the rate declined to 8%. Sewage systems reached 30% in urban areas and 0.3% in rural areas. A general consensus exists that to the present the situation has not improved, but rather that the growth of basic services is below the growth of the population and its needs. Bolivia's food situation has been inadequate for a long time. From the middle of the seventies, food production declined until it reached a critical threshold in 1983, as a result of the crisis in the livestock sector. Bolivia is not adequately self-sufficient in agriculture, and therefore cannot ensure proper nutrition for the population. This is a result of the acculturation and modernization process, an economic model which favors imports, and the progressive substitution of agro-industrial

products with greater prestige for traditional products of the family diet, to the detriment of local production and the impoverishment of the diet of low-income sectors.

According to the 1981 National Institute of Food and Nutrition survey, it was established that 46.5% of children less than five years of age suffer some degree of malnutrition, with the rural sector (50.8%) more affected than the urban sector (41.7%). The age group most affected was that from 12 to 23 months of age. According to available information the nutritional status of the population appears to have worsened.

The sharp reduction in public spending for health (almost 80% in the period 1980 to 1982) represents large cuts in operations expenditures and extreme reductions in maintenance expenditures, resulting in paralysis of coverage expansion, and deterioration in the efficiency, quality and effectiveness of current services, causing their severe reduction. This reduction has had the greatest impact on the poorest strata of Bolivian society.

According to the Ministry of Social Welfare and Public Health (Ministerio de Previdencia Social y Salud Publica, MPSSP) the health sector covers only 70% of the population of the country. The remaining 30% resort to traditional practices to solve their health problems. Of the covered population, 35% is reached by the Health Ministry, 20% by Social Security, and 15% by non-governmental and private medical organizations.

In the institutional sector, deficiencies have been identified in the supply of operations personnel, in supervision, information and supply systems, and moreover, in the unsatisfactory utilization of current health services capabilities.

With respect to the status of women, discrimination exists, which translates into a lower literacy rate, reduced access to productive work, subordination to men, and relegation to a predominantly reproductive role. The maternal mortality rate is estimated at 48 per 10,000 live births, the second highest in Latin America. Infection, hemorrhaging, and induced abortion are the principal causes of maternal mortality. Malnutrition and anemia are associated causes. The total fertility rate is high, with a national average of 6.7 children per woman.

In the estimation of infant mortality levels it is not possible to make use of vital statistics, because their underrecording is very high (60% to 70%). The most reliable national infant mortality data were obtained during the 1976 Census. The national average calculated for that year was 167 per 1,000 live births, ranging in urban areas from 97 to 134 per 1,000, and in rural areas from 120 to 210 per 1,000. The overall infant mortality rates vary according to ecological region, ethnic group, and according to socio-economic strata. For example, in the middle-upper stratum, a rate of 80 per 1,000 was observed, but in the lower stratum (non-salaried agricultural), the rate was 245 per 1,000.

The causes of infant mortality and mortality in children less than five years of age are:

1. Acute diarrheal diseases
2. Acute respiratory infections
3. Prenatal period disorders
4. Immunizable diseases
5. Malnutrition

Acute diarrheal diseases (ADD) have remained a very large problem for the country. Even given the limitations of the national epidemiological surveillance system, the annual number of diarrhea cases comprises one third of the total reported diseases for the period 1984 to 1986. The greatest incidence of diarrhea is observed in the 12 to 23 months age group, with an annual average of 9 episodes per year.

Acute respiratory infections (ARI) are the second leading cause of death in children less than five years of age. The group most affected group is children less than one year old, where the risk of death is up to 7 times greater than in children from 1 to 4 years old. Mortality due to ARI is proportionally greater the high plateau than in the valleys or plains.

High perinatal mortality is related to the low coverage of prenatal care and institutional birth (15% to 20%). Asphyxiation of the newborn is the primary cause of death, followed by low birth weight (related to maternal malnutrition and prolongation of gestation), neonatal tetanus (related to traditional practices in handling and cutting the umbilical cord, and low vaccine coverage of women of reproductive age).

Measles, whooping cough, poliomyelitis, tetanus, diphtheria, and tuberculosis are the infant diseases preventible by immunization that are included in the Expanded Program on Immunization (EPI). The mortality records of the Civil Registrar show that in 1981, deaths due to EPI-target diseases constituted 11.4% of mortality in children less than 5 years of age, and 4.8% of general mortality reported. Although current mortality data do not exist, it is presumed that based on the analysis of the evolution of morbidity, the current status of immunopreventible diseases has improved noticeably (with the exception of neonatal tetanus). This is due to the combined effect of periodic massive vaccination campaigns of urban centers of the country which the MSWPH has implemented, and to immunity of older children caused by epidemics in the recent past.

The health and well-being of Bolivian children is determined by four groups of aggregate variables. The first group, situated in the family and social environment called the social support networks, is important in the care and upbringing of the child and acts as a buffer in crisis situations. The second group includes family income (in money or in kind) available to satisfy the needs of childhood. The third group of factors is represented by the structure of public expenditures, especially for health and other services for particular social sectors. The fourth group includes environmental factors such as living space, availability of drinking water, availability of waste disposal systems, the presence of vectors, etc.

Based on a careful analysis of the available information, the priority population groups for child health intervention were established, distinguishing among ecological regions (first priority: valleys, second: high plateaus, third: plains), ethnic groups (first priority: Quechua, second: Aymara, third: Spanish and others), socio-economic strata (first priority: non-salaried agricultural, second: salaried agricultural, third: non-salaried non-agricultural), place of residence (first priority: rural, dispersed; second: rural, moderately dispersed; third: secondary cities), and age group (first priority: 0 to 11 months, second: 12 to 23 months, third: 2 to 4 years of age).

To select alternative interventions, a model to optimize the allocation of infant survival resources was used. This model shows mortality rates as the result or product of morbidity rates and fatality rates. Interventions aimed at preventing damage to the health and well-being of Bolivian children were selected according to potential effectiveness criteria, cultural feasibility, and relative cost.

In this way the proposed interventions are translated into accessible services (supply), which are determined by the available resources and the population's demographic and epidemiological characteristics. Utilization of the services provided is a direct function of the population's socio-economic and cultural characteristics, and can be changed through an appropriate educational program.

The last chapter describes the groups identified with the greatest risk, priorities for action, and the principal technologies and interventions to reduce child mortality.

II. WORKING GROUP

1. GOALS OF THE WORKING GROUP

- 1.1. Establish the general framework for the development of a child survival (CS) project adapted to the epidemiological, socio-economic and cultural reality of the country.
- 1.2. Identify the principal health problems related to child survival, beginning with the review of available secondary sources and field visits to selected sites.
- 1.3. Analyze and identify priorities for action utilizing an epidemiological and social focus.
- 1.4. Set the above within a global health framework for the year 2000, and aid the process of formulating a plan of action by facilitating the project development process in the field of child survival.

2. TERMS OF REFERENCE

- 2.1. Critical review of existing epidemiological data and information, with a focus on CS.
- 2.2. Verification of regional socio-economic differences and reconciliation of the ranges of cited infant mortality rates (IMRs).
- 2.3. Review of CS programs, estimate of coverage attained, and identification of principal obstacles.
- 2.4. Evaluation of EPI vaccination coverage and the current state of the cold chain.
- 2.5. Establishment of criteria to evaluate and select priority CS interventions and strategies, within the framework of national health policy.
- 2.6. Formulation of recommendations to reinforce, refocus, monitor and evaluate CS interventions within and outside the formal institutional health sector.
- 2.7. Identification of additional interventions within the primary care health strategy, which would be technically effective, logistically feasible, and culturally appropriate.
- 2.8. Support to MPSSP and the USAID mission in the definition of areas requiring CS research and its risk factors, including biomedical, socio-economic, demographic, and cultural factors.
- 2.9. Formulation of recommendations to USAID/MPSSP for short and long-term CS technical assistance.

3. METHODOLOGY

A document review of books, bulletins, reports, and articles related to child survival, published or produced in the last 12 years by UNICEF, PAHO/WHO, World Food Program (WFP), the Ministry of Social Welfare and Public Health (MPSSP), the Ministry of Planning and Coordination, as well as subsidiary agencies of these ministries, other non-governmental organizations and independent authors, was conducted for the preparation of this document.

The data collection was supplemented by interviews with health authorities, executive personnel of international cooperation agencies, non-governmental organizations performing health functions, and community health committees. Site visits to selected health establishments located in the high plateau (La Paz), valleys (Cochabamba and Chuquisaca), and plains (Santa Cruz) were also conducted. In La Paz, Cochabamba and Chuquisaca, rural and urban areas were visited, and in Santa Cruz, urban areas only.

4. COMPOSITION OF THE WORKING GROUP AND DURATION OF ASSIGNMENT

The team included Dr. Duncan Pedersen (team leader), Dr. Claude Betts (medical epidemiologist), Dr. Jorge Mariscal (Epidemiology Director of the MPSSP), and Dr. Javier Torres Goitia C. (pediatrician), who carried out their assignment from October 1, 1987 to November 4, 1987.

III. BASIC INFORMATION ABOUT BOLIVIA

1. BRIEF GEOPOLITICAL DESCRIPTION

Bolivia became a republic in 1825. It is located in the center of South America, bordered on the north and east by Brazil (3,000 Km.), to the southeast by Paraguay (738 Km.), to the south by Argentina (773 Km.), to the southeast by Chile (975 Km.), and to the east by Peru, (1,131 Km.). Bolivia is located between meridians 69 38' and 57 25' west longitude, and between parallels 2 38' and 22 53' south latitude. (See Figure III-1.)

Currently, Bolivia's land area is 1,098,591 square kilometers. Throughout its life as a republic, as a consequence of different conflicts with neighboring countries, its territory has been reduced by more than 50%. In the Pacific War, 1879, it lost its access to the sea (Morales and Rocabado, 1987).

Bolivia is a republic with a presidency. Its institutional organization includes the Executive, Legislative, and Judicial Branches. The executive and legislature are elected every four years by direct popular vote. The legislature is divided into two houses, with the upper comprised of senators, and the lower, by deputies. The highest executive authority is the President of the Republic. His successor, in the event of death or impediment, is the Vice-President and, in his absence, the President of the Senate.

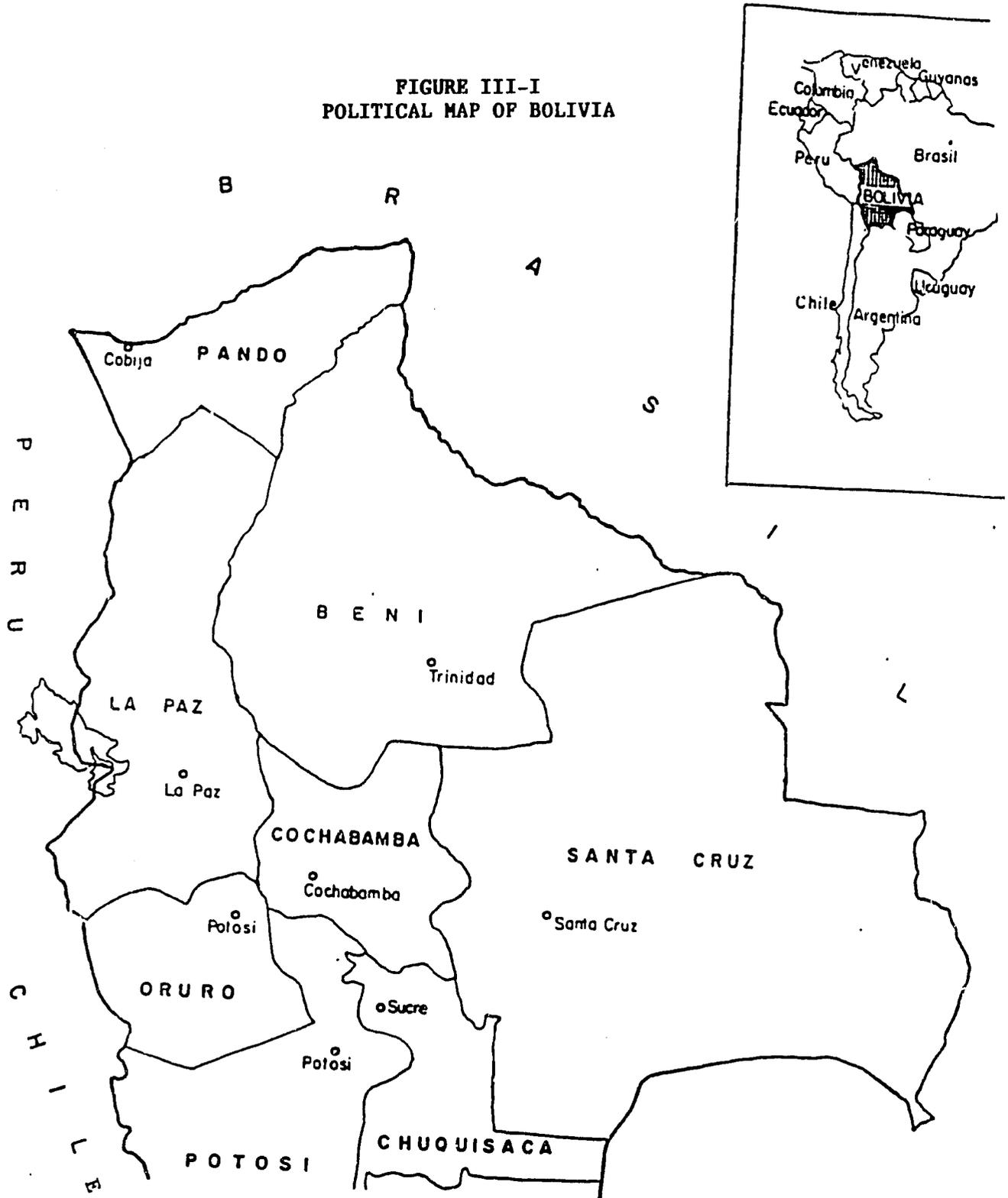
La Paz is the seat of the executive and legislative branches. Sucre is the seat of the judicial branch.

The President of the Republic has the prerogative to form his cabinet of ministers. There are currently 17 existing ministries, including among them the General Secretariat of the Presidency. The Secretariat of Integration, which formerly had the rank of ministry, was dissolved in 1987. In 1986, the Ministry of Revenue was created with temporary status while the tax reform passed that year was consolidated. The Social Emergency Fund was also created. Its head has the rank of Minister of State (Morales and Rocabado, 1987).

The territory of the Republic is divided into departments, provinces and districts. In each of the 9 departments there is a prefect, and in the provinces, a subprefect, who represent the Executive Branch in the regions under their jurisdiction.

In Bolivia there are three clearly differentiated ecological regions: the high plateau, the valleys, and the plains. The high plateau is located over 3,500 meters above sea level and covers 16% of the nation's land area. The valleys are located at a height ranging from approximately 1,000 to 3,500 meters and occupy 19% of the land area. More than 80% of the total population resides in these two regions. The plains stretch to the east and represent 65% of the land area. 35% of the population is considered urban or suburban; 49% is located in dispersed areas, and the remaining 16% in other population centers.

FIGURE III-I
POLITICAL MAP OF BOLIVIA



The differences in land quality and climate in these regions have given rise to different kinds of agriculture. According to Munoz Reyes (1980), 40% of the nation's land area is found in the dry zone, implying the need to provide water for sufficient agricultural development. Nevertheless, in the valley regions only 3.7% of land under cultivation is irrigated, and on the high plateau and in the valleys only 11 thousand hectares benefited from this system. It is estimated that the possibilities for irrigation could reach 150 thousand hectares, excluding the large projects of the eastern plains of Abapo, Izozog, etc.

The livestock sector encompasses close to one half of the workforce, but contributes only 17% to the GNP. Only 10% of agricultural workers are salaried. In land use, the cultivation of potatoes ranks first, followed by yuca. In the cereal group, corn is the most important product, because wheat production lags far behind demand. The mining sector is acquiring fundamental importance in the structure of exports and in the generation of national income, although it represents only 6% of the GNP and 4% of the labor force. Manufacturing industries occupy a modest position in contributing to the GNP (16%), and employ approximately 12% of the labor force. Within the service sector, basic services represent 14% of the GNP and non-basic services, 42%. 30% of the labor force is employed in the service sector.

Besides the attraction of large cities, rural decapitalization has caused a migration from the country to the city, causing in turn a large increase in unskilled labor, low family income, and a decline in the ability to provide basic necessities, including food, housing, and health education. To these is added the impact of natural disasters such as droughts and floods which in 1983 affected 35% of the nation's land area, with approximate losses of 1.652 billion dollars, and serious consequences for the standard of living and overall health of the rural population.

This growing process of impoverishment results in high levels of malnutrition, high mortality, low education levels, and inadequate socio-environmental conditions.

2. DEMOGRAPHIC DATA AND MIGRATIONS

2.1. Population by Age and Sex

The last national population census was carried out in 1976. The census planned for 1986 has not been performed, principally for economic reasons. The Bolivian population is estimated to reach 6,733,633 in 1987 by the National Statistics Institute. The age distribution observed in the country corresponds to that described in developing countries. The percentage of the population less than 20 years of age is 53.27%.

In the Bolivian population, the working age group (15 to 64 years old) is 53.75%, that is, 3,619,328 inhabitants. The population less than 15 years of age is 42.98%. This population group is outside the working age range, but in Bolivia, children begin to work from an early age at rates which are not insignificant for the age group to which they belong. The

ratio between males and females less than 20 years of age is 1.00. Among the 20 to 65 age group, females predominate. Beginning at 65 years of age this difference becomes accentuated. (Table III-1.)

TABLE III-1
ESTIMATED POPULATION BY SEX, ACCORDING TO AGE GROUP
BOLIVIA. JULY, 1987

AGE GROUP	BOTH SEXES		MALE		FEMALE		MASCULINITY RATIO ¹
	NO.	%	NO.	%	NO.	%	
TOTAL	6,733,633	100.00	3,325,741	49.39	3,407,892	50.61	98
0 - 4	1,147,411	17.04	579,092	8.60	568,319	8.44	102
5 - 9	940,689	13.97	471,354	7.00	469,334	6.97	100
10 - 14	806,016	11.97	401,998	5.97	404,018	6.00	100
15 - 19	692,891	10.29	344,762	5.12	348,129	5.17	99
20 - 24	592,560	8.80	293,586	4.36	298,973	4.44	98
25 - 29	504,349	7.49	248,471	3.69	255,878	3.80	97
30 - 34	422,872	6.28	206,723	3.07	216,150	3.21	96
35 - 39	357,556	5.31	174,401	2.59	183,155	2.72	95
40 - 44	291,566	4.33	142,080	2.11	149,487	2.22	95
45 - 49	241,737	3.59	116,492	1.73	125,246	1.86	93
50 - 54	206,723	3.07	98,984	1.47	107,738	1.60	92
55 - 59	175,074	2.60	84,170	1.25	90,904	1.35	92
60 - 64	134,673	2.00	67,970	0.95	70,703	1.05	90
65 - 69	96,291	1.43	44,442	0.66	51,849	0.77	86
70 - 74	65,990	0.98	30,301	0.45	35,688	0.53	85
75 - 79	36,362	0.54	16,161	0.24	20,201	0.30	80
80 plus	20,874	0.31	8,754	0.13	12,121	0.18	72

¹Masculinity Ratio: Number of men for every 100 women.
Source: National Statistics Institute

3.2. Urban-Rural Distribution

We adopt the definition of urban and rural from the 1985 Bolivia Statistics document (Bolivia en Cifras 1985), which corresponds to the United Nations definition, which states that any community which houses more than 2,000 inhabitants is urban, and any community which houses less than 2,000 inhabitants is rural.

In analyzing the projections from 1980 to 1985, we clearly observe a trend toward urbanization of the Bolivian population (Table III-2).

TABLE III-2
POPULATION PROJECTIONS IN URBAN AND RURAL AREAS
BOLIVIA, 1980-1985

Year	Total	Urban	%	Rural	%
1980	5,599,592	2,488,628	44.44	3,110,964	55.56
1981	5,755,072	2,595,237	45.09	3,159,835	54.91
1982	5,915,844	2,706,626	45.75	3,209,218	54.25
1983	6,081,722	2,822,546	46.41	3,259,176	53.59
1984	6,252,720	2,942,944	47.07	3,309,776	52.93
1985	6,429,226	3,068,051	47.72	3,361,175	52.28

Source: National Statistics Institute, Department of Social Statistics, Population Division.

Thus, in 1980, the percentage of rural population was 55.56%; for 1985 it was estimated that this percentage dropped to 52.28%. The opposite occurred in urban areas, which grew from 44.44% in 1980 to 47.72% in 1985. This migration from the country to the city is definitely a behavior pattern in the countries of Latin America, but it has important ramifications, in the overcrowding of marginal areas of the urban sector, and depopulation of potentially productive areas in rural zones. On the other hand, an important concept for health programming is that with the passage of time, inhabitants are grouping together in communities of more than 2,000 persons, which in a certain way facilitates access to the health system in populations which were traditionally inaccessible.

The distribution of the Bolivian population reveals an important imbalance in the three ecological regions of the country (Table III-3).

TABLE III-3
POPULATION DISTRIBUTION BY ECOLOGICAL REGION
BOLIVIA, 1985*

Total Population	High Plateau	Valleys	Plains
6,429,226	52.6%	26.6%	20.8%

*estimated

Source: 1985 Bolivia Statistics, 1985

The largest number of Bolivians is concentrated in the smallest land area, and the smallest population numbers are located in the largest ecological region with the greatest productivity potential. The sex differences in this population and ecological region are not significant, and the structure of the population by age does not differ from the national distribution.

In the high plateau zone, La Paz and Potosi have the greatest population concentrations. In the Department of La Paz the greatest concentration is in the urban population, while Potosi is fundamentally rural. In the valley zone the Departments of Cochabamba and Chuquisaca are those with the greatest population concentrations, both being basically rural. In the tropical or plains region, the Department of Santa Cruz has the densest population concentration, and is basically urban.

In the differentiation of urban and rural populations, it is important to consider several indicators estimated for 1985. The population of active age in urban areas comprises 57%, and in rural areas 50%, with minimal differences by department. The percentage of women of reproductive age (15-49 years old) is 24% in urban areas, and 20% in rural areas.

The urban area has a population growth 2.69 times higher than that of the rural area. The growth rate for the urban area is 4.15% and for the rural area is 1.15%. If we analyze this by department, we see that Santa Cruz is the department with the highest growth rate in the country, 5.31%.

According to recent estimates, the city of Santa Cruz would have a growth rate greater than 10% annually (Romero, 1987). La Paz would have a growth rate of 4%, followed by the remaining departments (see Table III-4).

TABLE III-4
ABSOLUTE POPULATION GROWTH AND GROWTH RATES
BY DEPARTMENTS AND DEPARTMENT CAPITAL CITIES
BOLIVIA, 1980-1985

Department	Department		Capital Cities	
	Absolute Annual Growth	Growth Rate%	Absolute Annual Growth	Growth Rate%
Total	165,928	2.76	82,119	4.06
Chuquisaca	8,139	1.84	2,013	2.47
La Paz	58,232	3.00	35,989	4.00
Cochabamba	22,919	2.49	11,385	3.96
Oruro	8,973	2.30	5,232	3.17
Potosi	17,850	2.14	3,299	3.14
Tarija	7,529	3.00	2,127	3.86
Santa Cruz	33,766	3.51	20,615	5.31
Beni	7,085	3.20	1,305	3.53
Pando	1,435	3.32	154	3.36

Source: National Statistics Institute, Department of Social Statistics Population Division.

2.3. Migrations

In Bolivia as in all the countries of Latin America, both foreign (colonization and republican eras) and internal (within distinct national zones of the country) migratory movements have been important.

The Spanish colonization upset the economic, social and political structures of the Indo-American peoples in general and of the Andes in particular. In Bolivia, colonizing migration transformed human settlements on the basis of the economic and trade interests of mineral development. Another important historical fact of our time related to migratory movements was the National Revolution of 1952, which, through its economic and social transformations, changed the spacial distribution of the population. We will first analyze migratory movements in the three ecological regions of Bolivia (Table III-5).

TABLE III-5
NET PERMANENT MIGRATION BY ECOLOGICAL REGION
BOLIVIA, 1976

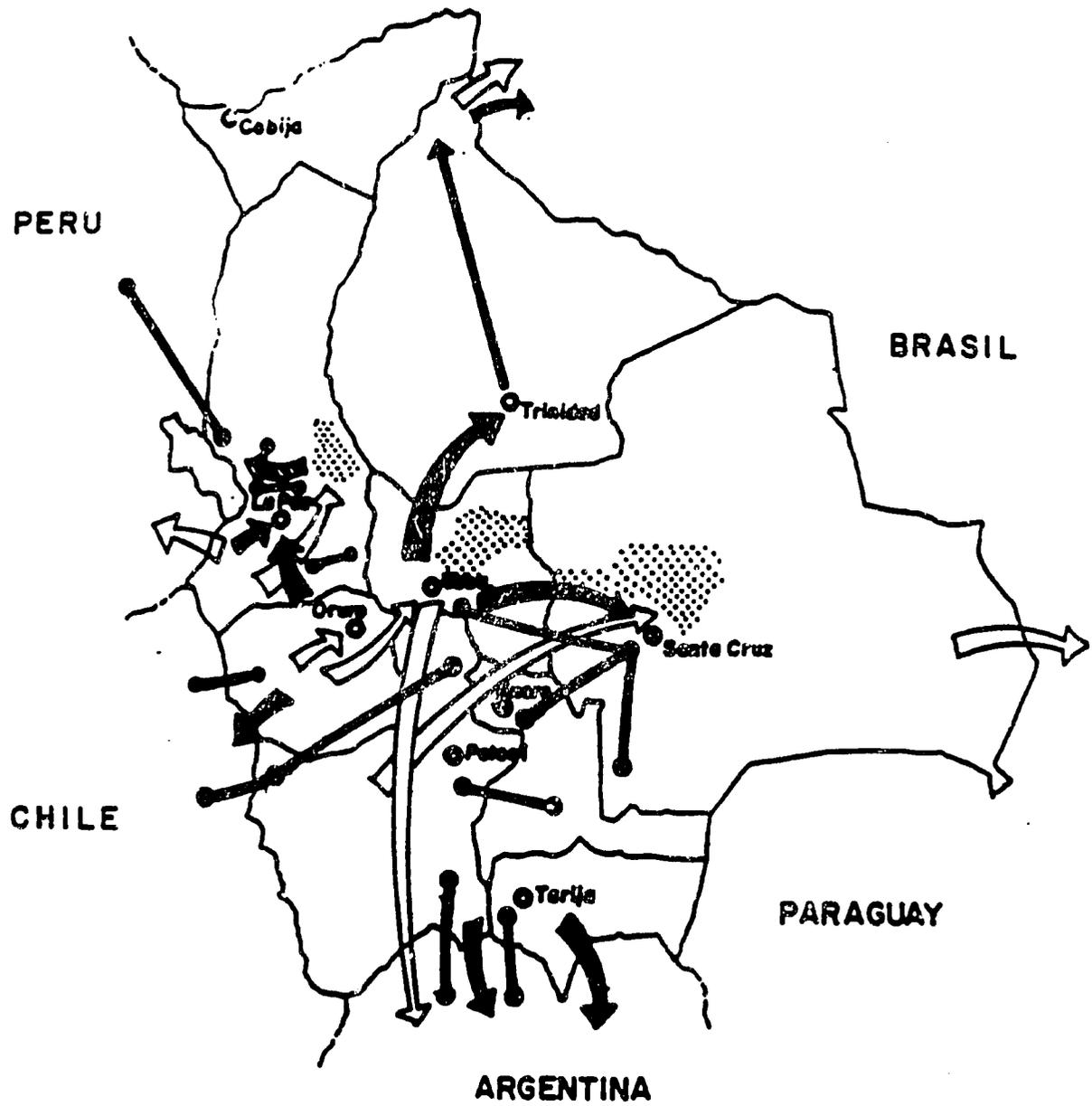
Ecological Region	Residence in 1976		Place of Birth		Net Migration No.
	No.	(%)	No.	(%)	
Total	316,121	(100.0)	316,121	(100.0)	--
High Plateau	82,587	(26.1)	131,199	(41.5)	-48,612
Valleys	108,003	(34.2)	146,590	(46.4)	-38,587
Plains	125,531	(39.7)	38,332	(12.1)	+87,199

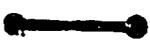
Source: Adapted from Garcia Tornell, Carlos, 1984.

The most important migratory flow has been to the plains or tropical region. The migrants come primarily from the valleys (63%), while only 37% come from the high plateau (Table III-6). This is due to the fact that, in 1952, after the Nationalist Revolution, the central power developed policies oriented to the use of the national territory. Thus, in 1954 the Cochabamba-Santa Cruz highway was opened, uniting east and west, where, until then, national activity had been concentrated.

In this process of directing migration to the eastern rural area, European migration and the migration of farmers from the valley and high plateau are included. According to data obtained by the team in Santa Cruz, current growth in the marginal urban area is greater than 10% annually. This indicates indirectly that the migration process to this department is very high, while the same is not happening in the other regions of the country. The valley population migrates most often to the plains, while that of the high plateau migrates more often toward the valleys.

FIGURE III-2
 PRINCIPAL MIGRATION PATTERNS IN BOLIVIA



- KEY**
-  Primary Migration Flow
 -  Secondary Migration Flow
 -  Seasonal Transfers
 -  Settlement Areas
 -  Department Capitals

Source: Munoz Reyes, Geography of Bolivia, 1977.

TABLE III-6
PLACE OF BIRTH AND RESIDENCE OF PERMANENT MIGRANTS
BY ECOLOGICAL ZONE, BOLIVIA, 1976

Place of Residence in 1976	Place of Birth							
	Total		High Plateau		Valleys		Plains	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
High Plateau	82,587	(100.0)	--	(0.0)	67,306	(81.5)	15,281	(18.5)
Valleys	78,003	(100.0)	84,957	(78.6)	--	(0.0)	23,051	(21.4)
Plains	125,531	(100.0)	46,247	(36.8)	79,284	(63.2)	--	(0.0)

Source: Adapted from Garcia Tornell, Carlos, 1984.

On the other hand, the influence exercised by migration on the different regions depends on the ratio between immigrants and emigrants in each region. Thus we see that the plains has a higher percentage of immigrant population (13.8%) in relation to the native population emigrating from the region. The high plateau has only 3.5% immigrants, and the valleys 8.4%, but the latter region produces the highest proportion of emigrants of the 3 ecological regions (See Table III-7).

TABLE III-7
PROPORTION OF PERMANENT IMMIGRANTS AND EMIGRANTS
BY ECOLOGICAL REGION
BOLIVIA, 1976.

Ecological Region	Immigrants (%)	Emigrants (%)
High Plateau	3.5	5.4
Valleys	8.4	11.4
Plains	13.8	4.7

Source: Garcia Tornell, 1984.

It is important to consider that migratory movements to the plains are not necessarily permanent, since a high percentage are seasonal and temporary, depending on the sugar and cotton harvest. This population is estimated at 43,200 persons (ILDIS, 1987).

In recent years migrations have also been induced by narcotics trafficking, attracting population groups primarily to Chapare in Cochabamba, Los Yungas in La Paz, and Alto Beni.

The principal migratory patterns in Bolivia can be observed in Figure III-2, developed from the 1976 Census, patterns which, in general terms, have continued into the present. We see that Santa Cruz is the department with the highest intradepartmental migration, 71.2%, followed by La Paz with 69%. This is basically explained by the fact that Santa Cruz is a center of livestock development, and in the case of La Paz, by the fact that it is the government capital and an important center of import and

export commerce. Potosi, the department with the greatest concentration of poverty, has one of the largest proportions of emigrant populations. Chuquisaca, the department ranking second in poverty concentration, is the department with the greatest number of emigrants.

According to the same 1976 Census data, it may be observed that Tarija and Pando have positive migratory rates, although this may be due to migrations to Argentina and Brazil which were recorded incorrectly.

3. CHRONOLOGICAL SUMMARY OF THE HISTORY OF BOLIVIA: FROM 1879 TO THE PRESENT¹

<u>Years</u>	<u>Events</u>
1879	The Pacific War. The conquest of Antofagasta was followed by the conquest of Mejillones and Caracoles, which could offer no resistance because of a lack of manpower. The Chilean troops broke the resistance with little effort, after the heroic sacrifice of Eduardo Avaroa.
1880	Founding of the Universidad de Santo Tomas de Aquino, today the Universidad Mayor Gabriel Rene Moreno. (Santa Cruz, January 11). The Peru-Bolivian Alliance, declaration of war by Chile on Bolivia and Peru.
1880-1899	Dominance of the la Plata mineral-feudal oligarchy, with constitutional governments of the conservative party. High British influence. Broadening of estate landholdings.
1892	Founding of the Universidad Mayor Tomas Frias. (Potosi, October 15). Founding of the Universidad de San Agustin, now the Universidad Tecnica de Oruro (December 25).
1899-1899	Civil war between liberals and conservatives resulted in defeat of the latter. Change of the seat of government to the city of La Paz (January 25).
1899-1920	Dominance of the liberal party with the Gen. Jose Manuel Pando. At this stage the tin era began. The development of this mineral was dominated until 1952 by mining groups: Patino, Hotschild, and Aramayo.
1903	Treaty of Petropolis. Negotiations were begun with the goal of obtaining an agreement between the governments of Bolivia and Brazil, for which the former authorized a special mission in Rio

¹This section is taken and condensed from the chronological summary presented in the official publication 1985 Bolivia Statistics.

de Janeiro on November 17 of that year. This treaty was signed in Petropolis, dispossessing Bolivia of Acre in exchange for some financial compensation and the construction of the Madera-Manore railroad, whose purpose was to promote trade through the Amazon.

- 1904 Signing of peace with Chile. Recognition of the total loss of 120,000 Km.2 of territory, the entire coastal department.
- 1932-1935 The dispute over Chaco was as old as the founding of Bolivia and Paraguay as independent states; it grew out of discussions between the colonial powers on the one hand, and on the other hand from territorial occupation as geographical protection. An understanding with Paraguay would have been possible at any time if Paraguay had come to recognize Bolivia's claim to its own port on the navigable section of the Paraguay River. However, this was never achieved.
- 1935 End of the war with Paraguay. The armistice was signed in Buenos Aires, Argentina, through the mediation of the United States and the League of Nations.
- 1936-1946 Military officers governed the country, tending to the revolutionary nationalism which emerged from the war, under the name of the RADEPA Lodge, May 2.
- 1937 Nationalization of Standard Oil Company. Creation of the National Bolivian Oil Resources (YPFB), March 15.
- 1946 Founding of the Universidad Mayor Juan Misael Saracho, Tarija, June 6.
- 1952 Popular insurrection organized by the National Revolutionary Movement; ends with victory for the mineral-feudal oligarchy, April 9.
- 1952 Universal suffrage law. Until 1951 the vote was restricted: illiterate persons could not vote (November 4).
- 1953 Nationalization of mines belonging to the Patino, Hotschild and Aramayo mining groups. Creation of the Bolivian Mining Corporation (COMIBOL). October 31. Agrarian reform law.
- 1955 Educational reform, January 20.
- 1964 In a coup d'etat, Gen. Barrientos overthrew the National Revolutionary Movement government, beginning a period of military governments ending in 1982. November 4.
- 1966-1969 Barrientos-Siles constitutional government during this period. July 3.
- 1966 Founding of the Universidades Catolicas of La Paz and Cochabamba, May 14.

- 1967 The Argentine-Cuban guerrilla Ernest "Che Guevara", died in the final confrontation of the Yuro canyon. La Higuera, October 7.
- 1968 Founding of the Universidad Tecnica Jose Ballivian Trinidad, November 18.
- 1969 Bolivia signed the Cartegena Accords, which advocated regional integration with the republics of Colombia, Chile, Ecuador, and Peru, in the city of Bogota, May 26. Overthrow of constitutional government by coup d'etat of General Ovando, September 26. Nationalization of the Bolivian Oil Gulf Company. National Dignity day is declared.
- 1982 Democracy was restored in Bolivia. General Guido Vildoso handed over the government to Dr. Hernan Siles Zuazo, winner of the 1980 elections. October 10.
- 1982 The Bolivian government decreed a floating price for the North American dollar.
- 1983 The "de-dollarization" of the Bolivian economy was established.
- 1985 Dr. Victor Paz Estenssoro, the current president of the Republic, was elected and assumed power August 6. A new economic model was implemented beginning August 21 (DS 21060). Founding of the Universidad Siglo XX, according to DS 20979, August 1.

IV. HEALTH, DISEASE, AND MORTALITY

1. HEALTH PROFILE OF THE COUNTRY

1.1. Background

Bolivia is one of the least economically developed of the Latin American countries, with very important ties of dependency, and the highest poverty levels on the American continent. Infant mortality itself exemplifies this situation; endemic diseases and high malnutrition levels also identify the Bolivian population as the most vulnerable.

Bolivia's budgetary distribution is also typical of a country where social sectors receive less attention. The population distribution, widely dispersed, often in inaccessible zones in small concentrations (less than 2,000 inhabitants), reveals infrastructure and communications limitations, and accentuates the inaccessibility of health systems to the population and vice versa.

Bolivia's health and disease profile is similar to that of under-developed countries. The basic characteristic, a young population (42.9% are less than 15 years of age), makes infant and childhood diseases the most important. Among these, at the national level, acute respiratory diseases and diarrheal diseases are the most frequent causes of infant morbidity-mortality. Moreover, other regional pathologies exist which are important for their high incidence and the seriousness of their current and medium-term implications (malaria and chagas' disease).

With respect to women, one of the primary problems confronting Bolivia is the low level of adequate delivery care at the institutional and home levels, with resulting repercussions for neonatal and maternal health. Although the magnitude of neonatal tetanus is unknown, there are still indications that it represents a very significant proportion of the total deaths in the first days of life of the newborn.

The high levels of abortion, according to a study performed by the Bolivian Gynecological Society in 1986, contribute 26% of the total maternal mortalities (Kushner, 1986). Although at present there is a greater commitment of the population to solving health problems as a partnership, the institutional health systems have still not been able to satisfy the growing demand of the population.

¹This section and the following ones have been taken from the PAHO/WHO offprint "Health Conditions in the Americas, 1981-1984", Bolivia, 1985.

1.2 Health Problems Which Affect the Population in General

a) **Tuberculosis:** This is one of the most significant infectious diseases in the country, not only in terms of morbidity and mortality, but due to its chronic nature and because it mainly affects the population of reproductive age. In 1986, 5,941 new bacillary cases were detected, which represent one fourth of the cases expected. Progress in the control of tuberculosis has not been observed, principally due to the insufficient detection of cases, to the high rate of early withdrawal from treatment, and to high initial resistance to the drugs in use: Streptomycin 23.5% and INH 7.5% (CEPANZO, 1985).

b) **Chagas' Disease:** Data obtained through national research carried out during the period 1980-1983 on Chagas' disease, indicate that the rate of housing infestation by insects of the genus *Triatoma* rose to 26.3%. In Santa Cruz and Chuquisaca the rates reached 100%. The principal carrier of the disease is *Triatoma infestans*. 27% of the triatomas were infected by *Tripanosoma cruzi*, which is a very high rate. The partial results of blood studies performed on the population exposed to risk indicate that 30% to 45% test positive. Of these, between 10% and 20% show signs and symptoms of Chagas' disease, verified through electro-cardiographical studies.

c) **Malaria:** The incidence of malaria constitutes a problem in the country, not only because of the growth in the number of cases, but also because of the presence of *Plasmodium falciparum* which is resistant to medications. The data show that malaria is not homogeneously distributed in the country, but rather is concentrated in its occurrence in the departments of Beni, Santa Cruz, Tarija, and Chuquisaca. The cases registered in the period 1981-1984 are as follows: 9,774 in 1981; 6,699 in 1982; 14,441 in 1983; and 16,388 in 1984. In addition to the presence of *Plasmodium falciparum*, *P. vivax* continues to predominate, comprising 92% in 1984.

d) **Yellow Fever:** This disease is endemic in some jungle areas of Bolivia, and has only been detected in the departments of Beni, Santa Cruz, Cochabamba, and La Paz. The available data reveal that in the period from 1981-1984, the number of cases of yellow fever were distributed as follows: 102 in 1981; 95 in 1982; 11 in 1983; and 5 in 1984.

The presence of *Aedes Aegypti* in the city of Santa Cruz, and the existence of jungle yellow fever in the surrounding areas implies the risk that yellow fever will spread to urban zones. Therefore, in October and November, 1983, people were mobilized to participate in a program of vaccination against yellow fever, which achieved coverage of 92,334 inhabitants, or 83.3% of the planned population in five areas.

e) **Bubonic Plague:** There are other important diseases in the region, among which bubonic plague may be mentioned, which has a migratory quality in the country. In the last five years it has been limited to the Apolo region, in the north of the Department of La Paz. The cases recorded by the services responsible for its control are: 21 in 1981; 24 in 1982; 21 in 1983; and 12 in 1984.

f) **Human Rabies:** The data available on human rabies show the following situation: 4 cases in 1981; 13 cases in 1982; 17 in 1983; and 5 in 1984. La Paz, Santa Cruz and Cochabamba are the cities with the greatest incidence of human rabies and dog rabies. The region of Tarija ranks fourth in frequency of dog rabies.

g) **Acute Respiratory Infections:** Reporting of some communicable diseases, which represents only a fraction of the reality of the country, indicates that the acute respiratory infections recorded under the heading of influenza continue to rank first in the last ten years.

h) **Silicosis :** There are more than 12,000 cases of silicosis annually. From 1970 to 1980, 3,398 miners affected by this disease died, averaging 363 deaths per year. In 1982, almost 30% of the 4,924 people who retired because of a work-related disease suffered total and permanent incapacity. Some studies have shown that in 1982, the frequency of accidents reached 12.14% among miners, and only 0.86% among manufacturing workers. Accidents generally cause temporary incapacity (10.4% among miners, and 0.60% among manufacturing workers), and permanent partial incapacities are rather rare. Fatal accidents in mining are responsible for 0.14%, and in 1982 there were no deaths in manufacturing.

2. Health Status of Women

The status of women in Bolivian society has various features, and should be analyzed not only from a reproductive point of view, but rather as fundamentally important within the social context, including the family, the division of labor, education, health, nutrition, and other socio-demographic characteristics.

On the one hand, women have primary responsibility for the home, and for the nutrition, up-bringing and care of the children. On the other hand, they take part in the productive process, often under very unfavorable conditions, and so put in a double work day which is tied to their multiple roles.

In urban areas, among the middle and upper classes, women in general are confined to a passive role with few opportunities for participation in professional-level decision-making and professional advancement. Nevertheless, in recent years more women are becoming professional and participating in the work of the nation. Women have more possibilities for participation in low-income sectors, in many cases controlling the family economy, without, however, any effective participation in decisions on the family budget. Their participation in the labor force has been for the most part in tertiary economic activities, principally in services and individual business, which provide them a certain stability.

Because of the crisis, the informal business sector has been proliferating. A majority of the participants in this sector are women, which makes evident a hidden unemployment.

In a rural context, peasant women play a role traditionally subordinate to men, performing household responsibilities and participating in the productive process and business activities. However, their

participation in goods, power, and prestige is limited and restricted, revealing an inconsistency between their economic role and their social status, which indicates discrimination in the lives of rural women.

19.4% of rural women participate in domestic tasks which are considered family production; in farm labor, 17.4%; and in shepherding, 11.6%; so that their total participation in productive tasks reaches 48.4% (Calderon, F. et al., 1987). The level of participation of women in the national economy can be observed in the following table.

TABLE IV-1
PARTICIPATION RATES IN ECONOMIC ACTIVITY BY SEX,
ACCORDING TO URBAN AND RURAL CONTEXTS
BOLIVIA, 1976

Entire Country	GPR ¹
Male	50.7
Female	14.2
Total	32.5
<u>Urban</u>	
Male	46.3
Female	18.2
Total	31.8
<u>Rural</u>	
Male	54.5
Female	11.6
Total	33.0

¹Gross Participation Rates : $\frac{\text{Economically Active Population}}{\text{Total Population}}$

Source: NSI "Bolivia, EAP Study", 1980.

As can be seen, women play an important part in the labor force of the country. The national GPR for women was 14.2% in 1976, a figure considered high in comparison with other countries such as Guatemala, which in 1973 had a GPR for women of 8.4%, and in Chile, 13.6%. The GPR for women in urban areas is clearly higher, at 18.2%, and in rural areas is lower than the national average, descending to 11.2% in part because of an important underestimate in the 1976 Census (NSI 1980), which used a category called "unpaid family workers", which does not include a large part of the productive activities of women.

In the rural context, women and their children often take part as temporary workers in the harvest tasks for those crops which require manual gathering, such as cotton and sugar cane, and in much smaller proportion, corn and soybeans. Given that the cotton and sugar cane harvests are concentrated at specific times of the year, massive migrations in

relatively short periods of time are generated by the growing cycles of each crop, from the departments of Potosi, Oruro, Tarija, to productive zones, in which precarious tent camps are erected for shelter.

Both the surveys conducted and the data which are often collected on temporary workers are usually based on lists provided by employers. This introduces a strong bias in these data, which do not include the work of children and women. Thus, when speaking of 12,000 sugar cane workers, what is not accounted for is that, together with the head of the family, approximately 3.6 persons are displaced to the harvest camps, of which an average of approximately 2.6 work.¹

If the work of men occurs in a context of acute exploitation, that of women is even more serious. The day begins for them at 3:00 a.m. in the camps, with the preparation of food for the family. At 4:00 a.m. women are on the way to the "plantation", several kilometers away. There they work as much as or more than men, since women harvest between 150 and 200 pounds of cotton, a quantity very seldom equaled by men.

An additional problem of the highest importance is the absolute lack of hygienic conditions and occupational safety in the cotton and sugar cane harvests. In the first place, the use and abuse of agro-chemicals, especially certain pesticides which are applied from the air before and in some cases during the harvest, presents a serious risk to the health of the harvesters, among whom are pregnant women and children of various ages. A study of the National Institute of Occupational Health confirms the high rate of poisoning resulting from fumigation with products which have been discontinued or prohibited in the international market.

As far as children are concerned, from the age of six or seven they already go to the country and work the whole day with their parents. At age 14 they are already assigned an amount of work equal to that of an adult. But their working conditions are worse, if possible, than those of the adults. In the first place, their short stature keeps them below the height of the plants, where there is no air flow and the temperature rises several degrees. This exposes them much more to the toxic effects of the pesticides, to insect bites, and to reptile attacks. These small ones, just like their parents, must carry the harvested cotton to the weighing station, and although they harvest between 80 and 100 pounds, the effort of carrying it is exhausting for them.

¹This and the following paragraphs are taken from the publication Agrarian Debate, No. 8: Temporary Workers; published by ILDIS, June, 1987.

In the sugar cane harvest the situation is similar. The men cut down the cane, and the women and children trim, peel and pile it. This is called "doing the fourth", because women earn one-fourth of male sugar cane harvesters. In the context of family units the inequity is not quite as serious. But in the case of single women, this one-fourth of an already meager income is hardly enough to eat on.

The working conditions described above are repeated in a much more cruel way with other products and farming tasks which require supplementary manual labor. This is the case with corn, rice, sorghum, pineapple, citrus fruits, peanuts, rubber, chestnuts, etc., as well as in the jobs of weeding, earthing over, clearing, etc., where the possibilities of organization and even simple knowledge of the reality of work are infinitely less. If fulfillment of the General Labor Law leaves so much to be desired with respect to the visible group of male harvesters, it is easy to imagine the situation for the rest. (ILDIS, 1987).

Illiteracy constitutes an important restriction of women into the economic life of the country. Its evolution can be observed in Table IV-2.

TABLE IV-2
ILLITERACY RATES AND NET REDUCTION BY SEX
BOLIVIA, 1950 AND 1976

Sex	Illiteracy Rate		Net Reduction During Period	Mean Net Annual Reduction
	1950	1976		
Male	58%	21%	37%	1.42%
Female	77%	43%	34%	1.30%
TOTAL	68%	32%	36%	1.38%

Source: NSI, 1950 Census and 1976 Census (adapted from the Analysis of the Status of Women and Children, UNICEF, 1987)

The above table reveals the high rate of illiteracy in both sexes. The reduction recorded in the period 1950-1976 is greater for males. The mean net annual reduction of illiteracy among females hardly reached 1.3% annually, in spite of efforts carried out in the field of education. If this trend continues, illiteracy among women will persist for several decades to come.

In order to better characterize the access women have to education, we must examine Table IV-3.

TABLE IV-3
SCHOOL MARGINALIZATION RATES¹ BY AGE GROUP AND SEX
BOLIVIA, 1984

Sex	AGE		
	5-9 years	10-14 years	15-19 years
Males	29%	30%	52%
Females	33%	38%	59%
Total	31	34%	55%

¹Proportion of children apt for school who do not have access to the school system.

Source: Analysis of the Status of Women and Children, UNICEF, 1987.

According to the above table, the school dropout rate is an alarming phenomenon, which is high in the elementary school age group (5 - 9 years old), and progressively increases to the middle school level. More than half of the school age population has dropped out before 19 years of age. The female dropout rate is earlier and more serious than that for males. According to Morales, R. (1987) this situation may be explained as an increase in discrimination against women due to economic causes.

Qualitative evaluations of the formal education system in rural areas show maladaptation, inadequacy, and alienation from the educational system. Its content and orientation are basically urban, and from a cultural and particularly linguistic point of view, exclusively Spanish, which generates a lack of participation within the national social structure (Calderon, F. et. al., 1987).

The demographic characteristics of the female population are related to the demographic structure of the general population, which is typically young (42% are under 15 years of age), with more females than males. The distribution of the female population by civil status can be seen in Table IV-4.

Most of the urban female population is concentrated in two categories: married or cohabiting, and single. The percentages of married or cohabiting women are the highest, except in Chuquisaca, where the percentage of single women surpasses those of married or cohabiting women. This discovery can be explained by the fact that the population of the city of Sucre is predominantly student. The highest percentages of widows are seen in the high plateau (Oruro and Potosi), and the lowest in Tarija, Santa Cruz, and Beni. The lowest percentages of divorced women are in Potosi, Oruro, and Chuquisaca, and the greatest are in Beni, Santa Cruz, and La Paz. The proportion of women considered single (widowed and divorced) is relatively high, ranging between 9.2% in Santa Cruz, and 11.5% in Beni, which means greater exposure to health risks for women and their offspring.

TABLE IV-4
MARITAL STATUS OF URBAN FEMALE POPULATION
BY DEPARTMENT, BOLIVIA, 1976

Marital Status	Proportion of Urban Female Population by Department							
	La Paz	Oruro	Potosi	Cochbba	Chuquasaca.	Tarija	Sta.Cruz	Beni
Single	39.5	41.2	39.5	42.7	48.8	43.5	40.2	40.9
Married or Cohabiting	48.7	46.3	47.9	44.6	39.8	46.2	49.5	46.8
Widowed	7.6	9.1	9.8	8.5	8.0	6.8	3.7	7.2
Divorced	3.4	2.3	1.7	2.9	2.3	2.7	3.5	4.3
Non Specified	0.5	1.1	1.0	1.3	1.0	0.8	1.0	0.8
Total	99.9	100.0	99.9	100.0	99.9	100.0	99.9	100.0

Source: NSI, Housing and Population Census, 1976.

The total fertility rate (TFR), which is the total number of children which a woman will bear throughout her reproductive life, is not only the result of a biological process, but rather is principally the result of social and cultural conditions in various strata of society. In 1976, the NSI found that Bolivia had a rate of 6.7 children per woman, which constitutes one of the highest rates in American countries. Because this rate is a national average it encompasses regional and contextual variations, which can be seen in the following table:

TABLE IV-5
TOTAL FERTILITY RATE
BY ECOLOGICAL REGION AND URBAN - RURAL CONTEXT
BOLIVIA, 1976

Ecological Region	No. of Expected Live Births per Woman's Reproductive Lifetime					
	Total	Primary Cities	Secondary Cities	Urban Districts	High Rural	Low Rural
High Plateau	6.3	5.2	6.7	7.3	7.3	7.4
Valleys	6.8	5.8	5.4	6.3	7.2	7.1
Plains	7.0	5.9	6.5	7.0	8.0	8.7

Source: Life's Light and Shadow: Population Policy Project, Planning Ministry, UNFPA. (Taken from Participation of Women in the Urban Labor Market in Bolivia).

In the three ecological strata it was shown that fertility rose to the degree that urbanization declined. Fertility in the context of highly rural areas exceeded that for the principal city by 47.4% in the plains, 42.3% in

the high plateau, and 22.4% in the valleys. The main variation in fertility is seen in the high plateau with 6.3, and in the plains, with 7.0. The variations between ecological strata are relatively minor compared with the variations within each stratum.

In considering the health situation of women in relation to their reproductive life, it is necessary to emphasize that the lack of adequate attention to their needs can increase the risk of death both for the woman and for the child. The inadequacies of vital statistics do not allow precise knowledge of maternal mortality. Official estimates calculate it at 48 per 1000 live births, a figure considered one of the highest in Latin America, as can be seen in Table IV-6.

TABLE IV-6
MATERNAL MORTALITY RATES IN SELECTED COUNTRIES
OF SOUTH AMERICA

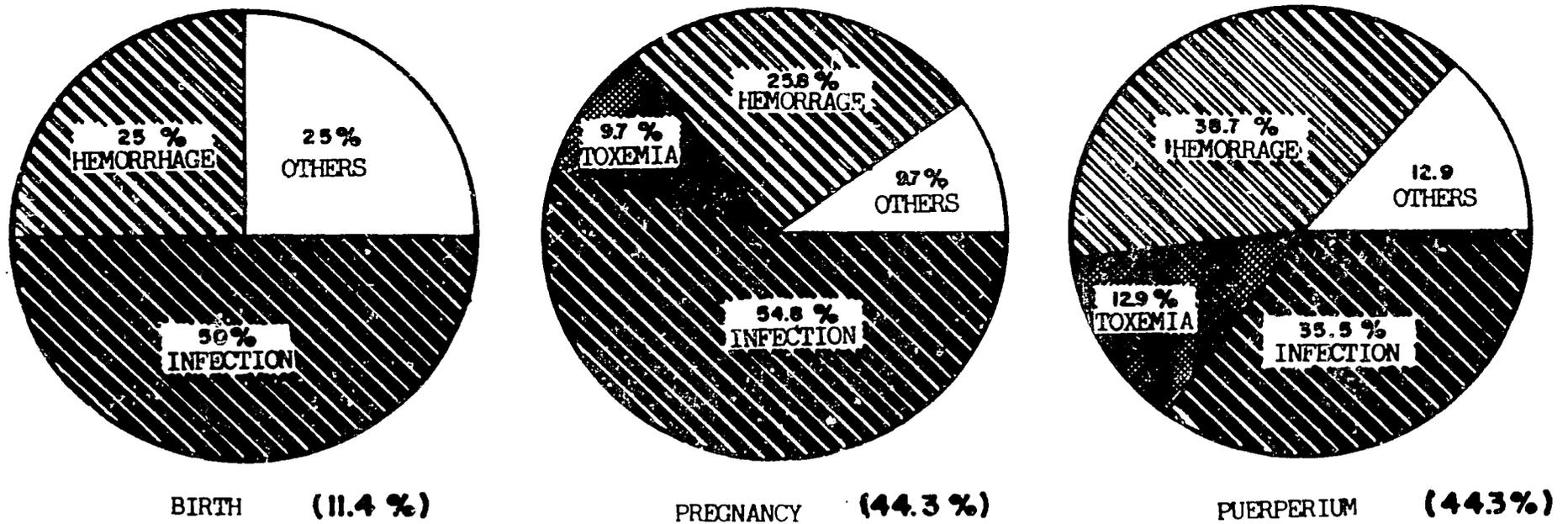
Country	Year	Maternal Mortality (per 10,000 live births)
Bolivia	1980-1985	48.0
Peru	1983	8.5
Brazil	1980	7.0
Colombia	1982	11.7
Chile	1981	3.7
Ecuador	1982	18.0
Argentina	1981	6.9
Paraguay	1984	27.5

Source: PAHO/WHO, 1985

Maternal mortality in Bolivia takes on demographic and social importance because, due to the structural youth of the population, close to one fourth of the total population is comprised of women of reproductive age. In the structure of mortality in the Americas, the single classification "pregnancy, birth, and postpartum complications" is among the five primary causes of death (Maternal and Child Health Program PAHO/WHO, 1986).

It is useful to point out that the health profile of Bolivian women is not necessarily reflected in the morbidity-mortality statistics due to the low coverage of health services and vital statistics registries. Women's health needs are not always expressed as a demand in the medical sector and appear to be underrecorded in hospital registries and those of other services.

FIGURE IV-1
 GROUP CAUSES OF DEATH
 ACCORDING TO STAGE IN REPRODUCTIVE CYCLE
 G. URQUIDI MATERNITY HOSPITAL, COCHABAMBA 1979-1986



28

Source: Institutional Maternal Mortality. Salinas, W. et al. (Unpublished).

Peasant women and women of marginal urban areas often encounter severe problems in accessing health services because of economic, geographic, and cultural reasons, often resorting to self-medication with home care, using modern household medicines and traditional medicine. Analysis of the structure of maternal mortality is difficult because the available data are dispersed, incomplete, outdated, and unrepresentative. Despite these limitations and the poor objective validity of the indicators, we present some data obtained by Salinas. W. (1987) in a review of causes of institutional mortality in the German Urquidi Maternity Hospital in Cochabamba during the period 1979-1986.

Of 32,000 hospital releases, 80 died, yielding a mortality rate of 25 per 10,000, considered high. Of the 80 deaths, 70 were studied. According to the results of the study, the direct obstetric causes, that is, those which resulted in complications during pregnancy, birth, and puerperium, caused 92% of the deaths. The indirect causes, that is, those resulting from a pre-existing sickness before or arising during pregnancy, and nonobstetric causes, that is, accidental or incidental (not related to the pregnancy) ones, showed similar rates (3% for each).

From the clinical perspective, 44.3% of the deaths studied occurred during pregnancy, 44.3% during puerperium, and 11.4% during birth. Figure IV-1 shows the distribution of causes of death according to the stages of gestation, birth, and puerperium.

Figure IV-1 shows that during pregnancy, infections and hemorrhaging are the principal causes of death, which is understandable because 14 of the 31 deaths which occurred during pregnancy were the result of induced abortion (45%). Of the deaths which occurred during childbirth, one half presumably were by infection, a diagnosis not considered very consistent, and difficult to interpret in this context. Hemorrhage ranked second among the causes.

Postpartum deaths were caused in the first place by infection, a situation associated with the quality of the services provided. The second-ranking cause was hemorrhage, also attributable in part to limitations on the quality of services. The group causes of maternal mortality can be seen in Table IV-7.

Infection is the primary cause of mortality, responsible for 25.7% of the deaths, attributable primarily to postpartum infection in 70% (10 deaths), a situation linked, as indicated above, to the quality of care, and therefore avoidable. Hemorrhage is the second-ranking cause of death and abortion is the third most frequent cause. It is presumed that abortion is one of the principal causes of maternal death in the country.

According to recent research conducted by the Bolivian Gynecological and Obstetrics Society (which researched 892 cases of induced abortion in five principal cities of the country), young women constitute a higher proportion of induced abortion than older women. No significant association was found with education level, which is provocative and should encourage deeper research into the problem. With respect to civil status, single and separated women constituted a higher proportion of induced abortions.

TABLE IV-7
AGGREGATE UNDERLYING CAUSES OF MATERNAL DEATH, G.
URQUIDI MATERNITY HOSPITAL, COCHABAMBA, 1979-1986

Aggregate Underlying Causes	Maternal Deaths	
	No.	%
Total	70	100.0
Infection	18	25.7
Hemorrhage	15	21.4
Induced Abortion	14	20.0
Toxemia	7	10.0
Embolism	2	2.9
Others	14	20.0

Source: Institutional Maternal Mortality. Salinas et. al. (unpublished)

Toxemia constitutes the second cause of death. It is in large measure avoidable through appropriate prenatal care.

Like the rest of the population, the female population also suffers from other maladies such as tuberculosis, malaria, endemic goiter, and other diseases prevalent in the general population.

The nutritional situation of Bolivian women is not known. The malnutrition prevalence studies were carried out almost exclusively on children. Short stature among adults and their stable tendency are considered a stigma of the poor. This situation is clearly seen in Figure IV-2, presented by Morales, R. et al.

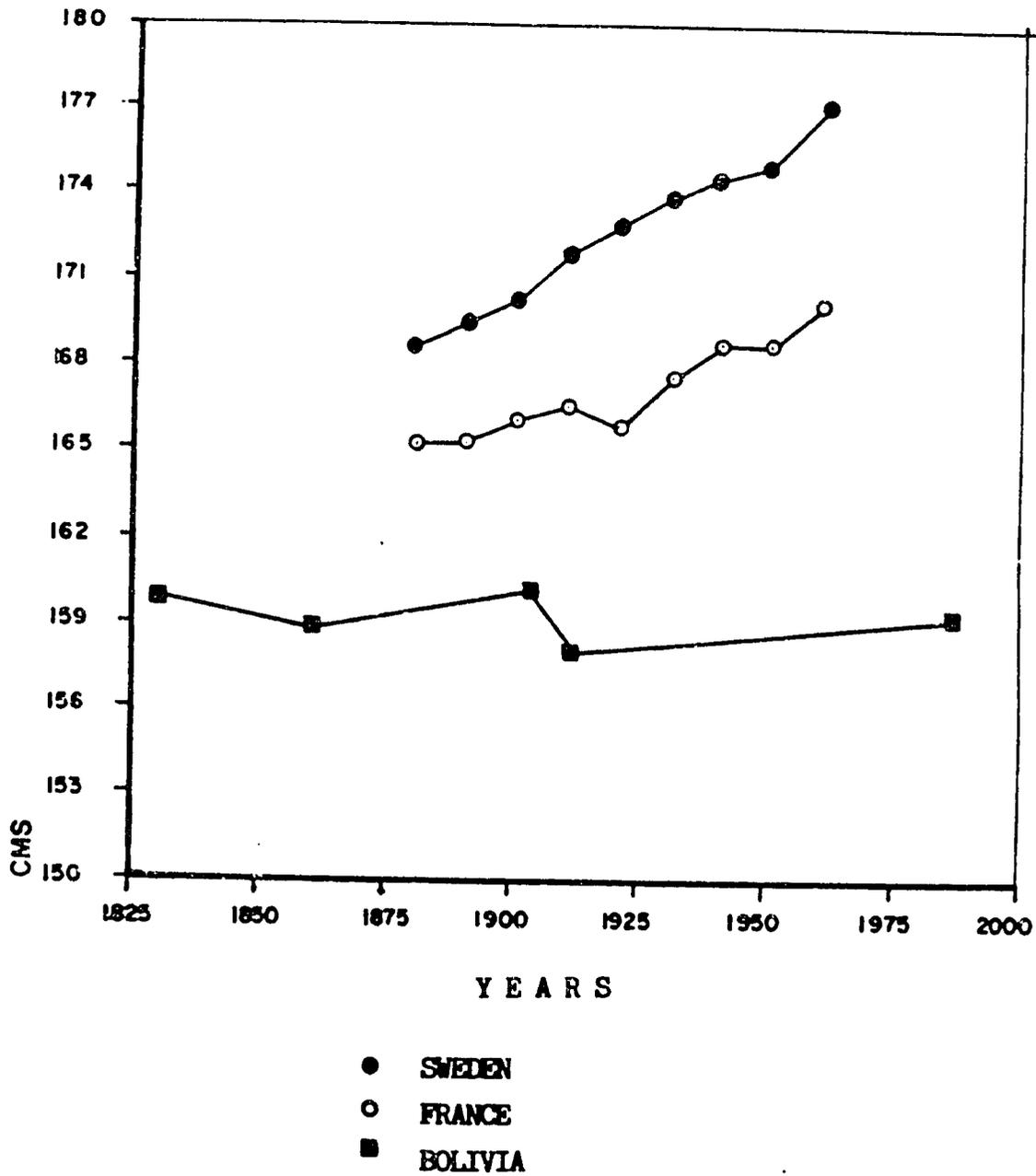
Anemia is a pathology frequently associated with the causes of maternal death (Salinas, W., 1987). It is necessary to note that there exist no nationally standardized criteria to determine the hemoglobin levels which should be considered anemic according to altitude.

With respect to the prevalence of anemia, Zuna, H. et al conducted research in 1978 on 2036 pregnant women in Santa Cruz (plains zone). Considering that hemoglobin levels less than 11 gr.% constituted anemia, they found an anemia prevalence of 35.7%.

In a study of causes of anemia among pregnant women in the Percy Boland Maternity Hospital in the city of Santa Cruz (Cardozo, L. et al, 1985), among 200 pregnant women in their second and third trimester, 25% were found to be anemic (less than 11 gr.% hemoglobin). Of the anemias, 76% were grade I (8-10 gr. Hb.), and 24% grade II (less than 8 gr. of Hb.).

Iron deficiency was found (sideremia) in 5% of the total pregnant women and in 88% of the anemic women. Macrocytosis was found in 4.5% of the pregnant women, and macropolycytosis in 5% of the same, a situation attributable to folate deficiency. The prevalence of hookworm in pregnant women was 33%.

FIGURE IV-2
 HEIGHT TRENDS: SWEDEN, FRANCE AND BOLIVIA



Source: NIFN, ORSTOM (Taken from Analysis of the Status of Women and Children UNICEF, 1987).

3. INFANT MORTALITY

3.1. Instrument Analysis

In Bolivia, both birth and death vital statistics records present levels of underreporting which range from 35% to 57% for births, and 61% to 77% for deaths (Table IV-8). Studies of the distribution of death underreporting levels, by age group, urban-rural origin, department, or ecological areas have not been undertaken. Currently the civil registrar charges a fee of Bs. 20 per registration (approximately U.S. \$10.00), which implies greater underreporting the greater the poverty level of the population. Infant deaths are relatively high in frequency in populations with limited resources, and are recorded less frequently.

All of the above makes it virtually impossible to use vital statistics to estimate infant mortality levels in Bolivia. The estimates available are all based on indirect methods obtained or projected from census data or demographic surveys.

The most reliable and coherent national data to date have been based on the 1976 National Population and Housing Census and the 1975 National Demographic Survey I.

The National Demographic Survey II was carried out in 1980, but serious problems in the data collection phase invalidated its results. Subsequently, other limited studies were performed in urban areas.

In 1983 a Medicine Prevalence Study was conducted, which included among the independent variables of the study, demographic variables for mortality in children. The study included urban strata (6,000 inhabitants or more) of the three ecological regions (high plateau, valleys, and plains), and a small sample of a dispersed rural population stratum. A total of 5,069 women from 15 to 49 years of age (90% of the expected size of the sample) were interviewed. The results may reflect the infant mortality situation of the urban strata of the country during the period 1979-1981, but the small size of the sample of the dispersed rural area (722 women expected) limits the inference of the results to the entire rural area of Bolivia.

The Comprehensive Count Survey was also conducted in Cochabamba in 1983, which covered 94% of the population of the city of Cochabamba, and whose results should reflect, very approximately, the infant mortality situation in this city during the period 1979-1981.

In 1984 a mortality study of the first three years of life in Bolivian urban areas was conducted. This is the first descriptive longitudinal study of infant mortality carried out in Bolivia. A sample of 6,071 children less than two years old was selected, who were followed for one year. A total of 4,334 children were successfully followed until the end of the study, with a loss of 28.6% of the children. The operative and logistics problems of this study limit the validity of the results obtained. This should be taken into account, particularly for results which are opposed to those obtained from other more reliable sources.

TABLE IV-8
BIRTHS AND DEATHS RECORDED BY THE CIVIL REGISTRAR¹
AND ESTIMATES DERIVED
FROM THE 1976 CENSUS, BOLIVIA: 1976-1982

Year	Births		Under- registration (%) of Births ²	Deaths		Under- registration (%) of Deaths ³	Natural Population Growth	
	Registered	Estimated		Registered	Estimated		Registered	Estimated ⁴
1976	128,252	224,670	42.9	28,456	90,274	68.5	99,274	133,946
1977	142,277	228,925	52.1	35,383	91,000	61.1	106,894	137,925
1978	151,061	234,660	35.6	32,361	91,769	64.7	118,700	142,391
1979	150,657	240,279	37.3	31,903	92,586	65.5	118,754	147,693
1980	147,667	246,070	40.0	26,928	93,433	71.2	120,739	152,637
1981	136,067	250,890	45.7	29,070	94,287	69.2	106,997	156,603
1982	106,918	252,046	57.6	21,532	95,108	77.4	85,386	156,938

¹ Information based on forms received by the Clerk of the Civil Registrar

² Under-registration (%) = $1 - \left(\frac{\text{Estimated Births} - \text{Registered Births}}{\text{Estimated Births}} \right) \times 100$
of Births

³ Under-registration (%) = $1 - \left(\frac{\text{Estimated Deaths} - \text{Registered Deaths}}{\text{Estimated Deaths}} \right) \times 100$
of Deaths

⁴ Absolute Growth = Births - Deaths

Source: National Statistics Institute, Department of Social Statistics, 1985 Bolivia Statistics, La Paz, Bolivia, 1986.

In 1984 as well, the Urban Demographic Study was conducted, which included the capitals of the departments of Bolivia. A population of 32,503 persons was surveyed. The results should approximately reflect the infant mortality situation in departmental capital cities during the period 1980-1982.

In 1983-1984 a survey was carried out by the Bolivian Human Reproduction Consultant (BHRC) in 10 Bolivian cities with a population of 20,000 or more inhabitants. 8,681 of the 10,262 women of reproductive age of the sample were surveyed, which represents an 84.6% response rate. The results may approximately reflect the infant mortality situation in the cities surveyed during the period 1983-1984.

Apart from the above sources, a summary table of Morales, Anaya R. shows infant mortality data from the period 1982-1983 which do not corroborate the results of the studies previously cited, and which unfortunately do not indicate their source. Therefore, no judgment can be made on the validity or consistency of the summary table.

According to a newspaper article,¹ the Director of the National Statistics Institute announced that the National Population and Housing Census planned for 1988 will be conducted in 1990, and that in 1988 a demographic survey will be conducted over 10% of the national population.

It will be necessary to wait until then to establish on a more solid foundation the infant mortality trends at the national level for Bolivia during the last decade.

International organizations such as UNICEF and PAHO/WHO utilize infant mortality figures for Bolivia obtained from projections developed by LAPSC (CELADE), which are based on statistical calculations of life tables, from which the trends between the 1950 and 1976 censuses are extrapolated, and which establish estimates which are considered "reasonable" for the probable evolution of life expectancy through the year 2000.

It should be emphasized that these estimates, by their very nature, do not indicate values which show variations imputable to facts and events determining infant mortality occurring after 1976, including those social, economic, or health policy changes which occurred during Bolivia's recent past.

3.2. Infant mortality trends in Bolivia

Because of the unavailability of data from civil registrars in Bolivia, the alternatives for the establishment of infant mortality trends are:

- i. Establish projections based on available data from previous years, and expected trends.

¹Presencia, October 17, 1987.

- ii. Conduct surveys or censuses which might establish approximate values for infant mortality which, compared with data available from previous years, would permit the establishment of trends.

One example of the first alternative is the projection developed by LAPSC through the year 2000, whose limitations were noted above. According to such projections, infant mortality during the five year period 1970-1975 was 151 per 1,000 live births, and would have reached values of 138 and 125 during subsequent five year periods, reaching 110 per 1,000 live births during the current five year period.

Although these projections could at one time or another approximate the real values of infant mortality in Bolivia, it is obvious, as indicated above, that the economic and social crisis which has strongly impacted Bolivians' living conditions during the current decade is not reflected in these projections.

The second alternative has been applied to Bolivia, as analyzed above. The results of these surveys are summarized in Table IV-9.

The only survey of national coverage after the 1976 census was the National Demographic Survey II (NDS II) in 1980. Unfortunately, the results of this survey were invalidated by the problems noted above, so that the possibility of relying on national data more recent than those of the 1976 census was lost.

The surveys conducted after 1980 have covered urban areas only. The only survey which included a dispersed rural area in its sample was the Medicine Prevalence Survey (MPS), but the sample design practically restricts inferences with reasonable margins of error to urban areas of the country.

Three of the five surveys conducted after 1980 present results which, compared with the data of the 1976 NPHC, would imply a downward trend in infant mortality in Bolivian urban areas between 1974 and 1982.¹ Of the two surveys which contradict the apparent downward trend in this period, that of BHRC presents the greatest increase. Its results not only show a higher infant mortality rate than the other surveys, but an even higher one than the 1976 NPHC survey. According to this survey, the infant mortality trend in department capitals between 1974 and 1982 would have been increasing, with the exceptions of Sucre and Tarija (See Table IV-10). The cities with the greatest increase in mortality were Santa Cruz and Cochabamba. The Comprehensive Counting Survey was conducted in Cochabamba in 1983, whose results also indicate a rise in infant mortality (106 to 114), but not as pronounced as that of the BHRC survey (106 to 148).

TABLE IV-9
INFANT MORTALITY IN BOLIVIA, ACCORDING TO VARIOUS SOURCES
BY URBAN AND RURAL AREAS SURVEYED, 1975 TO 1984

Year and Source	1975	1976	1980	1983		1983-84	1984	
Place	NDS I ¹	NPHC ²	NDS II ³	MPS ⁴	CCS ⁵	BHRC ⁶	MSWPH ⁷	EDS ⁸
Bolivia	164	167	128	119	--	--	--	--
<u>Urban</u>								
Ranges	--	97-134	--	100	114	115-148	91-108	89-105
Departmental Capital	--	124	--	100	--	128	98	89
<u>High Plains</u>								
Departmental Capital	--	138	--	--	--	144	91	97
<u>Valleys</u>								
Departmental Capital	--	107	--	--	--	125	106	--
<u>Plains</u>								
Departmental Capital	--	98	--	--	--	115	108	--
La Paz	--	125	--	--	--	134	--	105
Cochabamba	--	106	--	--	114	148	--	--
Santa Cruz	--	97	--	--	--	136	--	--
Rural	--	171	--	138	--	--	--	--

Source: ¹ National Demographic Survey I
² National Population and Housing Census
³ National Demographic Survey II
⁴ Medicine Prevalence Survey
⁵ Comprehensive Counting Survey in Cochabamba
⁶ Bolivian Human Reproduction Consultant's Survey
⁷ MSWPH & PAHO/WHO Mortality study in the First Three Years of Life
⁸ Urban Demographic Survey
 -- Data not Available

TABLE IV-10
VARIATION IN INFANT MORTALITY IN VARIOUS BOLIVIAN CITIES
ACCORDING TO THE 1976 CENSUS AND THE 1983-1984 BHRC SURVEY

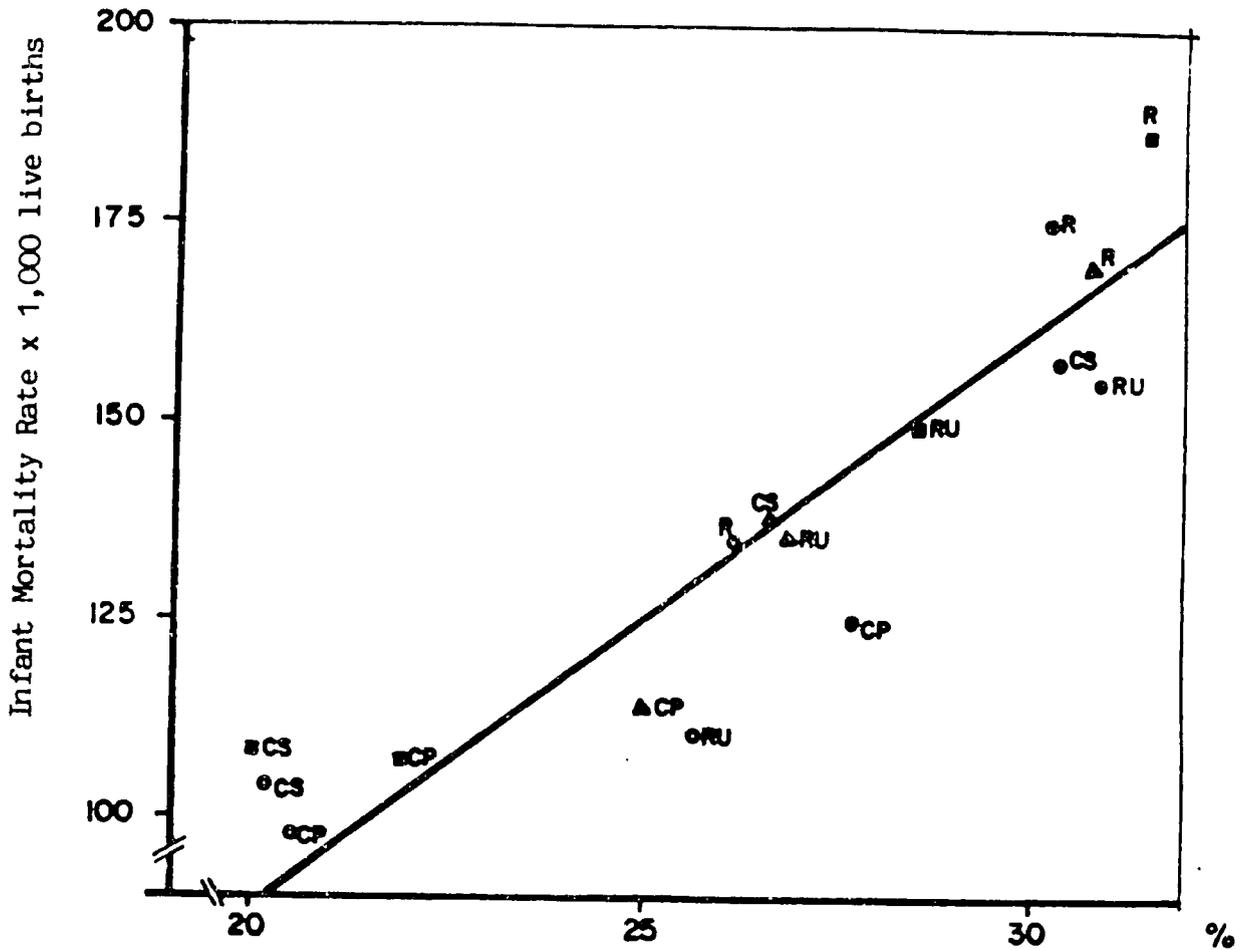
Cities	1976	1983-1984	Percent Variation
La Paz	123.6	133.5	+ 8
Cochabamba	105.7	147.6	+ 40
Santa Cruz	95.5	135.6	+ 42
Oruro	139.1	140.9	+ 1
Potosí	164.2	171.3	+ 4
Sucre	121.4	108.1	- 12
Trinidad	92.2	97.9	+ 5
Tarija	85.7	82.4	- 4
Quillacollo	-	129.2	-
Montero	-	87.1	-

Source: Reda Durán L., Del Castillo Asín J: "Influence of Socio-economic and Cultural Factors on Human Reproduction. C.A.P. Survey". BHRC, La Paz, Bolivia, 1985. pp. 176

Of the remaining three surveys, the Urban Demographic Survey (UDS) attained the most solid and coherent results and merits the most attention. Unfortunately the available data are brought together in such a way that they cannot be compared with the BHRC survey. However, the UDS average value for department capitals is much lower than that of the BHRC survey (89 and 128 respectively). We know of no other more recent surveys which could indicate the status of infant mortality after 1982. The next National Demographic Survey is planned for 1988, and its results could fill many existing gaps in information on the evolution of infant mortality in Bolivia, especially in rural areas, where there has been an almost absolute lack of data since the 1976 Census.

There is speculation about the impact of the economic crisis on social indicators, particularly on infant mortality in the literature reviewed. Socio-economic conditions are undoubtedly factors which affect the health of the population, and consequently, the probability of death, particularly in more vulnerable age groups such as children. But the relationship between economic crisis and infant mortality is complex: a group of variables and conditions enter into play which should be analyzed with care, in order to gain an adequate grasp of the situation and of the factors which positively and negatively affect this relationship in each population group. In other parts of this document, existing relationships between economic conditions and the health and well-being of Bolivian children are analyzed.

**FIGURE IV-3
CORRELATION BETWEEN INFANT MORTALITY AND
THE RATIO OF DEATHS BY ONE YEAR OF AGE OVER
TOTAL DEATHS IN CHILDREN UNDER TWO
BY ECOLOGICAL REGION AND ORIGIN**



Ratio of deaths by one year of age over
total deaths in children under two years of age.

- | | |
|------------------|----------------------|
| ▲ Entire Country | C.P. Primary City |
| ● High Plateau | C.S. Secondary City |
| ■ Valleys | R.U. Urban Remainder |
| ○ Plains | R. Rural |

Sources: (1) LAPSC-UNICEF, Infant Mortality in Bolivia. OI Series, No. 38. Santiago de Chile, 1985. p.20.

(2) UNFPA, Life's Light and Shadow. Mortality and Fertility in Bolivia. Population Policies Project. Ministry of Planning. La Paz, Bolivia, 1983. p. 159.

It is important to stress that infant mortality rates show large variations between population groups affected. These are variations not only in the respective infant mortality rates of each population group, but also in the factors which influence them. For this reason it is very useful to analyze infant mortality separated by geographical, socio-economic, and cultural characteristics, as far as the data available from the 1976 Census will allow, in spite of the passage of time and possible changes in the characteristics of the groups studied.

3.3. Child Mortality Differentials

Before beginning the analysis of infant mortality as such, it is useful to make clear that the structure of causes of death among children less than one year old continue to affect survivors, perhaps causing their death in subsequent years, and even affecting the last survivors. Moreover, deterioration in the quality of life during the early stages of life can have consequences which significantly affect future living conditions of these children and their descendants. Therefore it is not sufficient for a global strategy to guarantee survival during the first year of life: it is also necessary to guarantee a quality of life commensurate with the human dignity to which it is possible to aspire in the context of the social and technological development of the twentieth century.

That infant mortality is no more than the antechamber for mortality during the following year of life is clearly shown by the NPHC data itself. As can be seen in Table IV-11, the higher the infant mortality rate (mortality among children under one year of age), the higher the mortality rate among children more than one year old during their second year of life. However, not only does the mortality in children during their second year of life increase in proportion to infant mortality, but also a higher infant mortality increases the relative proportion of deaths which occur after the age of one with respect to the total deaths which occur in children under two (Figure IV-3). From this it is evident that if indeed the biological conditions of the child less than one make the child particularly vulnerable to its environmental conditions, when these conditions are extremely severe they are capable of overcoming the biological defenses of the child older than one in a proportion which surpasses the rate of increase produced in infant mortality. This situation is analogous to that seen in the relation between neonatal and postnatal mortality under intermediate environmental conditions.

3.3a. Infant Mortality According to Mother's Place of Residence and Socio-Economic Group¹

According to the NPHC, the average infant mortality in the country in 1976 was 167.5 per 1000 live births. The valleys (210.3) and the high plateau (191.2) presented IMRs higher than the national average (Figure IV-4). The high IMR of the valleys in turn shows marked disparity between

¹See Annex 1 for Census definition of Place of Residence and Socio-economic Group.

primary cities (111.4) and secondary cities (112.9), and intermediate rural areas (224.7) and highly rural areas (251.9). This is very significant, because three-quarters of the population of the valleys live in rural areas.

TABLE IV-11
MORTALITY¹ IN CHILDREN UNDER 2 YEARS OLD ACCORDING TO AGE AT DEATH BY ECOLOGICAL AREA AND PLACE OF RESIDENCE, BOLIVIA, 1976 CENSUS

Place of Residence	COUNTRY			HIGH PLATEAU			VALLEYS			PLAINS		
	Age			Age			Age			Age		
	<1yr	1yr	<2yr	<1yr	1yr	<2yr	<1yr	1yr	<2yr	<1yr	1yr	<2yr
Total	153 ¹	60 ²	213 ²	155	62	217	174	76	250	120	40	160
Primary City	114	38	152	125	48	173	107	30	137	97	25	122
Secondary City	138	50	188	158	69	227	108	27	135	103	26	129
Urban Remainder	136	50	186	156	70	226	150	60	210	110	38	148
Rural	171	76	247	176	77	253	138	87	275	135	48	183

¹per 1,000 population

Source: ¹LAPSC-UNICEF, Infant Mortality in Bolivia, DI Series, No. 38. Santiago, de Chile, 1985. p. 20.

²UNFPA, Life's Light and Shadow-Mortality and Fertility in Bolivia. Population Policies Project-Ministry of Planning, La Paz, Bolivia, 1983. p. 159.

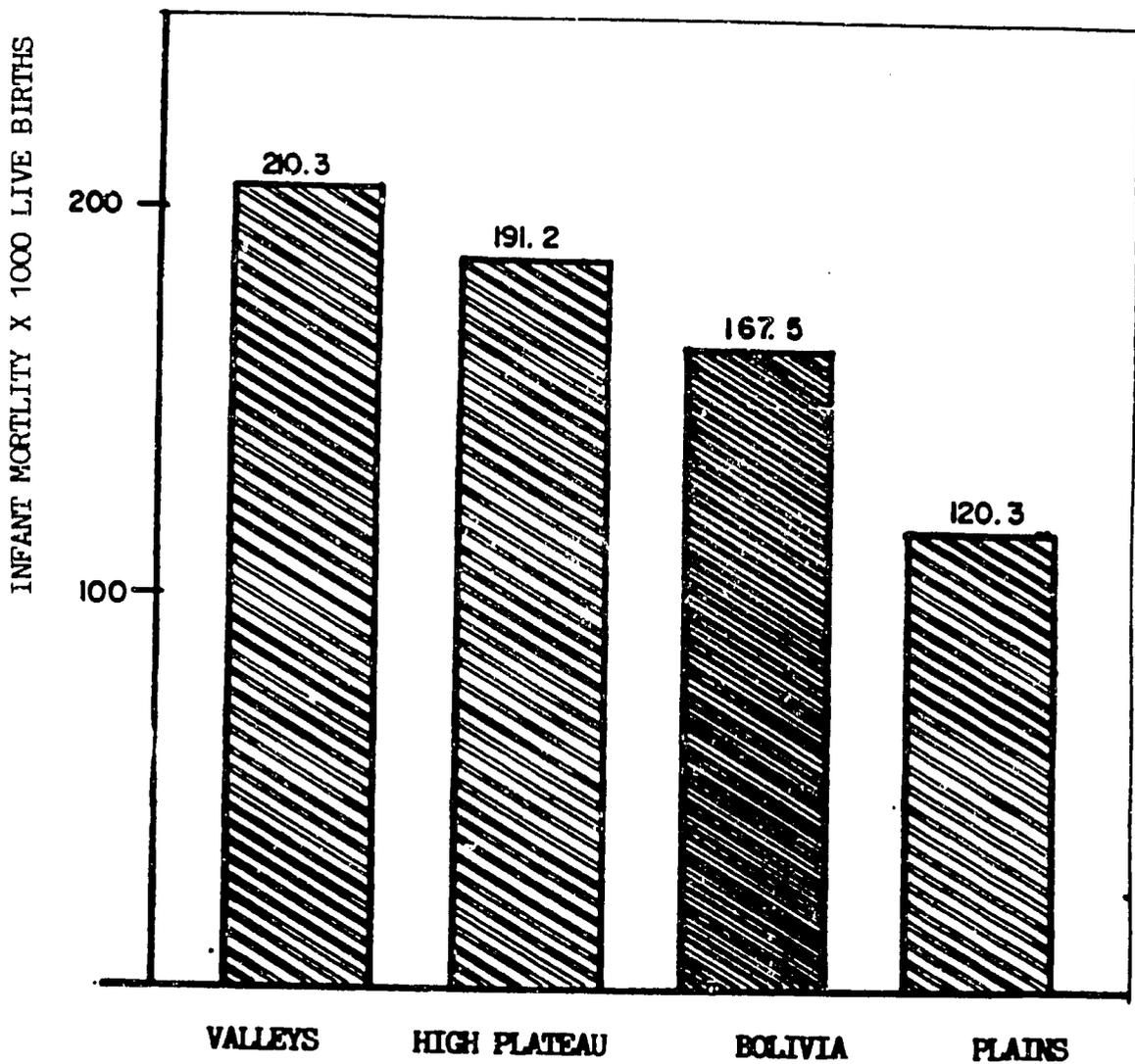
³Difference between ² and ¹. Mortality for under-1 year olds and under-2 year olds was calculated using the basic data from the 1976 census.

The high plateau presents urban-rural differences in its IMR, but these are not as pronounced as those of the valleys. The urban population of the high plateau represents more than one-half of the population of this ecological area, and the urban IMRs of the high plateau are much higher than the urban IMRs of the valleys.

In comparing the rural IMRs of the valleys and the high plateau, we find similarities, with the exception that the high rural valley rate is higher than the others.

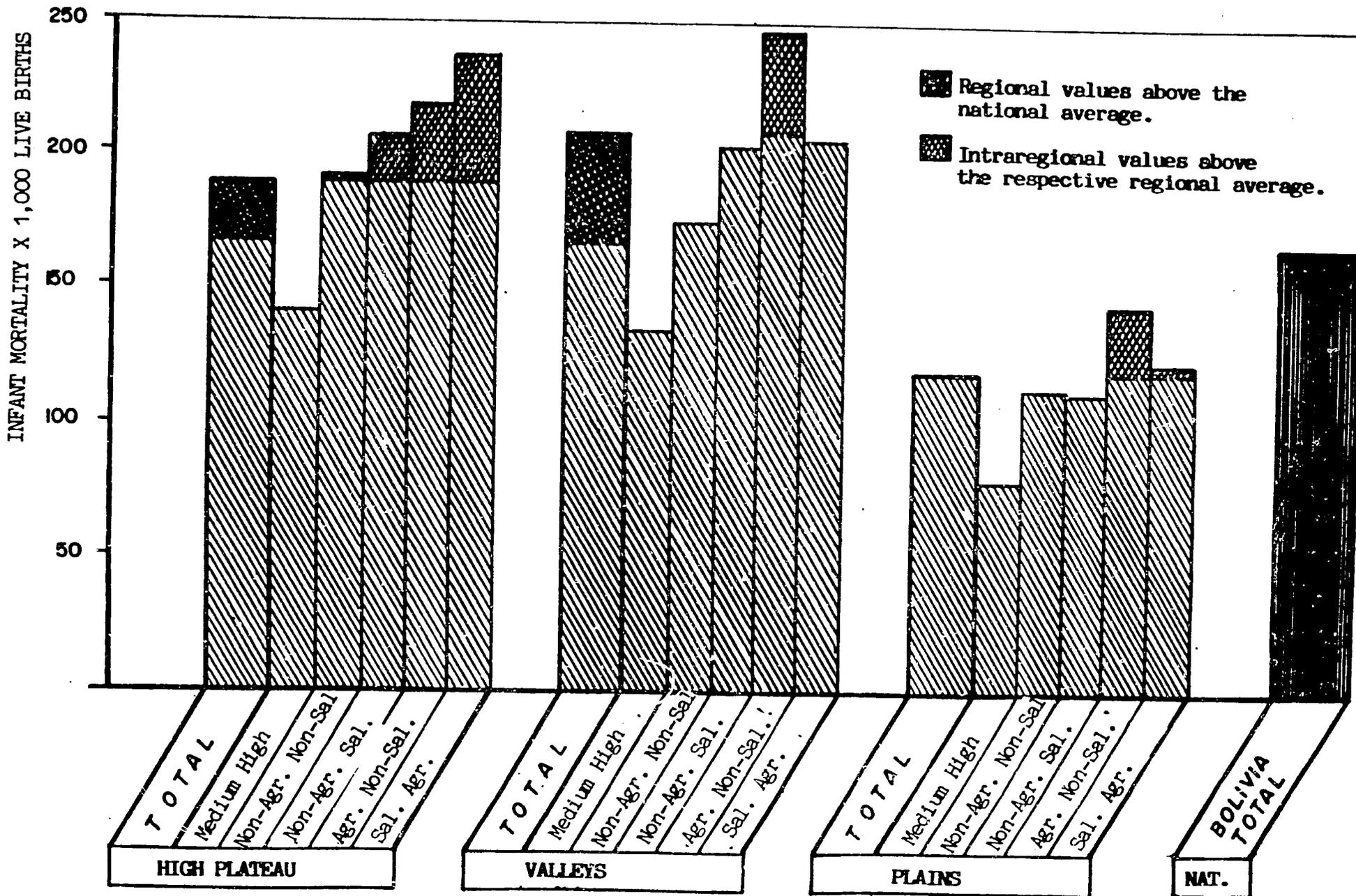
This analysis indicates that the rural areas of both regions (valleys and high plateau) and the urban areas of the high plateau are the most critical with respect to the high IMRs in Bolivia.

FIGURE IV-4
INFANT MORTALITY IN BOLIVIA
BY ECOLOGICAL REGION
NBPC 1976



Source: 1976 Population Census.

FIGURE IV-5
 INFANT MORTALITY BY ECOLOGICAL REGION
 ACCORDING TO SOCIO-ECONOMIC GROUP
 BOLIVIA, 1976



Obviously people do not live where they want, but where they can, and living in one area or another represents much more than the physical conditions of the ecological environment. We now see the behavior of the IMR as a function of the socio-economic group to which the population belongs (Figure IV-5). In all of the ecological regions, the group defined as "upper middle" presents lower IMRs than the other groups defined as "poor." In the valleys and the plains, the groups called "Poor - non-salaried Agricultural" presented the highest IMRs in their respective regions (247.2 and 146.5 respectively), while the group called "Poor - Salaried Agricultural" presented the highest IMR in the high plateau (238.0) followed by the "Poor Non-salaried Agricultural" group (219.9). But if the numerical importance of the "Poor Salaried Agricultural" and "Poor Non-salaried Agricultural" populations of the high plateau is compared, it is evident that the former represents only 1% of the population of the high plateau, while the latter represents 38%. Consequently the "Poor Non-salaried Agricultural" group merits the greatest attention because it is the most numerous in the high plateau, as well as in the valleys and the plains.

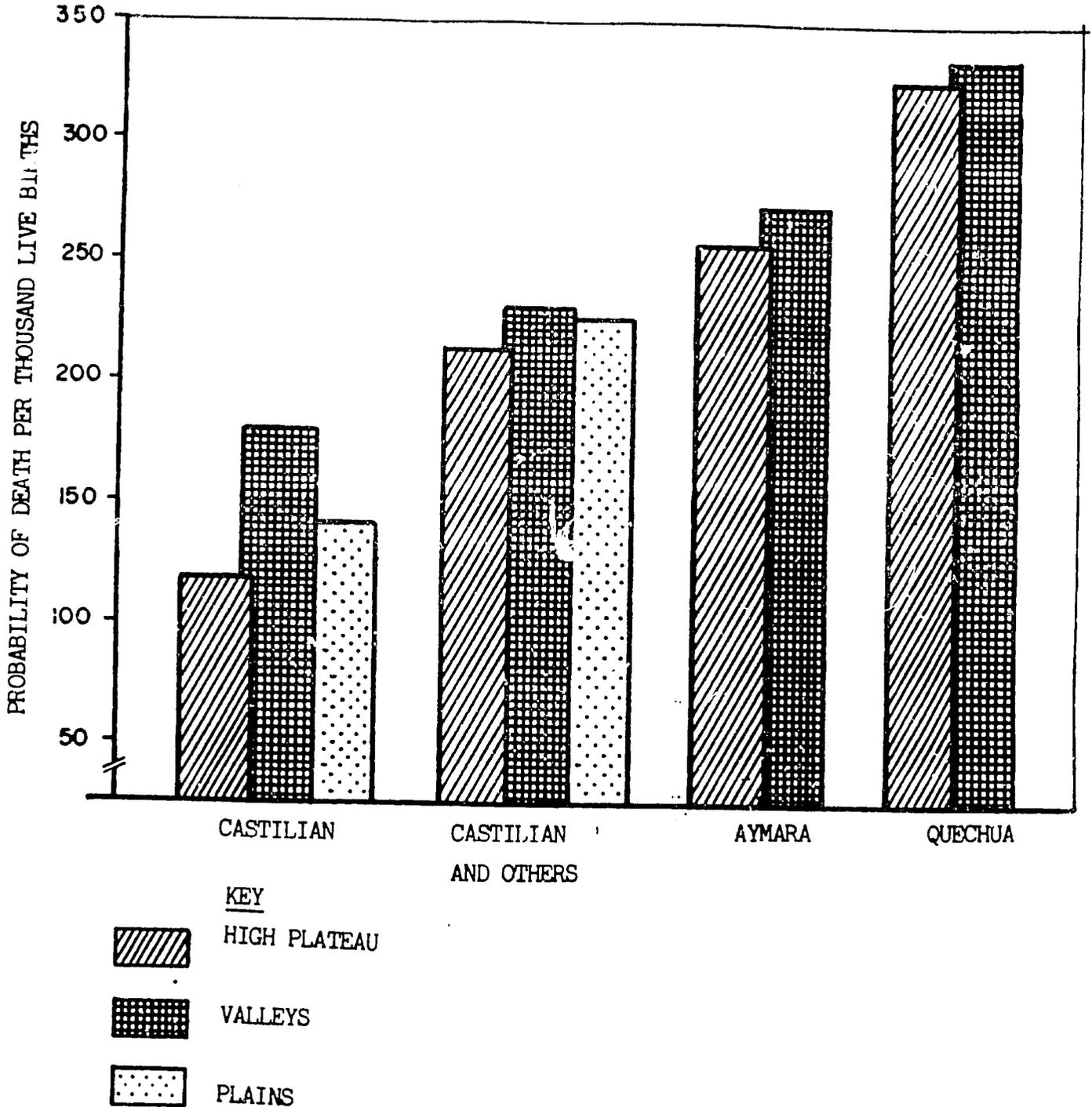
In both the high plateau and the valleys the groups called "Salaried Non-Agricultural" present higher IMRs than the Non-salaried Nonagricultural groups, while this difference does not exist in the plains (Figure IV-5). The analysis can be deepened by using the data available on mortality between birth and two years of age. Table IV-12 shows that in the primary cities, salaried individuals present lower mortality rates than non-salaried individuals. However, in secondary cities of the high plateau and the valleys, and in the urban remainder of the valleys, salaried individuals present higher mortality rates than non-salaried individuals.

If we assume no statistical errors have occurred, a hypothesis could explain this apparent contradiction: mining constitutes the primary salaried activity in these areas, and the mining population, which must submit to unfavorable working conditions and low salary levels, has a low life expectancy and consequently high levels of infant mortality. By contrast, the non-salaried individuals of these areas devote themselves to informal commercial activities, which in the long run allow slightly better living conditions than those of the miners. Already in the large cities of La Paz and Cochabamba, being a salaried worker implies light manufacturing jobs. In commerce, where salary levels are better, certain of the basic family necessities are guaranteed. Salaried individuals are better off than non-salaried individuals in this context.

3.3b. Infant Mortality According to the Mother's Ethnic, Cultural, and Educational Characteristics

The mother's spoken language constitutes an element of ethnic identity, which in turn is linked to other social factors determining the living conditions of population groups. As can be seen in Figure IV-6 the ethnic group is much more strongly associated with childhood mortality than the ecological regions where they reside. The Quechua group presents the highest childhood mortality rates, followed by those of the Aymaras. The ethnic group which shows the lowest rate is the Spanish-only group.

FIGURE IV-6
CHILD MORTALITY DIFFERENTIALS
ACCORDING TO MOTHER'S LANGUAGE



Source: Garcia Tornell C. et al. Leap into the Future.
FNUAP Population Policies Project
Ministry of Planning and Coordination
La Paz, Bolivia, 1985. p. 50.

TABLE IV-12
PROBABILITY OF DEATH PER THOUSAND LIVE BIRTHS BETWEEN BIRTH AND
AGE TWO BY ECOLOGICAL REGION CONTEXT AND SOCIAL SECTOR

Contexts and Social Sectors	Country	Ecological Regions		
		High Plateau	Valleys	Plains
Primary Cities	152	173	137	122
Upper Middle	109	128	86	80
Salaried, non-agricultural	176	187	165	140
Independent, non-agricultural	192	215	169	156
Secondary Cities	188	227	135	129
Upper Middle	121	151	91	68
Salaried, non-agricultural	245	280	167	166
Independent, non-agricultural	200	250	143	140
Urban Remainder	186	226	210	148
Upper Middle	133	174	149	98
Salaried, non-agricultural	215	244	242	147
Independent, non-agricultural	198	250	223	154
Salaried agricultural	163	--	194	154
Independent agricultural	210	--	218	199
Rural Intermediate	236	251	269	178
Upper Middle	156	185	173	129
Salaried, non-agricultural	242	281	264	169
Independent agricultural	206	220	218	156
Salaried agricultural	201	--	--	190
Independent agricultural	256	256	286	181
High Rural	256	255	280	190
Upper Middle	175	182	163	123
Salaried non-agricultural	268	273	286	200
Salaried agricultural	210	--	--	144
Independent agricultural	270	264	291	201

Source: Carafa, C., et al. Life's Light and Shadow, UNFPA Population Policies Project, La Paz, Bolivia, 1983. p. 165. (Developed with data from the 1976 Population Census).

According to place of residence (Table IV-13), the Quechuas who reside in rural areas (high and intermediate) have the highest IMRs, while those who live in primary cities have the lowest IMRs among this ethnic group. Similar relationships are observed for the group which speaks Spanish and another native language, and the group which speaks Spanish exclusively. The average infant mortality values of the latter group are of course lower than those of the Quechuas. In contrast to the relationship noted above, the Aymara group's second highest IMR is in the primary cities (222) rather than in the intermediate rural areas. However, independent of their place of residence, the Quechuas and Aymaras always present the highest IMRs, followed by the heterogenecus group, which, according to the census, speaks Spanish and another language.

TABLE IV-13
INFANT MORTALITY' BY MOTHER'S LANGUAGE, ACCORDING TO PLACE
OF RESIDENCE AND SOCIO-ECONOMIC GROUP
BOLIVIA, 1987

Place of Residence and Socio-economic Group	Quechua	Aymara	Spanish & other	Spanish
BOLIVIA	277.7	238.8	186.8	125.6
Place of Residence				
Primary City	204.7	222.1	152.9	87.0
Secondary City	244.9	-	183.2	107.8
Urban Remainder	227.5	190.1	170.8	110.7
Intermediate Rural	267.2	215.4	205.3	138.0
High Rural	289.5	252.8	216.0	163.7
Socio-economic Group				
Upper Middle	221.6	223.1	142.8	87.1
Low Non-salaried Non-agricultural	236.9	229.1	177.1	121.4
Low Salaried Non-agricultural	299.8	260.8	193.8	126.9
Low Non-salaried Agricultural	277.5	241.4	214.4	160.3
Low Salaried Agricultural	240.4	228.9	169.3	126.0

*per 1000 live births

Source: 1976 Population Census

With respect to the socio-economic group to which they belong, lower levels of infant mortality are seen in the group classified as upper middle for each ethnic group considered. But in spite of the relative advantage conferred by this factor within each ethnic group, that is, belonging to an upper-middle socio-economic group, the IMRs of the Quechuas and Aymaras who belong to the upper middle group (221.6 and 223.1) are higher than the rates of the low salaried non-agricultural groups who speak Spanish and another language (214.4) and Spanish only (160.3). Whereas for the latter the highest IMRs are found in the non-salaried agricultural group, for the Quechuas and Aymaras the highest rates are found in the low salaried non-agricultural group (299.8 and 260.8 respectively).

These data give rise to the hypothesis that the process of social marginalization of indigenous Bolivian groups is not limited to their situation in low socio-economic groups. Rather, even within each socioeconomic group, they are located in the most depressed sector, which is reflected in significantly higher IMRs among the indigenous groups than among all the socio-economic groups encountered, even within the upper middle group.

The reservation should be noted that the categorization of ethnic group by language has limitations, particularly for the group which, according to the Census (Table IV-14), is the largest. We refer to the category which "speaks Spanish and another language" (41% of the total population), which is also comprised of indigenous groups which have felt the need to learn another language in an environment where Spanish is the dominant language, and whose living conditions may not differ from those of

the indigenous groups which speak their native language only. In the category "Spanish-speaking and another language" there are also mestizos with different degrees of assimilation to the dominant culture.

What should be clear is that the indigenous population of Bolivia is not the 23% which, according to the census, speak only Aymara and/or only Quechua, given that among the 41% who speak "Castilian and another", there is a significant indigenous portion with not only a native language distinct from that of the dominant culture, but moreover, with a different system of values and beliefs, and their own world view.

TABLE IV-14
POPULATION DISTRIBUTION ACCORDING TO LANGUAGE, BY AGE GROUP
BOLIVIA, 1976

Age Language	<15 yrs	15-49 yrs	50+	Total		Cum.%
	No.	No.	No.	No.	%	
Aymara alone	104,957	112,227	98,044	313,228	7.6	7.6
Quechua alone	168,418	262,691	137,598	568,707	13.7	21.3
Aymara & Quechua	5,299	29,222	19,163	52,684	1.3	22.6
Castilian & Aymara	192,082	432,307	55,629	680,018	16.4	39.0
Castilian & Quechua	240,596	528,698	95,480	864,774	20.8	59.8
Castilian & both	9,990	75,380	17,299	102,669	2.5	62.3
Castilian & others	12,896	28,991	7,915	49,802	1.2	63.5
Castilian only	719,070	676,491	112,804	1,508,365	36.3	99.8
Others	3,009	2,704	1,301	7,014	0.8	100.0
Total	1,456,317	2,147,711	545,233	4,149,261	100.0	--

Source: 1976 Population Census.

Another characteristic associated with infant mortality is the mother's level of education, as can be seen in Table IV-15. The greater the educational level, the lower the IMR. This is observed for the whole country and for each ecological region. Nevertheless, if the different regions are compared for each level of education, large disparities are seen. For example, the IMR for mothers with 6 to 8 years of education in the high plateau (184.7) is greater than the IMR for mothers with no education in the plains (152.6). This only confirms the observations made above about the marginalization process for population groups. Even if education level is an indicator of greater distributive justice in education, strongly guarded barriers are maintained in the dominant social structures which impede the full enjoyment of the benefits which the educational levels attained could offer. Therefore, unacceptable IMRs continue in spite of higher educational levels. The association between infant mortality and education level, as well as many other variables, has a complex nature. The knowledge which a mother acquires throughout a certain number of years of academic instruction does not necessarily imply knowledge of how better to care for her children. The associations of other variables, such as family

income, access to basic services, etc., with education level, are factors which contribute to better clarify the relation between infant mortality and educational level.

There is a tendency to superficially interpret data such as those of Table IV-15, noting that the high IMRs for children of mothers with no education indicate that such mothers lack adequate "knowledge" to bring up their children, and of how to prevent sickness and death. This kind of analysis forgets that insufficient instruction is associated with unemployment, low family income, inadequate housing, lack of drinking water, lack of food, inaccessibility to health services, etc., and that if a mother with a university education were placed under the same conditions, it is almost certain that her children's probabilities of survival would be equal to or perhaps less than those of the children of an illiterate mother.

TABLE IV-15
INFANT MORTALITY BY ECOLOGICAL REGION ACCORDING TO MOTHER'S
EDUCATIONAL LEVEL
BOLIVIA, 1976

Education Level	Bolivia	High Plateau	Valleys	Plains
No education	226.5	248.4	250.9	152.6
1 - 2 years	195.1	206.2	234.1	129.4
3 - 5 years	157.6	187.5	188.5	112.1
6 - 8 years	136.6	184.7	146.7	92.2
9 or more years	75.7	86.7	84.6	54.4

per 1,000 live births

Source: 1976 Population Census.

3.3c. Infant Mortality According to Housing Quality and Services

Conditions of housing and basic services are positively related to the health conditions of their inhabitants. This postulate is reflected in the statistics of Table IV-16.

For the entire country and for each ecological region, good quality housing and services¹ are associated with lower IMRs. Nevertheless, the infant mortality values for good quality housing in the high plateau (131) and the valleys (127) are very close to the values for housing of bad quality in the plains (134).

¹Definition of housing quality and services

Housing Quality:

Good: (Tile or corrugated metal roof, or tile and covered floor).

Bad: (Other: earth floor, and/or roof of poor materials.)

Housing Services:

Good: (Plumbing, well, or pump and sewage system, latrine or bore-hole latrine).

Bad: (Others)

However, the same table shows that the IMRs for housing with good services is very similar for the three ecological regions (105, 97, 95). These data give rise to the hypothesis that the reduction of infant mortality is more strongly associated with good housing services, than with the quality of housing as defined by the Census.

TABLE IV-16
INFANT MORTALITY BY REGIONS ACCORDING TO
QUALITY OF HOUSING AND SERVICES
BOLIVIA, 1976

Quality of Housing and Services	R e g i o n s			
	Total	High Plateau	Valleys	Plains
Quality of Housing:				
Good	121	131	127	95
Poor	170	171	189	134
Housing Services:				
Good	99	105	97	95
Poor	166	164	181	155

per 1,000 live births

Source: LAPSC, UNICEF: "Infant Mortality in Bolivia." Series OI No. 38, Santiago, Chile, 1985. p. 32. (Based on 1976 Population Census).

The fact that the infant mortality values in the plains are equal for good housing quality and good services (95), together with the fact that the proportion of children born where there is high quality housing (38%) is almost equal to the proportion of children born where there is housing with good basic services (40%) (Table IV-17), reinforces the hypothesis above. By contrast, the high plateau and valleys present important differences in infant mortality between good quality housing (131 and 127) and good housing services (105 and 97). In addition, in these regions the proportions of children born where there is good quality housing (41% and 23%) differs from the proportion born where there are good housing services (17% and 9% respectively). This necessarily implies that a large proportion of housing classified as good lacks good services in the high plateau and plains.

But even when the data and epidemiological analysis reinforce these hypotheses, it should not be forgotten that these variables are also intimately related and mutually reinforce themselves with the other variables presented before.

4. STRUCTURE OF MORTALITY IN CHILDREN

The sources available on mortality data by cause are the civil registrar and hospital mortality registrars. In both cases underrecording is high in the whole country. According to the NSI, the underrecording of deaths in the civil registry estimated for 1981 was 69.2%. The most recently available mortality tabulations at the national level of the civil registry are for the year 1981. Between August, 1982 and July 1983, the MSWPH and PAHO recorded the mortality data from the civil registrars and hospital deaths in the urban

areas of the country, obtaining mortality data during the first 3 years of life, which allow for comparisons between ecological regions and the two data sources.

TABLE IV-17
RELATIVE DISTRIBUTION OF CHILDREN OF MOTHERS AGES 15-49
BY REGION, ACCORDING TO QUALITY OF HOUSING AND SERVICES
BOLIVIA, 1976

Quality of Housing and Services	Total	R e g i o n s		
		High Plateau	Valleys	Plains
TOTAL	100%	100%	100%	100%
Quality of Housing:				
Good	33%	41%	23%	38%
Poor	67%	59%	77%	62%
Housing Services:				
Good	18%	17%	9%	40%
Poor	82%	83%	91%	60%

Source: LAPSC, UNICEF: "Infant Mortality in Bolivia". Series OI No. 38, Santiago, Chile, 1985. p. 33. (Based on 1976 Population Census).

Because of its logistic and operational characteristics, the civil registry data better represent the situation of urban groups, of upper middle and low income salaried non-agricultural Spanish-speaking socio-economic strata, of those with medium and high education levels, and of those with better living conditions and basic sanitary services. Even if the other groups should eventually register their deaths at the civil registries, it is likely that this will happen much less frequently than with the other groups mentioned.

Records of hospital mortality better represent the situation of approximately the same groups noted above, and are conditioned, moreover, by accessibility to the health services. The advantage of these registrars over civil registrars is their diagnostic quality, but they have the disadvantage of excluding an important part of the population which does not have access to institutional health services.

This means that the structures of mortality reflected in the available data better represent the situation of sectors of the Bolivian population with less risk, than those sectors which have not had access to civil registrars or to hospitals, and whose health conditions may be much worse than the available data indicate.

TABLE IV-18
TEN PRIMARY CAUSES OF DEATH IN CHILDREN UNDER 5 ACCORDING TO CIVIL REGISTRY
BOLIVIA, 1981

Rank	C a u s e ¹	No.	(%)	Cum. %
1.	<u>Infectious Intestinal Diseases</u>	2,257	(19.0)	19.0
	- Typhoid Fever	24		
	- Shigellosis	4		
	- Food poisoning	17		
	- Intestinal infections due to other specific organism	1		
	- Poorly defined intestinal infections	2,211		
2.	<u>Other Respiratory Diseases</u>	2,104	(17.7)	36.7
	- Acute Bronchitis and Bronchiolitis	180		
	- Pneumonia	1,616		
	- Influenza	122		
	- Chronic Bronchitis and non-specified Emphysema and Asthma	90		
	- Pneumoconiosis and other pulmonary diseases due to external agents	51		
	- Others and non-specified	45		
3.	<u>Certain Infections Originating during the Prenatal Period</u>	1,664	(14.0)	50.7
	- Disease of mother affecting fetus and newborn	10		

Rank	C a u s e	No.	(%)	Cum. %
	- Obstetric complications affecting the fetus and newborn	3		
	- Slow fetal growth, malnutrition, and fetal immaturity	183		
	- Birth stress	12		
	- Hypoxia, asphyxia, and other respiratory infections of the fetus and newborn	937		
	- Hemolytic infections of the fetus or newborn	3		
	- Others and non-specified (including neonatal tetanus)	516		
4.	<u>Other Bacterial Infections</u>	1,020	(8.6)	59.3
	- Diphtheria	3		
	- Whooping Cough	391		
	- Streptococcal Pharyngitis, Scarlet Fever, Erysipelas	427		
	- Tetanus (acquired)	16		
	- Septicemia	169		
	- Others and non-specified	13		

(continued)

¹Causes grouped according to the 9th International Disease Classification

TABLE IV-18
TEN PRIMARY CAUSES OF DEATH IN CHILDREN UNDER 5 ACCORDING TO CIVIL REGISTRY
BOLIVIA, 1981
 (continued)

5. <u>Viral Diseases</u>	743	(6.2)	65.5
- Acute Poliomyelitis	13		
- Varicella	13		
- Measles	564		
- Rubella	1		
- Yellow Fever	129		
- Viral Hepatitis	6		
- Others and non-specified	13		
6. <u>Diseases of the Endocrine Glands and Metabolism, and Immunological Disorders</u>	705	(5.9)	71.4
7. <u>Circulatory, Pulmonary Diseases, and other forms of Heart Disease</u>	516	(4.3)	75.7
8. <u>Mental Disorders</u>	341	(2.9)	78.6
9. <u>Diseases of the Nervous System</u>	168	(1.4)	80.0
10. <u>Diseases of other parts of the digestive tract</u>	165	(1.4)	81.4
Sub-total	9,683	(81.4)	
Signs, Symptoms, and Poorly Defined Illness	1,223	(10.3)	91.7
Other Causes	978	(8.3)	100.0
TOTAL	11,884	(100.0)	-

In 1981 a total of 28,097 deaths were registered with the civil registrar. Of these, 11,884 (42.3%) were less than 5 years old. The 5 primary causes of death in this age group were (Table IV-18):

1. Infectious Intestinal Diseases
2. Other Respiratory Diseases
3. Certain Disorders Originating in the Pre-Natal Period
4. Other Bacterial Diseases
5. Viral Diseases

These causes together represent two-thirds (65.5%) of the deaths in children under five, and are all vulnerable, in greater or lesser measure, to currently available technologies. The following five causes of death, which represent 16% of the total, are less preventable causes, and some are dubiously classified (for example, mental disorders). Signs, symptoms and poorly defined illness represent 10% of the deaths.

TABLE IV-19
TEN PRIMARY CAUSES OF DEATH IN CHILDREN UNDER FIVE BY AGE GROUP
ACCORDING TO THE CIVIL REGISTRY
BOLIVIA, 1981

CAUSES	< 1 mo.		1-11 mo.		1-4 yrs.		Total	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
1 Intestinal Infectious Diseases	158	(7)	976	(43)	1123	(50)	2257	(100)
2 Other Respiratory Diseases	351	(17)	957	(45)	796	(38)	2104	(100)
3 Certain disorders originating during perinatal period	1664	(100)	-	-	-	-	1664	(100)
4 Other bacterial diseases	167	(16)	326	(32)	527	(52)	1020	(100)
5 Viral diseases	58	(8)	203	(27)	482	(65)	743	(100)
6 Diseases of endocrine glands and metabolism & immunological disorders	68	(9)	326	(47)	311	(44)	705	(100)
7 Circulatory and pulmonary diseases, and other forms of heart disease	72	(14)	235	(45)	209	(41)	516	(100)
8 Mental disturbances	33	(10)	124	(36)	184	(54)	341	(100)
9 Diseases of the nervous system	12	(7)	96	(57)	60	(36)	168	(100)
10 Diseases of other parts of the digestive tract	29	(17)	66	(40)	70	(43)	165	(100)

-: No cases registered

Source: National Statistics Institute (1981 Mortality Tabulation).

On the other hand, the data obtained on mortality in children under 3, in civil and hospital registers in urban areas of Bolivia (Tables IV-20 and IV-22), revealed almost the same 5 first causes of death noted above, with the exception of the category "nutritional deficiencies" which occupied fourth and fifth place respectively as a cause of death according to these sources. It may be emphasized that any of the causes noted above are affected in their severity by nutrition, and therefore the lethal nature of these pathologies will increase according to the degree of malnutrition of the children affected. It is probable that not tabulating malnutrition among the first causes of death in the 1981 civil registries was due to the classification system used.

TABLE IV-20
FIVE PRIMARY GROUPS OF CAUSES OF DEATH IN CHILDREN FROM 0 TO 35
MONTHS OF AGE, CIVIL REGISTRIES OF URBAN AREAS
BOLIVIA AUGUST, 1982 - JULY, 1983

IDC	GROUPS OF CAUSES	CASES	PERCENTAGE
01	INTESTINAL INFECTIOUS DISEASES	3,006	37.7
011	Typhoid Fever	37	
014	Amebiasis	5	
016	Poorly defined intestinal infection	2,964	
32	OTHER RESPIRATORY DISEASES	1,813	22.8
321	Pneumonia	1,813	
45	CERTAIN PERINATAL DISORDERS	466	5.9
771.3	Neonatal Tetanus	49	
19	POOR NUTRITION	427	5.4
192	Other protein-caloric malnutrition	427	
03	OTHER BACTERIAL INFECTIONS	378	4.7
033	Diphtheria	2	
034	Whooping Cough	54	
037	Tetanus	3	
038	Septicemia	319	
	SUB-TOTAL	6,090	76.5
46	SIGNS, SYMPTOMS, AND POORLY DEFINED ILLNESS	1,134	14.2
	Remaining causes	741	9.3
	T O T A L	7,965	100.0

Source: Toro, H. et al. Mortality in the first three years of life MSWPH-PAHO/WHO, Bolivia, 1984.

TABLE IV-21
FIVE PRINCIPAL GROUPS OF CAUSES OF MORTALITY IN CHILDREN 0 TO 35
MONTHS OLD, ACCORDING TO THE CIVIL REGISTRY OF URBAN AREAS BY AGE GROUP
BOLIVIA, AUGUST, 1982 - JULY, 1983

C a u s e s	0-11	12-23	24-35	Total
	m o s .	m o s .	m o s .	
	No (%)	No (%)	No (%)	No (%)
Intestinal Infectious Diseases	1,914 (33.0)	1,018 (52.8)	74 (32.2)	3,006 (37.7)
Other Respiratory Diseases	1,476 (25.4)	287 (14.9)	50 (21.7)	1,813 (22.8)
Certain Perinatal Disorders	466 (8.0)	- -	- -	466 (5.9)
Other Bacterial Diseases	273 (4.7)	90 (4.7)	15 (6.5)	378 (4.7)
Poor Nutrition	249 (4.3)	159 (8.2)	19 (8.3)	427 (5.4)
Diseases of the Nervous System	- -	35 (1.3)	7 (3.0)	- 3.0
S U B T O T A L	4,378 (75.4)	1,589 (82.4)	165 (71.7)	6,090 (76.5)@@
Poorly Defined Signs & Symptoms	890 (15.3)	213 (11.0)	33 (14.4)	1,134 (14.2)
Other Causes	538 (9.3)	127 (6.6)	32 (15.9)	741 (9.3)
T O T A L	5,806 100.0	1,929 100.0	230 100.0	7,965 100.0

-: No cases registered

Source: Toro, H. et al. Mortality in the First Years of Life
MSWPH-PAHO/WHO, Bolivia, 1984.

TABLE IV-22
TEN PRINCIPAL GROUPS OF HOSPITAL MORTALITY IN
CHILDREN 0 TO 35 MONTHS OLD BY CAUSE
BOLIVIA - AUGUST 1982 - JULY 1983

ICD 9th REVISION	CAUSES	NUMBER OF CASES	PERCENTAGE
01	INFECTIOUS INTESTINAL DISEASES	946	38.9
014	Amebiasis	10	
015	Intestinal infections due to other specific organisms	6	
016	Poorly defined intestinal infections	930	
32	OTHER RESPIRATORY DISEASES	374	15.4
320	Bronchitis	1	
321	Pneumonia	373	
03	OTHER BACTERIAL INFECTIONS	268	11.0
033	Diphtheria	3	
034	Whooping Cough	3	
037	Tetanus (non-neonatal)	2	
038	Septicemia	260	
45	CERTAIN INFECTIONS OF THE PERINATAL PERIOD	247	10.1
452	Prematurity	190	
453	Birth Trauma	1	
454	Hypoxia	10	
771.3	Neonatal tetanus	45	
773.2	Unspecified Jaundice	1	
19	NUTRITIONAL DEFICIENCIES	165	6.8
192	Other protein-calorie malnutrition	165	
22	DISEASES OF THE NERVOUS SYSTEM	121	5.0
220	Meningitis	120	
357.0	Guillan Barre	1	
02	TUBERCULOSIS	51	2.1
020	Pulmonary tuberculosis	51	
20	DISEASES OF BLOOD AND HEMATOPOIETIC ORGANS	42	1.7
200	Anemia	42	

(continued)

TABLE IV-22 (continued)
 TEN PRINCIPAL GROUPS OF HOSPITAL MORTALITY IN
 CHILDREN 0 TO 35 MONTHS OLD BY CAUSE
 BOLIVIA - AUGUST 1982 - JULY 1983

ICD 9th REVISION	CAUSES	NUMBER OF CASES	PERCENTAGE
44	CONGENITAL ANOMALIES	23	0.9
440	Spinabifida & Hydrocephalus	7	
442	Congenital Abnormalities of the Heart and of the Circulatory System	6	
444	Other deformities of the Digestive System	5	
759.9	Unspecified Congenital Abnormalities	5	
52	BURNS	17	0.7
949	Unspecified Burns	17	
	SUB-TOTAL	2,254	92.7
46	Signs, Symptoms, and Poorly Defined Illness	101	4.2
	Other Causes	77	3.1
	T O T A L	2,432	100.0

Source: Mortality in the First Three Years of Life, MSWPH-PAHO/WHO,
 La Paz, 1984

Hospital mortality data in children under 3 (Table IV-22) also identify tuberculosis and anemia as the 6th and 7th causes of death, respectively. The diseases that occupy the 8th, 9th and 10th causes (diseases of the nervous system, congenital anomalies, and burns) are the least vulnerable causes, and are more difficult to prevent than the previous ones.

Intestinal infectious diseases constitute the greatest cause of death in the three sources consulted. According to civil registrar data, this cause represents 33% of deaths from 0 to 11 months, 53% of deaths from 12 to 23 months, and 32% of deaths from 24 to 35 months (Table IV-21). The striking increase in their relative importance in the 12 to 23 month age group not only permits their identification as a priority group, but suggests a series of conditioning factors (weaning, malnutrition, greater exposure to the environment, etc.) which should be adequately evaluated for establishing attack strategies.

The next greatest cause according to the same three sources is called "other respiratory diseases", where the pneumonias are responsible for the majority of the deaths. According to data from the civil registry of 1981 (Table IV-19), 45% of the deaths by this cause occurred in children from 1 to 11 months old, and 16% in infants less than one month old. This indicates that almost 2/3 of the deaths by this cause in children under 5, affect

children under one year old. This suggests that, among the conditioning factors, housing conditions (overcrowding, dampness, lack of ventilation, etc.) should be considered.

There are some dispersed data that seem to indicate that respiratory problems are a more serious health problem in the highland than in other regions.

The third cause in importance according to the civil registries and the fourth cause according to the hospital registries is called "certain disorders originating during the perinatal period", which by definition only includes deaths which occur during the first 28 days of life. The civil registry of 1981 allows this data to be broken out by more specific diagnostic category, such as "hypoxia, asphyxia, and other respiratory infections of the fetus and the newborn" (Table IV-18). This diagnosis indicates the problems related to care during birth and immediate care for the newborn. In sites where there are health facilities, this factor should receive special consideration in order to reduce this important cause of death. "Other perinatal infections and unspecified infections" follow in magnitude, in which neonatal tetanus is included, but the aggregate nature of this tabulation does not allow separation of this cause (Table IV-18). Fortunately the 1982-1983 study breaks out neonatal tetanus. According to the urban area civil registry data, neonatal tetanus represents 10.5% of the deaths due to "certain perinatal disorders" (Table IV-20), and according to hospital mortality, 18.2% (Table IV-22). In any case, the proportion of deaths due to neonatal tetanus is high, more so because this is a disease whose current vulnerability in the face of a safe and inexpensive vaccine makes such high figures unjustifiable. In Chapter VIII, (Item 4) the neonatal tetanus discussion shall be broadened.

The two groups of diseases known as other bacterial diseases and viral diseases include diseases preventable by vaccination such as measles, whooping cough, acquired tetanus, diphtheria, polio, and yellow fever. Together, these represent 11.4% of the deaths of children under 5, and almost 5% of the total deaths among all ages, according to the 1981 civil registry data. According to the information available this situation seems to have improved due to the great effort by the EPI.

Tuberculosis in children under 3, according to hospital mortality recorded in 1982-1983 (Table IV-22), is ranked seventh as a cause of death, and according to the 1981 civil registry, ranks tenth for deaths between 1 and 4 years of age. This indicates high exposure of susceptible children (not vaccinated) to Koch's bacillus in unfavorable socio-environmental conditions. The frequent malnutrition in these groups aggravates the situation and makes the control of tuberculosis more difficult, in spite of technologies available for its control.

As indicated above, the mortality structure which has been analyzed does not establish the risks of death by specific causes according to the population groups which comprise Bolivian society. It is logical to assume that just as there are pronounced differences between infant mortality rates, the structure of causes of death should also vary according to the characteristics of the various population groups affected.

The only data on mortality causes grouped by ecological region are those of the 1982-1983 study. In each region the percentages of deaths due to each primary cause are established, but the coverage of these registries in each region are unknown. If the coverage were known, specific mortality rates by cause and by region could be estimated. The comparisons of percentages instead of rates can result in erroneous interpretations, because they do not measure the population's risk of disease.

Finally, it must be remembered that 75% of the Valley's population is rural, and that is where the IMRs are the highest. Data on the mortality structure by cause is not available for this important segment of the Bolivian population, which is probably of high priority in terms of child survival.

Until serious research is conducted in this area, the only alternative is to start with working hypotheses based on projections elaborated from the known universe.

V. COMMUNITY ORGANIZATIONS AND THE PROCESS OF PARTICIPATION IN HEALTH

1. BRIEF HISTORICAL SUMMARY

Bolivia has had a long and turbulent history of social mobilization and political activism in its evolution as a nation. It is important at this point to pause a few moments to analyze these facts in a succinct manner, because from this perspective we will be better able to outline the participatory process and appraise the current organization of the community and its true social potential in a country such as Bolivia.

From the founding of the Republic until 1952, the Bolivian social structure conserved the marks of feudal exploitation. Economic activity and social benefits were restricted to minority groups of the population (See Chronological Summary of the History of Bolivia, from 1879 to the present, in the respective section of Chapter III).

From this point forward, the labor sector of Bolivian society organized itself at different well-defined levels. Private businesses in the mining sector passed into the hands of the government, and their workers organized themselves into local federations which were then united into the National Syndicated Federation of Bolivian Mine Workers. This organization is the origin of the Bolivian labor structure, since as time passed, the other salaried sectors of the national economy grouped themselves in their own syndicates, such as manufacturing, driving, construction, oil workers syndicates, etc., which grouped themselves under the Bolivian Confederation of Labor (BCL).

The BCL brings together not only workers syndicates, but also the syndicates of other non-salaried sectors, such as students, teachers and peasants. In each department there is a Department Worker's Headquarters (DWH), which maintains a structure with regional variations, although with goals similar to those of the national BCL.

Within this national political and organizational process, the BCL has remained independent of government policy, except during the stage of cogovernment exercised by the Revolutionary Nationalist Movement (RNM) and the BCL during the period 1952-1954. The political influence of the BCL is important in the Bolivian process and it is probable that in the future it will gain increasing importance in the area of social recovery and health.

The population which is located principally in the livestock sector of the high plateau and valleys, and marginal urban areas of the cities, has a high indigenous ingredient of fundamentally Quechua and Aymara origin. This broad sector of the Bolivian population has a social organization which dates from pre-columbian times (See the section on Cultural Context in Chapter V of this document).

During the colonial period, the Spanish crown, by implanting a structure of domination and exploitation, profoundly upset the indigenous social structure and its politico-religious system, and practically caused its disappearance. In the war for independence against Spain, although indigenous

groups participated in the process, the mestizo population reaped the benefits of the historic change, while the indigenous sector remained embedded in a nation offering few benefits for its interests or survival. So it was that in the agrarian sector the feudal structures of possession and exploitation of land remained, while the rest of the national economy was passing through a slow process of modernization in the context of acculturation and adaptation to the lifestyle and values of the western world. This Republic generated such great social differences and social injustice that the Revolution of April, 1952 resulted from its own internal contradictions. This historical event was the result of the uprising and violent social mobilization of economically repressed and socially excluded sectors, such as the workers of the mining sector and an important part of the peasant sector.

During this new stage in the national life, universal suffrage was granted and the process of agrarian reform begun, in an attempt to incorporate the peasants (the large majority of them Quechuas and Aymaras) into the productive life of the nation. However, they still remained on the sidelines of the political life of the country. So it was that in a nationalized revolutionary state such as that created in 1952, the peasants and particularly the indigenous sector were once again left behind, so that their living conditions and opportunities for access to the goods and benefits of society not only did not improve, but remained the same or grew worse. Moreover, even if educational and health programs for specific geographic areas strategic to the national economy have existed since then, the fact is that these programs have not been able to change the situation of the rural and indigenous population. At the same time, the urban union or syndicated sector made significant gains on this path and achieved successes in the health area, such as the Social Security system.

2. LEVELS OF COMMUNITY PARTICIPATION

Through this clear difference in the Bolivian social organization, we see that the levels of community participation took two different courses: one which grew from the union and syndicated organizations, that is, from the entities uniting persons through their common interest as workers; and the other from the rural productive sectors, as happened with the salaried peasant sector.

The origin of the peasant syndical movement goes back to the period after the Chaco war, during the thirties, with the rise of peasant syndicates in various departments, particularly in the region of Cochabamba. In 1952, the Federation of Peasant Workers was formed, a body which united the various organizations of agrarian workers, and which, as distinct from the union and syndicated labor movement, was co-opted by successive governments, and submitted to the influence of successive government agencies (Mallon et al, 1985).

Towards the end of the seventies, in some sectors of salaried peasants, the Single Syndicated Confederation of Bolivian Peasant Workers was organized, with characteristics similar to the traditional Bolivian production syndicates, which required greater levels of participation.

Moreover, there is another significant group of non-salaried, independent, migrant, indigenous, peasant workers who are included in neither the first nor the second organizational structure. It is in these sectors that private voluntary organizations and religious organizations (Catholic, evangelical, and others) introduce participatory processes and organize free or low-cost health service systems. To a certain extent these systems attempt to alleviate the poor infrastructure of existing services in the public sector, but they do not succeed in attending to the requirements of the neediest.

In Bolivia there are various non-syndicated community organizations, such as cooperatives, neighborhood boards, and organizations of women and mothers at the urban and rural community levels.

The cooperatives, based on democratic principles of organization, free association, and equality of rights and obligations among members, constitute ad hoc instruments for the development of productive activities and services (housing, transportation, communications, etc.). Nevertheless, the Bolivian cooperatives do not perform significant activities in the services sector or in health services.

The neighborhood boards developed in the fifties with the purpose of attending to the emerging need for an infrastructure of basic services, although they have also participated in food supply drives during crisis periods.

Their scope of activity is urban at the level of marginal barrios in important cities and capitals of departments and provinces. The boards are united in Federations of Neighborhood Boards, whose goals include various urban development activities: schools, colleges, parks, athletic camps, day care centers, and to a lesser extent, hospitals and health services.

Of the voluntary women's organizations, the mothers' clubs or centers stand out, whose scope of activity is marginal urban and also rural. These organizations are in general supported by philanthropic social concerns or religious organizations. The goals of these centers or "clubs", as they are more frequently called, are improvement of the home and family life, group assistance in solving common health problems; education; and nutritional supplements or assistance. In practice the mothers' clubs are organized and revolve around this last activity, the distribution of milk and other foods to the needy, which in general consists of children, and in some cases, pregnant and nursing mothers. Other health activities, and the promotion of women and the family, are in general subordinate to food distribution (Table V-1).

3. RECENT EXPERIENCE IN COMMUNITY PARTICIPATION IN HEALTH

In 1983, a very active process of community participation was begun. At that time a national health policy was clearly articulated (Foundations for the National Health Policy, MSWPH, La Paz, June, 1983), in which actions aimed at the treatment of basic health problems of children, women, and workers were identified. This document includes a chapter on the participation of the organized community, which is structured after existing social organizations such as syndicates, neighborhood boards, mothers' clubs, etc.

TABLE V-1
WOMEN'S ORGANIZATIONS IN BOLIVIA, 1984

Department	Mothers' Clubs		
	Members	Beneficiaries	Others
La Paz	-	57,599 ¹	-
Santa Cruz	14,974	34,645	3,134
Cochabamba	-	43,906	41,022
Oruro	8,152	-	-
Potosi	10,000	-	-
Chuquisaca	2,716	-	-
Tarija	1,835	-	-
Beni	3,200	-	-
Pando			1,500
TOTAL	40,877	136,150	45,656

¹Includes 6,630 housekeepers.

Source: Sanchez Garcia, et al., 1984.

From these organizations, community health representatives (CHR) arise, who do not supplant their parent organizations, but together form what are called Community Health Committees (CHC), with representatives at the local, regional and national levels. The CHC are related with the upper levels of the Health ministry, and maintain their political and administrative independence. Today there are approximately 1300 Community Health Committees in the whole country (Table V-2).

In analyzing Table V-2 and comparing it to the estimated population for 1985, we see that the number of Community Health Committees per 10,000 inhabitants is as follows: La Paz: 2.75; Cochabamba: 1.48; Santa Cruz: 1.14; Riberalta: 30; Trinidad: 12.5; Oruro: 2.4; Potosi: 1.25; Tupiza: 0.64; Chuquisaca 0.82; Tarija: 0.37; Pando: 7.46.

At the operational level in the health areas, the doctors, nurses, and aides, together with the CHR of the Community Health Committees (there are approximately 15,680 in the country today), conduct a series of diagnostic activities (such as a census of their zone and identification of the primary health problems, etc.). Beyond the diagnosis and analysis of the situation, specific solutions are proposed, requiring inter-institutional and community participation. This participative process takes on real importance in the country because it not only includes certain new elements, but was begun and developed during a crisis, which is not only economic, but includes all structures of society and the nation.

One of the important elements of this participatory health process is that it is based on the participation of already existing social organizations. These take on importance and grow in vigor as they act on concrete health issues, such as vaccination, education, and food drives,

transforming policies undertaken by the health sector into solid and enduring social activities. At the same time, the community organizations appropriate the technologies transmitted by the institutional sector.

TABLE V-2
NUMBER OF COMMUNITY HEALTH COMMITTEES BY DEPARTMENT AND URBAN/RURAL AREAS
BOLIVIA 1987

Department	Number of Community Health Committees	
	Urban Area	Rural Area
La Paz	500	60
Cochabamba	120	25
Santa Cruz	120	--
Riberalta	30	45
Trinidad	34	16
Oruro	60	40 ¹
Potosi	110	--
Tupiza	44	55
Chuquisaca	30	8
Tarija	10	In organizational stage
Pando	12	23
Total	1,070	272

¹Most are Miners' Centers.

Source: Community Health Council, La Paz, November, 1987.

Integral Child Centers are another experiment in participation in the health area, and are the result of a partnership between the community and institutions. Their creation does not depend exclusively on central administrative levels, but on the felt need of the population to overcome the poverty and destitution in which they live. As a survival strategy, it should be emphasized that currently in some sectors of the unemployed population, especially the mining sector, these Integral Child Centers have been organized in the marginal urban zone of La Paz, to give their children a better alternative solution to the problem and consequences of unemployment. Currently the centers are administered by persons from the community, carry out supplemental food projects (which for some sectors is the only food they receive), and serve as day care centers. At the same time an entertainment program in the area of adequate stimulation is being developed, consisting of community caretakers who are elected by the CHC.

The Social Mobilization Office of the MPSSP, the institutional agency on which the Integral Child Centers (ICC) depend, has predicted that 4,000 children under 5 will benefit from 70 centers in the country by the end of 1987. La Paz, Oruro, Potosi, Sucre, and Tarija are departments with this program.

In addition to the ICC there is another program, Child Milk Centers (CHICOLAC), which currently serves 200,000 children and projects it will serve up to 300,000 children by the end of 1987. This program simply delivers 250 cc of whole milk enriched with margarine to each child each day. At the present, the possibility of adding to this program elements of health education, adequate stimulation, and supplementary nutrition is being studied. There are 1250 Child Milk Centers in the entire country. Their distribution is 90% marginal urban, and 10% rural.

At the present time, the Three Year Health Plan 1987-1989 proposes two courses of action. One is institutional in nature, with the principal objective being reinforcement and development, and the other is social in nature, proposing the active participation of the organized community. With respect to the latter course of action, the Three Year Plan proposes a community participation strategy:

The Ministry understands that organized community participation in all social strata and at all health levels, includes not only the development of activities, but also the process through which total participation of the organized community should be achieved, that is, in the research, planning, programming, execution, supervision, and evaluation of health activities and services.

Reality has shown that it is not possible to solve national health problems without the conscious, active, ongoing participation of community organizations in health programs. In this sense, community participation in health management should be understood as the formulation of problems and their possible solution through the presentation of plans and projects, contributing to a better planning and implementation process.

VI. HEALTH SECTOR AND SERVICES

1. NATIONAL POLITICAL FRAMEWORK¹

The Constitution specifies that the State has the obligation to safeguard human resources by protecting the health of each inhabitant and/or resident in all parts of the national territory. Within this framework the National Revolutionary Government has established the outline of policies which would promote economic and social development. Their fundamental purpose is to stop hyperinflation and establish a foundation for social involvement. Currently, this policy has established both domestic and international confidence as the following goals are achieved:

- Improve living conditions and socio-economic levels in the various strata of the Bolivian population;
- Encourage the integration of marginal sectors of the population into the development process, especially in rural areas;
- Sponsor the expansion of sectors producing essential goods, intermediate goods, and goods for export;
- Reorganize the production process so as to base it on the mixed, modern economy, implying the involvement of State, private, and cooperative sectors;
- Reinforce the process of territorial integration, considering the country as a whole, by establishing complementary policies among regions with distinct economic bases;

2. HEALTH POLICIES AND STRATEGIES

The health policy contained within the national development process guided by the Alma Atta Declaration and Accords, of which Bolivia is a signatory, seeks:

- To improve the quality of life;
- To lower the risk of disease and death in the most vulnerable population groups.

The targeting of health care activities to the mother and child, workers, and environmental sanitation, within a framework of responsibility shared between the institutional and community sectors, is considered a priority.

¹Ministry of Social Welfare and Public Health
Three Year Health Plan, 1987-1989.

Therefore the Ministry of Social Welfare and Public Health poses the following as the foundation of its policy:

- Strengthen the institutional structure in order to provide an adequate response to the health needs of the population.
- Strengthen community participation as object and as subject, in such a way that the organized community can strengthen health systems.
- Achieve integrated, timely, and permanent health care for all Bolivians and especially for large national groups.
- Reduce unjust inequalities in health care between privileged minorities and large abandoned groups, through equitable distribution of the financial and human resources which the country and international aid grant to the people.

The Three Year Health Plan, 1987-1989, defines as a priority, the care of the mother, the child, and the worker, and environmental sanitation, in the context of responsibility shared between the institutional and the community sectors.

The restrictions on the health sector and the need to decrease the social impact produced by a deep economic crisis led the MSWPH to concentrate its efforts on the reduction of the principle causes of child mortality. Large-scale action directed at children under 5 was undertaken for this purpose.

More than 15 national vaccination campaigns were carried out in the last five years, a network of close to four thousand oral rehydration units was implemented, and the control of acute respiratory infections and the monitoring of child growth were begun.

In spite of the successes achieved by these interventions, this activity has still not achieved adequate coverage, is not offered continuously, and is isolated from other activities, requiring continuing integration.

The regionalization process is going forward in the whole country, which is gradually being subdivided into health areas which are beginning to function with this new administrative and operational vision.

During the eighties the foundation has been laid for a new vision and health organization which is based on primary care and regionalization with community participation. This means beginning a process from which it will be difficult to withdraw. Bolivia has been committed to the global strategy of "Health for All by the Year 2000," and will contribute to the efforts of all to improve health levels, achieve child survival, and provide the population accessible and acceptable services.

This entire health system is undoubtedly affected by the social and economic crisis. Although changes in the health sector have been extremely important and have brought positive changes to the country, the reality is that health indicators have not changed, due fundamentally to the negative impact of the deepest economic crisis in Bolivia's history.

The Three Year Health Plan 1987-1989 proposes the following basic strategies:

- Strengthening institutional development
- Community participation
- Human resources development
- Drug policy
- Food and nutrition
- Protection and improvement of the environment
- Sector and inter-sector coordination
- Services development policy

The plan assigns priority to the primary health care strategy, with an important community participation component, regionalization of services, and utilization of the health area concept as an operative instrument.

3. SECTOR ORGANIZATION AND PRINCIPAL PROGRAMS

The health sector in Bolivia has three principal components: The Ministry of Public Health; Social Security; and the private sector.

According to data of the Ministry of Social Welfare and Public Health, the health sector achieves coverage of only 70% of the population. Of this percentage, 35% are covered by the Ministry, 20% by Social Security, and 15% by non-governmental organizations and private medical practice.

The primary health care programs currently operating in the country are almost exclusively the responsibility of the Ministry and private nonprofit non-governmental organizations. Thus Social Security does not implement primary care programs designed by the Health Ministry. The principal programs implemented by the Ministry are designed to reduce morbidity in mothers, children, and workers.

HEALTH MINISTRY PROGRAMS

CHILD CARE:

Vaccination Programs (BCG, DPT, Measles, Polio)
Oral Rehydration Unit (ORU) Program (Diarrheas)
ARI Program (Acute Respiratory Infections)
Child growth and development monitoring program
Supplemental food
Parasitosis Program
Goiter Program
Tooth Decay Program

ADOLESCENT CARE:

Venereal Disease (Syphilis, Gonorrhea) Program
Mental Health Program (Drug addiction, Alcoholism, Toxicomania, Nicotinism)

CARE FOR WOMEN: Prenatal, Partum, and Puerperium Care Program
Vaccination Program (Tetanus)
Goiter Program (Lugol)
Venereal Disease Program
Cervical Cancer Prevention Program

DISEASE CONTROL:

Malaria	Leprosy
Chagas	Parasitosis
Yellow Fever	Scabies
Typhus	Rabies
Bubonic Plague	Hemorrhagic Fever
Leishmaniasis	Goiter
Syphilis	Mental Disorders
Gonorrhoea	Oral-Dental Disorders
Tuberculosis	

WORKER CARE:

- Industrial Sector (Miners)
- Manufacturing Sector (Textiles, Leather)
- Petroleum, Metal Mechanic, Printing
- Agro-industrial
- Wood, Brewery, Soft Drinks
- Chemical Products

ENVIRONMENTAL CARE:

- Water Supply
- Waste Disposal
- Garbage
- Housing
- Rodents and Carriers
- Food and Drink

4. HEALTH SYSTEM COVERAGE

4.1. Public Institutions

Bolivia has two institutional health entities: the MSWPH, which is centralized; and Social Security, which is decentralized with multiple managing agencies.

4.2. Social Security

Currently there are 5 Basic Insurance Bureaus and 5 Delegated Insurance agencies.

Basic Insurance

- National Bureau of Social Security
- Petroleum Bureau of Social Security
- Railroad Bureau of Social Security
- Driver's Bureau of Social security
- Banking Bureau of Social Security

Delegated Insurance
 Bolivian Mining Corporation
 National Road Service
 Bolivian Development Corporation
 Social Security of the Universidad Mayor de San Andres
 Social Security of the Universidad Tecnica de Oruro

Until April, 1987, Social Security had three Basic Bureaus and seven delegate agencies. In addition there existed 17 supplemental retirement funds. These systems functioned with the contributions of 28% for employers, 8.5% for workers, and 1.5% from the State. Beginning April, 1987, there is a new finance law in effect which changes the structure of Social Security, and reduces the employer contribution to 15%, the worker contribution to 5%, and the State contribution to 1%. Family allowances and low cost housing systems have been eliminated. Moreover, the provision of maternity and treatment services are the responsibility of insurance bureaus, and disability and death insurance are delegated to supplemental funds.

It is necessary to make clear that at the level of Social Security, strategies and plans of action are designed which often do not coincide with parallel programs and strategies of the MSWPH. Thus national ARI, ORU, supplemental nutrition, and free childbirth programs, etc., are not implemented by Social Security agencies.

i. Coverage of the Social Security Institution (1984)

<u>Basic Insurance Bureaus</u>	<u>Total</u>	<u>Coverage Percentage</u>
National Bureau of Social Security	986,019	73.99
Petroleum Bureau of Social Security	45,183	3.39
Railroad Bureau of Social Security	51,050	3.83
Drivers' Bureau of Social Security	60,846	5.02
Banking Bureau of Social Security	13,330	1.00
<u>Delegated Insurance</u>		
Bolivian Mining Corporation	128,047	9.61
National Road Service	17,781	1.33
Bolivian Development Corporation	14,096	1.06
Social Security of the U.M.S.A.	9,063	0.68
Social Security Univ. Tec. de Oruro	1,153	0.09
<u>T O T A L</u>	<u>1,332,609¹</u>	100.00

¹Total percentage in relation to total population of Bolivia, 1984 estimate is: 21.3%.

ii. Functions

Social Security in Bolivia is structured on the principles of universality, solidarity, unity of management, economy, opportunity, and effectiveness. Its fundamental role is the protection of the health and human resources of the country, continuation of their means of support, provision of adequate services for the rehabilitation of suffering persons, the provision of the resources necessary to improve family life.

The Social Security Code and its regulations define the scope of its standards, and includes all citizens and foreigners of both sexes who work in the country, who provide paid services for individuals or legal entities through their designation, employment contract, or apprentice contract, whether these be collective or individual, in public or private institutions, with no exceptions. Mandatory Social Security is based on the labor force and only covers salaried workers who work for an employer. Protected persons include the insured, and within the family group, family members and cohabiting persons, children, parents, and siblings.

4.3. The Ministry of Social Welfare and Public Health

The MSWPH is a public institution responsible for improving the general health level of the population. The Ministry is a centralized institution which establishes norms and implements programs at the national level. Since 1982 the basic strategy has been primary care, with organized community participation structured at the technical levels of the MSWPH.

The Ministry of Social Welfare and Public Health is the organ of the Executive Branch which is responsible for planning, setting standards, managing, coordinating, and supervising the activities of social welfare and public health in the public sector, as well as promoting, guiding, and controlling activities undertaken by the private sector. The MSWPH formulates and carries out the national health policy according to the guidelines of the Government. Some of its specific functions are:

- a) Encourage and conduct research into the problems of social welfare and public health of the country in order to apply appropriate solutions;
- b) Program, set standards, execute, coordinate, and control activities in the areas of preventive and curative medicine, and activities for rehabilitation;
- c) Conduct campaigns for the improvement of nutrition, hygiene, and health education, and fight communicable diseases;
- d) Organize, manage, and supervise medical, clinical, and hospital services;
- e) Promote, regulate, and control activities in the areas of preventive and curative medicine, and activities for rehabilitation;

- f) Program, set standards, manage, and carry out occupational health activities in the country;
- g) Formulate and coordinate sector programs and projects in accordance with the development plans and programs of the sector, and evaluate their results; and
- h) Create, preserve, and improve the service infrastructure of social welfare/public health, to provide greater services to the community.

4.4. The Private Sector

The private sector is divided into private for-profit medicine, and the system of private non-profit voluntary organizations. The former is concentrated primarily in urban areas and some provinces where the economic development of the population allows it. The latter is comprised of private non-governmental organizations which have developed fundamentally rural programs in areas far from urban centers. For the last four years, since 1983, private non-governmental organizations have implemented programs designed by the MSWPH, since previously they had their own programs which did not necessarily coincide with those of the public sector.

TABLE VI-1
HUMAN RESOURCES CLASSIFIED BY CATEGORY,
MINISTRY OF SOCIAL WELFARE AND PUBLIC HEALTH, BOLIVIA, 1980-1984

PERSONNEL CATEGORIES	YEARS					% INCREASE
	1980	1981	1982	1983	1984	
TOTAL	9,403	9,705	9,895	10,180	10,313	10
Doctors	1,214	1,254	1,292	1,319	1,339	10
Dentists	217	220	222	231	231	6
Nurses	708	729	737	750	752	6
Nurses Aides	2,396	2,469	2,484	2,574	2,603	9
Other Professional & Technical Personnel	1,521	1,616	1,679	1,720	1,781	17
Administrative Personnel	1,335	1,357	1,392	1,428	1,442	8
Services Personnel	2,012	2,060	2,089	2,158	2,165	8

Source: MPSSP, 1986.

The staffing of the health system appears in Table VI-1. A detailed analysis of this information is not possible because we do not have the distribution of health personnel by distinct care levels. That is, data by specific province or area, or by location in rural or urban areas, are not available. According to territorial analysis, we can conclude that the concentration of doctors, dentists, and nurses is greater in urban centers than in rural areas. With respect to the number of facilities, beds, and

the ratio of beds to facilities, we see a greater concentration in urban areas, and in these areas there is a very high ratio of beds to specialized centers (Table VI-2).

TABLE VI-2
NUMBER OF MPSSP FACILITIES AND BEDS BY AREA
BOLIVIA, 1986

TYPE	FACILITIES	%	BEDS	%	AVERAGE NO. BEDS PER FACILITY
<u>URBAN AREA</u>	98	8.4	4,164	60.2	42.5
General Hospitals	11	1.0	2,287	33.1	207.9
Specialized Hospitals	19	1.6	1,710	24.7	90.0
Health Center Hospitals	4	0.3	167	2.4	41.8
Other Health Centers	64	5.5	0	0.0	0.0
<u>RURAL AREA</u>	1,066	91.6	2,753	39.8	2.6
Specialized Hospitals	2	0.2	70	1.0	35.0
Hospital Health Centers	141	12.1	2,540	36.7	18.0
Other Health Centers	923	79.3	143	2.1	0.2
T O T A L	1,164	100.0	6917	100.0	5.9

Source: MPSSP, 1986.

5. SERVICE NETWORK STRUCTURE

The MSWPH proposes to operate primarily within the child, mother, and worker population groups. For this purpose it establishes primary care at the health area level, secondary care at the district level with hospital services at this level, and finally, tertiary care at the regional level. The community organization sector is developed in a manner parallel to the institutional sector.

ADMINISTRATIVE LEVELS

Level	<u>Institutional System</u>	<u>Community Organization System</u>
4	MPSSP Central Office	National Community Health Council
3	MPSSP Regional Office Health Units	Regional Community Health Council

2	MPSSP District Offices Health District	District Community Health Committee
1	MPSSP Health Area Office	Area Community Health Committee

LEVELS OF SERVICE PROVISION

<u>Level</u>	<u>Type of Care</u>	<u>Institutional System</u>	<u>Community Organization System</u>
3	Secondary and tertiary care. Medium & high complexity specialized services.	Regional Hospitals	Regional Committees
2	Primary & secondary care. Medium complexity services, basic specialities & general care.	Health Centers District Hospitals	District Community Health Committees
1	Primary health care, low complexity services & general care.	Area Health Centers	Area Community Health Committees

For the development of health activities at the levels mentioned, basic strategies such as the Health Area Program (HAP) social mobilizations have been designated. The HAP Program contains an analysis component, the basic information module, and three sub-programs: 1) Social Communication and Community Participation; 2) Essential Health Assistance; 3) Administrative Support. The general objective of the HAP is the improvement of Bolivian living conditions through the provision of primary health care services for the well-being of the population, within the framework of social development, based on the principles of justice and equity. Among its specific objectives are:

- a) Establish linkage mechanisms between community organizations and the health service provision system, allowing activities to be coordinated between them, in order to solve priority health problems.
- b) Continue progress in bringing together institutional service offerings and the real needs of the population, thereby generating a rational demand whose satisfaction is within the reach of the economic capacity of the community and of the country.
- c) Structure the administrative and service provision systems of greater and lesser complexity as a function of the health area.

To fulfill these objectives, the Community Organization Health System adopts the following structure:

At the national level, a National Community Health Council has been formed, which consists of representatives of large community organizations of the country. Its function is deliberative, with the goal of attaining agreements with the Ministry of Social Welfare and Public Health for the formulation of a health policy and strategies aimed at the achievement of an objective conception, accepted by both by consensus.

The function of the District Community Health Committees is to formulate and carry out district programs agreed upon with the District Office of the Ministry of Social Welfare and Public Health. In the health area, the function of the Community Committees is to develop and carry out local programs together with health personnel. They should also be represented at the district level. The formulation of plans and programs at each level is carried out through the critical analysis of the match between institutional services and the needs of the population.

VII. SOCIO-ECONOMIC AND CULTURAL CONTEXT

1. SOCIO-ECONOMIC CONTEXT

In Bolivia today, poverty, malnutrition, and mortality are the result of a structural group of causes endured throughout recent decades. There is little doubt that the world economic recession has had unfavorable repercussions in Bolivia, intensifying the crisis and causing negative economic growth. Nevertheless, evidence indicates that progress (or decline) in the child population's levels of health and well-being depend more on the model or style of development than on the simple rate of economic growth or contraction.

In the case of Bolivia, as in many Latin American countries, structural factors such as the unequal distribution of wealth, the foreign debt, and in particular the marginalization of large sectors of the population who experience exclusion from access to basic social services, are elements pulling down health and living standards. The unsatisfactory use of financial resources also aggravates the health and well-being problems of Bolivian children.

Nevertheless, in spite of the world recession and its serious repercussions for the Bolivian economy, the democratization process begun in 1982 has brought with it the articulation of social policies and new strategies targeted to the most needy populations, providing significant opportunity for international technical and financial cooperation in all fields, especially in the area of primary health care.

1.1. Socio-Economic and Environmental Factors: An Inter-Related Model

We will now try to analyze the relationships between the health and well-being of Bolivian children, and their principal determining and conditioning factors.

This analysis is presented in order to better identify the greatest impediments in Bolivia's social and economic context, which result in an interrelated group of risks and damages which impair the quality of health in a serious, and/or repetitive or permanent way, or significantly increase the risk of disease and death in children.

The global analysis model is based on a similar one proposed in a study on the impact of the world recession on children (Jolly and Cornia, 1984), to which other operative variables have been added. The well-being of children would be determined by four groups of aggregate variables (Figure VII-1).

The first, located in the immediate family and social context, called "social support networks," is determined in turn by the political, cultural, and educational context of the country, and includes the mother, the family, the community, and society all together. The social support networks, with respect to children, are represented by nuclear or extended family members, linked by real or symbolic (godparent) kinship, and also

include membership in formal and informal groups, such as larger social and religious institutions (cooperatives, churches, parishes and other religious organizations).

The social support networks are closely related to the health and well-being of children, to the extent that the hypothesis can be proposed that child survival in the case of Bolivia (and Latin America) is determined in large measure by the density and quality of these networks.

The value of these support networks in the care and rearing of the small child is provided not only by the social and affective content of the relationship, but also through biological survival elements: nursing; food; protection; shelter; etc. The efficiency and effectiveness of these networks is strongly determined by the family's socio-economic status, degree of acculturation, and level of integration into or separation from national society, as well as by social policies of equity and access to goods and services.

The second group influencing child health and well-being includes family income (in money or in kind) available to provide for the needs of children, particularly food, and then housing, and in some cases, health and education services.

The deterioration and steep drop in real income (Table VII-1) in Bolivia has had unfavorable repercussions on the health of children, especially on family consumption and on the quantity and quality of its nutrition (Table VII 2, and Figures VII-2 and VII-3). Presumably this phenomenon has been even more serious in sectors of salaried workers who are out of a job or whose income has been substantially reduced, and among peasants migrating to the cities and confronting great challenges in adapting within a context of forced acculturation, unemployment, and stress.

The third group of factors is represented by the structure of public expenditures, especially for health and other social services. Based on data calculated by the Inter-American Development Bank on current governmental expenditures in health and the per capita gross national product, the health expenditures of the public sector (excluding Social Security) per person and per year, in constant U.S. dollars (Musgrove, 1987) have been estimated. Estimates for certain selected countries are presented in Table VII-3.

A substantial reduction is seen for Bolivia for the period 1980-1982, reaching the figure of U.S. \$2.44 per person, which represents the greatest decline (80% reduction) in public health expenditures among all countries of Latin America, including Haiti, for this period.

FIGURE VII-1
 INTERRELATIONS SHOWING MAIN SOCIO-ECONOMIC AND ENVIRONMENTAL
 FACTORS INFLUENCING THE HEALTH AND WELL-BEING OF BOLIVIAN CHILDREN

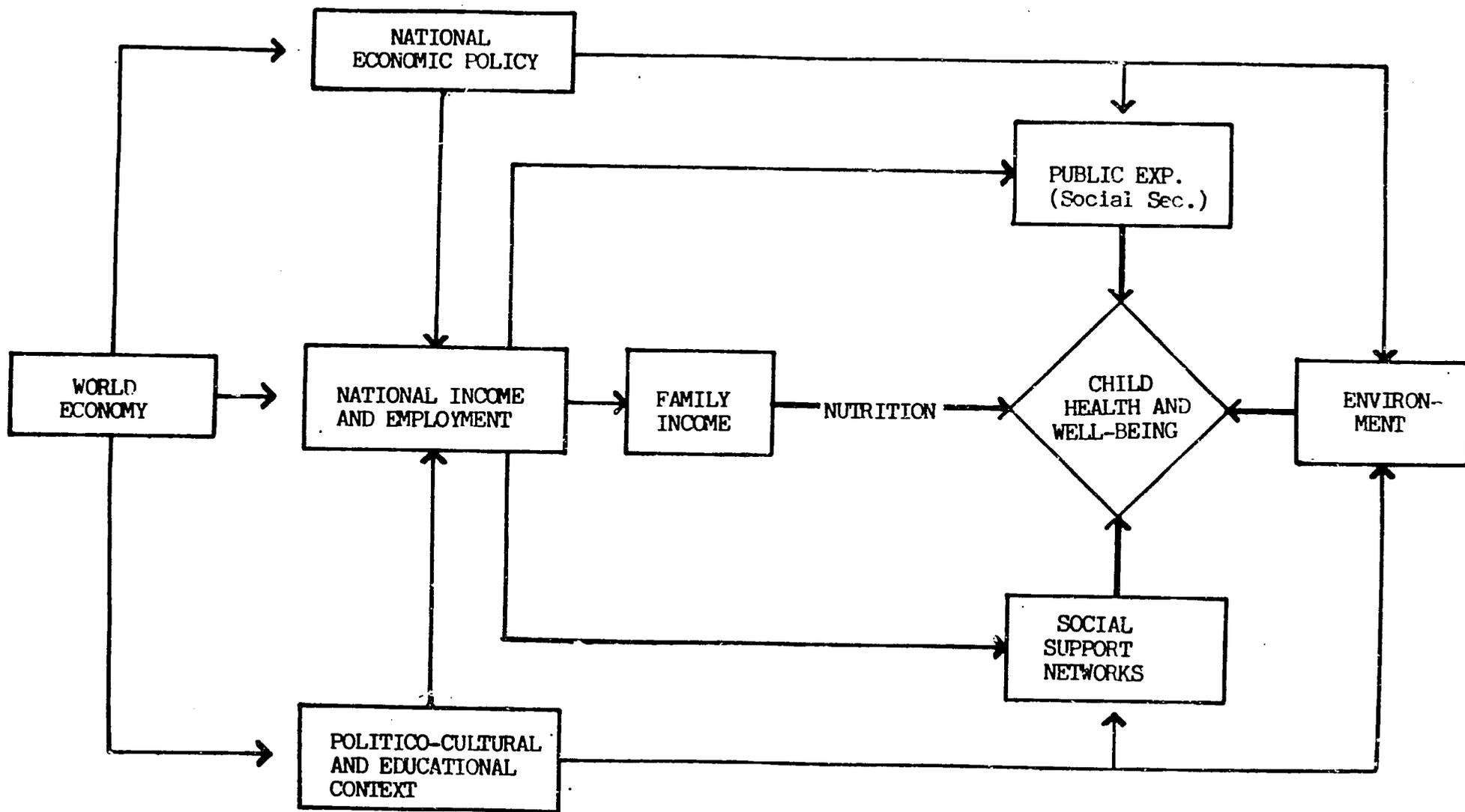


TABLE VII 1
GROSS NATIONAL PRODUCT PER PERSON
AND ANNUAL VARIATIONS, BY YEAR
(In millions of Bolivian pesos and at 1970 prices)
BOLIVIA: 1970-1982

Year	GROSS NATIONAL PRODUCT(GNP)		GNP PER PERSON	
	Value \$B.	Annual Variation	Value \$B	Annual Variation
1970	12,370	5.21	2,860.4	2.70
1971	12,976	4.90	2,928.2	2.37
1972	13,729	5.80	3,023.2	3.24
1973	14,646	6.68	3,146.5	4.03
1974	15,400	5.15	3,227.0	2.56
1975	16,417	6.60	3,354.2	3.94
1976	17,413	6.10	3,464.9	3.30
1977	18,151	4.21	3,515.4	1.46
1978	18,760	3.36	3,537.1	0.62
1979	19,104	1.83	3,505.8	-0.88
1980	19,324	1.15	3,451.0	-1.56
1981	19,124	-1.03	3,230.0	-3.71
1982	17,703	-7.43	2,992.5	-9.95

Source: Morales Anaya, 1984 (Based on data provided by NSI, 1982 Statistical Summary, and information of the Central Bank of Bolivia).

Although the information presented appears outdated, the level of government health expenditures does not seem to have changed significantly from 1982 levels.

Finally, the fourth group includes natural environmental factors such as those surrounding the living area: the availability of clean water for drinking and personal hygiene, waste and garbage disposal, the presence of carriers, and general conditions or degree of environmental contamination (air, land, water, etc.) affecting the child, the family, and the community.

Important epidemiological modes of transmission are found within this group of factors: fecal-oral (fingers, hands, water, food), direct contact (skin and mucous), airborne, percutaneous (wounds, injections, etc.), and carriers.

TABLE VII-2
INCOME AND CONSUMPTION PATTERNS OF FAMILIES
DURING THE ECONOMIC CRISIS:
VARIATIONS OF SOME ECONOMIC INDICATORS WITH RESPECT TO 1980
BOLIVIA, 1985-1986¹

	1985	1986
a. <u>Variations in relation to 1980</u>		
GNP	-11.3	-13.9
GNP/Person	-22.7	-27.0
Agricultural GNP	- 7.6	- 9.4
Agricultural GNP/Person	-20.4	-23.2
Family income	-19.1	-22.3
Family income/Person	-28.7	-34.1
Family consumption	- 6.9	- 7.7
Family consumption/Person	-17.7	-21.8
Value of Agricultural Production/ WPI manufacture ²	-42.0	-44.0
Average salary	-47.0	-69.0
b. <u>Other Employment Figures</u>		
Unemployment rate	18.0	20.9
Number of unemployed	371,000	439,000

¹Source: Morales and Rocabado, 1987. Based on national calculations (BCB).

²WPI: Wholesale price index.

TABLE VII-3
GOVERNMENT HEALTH EXPENDITURES PER PERSON/YEAR¹
FOR CERTAIN LATIN AMERICAN AND CARIBBEAN COUNTRIES
1970-1984 (In 1982 U.S. Dollars)²

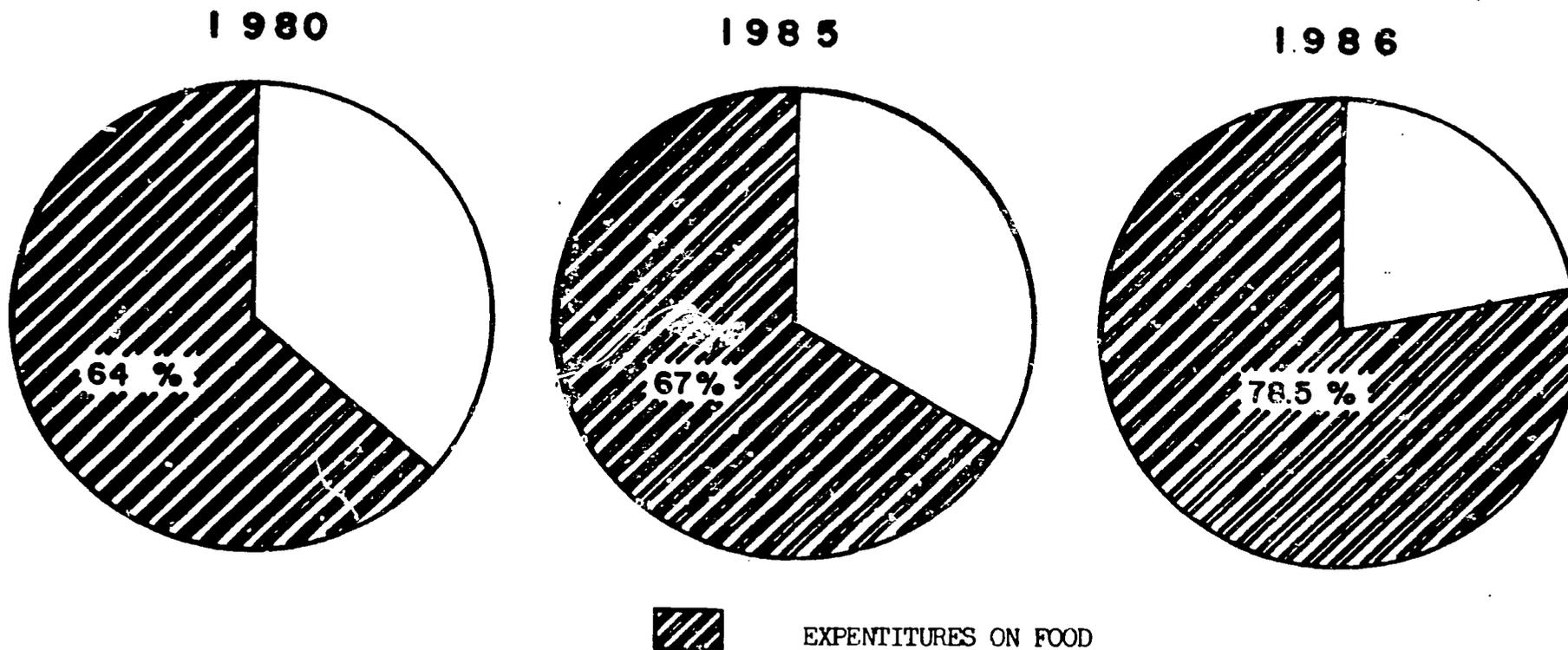
Country	YEAR							
	1970	1978	1979	1980	1981	1982	1983	1984
Argentina	7.98	11.47	...	11.38	8.56	6.03	8.27	9.8
Bolivia	5.82	7.33	7.36	10.94	5.91	2.44
Chile	21.16	21.61	...	27.08	28.49	25.99	21.12	20.64
Haiti	2.44	3.03	...	2.70	2.62	3.81	2.98	...

¹Social Security and grant funds excluded.

²Source: Musgrove, P., 1987.

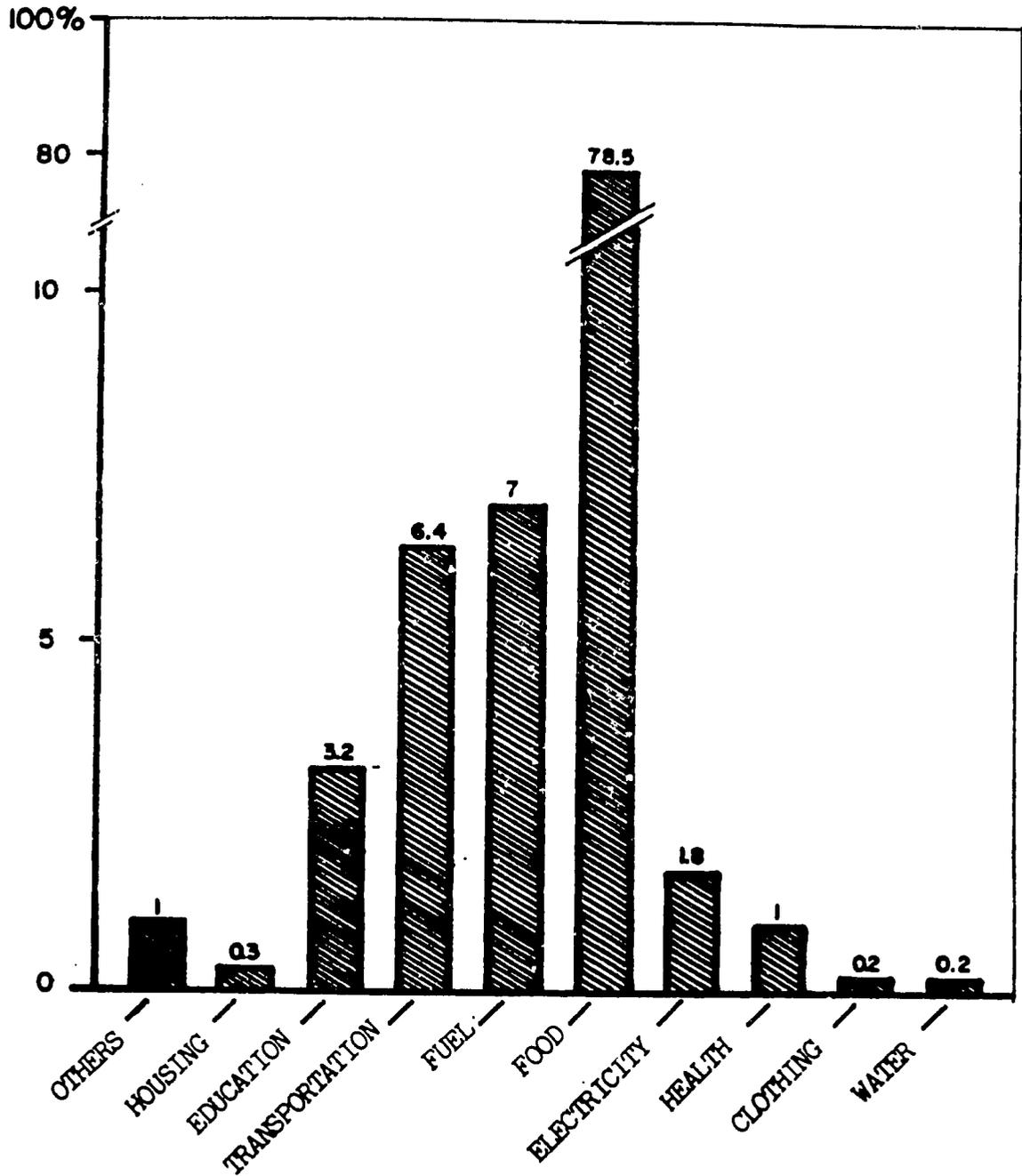
... No information available.

FIGURE VII-2
PROPORTION OF EXPENDITURES ON FOOD AMONG LOW INCOME FAMILIES



Source: Prudencio, J. and Velasco, M. 1986; PMA Project (CERES) 1986.

FIGURE VII-3
EXPEDITURE CATEGORIES OF LOW-INCOME FAMILIES. LA PAZ, 1986



Source: PMA Project (CERES), 1986.

The quality (contamination, etc.) of this environment is in turn influenced by public expenditures for basic environmental health projects such as water, waste disposal, and sewage systems, as well as by the relationship of the family and the community to the environment, and the management of its resources, as suggested in Figure VII-1.

Of the factors analyzed to this point (public expenditures, family income, social support networks at family and community levels, and the environment), the first two are directly affected by the economic recession and unemployment. The economic recession also translates into less food, goods, and services available for children, both in quantity and quality.

At the level of social support networks, the family and the community (the immediate social environment of the child), although very directly affected by the economic crisis, in turn generate adaptive or "cushioning" mechanisms and develop various survival strategies (for example, migration, or greater female participation in the work force) which lessen the impact of the economy on the health and well-being of the child population. Nevertheless, in extreme situations, family and community resources are finally impacted by the crisis.

Important signs of disintegration are then seen in society and the family: an increase in abortions, infanticide, child abuse and abandonment, negligence in child-rearing and nutrition, alcoholism, suicide, drug abuse, and violence. These are generally the symptoms of a deep crisis, resulting from the conditions of extreme poverty brought about by the national and global world economic recession. In turn these signs of deterioration translate into sustained, high child mortality rates (between 200 and 300 deaths in children under two per 1,000 live births), and into the reappearance and significant increase of cases of malnutrition and infection, as well as into other health problems in the child population. Nevertheless, these indicators are delayed manifestations of the negative impact on the health and well-being of children. Moreover, these factors, as is the case in Bolivia, are not always available and frequently are grossly underestimated, impeding evaluation of the situation in all its scope and import.

To summarize, in Bolivia the following elements have direct and indirect implications for the health and well-being of children:

- The sustained rise in unemployment (significant numbers of unemployed: for example, 30,000 dislocated miners).
- The drastic reduction in family income (both in the salaried sector, as well as among small farmers, due to floods, droughts, and other natural disasters), which has been more severe in the poorest groups and in the medium low stratum, with an increase in absolute poverty.
- The sharp reduction in public health expenditures (almost 80% in the period 1980-1982), reaching U.S. \$2.44 per capita, which represents deep cuts in operations costs (only salaries of personnel are continued) and extreme reduction in maintenance costs.

- This situation yields a paralysis in the development of new basic services (both in the authorization of new health services, and in water and sewage projects), and a decline in efficiency, quality and effectiveness of current services.

As a consequence of the above, a severe contraction of services has occurred, both in quantity and quality. This contraction has been even greater in services targeted to infants and children of the poorest strata of Bolivian society. This enormous contraction in services targeted to infants can be difficult to prove in the case of Bolivia, because of the accompanying lack of health services production records and statistics. Nevertheless, the research we were able to do during our field visits (surrounding urban areas of La Paz, Cochabamba, Sucre, and Santa Cruz), although not representative of the whole country, confirms these observations.

1.2. The food situation

Bolivia's food situation has been deficient for a long time. From the middle of the seventies, the rate of growth of food production declined, reaching a critical threshold in 1983 as a consequence of the livestock sector crisis. As a result, Bolivia is no longer self-sufficient in agriculture; it does not produce enough to adequately feed the population. There have also been price increases, resulting in large profits to the middleman. In addition, as a result of the acculturation and modernization process and of the model favoring imports, there has been a progressive substitution of higher-prestige agro-industrial products (sugar, noodles, flour, rice, etc.) for traditional products of the family diet (potatoes, corn, beans, quinoa, oca), to the detriment of local production and impoverishment of the traditional diet.

From time immemorial the population of the Bolivian high plateau has eaten green and mature rice, potatoes, quinoa, and beans, adding barley, tubers, fruits, and leaves, according to the season. This group of foods yielded a balanced diet, resulting in the well-being and survival of the population.¹

Information on the composition and characteristics of the current diet was not found. Nevertheless, simple observation of certain facts, such as the consumption of white bread made of wheat, instead of quinoa bread; the consumption of noodles instead of toasted quinoa and millet flour; the consumption of white sugar instead of brown sugar; the consumption of brandy instead of corn or quinoa liquor, means departure from a better, ancestral diet to a modern diet of poor nutritional value.

¹This and the following section have been taken from: Tagle, M.A. "Aspects of Food and Nutrition." Report of the Evaluation Commission, November 1-21, 1985.

The primary crop is corn, occupying 321,731 hectares; followed by potatoes, with 142,555 hectares; and by rice, with 120,838 hectares. These together represent 58% of the land currently under cultivation.

The crops which follow are barley, wheat, vegetables, sugar cane, and other tubers (yuca, sweet potato, etc.). All of the above implies that production is oriented to foods rich in carbohydrates, and almost all are seasonal crops. On 22% of the cultivable land (284,200 hectares), such perennial crops as coffee, cocoa and fruits are grown.

Quinoa, traditionally the basic food of the Andes region, has been displaced by other crops. Nevertheless, there are many small farms where quinoa is grown and for which trustworthy statistics do not exist.

Currently it is estimated that quinoa production hardly reaches 14 metric tons per year, but it is very possible that this figure is underestimated. The cultivation of cocoa should also be mentioned, particularly in the department of Cochabamba, where it has displaced other crops which have similar climate and soil requirements, such as coffee. It is difficult to estimate the farmland currently devoted to the production of cocoa.

According to some estimates, Bolivia's arable land would be equivalent to 3% of the total land area of the country, but other estimates of land potentially suitable for cultivation put the figure at 7,580,000 hectares, which represents 7% of the total area. That is, there is significant land area waiting for agricultural development. With respect to livestock, the unexploited potential appears to be even greater, although current yields of meat per hectare are low (10 Kg/Hect./year in the high plateau, and 32 Kg/Hect./year in the Beni).

TABLE VII-4
 AVAILABILITY OF ENERGY, PROTEIN, AND FAT
 PER PERSON PER DAY, BOLIVIA, 1981-1983

Category	Values
Total calories	2,067 calories
Total protein (g)	54.3 g.
- Animal protein (g)	16.9 g.
- Vegetable protein (g)	37.4 g.
Total fat (g)	43.5 g.
- Animal fat (g)	28.4 g.
- Vegetable fat (g)	15.2 g.

Source: Tagle, 1985.

The nutritional balance sheet shows low caloric intake per individual per day (Table VII-4). As average national estimates, these figures are dangerously low, and would indicate that an important part of the Bolivian population lacks an adequate diet. The national average caloric intake is lower than that recommended in various items: calories, proteins, (although here, the degree is not specified), calcium, vitamin A, and riboflavin.

Table VII-5 shows the availability of calories and nutrients, calculated from the balance sheet, and compares it to the availability for Latin America.

TABLE VII-5
AVAILABILITY OF CALORIES AND NUTRIENTS PER PERSON PER DAY
BOLIVIA AND LATIN AMERICA, 1982

Categories	Bolivia	Latin America
Calories	2,086 cal.	2,591 cal.
Protein (grams)	52.80	66.30
Fat (grams)	44.60	59.40
Calcium (milligrams)	275.00	487.00
Iron	273.00	269.00
Equivalent of betacarotene (mg)	1,611.00	2,069.00
Thyamin (milligrams)	1.31	1.30
Riboflavin (milligrams)	0.82	1.11
Niacin (milligrams)	14.26	14.30
Ascorbic Acid (milligrams)	119.00	91.00

1.3. Food Intake

In a recent study among the rural population of depressed areas, a survey was conducted of food intake by recorded weight per 24 hours. Segments of the population were found with important deficiencies in a majority of the nutrients. Table VII-6 shows the categories of recommended intake of protein per population group. It can be seen that categories below 80% of the recommended amount include 51% of all children, 41% of all women of reproductive age, 60% of pregnant women, 76% of wet-nurses, and 46% of all homes.

It can be stated that national intake has grown worse in recent months, because family income has suffered a permanent deterioration in purchasing power. According to National Statistics Institute (NSI) data, the consumer price index (CPI) from January 1986 to June 1986 rose a cumulative 56.6%, which means a decline in the purchasing power of wages and salaries. This is even more serious for those strata in which the proportion of expenditures on food is highest (LAISR, 1986).

TABLE VII-6
PERCENT DISTRIBUTION OF SELECTED POPULATION GROUPS
ACCORDING TO ADEQUACY OF REQUIRED PROTEIN CONSUMPTION IN
DEPRESSED RURAL AREAS OF BOLIVIA, 1984

Population Group	No. of cases	Adequacy of Required Protein Consumption					Mean Adequacy of Required Protein Consumption %
		>100%	80-99%	60-79%	<60%	Total %	
Children (months)	613	31.8	17.1	23.5	27.6	100.0	86.9
12 to 23	134	24.6	17.9	22.4	35.1	100.0	79.9
24 to 35	177	31.6	12.4	24.9	31.1	100.0	84.7
36 to 47	146	32.2	18.5	23.3	26.0	100.0	87.6
48 to 60	156	37.8	20.5	23.1	18.6	100.0	94.7
Women (years)	288	38.9	19.8	20.8	20.5	100.0	91.6
15 to 19	46	39.1	19.6	17.4	23.9	100.0	89.9
20 to 29	74	37.8	24.3	21.6	16.2	99.9	92.6
30 to 39	104	40.4	20.2	20.2	19.2	100.0	93.2
40 to 49	64	37.5	14.1	23.4	25.0	100.0	89.1
Pregnant Women	99	20.2	20.2	26.3	33.3	100.0	78.2
Wet-nurses	376	11.2	13.3	24.5	51.1	100.0	78.2
Homes	810	34.9	19.0	23.2	22.4	99.5	89.6

Source: Daza, G. et al. Nutritional Study in Depressed Rural Communities in Bolivia. UNICEF. La Paz, 1985.

TABLE VII-7
CHANGES IN THE MINIMUM LIVING WAGE AND PRICES OF
SOME FOOD PRODUCTS (In bolivianos)
BOLIVIA, AUGUST 1985-APRIL 1986

Category	Aug. 1985	Oct. 1985	Dec. 1985	March 1986	April 1986
Minimum living wage	30.00	30.00	30.00	30.00	30.00
Potatoes (lb.)	2.50	4.00	4.50	4.55	5.55
Noodles (bag)	1.10	1.30	1.50	2.00	2.20
Evaporated milk (can)	0.50	0.60	0.65	0.90	1.00
Eggs (per unit)	0.63	0.70	1.00	1.60	2.00
Sugar (lb.)	0.18	0.18	0.20	0.30	0.30
Rice (lb.)	0.23	0.23	0.27	0.55	0.60
Oil (lt.)	1.10	1.10	-	2.20	2.20

Source: LAISR, 1986.

If we briefly analyze the evolution of the prices of some foods, as well as the minimum living wage (MLW) of workers during 1985-1986, we see the depreciation in value of the latter, and the sustained increase in food prices (Table VII-7).

Thus, while from August, 1985 to April, 1986, the MLW of workers remained fixed, the price of potatoes increased 2.2 times; noodles, 2 times; evaporated milk, 2 times; eggs, 3.1 times; sugar, 1.6 times; rice, 2.6 times; and oil, 2 times.

It is evident that the living standard of the population in general has seriously deteriorated in recent times. Low-income people devote more and more of their income to food purchases. In 1980, of the total family budget, 64% went to food expenses, while in 1986, this figure reached 78.5% (Figures VII-2 and VII-3).

1.4. Composition of the Family Diet

In families with limited resources, the composition of the diet has followed the food intake model which is more and more dependent on imports, to the detriment of the more balanced traditional diet.

94% of the diet of the population with limited resources is comprised of 9 products, of which 4 are processed (bread, oil, sugar, and noodles), and 5 are locally produced products consumed directly (potatoes, rice, beans, meat, and eggs).

According to Table VII-8, processed food products are concentrated in 3 groups or basic foodstuffs: one based entirely on wheat, the second on oils, and the third on cane sugar. These products together constitute 83.3% of the total calories ingested daily by the members of a family.

With respect to basic raw materials, it is estimated that at least 73.8% of total calories derive directly from imports of foods in the form of raw materials (LAISR, 1986).

The average diet in Bolivia derives 3/4 of its calories from imported sources. Presumably, the upper class diet is even more dependent on imported food.

In the light of the data we have considered, the serious downward trend in the production of traditional basic foods, and the increase in the production, import, or grants of "modern" foods, are explained. Although a consensus exists that food grants represent an important proportion of the calories and proteins consumed by the target populations (for example, donated foods represent 35% of the calories and 44% of the proteins consumed in the rural sector of La Paz; in Cochabamba it is less, 20% and 25% respectively, according to LAISR data), the nutritional impact of these food grants seems to have a short-term effect. In particular, canned meats such as fish and beef are consumed very fast: in one-half or one-third of the time expected to consume the ration. Its nutritional effect is so fleeting that some authors call it a "nutrient injection."

TABLE VII-8
ORIGIN OF THE CALORIC CONTRIBUTION
OF PRINCIPAL FOOD PRODUCTS
BOLIVIA, 1985

Food Product	Basic Raw Material	Imported Caloric Portion as % of Whole Diet	Caloric Portion of Whole Diet	
			Calories	%
A. Processed				
1. Bread, Noodles flour	wheat	73.5 ¹	1,469.6	74.4
2. Oil	cotton seed, soy	0.3 ²	101.2	5.1
3. Sugar	sugar cane		76.4	3.8
4. Milk	evap., cond., powd. milk	?		
	Sub Total	73.8	1,647.2	83.3
B. Direct intake				
5. Potatoes		0.0006 ³	67.2	3.4
6. Beans			23.8	1.2
7. Rice			45.3	2.3
8. Eggs			14.6	0.7
9. Meat			50.6	2.6
	Sub Total	0.0006	201.5	10.2
TOTAL CALORIES CONSUMED*		73.8	1,849.0	(93.5)
TOTAL CALORIES CONSUMED PER PERSON PER FAMILY*		-	1,977.5	(100.0)

Notes: ¹99% of the wheat consumed in 1985 was imported.

²6% of the total oil in 1984 was imported.

³0.02% of the total potatoes consumed in 1985 was imported.

* Data as presented by author

Source: LAISR, 1986.

For example, the food assistance program operating in the El Alto area has surpassed all expectations for the number of pregnant women enrolled in the program. Nevertheless, our impression is that donated food, which is only given to pregnant women who comply with prenatal care, unintentionally discriminates against pregnant women who do not receive this care. In general, these are the very women who are in the worst nutritional and health condition, or who, because of their extreme poverty, are at greatest risk of giving birth to an underweight child, and have higher rates of perinatal mortality.

Another effect which can be glimpsed is the sharply increasing dependence of community organizations, especially the mothers' clubs and housewives' groups, who are not fulfilling the original objectives for which they were

created. Supposedly the mother's clubs receive nutritional assistance for two years, and then become self-sufficient by capitalizing on the receipt of food assistance to create new productive projects. At that time the donated food should be withdrawn and the new projects would continue. However, indications are that these organizations are beginning to depend completely on donated food (LAISR, 1976).

1.5. Housing and Services Characteristics

The data available on housing and services are those of the 1976 Housing and Population Census. There is a consensus that in general things have not changed, and that growth in basic services has been below the growth of the population and its needs. The data gathered in principally urban studies, carried out by mayors' offices, the National Statistics Institute, the IBRD and the PAHO/WHO, appear to confirm this general impression.

With respect to the number of rooms per housing unit, the available information is out of date. In the city of La Paz, according to 1985 NSI data, of the total housing units in the city (210,205), 35% had only one room (approximately 74,000). 268,115 person lived in these single-room units, which generates a very high rate of overcrowding. In 1976, according to National Census data, 33% of housing units had no bedroom to rest in, and 76% of the total housing units of the country reported between 0 and 1 bedroom.

Characteristics of the flooring of housing units are shown in Table VII-9. If roof materials are added, 64% of housing units were constructed of inadequate materials (corrugated sheet metal, curved roof tiles, or porcelain tiles were considered good). With respect to other services, approximately 60% of housing units have space for food preparation (kitchen), and only 7.5% had a shower or bathtub. Concerning the availability of sanitation services, 53% of urban housing units and 96% of rural housing units lack them (Morales and Rocabado, 1987).

As for access to water service, the situation is very unfavorable for Bolivians; as only 39% of the population had access to a private or public piped water system, while the principal source for the remainder was a well or chain pump (24%), a river, lake, spring, or pond (33%), or other (4%). According to a UNICEF report, the situation of housing units with respect to sewage elimination systems is shown in Table VII-10. Table VII-11 also illustrates the serious lack of sewage disposal systems, which has a predictable impact on the health of the population. Recent data from the mayors' offices and the IBRD commission show that in 1985 the situation of department capital cities did not differ greatly from that recorded in Table VII-11, for urban areas. For the cities of La Paz and Cochabamba, it is estimated that only 40% of the housing units had access to public water systems. In Oruro the rate was 30%; in Potosi, 60%; Sucre, 75%; and in Tarija, 50%.

TABLE VII-9
HOUSING DISTRIBUTION, BY FLOOR TYPE
BOLIVIA, 1976

Floor Type	% Of Housing Units
Wood, tile, cement, brick	36%
Earth	57%
Unspecified	7%
T O T A L	100%

TABLE VII-10
DISTRIBUTION OF SANITATION SERVICES (toilet, latrine, etc.).
BY URBAN AND RURAL AREA
BOLIVIA, 1976

Area	Sanitation Services				Total %
	With			Without	
	Private Use (%)	Collective Use (%)	Subtotal (%)	Unequipped(%)	
Urban	27	20	47	53	100%
Rural	3	1	4	96	100%
Country	13	9	22	78	100%

TABLE VII-11
POPULATION SERVED BY SEWAGE ELIMINATION SYSTEMS
BY URBAN AND RURAL AREA
BOLIVIA, 1976

Systems	Urban %	Rural %	Total %
Sewage pipes	30	0.3	12
Septic tank	4	0.5	2
Bore-hole latrine	14	3.5	8
None	52	95.7	78
TOTAL	100%	100%	100%

Source: Morales and Rocabado, 1987.

1.6. Education¹

According to UNICEF estimates, the school age population, that is, those between 5 and 19 years of age, reached 2.5 million youths in 1985, or 36.9% of the total population.

At that time the population in school was 1.5 million, which means there were approximately 1 million children and youth between the ages of 5 and 19 years of age outside the school system.

The distribution of enrollment by place of residence, sex, and age, by grade, reveals various phenomena, among which are the following:

- Urban enrollment constitutes 68% of the total, whereas only 48% of Bolivia's population is urban.
- Of every 10 enrolled, 5.3 are boys, and 4.7 are girls.
- 29%, 30%, and 52% of male children and youth 5-9, 10-14, and 15-19 years of age, respectively, were outside the school system; among girls, these percentages were 33%, 38%, and 59%.
- In rural areas, during the period 1983-1984, 54% of male children between 5 and 9 years of age did not attend school. This percentage reached 58% for female children.

The 1976 data (and there is no factor indicating they have improved, but rather, have worsened) show that of 1,000 students entering first grade, 680 drop out after finishing third grade. 320 remain, and of these, 240 finish primary school, of which 180 enroll in secondary school. 30 finish secondary school, 16 enter the university, and of these, 4 professionals are graduated (Camacho, 1987).

The average retention and promotion rates for the period 1969-1979 suggest that females, once they have been enrolled, make a greater effort to remain in school than males, and do so also to be promoted to the next grade. Nevertheless, their school system retention rates, between the second and last grade of primary school, are significantly inferior to those of males. However, the rates for middle school are somewhat similar (UNICEF, 1987).

According to best-case estimates done by UNICEF, the school dropout phenomenon essentially affects primary school. 2.5% of the expected cohort dropped out in 1980, rising to 3.8% in 1981, to 5.2% in 1982, and to 6.1% in 1983 and 1984. During this last year, approximately 58,000 children dropped

¹This section is taken in part from Morales, R, and Rocabado, F., "Bolivia 1987: Analysis of the Status of Women and Children: (UNICEF: La Paz, September, 1987).

out of school prematurely, of which 55% were females. In primary school, above all in the early grades, education is oriented to the development of reading, writing, and basic arithmetic operations. Generally, the method used is the child's repetition of the explanation received, with little emphasis on his active participation in the teaching-learning process.

Spanish-speaking children normally succeed in reading and writing simple texts (although imperfectly) within 4 or 5 months of beginning school. For Quechua- or Aymara-speaking children, who are taught in Spanish, the process of learning to read is slower, and can take from 1 to 2 years.

Moreover, as noted above, school cohorts register accelerated enrollment losses. For example, only 3/4 of the enrollments arrive to the second from the first grade; less than 2/3 to the third grade; and only half to the fourth grade, which implies that many children drop out of school before learning to read, having only grasped the letters of the alphabet.

The above observations explain, in large measure, the results of certain surveys which show important functional illiteracy rates (approximately 2/3 of the population older than 15 years of age was literate, but only 1/3 was able to read and understand a simple text).

1.7. Poverty Map

Bolivia has made significant efforts to define, identify, and locate the population sectors which are most depressed and alienated from the national economy, and therefore with the greatest social needs, in terms of education, employment, health, and well-being.

Various researchers have used different methodologies to determine, through various indicators (such as income level and distribution, access to goods and services-water, sewage systems, electricity, education-mortality, migration, etc.), the spacial and population distribution of poverty (Morales Anaya, 1984; CONAPO, 1985). Target populations for food supplementation/nutrition programs have been identified, combining factors such as height for age, mortality (0-2 years), rural setting, and population density (Rocabado, 1985).

There are discrepancies among the various poverty maps, since they combine different factors and methods. Moreover, the poorest provinces are those which present a high rate of ruralism, are most isolated, and have no health services infrastructure, nor sufficient human resources. In urban areas, inter-district and inter-barrio poverty differences have not been established, which would allow identification of the most depressed sectors of the urban population. In addition, the plains region (departments of Santa Cruz, Beni, and Pando) is not considered one of extreme poverty by the CONAPO classification, although this should not be interpreted as if poverty does not exist in this region. In reality, according to Morales Anaya, some provinces of Santa Cruz, Beni, and Pando are found in the poorest categories of the spacial distribution.

The plains regions are receivers or destination points for permanent and temporary internal migrations (see section on migration in this document), which are an adaptive response or survival strategy for populations submitted to conditions of extreme poverty, unemployment, and undernourishment. In reality, it is very probable that these regions have functioned historically as refugee zones to which the indigenous population of the valleys and the west have migrated, either temporarily or permanently, in order to flee colonization, "reducciones" (forced settlements) and "las mitas" (communal labor camps).

To conclude our analysis of the socio-economic context of Bolivia, we have preferred the use of the CONAPO study, which identifies 53 provinces in the country as being in conditions of extreme poverty (Table VII-12). These provinces were ranked according to the following classification criteria:

1. Mortality in children under 2	= 0 to 213
2. Illiteracy rate	= 0 to 37%
3. Net migration rate	= 0 to -0.2%
4. Piped drinking water	= 0 to 15%
5. Electricity	= 0 to 12%

The information has been regrouped in order to select priority populations, or those with greatest risk of disease or death, at the departmental level. The project activities should be concentrated in those areas where the greatest proportion of the population lives in extreme poverty, in those which also fulfill the requirements of health services accessibility, and, as far as possible, in those where other cooperation or development projects do not exist.

Tables VII-12, VI-13 and VII-14 present populations in extreme poverty by groups of provinces and departments. The following departments and areas are noted in order of priority for child survival activities:

1. Potosi
2. Chuquisaca
3. Cochabamba
4. Oruro
5. La Paz
6. Tarija

In the Department of Santa Cruz, the urban-marginal area of the city, and the provinces of Ichilo, Santisteban, and Cordillera are considered priorities. In the departments of Beni and Pando, concentrated population areas were selected: Trinidad, Riberalta, Guayaramerin, etc.

TABLE VII-12
TOTAL POPULATION AND PERCENTAGE OF RURAL POPULATION
IN PROVINCES IN EXTREME POVERTY

CODE	PROVINCE	DEPARTMENT	POPULATION*	% RURAL POPULATION**
GROUP 1: PROVINCES IN MOST DEPRESSED CONDITIONS				
59	Ibanez	Potosi	31,557	100.0
56	Chayanta	Potosi	118,793	95.2
45	Carangas	Grura	33,125	100.0
65	Bilbao	Potosi	12,929	100.0
32	Arze	Cochabamba	39,336	90.7
57	Charcas	Potosi	43,130	100.0
08	B. Boeto	Chuquisaca	18,011	78.7
34	Arque	Cochabamba	39,569	100.0
39	Tapacari	Cochabamba	30,465	100.0
02	Azurday	Chuquisaca	26,840	100.0
31	Ayopaya	Cochabamba	75,980	95.3
07	Nor Cinti	Chuquisaca	78,158	96.2
04	Tomina	Chuquisaca	40,121	91.5
30	Campero	Cochabamba	13,171	84.7
26	Saavedra	La Paz	14,445	100.0
15	Muñecas	La Paz	30,898	100.0
14	Camacho	La Paz	101,310	97.0
33	Arani	Cochabamba	51,941	92.4
71	Avilés	Tarija	19,543	100.0
03	Zudañez	Chuquisaca	35,752	100.0
35	Capinota	Cochabamba	31,830	90.2
72	Méndez	Tarija	35,814	91.9
T O T A L			952,624	95.7
GROUP 2: PROVINCES IN DEPRESSED CONDITIONS				
62	Sud Lipez	Potosi	5,540	100.0
61	Nor Lipez	Potosi	12,232	100.0
52	Saucari	Oruro	9,720	100.0
41	Mizque	Cochabamba	37,129	100.0
40	Carrasco	Cochabamba	63,101	100.0
19	Loayza	La Paz	61,940	90.5
09	Sud Cinti	Chuquisaca	28,536	100.0
55	Saavedra	Potosi	72,253	96.0
63	Linares	Potosi	71,410	100.0
06	Yamparaez	Chuquisaca	36,166	91.7
28	Villarroel	La Paz	22,825	100.0
12	Omasuyos	La Paz	118,896	95.3
27	M. Kapac	La Paz	33,692	87.6

(Continued)

TABLE VII-12 (continued)
TOTAL POPULATION AND PERCENTAGE OF RURAL POPULATION
IN PROVINCES IN EXTREME POVERTY

CODE	PROVINCE	DEPARTMENT	POPULATION [*]	% RURAL POPULATION ^{**}
17	Tamayo	La Paz	23,465	100.0
73	O'Connor	Tarija	21,711	100.0
T O T A L			618,615	97.4
GROUP 3: PROVINCES IN LESS DEPRESSED CONDITIONS				
64	Quijarro	Potosi	51,704	70.7
47	Litoral	Oruro	3,835	100.0
44	Avaroa	Oruro	44,328	90.5
48	Poopo	Oruro	25,932	100.0
50	Cabrera	Oruro	14,364	100.0
51	Atahualpa	Oruro	6,764	100.0
54	Bustillos	Potosi	122,063	46.4
53	Frias	Potosi	163,978	37.0
49	Dalence	Oruro	44,363	27.7
58	Nor Chicas	Potosi	64,044	85.2
20	Inquisivi	La Paz	108,710	76.1
38	Chapara	Cochabamba	78,555	90.4
60	Sud Chicas	Potosi	73,590	54.1
42	Punata	Cochabamba	47,859	64.4
01	Oropeza	Chuquisaca	139,137	41.0
67	Omiste	Potosi	27,574	39.2
T O T A L			1,016,800	69.6

^{*}1985 population estimates derived from NSI projections at the provincial level for 1982, and at the department level for 1985.

^{**}Defined as the relation between localities with less than 2000 inhabitants and surrounding population, and the total population of each province, according to the 1976 census.

Sources: NSI: Demographic Bulletins
NSI: Bolivia Statistics, 1985

SUMMARY OF TABLE VII-12

GROUP	PROVINCES	POPULATION	% RURAL POPULATION	
1	22	952,624	95.7	
2	15	618,615	97.4	
3	16	1,016,800	69.6	
T O T A L S		53	2,588,039	87.5

TABLE VII-13
POPULATION IN EXTREME POVERTY CONDITIONS¹
LIVING IN DEPRIVED PROVINCES BY
DEPARTMENT AND DEGREE OF POVERTY
BOLIVIA, 1985

Department	P O P U L A T I O N			
	Group 1	Group 2	Group 3	Total
Potosi	206,409	161,435	502,953	870,797
Cochabamba	312,192	100,229	126,414	541,835
La Paz	146,659	260,818	108,710	516,187
Chuquisaca	198,882	64,702	139,137	402,721
Oruro	33,125	9,720	139,586	182,531
Tarija	55,357	21,711	-	77,068
Total	952,624	618,615	1,016,800	2,588,039

¹ Poverty classification criteria: mortality of 0-2 years, illiteracy, migration, piped drinking water, electricity supply (see Annex 3).

Group 1 represents the most depressed, and group 3 the least depressed.

Mortality rate changes in children under 2 years old:

Group 1 = 217-341 per thousand

Group 2 = 145-306 per thousand

Group 3 = 217-296 per thousand

Source: CONAPO
 NSI. Demographic Bulletins
 NSI. Bolivia Statistics. 1985.

2. CULTURAL CONTEXT

2.1. Ethnic Groups and Social Organization

As in all countries of the Andes, Bolivia is a multicultural and multilingual country, in which, besides the Spanish-speaking group, the Aymara and Quechua groups stand out, as well as a group of ethnic minorities of the Tupi-Guarani family and others.

The largest populations of Aymara and Quechua are concentrated in the high plateau and valley regions respectively, although there are also bilingual areas where both languages coexist, as in the northern region of the Department of La Paz, eastern Oruro, and northern Potosi (Plaza Martinez, 1985). According to some estimates derived from the 1976 Census, the monolingual population (Aymara or Quechua only) is some 900,000

TABLE VII-14
POPULATION IN EXTREME POVERTY CONDITIONS BY DEPARTMENT.
BOLIVIA, 1985

Department	Total Population ¹	Population in Extreme Poverty Conditions	Proportion of Population in Extreme Poverty
Potosi	878,232	870,797	99.1%
Cochabamba	979,171	541,835	55.3%
La Paz	2,091,429	516,187	24.7%
Chuquisaca	462,904	402,721	87.0%
Oruro	412,756	182,431	44.2%
Tarija	270,027	77,068	28.5%
Santa Cruz	1,047,964	- ²	-
Beni	239,810	- ²	-
Pando	46,933	- ²	-
TOTAL	6,429,226	2,588,039	40.2%

¹ Total population by department, according to projection as of July 1, 1985.

² The population in extreme poverty conditions is concentrated in marginal urban and rural areas, but is not considered by the classification criteria because these regions receive migrants, and have lower ranges of infant mortality.

Source: NSI. Bolivia Statistics, 1985.

(approximately 22% of the total population), and the bilingual population (native language plus Spanish as a second language) reaches 1,700,000 (approximately 40% of the total population). Both estimates are conservative because, due to the low prestige of native languages, this response is hidden or disguised on the census form (Table VII-15).

The total population of Aymara or Quechua descent in the country would reach some 2,600,000 inhabitants, which represents a significant percentage (62%) of the Bolivian population, and occupying a large expanse of the country.

From the analysis of the data presented in Table VII-15, another fact becomes clear: young groups state "Spanish only" as their language (almost 50% of the population under 15 years of age), while among the oldest groups (older than 50 years), 80% state they speak one or more native languages, with or without Spanish as a second language.

In the population settlements of the tropical and sub-tropical zones of eastern Bolivia, an important group of ethnic minorities are found, among which the following groups stand out: Awa and Izoceno, speaking tupiguarani, settled in Cordillera Province in southern Santa Cruz (approximately 50,000 inhabitants); the Chiquitanos (40,000 inhabitants), Ayoreos (3,800 inhabitants); and Guarayos (8,000 inhabitants); and the

Ignacianos (4,000 inhabitants) and Itonamas (5,000 inhabitants) in Beni. Growing contingents of colonists from the high plateau and valleys are concentrating in the eastern plains regions, particularly around cities such as Santa Cruz, resulting in enormous demographic growth (between 10% and 15% annually), primarily at the expense of the migratory groups.

The Aymara group is located primarily in the high plateau region of Peru, Bolivia, and northern Chile. In Bolivia, Aymara regions are primarily in the departments of La Paz (high plateau, valleys and warm valleys) and Oruro, although they are also in northern Potosi, in Cochabamba (eastern region), and in some enclaves of the department of Chuquisaca. The Aymaras were traditionally grouped in "Ayllus", social units of production with kinship linkages, which currently have been transformed into rural communities which remain united by strong ties of kinship, consanguinity and affinity.

TABLE VII-15
POPULATION DISTRIBUTION ACCORDING TO LANGUAGE, BY AGE GROUP
BOLIVIA, 1976 ⁽¹⁾

Age	<15	15-49	>50	Total		Cumulative
Language	Number	Number	Number	Number	%	%
Aymara only	104,957	112,227	98,044	315,228	7.6	7.6
Quechua only	168,418	262,691	137,598	568,707	13.7	21.3
Aymara & Quechua	5,299	28,222	19,163	52,684	1.3	22.6
Castilian & Aymara	192,082	432,307	55,629	680,018	16.4	39.0
Castilian & Quechua	240,596	528,698	95,480	864,774	20.8	59.8
Castilian & Both	9,990	75,380	17,299	102,669	2.5	62.3
Castilian & Others	12,896	28,991	7,915	49,802	1.2	63.5
Castilian only	719,070	676,491	112,804	1,508,365	36.3	99.9
Others	3,009	2,704	1,301	7,014	0.2	100.0
TOTAL	1,456,317	2,147,711	545,233	4,149,261	100.0	-

Source: 1976 Population Census.

In the Andes, this structure has been described as "Andes verticalism" (a concept generated by the Ayllu nucleus) with settlements in high altitude regions (Lupaga) and one or more territorial "islands" in the valley. This forms a vertical archipelago for the maximum control of ecological levels and for crop diversification. This arrangement was derived from the original spacial configuration of the Inca State (Murra, 1975). Within the ayllu, the principle of reciprocity ruled the relations among individuals, families, and groups; just as outside, the principle of "redistribution" supposes the existence of a superior hierarchical level, which decides the use and distribution of surpluses.

The organization and composition of the ayllus has been treated in various ways by different authors. In a schematic way, population groupings in high altitude and valley regions of the central Bolivian high plateau are gathered in small residential nuclei (from 10 to 30 inhabitants on average) called estancias (small community), which in varying numbers comprise an ayllu (intermediate sized community). Various ayllus are formed into a large community which is usually organized into a head village with permanent or stable residents, and a floating or temporary population comprised of various members of the large community who reside permanently in the estancias (Molina Rivera, 1986).

Access to land for cultivation and grazing is strongly tied to the membership of the individual or family in the three levels described: estancia, ayllu, or large community, as well as is the right to vote in communal assemblies and the performance of various community and religious responsibilities (Harris, 1982).

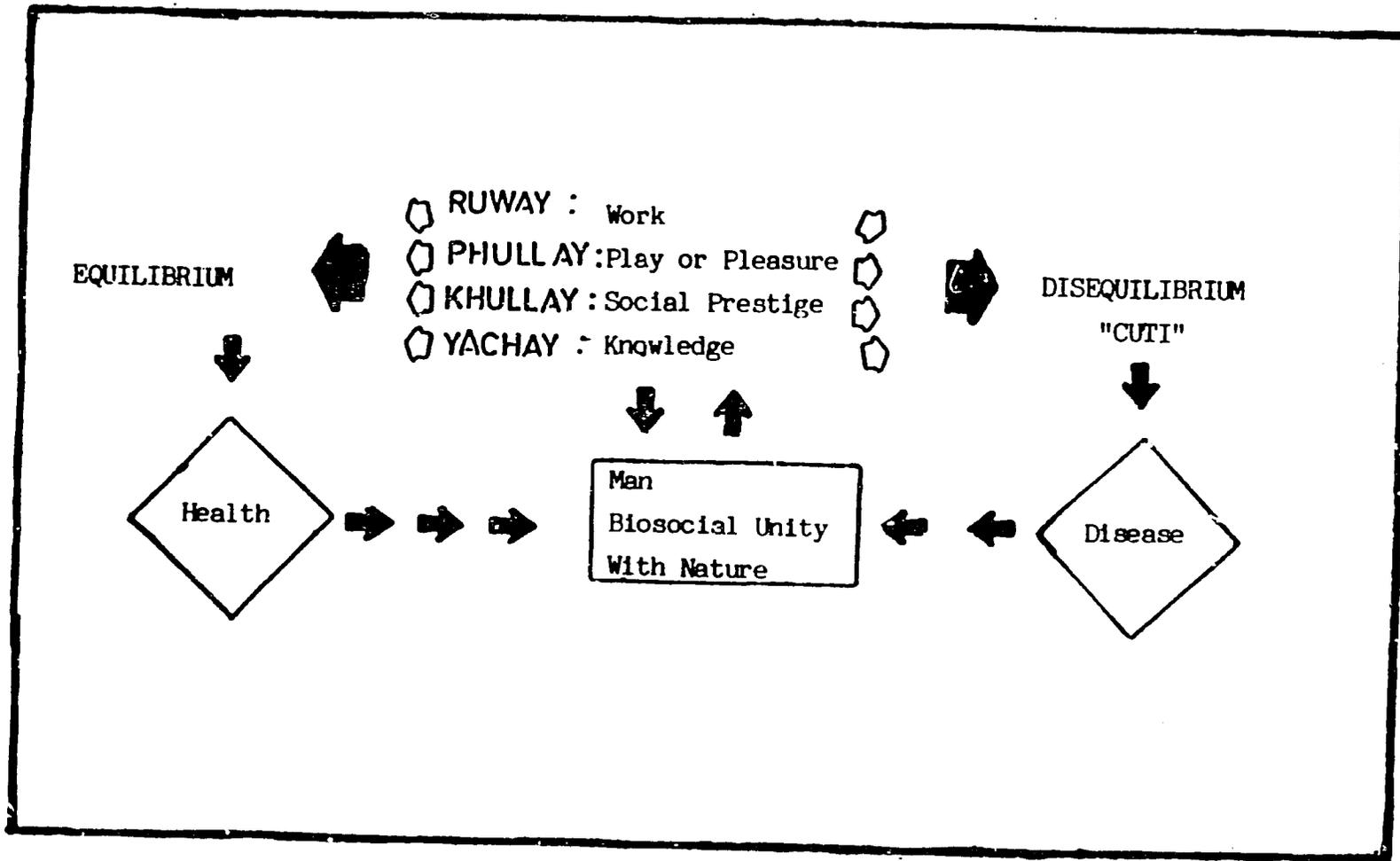
2.2. The Health-Disease Process

The altitude of the high plateau region, which ranges from 3,500 to 4,500 meters above sea level, imposes very hard living conditions, to which the resident population has successfully developed a group of adaptive responses. The morbidity and mortality profile presented by the Aymara population of this altitude corresponds to the characteristics presented by low socio-economic level populations of other Bolivian regions. There is a clear predominance of infectious diseases, parasites, and malnutrition, which translates into a high incidence of diarrheal and acute respiratory diseases in the infant population, as well as other endemic diseases. Both data obtained from the medical and epidemiological records analyzed, and data reported by cross-sectional studies and surveys (Murillo et al, 1980; Frerichs, 1977) appear to confirm this situation. As usual in the Andes and elsewhere in the Third World, the studies reveal the existence of a large number of cases in the category of "poorly defined symptoms and sickness" (ICD 780-796). This suggests the existence of a high frequency of culture-bound syndromes, for which the International Disease Classification is inadequate or unresponsive.

The health-disease process in the Andes is dominated by the concepts of equilibrium and disequilibrium, of overturning ("cuti") or inversion of the auspicious into the ominous. Health means happiness, with the will and ability to work, and above all, knowledge (yachay). The man who "knows," and who knows his body and nature, is a healthy man, who does not get sick easily (Figure VII-4). The reverse is also true: the man who does not know frequently falls ill.

The traditional or folk model of the Andean doctor is represented by a large group of specialists: kolliris, campec, alcos, kamasas, soncoyoc, jampiris, sirkak, yatiris, and callaguayas, who, in virtue of being elected, have special powers through which they can fight against the "cuti", that is, against the disequilibrium of the relationship between the Andean man and nature (Mantilla, C., 1986).

FIGURE VII-4
 CONSTITUTIVE ELEMENTS OF THE HEALTH-DISEASE PROCESS



SOURCE: "Education in our America", Luis Rojas Aspiazu.

The two principal sources of the folk model which are predominant in the Andean high plateau and valleys of Bolivia are the Aymara culture and the Quechua culture. The Aymara and Quechua folk models share many elements of the explanatory model on the origin of diseases, the conception of the body and its cavities (including concepts of fluid circulation for which there is an Aymara "hydraulic body fluids circulation" model described by J. W. Bastien, 1985), and some preventive-therapeutic procedures.

Diseases are classified in two large categories: "diseases of God", or of mythical or supernatural origin, and natural diseases (or also "street sickness"). The first are identified by the circumstances and contexts of contact with supernatural agents, as in the case of those seized (jap'iga), by an ill wind (sajra wayra) or spirit (sanku).

Other diseases common among children are fright or shock (macharisqa), itch (chullpa unquy), cold with cough (chiri, ch'uju), whooping cough (t'uku ch'uju) and various forms of diarrhea: runs, aika (light diarrhea from change in diet), wijch'uy (temporary episode of diarrhea), curso (persistent diarrhea), and wila curso (diarrhea with mucous and blood, or serious dysentery), and the most serious forms of malnutrition (ayiasca, and other equivalent designations).

In the east and the plains, corresponding to the tropical and subtropical areas of Bolivia, other traditional medical cultures are found, consisting of a folk model with strong amazon influence. These medical practices have their own explanatory model and original therapies, with afro-American elements brought from Brazil by "macumberos". They have their own sanctuaries and pilgrimage sites, in which the use of medicinal plants, psychotropic substances, prayers, and exorcism and propitiation rituals of a therapeutic nature are combined.

2.3 Reproductive Life: Pregnancy and Birth, Nursing and Weaning

Modern contraceptive practices apparently are not widespread among the indigenous and mestizo population of the high plateau and valleys. Nevertheless, there are various traditional recipes frequently used, such as "mates" or herbal teas (itapallu, oregano, etc.), doses of condor blood, or even magical procedures such as driving into the ground (pachama) the point of a brooch (t'ipa), as has been described for north Potosina communities (Isko et al, 1986). Various substances with abortive effects are known and used: floripondio, rue and wachanga, mate of sumpupu excrement (variety of large ant); and also intentional or unintentional procedures such as lifting large weights or "stamping on the stomach."

Delivery is a natural event which for the most part takes place in the intimacy of the home, attended by a midwife, by a close family member, or even alone. The actual delivery is accomplished while squatting over a sheep skin, on which the newborn is received, in a relatively dark atmosphere lit by candles. The umbilical cord is cut in various ways, sometimes with metal scissors, other times with fragments of broken tiles, pieces of cane, or rocks. The norm of a long stump for males and a short stump for females is observed. The disposal of the placenta (wawa iquina)

is very important, and it is generally buried somewhere in the home. If buried far away, in a hostile place, if thrown into water (which is generally done in hospital births), or if it is devoured by an animal (dog, pig), the child may die or risk disease or a serious abnormality.

During puerperium, the mother should rest for a variable amount of time and maintain an appropriate diet (food and mates). Certain foods are forbidden, and contact with water or exposure to open areas should be avoided for some two weeks because of danger of a relapse.

Nursing is prolonged, between twelve and eighteen months on average, and beginning with the sixth or eighth month the child begins to share certain foods eaten by the mother. There are various methods of weaning, which are also defined culturally, in which chili pepper is frequently applied to the nipple, or even mud, thorns (sajrana), or spiders or even animals so that the child will give up nursing. Another important transition is the passage from infancy to childhood, around the second or third year of life, through the hair-cutting (uma ruthuku) ceremony, performed when the fontanels (pujyu) have closed. The godfather makes the first cut of the hair, and other relatives and neighbors follow. These people often bring a valuable gift, possibly an animal (Izco et al, 1986).

The ethnic groups of the eastern plains also have their traditional obstetric practices, their own explanatory model for the process of health and disease, as well as a group of child rearing and feeding practices. Although these practices are less known than those of the Quechua and Aymara groups, they are not less important within the context of these groups. Among the populations of settlers in rural and urban areas of subtropical regions, a veritable mosaic of birth care and disease treatment practices is found. Nevertheless, in urban enclaves there is a marked tendency to institutional care for childbirth. If we compare this with the behavior of other groups of the Andes region, hospital services of this region register an important proportion of the institutional births of urban areas and of the country. In rural areas, births are in general attended by a family member (spouse, mother, etc.) or neighbor, and a smaller proportion by a doctor or midwife, given that more than 80% of births take place in the home. Women rest for four days or more, and a large majority sustain nursing for an average of 12 months. The cost of birth care in medium rural areas (Department of Santa Cruz) has been reported in a study done 10 years ago as U.S. \$10.31 on average (Frerichs, 1977), although half of home births take place at no cost.

Currently, in the urban area of Santa Cruz, institutional births cost a minimum of U.S. \$30.00 or more, depending not only on the care received, but also on the medicines used.

2.4. Health Systems: Professional Model, Popular Model, and Traditional Model

Health systems, or medical systems as others prefer to call them, are a manifestation of a social phenomenon which, in a restricted sense, includes a more or less complex bureaucratic system of hospitals, clinics,

doctors' offices, schools, and associations of professionals, companies, and standardization agencies, who train personnel and maintain an infrastructure for biomedical research and services at various levels of complexity aimed at the prevention, care, treatment, and rehabilitation of the ill.

From this one-sided and restricted perspective, all other forms of medical and health care which are not part of the official structure, legally authorized, are generally ignored or scornfully considered a mere curiosity, simple charlatanism, or superstition. However, a more integrated and realistic vision should consider medical systems as pluralistic systems, in which modern medicine is only one component, on a par with other therapeutic alternatives (Leslie, 1978; Pedersen, 1985). These other therapeutic alternatives are many in the society of the Andes and contribute to a vast mosaic of medical practices and religious, lay, popular, traditional, and modern procedures.

In the treatment of common infant diseases, in general it is the mother who takes the therapeutic initiative, interpreting the symptoms and fitting them into her cognitive framework and explanatory model, and responding with the use of herbs, household preparations, massages, prayers, modern medications, etc. This conglomeration of actions make up the popular model, which at the individual and family levels includes self-care elements or other elements derived from traditional or folk model medicine (herbs, dietary practices, etc.); or professional model practices (drugstore medicines); or finally, third-party therapeutic advice (neighbors, family members, etc.). There is evidence that this configuration is important in the treatment of common diseases of infancy. In Bolivia, the population resorts to various sources of care for treatment of their problems. Table VII-16 shows the various reasons why families in depressed rural areas chose not to use public health services.

In Bolivia, traditional and popular medical practices are not a historical vestige which are disappearing, but rather represent a current, dynamic, and changing reality, permanently recreated by society in its ongoing search for health. The popular model is thus a dynamic field, a continuous interaction between the professional and traditional models, recreating an original explanatory model of diseases and their causes. Its principal functions are the naming, interpretation (causality), diagnosis, and therapeutic treatment of illness.

If the popular model is consonant with the professional model, that is, there are no disagreements between their respective explanatory models (the mother or the patient consulting a doctor, for example), it is probable that an effective doctor-patient relationship will be established, with a good response to and follow-up of medical signs and their treatment. The same would occur in the interchanges between the popular and the traditional models (the patient consulting a witch doctor), when there is convergence between both explanatory models.

However, it does not always happen this way. The confrontation between the professional and popular models regarding illness and its treatment is a daily fact widely reported in the literature by various authors and researchers into the reality of health in Bolivia (Bastien, 1982; Izko, Molina and Pereira, 1986; Daza, 1985) and other countries.

TABLE VII-16
BOLIVIA: REASONS FOR NOT USING PUBLIC HEALTH SERVICES
AMONG FAMILIES IN RURAL DEPRESSED AREAS
BOLIVIA, 1984

Reasons	High Plateau %	Valley %	Control Group %	Total %
Not necessary	23.0	46.7	38.7	33.7
Service is very far	26.7	4.7	5.6	14.8
Care is poor	0.5	2.8	3.2	1.9
Prefer other care ¹	38.5	40.2	36.3	38.3
No opinion, don't know	11.2	5.6	16.1	11.2

¹ Witch doctor, neighbor, friend, relative, private doctor, pharmacy, midwife, others.

Source: Daza, G. et al. Nutritional study of depressed rural communities in Bolivia. La Paz, 1984.

In reality the confrontation is only part of the old problem of public and governmental institutions in the Andes area: how to make monocultural institutions (such as hospitals or schools) mesh or develop efficiently within a multi-ethnic and multicultural reality (Salomon, 1982).

Medical and nursing schools in countries of the Andes continue to design their teaching curriculum within the needs profile of middle-class urban society. This is based on the mistaken premise that the hegemonic practice of modern medicine will end by dominating society, because no other valid or legitimate medical systems exist as a response to the health-disease process. Health professionals who are exposed to rural or marginal urban areas in Bolivia interpret the resistance of the indigenous population to adopting modern medical technologies (vaccines, health examinations, growth and development records) as "cultural barriers" or simple ignorance, without realizing that the resistance to change and innovation in individual and collective health care has a structural and epistemological explanation at base (Bastien, 1982), which it is necessary to research and re-evaluate, before discounting it.

The situation described to this point should direct health and child survival project strategies to the area of research into the popular model prevalent in the various regions and social groups of the high plateau, inter-Andean valleys, and eastern plains, which is used in the home by the family and mothers to manage health and disease situations. If the introduction of medical technologies for the prevention and treatment of child diseases is proposed, it is essential to recognize the model of healthy behavior which is used in various social and cultural contexts of

the country, and how popular, traditional, and professional models are generated and interact with respect to the health needs of the child and the Bolivian family.

**VIII. CHILD SURVIVAL PRIORITIES: PRINCIPAL PROBLEMS AND
DISEASES IDENTIFIED**

1. BIRTH AND PERINATAL HEALTH

1.1. The Problem

The information available does not show the current coverage and concentration of prenatal care. Nevertheless, based on isolated data, it is possible to estimate that this activity benefits approximately 15% to 20% of pregnant women in urban areas. In rural areas, with few exceptions, prenatal control practically does not exist. In field visits to maternity hospitals in the cities of La Paz, Cochabamba, Santa Cruz, and Sucre, the use of prenatal check-ups was observed to be very low, in the range of 1.4 to 2.1 visits per pregnancy, and the majority of the consultations were late, occurring after the first half of the pregnancy.

In all maternity hospitals visited, it could be confirmed that the tetanus toxoid is not being used in pregnant women, with the exception of the German Urquidi maternity hospital in Cochabamba. VDRL serology coverage for the detection of syphilis is very low and relatively costly for patients.

There are no criteria for obstetric and perinatal risk in the country. Some values based on the Nesbitt scale have been produced, but these values have not been validated for the Bolivian population.

In 1982, the National Statistics Institute estimated 252,046 births at the national level. 47,760 hospital births were reported (including the MSWPH and Social Security), which means that the percentage of institutional births was close to 18.9%, a figure considered one of the lowest in South America. The above data allow the inference that close to 80% of childbirths occur in the home, the majority of which presumably do not have sanitary conditions, especially for handling, severing, and ligating the umbilical cord, which in some regions is performed using traditional obstetric practices.

Hypoxia and asphyxia in the newborn constitute the principal cause of perinatal death (NSI, 1981), a situation associated with the inadequate care of the newborn, both in institutions and at home, and intrapartum fetal distress.

In a study of 303 autopsies covering the neonatal period, performed in a Social Security hospital in the city of La Paz between 1963 and 1982 (Patino, L. et al), hypoxia was considered the primary cause of death. Low birth weight (under 2,500 g.) constituted another important cause of perinatal hospital mortality. Its incidence in maternity hospitals in La Paz and Cochabamba is between 11.6% and 19%.

Neonatal tetanus is another important cause of mortality which was discussed in the chapter on immuno-preventible diseases. Congenital syphilis constitutes another problem whose magnitude has not been sufficiently evaluated.

1.2. The Program

In the area of infant and maternity care, the MSWPH has implemented "free childbirth" in selected maternity hospitals of the country. This program consists of subsidies of the basic supplies for obstetric care of normal childbirth. Nevertheless, it does not cover the cost of laboratory tests and of other medications necessary for the management of normal or dystocial childbirth. According to information supplied by the management of the maternity hospitals visited, the supplies delivered for free childbirth do not cover necessities. Since the start of the "free childbirth" program an increase in institutional childbirths has been recorded, but occupancy rates are still low (30-50%).

The delivery and immediate care rooms for the newborn lack the minimum equipment to guarantee efficient, good quality care. Mother and child stay together, a widespread, satisfactory practice. However, deficiencies in obstetric services were recorded in the city of La Paz, because of overcrowded conditions and low temperatures in rooms for newborns and puerperal care. In one service, the operating room was closed for lack of resources, so that dystocial childbirths must be referred to other services with an operating room.

1.3. Strategies and Plan of Action

i. Institutional level:

- Improve output of current capacity.
- Increase prenatal consultation schedule.
- Begin simplified perinatal clinical history for follow-up of the pregnancy and other services (birth and newborn).
- External consultation equipment (scale, tape measure, b.p. cuff, etc.)
- Train medical personnel and nurses in physical examination and recognition of high risk.
- Provide reagents and supplies for routine laboratory tests.
- Systematically give tetanus toxoid to pregnant women.
- Redesign food assistance strategy for pregnant women, in order to increase the number of beneficiaries, using risk criteria to identify groups in extreme poverty. Readapt rations contents, encouraging the inclusion of traditional

foods which gradually replace foods which are not appropriate for the local food culture. Develop a monitoring system for the food assistance program.

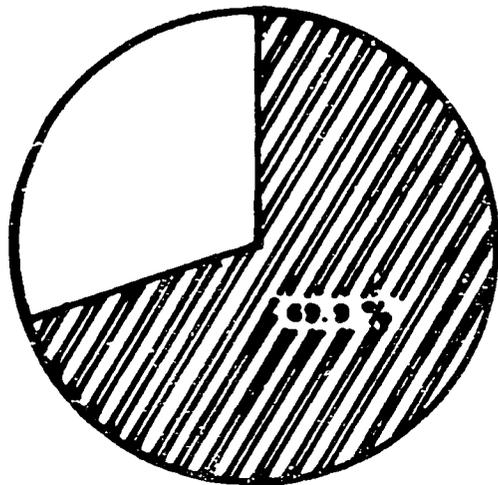
- Encourage walking during labor.
- Respect the obstetric position desired by the mother during childbirth.
- Place the newborn on the mother's stomach skin to skin, and facilitate mother-child visual contact.
- Facilitate access of spouse or close relative to the delivery room.
- Encourage return of the placenta to the indigenous mother who may request it.
- Encourage early nursing of the newborn.
- Respect nutritional practices during the immediate puerperal period.
- Ensure that mother and child stay together.
- Encourage early discharge.
- Develop educational activities for mothers, taking advantage of their confinement to educate them about care for the newborn, breast hygiene, pregnancy intervals and infant vaccination schedules.

ii. Community level

- Identify traditional midwives.
- Encourage meetings of traditional midwives to reinforce satisfactory practices and change inappropriate techniques.
- Train midwives in techniques of umbilical cord handling, immediate care, and revival of the newborn; vaccination of pregnant women with tetanus toxoid, and BCG and polio vaccinations for the newborn.
- The implements to be delivered to midwives should include cakes of soap, ligatures for the umbilical cord, and bulb syringes to absorb secretions.
- Encourage clean childbirth attended by traditional midwives.

FIGURE VIII-1

PERCENTAGE DISTRIBUTION OF CHILDREN CURRENTLY NURSING
IN BOLIVIA, ACCORDING TO PLACE OF RESIDENCE AND AGE GROUP. 1981.



6-11 MONTHS

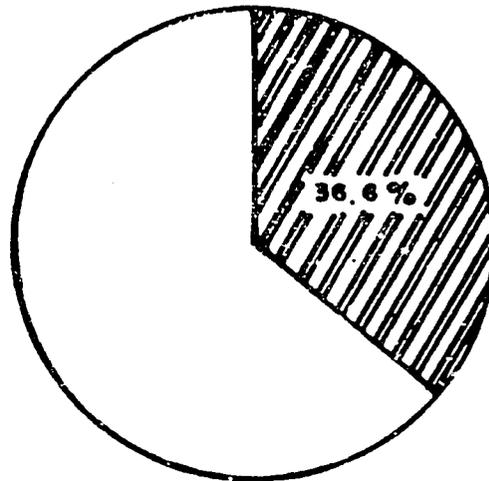
URBAN AREA



NURSING

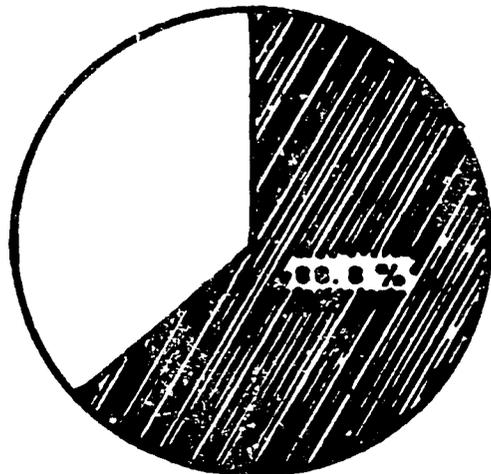
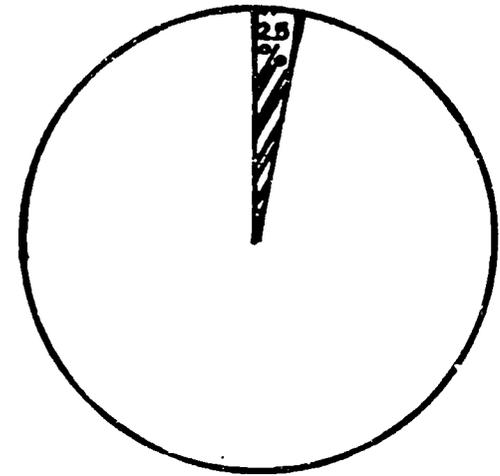


NOT NURSING



12-23 MONTHS

24-35 MONTHS



6-11 MONTHS

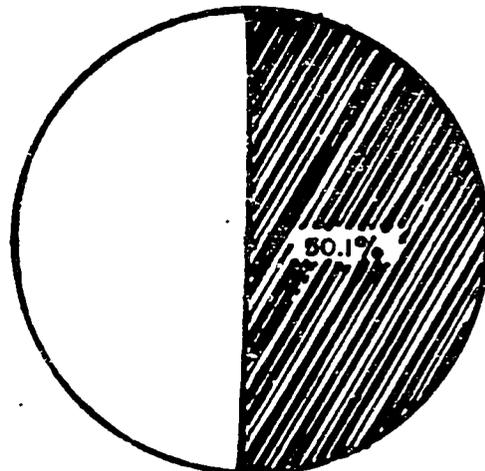
RURAL AREA



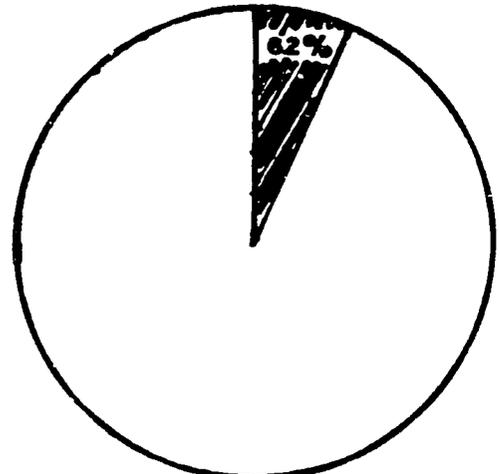
NURSING



NOT NURSING



12-23 MONTHS



24-35 MONTHS

2. NURSING AND WEANING

2.1. The Problem

Breastfeeding is an essential factor for the growth and development of the child during its first 18 months of life. Moreover, it is a factor contributing to a reduction in the frequency and severity of common infant infections (diarrheal, respiratory diseases, etc.). This effect, on the one hand, reduces the exposure of the child to pathogenic agents in the environment, and on the other hand, provides him antibodies protecting against various common pathogens.

In a 1981 study by the National Institute of Food and Nutrition (INAN), it was observed that in Bolivian urban areas, 69.9% of children between 6 and 11 months of age were breastfeeding (Figure VIII-1), and in Bolivian rural areas, the same was observed in 88.8% of children of the same age. Between 12 and 23 months of age, the difference between urban (36.3%) and rural (50.1%) maternal nursing rates widens. This means that during the second year of life, two-thirds of urban children and one-half of rural children were not receiving the benefit of breastfeeding. This discovery is compatible with the rise in diarrheal diseases in this same age group.

In all ecological regions, breastfeeding is more widespread and long-term in rural than in urban areas. The high plateau region presents higher levels of breastfeeding, followed by the valleys and lastly by the plains (NSI, 1985). Coincidentally, the rural areas and the altiplano and valley regions are the ones which present the highest infant mortality rates (IMRs). At first sight this seems incompatible with the principle that breastfeeding reduces infant mortality. Nevertheless, the large proportion of mothers that continue breastfeeding for long periods of time represents an efficient mechanism of adaptation to extremely adverse environmental conditions. If it were not for the high prevalence of breastfeeding, particularly in rural areas of the high plateau and the valleys, infant mortality rates would certainly be much higher.

It is cause for concern that groups migrating from rural areas to urban areas decide to abandon traditional practices of breastfeeding, and as a consequence lose this important element of child survival.

2.2. The Program

The promotion of breastfeeding is incorporated as an activity of the diarrhea control and ARI programs.

2.3. Attack Strategies and Key Elements for Action:

- a. Breastfeeding should be encouraged in urban areas of the country, particularly in marginal urban areas where immigrant groups from rural areas are concentrated.

- b. Priority should be given to marginal urban areas of Santa Cruz, Cochabamba, and La Paz, which receive large contingents of migrants, and where breastfeeding levels are low, particularly in Santa Cruz.

3. CHILD MALNUTRITION

3.1. The Problem

In order to discover the distribution and gravity of malnutrition in the country, several surveys were conducted by the Ministry of Health, UNICEF, and other institutions. Nevertheless, these studies were limited in their coverage and used various methodologies and referent populations which do not permit their comparison or generalization.

The most recent work which gives a global picture of the nutritional status of the population of the country, is the anthropometric survey conducted at the national level in 1981 by the National Institute of Food and Nutrition (INAN) among children less than five years of age (Vera, R. et al, 1981).

The INAN survey was composed of a random sample of 5,880 children from 0 to 59 months of age, residing in the three ecological regions of the country, according to urban and rural contexts. The referent population used was that of the National Center for Health Statistics (NCHS) of the United States.

Table VIII-1 shows the distribution of nutrition status according to the Waterlow classification.

TABLE VIII-1
NUTRITIONAL STATUS OF CHILDREN 6 TO 59 MONTHS OF AGE
ACCORDING TO WATERLOW CLASSIFICATION, BY REGION AND GEOGRAPHICAL AREA
BOLIVIA, 1981

Geographic Region and Area	Number	Weight for Height Deficiency	Height for Age Deficiency	Normal Combined Deficiency
Total	5,763	0.6	0.2	59.1
High Plateau	1,941	0.0	0.2	48.5
Valleys	1,928	0.8	0.4	61.0
Plains	1,894	1.0	0.2	67.9
<u>Urban Areas</u>	2,671	0.4	0.4	65.8
High Plateau (La Paz)	896	0.1	0.2	54.1
Valleys (Cochabamba)	890	0.6	0.6	70.8
Plains (Santa Cruz)	885	0.6	0.5	72.5
<u>Rural Areas</u>	3,092	0.7	0.1	53.2
High Plateau	1,045	0.0	0.0	43.7
Valleys	1,038	1.0	0.3	52.5
Plains	1,009	1.2	0.0	63.7

Source: INAN, March, 1985 Bulletin.

Analysis of the weight for height relationship, which reveals recent malnutrition, shows that this factor was practically unchanged in 1981. The height for age relationship, indicating chronic malnutrition, was profoundly affected, registering a national average deficiency of 40.1% in relation to the referent population of the NCHS.

Examination of the ecological regions reveals that the high plateau has a higher deficiency (51.4%), that is, more than the valleys and the plains, with this last region showing the least height for age deficiency. In his 1984 book, Poverty and Development in Bolivia, Morales, R. characterizes the high plateau, and particularly rural areas, as the poorest region with the greatest restrictions on food production and consumption.

Variations within each region are much larger than between ecological regions. Thus, rural areas of the high plateau are 23.4% more deficient than urban areas. The situation of valley rural areas in comparison with that of urban areas shows a deficiency of 64.6%, much greater than in other regions. In the plains, the rural areas are also 32.9% more affected than urban areas.

The marked urban-rural differences are explained in large measure by the small farm structure of production, the incipient division of labor, and low technological levels. These lead to an under-development of the agrarian structure at the national level. Thus, the primary function of agrarian production is to satisfy the subsistence needs of the rural population, and not the market. For the most part, the living standards attained by this population do not guarantee a sufficient nutritional level.

The weight for age relationship is the indicator most widely used to classify the degree of malnutrition by deficiency. This is called the Gomez classification, which compares the weight of the child surveyed with the weight of a child considered normal for his age (in this case, the NCHS referent population).

The limitation on this method is that it does not allow the separation of those with low weight and normal height (acute malnutrition) from those with low weight for their age, but normal for short height (chronic malnutrition).

Table VIII-2 shows nutritional status according to the Gomez classification. The malnutrition figures obtained which correlate weight and age with ecological region and urban-rural context also show that the high plateau was the region most affected, followed by the valleys and the plains. The rural context had a greater prevalence of malnutrition than the urban context within each region.

TABLE VIII-2
NUTRITIONAL STATUS OF CHILDREN 0 TO 59 MONTHS OF AGE ACCORDING TO
THE GOMEZ CLASSIFICATION, BY REGION AND GEOGRAPHICAL AREA
BOLIVIA, 1981

GEOGRAPHICAL REGION & AREA	No.	% of Population with Malnutrition				% of Population with Nutritional Status:		
		Total	Med.	Mod.	Severe	Total	Normal	Over- Weight
Total	5,874	46.5	39.2	6.8	0.5	53.5	46.7	6.8
High Plateau	1,963	57.2	49.0	7.6	0.6	42.8	40.9	1.9
Valleys	1,945	50.8	41.5	8.8	0.5	49.2	43.4	5.8
Plains	1,966	31.5	27.2	4.0	0.3	68.5	55.7	12.8
Urban Areas	2,711	41.7	36.7	4.8	0.2	58.2	50.2	8.0
High Plateau (La Paz)	910	51.8	47.1	4.4	0.3	48.2	46.4	1.8
Valleys (Cochabamba)	898	46.8	40.0	6.7	0.1	53.2	46.2	7.0
Plains (Santa Cruz)	903	26.6	23.0	3.3	0.3	73.4	58.1	15.3
Rural Areas	3,163	50.8	41.6	8.5	0.7	49.2	43.5	5.7
High Plateau	1,053	62.2	50.9	10.4	0.9	37.8	35.9	1.9
Valleys	1,047	54.4	42.9	10.6	0.9	45.6	40.9	4.7
Plains	1,063	36.0	31.0	4.6	0.4	64.0	53.5	10.5

Source: INAN, March, 1985 Bulletin

Analysis by nutritional category reveals that slight or first degree malnutrition (10% to 25% deficiency) was the most frequent, affecting 84.3% of those suffering from malnutrition, and 39.2% of the total population less than five years of age. Moderate or second degree malnutrition (25% to 40% deficiency) ranked second in importance, affecting 14.6% of those suffering from malnutrition and 6.8% of children under 5 years of age. Finally, severe, or third degree malnutrition (greater than 40% deficiency) was the least prevalent, affecting 1.1% of those suffering from malnutrition and 0.5% of the total population under 5 years of age. Clearly, moderate malnutrition affected the valleys more than the high plateau or plains.

6.8% of the children surveyed were found to be overweight. This discovery varied from a minimum of 1.9% in the high plateau to a maximum of 12.8% in the plains. The valleys had an intermediate level of 5.8%. Overweight children were found principally in urban areas.

From tabulations of the same INAN survey, it is possible to examine the behavior of nutritional status by weight and sex (Table VIII-3).

With respect to age, the 12 to 23 month old group appears to be the most affected, in total malnutrition as well as in other subcategories, particularly the severe, which is 14 times more frequent than in those under 1 year of age. Considering the patterns of breastfeeding, this could be due to insufficient substitution of maternal milk by solid food. With respect to sex, there are no significant variations.

TABLE VIII-3
NUTRITIONAL STATUS OF CHILDREN 0 TO 59 MONTHS OF AGE ACCORDING TO
THE GOMEZ CLASSIFICATION, BY AGE GROUP AND SEX
BOLIVIA, 1981

AGE GROUP (in months)	No.	% of Population with Malnutrition				% of Population Nutritional Status:		
		Total	Med.	Mod.	Severe	Total	Normal	Over-Weight
<u>TOTAL</u>	<u>5,874</u>	<u>46.5</u>	<u>39.2</u>	<u>6.8</u>	<u>0.5</u>	<u>53.5</u>	<u>46.7</u>	<u>6.8</u>
6-11	742	37.3	30.4	6.8	0.1	62.7	49.1	13.6
12-23	1,447	55.6	44.6	9.6	1.4	44.4	38.1	6.3
24-35	1,322	44.3	37.8	6.2	0.3	55.7	49.4	7.3
36-47	1,160	44.3	39.0	5.2	0.1	55.7	50.8	4.9
48-59	1,203	45.9	40.0	5.8	0.1	54.1	49.8	4.3
<u>MALES</u>	<u>2,986</u>	<u>48.0</u>	<u>40.3</u>	<u>7.1</u>	<u>0.6</u>	<u>52.0</u>	<u>45.7</u>	<u>6.3</u>
6-11	390	37.6	30.9	6.4	0.3	62.4	49.1	13.3
12-23	739	55.6	43.9	10.0	1.7	44.4	38.9	5.5
24-35	651	44.1	37.5	6.3	0.3	55.9	49.3	6.6
36-47	595	49.0	42.1	6.7	0.2	51.0	46.7	4.3
48-59	611	48.8	43.0	5.6	0.2	51.0	46.9	4.3
<u>FEMALES</u>	<u>2,688</u>	<u>44.9</u>	<u>38.0</u>	<u>6.5</u>	<u>0.4</u>	<u>55.1</u>	<u>47.8</u>	<u>7.3</u>
6-11	352	36.9	29.5	7.4	0.0	63.1	49.1	14.0
12-23	708	54.8	44.2	9.3	1.3	45.2	38.0	7.2
24-35	671	44.6	38.2	6.2	0.2	55.4	47.3	8.1
36-47	565	40.0	36.3	3.7	0.0	60.0	54.5	5.5
48-59	592	42.9	36.8	5.9	0.2	57.1	52.7	4.4

Source: INAN, March, 1985 Bulletin.

Infections play an important role in causing and prolonging malnutrition. Children with severe malnutrition suffer an important reduction in their immunological effectiveness. The effects are most notable in cellular immunity, and less notable in humoral immunity (Martorell and Ho, 1984). The factors determining the infection are, it seems, more related to the quality of the environment than to nutritional status. Nevertheless, once the child has been infected, the severity and duration of the episode depends on his nutritional status.

There is not sufficient information to determine the evolution of the nutrition status of the infant population of the country. Nevertheless, we present a summary of the tabulation of anthropometric records of children under five years of age originating in 42 mothers' centers located in urban areas around the periphery of the city of La Paz. The cutoff point for

identifying malnutrition was the third percentile of the NCHS referent population. 1983 and 1985 results for the same 42 mothers' centers are compared (Rocabado et al, 1986) in Table VIII-4.

**TABLE VIII-4
MALNUTRITION PREVALENCE IN CHILDREN UNDER FIVE YEARS OF AGE
MOTHERS CENTERS, LA PAZ, 1983-1985**

Year	Number of Mothers' Centers	Total Children	Percentage of Malnutrition
1983	42	5,263	19.9
1985	42	4,661	27.1

Source: Bulletin of the Epidemiological Nutritional Monitoring System, MSWPH.

As can be seen, from 1983 to 1985 malnutrition grew 36.1%, which could be considered an indication of a rise in malnutrition in peripheral urban zones of La Paz. Considering that these Mothers' Centers receive supplementary nutritional assistance, we can assume that the situation of the population not served is still more precarious.

Endemic Goiter

Endemic goiter is a broadly distributed threat to the country, affecting women and adolescents primarily. There are no studies of its real magnitude in children less than 5 years old. In 1983 the Health Ministry conducted a national survey of 89,176 school-age individuals (6 to 20 years old) residing in 286 urban and rural localities of the country, using the palpation, inspection and classification methodology of the WHO. The distribution by ecological regions and clinical degree can be seen in Table VIII-5.

The figure shows that at the national level, 65% of the school population surveyed suffered from some degree of goiter, with no significant differences according to ecological region. The departments most affected were Chuquisaca, 75.8%, and Santa Cruz, 75.2%. Those least affected were Tarija, 56.9%, Cochabamba, 59.4%, and La Paz 61.2%.

The clinical classification of goiter by thyroid size shows that the initial form of the disease (1A: palpable but invisible goiter) is the most frequent, and 40.6% of the total school population suffers from it. The advanced forms, grades 2 and 3, affect 6% of the total population, which shows the gravity of the endemic illness.

According to data from the same study, large goiters, grades 2 and 3, are twice as frequent in women as in men, with this difference becoming more marked as age increases.

TABLE VIII-5
PERCENTAGE DISTRIBUTION OF ENDEMIC GOITER IN SCHOOL CHILDREN
BY REGION AND DEPARTMENT ACCORDING TO CLINICAL GRADE
BOLIVIA, 1983

REGION	DEPARTMENT	CLINICAL CLASSIFICATION					TOTAL
		NORMAL 0	1A	1B	2	3	
High Plateau	La Paz	38.3	36.9	20.6	3.5	0.7	61.2
	Oruro	32.0	47.9	17.3	2.8	0.0	68.0
	Potosi	35.7	42.9	17.1	4.3		64.3
Valley	Cochabamba	40.6	31.1	22.5	5.3	0.5	59.4
	Chuquisaca	24.2	39.1	26.3	10.3	0.1	75.8
	Tarija	43.1	38.6	14.7	3.2	0.4	56.9
Plains	Santa Cruz	24.8	52.0	14.6	8.6		75.2
	Beni	37.5	38.7	18.9	4.9	0.0	62.5
	Pando	35.3	37.9	22.4	4.3	0.1	64.7
NATIONAL TOTAL		34.6	40.6	19.4	5.1	0.9	63.4

Source: SVEN Bulletin, December, 1986.

One of the consequences of the high prevalence of endemic goiter, associated with sustained lack of iodine and other micronutrients in pregnancies, is cretinism. In a study conducted in rural localities of the departments of Oruro, Potosi, and Chuquisaca, a prevalence of cretinism and deaf-muteness was found in 0.63% of the total population of 22,452 inhabitants (Daza, et al, 1985).

Nutritional Anemia

Nutritional anemias are a little-studied health problem. The data available on anemia in pregnant women is presented in the chapter on women. In 1982 the NIFN and the Universidad Mayor de San Simon conducted research in Cochabamba, whose partial results show prevalences of 18.5% in children under 5 years of age, and 16.2% in pregnant women.

According to the available information, the principal causes of the anemias would be the low consumption and absorption of iron and/or infestation by intestinal parasites, principally *Anquilostoma duodenalis* or *Necator Americano*. According to research in depressed rural areas (Daza, G., 1985), it appears that a relatively adequate amount of iron is ingested, but because the iron consumed is basically vegetable in origin, the absorption is very low (according to Dallman and Simes, the body absorbs less than 1% of iron of vegetable origin, and between 10% and 25% of iron of animal origin).

There are very few studies and some divergent opinions about the sufficiency of micronutrient consumption. One of the few studies conducted is that cited above on depressed rural areas, whose principal results are presented in Table VIII-6.

TABLE VIII-6
AVERAGE PERCENT OF ADEQUACY OF MICRONUTRIENT CONSUMPTION
IN POPULATION AT-RISK IN RURAL AREAS, 1985

POPULATION GROUPS	NUMBER OF CASES	% OF ADEQUACY OF CONSUMPTION					
		IRON (%)	RETINOL (%)	THYAMINE (%)	RIBOFLAVIN (%)	NIACINE (%)	ASCORBIC ACID (%)
CHILDREN(m.o.)	613	133	34	73	64	69	104
12 to 23	134	85	66	67	64	63	106
24 to 35	177	128	29	77	65	71	87
36 to 47	146	143	28	72	68	71	105
48 to 60	156	169	21	74	60	69	120
WOMEN(yrs)	288	95	13	85	63	78	121
15 to 19	46	102	17	85	62	78	147
20 to 29	74	88	14	83	62	75	113
30 to 39	104	88	13	86	67	80	114
40 to 49	64	109	10	84	60	79	120
PREGNANCIES	59	79	13	84	56	72	84
NURSING HOMES	376	82	15	75	50	65	75
(per capita consumption)	829	162	23	85	63	77	129

*Average household size was 5.8 persons of various ages.

Source: Biological absorption of foods in Bolivia (Daza et al, 1985).

The Table VIII-6 shows that there is practically no deficiency in iron intake. The intake of vitamin A is least sufficient, particularly among pregnant and breastfeeding women. Nevertheless, the clinical signs related to Vitamin A deficiency, such as conjunctival xerosis, are hardly found, in only 0.46% of the population, with no cases of bitots spots. Fuller knowledge of the real scope of avitaminosis A is therefore necessary.

3.2. The Program

The Health Ministry, UNICEF, and PAHO/WHO cooperate in nutrition activities, in the commercial distribution of iodized salt. However, there is no information on current intake of iodized salt.

In order to reduce the prevalence of endemic goiter and avoid new cases of cretinism in areas with high endemic goiter which do not consume iodized salt, the massive mandatory use of iodized oil was begun in 1985 in 274 localities of nine departments considered to be high-risk based on data

from the survey of goiter in school children. This activity benefited 99,834 inhabitants, from newborns to 40 year olds, with total actual coverage compared to that planned of 92.2% (See Table VIII-7).

TABLE VIII-7
RESULTS OF THE NATIONAL PLAN FOR DIRECT INTERVENTION
WITH IODIZED OIL IN SELECTED LOCALITIES WITH HIGH ENDEMIC GOITER
HEALTH MINISTRY, BOLIVIA, 1985

HEALTH UNIT	No. OF LOCALITIES SERVED	PERSONS SERVED WITH IODIZED OIL
TOTAL	174	99,834
La Paz	29	9,734
Oruro	1	200
Potosi	19	5,349
Cochabamba	16	10,561
Chuquisaca	59	26,902
Tarija	29	3,583
Beni	2	3,700
Pando	1	489
Santa Cruz	17	19,324
Riberalta	1	14,992

Source: SNEN Bulletin, March, 1986.

The Health Ministry is beginning the distribution of iron tablets with folic acid to pregnant and breastfeeding mothers, with very low current coverage.

Nutritional monitoring was conducted using growth and development cards (health card) used for children under five years of age. Coverage for the use of this instrument is not quantified, and is estimated at lower than 10% of the population of this age group.

Although there are various food assistance programs (ONG, etc.), information was not gathered for this document.

3.3. Strategies for Action

The extent and seriousness of the malnutrition problem merits an effective inter-sector activity to develop farm production, increase technological levels, and facilitate credit to farmers. It should be ensured that food donations do not compete with production of traditional foods. Mechanisms should be found to facilitate direct movement of goods from producer to consumer, eliminating as much as possible the chains of intermediaries which drive up product prices. Improved consumption will also require implementation of social employment policies and salary improvements.

In the health field the following are recommended:

- Promotion of breastfeeding, with emphasis on urban areas.
- Introduction of solid foods into the diet of breastfeeding infants at 4-6 months of age.
- Ensure adequate nutrition after weaning by returning to traditional foods.
- Administration of supplementary micronutrients such as ferrous sulphate with folic acid and iodine to pregnant women and other at-risk populations or geographical groups. The administration of Vitamin A should follow studies which demonstrate its deficiency.
- Use of indigenous foods as much as possible in supplementary nutrition programs. For greater effectiveness, high-risk populations and groups should be identified clearly, and control mechanisms implemented to avoid duplications and omissions.
- Monitoring centers should be developed for an epidemiological nutrition surveillance of the population.

4. IMMUNOPREVENTIBLE DISEASES

4.1 The Problem

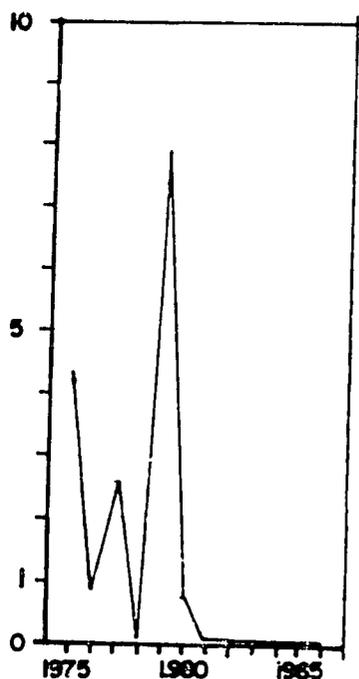
Measles, whooping cough, poliomyelitis, tetanus, diphtheria, tuberculosis, and yellow fever belong to the group of diseases which are preventible by vaccination.

In 1981 the Civil Registrar reported 1352 deaths at the national level of children under five years old, caused by immunopreventible diseases (NSI, 1987. Unpublished document). The reported deaths amounted to 11.4% of mortality in children under five years old, and 4.8% of general mortality registered. The same year the Ministry of Social Welfare and Public Health announced the detection of 22 poliomyelitis sequelae (Epidemiology, 1981).

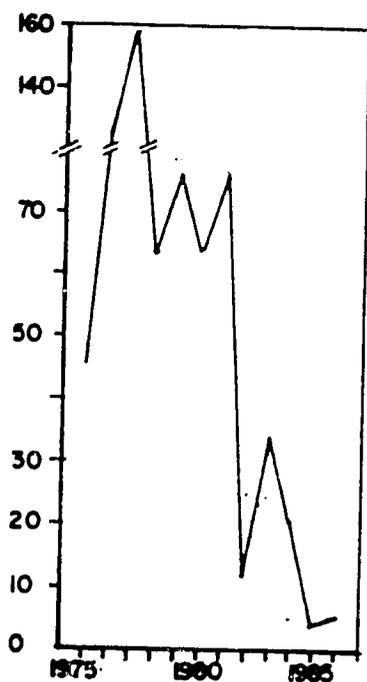
Based on the analysis of the evolution of morbidity reporting, it is presumed that the status of immunopreventible diseases has noticeably improved after 1981 (see Figure VIII-2). This change could have occurred due to the combined effect of mass periodical vaccinations of the country's urban centers (Social Mobilizations, 1983-1987), and the herd immunity among older children resulting from previous epidemics. Unlike other immunopreventible diseases, neonatal tetanus and yellow fever do not show evidence of change after 1981.

FIGURE VIII-2
REPORTED CASES OF IMMUNIZABLE DISEASES AND
RATES PER 100,000 INHABITANTS
BOLIVIA 1975-1986

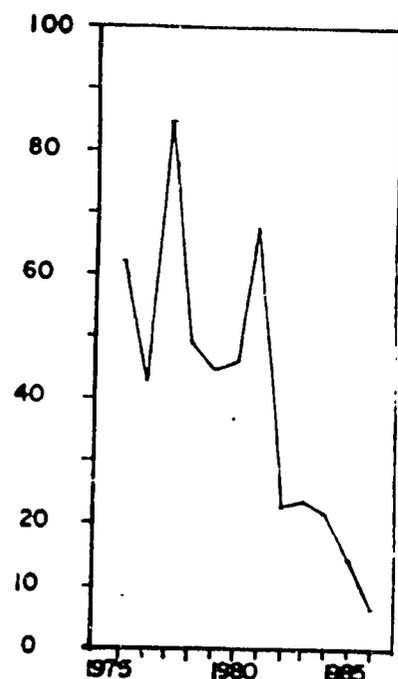
(1) POLIOMYELITIS



(2) MEASLES



(3) WHOOPING COUGH



POLIOMYELITIS

YEAR	CASES	RATE:100,000
1.975	213	4.35
1.976	49	0.98
1.977	134	2.60
1.978	10	0.19
1.979	433	7.98
1.980	43	0.77
1.981	10	0.17
1.982	10	0.17
1.983	7	0.12
1.984	0	-
1.985	0	-
1.986	4	0.08

MEASLES

YEAR	CASES	RATE:100,000
1.975	2.244	45.85
1.976	6.427	128.00
1.977	8.194	159.08
1.978	3.363	63.63
1.979	5.802	106.95
1.980	3.352	63.77
1.981	6.279	109.77
1.982	.720	12.26
1.983	2.034	33.71
1.984	1.270	20.49
1.985	217	3.41
1.986	346	5.28

WHOOPING COUGH

YEAR	CASES	RATE:100,000
1.975	3.078	62.89
1.976	2.194	43.70
1.977	4.375	84.93
1.978	2.611	49.40
1.979	2.457	45.29
1.980	2.596	46.61
1.981	3.943	68.93
1.982	1.388	23.63
1.983	1.445	23.95
1.984	1.393	22.47
1.985	964	15.13
1.986	537	8.20

Note: Rates were calculated using the total population of the country.

Source: Extended Immunization Program

National Board of Epidemiology

In order to monitor immunopreventible diseases (including neonatal tetanus and tuberculous meningitis) and other diseases of national importance, the Ministry of Health has maintained a National Epidemiological Surveillance System since 1975. The System currently includes a network of 1480 reporting establishments, reporting to the Ministry of Social Welfare and Public Health, Social Security, certain non-governmental organizations, and other health institutions. These establishments are distributed principally within urban areas, but also including parts of rural areas with the so-called "health posts" run by nurses' aides.

In 1986, 626 establishments, or 42% of the total, reported with some regularity. During site visits conducted by this mission to the Health Units of La Paz, Cochabamba, Santa Cruz, and Chuquisaca, it could be seen that weekly reporting of communicable diseases is usually done monthly, and very often unreliably. It was also confirmed that some establishments were not currently reporting, nor sending their statistical reports to their respective regional offices, possibly because of a lack of supervision and loss of interest.

The Epidemiology Board also conducts special epidemiological surveillance for poliomyelitis, measles, diphtheria, and yellow fever, which includes case-finding and contact-tracing, completing epidemiological clinical records, taking serological and fecal samples (polio), pharyngeal samples (diphtheria), and viscerotomia (yellow fever). The diagnosis is clinical for measles.

POLIOMYELITIS

In Bolivia poliomyelitis is endemic in character, displaying epidemic outbreaks every two or three years (See Figure VIII-2). The majority of the cases are in the country's urban areas, between the months of December and April (rainy season). The cities of Cochabamba, Santa Cruz, and La Paz historically have generated the greatest number of cases.

The largest epidemic outbreak occurred in 1979, with national repercussions. Its distribution by age group can be seen in Table VIII-8.

Table VIII-8 shows that 95.2% of the cases occurred in children under five years of age. It is important to note that 20.3% of the cases were children less than one year old, and that cases in children less than 5 months old are comparable to the total cases occurring in youths older than 15 years of age.

The greatest rate of infection appeared in children one year old (102.2 per 100,000), which is 255 times higher than in children older than 5 years.

TABLE VIII-8
PARALYTIC POLIOMYELITIS CASES,
PERCENTAGES AND RATES OF ATTACK BY AGE GROUP
BOLIVIA, 1979

AGE GROUP	NO. OF CASES	PERCENTAGE	RATE X 100,000
TOTAL	433	100.0	7.9
0- 5 months	23	5.3	22.2
6-11 months	65	15.0	52.8
1 year	178	41.1	107.2
2 years	93	21.5	53.4
3 years	41	9.5	22.1
4 years	12	2.8	6.5
5 or more years	19	4.4	0.4
No data	2	0.4	-

Source: Epidemiological Bulletin No. 83. Ministry of Social Welfare and Public Health.

With respect to the type of virus causing the outbreaks, there is documented evidence that in the 1977 Ixiamas outbreak (La Paz), type I and type II viruses were isolated. In the 1979 outbreak, serotype I was isolated, and in three isolated cases in 1986, serotype III was isolated.

After the 1979 outbreak, poliomyelitis has shown a sharp downward trend, occurring, however, in isolated cases in Cochabamba and Santa Cruz. Following PAHO/WHO standards, an active search for cases was begun in 1986 at the national level.

MEASLES

Measles is still an important preventible cause of death in the country. It is present in endemo-epidemic form, with outbreaks every two or three years, usually during winter and the beginning of spring (June to September), in urban as well as rural areas.

Its fatality increases when accompanied by malnutrition and lack of adequate care for the complications. Puffer and Serrano (1973) encountered fatality rates of 30% in high plateau rural populations. The hospital fatality during a 1977 outbreak was 4.5% (National Division of Biostatistics, Bolivia, 1977).

Measles has been decreasing in recent years, in magnitude as well as in geographical distribution of cases (see Figure VIII-2). In recent years there were isolated epidemic outbreaks in distant, hard-to-reach localities bordering on neighboring countries, such as the San Matias outbreak (Angel Sandoval Province in Santa Cruz), in which there were 344 registered cases

and 18 deaths in a population of 8,132 inhabitants. It should be noted that 83.3% of the deaths occurred in children under 3 years of age, which confirms the priority of this group.

TABLE VIII-9
MEASLES CASES, PERCENTAGES, AND ATTACK RATES
BY AGE GROUP, SAN MATIAS AND ADJOINING LOCALITIES*
SANTA CRUZ, AUGUST, 1987

AGE GROUP	NO. OF CASES	PERCENTAGE	RATE X 10,000
TOTAL	344	100.0	423
< 1 year	5	1.5	161
1 year	27	7.9	1,038
2 years	28	8.1	1,077
3 years	42	12.2	1,500
4 years	32	9.3	1,143
5-14 years	199	57.8	945
15 and up	11	3.2	24

* Includes 15 small localities of Angel Sandoval Province, Santa Cruz.
Source: National Board of Epidemiology.

Table VIII-9 shows that 39% of the cases occurred in children under five years old, while the 5 to 14 age group concentrated the largest percentage of cases (57.8%).

Examination of the specific rates of infection for each age group clearly shows that children under five years of age are at greater risk for contracting measles.

The relatively low rate of infection in children under one year old suggests good maternal antibody protection transferred to the child.

DIPHTHERIA, WHOOPING COUGH AND TETANUS

Diphtheria is an endemic disease which breaks out every 10 or 12 years, and principally affects the departments of Cochabamba, La Paz, and Santa Cruz. Its greatest impact is in urban areas.

During the period prior to 1980 the majority of the cases occurred in the age group under five years old. After this year, the disease was displaced to groups older than 15 years of age. Presently most cases occur in adults.

Whooping cough is an endemic disease breaking out into epidemics every three to five years. These usually occur in winter (May to July).

The Civil Registrar recorded 434 deaths from whooping cough in 1981, of which 90% or 393 occurred in children under five years of age. The under-recording by the Civil Register for 1981 was estimated by the NSI to be 70%, meaning the number of actual deaths was much higher than recorded.

The annual incidence rates for whooping cough have gradually decreased since 1982, as well as the frequency and distribution of the epidemic outbreaks (See Figure VIII-2).

Neonatal tetanus is a problem of unsuspected magnitude, especially in the plains and valleys.

The data in Table VIII-10 are taken from an infant mortality study conducted by Toro et al from 1982 - 1983, in which statistics from the Civil Registries in urban localities of more than 6,000 inhabitants were reviewed.

TABLE VIII-10
PROPORTION OF PERINATAL MORTALITY CAUSED BY NEONATAL TETANUS
BY ECOLOGICAL REGION ACCORDING TO CIVIL REGISTRIES OF URBAN AREAS.
BOLIVIA. AUGUST, 1982 - JULY, 1983

Ecological Region	D E A T H S	
	Certain Perinatal Infections (No.)	Neonatal Tetanus No. (%)
High Plateau	306*	1 (0.3)
Valleys	76	7 (9.2)
Plains	84	41 (48.8)
Bolivia	466	49 (10.5)

* 72 hypoxia deaths are not included since the original table (no. 27, page 201) did not assign them.

Source: Toro, et. al., Mortality in the First Three Years of Life in Bolivia

This figure shows that neonatal tetanus is more frequent in the plains, followed by the valleys, and is least frequent in the high plateau. Neonatal tetanus was responsible for 48.8% of perinatal deaths registered in urban localities of the plains, and 9.2% of perinatal deaths in the valleys.

If we consider that surveys conducted by WHO in countries with a high prevalence of neonatal tetanus discovered that less than 5% of neonatal tetanus cases are detected by regular reporting systems, and given that in Bolivian rural areas, practically all births take place in the home where practices are used in handling and cutting the umbilical cord which are not always satisfactory, the real incidence of neonatal tetanus in Bolivia should be much greater than that reported in the civil registries.

4.2. The Program

The Expanded Program on Immunization is one of the main programs of the Ministry of Social Welfare and Public Health. During the last five years it has received the highest political and operational priority, which translated into more than 15 national vaccination campaigns and a substantial reduction in morbidity caused by immunopreventible diseases.

The current program administers poliomyelitis, measles, DPT, and BCG vaccines together, to children under three years old, using three basic strategies:

- Massive national vaccination campaigns, three times per year. These campaigns are called "Social Mobilizations", and are conducted in urban localities with important direct participation of the community in promotion and vaccination activities.
- Vaccination using mobile teams, which are used to cover rural dispersed areas following social mobilizations.
- Continuous vaccination in health services which have an established cold chain. The coverage attained by use of this strategy is not high, due in part to the preponderance of vaccination campaigns and to economic restrictions on the maintenance of the cold chain.

Use of cumulative vaccination records is not helpful in discovering the coverage attained by the program according to vaccine type and dosage, because during the campaigns, the same child can receive vaccines even if he already completed the basic format.

Moreover, there is underreporting of vaccines administered, particularly in rural areas, a situation which was verified during the field visits.

Therefore, the National Board of Epidemiology, with the cooperation of PAHO/WHO, UNICEF, and PL-480, Title III, designed and conducted vaccination coverage surveys. In its first phase the 11 Health Unit headquarters cities were surveyed, followed by rural areas in the second phase.

The urban survey was conducted during the first week of November of this year, in a sample of children from 12 to 23 months old. The sample was designed with 95% reliability and a 10% margin of error, according to the methodology proposed by the World Health Organization. The preliminary results are shown in Table VIII-11.

The 11 cities surveyed comprise 76.5% of the urban population of the country and 34.4% of the total population. As can be seen in Table VIII-11, the survey covered 5,168 children. The weighted average coverage for third dose for poliomyelitis and DPT vaccines reached 61.6% and 60.2% respectively. The lowest coverage for both vaccines was recorded in Potosi, with 41.6%. The maximum value recorded for both vaccines was 78.5% in Tarija.

TABLE VIII-11
RESULTS OF THE VACCINATION COVERAGE SURVEYS
BY HEALTH UNIT URBAN CAPITALS AND VACCINE TYPE
(12 TO 23 MONTH GROUP), BOLIVIA, NOVEMBER, 1987

Cities	Total Children Surveyed	% Fully Immunized With:				
		Polio III	DPT III	Measles	BCG	Tetanus Toxoid II
Bolivia	5,168	61.6	60.2	65.8	76.3	3.2
La Paz	2,100	61.3	60.3	63.6	71.0	4.9
Santa Cruz	822	65.2	64.1	65.5	88.1	1.1
Cochabamba	641	64.5	60.1	70.9	81.0	2.7
Potosi	214	41.6	41.6	50.5	74.3	0.9
Chuquisaca	214	61.2	60.7	63.6	65.0	0.0
Oruro	212	57.1	55.7	67.9	77.8	0.0
Tarija	205	78.5	78.5	84.9	81.0	3.9
Trinidad	221	54.3	51.6	78.3	55.7	2.7
Riberalta	215	63.3	61.9	80.5	80.9	25.1
Tupiza	212	65.1	65.6	76.9	64.2	0.0
Cobija	112**	69.6	68.8	83.0	56.3	36.6

* Mothers of the children surveyed.

** Complete enumeration of all eligible children.

Source: Expanded Program on Immunization
National Board of Epidemiology, 1987.

Single dose measles vaccine achieved a weighted average coverage of 65.8%, fluctuating between a minimum of 50.5% in Potosi, and a maximum of 84.9% in Tarija. Overall, BCG vaccine coverage (as measured by scar presence) was 76.3%, with a minimum value of 56.3% in Cobija, and a maximum value of 88.1% in Santa Cruz.

Second dose coverage with tetanus toxoid in mothers of the children surveyed is very low, and explains the high incidence of neonatal tetanus.

In the cities of Santa Cruz, Trinidad, Riberalta, and Cobija, which are plains localities with high tetanus risk, coverages fluctuate between 1.1% and 36.6%.

Currently there is not sufficient information on vaccination coverage in rural areas. Results from the rural surveys, which are now being conducted using the same methodology as the urban surveys, are awaited.

In order to evaluate the current status of the cold chain network, visits were made to the national vaccine warehouse, some regional warehouses, and both rural and urban peripheral health services. The central level has a 30 cubic meter capacity cold room for bacterial

vaccine storage. There are 18 freezers with a gross capacity of 20 cubic feet each for viral vaccine storage. These resources are sufficient for the storage of vaccine requirements for six months for the whole country. Organization of the packets and administrative control systems are sufficient. Commercial airlines and in some cases a refrigerated truck from the La Paz program are used for transportation of the vaccines to the regional level.

Each regional warehouse has two to four freezers and two to four refrigerators which provide vaccine storage for the Health Unit for one quarter.

To discover the current distribution and functioning of the cold chain, the National Board of Epidemiology conducted an inventory at the national level, whose principal results are shown in Table VIII-12.

TABLE VIII-12
COLD CHAIN INVENTORY RESULTS
HEALTH MINISTRY ESTABLISHMENTS
BOLIVIA: APRIL-NOVEMBER, 1987

Area	Health Estab- lishments	Estab- lishments Visited	Refrigerators			Freezers		
			Good	Fair	Poor	Good	Fair	Poor
Bolivia	1394	571	485	3	96	29	-	5
Urban ¹	191	112	91	3	20	23	-	4
Rural	1203	459	394	-	76	6	-	1

¹ Only health unit headquarters sites were considered.
Source: National Board of Epidemiology, 1987.

The inventory reached approximately 85% of the health establishments with cold chain equipment. As can be seen in Table VIII-12, the cold chain consists of 485 refrigerators in good condition, with 91 in urban areas, and 394 in rural areas. Given that the Ministry of Health has 894 health establishments which could provide continuous vaccination services, there would be a deficiency of approximately 350 refrigerators and 80 freezers.

Each health unit has at least two specially trained technicians for the maintenance of its cold chain. However, the cold chain is not continuously monitored.

4.3. Strategies and Plan of Action

To broaden the benefits of the program and consolidate the achievements, the following are recommended:

Strengthen continuous vaccination in the health services, focusing on children under one year old, by providing training for operations personnel, extension and monitoring of the cold chain, local programming, supervision of activities, and health education appropriate to the particular cultural characteristics of the various groups at risk.

The mass vaccination campaign strategy with the participation of the community should supplement and not supplant regular vaccination in the health services. For this it is recommended that the frequency of the campaigns gradually be reduced, and that they focus on completion of vaccinations in uncovered groups more than repetition of vaccinations in completely protected groups.

Population groups in precarious socio-economic conditions, such as temporary migrants and the unemployed, should receive special attention. Prenatal care and occasions when mothers bring in their children to be vaccinated should be used for vaccination with tetanus toxoid. It is recommended that mass vaccination campaigns be conducted among women from 15 to 35 years of age residing in the plains and valley regions.

Epidemiological field studies of neonatal tetanus are considered important to conduct.

Vaccination of newborns with BCG and polio should be a routine practice during institutional births.

For the epidemiological surveillance of immunopreventible diseases, the establishment of surveillance centers in the health services, which could report regularly and reliably, is required. For poliomyelitis it will also be necessary to conduct an active search for cases.

5. ACUTE DIARRHEAL DISEASE (ADD)

5.1. The Problem

For many years acute diarrheal disease (ADD) has been a problem of great magnitude in Bolivia. Since the Inter-American Research on Child Mortality, it has been known that in the case of Bolivia acute diarrheal disease is the basic cause behind 28 percent of the deaths recorded in children under the age of 5 (Puffer and Serrano, 1973). Furthermore, the

background of child malnutrition, examined in another section of this document, is a cause associated with 34 percent of the deaths of children aged 0-5. This, in turn, is a result of, and a factor predisposing to, enteric infection.

Even with significant limitations in the national epidemiological surveillance system, the yearly volume of ADD cases comprises about one third of the total deaths reported for the period 1984-1986.

Furthermore, the Diarrheal Disease Control Program reported the following total number of cases treated annually:

1985	164,000 cases (figure estimated for the first half of 1985).
1986	114,150 cases.

The average oral rehydration salts delivered is between 1.8 and 2.3 packets per case. There is no reliable information on the follow-up of cases, packets distributed and used, number of deaths, and fatality rate for the health services (institutional oral rehydration units - ORUs).

According to data from the Ministry of Social Welfare and Public Health (MSWPH), one third of the total consultations (29%) in the facilities is comprised of cases of acute diarrheal diseases (ADDs) and 19% of the hospital discharges involve patients with diarrheal diseases and their complications, dehydration in particular.

Concerning the seasonal variation, the largest number of cases occurred from September to January, that is, during the summer season (Figure VIII-3).

TABLE VIII-13
INCIDENCE RATE AND AVERAGE ANNUAL NUMBER OF CASES OF DIARRHEAL
DISEASES IN CHILDREN AGED 0-5, BY LOCALITY
BOLIVIA, 1983

Localities	Incidence Rate (%)	No. of cases per year
<u>Plains</u>	31.3	7
Chulumani	36.0	9
Coripata	31.6	8
Cobija	27.1	6
<u>Highlands</u>	24.3	6
Corocoro	39.1	9
Potosi	24.2	6
Villazon	15.4	4
<u>Valleys</u>	23.5	6
Tupiza	43.9	10
Padilla	22.2	5
Sucre	19.6	5

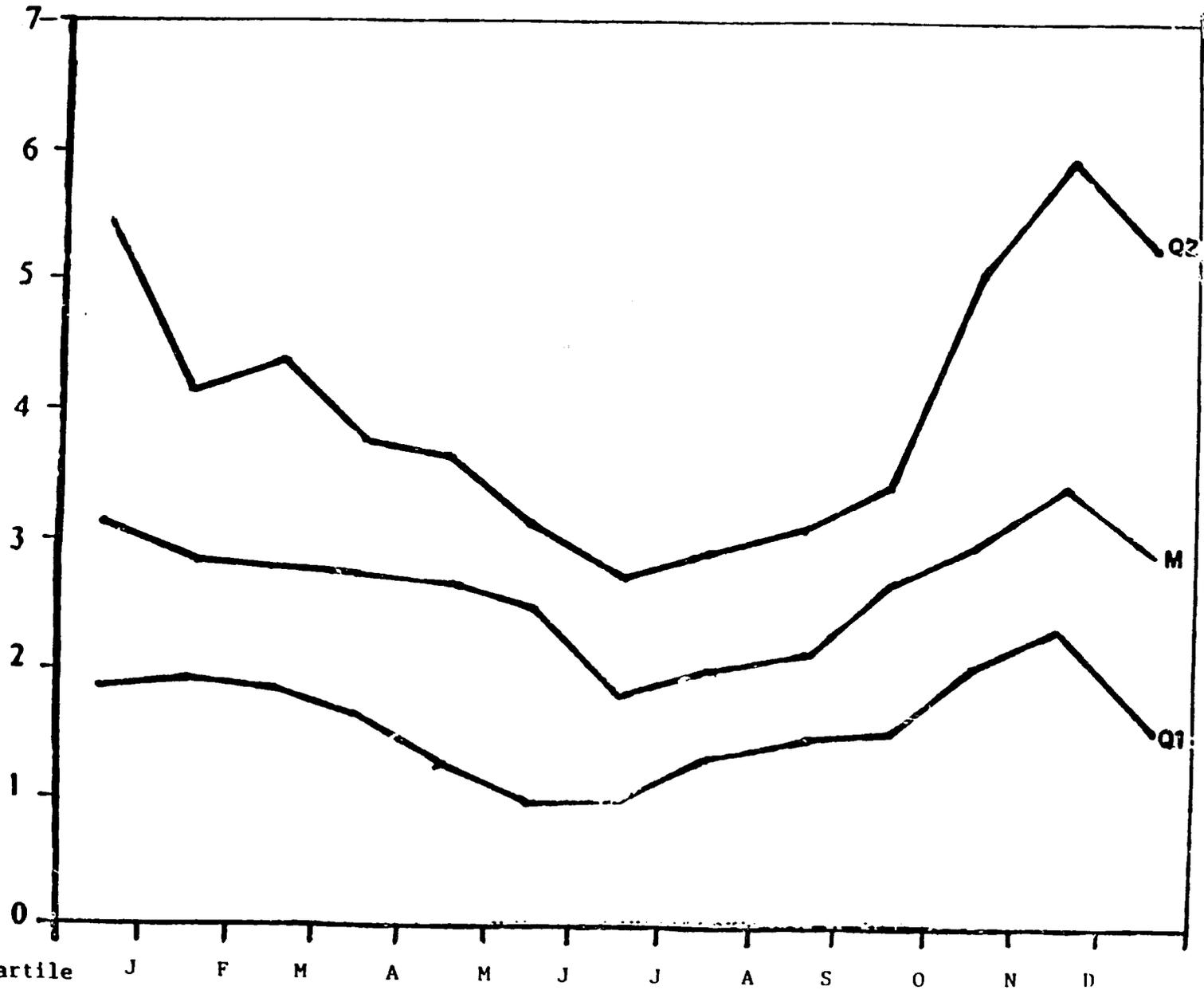
Source: De la G. Murillo, 1985.

FIGURE VIII-3
SEASONAL VARIATIONS IN DIARRHEAL DISEASES

BOLIVIA, 1975-1985

CASES IN 000

131



MONTHS

KEY: Q₃ = 3rd Quartile
M = Median
Q₁ = 1st Quartile

(SOURCE: M.P.S.S.P. (Direccion Nacional de Epidemiologia))

According to data from research conducted in 1983 on a sample of 41,261 homes in cities of the highlands (Potosi, Corocoro and Villazon), of the valleys (Sucre, Padilla and Tupiza), and the plains (Chulumani, Cobija and Coripata), in which 66,827 children 0-5 years of age were studied, the diarrheal disease incidence rate (within the 15 days preceding the survey) was 24.3 percent in the survey population (De la G. Murillo, 1985). The incidence rate and average yearly number of ADD cases in children under 5 are presented in Table VIII-13. The incidence by age cohorts is given in Table VIII-14. A prominent fact revealed by this table is a high incidence rate in the 0-6 month cohort. The greatest incidence occurs in the age cohort of 7-35 months, particularly from 12 to 23 months (36.2 percent and 9 cases of diarrheal diseases as a yearly average).

TABLE VIII-14
INCIDENCE RATE AND AVERAGE ANNUAL NUMBER OF CASES OF
DIARRHEAL DISEASES IN CHILDREN 0-5 YEARS OF AGE, BY
AGE COHORT, BOLIVIA, 1983

Age	Incidence Rate (%)	No. of diarrhea cases/year
0- 6 months	20.9	5
7-11 months	29.9	7
12-23 months	36.2	9
24-35 months	25.3	6
36-71 months	20.3	5
Total	24.3	6

Source: De la G. Murillo, 1985.

5.2. The Program

The National ADD Control Program was begun in June, 1984. The program now has the following goals (MSWPH, 1985):

- a. Reduce the deaths caused by diarrheal diseases in children less than 5 years of age by 50 percent by the end of 1988.
- b. Take care of 80 percent of the children experiencing dehydration from diarrhea.
- c. Rehydrate 100 percent of the children entering Oral Rehydration Units (ORU) without serious complications.
- d. Set up ORU-I (institutional) in 100 percent of health establishments by the end of 1988.
- e. Complete the implementation of ORU-C (Community) by each ORU-I: organize ten ORU-Ps (popular) for each ORU-I.

Given the current conditions of coverage, reliability and suitability of the program's information system and the difficulties involved in obtaining current data on the population exposed to risk (for example the number of deaths from diarrheal diseases or the number of dehydration cases, etc.), it is not feasible to evaluate the degree of progress or fulfillment of the goals set forth in the program.

The first evaluation of the national program carried out by the MSWPH in cooperation with PAHO/WHO and UNICEF (in November 1985) revealed limitations and problems, and it was confirmed that these limitations and problems still exist today in most of the health services we visited:

- The services do not have data on the population exposed to risk in the program and current demographic information on the population in their area;
- There are rotations and continuous personnel changes in the operating units, which detract from the program's continuity;
- There are no scheduled control activities, goals, or indicators to measure progress (or decline) in the program. The services also do not have written guidelines;
- There are no supervision guidelines, no resources to mobilize personnel, and no field visits;
- There is discontinuity in in service training;
- Appropriate instructional materials are lacking at the operational level for the sociocultural characteristics of the population; Local design and production of informational and instructional materials are not encouraged, owing to the lack of initiative and resources;
- The sparse instructional material available is intended more for the preparation of oral rehydration salts (ORS) than for preventing fecal-oral transmission, or transmission by contact;
- There are difficulties in the logistics of supplying ORS and in the scheduled distribution. Most of the services visited do not have any ORS available; and
- The delivery of ORS for ADD cases in the home is not performed according to standards.

Worthy of note are the results provided by a recent study done by CARITAS Boliviana in September 1987 (Espindola, 1987) on the patients of maternal and child centers. A total population of 30,235 women members were studied according to the following geographic distribution:

CARITAS La Paz	9,111 members
CARITAS Corocoro	9,957 members
CARITAS Oruro	11,167 members

Some of the main results obtained from the total number of women surveyed are:

- a. 67% replied that they had "seen" and recognized the ORS at some time in the past;
- b. Of this total (20,289 members), although 95% is aware of the proper amount of water to mix with the packet, 90% replied that the ORS serve to "cure diarrhea;"
- c. 88% do not know the signs of dehydration; apparently this is a difficult concept to explain to the mothers surveyed;
- d. 56% are aware of home remedies to cure diarrhea;
- e. Between 68% and 87% continue to nurse children with ADD; and
- f. A total of 2,440 deaths were reported of children under the age of 5 in the last two years, 785 of whom had symptoms of diarrhea before dying. One hundred percent of those women (785) replied that ORS "cures the disease."

Another significant aspect of this survey are the results of a small control sample of 143 nonmember women. They are:

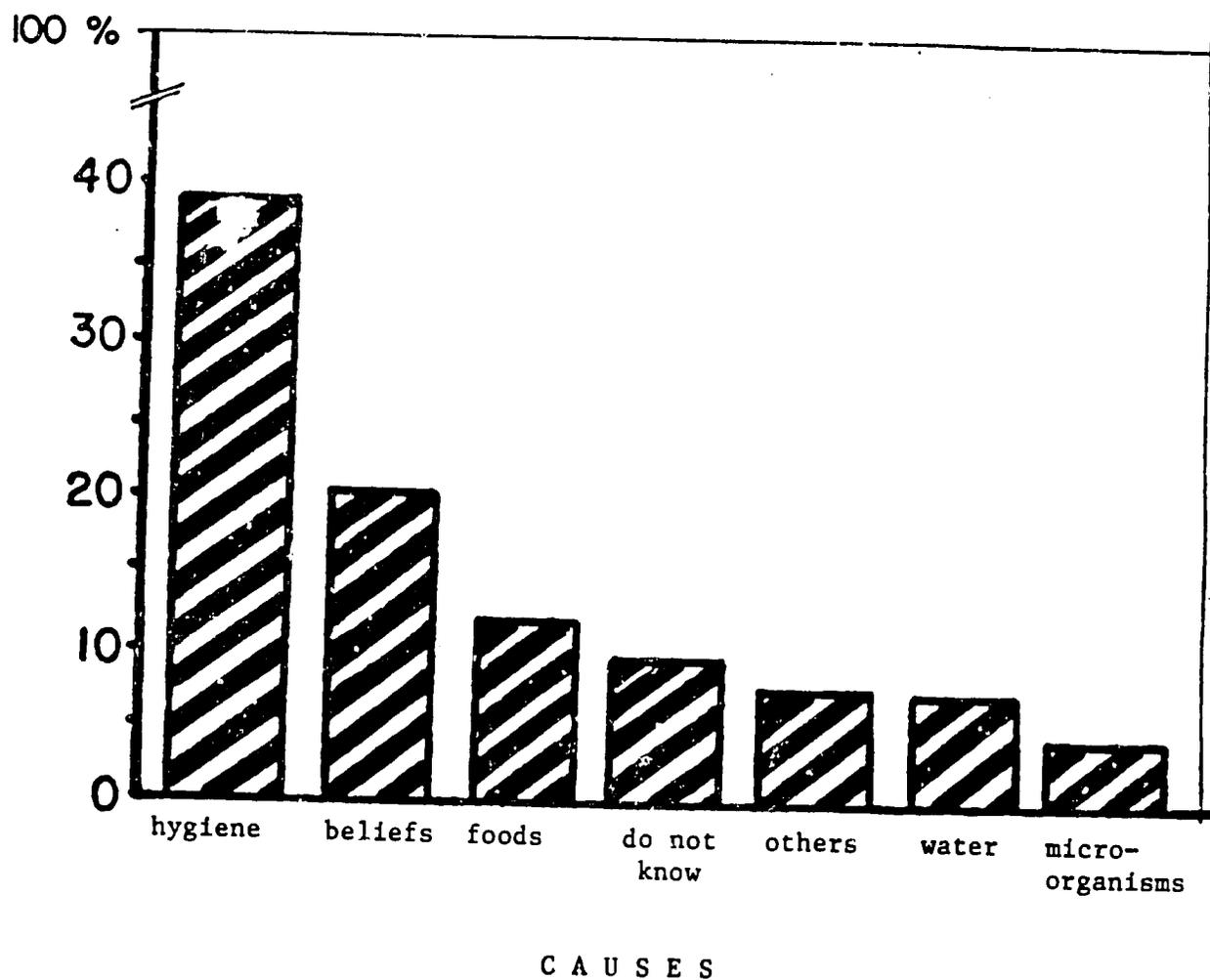
- a. Although most of the "nonmembers" have never seen ORS and are not familiar with them, a smaller percentage than in the group of women members stated that ORS serves to "cure diarrhea" (67 percent). They appear to be more confused with regard to the outcome expected from ORS; and
- b. 28% of the nonmembers who are familiar with home fluid responded that it is used for rehydrating the child. This is a higher percentage of correct answers, in comparison to the "members."

Etiology of Acute Diarrheal Diseases and Risk Factors

Little is known about the pathogens causing intestinal diseases associated with ADD in Bolivia. Although quite probably there are significant regional variations in the etiology of ADD between the high plateau, valleys, and the tropical and subtropical regions of the plains, no systematic etiological studies between the various population groups are known.

According to widespread opinion, the pathogens causing intestinal diseases prevailing in Bolivia are of the genera *Escherichia coli*, *Salmonella* and *Shigella*. Others mention Rotaviruses, *Entamoeba histolytica* and several intestinal parasites (e.g. *Giardia lamblia*) as being the most frequent in the plains regions.

FIGURE VIII-4
OPINION OF THE MOTHERS ON THE ORIGIN OF DIARRHEA IN CHILDREN



SOURCE: M.P.S.P. (National Mother and Child Division) PAHO

E. Coli are transmitted mainly through fecally-contaminated foods and water. Transmission from one person to another appears to be quite rare. Shigellae are also transmitted fecally and orally and very small infectious doses of Shigellae are needed to produce infection and diarrhea. According to some authors, only 10 bacteria are sufficient to produce a case of ADD, and consequently they can also be transmitted through contact between one person and another (Black et al., 1984).

Flies can pick up Shigellae from feces that are contaminated and exposed to air and carry them to foods. The rotaviruses are transmitted fecally and orally, although the most frequent means of transmission is probably direct contact with another person or objects or utensils that are contaminated. The immunological response to the rotaviruses is not very well known, although children more than 2-3 years old and adults have greater resistance, probably acquired, to diarrheas caused by rotaviruses.

At present, it is obvious that socio-economic and environmental conditions (water supply; handling, preserving, and preparing food; and excreta and household waste disposal systems) are seriously deficient and create conditions of great risk for intestinal infections in the general population and in the child population in particular. The gregarious behavior of sedentary rural people (agricultural activities, markets, fiestas and other events that bring people together), as well as living conditions in marginal urban areas, exponentially increase the transmission of pathogens that cause intestinal diseases through fecal-oral modes and by direct contact.

The sanitary conditions of some low-income nurseries (Integral Child Care Centers) that were visited are so deficient that the proportion of children experiencing an episode of acute diarrheal disease (ADD) or acute respiratory infection (ARI) must be 50 percent higher in the population regularly attending this type of institution.

Lastly, housing conditions, examined in another section of this document, considerably limit access to water for personal hygiene and for washing clothes, diapers and kitchen utensils.

Mothers with small children who work 8 to 10 hours a day in the informal sector (street stands for selling food, markets in the public thoroughfare) do not have access to hygiene services, wash basins or public faucets.

The risk factors increasing the transmission of pathogens causing intestinal diseases in rural areas are much less known, but the morbidity and mortality rates from ADD are similar to or greater than those reported for marginal urban areas.

In Bolivia the popular model explaining diseases, which was described in another section of this document, is of two kinds or types (Figure VIII-4). In some groups of mothers there is an explanation much closer to the traditional or folk explanation (cold and hot foods, teething, staring, fear or fright, etc.). In other groups, the explanatory model includes modern causative elements such as germs or parasites. Most of the women of

marginal urban and rural areas with access to stores or places that sell modern medicines use antibiotics (for example chloramphenicol) and other "antidiarrheal remedies" to "halt the diarrhea." The frequency of use of household remedies and pharmaceuticals varies in accordance with the level of education of the mothers (Figures VIII-5 and VIII-6). Lastly, in other groups this "professional" model has entirely replaced any preexisting explanatory model.

On the other hand, from information gathered during field trips, the professional explanatory model was in turn affected by the popular model. Doctors incorporated beliefs about certain foods, for example "green mango," or "the climate" into the model of causes of ADD. Many still recommend abstinence from certain foods and even from nursing during a diarrhea occurrence, under the assumption that fasting helps to hold back the frequency and the number of liquid bowel movements.

Despite basic information available from the studies done, in the case of Bolivia it is necessary to expand the research in order to fully understand the sociocultural factors and conditions which intervene in and contribute to the high prevalence of diarrheal diseases in infancy.

Although today the major environmental and social factors associated with ADD can be recognized (parental illiteracy, malnutrition, inadequate housing, lack of piped water and sewerage, fecal contamination of water and food, and other seasonal and climatic factors), it is not sufficiently known how these factors interact and cause greater frequency and prevalence of ADD in certain social and cultural groups, and in some ecological regions more than in others.

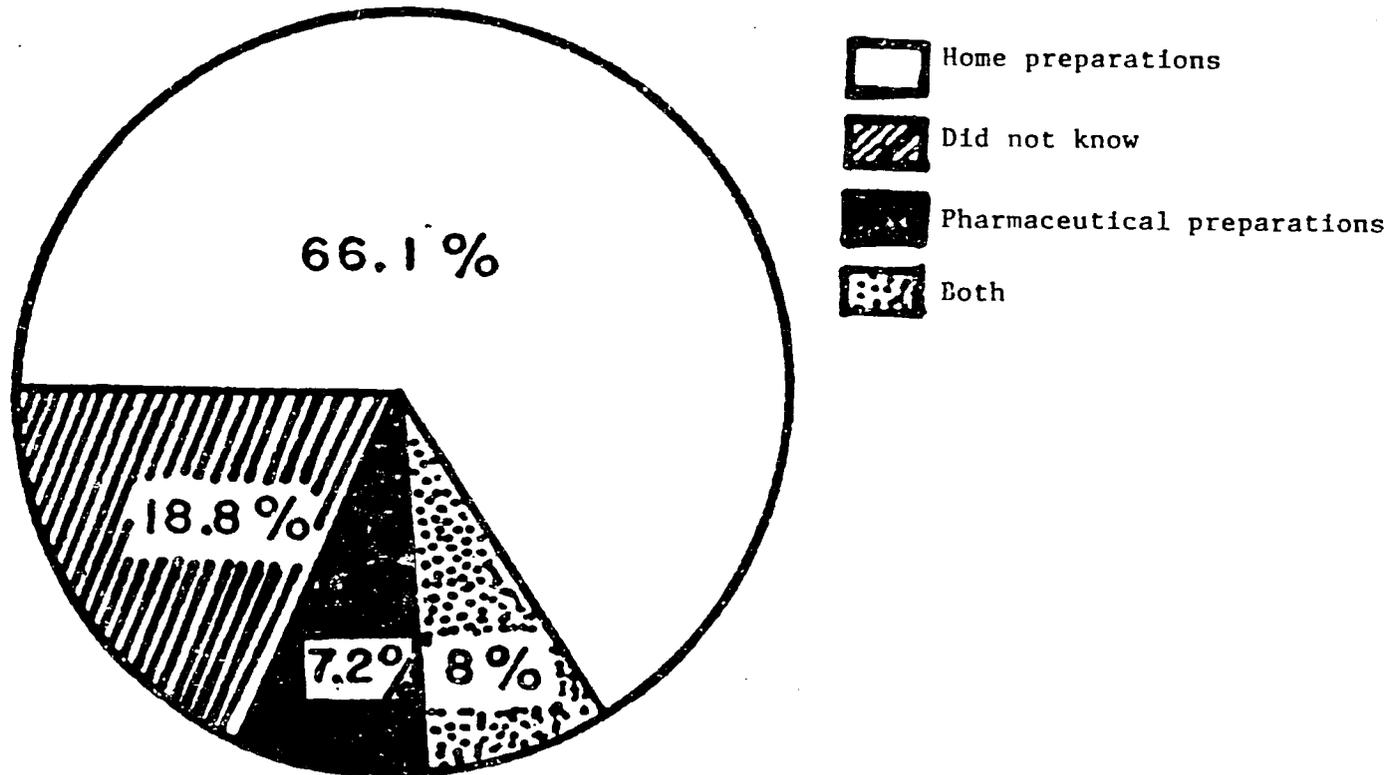
Nor has the behavior of the family, and in particular of the mother, in handling a case of ADD in the home been explored. There is valuable information on the frequency of use of home preparations in an urban population sample, from a study by D. de la G. Murillo (Figure VIII-7). This figure shows the frequent use of rice water or rice soup (27.3%). Figure VIII-8 shows that a majority of mothers offer liquids, or solids with liquids during the diarrhea episode.

It is important to conduct participatory observation studies with follow-up of ADD cases in the home so that the strategies for handling cases at the home level can be reoriented on the basis of this information. The same would have to be done at the health services level, to revise the regulatory framework for managing cases at the level of health institutions, and to redesign health personnel education and training.

5.3 Plan of Action

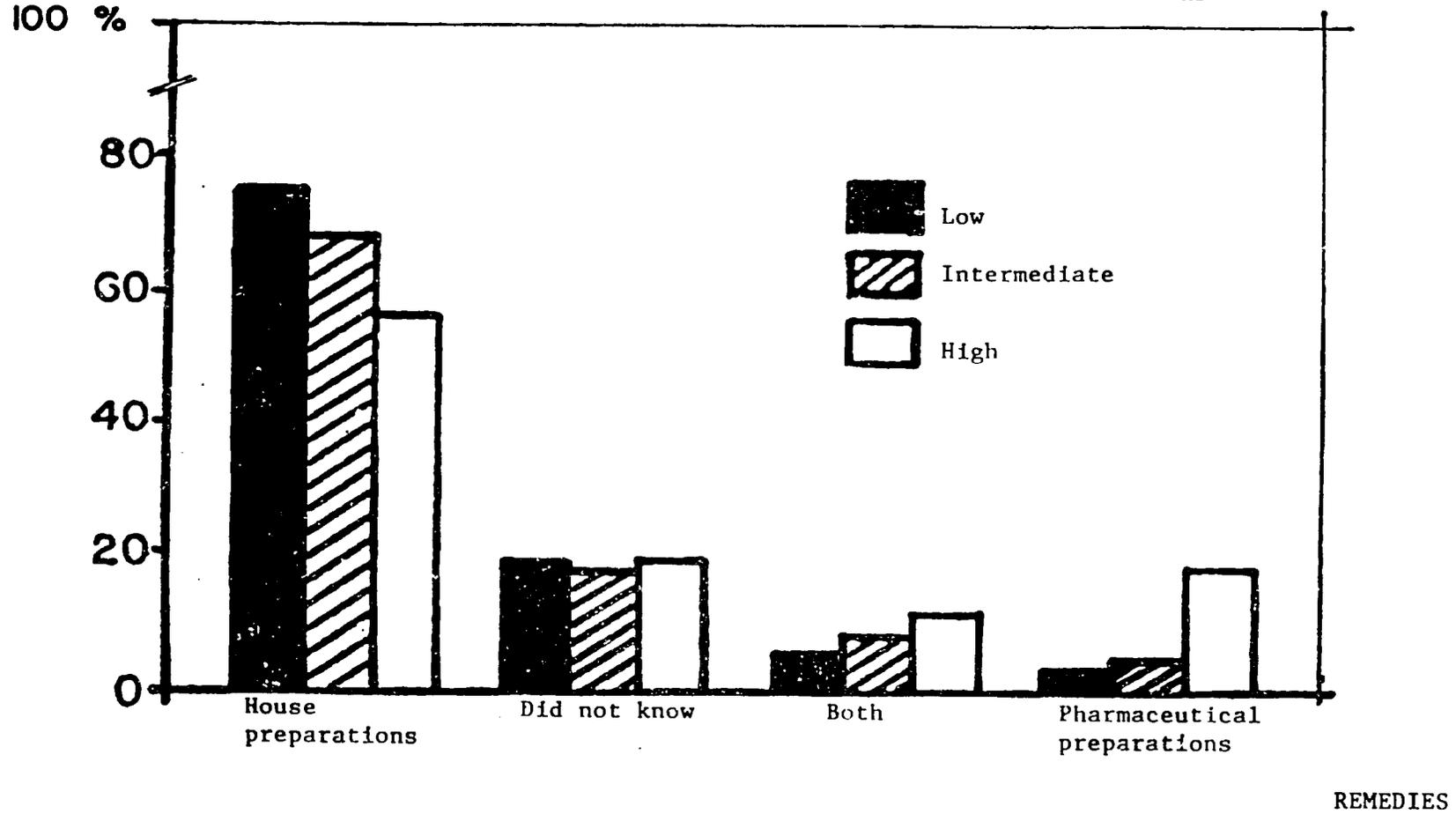
The ADD control model for infancy, particularly in the case of Bolivia, must combine elements from the popular model with elements derived from modern medicine and, in certain cases, from traditional medical practices. In other words, medical responses or technologies alone will not change the situation, since it is not only a matter of resolving the problem of accessibility but also of achieving a solution that is effective and socially and culturally acceptable.

FIGURE VIII-5
PERCENTAGES OF MOTHERS WHO KNOW OF VARIOUS
PREPARATIONS AGAINST DIARRHEA



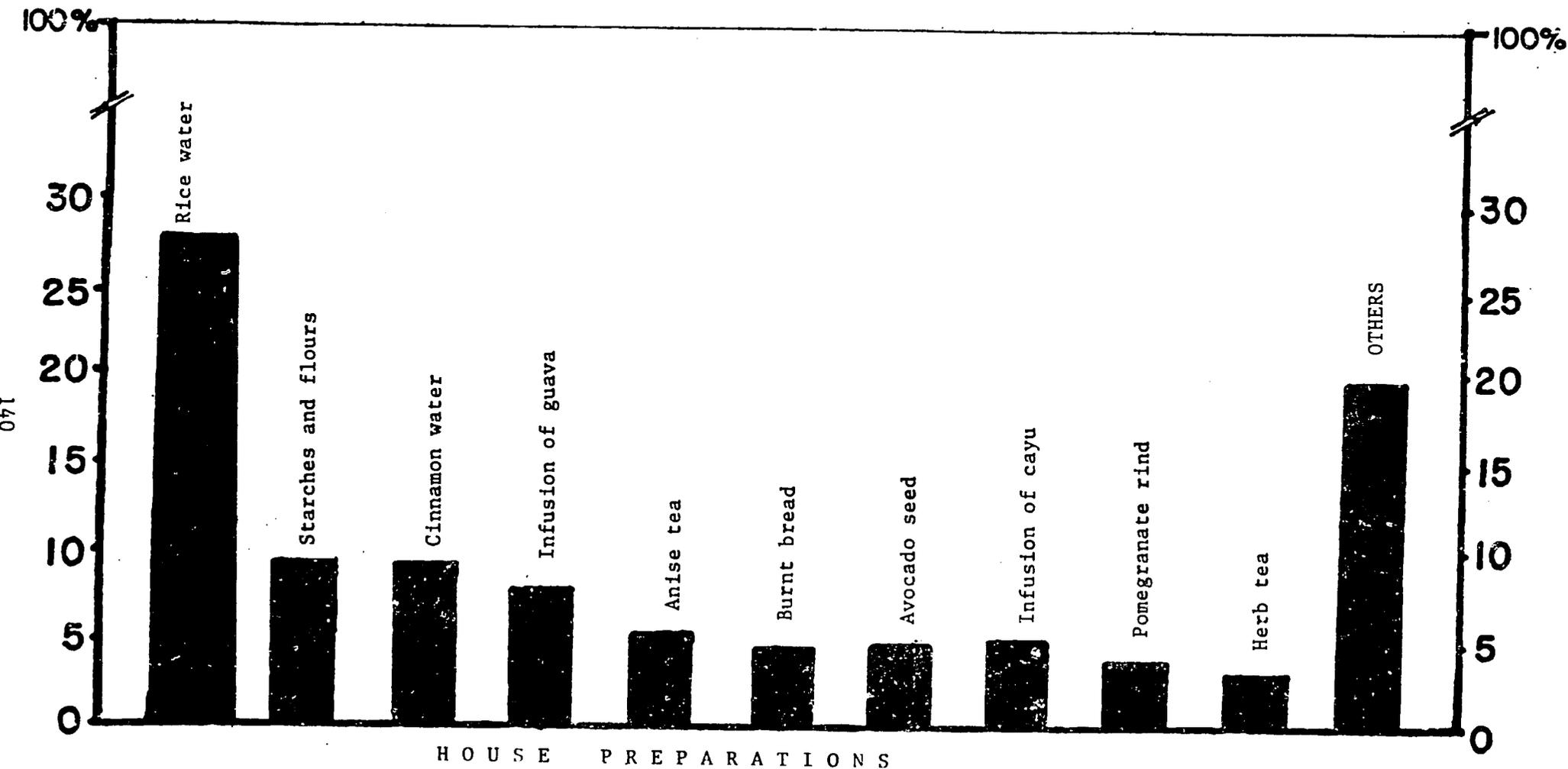
SOURCE: M.P.S.S.P. (National Mother and Child Division) PAHO

FIGURE VIII-6
KNOWLEDGE OF PREPARATIONS AGAINST DIARRHEA
ACCORDING TO THE LEVEL OF EDUCATION OF THE MOTHERS



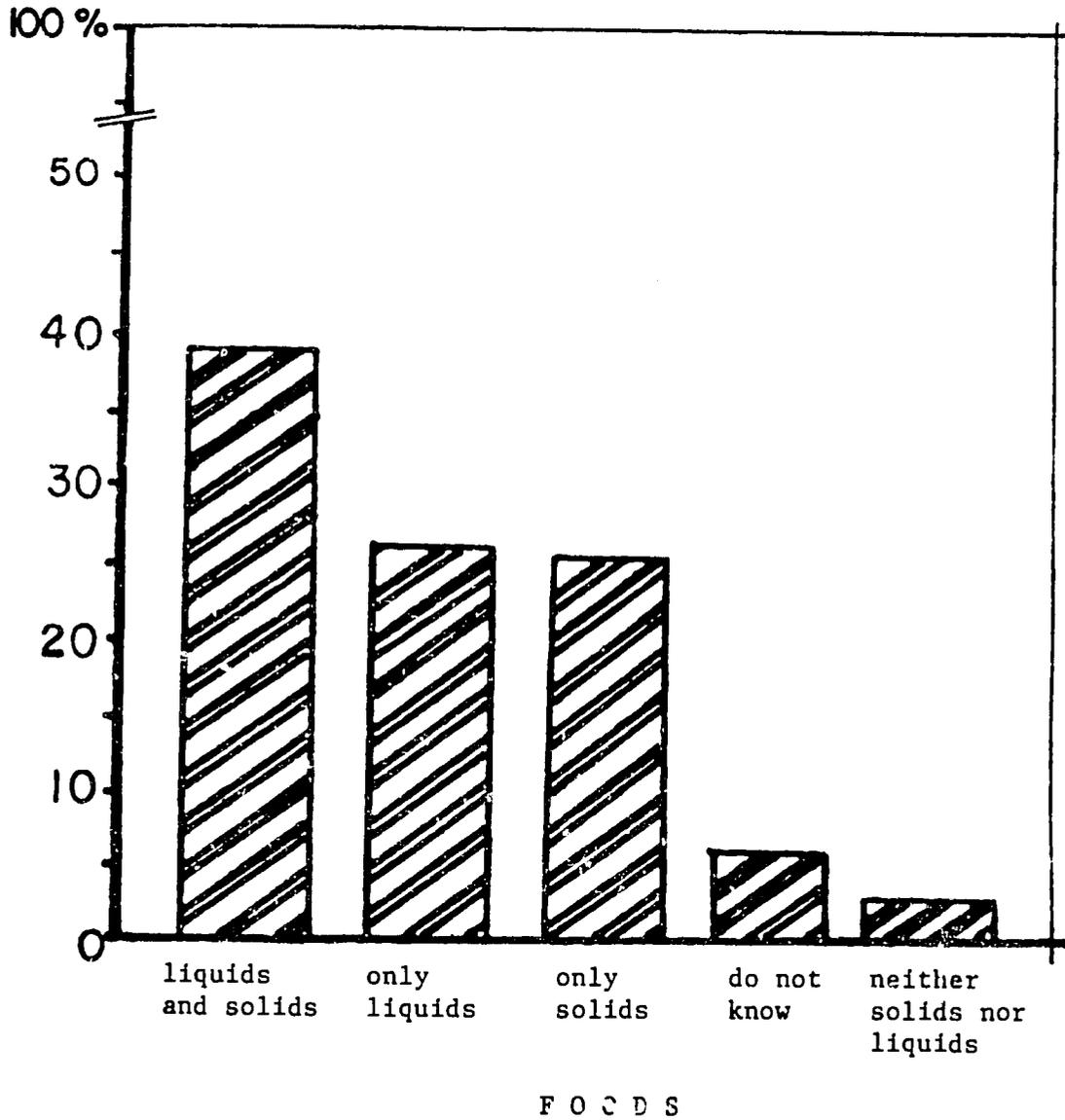
SOURCE: M.P.S.S.P. (National Mother and Child Division) PAHO

FIGURE VIII-7
TEN MAJOR HOUSE PREPARATIONS AGAINST DIARRHEA



SOURCE: M.P.S.S.P. (National Mother and Child Division) PAHO

FIGURE VIII-8
TYPE OF FOODS ADMINISTERED BY THE MOTHERS
TO CHILDREN WITH DIARRHEA



SOURCE: M.P.S.S.P. (National Mother and Child Division) PAHO

The control model must also fulfill other essential requirements. It must maximize the use of community and traditional resources per se, promoting the participation of society in the model for the prevention and the management of ADD, as well as minimize dependence on foreign technological resources and on modern medical services. It is necessary to strive for democratization of the knowledge of ADD prevention and management, rather than merely delegate the distribution and use of certain technologies (e.g., oral rehydration salts) as the only solution.

Given Bolivian housing and environmental sanitation conditions, it is difficult not to recommend basic environmental sanitation measures. Nevertheless, only a medium-term effect can be expected from these measures, which will require significant investment in water supply and sewerage systems.

Activity must be focused on the micro environmental and family home level, through education, promotion of hand washing, preparing foods which are appropriate for the weaning process (formulas with native cereals), promoting appropriate strategies for handling cases at home (home solutions, etc.), and promoting nursing and feeding during episodes.

In brief, the approach of the current strategy must vary substantially at the institutional level as well as at the community level, and its actions must be focused on interrupting the transmission of pathogens causing intestinal diseases, and promoting and re-evaluating home solutions to prevent dehydration resulting from ADD.

6. ACUTE RESPIRATORY INFECTIONS (ARI)

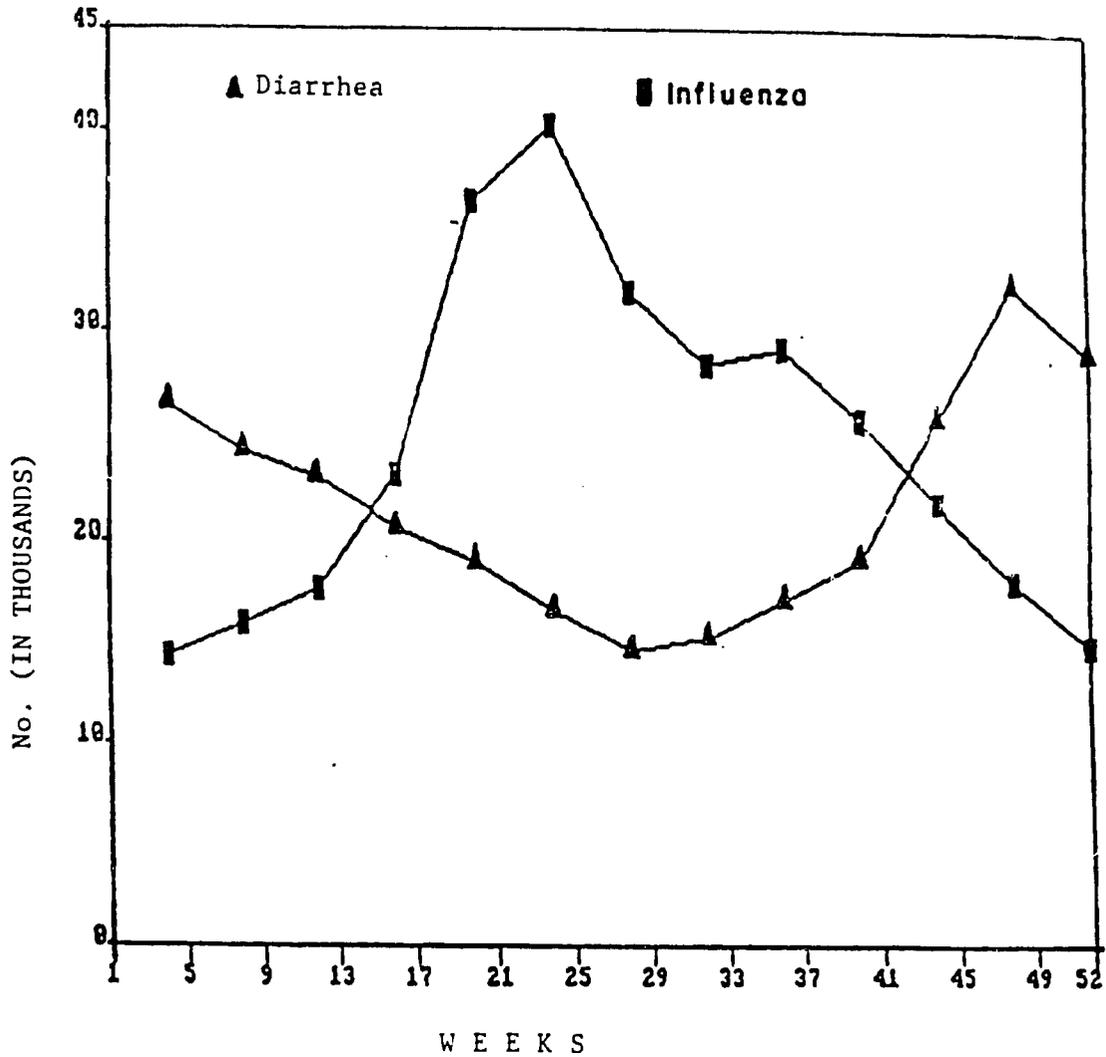
6.1 The Problem

Respiratory diseases are the second largest cause of death in children under the age of 5 in Bolivia. The age group most affected is children under the age of one, in which the risk of dying is as much as 7 times greater than in the case of children 1 to 14 years old.

The death rate from respiratory diseases in children under the age of 5 in Bolivia is more than 40 times the death rate from the same cause in developed countries.

The specific respiratory diseases producing the most deaths are pneumonia (1,616 deaths), acute bronchitis and bronchiolitis (180 deaths), influenza (122 deaths) and chronic bronchitis, emphysema and asthma (90 deaths). Moreover, whooping cough (342), diphtheria (13) and measles (564), which are classified as "other bacterial diseases" and "viral diseases" are also intimately related to respiratory pathology, as well as tuberculosis (75 recorded deaths in children under the age of 5 in 1981). The data from cases of influenza reported to the Board of Epidemiology of the MSWPH (Figure VIII-9) point to a distinct seasonal variation, with the greatest number of cases occurring between May and July.

FIGURE VIII-9
DIARRHEA - INFLUENZA, SEASONALITY



* Note: The year, or years utilized to construct the graph were not specified by source.

Source: Morales R. et al "Health Situation of the Child and Mother" UNICEF (1987)

Data from the urban civil registrars for 1982 and 1983 reveals that respiratory diseases account for a much greater proportion of all deaths in infants less than one year old in the high plateau (29 percent) than in the valleys (21 percent) or in the plains (16 percent) (Table VIII-15). This is even more significant when considering that the available data from the 1976 census point to greater infant mortality in the urban area of the high plateau compared to the urban areas of the valleys and the plains.

No data is available to correlate the behavior of respiratory disease against other pertinent variables such as socioeconomic and ethnic groups, mother's level of education, housing characteristics, access to health services, etc. Consequently, there is a need for epidemiological research in this field.

TABLE VIII-15
INFANT MORTALITY DUE TO "OTHER DISEASES OF THE RESPIRATORY SYSTEM"
ACCORDING TO CIVIL REGISTERS OF URBAN AREAS, BY ECOLOGICAL REGION
BOLIVIA: AUGUST 1982-JULY 1983

Causes	Ecological Regions							
	High Plateau		Valleys		Plains		Total	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Other Diseases of the Respiratory System	1,085	(29.0)	263	(21.1)	128	(15.6)	1,476	(25.5)
All Other Causes	2,663	(71.0)	976	(78.8)	691	(84.4)	4,330	(74.5)
Total	3,748	(100.0)	1,239	(100.0)	819	(100.0)	5,806	(100.0)

6.2. The Program

The ARI program was established in 1984 under the jurisdiction of the Board of Epidemiology and was transferred to the Direccion Materno Infantil (Mother and Child Directorate) in 1986. The regulations were revised and the community participation strategy was implemented, a change which has not been verified in the field. The ARI program falls under the program recommendations issued by the Pan American Health Organization (PAHO). Acute respiratory infections (ARI) are classified in accordance with their severity into: mild, moderate, and severe. For cases classified as mild, the program calls for the utilization of general measures such as environmental humidification, but prohibits use of expectorants and cough suppressants. The program recommends the use of antipyretics when necessary.

In cases of moderate ARI the program proposes the use of penicillin, benzatinica and cotrimoxasol, besides the above measures.

In cases of severe ARI the patients are referred to some more advanced hospitals which have some antibiotics especially supplied by the program. The program does not include the use of bronchodilators in the treatment of ARI.

In the field trips undertaken by the team it was noted that this is one of the programs with the least institutional development at the public services level. The following limiting factors are identified:

- a. The classification of degrees of ARI is not very clear and difficult for the community to use;
- b. The prohibition of expectorants and their replacement by environmental humidification signifies in actual practice the introduction of operational problems at the community level, such as greater smoke production, risks of accidental burns, etc. which limit the recommendation's desired outcome;
- c. The lack of bronchodilator use in the program can produce a worsening in many cases where bronchospasms are an important component of the respiratory pathology;
- d. There is not always continuity or reference between primary health care levels and hospitals in the management of cases of severe or moderate ARI which do not respond to treatment using the two antibiotics of the program;
- e. The supplies required by the program are not always available; and
- f. There is almost complete lack of instructive supervision at operating levels.

6.3. Risk Factors

The extremely marked differences in mortality from respiratory diseases which are noted when comparing Bolivia to other more developed countries points to the need to identify and quantify the major risk factors leading to those differences.

The data presented on Bolivia allow for a comparison of the proportion of total deaths caused by respiratory diseases according to ecological regions (urban areas) (Table VIII-15). These data suggest that the magnitude of the impact in the high plateau is greater than in the valleys and that it is greater in the valleys than in the plains. This situation warrants the undertaking of epidemiological studies to identify social, economic, cultural, nutritional and environmental variables, access to health services, and health care conditions at the institutional and community levels which might better explain the differences observed.

Some explanatory hypotheses could be formulated, such as:

- o Climatic conditions in the high plateau (lower oxygen levels, lower relative humidity, lower temperatures, and strong winds), environmental conditions (suspended dusts), and conditions in the home (darkness, smoke from wood stoves, and overcrowding). These factors, when added to high malnutrition rates and low accessibility to health services, would contribute to the greater number of deaths from respiratory diseases in the high plateau;
- o At the case-management level, the prohibition of expectorants by the ARI program could be conducive to complications, particularly in the dry climate of the high plateau;
- o The abundance of allergens of the inert variety (dust, smoke, etc.) as well as of the biological variety (viruses and bacteria), probably causes a large proportion of cases of bronchospasm and bronchial asthma as well as greater propensity to pneumonia complications. These factors will probably unfavorably affect the mortality rate in the three ecological regions; and
- o Owing to the greater population density in the high plateau, the transmission of specific etiologic agents that have an epidemic potential, such as the flu virus and B. pertussis, among others, would be made easier.

6.4. Plan of Action

At the primary prevention level:

- a. Vaccination with DPT, measles and BCG
- b. Health education with emphasis placed on:
 - breast-feeding by the mother
 - Supplementary feeding
 - Not smoking, especially when children are present
 - Vaccinating children
 - General care (wrapping up and protecting children, changing wet diapers, etc.)
 - Cleaning nasal secretions
 - The importance of professional care upon noting the first alarming symptoms.

At the secondary prevention level, the following actions are emphasized:

- a. Management at the community level:
 - Cleaning secretions
 - Hydration and feeding
 - Use of pharmaceuticals to lower high temperatures
- b. Management at the institutional level
 - Classification of ARI by degree of severity
 - Treatment of moderate cases using antibiotics, expectorants and bronchodilators
 - Hospitalization of severe cases and moderate cases who do not respond to treatment; administration of medicines and procedures as the case may require.

7. MALARIA¹

7.1. The Problem

Bolivia's malarial area covers approximately 75 percent of the national territory. The population at risk of contracting malaria is calculated at 2.6 million inhabitants for 1987.

Malaria has traditionally been responsible for the abandonment of large fertile areas. That situation assumes pathetic proportions in broad tropical or subtropical areas of the country, where settlement and development are severely restricted, with dire consequences to the population. Factors that make the problem even worse are the dilapidated nature of homes, and migrations.

The reduction in productivity caused by job absenteeism, school absenteeism, abortion and stillborn births, as well as the lag in the growth and development of infants and the high death rate in areas plagued by Plasmodium falciparum also are direct consequences of this disease.

In 1986 malaria was the third largest cause of communicable disease reported. Laboratory tests confirmed 20,993 cases, of which 19,319 involved Plasmodium vivax (92 percent) and 1,674 had to do with Plasmodium falciparum (8 percent). The breakdown by age group and sex may be seen in Table VIII-16.

¹ This section was prepared in cooperation with Dr. Andrew A. Arata.

As may be seen in Table VIII 16, 41.7 percent of the cases reported occurred in children under the age of 15. Although the incidence rates are lower in children under the age of 5, the mortality rate in that group is higher.

TABLE VIII-16
CASES OF MALARIA BY AGE GROUP
BOLIVIA, 1986

AGE GROUP	No. OF CASES	PERCENTAGE	RATE X 1,000 INHABITANTS
T O T A L	20,993	100.0	8.0
Less than 1 year	224	1.1	2.1
1 to 4 years	2,335	11.1	6.9
5 to 14 years	6,191	29.5	9.1
15 years and older	12,243	58.3	8.3

Source: Programa Nacional de Malaria (National Malaria Program) M.P.S. and S.P.

It is important to point out that, due to its hemolytic effect, malaria is a factor causing mental disturbances in children and pregnant women, and in people who have had previous malnutrition and anemia problems.

7.2. The Program

The Servicio Nacional de Erradicacion de la Malaria (National Malaria Eradication Service) was established in 1958, as the agency responsible for establishing, applying, coordinating and evaluating antimalarial activity in Bolivia.

The basic control method used by the campaign is home spraying with DDT. Since 1977 the situation has steadily grown worse, with an increase in morbidity rates, and the resulting spread of the disease over the entire initial malarial area. In the last 3 years the program has been able to stop the worsening trend. The current program is based on:

- Treatment of persons suspected of having malaria by means of the system of health services and a broad network of community volunteers;
- Mosquito spraying with Deltametrina (an insecticide);
- Home spraying with DDT insecticide; and
- Elimination or reduction of the breeding grounds of anopheles mosquitoes through voluntary work by the community.

7.3. Strategies and Plan of Action

In the event that the Child Survival Project is established in a malarial area, control measures must be undertaken at the primary health care level for the purpose of reducing the impact of this disease on the health of infants. To this end, the following actions are recommended:

- Support the development of treatment networks with a view to reducing the mortality rate;
- Promote the proper use of mosquito nets; and
- Promote community participation in eliminating or reducing the breeding places of anophelid mosquitoes as identified by the malaria personnel.

8. CHAGAS' DISEASE¹

8.1. The Problem

The Chagas' disease area covers approximately 60 percent of the national territory, where 45 percent of the Bolivian population lives.

According to data gained from the National Survey undertaken by the MSWPH for 1980-1983, 30 to 45 percent of the total population at risk would be infected (positive serology), and the sick population (with symptoms and electrocardiogram signs indicating Chagas' disease) would be 15 percent to 20 percent of the infected population.

The distribution of the main vector, *Triatoma infestans*, occurs at elevations of 350 to 3,500 meters above sea level. House infestation rates were found of up to 100 percent in the towns of Chuquisaca, Potosi, Santa Cruz and Cochabamba. The natural infestation of the samples collected reached an average of 27 percent, which is considered to be exceptionally high.

According to studies done by Mazza in the northern part of Argentina, 80 percent of the children in the endemic areas become infected with *Tripanosoma cruzi* before they have attained the age of 10.

The fatality rate from Chagas' disease varies according to different authors, between 10 percent (Rassi, 1977) and 16.7 percent (Torrico 1959). According to studies performed in the Albina Patino Hospital in the city of Cochabamba by Chapuis (1974) the fatality rate would be 46 percent. According to the same researcher, the fatality would drop to 15 percent through treatment with Nifurtimox (Lampid).

¹ This section was prepared with the cooperation of Dr. Andrew A. Arata.

8.2 The Program

The National Program is aimed at reducing the infestation of vinchucas (insects of the genus *Triatoma*) in the home, by means of the promotion of cleanliness and the improvement of the home with local materials, with the participation of the community in periodic activities called "social mobilizations."

Despite the efforts undertaken, the achievements are not lasting. To halt the transmission of the disease within the home requires an ongoing sanitary education program, supported if possible by chemical control.

8.3. Strategies and Plan of Action

In view of the absence of immunization agents and drugs that can be used on a mass scale at the primary health care level and the impossibility of implementing measures in animal reserves, which are many and varied, the control strategy becomes limited to combating the vector. The most effective alternative would be to improve home conditions to prevent infestation by *Triatoma* insects, which in actual practice turns out to be quite difficult owing to the magnitude of the problem and the lack of chemical means to control the vector. The following measures are consequently recommended:

- Ongoing health education to promote through all available means the improvement of the home, using local material and systematic, daily cleaning of the home;
- Provision of information to and motivation of teachers and health operations staff to act as multiplier agents in the struggle against the vector (*Triatoma*); and
- Promotion of the use of mosquito nets as a way to provide for personal protection.

9. WORKING CHILDREN

9.1. The Problem

Work by children and adolescents, as well as by women, is very difficult to measure, since such work includes household tasks and work in the informal sector. The labor of this age group is outside of the legal provisions of the General Labor Law. Consequently, wages, remuneration and social security do not apply to this group.

Table VIII-17 reveals the overall work status of children, divided by two age groups, 7 to 9 and 10 to 11 years of age, and by sex.

TABLE VIII 17
ECONOMICALLY-ACTIVE POPULATION (EAP) BY AGE
BOLIVIA, 1976

	Age 7 to 9	Age 10 to 14
% total population	7.0	12.0
EAP - children and youth (%)	4.8	9.8
EAP - female	3.6	7.5
EAP - male	6.0	12.3
% EAP Total	1.0	4.0
% TOTAL EMPLOYED	...	3.0

Source: Morales and Rocabado, 1987.

TABLE VIII-18
RATES OF PARTICIPATION OF CHILDREN AND YOUTH
BY PLACE OF RESIDENCE, SOCIOECONOMIC GROUP AND AGE,
BOLIVIA, 1976

Place of Residence & Socio-Economic Group	Group 7-9 years		Group 10-14 years	
	Both sexes	Women	Both sexes	Women
A. Residence:				
Principal city	1.0	0.9	6.6	7.4
Secondary city	0.8	0.8	5.8	7.4
Urban Remainder	1.3	0.9	4.8	4.2
Intermediate rural	6.5	5.1	12.5	8.3
High rural	7.9	5.7	12.9	8.8
B. Socio-economic group:				
Middle-high	0.6	0.5	2.4	1.7
Salaried nonagricultural	2.2	2.3	13.1	15.8
Nonsalaried nonagricultural	2.3	1.9	6.3	4.8
Salaried agricultural	7.1	3.3	15.2	4.1
Nonsalaried agricultural	8.3	6.3	13.3	9.5

Source: Morales and Rocabado, 1987

Table VIII-17 shows that 14.6 percent of the 19 percent of the total population in the age group from 7 to 14 years of age is in the economically active population (EAP), with a greater percentage in the 10-14 age group. Furthermore, males in both age groups participate in work in greater proportions.

One (1) percent of the total EAP is comprised of children aged 7 to 9, and four (4) percent is comprised of children 10 to 14 years of age. These data obviously involve significant underreporting, but even so, we see that Bolivian children enter the job market at a very early age. Furthermore, the next table reveals that participation in work on the part of children from 7 to 14 years of age is increasing as the degree of urbanization decreases. Moreover, participation in the labor force is greater in the rural agricultural population than in the nonagricultural population or in the medium-high socioeconomic level.

Recent information (CET 1986)¹ reveals that 4 out of 10 itinerant vendors in the city of La Paz are children and adolescents, with a greater share of males.

9.2. The Program

There is no national program which focuses on the problem of working children. However, the private non-governmental organizations or other religious or volunteer organizations have developed job hostels for children in this age group, providing them with education and a certain degree of social protection.

9.3 Risk Factors

One of the factors leading to the entrance of children into the labor force is obviously the poor financial status of most of the general population. The phenomenon of the working child does not mean anything else than a way for impoverished families to earn more income.

Child labor inflicts considerable damage on the health of this group because of marginal working conditions. Besides specific health aspects, working children and adolescents are exposed to other risks arising from the lack of social security, the impossibility of banding together into social organizations that defend their own interests, and exploitation.

9.4. Strategies and Plan of Action

Since this is an aspect of basically economic origin and connotation, the programs without a doubt must consider policies that deal with the environment and the development of incentives to go to school, but with an approach based on the family budget and the community.

Besides a solution at the general political level of the country, the labor laws must be updated, adjusting them to the economic and social reality of the country. The amendment of the Code of Minors and of the General Labor Law is essential at this stage.

¹ CET 1986 - Actualidad Laboral No. 2, Sept. 1986, La Paz.

The government must examine the possibility of creating child centers or hostels which include educational, productive and social components. Informal education programs will have to be designed which provide adequate education components and employment counseling for the child in accordance with his age and abilities.

10. CHILD ABUSE AND NEGLECT

10.1. The Problem

There is no data in Bolivia that can be used to analyze what is happening in this area, although it may be assumed from indirect indicators that the problem exists and is increasing, particularly in the marginal urban areas experiencing great pressure from migration and extreme poverty conditions.

The term "child abuse and neglect" has not been defined at the national level. This makes research and recording difficult.

In 1986 the NSI published a list of causes of death registered in 1981, which included traffic accidents, poisonings, and accidents caused by fire, projectiles, gases and vapors. This list was drawn up on the basis of the data reported by the Civil Registrar in Bolivia and consequently involve considerable underreporting.

However, in this list of causes of death, is the rate of 0.24 per thousand for accidents in children aged 1 to 5. These accidents might include categories of abuse or neglect. Worthy of note among the accidents recorded in children under 4 years of age is the fact that the category of "injuries in which it is not known whether they were accidentally or intentionally inflicted" ranks first with 39.4 percent. Other accidents such as those involving traffic, poisoning, falls, drowning, drugs and pharmaceuticals are in second place with 22.8 percent. In third place are motor vehicle traffic accidents with 14.1 percent.

A high percentage of the marginal urban population leaves their children alone at home or in the neighborhood while they go out to work. This is the time when accidents such as burns and poisonings occur most frequently. There are no regional or national studies on infanticide, except for some references at the local level in field investigations in communities of the high plateau region of Potosi and Oruro.

We also have information from Santa Cruz gathered by the working team in October 1987, which reveals that accidents rank second among the causes of admission to the Children's Hospital in this city. Diarrheal diseases rank first and acute respiratory diseases third. Furthermore, the number one cause for outpatient consultations in this hospital is accidents and/or violence for children above the age of 1 and under the age of 14.

The data from Santa Cruz also indicate that the fourth largest cause of death in this hospital is traumatism. The number one cause of death is diarrheal diseases and diseases of the respiratory system take sixth place.

With these partial data, we believe that prevention of trauma is an area for future research. Since there are no national programs aimed at preventing trauma, its magnitude is not known. If the situation in Santa Cruz was representative of the country, these levels would become alarming and consequently of high priority for intervention.

IX. GROUPS AT RISK AND PRINCIPAL INTERVENTIONS

1. MAJOR DISEASES AND AT-RISK GROUPS

Major Diseases	Risk Groups
1. Infectious intestinal diseases	<ul style="list-style-type: none">-Children 12-23 months old-Children 0-11 months old who were weaned early.-Undernourished children under 2-Neighborhoods or districts without potable water or sewerage-All the marginal urban areas and concentrated rural towns-Low socioeconomic groups, Quechua and Aymara, and then Spanish and other groups.
2. Other diseases of the respiratory system	<ul style="list-style-type: none">-Children 0-11 months old-Undernourished children less than 2-Children not vaccinated against DPT, measles and BCG.-Highlands and valleys and then plains-Dark homes, with wood stove and crowded.-Low socioeconomic groups-Quechua and Aymaras, then Spanish and other linguistic groups.
3. Neonatal tetanus	<ul style="list-style-type: none">-Pregnant women not vaccinated against tetanus.-Plains and valleys more than highlands-Rural area and then marginal urban area
4. Measles, poliomyelitis diphtheria, acquired tetanus and whooping	<ul style="list-style-type: none">-Unimmunized children under 5-All of the ecological regions,

cough

places of residence, socioeconomic and ethnic groups.

5. Nutritional deficiencies

-Aymaras, Quechuas, and then Spanish and other linguistic groups

-Highlands and valleys, then plains

-Rural area and then marginal urban area.

-Children 12-23 months old

-pregnant women and women during the breast feeding period.

2. PRIORITIES FOR ACTION

2.1. Priority human groups for health interventions¹

1) According to the age of the child:

1st priority: children 0-11 months old
2nd priority: children 12-23 months old
3rd priority: children 2-4 years old

2) According to the ecological area of residence of the mother:

1st priority: valleys
2nd priority: highlands
3rd priority: plains

3) According to the place of residence (urban-rural) of the mother:

1st priority: rural high (rural scattered)
2nd priority: rural intermediate
3rd priority: secondary cities

4) According to the socioeconomic group of the mother:

1st priority: low nonsalaried agricultural
2nd priority: low salaried agricultural
3rd priority: low salaried nonagricultural

5) According to the ethnic group of the mother:

1st priority: Quechua
2nd priority: Aymara
3rd priority: Spanish and others.

¹ This prioritization was based on the epidemiological analysis of data compiled in this document.

6) According to the level of education of the mother

1st priority:	No education
2nd priority:	1 to 2 years of education
3rd priority:	3 to 5 years of education

7) According to the quality and services of the housing

1st priority:	Poor housing services
2nd priority:	Poor housing quality
3rd priority:	Good quality of housing but poor housing services

3. PRINCIPAL TECHNOLOGIES AND INTERVENTIONS PROPOSED:

If we return to the model of interrelationships presented at the beginning of this report (in the section on the socioeconomic context), medical technologies should be applied primarily to the intermediate variables or the most direct determining factors of the cause of disease and death. Some modern technologies, such as vaccinations and some antibacterial agents, are of great specificity. Others such as insecticides can be targeted at a certain sector, but are nonspecific technologies that affect other forms of life and have other side effects (Mosley and Chen, 1984). According to these authors, medical technologies can be applied within the health system through the following:

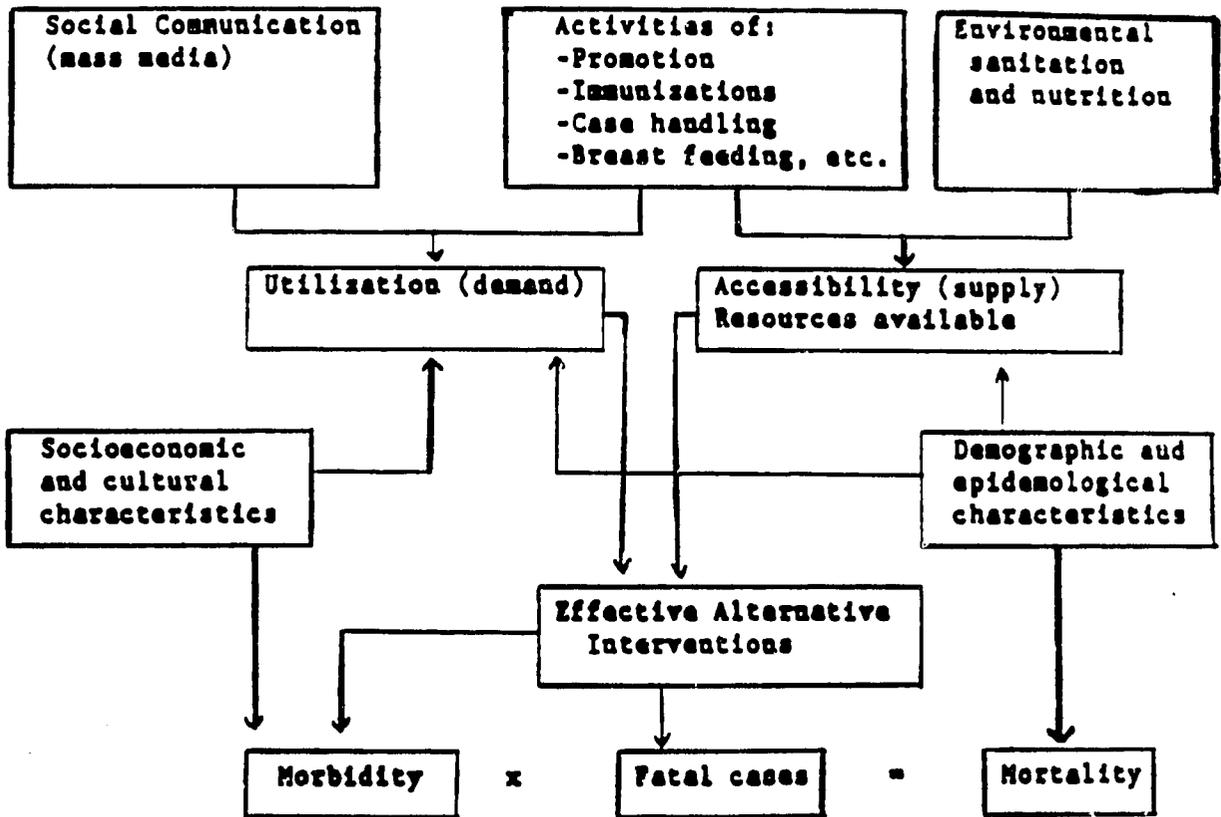
- a. An institutional mandate (for example DDT, environmental sanitation, potable water supply, standards for handling foods, vaccination against yellow fever, etc.)
- b. A system of subsidies or free services (for example, vaccinations, pharmaceuticals, contraceptives, oral rehydration salts, etc.).
- c. Educating and informing people on the use of certain technologies, paying a price for them (for example, the use of latrines, soap, boiled water, etc.).

The series of proposals presented below are to be implemented primarily through the last two mechanisms.

Given the demographic and epidemiological profile of the people, their social, economic and cultural characteristics, the supply of resources and the effectiveness of the available interventions and technologies, we selected a series of alternative interventions which, within their existing limitations (feasibility), will maximize the probability of child survival through changes in mortality and reductions in the fatality rate.

FIGURE IX-1

MODEL OF INTERACTION BETWEEN ACTIVITIES, INTERVENTIONS
AND RESULTS IN INFANT SURVIVAL



We based our selection of alternative interventions on a general hypothesis developed in Colombia to optimize the allocation of resources towards infant survival (Barnum and Barlow, 1980). The global model derived from this experience is presented in Figure IX-1. At the bottom of the figure this model shows the mortality rate as resulting from or being the product of the morbidity rate multiplied by the fatality rate. The three boxes in the upper part represent the main interventions. They are converted into accessible services (supply), which are determined by the resources available and the demographic and epidemiological characteristics of the people.

The use of the services offered (demand) is a direct function of the socioeconomic and cultural characteristics of the people and can be altered through proper use of the mass communications media and by other means.

In order to be effective, the alternative interventions must not only be accessible but they must also be used. These interventions are aimed at two major areas, morbidity (which is determined to a great extent by the socioeconomic and cultural characteristics of the people) and the fatality, in other words, the number of deaths caused by a disease among people who are affected by this same disease. From the interrelationship of these factors we hope to be able to exert an effect on the mortality rate.

The principal diseases affecting infant survival and the interventions proposed may be noted in Table IX-1.

TABLE IX-1
MAJOR DISEASES AFFECTING INFANT SURVIVAL AND INTERVENTIONS PROPOSED
BOLIVIA, 1987

No.	MAJOR DISEASES	RISK OF DEATH	INTERVENTIONS PROPOSED	POTENTIAL EFFECTIVENESS	FEASIBILITY	RELATIVE COST	OBSERVATIONS
1	Diarrheal	High	-Potable water supply and basic sanitation	High	Medium	High	-Priority for peripheral urban areas and concentrated rural areas.
			-Health education aimed at halting the transmission	High	Medium	Medium	-Requires research into the socio-cultural aspects
			-Oral rehydration therapy: -Home solutions	Medium	High	Low	-Bring back traditional preparations
			-Oral Rehydration salts	High	High	Low	-Ensure proper application supervised by a health officer or RPS (Responsable Popular de Salud-- Popular Responsible for Health)
			-Parental rehydracion	High	Medium	Low	Selective application

(continued)

TABLE IX-1
MAJOR DISEASES AFFECTING INFANT SURVIVAL AND INTERVENTIONS PROPOSED
BOLIVIA, 1987

No.	MAJOR DISEASES	RISK OF DEATH	INTERVENTIONS PROPOSED	POTENTIAL EFFECTIVENESS	FEASIBILITY	RELATIVE COST	OBSERVATIONS
			-Encouragement of breast feeding	Medium	Medium	Low	Priority for urban area
2	Acute Respiratory Diseases	High	-Vaccination against measles, whooping cough and diphtheria (DPT)	High	High	Low	-Included in the Expanded Immunization Program
			Case management: -Family/community	Medium	Medium	Low	-Requires research into attitudes and practices
			-Institutional primary care	High	Medium	Medium	-Ensure follow-up
			-Institutional secondary care	High	Medium	High	-Selective
			-Health education	Medium	Medium	Medium	-Requires research
3	Diseases Preventable by Vaccination	High	-Continuous vaccination	High	Medium	Medium	-Requires extension of cold chain
			-Vaccination campaigns	High	High	Low	-Must be supplementary to continuous vaccination
			-Health education	Medium	Medium	Medium	-Must be in keeping with the advances and problems of the program.
4	Malnutrition	High	-Development of agriculture and livestock production	High	Medium	High	-Technical and credit support

(continued)

TABLE IX-1
MAJOR DISEASES AFFECTING INFANT SURVIVAL AND INTERVENTIONS PROPOSED
BOLIVIA, 1987

No.	MAJOR DISEASES	RISK OF DEATH	INTERVENTIONS PROPOSED	POTENTIAL EFFECTIVENESS	FEASIBILITY	RELATIVE COST	OBSERVATIONS
			-Implementation of social policies on employment and improvement of family income	High	Medium	High	-Ministry of Planning and Finance -Credit programs for the informal sector
			-Promotion of breast feeding	High	Medium	Low	-Emphasis on urban areas
			-Proper feeding before and after weaning	High	Medium	Low	-Bring back native foods
			-Supplementary food program	Medium	Medium	High	-Selective in populations and groups at risk using native foods. Establish monitoring mechanisms
			-Develop systems of nutritional food monitoring	-	High	Low	-Monitoring centers
			-Administration of supplementary micronutrients (iron, folic acid, iodine, vitamin A)	High	High	Low	-Target group pregnant women
			-Parasite control	Medium	High	High	-Through mass campaigns
			-Health education	Medium	Medium	Medium	-Mass radio communication, use of alternate methods

(continued)

TABLE IX-1
MAJOR DISEASES AFFECTING INFANT SURVIVAL AND INTERVENTIONS PROPOSED
BOLIVIA, 1987

No.	MAJOR DISEASES	RISK OF DEATH	INTERVENTIONS PROPOSED	POTENTIAL EFFECTIVENESS	FEASIBILITY	RELATIVE COST	OBSERVATIONS
5.	Diseases of the Perinatal Period (Neonatal tetanus, congenital syphilis, & others)	High	-Vaccination against tetanus:				
			-Pregnant women	High	Medium	Low	-During prenatal checkup
			-Vaccination of mothers (15-35 years)	High	Medium	Medium	-Priority for the plains and valleys
			-Increase output of the installed capacity of institutional care for child birth	High	Medium	Medium	-Respect popular obstetrical traditions
			-Promote clean child birth by practicing midwives	High	Medium	Low	-Ensure proper handling of the umbilical cord, immediate care for the new born including cardiopulmonary resuscitation
			-Epidemiological investigation of neonatal tetanus	-	High	Low	-Distribution and explanatory factors
			-Research (V.D.R.L. - Venereal Disease Research Laboratories) and treatment of cases of syphilis in pregnant women.	High	Medium	Low	-During prenatal checkup

(continued)

TABLE IX-1
MAJOR DISEASES AFFECTING INFANT SURVIVAL AND INTERVENTIONS PROPOSED
BOLIVIA, 1987

No.	MAJOR DISEASES	RISK OF DEATH	INTERVENTIONS PROPOSED	POTENTIAL EFFECTIVENESS	FEASIBILITY	RELATIVE COST	OBSERVATIONS
6	Tuberculosis	High	-BCG vaccination (Calmette-Guerin Bacillus)	High	High	Low	-Systematic vaccination with institutional child birth
			-Case treatment	High	Medium	Medium	-Ensures follow-up until completion of treatment
7	Malaria	Medium	-Spray homes with insecticides	High	Medium	High	-Requires update of tests of sensitivity to agents that destroy anopheles mosquitoes and insecticides
			-Case treatment	High	Medium	Low	-Priority for areas of Plasmodium Falciparum
			-Use of mosquito nets	Medium	Medium	Medium	-Can also control Chagas' disease
8	Chagas' Disease	Low	-Use of mosquito nets	High	Medium	Medium	-Priority for high risk areas
			-Improvement of the home, plastering the interior walls	Medium	Medium	Medium	-Foods for work
			-Detection and treatment of acute cases	Medium	Medium	Low	-Concentrate on areas of greatest risk
			-Research in blood banks	Medium	Medium	Medium	-Endemic areas

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(Director of the German Urquidi Maternity Clinic)

Dr. Nelson Barriga - Director Pabellón Pediatría Hospital Viedma
(Director of the pediatrics Department of the Viedma Hospital)

Dr. Max Sánchez - Director Hospital Albina Patiño
(Director of the Albina Patino Hospital)

Dr. José Velásquez- Director Hospital COMBASE.
(Director of the COMBASE Hospital)

Dr. Saúl Orellana - Director Hospital Punata.
(Director of the Ppunata Hospital)

Dr. Lucio Hinojosa - Médico Hospital Central de Cliza.
(Doctor at the Cliza Central Hospital)

Enf. Mirtha López - Enfermera Hospital Central de Cliza.
(Nurse in the Cliza Central Hospital)

Lic. Rosemary Salazar - Directora a.i. Centro de Estudios de Población
(Temporary Director Population Studies Center)

Miss. Olga Quiroga - Responsable Estadística Matern. Germán Urquidi.
(Official in charge of the German Orquidi Maternity Clinic)

8. Unidad Sanitaria Santa Cruz

Dr. Ronald Rivero - Director Unidad Sanitaria.
(Health Unit Director)

Dr. Gladys de Roca - Jefe Regional Materno Infantil
(Regional Chief Mother and Child)

Dr. Luis Eduardo Nuñez - Jefe Regional Epidemiología
(Regional Chief Epidemiology)

Dr. Hernado Eguez - Director Hospital Pediátrico Mario Ortiz
(Director of the Mario Ortiz Pediatric Hospital)

Lic. Elena de Aliaga - Enfermera Jefe Hospital Mario Ortiz.
(Head Nurse of the Mmario Ortiz Hospital)

Mr. Víctor Rioja - Jefe Estadística Hospital Mario Ortiz
(Chief of Statistics of the Mario Ortiz Hospital)

Dr. Roger Jiménez - Director Maternidad Percy Boland
(Director of the Percy Boland Maternity Clinic)

Lic. Isabel de Yabeta - Enfermera Jefe Maternidad Percy Boland
(Head Nurse at the Percy Boland Maternity Clinic)

Dr. Benjamín Rivera - Director CENETROP
(Chief Hematology Unit CENETROP)

Dr. Hugo Zuna - Jefe Unidad Hematología CENETROP
(Chief Hematology Unit CENETROP)

Dr. Carlos Lafuente - Jefe Unidad Serología CENETROP
(Chief Serology Unit CENETROP)

Miss. Dorita de Kennedy - Directora "Comunidad Cruceña de Hombres Nuevos" (Direcotr of the "Santa Cruz Community of New Men)

Dr. Jaime Unzueta - Director Proyecto PROSALUD
(Director of the PROSALUD Project)

Dr. Carlos Cuéllar - Jefe Médico Proyecto PROSALUD
(Chie¿ Physician of the PROSALUD Project)

Lic. Pilar Sebastián - Enfermera Jefe Proyecto PROSALUD
(Head Nurse of the PROSALUD Project)

9. Unidad Sanitaria Chuquisaca

Dr. Pastor Miranda - Director Unidad Sanitaria
(Health Unit Director)

Dr. Roberto León - Epidemiólogo Unidad Sanitaria
(Health Unit Epidemiologist)

Dr. Fernando Cáceres - Jefe Planificación Unidad Sanitaria
(Health Unit Planning Chief)

Dr. Hugo Loayza - Jefe Regional Materno Infantil
(Regional Chief Mother and Child)

Dr. Franz Beltrán - Director Centro de Salud
(Health Center Director)

Dr. Jaime Villafán - Director Hospital Pediátrico Santa Bárbara
(Director of the Santa Barbara Pediatric Hospital)

Sister Natividad Sanes - Jefe Enfermería Hospital Santa Bárbara
(Head Nurse of the Santa Barbara Hospital)

Mrs. Teresa de Ramalio - Estadística Hospital Santa Bárbara
(Statistics Santa Barbara Hospital)

Dr. Vito Soliz - Director Hospital Ginecobstétrico 27 de Mayo
(Director of the 27 de Mayo Gynecology and Obstetrics Hospital)

Lic. Adela Cardozo - Enfermera Jefe Hospital 27 de Mayo
(Head Nurse of the 27 de Mayo Hospital)

Lic. Delia Ballivián - Estadística Hospital 27 de Mayo
(Statistics 27 de Mayo Hospital)

Dr. Daniel Rivas - Director Distrito 1 Yotala
(Director of District 1 Yotala)

Lic. Ruth Senzano - Directora Convenio Social Boliviano Británico
(Director of the Bolivian British Social Agreement)

Dr. Joaquín Vargas - Director Area Kirpinchapa
(Kirpinchapa Area Director)

Dr. José Vargas - Director Area Mercado Minorista
(Retail Market Area Director)

ANNEX 1

Construction of Population Levels¹

For the purpose of Project Bol/78/P01, the ecologic levels were divided in GROUPS; in other words, into environments in which people interact. The degree of urbanization (the number of people in the area) was taken into consideration. The following five groups were distinguished:

1. Primary Cities (P.C.): This group includes cities in each region with populations of at least 200,000: La Paz in the "Altiplano," Cochabamba in the "Valle," and Santa Cruz in the "Llano."
2. Secondary Cities (S.C.): These are cities with populations between 20,000 and 200,000: Oruro, Potosi and Llallagua in the "Altiplano," Sucre and Arija in the "Valle," and Montero and Trinidad in the "Llano."
3. Remaining Urban Areas (R.U.A.): This group is comprised of the remainder of the population living in urban areas (2,000 to 20,000 inhabitants).²
4. Intermediate Rural Areas (I.R.A.): This group refers to the population living in regions of at least 2,000 residents and in remote localities with at least some urban influences.
5. Rural Rural (R.R.): In this group the population lives in rural areas without any urban influences.

¹ For a detailed explanation refer to: Torrez, Hugo "Bolivia: Diagnostico y factores explicativos en la mortalidad en la niñez, Censo 1976" (Bolivia: Factors and diagnosis explaining child mortality, 1976 Census"), Project Bol/78/P)1, Nov. 1980 (annex); and Gonzales, Gerardo and Valeria Ramirez: "Análisis de la fecundidad diferencial en Bolivia" ("Analysis of the differential fertility in Bolivia"), Project Bol/78/P)1, Nov. 1980 (annex).

² The Housing and Population Census of 1976 defines an urban population as those residents living in areas of at least 2,000 inhabitants.

Moreover, the country's total population and the population classified into ecologic levels and groups were divided into SOCIAL SECTORS, which we divided into upper-middle levels and lower levels.¹ The lower level was subdivided into four parts according to the type of work (agricultural or non-agricultural) and the occupational category (salaried or non-salaried) of the head of the family. Thus, five social sectors were formed:

- I. Upper-Middle (Agricultural and Non-agricultural)
- II. Lower Non-Agricultural, Salaried
- III. Lower Non-Agricultural, Non-Salaried
- IV. Lower Agricultural, Salaried
- V. Lower Agricultural, Non-Salaried

Social Levels	Upper-Middle	I		Occupational Categories	
	/	II	IV		Salaried
	Lower	III	V		Non-Salaried
	\	Non-Agricultural	Agricultural		
		Economic Sector			

¹ For the first group, the type of occupation and level of education of the head of the house were combined. They were considered Upper-Middle occupations if at least 70% of the heads of the house had 6 years or more of education. Lower level occupations had at least 70% of the heads of the house with less than 6 years of education. The "employers" were considered Upper-Middle regardless of their level of education or type of occupation. Those not classified in this first stage were considered in the Upper-Middle level if they had 9 or more years of education, and in the Lower level if they had a shorter education.

ANNEX 2

PROVINCES IN EXTREME POVERTY CONDITIONS

CLASSIFICATION CRITERIA:

Deaths in children under 2 = 0 213

Illiteracy rate = 0 to 37%

Migratory efficacy rate [MER] = 0 to -0.

Piped water supply = 0 15%

Electric Energy = 0 12%

PROV- INCE CODE	PROVINCES	DEPT.	(1,000)20 ⁿ (1)	MER (2)	ILLIT- ERACY (3)	WATER SUPPLY (4)	ELECTRIC ENERGY (5)
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1: PROVINCES IN THE MOST DEPRESSED CONDITIONS

59	Ibañez	Potosí	341	-0.21	68.9	4.1	0.1
56	Chayanta	Potosí	285	-0.34	80.3	7.2	3.5
45	Carangas	Oruro	235	-0.21	41.2	4.8	0.7
65	Bilbao	Potosí	341	-0.35	63.0	6.5	0.5
32	Arze	Cochabamba	329	-0.38	56.7	8.7	5.2
57	Charcas	Potosí	328	-0.40	79.6	2.9	0.9
08	B. Boeto	Chuquisaca	306	-0.39	65.2	10.3	8.4
34	Arque	Cochabamba	306	-0.43	79.4	5.2	5.6
39	Tapacari	Cochabamba	306	-0.39	79.2	2.6	1.0
02	Azurduy	Chuquisaca	294	-0.60	76.8	3.0	0.1
31	Ayopaya	Cochabamba	285	-0.21	69.3	9.3	6.0
07	N. Cinti	Chuquisaca	273	-0.41	75.0	5.5	2.1
04	Tomina	Chuquisaca	264	-0.44	69.9	10.3	4.8
30	Campero	Cochabamba	245	-0.49	60.4	14.2	5.8
26	Saavedra	La Paz	235	-0.46	72.3	10.1	0.1
15	Muñecas	La Paz	217	-0.64	75.9	6.8	3.4
14	Camacho	La Paz	217	-0.36	61.2	6.1	2.5
33	Arani	Cochabamba	329	-0.50	57.2	9.9	6.0
71	Avilez	Tarija	318	-0.47	59.0	3.3	3.6
03	Zudañez	Chuquisaca	306	-0.33	83.0	5.7	2.0
35	Capinota	Cochabamba	285	-0.31	56.7	13.8	9.9
72	Méndez	Tarija	217	-0.34	63.1	4.1	4.8

(Continued)

ANNEX No.2 (cont.)

2: PROVINCES IN DEPRESSED CONDITIONS

62	Sud Lípez	Potosí	306	*	37.8	0.0	8.8
61	Nor Lípez	Potosí	264	-0.27	38.2	*	1.6
52	Saucari	Oruro	227	*	47.7	0.1	1.0
41	Mizque	Cochabamba	306	*	74.5	6.0	0.3
40	Carrasco	Cochabamba	273	*	55.8	6.3	1.2
19	Loayza	La Paz	235	-0.20	43.2	*	11.7
09	Sud Cinti	Chuquisaca	217	*	66.4	7.5	6.0
55	Saavedra	Potosí	296	*	73.2	9.7	5.4
63	Linares	Potosí	285	?	64.8	4.8	2.8
06	Yamparaez	Chuquisaca	273	-0.28	80.3	*	2.4
28	Villarroel	La Paz	209*	-0.67	40.0	0.5	0.2
12	Omasuyos	La Paz	201*	-0.61	53.4	7.4	3.8
27	M. Kapac	La Paz	209*	-0.31	56.1	12.2	5.4
17	Tamayo	La Paz	209*	-0.59	65.0	7.9	0.6
73	O'Connor	Tarija	145*	-0.28	46.6	10.0	7.3

3: PROVINCES LESS DEPRESSED

64	Quijarro	Potosí	264	*	38.2	*	*
47	Litoral	Oruro	253	*	*	13.1	1.5
44	Avaroa	Oruro	253	*	47.7	*	5.1
48	Poopo	Oruro	253	*	*	*	*
50	Cabrera	Oruro	253	*	8	7.0	3.2
51	Atahuallpa	Oruro	217	*	*	*	5.1
54	Bustillos	Potosí	285	*	44.9	*	*
53	Frias	Potosí	253	*	35.7	*	*
49	Dalence	Oruro	245	*	*	*	*
58	N.Chichas	Potosí	296	*	26.7	*	*
20	Inquisivi	La Paz	264	-0.23	38.7	*	*
38	Chapare	Cochabamba	273	*	45.3	11.2	*
60	S.Chichas	Potosí	253	*	*	*	*
42	Punata	Cochabamba	235	-0.49	*	*	*
01	Oropeza	Chuquisaca	227	*	41.0	*	*
67	Omiste	Potosí	227	*	*	*	*

- Notas: (1) Mortality rate in children under 2
 (2) Net migration rate
 (3) Illiteracy rate
 (4) Percentage of homes with piped water supply
 (5) Percentage of homes with electricity

* Values outside of the limits of strict classification
 Source: Special tabulations - CONAPO (National Population Commission)
 INE - Censo Nacional, Poblacion, Vivienda (National Institute of
 Statistics, National Census Population Housing), 1976