Brazil
Human Resources Special Report

Summary Report
July 13, 1979
LAC II

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CURRENCY EQUIVALENTS

Currency Unit: Cruzeiro

Exchange Rates Effective June 12, 1979

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Average Exchange Rates

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PREFACE

This report is based on findings of a mission which was in Brazil in October-November 1977 composed of:

Peter T. Knight (Chief of Mission)
Ricardo Moran (Deputy Chief of Mission)
Constantino Lluch (Senior Economist)
Dennis Mahar (Health and Nutrition Consultant)
Francisco Swett (Education Consultant)

The report consists of a summary volume and four annexes. The title and principal authors are as follows:

Summary Report
Peter T. Knight and Ricardo Moran

Annex I: Population
Thomas W. Merrick and Ricardo Moran

Annex II: Employment, Earnings, and Income Distribution
Constantino Lluch

Annex III: Health, Nutrition and Education
Peter T. Knight, Dennis Mahar, and Ricardo Moran

Annex IV: Housing, Water Supply, and Sewerage
Peter T. Knight and Ricardo Moran

Substantive contributions to this report were also made by health consultant Ernesto Calderon (Annex III); education consultants Claudio de Moura Castro, Ernesto Schiebelbein, and Francisco Swett (Annex III); and nutrition statistics consultant Joseph Quinn (Annex III). Joseph Quinn and Roger Bove of the U.S. Bureau of the Census contributed to the development of the Long Run Planning Model used for the demographic and other simulations and assisted Thomas W. Merrick with the demographic work. Research assistance was provided by Julie Otterbein.
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<tr>
<td>BNH</td>
<td>Banco Nacional de Habitacao (National Housing Bank)</td>
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<td>COHAB</td>
<td>Companhia de Habitacao Popular (Popular Housing Company)</td>
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<tr>
<td>EMBRATER</td>
<td>Empresa Brasileira de Asistencia Tecnica e Extensao Rural (Brazilian Technical Assistance and Rural Extension Enterprise)</td>
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<tr>
<td>ENDEF</td>
<td>Estudo Nacional da Despesa Familiar (National Family Expenditure Study)</td>
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<tr>
<td>FAE</td>
<td>Fundo de Financiamento para Agua e Esgotos (Water and Sewage Fund)</td>
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<td>FAO</td>
<td>United Nations Food and Agriculture Organization</td>
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<td>FGTS</td>
<td>Fundo de Garantia do Tempo de Servico (Time-on-Job Guarantee Fund)</td>
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<tr>
<td>FUNRURAL</td>
<td>Fundo de Asistencia ao Trabalhador Rural (Rural Workers' Social Assistance Fund)</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>IBGE</td>
<td>Fundacao Instituto Brasileiro de Geographia e Estatistica. (Brazilian Institute of Geograph and Statistics Foundation)</td>
</tr>
<tr>
<td>INAN</td>
<td>Instituto Nacional de Alimentacao e Nutricao (National Food and Nutrition Institute)</td>
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<td>INPS</td>
<td>Instituto Nacional de Previdencia Social (National Social Security Institute)</td>
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<td>IPASE</td>
<td>Instituto de Previdencia e Assistencia dos Servidores do Estado (Social Security and Welfare Institute for Public Servants)</td>
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<td>MOBRAL</td>
<td>Movimento Brasileira de Alfabetizacao (Brazilian Literacy Movement)</td>
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<td>PIASS</td>
<td>Programa de Interiorizacao das Acoes de Saude e Saneamento no Nordeste (Program for Grass Roots Health and Sanitation Actions in the Northeast)</td>
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<td>PIPMO</td>
<td>Programa Intensivo de Preparacao de Mao de Obra (Intensive Program for Manpower Training)</td>
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<tr>
<td>PLANASA</td>
<td>Plano Nacional de Saneamento (National Sanitation Plan)</td>
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<tr>
<td>Acronym</td>
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<td>POLONORDESTE</td>
<td>Programa de Desenvolvimento de Áreas Integradas do Nordeste (Development Program for Integrated Areas in the Northeast)</td>
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<td>PRONAN</td>
<td>Programa Nacional de Nutrição (National Nutrition Program)</td>
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<td>SBPE</td>
<td>Sistema Brasileiro de Poupança e Empréstimo (Brazilian Savings and Loan System)</td>
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<tr>
<td>SENAC</td>
<td>Serviço Nacional de Aprendizagem Comercial (National Service for Commercial Apprenticeship)</td>
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<td>SENAI</td>
<td>Serviço Nacional de Aprendizagem Industrial (National Service for Industrial Apprenticeship)</td>
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<td>SFH</td>
<td>Sistema Financeiro da Habitação (Housing Finance System)</td>
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<td>SFS</td>
<td>Sistema Financeiro do Saneamento (Sanitation Financing System)</td>
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<td>WHO</td>
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SUMMARY AND CONCLUSIONS

Introduction and Main Conclusions

i. During the past thirty years Brazilian economic growth has been very rapid. Total production has grown at close to 7 percent a year. By many other measures the country also made extraordinary progress, bringing material well-being to a considerable portion of the population. Today the wealth evident in all large Brazilian cities is impressive, but serious social problems persist. Malnutrition, high infant mortality, and lack of access to basic public services still affect millions of Brazilians. Public awareness of such contrasts has increased in recent years. At the same time, accelerating inflation and a slowdown in economic growth have contributed to widespread questioning of past development strategies. The debate about national priorities has been intensifying, and support seems to be increasing for a more egalitarian distribution of the benefits of development. Since 1974 the Brazilian government has been giving greater emphasis to investment in basic public services and to initiating programs that alleviate material deprivation among the poor and increase their productivity.

ii. The Brazil Human Resources Special Report focuses on population dynamics and on the development of human resources or, from a somewhat different point of view, the provision of basic services in the broader context of development. By combining historical and prospective analysis, its aim is to facilitate the search for effective policies and efficient programs. The specific and proximate objectives of this report are fourfold:

- to assess the historical evolution of various socioeconomic indicators disaggregated among three large regions characterized by considerable economic and demographic disparities: the low-income Northeast, the higher income Southeast, and the sparsely populated Frontier (see map);

- to relate the evolution of these indicators to a broader historical framework of population and development in Brazil, particularly since World War II;

- to analyze available data and estimate the quantitative relations between variables pertaining to population dynamics; human resource development; and labor markets, income distribution, and basic macroeconomic variables;

- to articulate these quantitative relations in simple simulation models and to analyze the costs and outcomes of selected policy interventions in the coming decades.
This summary report presents the highlights of the more detailed analyses and simulations contained in four separate annexes. Annex I deals with population; Annex II with employment, earnings, and income distribution; Annex III with health, nutrition, and education; Annex IV with housing, water supply, and sewerage. Each annex contains a considerable amount of statistical material and explanations of the assumptions, methods, and arguments underlying the conclusions presented in the summary report. In the annexes, as in the summary report, the general pattern of presentation consists of an exposition of historical trends and regularities, an analysis of the evolution of government policies and programs, and projections (or, more properly, illustrative simulations) through the year 2000.

iv. The most important conclusions may be summed up briefly:

- During the postwar years the economy of Brazil has grown more than twice as fast as the population. Although there has definitely been some "trickle-down" of benefits to the poor in the areas studied in this report, the growth process has been very uneven: among sectors of the economy, among regions and urban-rural locations, and certainly among households. As a result, large differences in economic welfare among population groups persist. Clearly, much remains to be done.

- Projections of population growth through the end of the century are relatively insensitive to wide variations in prospective rates of improvement in basic needs indices, but faster improvement in these indices during the next twenty or so years should result in slower population growth beyond 2000.

- Rapid economic growth will be necessary to provide productive employment for the growing labor force and to meet the basic needs of the population. But growth in the modern sector alone is unlikely to absorb the bulk of the working-age population before the end of this century; it will take even longer for that sector to absorb the current and prospective supply of low-skilled workers. Therefore policies to increase productivity in the rest of the economy will be crucial in achieving more equitable socioeconomic development.

- Meeting the basic needs (as defined in this report) of the entire Brazilian population by the end of the century is not, at its root, an economic or financial problem. It is a matter of political will. If priority is given to this goal, the numerous administrative obstacles can be overcome and much faster progress can undoubtedly be achieved.

Historical Trends and Regularities

v. The growth of population in this century has been very fast and will almost certainly fail to slow substantially before the year 2000. With 120 million people in mid-1979 and a growth rate estimated at 2.8 percent, Brazil is currently adding some 3.4 million to its population each year -- more than a third of Latin America's contribution to world population growth.
Urban population growth has been and will continue to be much faster than the national average, with correspondingly surging demands for urban infrastructure. Population growth has also differed widely across regions, with the Frontier growing more than twice as fast as the Northeast. This trend is expected to continue.

vi. Although life expectancy has been increasing in all regions for at least forty years, a sustained decline in fertility can be detected only in the Southeast. In the Northeast, fertility might still be increasing, and for all of Brazil the trend was still basically flat by 1970. Life expectancy in the 1960s was probably considerably lower than the sixty-one years cited by Brazilian official sources and international agencies, perhaps as low as fifty-six years.

vii. The age and sex compositions of the population have changed very little since 1950. The share of those under fifteen has remained virtually constant at about 42 percent, compared with 28 percent for the United States in 1970. But regional differences in age-sex composition are substantial because of differences in vital rates and age- and sex-selective inter-regional migration.

viii. Relations between demographic and development variables analyzed in the report show that:

- Household size and household income are inversely related in large metropolitan areas. Compared with the higher income families, the poorest households have fewer earners, whose average wages are lower, and a higher proportion of children as dependents.

- Members of urban households reporting monthly income of less than US$50 (1970 prices and exchange rates) had an average life expectancy of sixteen fewer years than that of urban families reporting more than US$150.

- The regional pattern of malnutrition conforms to that of infant mortality.

- For a given income level, a 10 percent increase in the income share of the bottom 40 percent of the labor force is accompanied by an 11 percent decline in infant mortality and about a 3.5 percent decline in fertility.

Other relations involving fertility show strong rural-urban differences, a somewhat less strong negative relation to household income, a very strong negative relation to women's years of schooling, and a strong relation to labor market status. This evidence on socioeconomic correlates of fertility at the household level strongly suggests -- if recent patterns of association remain reasonably stable over time and if the ongoing processes toward greater urbanization, female education, and female employment
in the modern sector continue at rates comparable to those in the 1960s and 1970s -- that fertility will probably decline in the coming decades, even in the absence of an activist official population policy.

ix Although Brazil's population growth in the postwar period has been fast, the economy has grown considerably faster. Between 1948 and 1976 the average annual rate of GDP growth was 7 percent; agriculture grew at 4 percent a year; manufacturing at 9 percent. There were large fluctuations around that trend. By 1975 income per capita reached US$1,000.

x. Structural change of the labor force and of relative sectoral output was considerable during the period 1950-70. The shares of agriculture in the labor force and in value added declined in the Northeast and even more in the Southeast. Correspondingly, manufacturing expanded its share in total value added. Labor productivity in manufacturing was 3.8 times that in agriculture in 1950. By 1960 this difference almost doubled to 7.5 and by 1970 increased further to 7.9. However, the regional shares in economic production remained relatively stable.

xi. The pattern of income distribution associated with the growth process appears to have worsened in the 1960s. The ratio of the mean income of the top 20 percent to the bottom 40 percent of the income-earning labor force went from 9 to 1 in 1960 to 12 to 1 in 1970. A detailed discussion of the census and other available income distribution data for Brazil, including the period since 1970, may be found in another World Bank report. 1/

xii. An enduring issue concerning Brazilian development is whether the dualistic nature of the economy might yield to the theoretical solution of eliminating dualism by having the modern sector eventually absorb all low-skilled labor from the traditional sector. As a first step in analyzing the potential for such labor absorption, value added and employment can be allocated between two sectors -- the modern sector and a residual sector for the rest of the economy. The modern sector, which is broadly defined in this report, included 85 percent of value added and 45 percent of employment in 1970. In the 1960s employment in that sector grew at 3.7 percent a year; total employment grew at 2.7 percent. A projection of these rates yields the result that the modern sector would absorb the total labor force in seventy-eight years -- that is, in 2048. It is useful to compare two related rates of change: the rate of absorption into the modern sector of low-skilled workers (less than four years primary education) of 2.2 percent a year during the 1960s; and the natural rate of growth of the population in the lower income groups from which the low-skilled labor force is drawn. Unless individuals from the lower income groups acquire a full four years of primary education, which is necessary to move them to the high-skilled category, these rates imply that the low-skilled labor force would never be absorbed.

xiii. General health conditions as measured by life expectancy and infant mortality appear to be worse in Brazil than in countries having similar levels of per capita GNP. Between regions and income groups in Brazil, there are large differences in these indicators. Judging from the fragmentary information available, morbidity attributable to malaria, Chagas' disease, and schistosomiasis remains high within wide geographic areas. Of these three parasitic diseases, it appears that only malaria has been successfully contained. With respect to the number of physicians, nurses, and hospital beds per capita, Brazil compares favorably with other countries in its income class. As in most other countries, however, the quality and distribution of health services are uneven. Residents of the Southeast, urban areas, and higher income areas generally enjoy better health conditions than residents of other regions, rural areas, and the poor. Large portions of the population lack effective access to medical care, and this lack of access is the principal constraint on improving health conditions in Brazil.

dev. The nutritional status of a population is closely related to demographic factors and to the level of satisfaction of other basic needs. A lot more is known about the character and extent of malnutrition in Brazil than about its consequences. There nevertheless are strong indications that malnutrition is significant as a cause of child mortality and stunted physical development; many experts also believe that acute and prolonged malnutrition impedes full mental development and, hence, educational attainment and productivity. A study published by the Pan American Health Organization shows that 60 to 70 percent of all deaths of children under five are related to nutrition. That study also shows there is a strong interaction between malnutrition and infection; 60 to 75 percent of all deaths from infections and parasitic diseases have nutritional deficiency as an associated cause.

xv. The National Household Expenditure Study (ENDEF), conducted in 1974-75, is by far the most complete and carefully executed survey on nutrition and family expenditure ever done in Brazil. Data from this study suggest that malnutrition in Brazil is more widespread and severe than earlier analyses based on other sources had indicated: 21 percent of children under eighteen are estimated to have been suffering from malnutrition of the second or third degree (using the Gomez classification). In the Northeast the proportion was 30 percent, almost twice as high as in the Southeast. It is estimated that 17 percent of the Brazilian population had severe calorie deficits of more than 400 calories a person a day. Deficits of this magnitude are unmistakable evidence of serious nutritional problems. Further analysis based on the ENDEF data suggests that reliance on increases in income associated with current trends (that is, in the absence of massive income redistribution or changes in consumption habits) will not bring about rapid progress in reducing malnutrition.

xvi. Before the 1940s basic education in Brazil was restricted, and only a tiny fraction of the population advanced beyond the first few grades. In 1940 less than half the adult population claimed to have minimal reading skills. Enrollment expansion has since been very great, and literacy rates have grown markedly despite rapid population growth, particularly among
school-age groups. Although the educational situation in urban areas of the Southeast seems favorable by developing country standards, it is dismal elsewhere in the country, notably in the rural Northeast. In 1970 state-level literacy rates were about 80 percent in the urban Southeast, but only about 25 percent in the rural Northeast. For all Brazil, in rural areas only about 5 percent of the adult population had more than four years of schooling -- a conventional measure of functional literacy. Other indicators of basic education tell a similar story.

xvi. A massive literacy program (MOBRAL) has been under way since the early 1970s. According to MOBRAL data, the total number of participants in its program add up to a majority of adults classified as illiterate in 1970. Although such numbers greatly exaggerate the impact of the program on illiteracy, it is certain that reliable measures of literacy would stand higher in mid-1979 than in 1970.

xvii. Enrollment expansion has been much faster in secondary schools than in primary schools, although primary enrollment is still far from universal. The growth of higher education has been explosive since the 1960s, but the quality of instruction in most private universities has not kept up with the high standards of the best public universities. Although less dramatic in terms of growth, some nonformal vocational training programs, particularly the industrial and commercial training services, have steadily expanded their activities while sustaining, and in many cases improving, a long tradition of high quality instruction.

xviii. Rapid population growth has led to mounting demands for housing and such essential residential services as potable water and sanitary waste disposal. Deficiencies in these services, rather than in shelter, are the biggest housing problems Brazil faces today. Nevertheless only 75 percent of dwellings in 1970 were classified as "durable" according to a modest standard of durability. In that same year indoor plumbing was available in 33 percent of dwellings; sewerage connections or septic tanks in 27 percent. Although regional and rural-urban disparities in the availability of these services are still pronounced, progress since 1950 has been proportionately greater in those regions (the Northeast and Frontier) and areas (rural) lagging farthest behind in these services at that time. Brazil's below-average standing with respect to these services, as compared with other countries in the same per capita income class, reflects the low level of services around 1950, not its recent rate of progress.

Public Programs and Policies

xx. Until the early 1970s the official Brazilian policy on population was implicitly pronatalist. Since 1974 a more neutral stance has emerged, and there are hints that a more activist policy to slow population growth may be forthcoming as the problems of rapid population growth become increasingly evident, particularly in the face of slower rates of economic growth. But even if antinatalist policies were adopted tomorrow, it would take at least until the 1990s for those policies to have a substantial impact on population growth rates.
xxi. Brazil's public health sector increasingly favored the curative approach to health care, not the preventive, at least until the mid-1970s. Social security agencies have been established to provide curative health care, first in urban areas and more recently in rural areas. By 1975 almost 80 percent of the urban population and 40 to 60 percent of the rural population were so covered. Preventive health care, besides being more cost-effective in many instances, would be the only method for controlling mortality and avoiding the "curative" costs associated with endemic diseases for which no cures exist. The successful campaign against spinal meningitis in 1974-75 -- 81.7 million Brazilians were vaccinated in less than ten months -- shows that when a relatively cheap technology is available and political priority is high, Brazil's Ministry of Health can organize and administer rapid and effective programs of a preventive nature.

xxii. The implementation of two major new programs of preventive health care began in 1976. One aims at controlling schistosomiasis by epidemiological surveillance, chemotherapy, vector control, improvements in water supply and sanitation, sanitary education, and research. Its eventual success hinges on its ability to treat a proportion of the infested population large enough (probably above 80 percent) to control transmission. This task is likely to be extremely difficult. The other, the Program for Grass Roots Health and Sanitation Actions in the Northeast (PIASS), was established to provide greater primary health care for rural northeasterners. Its guiding principle is that many health problems can be dealt with at the community level by providing simple services, without recourse to expensive hospitalization in urban areas. These services are integrated with the more specialized services provided in urban medical centers. Shortages of qualified staff, difficulties of interagency coordination, and other problems of organization and management have delayed scheduled implementation. The experience PIASS gains is likely to influence future health policy, because the program is seen by many to be a promising model for a national rural health system.

xxiii. The principal issues facing the Brazilian public health sector are the inadequate coordination between government agencies responsible for health matters, the bias toward high-cost curative care, and the geographical concentration of facilities and manpower. Partly as a result of these factors, progress against certain endemic diseases, especially schistosomiasis and Chagas' disease, has been slower than expected.

xxiv. Assuring an adequate supply of food at affordable prices has been an ongoing concern of policymakers in postwar Brazil. Until recently there was no explicit nutrition policy. Consequently the critical relation between malnutrition and poverty was rarely discussed. Policies initiated in the mid-1970s recognized that malnutrition is most severe among the poor; direct government action to increase their food consumption was thus justified. The National Nutrition Program (PRONAN) is the most important new initiative to this end. The program attempts to alleviate malnutrition in the near term, by providing food supplements directly to needy groups, and to improve the long-term viability of small-scale food production in Brazil's poorer regions. It still is too early to assess PRONAN's effectiveness.
xxv. One way to promote better nutrition among the poor may be to reduce
the costs of "basic foods" accounting for a large share of their food expendi-
ture. Policies aimed at reducing the cost of producing, processing, and
marketing basic calorie-intensive foods could trigger an agricultural develop-
ment process with significant nutritional benefits. As in the direct provision
of diet supplements to the poor, their effectiveness is strongly influenced by
the degree to which the needy population is moved to fulfill calorie require-
ments rather than spend income for other purposes.

xxvi. Analysis of the ENDEF data reveals that food expenditure among
families in the bottom 20th percentile is only about half of their total
expenditure in urban areas and about 60 percent of their total expenditure
in rural areas. These shares tend to fall as family income rises. Another
finding is that families with large estimated calorie deficits spend about a
fifth of their food budget on meat and fish, despite the very high cost per
calorie compared with cereals. Meat and fish normally are important sources
of proteins and other nutrients. But when calorie deficits are large, most
protein from meat and fish is converted into energy, not body tissue. Strong
cultural factors undoubtedly play an important role in sustaining these
patterns, which apparently are nutritionally inefficient. Moreover substantial
proportions of lower income urban families own such consumer durables as
televisions, refrigerators, and blenders, but fall short of meeting calorie
requirements. These findings raise questions about the concept of "basic
human needs." For example, they indicate that at least some members of the
deprieved population consider the ownership of a television to be of higher
priority than the fulfillment of calorie requirements. Such an ordering of
priorities has adverse cost implications for any public effort to reduce
malnutrition through specific programs. Increasing the public awareness of
the nutritional consequences of consumption habits should thus be a part of
public nutrition policy.

xxvii. The allocation of public funds to education generally produces
subsidies that are positively related to the income of the student's family:
that is, families with the highest income receive the largest subsidies per
student, and vice versa. Certain aspects of this allocational pattern are to
be found throughout the world, but it seems that the pervasiveness and relative
magnitude of such perverse subsidies are unusually great in Brazil. The
allocation of federal education funds among states has tended on balance to
be redistributive, but this has not been true for other levels of government.
Within states, transfers benefit the most prosperous municipalities, and
individual municipalities spend more per student on the schools located in
their most affluent sections. The extent to which current patterns should be
modified, the ways to modify them, and the timetable for that modification are
among the most important issues of Brazilian education today.

xxviii. Another related set of policy issues concerns the growth at the
various educational levels. For example, one subject of debate is whether the
vertiginous rate of growth of higher education -- more than four times as
fast as primary education -- is justified when two-thirds of the school-age population still is not completing the four to five years of schooling considered necessary to achieving functional literacy. There certainly is a need for highly skilled leaders, managers, and other professionals. But the expansion of higher education at current rates is compromising its quality.

xxix. In 1964 the National Housing Bank (BNH) was established to finance housing, especially for the low-income population. The BNH has expanded its activities to include all kinds of urban infrastructure, especially water supply and sewerage after 1968. Today the BNH is better characterized as an urban development bank than as a housing bank. Throughout the period 1964-77 there was a marked tendency for goals to exceed achievements in the construction of low-income housing and all other types of housing.

xxx. Four basic institutional and economic factors underlie the relatively poor performance of the BNH in financing low-income housing. First, the high proportion of poor families means that a majority of urban families have not been able afford the kind of low-income housing financed by the BNH, at least until the advent in 1975 of a sites-and-services program. Second, the BNH does not receive any major funds for which it does not have to pay monetary correction and at least 3 percent interest. As a result, the possibilities are limited for direct BNH subsidization of low-income housing by charging lower-than-average interest rates to low-income borrowers. Third, land and construction costs have risen considerably faster than the general price index or the minimum wage, thus raising the real cost of housing. Fourth, many low-income housing companies, at least until 1973, were not financially viable and did not have the technical capacity to carry out large-scale operations.

xxxi. Government housing policy has not been unresponsive to these problems. Three measures adopted -- a new system of Treasury-financed subsidies, the sites-and-services program, and a new program for financing the purchase of construction materials by low-income borrowers -- have made housing finance more accessible to the poor. Together these measures represent a new approach to low-income housing, an approach that emphasizes the provision of water, sewerage, and electricity in prepared housing sites on which self-help housing can be constructed.

xxxii. The National Sanitation Plan (PLANASA), which sets national objectives for water supply and sanitary sewerage, was formulated and formally initiated by the BNH in 1971. Long-term objectives include the elimination of deficits in water supply and sanitary sewerage and the creation of new capacity to meet growing demand. The goal for water supply -- providing safe drinking water to at least 80 percent of the urban population in at least 80 percent of Brazilian municipalities and all nine metropolitan regions by 1980 -- may be within reach if a vigorous effort is maintained through 1980. Investments in sewerage are more complex and costly than those in water supply and have not received the same priority. BNH officials warn that meeting targets is more problematical for sewerage than for water supply. Furthermore the construction of a water or sewer network does not guarantee that it will be used, especially by the poor. For example, both the felt needs of the poor and their ability to pay the required rates may limit connections below network capacity.
As of early 1979 there was little organized public activity to provide housing, water supply, or sanitary waste disposal in truly rural areas, but some programs for water supply and latrine building were reaching small towns.

**The Future: Simulations**

Brazilian demographic projections prepared by the official statistical agency (IBGE) arrive at state-level population estimates by prorating nationally projected future growth according to each state's share in total growth in the period 1960-70. Alternative demographic simulations ("projections") for each of the three regions were done for this report. Far from being forecasts, they are intended as arithmetical exercises to answer questions of the sort, What-would-happen-if ...? The alternative simulations show that widely different assumptions on future paths of socioeconomic correlates of fertility and mortality, such as basic education and water supply, do not lead to much difference in the rate of population growth during the rest of this century or in the total population in 2000. The main reason is that differences in mortality and fertility between projections tend to cancel each other out in their effect on population growth. The largest difference in total population by 2000 is between the projection by IBGE (202 million) and that based on relatively pessimistic assumptions concerning the future evolution of coverage by social services (209 million), coverage which is an important determinant of mortality and fertility. Differences in population size across projections are concentrated in the younger age groups. If the projections were extended further into the future, the differences in total population would grow rapidly, and the differences in the ultimate size of the population would be very great.

When considered together with official targets for coverage by various social services and productive employment, the current policy toward population growth implies acceptance of the aggregate costs required to meet these objectives given the population increases associated with this policy. If a more activist population policy were adopted, the costs of meeting these social objectives would be lower. Alternatively, if the resources available to achieve these objectives were fixed, the time required would be shorter. Although the logic underlying these observations is elemental, the welfare tradeoffs they highlight are complex.

It is unlikely, no matter how hard Brazil may try to slow down population growth, that the population could be held below 200 million by the year 2000. In the twenty-first century, however, the results of an activist policy would become much more pronounced. Under a neutral policy, demographic theory and the experience of other countries strongly suggest that the Brazilian population would continue to grow at least until the second half of the twenty-first century and that it would not stop growing until a population of no less than about 300 million were reached. This figure is more than 2.5 times the estimated size of the population today. It is difficult to imagine how such a staggering increase in population could occur without detrimental effects to Brazil's ecological systems and hence to its environment.
What is the maximum plausible rate of absorbing low-skilled labor into a broadly defined modern sector of the economy over the period 1970-2000? Underlying this question is the current Brazilian debate about whether the growth strategy adopted in the past, which emphasizes investment in the modern sector, is inherently disequalizing. Growth itself is not in question, because increased output will help meet many national objectives. The employment and income distributions of the growth process are in question. A model developed in Annex II focuses on one aspect of "trickle-down" or "spill-over" effects from modern sector growth: the demand of that sector for low-skilled labor. The results obtained suggest that a strategy based on incentives to fast growth of the modern sector alone is unlikely to produce widespread increases in living standards directly through the employment of unskilled labor. Thus modern sector growth does not appear, by itself, to provide an answer to the employment problem the Brazilian economy will face in coming decades, even if that sector is very broadly defined. This conclusion suggests that policies designed to increase productivity in the traditional sector may be crucial in achieving more equitable socioeconomic development in Brazil.

Improving access of the poorer Brazilians to basic health services, sufficient food, basic education, adequate housing, safe water, and sanitary waste disposal can be regarded as raising basic consumption standards. Alternatively it can be regarded as investment in human resources. There is a heavy component of investment in basic consumption. When basic needs of workers are not met, their productivity tends to be below that of workers who are healthy, well fed, and adequately housed. Similarly, when the basic needs of children are not met, their learning capacity and future productivity are also impaired. But even if there were no investment component, it could be argued that the basic consumption needs of the entire population should be satisfied if possible.

Alternative simulations in Annexes III and IV seek to delimit probable upper and lower bounds for the degree to which the basic needs of the Brazilian population would be met for health care, nutrition, education, housing, water supply, and sewerage at various points through the year 2000. They also seek to delimit the cost in public resources of meeting these needs. The "baseline" demographic projections developed in Annex I -- regionally disaggregated projections designed to approximate the overall growth rate of the IBGE projections -- were used in making these simulations. The lower simulations (labeled "pessimistic") correspond to a 4 percent annual rate of GDP growth and a relatively modest program effort; the higher simulations (labeled "optimistic") to a 7 percent rate and strong program effort.

For each service considered, the simulations suggest that a national effort to meet certain minimum needs of the Brazilian population by the year 2000 would not impose an inordinate burden on public sector outlays. Is this true in the aggregate as well? The total cost for basic health care, nutrition, basic education, housing, water supply, and sewerage -- as estimated in the pessimistic and optimistic simulations of the period 1981-2000 -- in no case would exceed 5.6 percent of GDP for either decade. Faster economic growth would reduce the cost to less than 5 percent of GDP. In no case is full coverage of the target population attained from the outset, but the simulations are
based on seemingly plausible paths toward this goal. Progress generally is faster in the optimistic simulations than in the pessimistic. For the total costs, it is estimated that the maximum increase in taxation required for any simulation would be less than 2 percent of GDP.

xli. It must be stressed that the cost estimates include only public sector expenditure. The level of services provided generally is not the best possible, but a realistic approximation of what is "basic." Implementation rates are also constrained to realistic estimates of what is possible. Furthermore the relatively low total cost, when measured as a percentage of GDP, reflects the fact that GDP grows at 4 percent even in the pessimistic simulation, while population growth begins to slow from the current estimate of 2.8 percent. Finally, particularly in the optimistic simulations, 100 percent coverage for some services is achieved relatively early in the period. Once 100 percent coverage is attained, costs generally do not grow much faster than population. As a result, the total costs decline in relation to GDP.

xlii. Although these estimates of the possible costs involved are necessarily rough, they suggest that meeting the basic needs of Brazil's entire population by the end of this century is not essentially an economic or financial problem. The binding constraints are more likely to be organizational, staffing, and logistical bottlenecks, which could retard the pace of extending services, especially in rural areas. These are serious obstacles. Much remains to be learned about how to deal with them effectively. But if priority is given to basic needs, the main obstacles can probably be overcome.
I. INTRODUCTION AND OVERVIEW

A. Rationale

1. From 1968 through 1973 Brazil's per capita GDP grew at an average annual rate of more than 8 percent. By most standard measures of aggregate economic performance, the country made extraordinarily rapid progress during these years. But economic growth has slowed after the fourfold increase in petroleum prices in late 1973; inflation has accelerated. Social problems, such as high infant mortality, malnutrition, and lack of access to basic public services, still affect large proportions of the population. Public awareness that the fruits of the development process are being unevenly shared by rich and poor has increased. All these factors contribute to a new climate propitious for debate about development priorities.

2. Compared with the recent past, constraints on achieving widely held goals (e.g., continued rapid growth, greater income equality, poverty eradication, and fuller development of human resources) and the possible tradeoffs among them are now more clearly perceived. Interest is growing in distribu- tional aspects of development. Alternative development strategies for the future, once discussed only by small groups of intellectuals, now are widely debated in the press and within government, universities, trade associations, unions, and political groupings. This new climate has encouraged attempts inside and outside government to evaluate what has been achieved in the development process to date, and what remains to be accomplished.

3. Although a wide variety of statistical materials and relevant research results are available in Brazil, it is not easy to assemble them in one place or to evaluate their quality. Often the statistics are not accompanied by analysis or vice versa. Regional disaggregation is not always possible along consistent lines. Information on government programs is frequently divorced from their historical context, and to discern the interrelation between different programs and policies is difficult. The situation is particularly confusing for public services and programs aimed at meeting basic needs (e.g., education, health care, nutrition, water supply, basic sanitation, and housing). Despite considerable improvements in the quantity and quality of statistics available, indicators of quantitative and qualitative progress in these areas still leave much to be desired; demographic and financial data necessary to evaluate them are hard to come by. When it comes to designing future development strategies and estimating their costs, data problems become still more severe.

4. Since 1974, the Brazilian government has given investment in basic public services greater emphasis. For example, investment in water supply and sewerage under the National Sanitation Plan (PLANASA) has been accelerated; an urban sites and services program and a construction materials loan program have been launched to allow low-cost, self-help housing construction; and a new program has been established to provide basic health care in the poverty stricken rural Northeast. Other programs, such as the POLONORDESTE integrated rural development projects in the Northeast (which normally include components such as health, education, sanitation, and water supply as well as agricultural
credit and extension) and the National Nutrition Program (PRONAN) are also designed to help meet basic needs of the poor while increasing their productivity.

B. Objectives

5. The present historical and prospective analysis of population dynamics in Brazil and the provision of basic services -- or, looked at from a somewhat different point of view, the development of human resources -- aims at facilitating the search for efficient policies and programs. More specific and proximate objectives of this report are:

(a) to assess the historical evolution of various socioeconomic indicators disaggregated among three large regions characterized by considerable economic and demographic disparities: the low income Northeast, the higher income Southeast, and the sparsely-populated Frontier (see map); 1/

(b) to relate the evolution of these indicators to a broader historical framework of population and development in Brazil, particularly since World War II;

(c) to analyze available data and estimate quantitative relations between variables pertaining to:
- human resource development or, looked at from a somewhat different perspective, basic needs satisfaction;
- population dynamics; and
- labor markets, income distribution, and basic macroeconomic variables; and

(d) to articulate the quantitative relations mentioned in (c) above into simple simulation models to analyze the costs and outcomes of selected policy interventions over the coming decades.

1/ The Northeast is defined as the nine states normally assigned this label by the Brazilian statistical agency, the Southeast merges the regions normally called the Southeast (Minas Gerais, Espirito Santo, Rio de Janeiro, and Sao Paulo) and the South (Parana, Santa Catarina, and Rio Grande do Sul), while the Frontier includes the remainder of Brazil geographically dominated by the Amazon Basin and usually referred to as the Central West and North. We believe this three region breakdown captures the fundamental regional economic and demographic disparities which characterize Brazil. A finer regional breakdown was used only infrequently in the report since it multiplies the number of statistics and projections (and, hence, costs), without contributing correspondingly large benefits to the analysis.
For (d), one important class of policy variables considered is the proportion of GDP channeled through the public sector for various types of human resource investment or, alternatively, the satisfaction of basic consumption needs. The administrative and other institutional changes as well as financial resources required in an effort to meet these needs on a broader scale is also considered.

C. Structure of the Report

6. This summary report presents the highlights of the more detailed analyses and simulations contained in four separate annexes, each of which is considerably longer than the present volume. Annex I deals with population; Annex II with employment, earnings, and income distribution; Annex III with health, nutrition, and education; and Annex IV with housing, water supply, and sewerage. Each of the annexes contains a considerable amount of statistical material and explanations of the assumptions, methods, and arguments underlying the analysis contained in this summary report.

7. The summary report itself is divided into three major sections in addition to this introduction. The first deals with historical trends and regularities. It begins with the demographic setting, and then proceeds to review trends in employment, earnings, and income distribution, including an attempt to define empirically the "modern sector" of the Brazilian economy. It concludes with a review of the available evidence concerning progress in the areas of health, nutrition, education, housing, water supply, and sewerage. The second section treats the evolution of government policies and programs in these areas over the postwar period, with particular emphasis on the years since 1964. Population policy is discussed, and then policies and programs in the social sectors mentioned above. The third and final section deals with projections (simulations) through the year 2000.

8. Four regionalized demographic projections are presented. The first, called the "baseline projection," attempts to update and explore in detail the assumptions implicit in the official Brazil-wide demographic projections. The second and third trace the likely demographic impact of two widely diverging paths in the coverage of certain social services -- such as basic education and water supply -- which have been found to be strongly associated with fertility and mortality in Brazil (see Annex I). The fourth simulation explores the effects of accelerated interregional migration out of the most economically depressed part of Brazil, the Northeast. Next, a projection framework developed in Annex II is used to explore the potential for low skill labor absorption by the modern sector of the economy under alternative aggregate growth assumptions. Finally, alternative simulations are presented which seek to delimit probable upper and lower bounds for the degree to which the Brazilian population's basic needs for health care, nutrition, education, housing, water supply, and sewerage would be met at various points in time through the year 2000, and the cost in public resources of meeting these needs. The "baseline" demographic projections are used in making these simulations. The lower simulations, labeled "pessimistic," correspond to a
4 percent annual GDP growth rate and a relatively modest program effort; the higher simulations, labeled "optimistic," to a 7 percent GDP growth rate and a somewhat higher priority assigned to these sectors in development policy. Such simulations are not forecasts; they are intended as upper and lower bounds of what may reasonably be expected. The actual outcome is likely to fall somewhere between the optimistic and pessimistic simulations.

D. A Note on the Definition of Basic Needs

9. Minimum human requirements for health care, nutrition, shelter, water, and excreta disposal are at least to some extent subject to scientific definition. But what is considered "a basic need" is also a social phenomenon. For example, a diet meeting all scientific requirements of adequacy may be neither palatable nor socially acceptable if it does not contain foods customarily eaten by a given population. Likewise, housing providing shelter from the elements may not meet socially defined standards of appearance and comfort.

10. In defining basic needs for the purpose of this report, we have sought to balance technical and social criteria. In general, we sought to give our definitions operational content by basing them on existing government programs, some of them experimental, or on survey research combined with a scientific definition of minimum requirements for normal human development. In this way we were able to estimate costs of satisfying basic needs, costs which are based on Brazilian experience. We are sensitive to the criticism that basic needs cannot be defined strictly objectively, "needs" expressing psychological phenomena having social and cultural roots. But we believe that it is possible and useful to write a report of this kind even in the absence of a survey finding out what the population itself considers "basic needs" even though such an exercise would also be extremely useful.

11. Finally, we have sought to flag certain definition problems which merit further investigation and debate. For example, again taking an example from nutrition, the available expenditure survey data suggests that Brazilians consider many other needs more basic than meeting their calorie requirements. As a result, (scientifically defined) requirements are not met until a Brazilian family is well above the median of the total expenditure distribution for most subregions. A basic issue arises here concerning tastes and preferences, since they are subject to change through education. How much public intervention is acceptable in the formation of dietary habits is clearly a political question, which may have important economic consequences. The Brazilian data suggest that the nutritional status of Brazilian families could be greatly improved, with a major impact on health, by modifying the way Brazilians spend their incomes, even if the amount spent on food were not increased. We therefore, suggest further research to confirm or reject our tentative findings and highlight the economic implications of alternative definitions of needs.
II. HISTORICAL TRENDS AND REGULARITIES

A. Population and Development in Brazil: The Demographic Setting

12. Brazilian concern for having sufficient population to control a vast national territory can be traced to colonial times. Since World War II, this concern has been reinforced by the view that a large population, combined with its continental size and a commensurably large national product, would enhance Brazil's position as an emerging world power. Fulfillment of these aspirations for a large population has proceeded at a rapid pace throughout this century. Population growth is likely to continue at a brisk, if gradually slowing rate well into the next century.

13. The path of Brazilian growth -- and its demographic components of fertility, mortality, and migration -- has been crucially influenced by the country's historical pattern of economic and social development. Conversely, population factors have helped shape Brazilian economic history. On a less grand, yet no less important scope, differential access across population groups to certain basic fruits of development -- goods and services to satisfy basic human needs -- have strongly affected their demographic experience. Higher out-migration and mortality rates among the relatively least advantaged groups in Brazil are two such examples. In turn, this different demographic experience across population groups feeds back into the socio-economic realm. For instance, the rapid inflow of rural migrants into urban areas aggravates stress on the infrastructure of urban services.

14. For a brief review of the broad associations of Brazil's demographic development with major features of the country's economic history from colonial times up to World War II, the reader is referred to Annex I. The present section summarizes the salient features of Brazil's demographic evolution from the 1940s to the present and relates them to socio-economic developments.

1. Demographics

15. From a total of 17 million in 1900, Brazil's population has grown to about 117 million in mid-1978, making it the sixth most populous country in the world. With an annual growth rate of 2.8 percent, it is currently adding more than 3.3 million persons to its population each year. This represents more than a third of Latin America's contribution to world population growth.

16. From 2.3 percent per year in the 1940s, Brazil's rate of population growth accelerated to 3.0 percent per year in the 1950s and remained virtually unchanged at about 2.9 percent per year in the 1960s. Demographic projections indicate that population growth for the 1970s may slow another notch to about 2.8 percent per year and continue to ease gradually towards a range of 2.2-2.4 percent per year by the end of this century. Total population by the year 2000 would lie between 202 and 209 million. Although demographic projections beyond 2000 become increasingly speculative, they indicate a high likelihood that Brazil's total population will continue to grow well into the 21st century and attain a size of no less than 2.5 times its current size.
17. Rapid as Brazil's total population growth has been during recent decades, its urban population has been increasing much faster. In the 1950s, urban areas grew almost 80 percent faster than total population; and in the 1960s more than 70 percent faster. The gap between the two rates of growth is almost certain to persist, in a converging pattern, throughout the rest of the century. From an urban share of 32 percent in total population in 1950 and 56 percent in 1970, this share is projected to lie between 70-81 percent by the year 2000, the current urban share of most OECD countries.

18. Population growth since 1950 has proceeded at widely diverging rates across the three major regions distinguished in this report. Taking extreme values among regions, population grew almost 90 percent faster in the Frontier than in the Northeast -- in the 1960s, more than twice as fast. Regional demographic projections indicate that the Frontier will increase its share of national population from less than 10 percent in 1970 to between 12 percent and 15 percent in the year 2000. At the other extreme, the Northeast's share is projected to decline from 30 percent in 1970 to between 22 and 28 percent in the year 2000. Thus the Southeast is projected to retain the bulk of the Brazilian population for the remainder of this century. Similarly urbanization rates in the Frontier have been much faster than elsewhere: above 7 percent a year in both the 1950s and 1960s -- compared with less than 5 percent in the Northeast.

19. The virtual stability of Brazil's population growth rate between the 1950s and 1960s was the result of commensurate declines in both its birth and death rates throughout the 20 year period -- international migration having been a negligible demographic factor since the 1940s. The crude birth rate fell from 46 to 41 per thousand between the periods 1950-54 to 1965-69, while the crude death rate fell from 17 to 12 per thousand. Recent (and unofficial) estimates of more refined measures of fertility and mortality that abstract from the effect of changing age composition on these crude indices, however, indicate that the former (measured by the total fertility rate) declined only slightly -- by less than 2 percent -- between the 1950s and the 1960s, while life expectancy rose by more than a third to 56 years. According to these same estimates, regional disaggregation of the evolution of the national mortality and fertility rates reveals much sharper differences.

20. In the Southeast, life expectancy rose from 56 years in the 1950s to 63 years in the 1960s. In the Northeast, it rose from 43 to 48 years; and in the Frontier from 47 to 55 years. Published estimates based on official death registration statistics, nevertheless, show substantially increasing infant mortality rates in certain metropolitan areas during the 1960s and early 1970s, most notably in Sao Paulo. But there is controversy on the interpretation of these data. Some analysts argue that the rising trends do not reflect actual increases in infant mortality, but are due to measurement problems. Among those who accept the reliability of the data, no consensus has yet been reached concerning the reasons behind the rising (and more recently, falling) infant mortality rates.

1/ The definition of this and other demographic terms may be found in a glossary at the beginning of Annex I.
21. While the fertility rate in the Southeast fell by almost 4 percent between the 1950s and the 1960s, and by almost 3 percent in the Frontier, it rose by almost this same percentage in the Northeast. Regional fertility estimates going back to the 1930s trace a monotonically declining trend for the Southeast, a similarly rising one for the Northeast, and an irregularly flat profile for the Frontier. Thus, to the crucial question of whether Brazil had entered into the sustained fertility decline phase of the demographic transition by the year of its last census (1970), the best answer seems to be one that is not strictly congruent; namely, that for the Southeast it had; for the Northeast it had not; and for the Frontier, it is unclear. There is reason to believe, however, that barring an unforeseen reversal of well-affirmed socio-economic development trends in Brazil, Northeastern fertility is likely to have peaked during the 1970s, and the Frontier’s to have commenced its downward path. The key to these prospects lies in the presence of seemingly powerful interrelations among fertility, mortality, and certain socio-economic development indices in Brazil.

Sources of Urban Growth: 1960-70

22. Overall, rural-urban migration in the 1960-70 period is estimated at 9.4 million, or 46 percent of Brazil’s 20.2 million urban population growth in the decade 1960-70 — and about 24 percent of the rural population in 1960. The contribution of migration to urban growth is greater in the South-eastern states, where natural increase is lower. Contrary to the popular notion that the Northeast has been the main source of migrants to Southeastern cities, it turns out that rural areas in the Southeast region itself accounted for about 90 percent of urban growth in the Southeast. (Rural areas of the Southeast, however, were also recipients of some interregional migrants, most of whom probably came from the Northeast.) Among the nine largest metropolitan areas in Brazil, migration’s share to their intercensal growth ranged from about a third in Belem to over 80 percent in Porto Alegre. Additional evidence suggests that this migration share has been declining during the 1970s in Rio de Janeiro and Sao Paulo metropolitan areas. In sum, the demographic evidence supports the view that migration remains a very powerful factor in Brazilian urban growth, particularly in the more highly industrialized Southeastern region. Nevertheless, interregional migration plays a rather minor role in this region’s urban growth.

Patterns in Age and Sex Composition

23. Although the age and sex composition of the Brazilian population shows only modest change between 1950 and 1970, there were significant differences across regions in the earlier year, and some of them widened during the 20-year interval. Nationwide, the share of 0-14 year olds in total population remained virtually constant at about 42 percent (compared with about 28 percent for the US in 1970); those in working ages 15-64, at around 56 percent (about 62 percent in the US); those 65 and over, at around 3 percent (about 10 percent for the US). The overall sex composition was also stable at roughly equal numbers in each group. Thus, owing largely to the sustained high fertility pattern of growth during the current century, the Brazilian population’s age composition has been heavily weighted by children whose consumption of national
income far outweighs their contribution to production. According to the demographic simulations, the share of 0-14 year olds by the year 2000 will have somewhat declined to between 35 and 37 percent of the total.

24. Most notable interregional differences in the age-sex composition, both in 1950 and in 1970, occur between the more demographically advanced Southeast on one hand and the Northeast and Frontier on the other. For example, in 1950, the share of 0-14 year olds in the Northeast and Frontier was almost 10 percent higher than in the Southeast. By 1970, it was about 14 percent higher. According to the demographic simulations, this difference between the Northeast and Southeast will have further increased to within the range of 19 to 23 percent. Thus, this "demographic burden" to net economic production has been heaviest in the poorest Northeast region, and will likely become even heavier through the duration of this century.

25. Age-and sex-selectivity of migrants out of the Northeast prior to 1970 further augmented its demographic dependency problem. Those who left were more likely to be producers of market goods and services (working-age males). Those who stayed were more likely to be either almost pure consumers (children and the very old) or working age women, whose production activities have not been typically market-oriented. In contrast, migration selectivity into the Frontier has favored working-age males.

2. Migration and Regional Inequality

26. By transferring labor from the lowest wage area of Brazil, the rural Northeast, to the highest wage area, the urban Southeast, and to other intermediate wage areas -- particularly the rural Frontier, migration has played an important role in dampening interregional wage differentials during past decades. There are some indications that longer term patterns may be changing. This dampening effect appears strongest in the sectors absorbing the greatest share of migrants: services and agriculture. In manufacturing, it may have been swamped by other factors. Northeast to Southeast migration flows during the 1960s were lower than in the 1950s and a larger share of this reduced flow went into the rural Southeast.

27. The initial surge of migration to colonize virgin land in the Frontier during the 1960s seems to have undergone substantial retrenchment in recent years. Former expectations concerning the capacity of organized Amazon colonization to provide an alternative escape valve for population pressure in the Northeast have recently been revised downward. The costs of establishing unskilled migrants in the Amazonian setting were grossly underestimated. Rapid spontaneous migration to the Central West region (Goias, Mato Grosso the Federal District) and the territory of Rondonia continues, however.

3. Urban Growth and Urban Problems

28. Migration into the largest metropolitan areas seems to have been an important factor in the closely related problem of deficits in basic urban services, such as residential access to piped water. In the six largest Brazilian metropolitan areas in 1970, recent migrants were a much
higher share of the population located in peripheral municipalities than in the municipality containing the seat of state government. Correspondingly the percentage of dwellings with piped water in these metropolitan areas was substantially lower in their migrant-heavy peripheral municipalities in all six cases.

29. Besides migration, there are other important interrelations between demographic characteristics, income, and other indices of socio-economic status discernible in Brazilian data.

4. Demographic Variables and Income

30. Although increases in school attendance have reduced activity rates for younger workers in recent years, the share of working individuals in these ages reporting earnings has been rising as a result of declines in the proportion of unpaid family workers. This increased proportion of younger earners (with lower average earnings) has tended to aggravate income inequality as measured by reported earnings. The rising share of female earners has had a similar effect, since increased female labor force participation has been concentrated in ages 15-24. In part, these findings reflect statistical problems relating to the adequate measurement of earnings in a changing economy.

31. More fundamental relations of demographic factors to income patterns must be sought at the household level. For example, are there systematic differences between household income and household size? Supposing an inverse relation prevails, to what extent does this reflect that lower income households on average have fewer income earners? To what extent does this reflect that income earners in lower income households earn less?

32. A study of the Belo Horizonte metropolitan area shed light on these issues. Results show that household size and household income (per adult equivalent consumer) are inversely related. However, households in the poorest of four income groups have fewer earners at lower average earnings than the rest. In addition, children are a higher proportion of dependents in poor households. Additional results indicate that despite a large number of adults (potential earners), poor families have the lowest average number of actual earners per household. Moreover, earnings of heads of poorer households do not increase as much with age as those of higher income groups.

5. Income and Other Mortality Correlates

33. Effects of economic factors on demographic variables are indicated by empirical associations between indices of income and mortality. One such broad association was suggested above when noting the historical evolution of life expectancy across regions. Life expectancy in the higher income South-eastern region exceeded that of the economically lagging Northeast by 15 years in the 1960s. Other evidence indicates that:

- Malnutrition, a widely recognized factor in infant mortality, shows a regional pattern of severity that conforms to Brazil's pattern of infant mortality.
Using the 1970 census data for 21 states and 10 regions, in Annex II it is estimated that, for a given income level, a 10 percent increase in the share of the bottom 40 percent of the (income earning) labor force is associated with infant mortality declines of 11-12 percent.

Members of households reporting the rough equivalent of less than US$50 of monthly money income in the 1970 census had a life expectancy averaging 12 years less than their counterparts in households reporting more than US$160.

When the same categories are broken down by urban-rural household location, the corresponding differences in life expectancy are: for urban locations, 16, and for rural locations, 9 years advantage respectively for the higher income households.

Further disaggregating the urban category, life expectancy averaged 40 years for the low income urban households in five central Northeastern states (comprising the bottom 47 percent of the urban income distribution in those states) and 67 years in Rio Grande do Sul (the bottom 11 percent of the distribution). By way of comparison, UN estimates of current life expectancy are 46 years for Bangladesh and 73 years for the United States.

6. Income and Other Fertility Correlates

Some associations between income and fertility are also found in Brazilian data. Interregional fertility differences mentioned above, show that the fertility rate in the Northeast (7.8) was 2.7 children per woman higher than in the higher income Southeast. Again using the 1970 census data for 21 states and 10 regions, in Annex II it is estimated that, for a given income level, a 10 percent increase in the share of the bottom 40 percent of the (income earning) labor force is associated with decline in fertility of 3.2-3.9 percent. Other evidence on socio-economic correlates of fertility at the household or individual level based on data from the 1970 census, where fertility is measured by two different indices of cumulative births to women in particular groups, is summarized below:

Income

Urban women in the lowest of three income classes had over 40 percent higher fertility than those in the highest group; in the case of rural women, there is no difference between the same two income groups, and it is almost 20 percent higher for the middle income group. Controlling for income, rural women show higher fertility than urban women, with the greatest relative difference, 60 percent, in the highest income group.

Years of Schooling

36. Associations between women's years of schooling and their fertility in both urban and rural areas are the most powerful among the available tabulations. The decline of fertility across six categories of ascending years of schooling is sharp and ever-decreasing in all cases. For example, one of the fertility indices for women without schooling is 5.5 times greater than for those with 13 to 17 years of schooling in urban areas. The corresponding multiple in rural areas is 4.7. Urban-rural differences within each years of schooling group are much narrower than when controlling for household income. The widest relative difference among those reported is less than 15 percent -- for women with 4-5 years of schooling.

Labor Market Status

37. For urban women classified as out of the labor force, fertility is more than twice that of their (urban) counterparts in the labor force. Looking at fertility across six occupational categories for urban women reveals that fertility is more than twice as great for urban women engaged in agricultural and related occupations (an atypical situation) than for those engaged in manufacturing and personal services; and around three times as great as for those engaged in commerce, or doing administrative, technical, or artistic work. Finally, among these same working women there is no strong association between their fertility and their labor earnings.

Conclusions

38. This evidence on socioeconomic correlates of fertility at the household level strongly suggests that if recent patterns of association remain reasonably stable over time, and if the ongoing processes toward greater urbanization, female education, and female modern sector employment continue at rates comparable to those in the 1960s and 1970s, fertility will probably decline in the coming decades even in the absence of a more activist official population policy.

39. Given that both mortality and fertility are higher among the poor, an intriguing question is whether their rate of natural increase differs from that of more affluent families. Unfortunately no direct estimates based on individual household data are available to answer this question. Nevertheless analysis of 1970 census data indicate that the differential in fertility across income groups is greater than in mortality. The work reported in Annex II based on 1970 census (cross-section) data at the state level suggests that the growth of the population with a per capita monetary income on the order of US$90 (in 1970 prices and exchange rates) is about 3.5 percent yearly, while for the population with an income of about US$900, it is below 2 percent. Although caution is required in converting the available measures of total fertility and life expectancy into rates of natural increase, these results suggest that the natural increase of the low income population has been greater.
B. Employment, Earnings, and Income Distribution

40. This section summarizes the evidence on long run changes in the structure of output, the labor force, and the distribution of income contained in Annex II. The statistical sources used are the Demographic Censuses and the National Accounts.

1. Long Term Changes in Economic Structure

41. In 1975 income per capita in Brazil reached US$1,000. Over the period 1948-1976, the economy grew at an average rate of 7 percent, with a large variability around that mean. The average growth rate in agriculture was 4 percent; that in industry, 9 percent. Over the period 1940-1970, the Brazilian population grew from 41 to 93 million, at a yearly rate of 2.75 percent.

42. Associated with this fast growth, there has been a profound change in the structure of the labor force and value added. In 1950, 60 percent of the Brazilian labor force was in agriculture, and it generated 25 percent of value added. In 1970 the corresponding percentages were 44 and 10.

43. Regional disparities in the Brazilian economy are well known. In 1970, at least three fourths of output (net domestic product at factor cost) originated in the Southeast, which had 60 percent of the people; 11 percent of output originated in the Northeast, which had 30 percent of the people. Regions have markedly different characteristics in the structure and trends of output and labor force by sector.

44. In 1970 the Northeast had 63 percent of its labor force in agriculture, down from 79 percent in 1950 (a decline of 16 percentage points). In 1970 the Southeast had 35 percent of the labor force in agriculture, down from 60 percent in 1950 (a decline of 25 percentage points). This evolution of the sectoral structure of the labor force by region is indicative of faster growth and structural change in the Southeast. Thirteen out of the 16 percentage points decline in the Northeast was picked up by services; while 15 out of the 25 percentage points decline in the Southeast went to services and the rest to industry.

45. Regions also differ in structure and trends in value added. In 1970 the Northeast generated 19 percent of its value added from agriculture, down from 35 percent in 1950 (a decline of 16 percentage points). The corresponding percentages in the Southeast are 9 and 24 -- a decline of 15 percentage points. In the Northeast, services was the economic activity picking up most of the decline (15 out of 16 percentage points). In the Southeast, Industry picked up 10 of the 15 percentage points. The rate of industrialization was, therefore, much faster in the Southeast over the period 1950-1970.

46. Over the period 1940-1970 there was a substantial migration out of the Northeast to the Southeast and increasingly to the Frontier; the Northeast's share in the total population declined from 35 to 30 percent;
in the total labor force from 34 to 28 percent. As a result of these migration flows, the regional structure of value added per capita has been relatively constant, despite large differences in regional economic performance. The ratio of Southeast to Northeast value added per capita was roughly 3 to 1 over the period 1950-1970.

47. The structure of value added per worker (which is relatively stable across regions over time) sharply diverges by sector over time. In 1950 value added per worker was 4 times as much in industry as in agriculture; in 1970, it was 8 times as much. The diverging trend is also observed in services, relative to agriculture: 7 times as much in 1970. Dualism as a process of uneven, unequalizing growth would tend to produce these results. The diverging trend is more pronounced in the Southeast.

2. Earnings and Income Distribution

48. There is no immediate link between changes in the level and composition of output by sector and region and the associated distribution of income to factors of production or to people. Some distributional statistics from the national accounts and demographic censuses are given below.

49. According to the national accounts, the share of labor in non-agricultural activities declines from 57 to 52 percent from 1949 to 1973. This decline resulted from two different trends: the share increased from 40 to 45 percent in industry and it declined from 65 to 57 percent in services. It is important to note that the labor shares for manufacturing reported in industrial censuses are very different from those given in the national accounts.

50. According to the demographic census, the ratio of mean incomes of the upper 20 to the bottom 40 percent of the (income earning) labor force was about 9 to 1 in 1960 and 12 to 1 in 1970. 1/

3. Definition of the Modern Sector of the Economy

51. Aggregative analyses of employment, growth, and distribution in the Brazilian economy should take into account the above evidence on large differences in the structure of value added and the labor force and how the sectoral differentials in the average productivity of labor increased over time. As a first step in analyzing the potential of the Brazilian economy for low skilled labor absorption, value added and the labor force may be allocated between two sectors -- the "modern" sector and a residual one.

52. The modern sector is broadly defined, as an upper limit of plausible definitions. It includes all members of the labor force earning more than Cr$150 a month in 1970 prices (US$400 a year at 1970 prices and exchange

1/ See "Income Distribution and Poverty in Brazil" a World Bank report by G. Pfeffermann and Richard Webb (forthcoming 1979) for an analysis of the census and other available income data, including for the 1970s. Large differences in the estimated cost of adequate diets between urban and rural areas as well as smaller differences between regions reported in Annex III and summarized on page 19 below suggest that income comparisons not adjusted for cost of living differentials may present serious difficulties of interpretation.
rates) 1/ — 13.5 million workers in 1970, (45 percent of the labor force). Of them, 9.4 million were low skilled (i.e., they had less than full primary education, according to a schooling definition of skill levels). The sector generated about 85 percent of Brazilian value added. Its labor force grew at the rate of 3.7 percent during the sixties, while the total Brazilian labor force grew at 2.7 percent. If those rates continue, the modern sector would absorb the total labor force in 78 years.

53. It is useful to compare two other rates: the rate of low skill labor absorption in the modern sector (2.2 percent per year during the sixties) and the natural rate of growth of the low skill labor force (above 3 percent during the same period). At those rates, the low skill labor force would never be absorbed.

C. General Health Conditions

54. On the basis of estimates presented in the World Bank, World Tables 1976, it appears that general health conditions in Brazil are poor compared to countries at similar per capita GNP levels. Though the life expectancy in 1970 given in this source was slightly higher than the group average (63.0 years compared with 61.4 years), the infant mortality rate was nearly twice as high (110 compared with 55.6). 2/ Both indicators have substantially improved in recent decades, but significant interregional and income class differences still persist. As of 1960-70 the estimates presented in Annex I show life expectancy in the Southeast to have been 15 years greater than in the Northeast, while the infant mortality rate in the Northeast was two thirds higher than that prevailing in the Southeast. Special census tabulations show that life expectancies vary by more than 12 years for the highest and lowest income groups.

55. Patterns of mortality (and by implication of morbidity) markedly differ from region to region. The Northeast and Frontier exhibit the classical characteristics of underdevelopment: a high proportion of total deaths occurring in children under five years of age, and high mortality due to infectious and parasitic diseases and perinatal causes. Mortality patterns in the Southeast, in contrast, are closer to those observed in developed nations, where a relatively large proportion of deaths occur after 55 years of age, and the leading causes of death are diseases of the circulatory system and neoplasms (tumors). Further, data on proportional mortality rates attributable to infectious and parasitic diseases—when disaggregated into those reducible through immunizations (e.g., tuberculosis, diphtheria, polio, smallpox, measles, measles)

1/ Roughly twelve monthly minimum wages in 1970. The average minimum wage for January-December 1970 was Cr$177 in Rio de Janeiro and Sao Paulo and 136 in Recife and Salvador.

2/ The Brazil average of 56 years given on page 11 above is for the decade of the 1960s, not for 1970. Nevertheless, the estimates presented in Annex I are not consistent with that presented in World Tables 1976. See the footnote on pages 9 and 10 of Annex I, for an explanation.
whooping cough) and through improved basic sanitation (e.g., typhoid, dysentery, enteritis, plague, malaria)—indicate that about 80 percent of all deaths from infectious and parasitic diseases could be prevented by appropriate interventions. This relation varies little between major regions, though basic sanitation programs generally have a greater potential to reduce mortality than do immunizations. But basic sanitation is also more costly.

56. Aside from indirect evidence provided by mortality data, relatively little is known about the incidence of various diseases in Brazil. Judging from the fragmentary information available, morbidity attributable to malaria, Chagas' disease, and schistosomiasis remains high within wide geographic areas. Of these three parasitic diseases, it appears that only malaria has been successfully contained over the past three decades. Although the mosquitoes that transmit malaria are found in more than 80 percent of Brazil's territory (containing 40 percent of the national population) in 1978 less than 9 percent of the national population was exposed to the risk of malaria. The Ministry of Health foresees complete eradication by 1980 in all but the Amazon region.

57. Until recently, Chagas' disease (the American form of trypanosomiasis) and schistosomiasis received comparatively little official attention. Chagas' disease has been detected in most of the Atlantic coastal states, but the focal points of the disease appear to be the inland states of Minas Gerais and Goias, with 30 percent or more of the population infested in some municipios (counties). Because there is no known cure for this disease, government programs have been directed at reducing human exposure to the principal vector (a nocturnally active blood-sucking insect) by spraying and rural housing improvements (see Annex IV). The range of schistosomiasis, which like Chagas' disease is a debilitating and sometimes fatal affliction, is similar— it is endemic to all seaboard states from Para to Parana (except Piaui) plus Minas Gerais. Another similarity is that no control measure has yet proven effective in mass campaigns. Although inadequate statistical data prevent a clear determination, it is likely that important migratory flows from the Northeast to the Frontier have widened the disease's range in recent years. The control of schistosomiasis through improvements in sanitation, elimination of the principal vector (a fresh water snail), chemotherapy, education, and epidemiological surveillance is high on the Ministry of Health's list of priorities, although to date no control measure has proven effective in mass campaigns.

58. Although yellow fever, rabies, and plague have been virtually eliminated from Brazil, leprosy, trachoma, and especially tuberculosis continue to be endemic. However, there has been considerable progress in the control and cure of trachoma and tuberculosis over the postwar period. Spinal meningitis has always been endemic, but from time to time has assumed epidemic proportions. The most recent epidemic began in 1971 and was effectively halted during 1975 through a very effective campaign beginning in 1974 which resulted in the vaccination of 81.7 million Brazilians in less than ten months. This experience shows that when a relatively cheap technology suitable for mass campaigns is available and political priority is high, Brazil's Ministry of Health can organize and administer rapid and effective programs of a preventive nature. Progress has been slower if substantial in the National Immunization Program initiated in 1973 which includes measles, poliomyelitis, diptheria, whooping
cough, tetanus, and smallpox. In 1978 well over half the infant population was still not being reached by this program, in large part due to the lack of a broad and dense network of basic health facilities, especially in rural areas.

59. According to the census, there was one physician for every 2,167 Brazilians in 1970. This ratio is considerably better than average when viewed in a Third World context, but worse than the average prevailing in industrialized countries. The ratios of population per nursing person (nurses plus nursing auxiliaries) and population per hospital bed prevailing in Brazil also compare favorably with those of most developing countries. Nevertheless the quality and distribution of health services and personnel is uneven. As in many other countries, physicians and other health personnel show a marked locational preference for state capitals as opposed to smaller towns and rural areas. In addition, the health care system is far more developed in the industrial Southeast than in either the Northeast or the Frontier.

60. The available data strongly suggest that lack of access to medical care constitutes a formidable barrier to improved health conditions in Brazil. This problem seems to be most serious in the Frontier and Northeast, where the proportions of the population living in municipios without a resident physician were 21 and 16 percent, respectively. Income may be at least as important as location in determining who gets medical care, but no survey or other statistical evidence was found to this effect.

D. Nutritional Status of the Population

1. The Relationship among Nutrition, Other Basic Needs, and Economic Development

61. The nutritional status of a population is closely related to demographic factors and to the satisfaction of other basic needs. Indeed the interrelation between nutrition and family size, health, sanitation, shelter, and education are multiple. For example, poor sanitation is a major cause of gastrointestinal disturbances, which can diminish the body’s ability to assimilate what food is ingested. A child’s mental capacity and energy, and hence the capacity to learn, are affected by serious malnutrition. And, with any given family income, the larger the family, the higher the probability of malnutrition. Overcrowding of dwelling space and lack of such basic residential services as sewerage and potable water are sources of sanitation and health problems, which in turn may have adverse nutritional consequences. Unraveling and quantifying these complex interrelations is not easy.

62. Research on the consequences of malnutrition in Brazil is considerably less developed than that aimed at measuring its nature and magnitude. This situation is largely explained by the lack until recently of an appropriate data base, but also by methodological difficulties. Nevertheless there is strong indication that malnutrition is an important cause of child mortality and stunted physical development. It may also impede full mental development (and hence educational attainment and productivity), though the evidence on this point is not incontrovertible.
A study published by the Pan American Health Organization in 1973 showed that between 60 and 70 percent of all deaths of children under five years of age in the areas surveyed were nutrition-related, and even higher in the under one year age group. This study also documents that there is a strong interaction between malnutrition and infection, with 60-75 percent of all deaths from infectious and parasitic diseases having nutritional deficiency as an associated cause. Breastfeeding is declining in Brazil, as in many other countries, with negative nutritional consequences. These consequences are compounded by contaminated water supplies, unsanitary preparation of powdered milk or milk substitutes, and nutritionally harmful customs (e.g., substituting cassava gruel, lacking in any protein, for mothers' milk at age five to six weeks, a common practice in Northeast Brazil).

The Extent of Malnutrition

Malnutrition in Brazil has long been the subject of studies and concern by both Brazilian and foreign experts. But the National Household Expenditure Study (ENDEF) conducted in 1974-75 is by far the most complete and carefully executed survey on nutrition and family expenditure ever done in Brazil. Most of the analysis in this report is based on the early publications of the ENDEF and some unpublished ENDEF tabulations, though earlier national estimates based on food balance sheets and surveys conducted by the Getulio Vargas Foundation are reviewed along with some surveys which cover only a single city. When all the ENDEF results become available, it will be possible to find out a great deal more about the causes and consequences of malnutrition in Brazil. The analysis in this report concentrates on calorie malnutrition because numerous surveys, including the ENDEF, have shown that if calorie intake is adequate, protein requirements are almost always met given the foods normally consumed by Brazilians.

The ENDEF data show average per capita daily calorie consumption (food served on the plate) in 1975 of 2,208 in rural areas and 2,051 in urban areas, or 2,123 for Brazil as a whole. According to ENDEF estimates of calorie requirements, adjusted upward slightly for food not ingested, this would mean average surpluses of 151, 44, and 93 calories per capita per day for rural, urban, and all Brazilians respectively. But the preliminary ENDEF publications warn that these "minimum requirements" are "not optimal levels for promotion of a better nutritional state and much less for nutritional recovery." Since in this report requirements are needed which are suitable for projecting the needs of a healthy population, two other estimates of requirements by major region and urban/rural location were prepared using FAO/WHO guidelines. These estimates differ only with regard to the assumed weight of the population more than 12 years of age (the guidelines fix calorie requirements for children through age 12 independent of weight). The first, called FAO/WHO High, assumes that well-nourished Brazilians aged 20-39 have the standard weights used by FAO/WHO (65 kg for men and 55 kg for women).

Areas surveyed were Recife and certain urban, suburban, and rural areas of Sao Paulo state, including the capital.
The second, called FAO/WHO Low, is based on estimates of the weight of healthy Brazilian adults derived from the ENDEF anthropometric data. Both use the FAO/WHO recommendations for adjusting requirements for young adults to estimate requirements for older adults and teenagers. Both are adjusted by ENDEF estimates of food not ingested so as to be comparable to the ENDEF consumption data. The "baseline" demographic projections (see Annex I) were used to provide the age-sex breakdown of the population for urban and rural areas of the three regions necessary to make these alternative estimates.

66. By either of these new estimates, average daily consumption in Brazil is below requirements. Rather than a surplus, there is a deficit equivalent to a 9 percent or 5 percent shortfall, depending on whether the High or Low FAO/WHO requirements are used.

67. Using unpublished tabulations of normalized per capita consumption for 22 ENDEF subregions and 9 classes of global family expenditure, estimates of the number of people obtaining adequate diets (defined here as diets satisfying the FAO/WHO Low calorie requirements) and those with three levels of calorie deficits (0-200, 200-400, and more than 400 calories per day) were made. Only 33 percent of the 1975 Brazilian population met the FAO/WHO Low calorie requirements. This average hides strong (but not unexpected) regional and urban/rural differences—the low is 9 percent in the urban Northeast and the high 70 percent in the rural Southeast. Nineteen percent of all Brazilians had deficits under 200 calories per person per day the nutritional significance of which is highly debatable given the controversy among experts concerning the proper way to estimate requirements and the possibility of measurement errors. But another 31 percent of the population had moderate deficits in the 200-400 calories range which probably represent real nutritional problems. Finally, 17 percent of the population had deficits over 400 calories averaging 543 calories. These large deficits are unmistakable evidence of serious nutritional problems since they average 2.7 times a margin of error of 200 calories in deficit estimation. Twenty-nine percent of the population in the Northeast (49 percent in urban areas and 14 percent in rural areas), 9 percent in the Southeast, and 32 percent in the Frontier are estimated to be suffering from these serious deficits, which total over 10 billion calories per day.

68. ENDEF anthropometric data may be used to estimate the extent of malnutrition using the Gomez indexes (first degree malnutrition, 76-90 percent of normal weight for age; second degree malnutrition, 61-75 percent of normal weight; and third degree malnutrition, 60 percent of normal or less). From birth to 17 years of age, only 42 percent of all Brazilian children reached normal weights for their age. The corresponding figures are 32 percent in the Northeast, 48 percent in the Southeast, and 37 percent in the Frontier region. First degree malnutrition affected about 17 percent of Brazilian children from birth to six months of age (the period of maximum breast feeding), but increased to 40 percent two years after birth. For all children through age 17 the average was 37 percent and regional differences were small.

69. Nutritionists differ on the amount of harm caused to a child by mild malnutrition. But there is little debate concerning prolonged second degree malnutrition (as opposed to short bouts). It stunts growth, and the
growth deficit will be permanent if not made up before adolescence. Many experts also suspect that brain growth may also be impaired, with lasting effects on mental capacity, but this position is questioned by others. For all Brazil, 20 percent of children under 18 years of age are estimated to have been suffering from second degree malnutrition in 1975. The regional averages were 28 percent in the Northeast, 15 percent in the Southeast, and 23 percent in the Frontier. Third degree malnutrition usually leads to death. For this reason, and because the ENDEF excluded from final tabulations persons who were obviously ill or abnormal, only about 1 percent of the population under age 18 show up as being afflicted by third degree malnutrition.

70. The cost of adequate diets was estimated for each of the 22 ENDEF subregions by estimating the costs of the food mixes consumed and prices paid by people just meeting the FAO/WHO Low national average calorie requirements in each subregion. The unweighted average cost per person per year for these diets (called Type 1 diets) was US$289 for the nine metropolitan areas plus Brasilia, US$264 for the seven other urban subregions, and US$149 for the five rural subregions at the average prices and exchange rates of August 1974. The average costs of calorie-adequate diets composed of the mix of foods consumed at prices paid by families at the (lower) 20th percentile of the ENDEF subregional family expenditure distributions (Type 2 diets) for the same groupings of subregions were US$199, US$155, and US$137 respectively. As a control, calorie-adequate diets composed entirely of cereals and cereal derivatives (Type 3 diets) were also estimated.

71. The meaning of these adequate diet costs is better grasped if they are in the context of a poor family budget expressed in terms of the cost for feeding a Type 2 diet to a family of five measured in annualized Rio de Janeiro minimum wages (the minimum wage in Rio de Janeiro is the highest in Brazil). Only in the rural areas outside of Sao Paulo and the South (Parana, Santa Catarina, and Rio Grande do Sul) would this adequate "poor family's diet" cost less than one minimum wage. In fact, it is closer to two minimum wages in Rio de Janeiro, Sao Paulo, Porto Alegre, and Brasilia. The significant diet cost differences found between subregions even for Type 2 diets suggest that, at least as far as the food component of family expenditure is concerned, using national average income, wage, or expenditure data to identify the absolute or relative poor may be quite misleading, tending to underestimate the number of poor in high food cost areas and overestimate them in low food cost areas.

72. A preliminary analysis of family expenditure, calorie consumption, and durable goods ownership patterns at four points in the 22 ENDEF subregional distributions of global family expenditure shows some striking features. First is the relatively low proportion of total expenditure devoted to food purchases in urban areas. Even at the (lower) 20th percentile, the unweighted mean for the nine metropolitan areas and Brasilia was only 45 percent. For seven other urban subregions it was 53 percent, and for five rural subregions, 63 percent. The percentages tend to fall as one moves up the expenditure distribution, but much less in rural than in urban areas. In general, the analysis suggests that after deflating by food costs, the rural poor are still poorer than the urban poor, but better fed.
Another significant fact is that even families with large calorie deficits spend about one-fifth of their food budget on meat and fish, despite the very high cost of calories from these sources compared with cereals, for example. There are undoubtedly strong cultural factors underlying this phenomenon, and of course meat and fish are important sources of proteins and other nutrients as well as calories. But when calorie deficits are large, the ingestion of protein from meat and fish appears economically wasteful since most of the protein will be converted into energy rather than body tissue. The ENDEF data also suggest that for large numbers of poor and not so poor urban families, owning consumer durables such as television sets, refrigerators, blenders, and even automobiles may be preferred to meeting calorie requirements.

Perhaps the most significant conclusion which may be drawn from the preliminary analysis of Brazilian expenditure patterns is that unless consumption habits change, reliance on increases in income alone to improve the nutritional status of the poor will involve either massive transfers of income or allowing serious nutrition to persist well into the 21st century. This is because the elasticity of per capita calorie consumption with respect to per capita expenditure appears to be quite low—on the order of 0.2 for (lower) 20th percentile families in urban areas and 0.3 in rural areas—despite the fact that these families generally have deficits well above 400 calories per capita in urban areas and 300 per capita in rural areas.

The basic conclusion which emerges from the preliminary analysis of the ENDEF data is inescapable. Comparisons of the ENDEF food consumption data with requirements for a healthy Brazilian population, the growth patterns of Brazilian children with those of healthy children of similar ethnic background in other countries, and the ENDEF age-weight data with the normal standard using the Gomez classification all suggest that malnutrition in Brazil is more widespread and severe than earlier analyses based on food balance sheets or the family budget studies of the early 1960s had indicated. This conclusion is also supported by the estimates of the number of Brazilians with moderate and severe calorie deficits. The cost of calorie adequate diets for a family of five containing foods in the same proportions and at the same prices paid by the (lower) 20th percentile families in each ENDEF subregion, when measured in terms of the highest minimum wage prevailing in Brazil in August 1974 is such that except in some rural areas, at least one full minimum wage would have been required simply to feed the family adequately—in a number of urban areas the cost would have been close to two minimum wages. But the patterns of family expenditure, calorie consumption, and durable goods ownership revealed by the ENDEF data suggest that reliance on increases in income alone, without any massive income redistribution, will not allow rapid progress in reducing malnutrition.
E. Trends in Educational Indicators

76. During the period 1940-70 the share of the population aged 10 and over classified as "literate" grew from 43 percent to 67 percent. Progress was quite uneven between the three intervening decades and was substantially faster for women. Relative to the group average of 26 other countries in Brazil's per capita income class (70 percent), Brazil's adult literacy rate in 1970 was slightly lower. While this group average literacy rate increased by 19 percentage points between 1960 and 1970, Brazil increased its rate during the same period by only 6 percentage points -- less than one third of the group average increment. In absolute numbers, the 1960-70 net increase in Brazil's literate population among persons 10 years of age and older amounted to over 14 million. The total population in this age group, however, grew by an even larger amount. Thus, the absolute number of illiterates increased by almost 2.5 million.

77. The evolution of educational opportunities is reflected in the age distribution of literacy. In 1970, the literacy rate for the population aged 10-19 was around 73 percent. The age-group rates decline gradually for older cohorts, to a low of 43 percent for the population aged 70 and above. The overall literacy rate in urban areas was 73 percent while the rural rate was 40 percent.

78. The extent of literacy varied widely across regions and between urban and rural areas in 1970. The most dismal literacy levels are consistently found in rural areas of the Northeast, where state-level literacy rates ranged from 19 percent to 27 percent. Urban areas of the Southeast show the highest state levels: from 73 percent to 82 percent. In the country as a whole, 22 percent of the men and 21 percent of the women aged 15 and over had attained more than four years of schooling, the conventional measure of achievement of functional literacy. In the urban areas, the corresponding proportions were 36 percent and 32 percent respectively. For rural areas they were about 5 percent for both sexes. In comparison, literacy rates (according to the standard definition) for the same age group are about three times as high as the functional rates. Again there are major differences between urban and rural areas.

79. Increases in literacy have been accompanied by improvements in the educational profile of the adult population. In 1940, in the group aged 20 and over, 88 percent of the literate population had not completed elementary schooling, while 96 percent had not completed 4 years of middle-level schooling and less than 1.5 percent had completed higher education. By 1970, 68 percent had not completed elementary, 87 percent had not completed middle, and about 2 percent had completed higher education. The proportion of the working age population having completed at least 12 years of schooling can be used as a

1/ "Literacy" and "literacy rates" refer here to the official census (or "standard") definition of literacy which is a positive response to the question of whether the respondent can read or write a short paragraph in any language. A common convention is to judge as functionally literate those who have completed more than four grades of primary schooling. Neither criterion is ideal.
crude index of a country's per capita accumulation of human capital (or analogously, of the productive "quality" of its human resources). Though estimates indicate that such an index grew from about 2 percent in 1940 to 4 percent in 1950 to 10 percent in 1970, extrapolating the rate of (percentage point change) in this indicator between 1950 and 1970 would carry it to about 28 percent in 2000. Doubling the rate would carry it to about 46 percent in 2000. The historical trends are thus clearly too slow if the objectives of a predominantly skilled work force are to be achieved within the next hundred years or so.

F. Housing, Water Supply, and Sewerage

80. Brazil's very rapid population growth, particularly since the 1950s, has led to mounting demand for housing and such essential residential services as potable water and sanitary waste disposal. This has been especially acute in urban areas, where massive in-migration has added to a high rate of natural increase of the urban population. Between 1950 and 1970 the number of urban households increased 2.8 times, and the current annual growth rate is estimated at over 4 percent, which means that each year over half a million new urban families add to the demand for housing and essential residential services. Supply responses for the provision of these services have been, by and large, quite strong. Measured in terms of proportional coverage of these services, the situation has definitely improved since 1950, yet serious qualitative and quantitative deficiencies remain. Squatter settlements and illegal subdivisions are common phenomena, especially on the peripheries of Brazilian cities.

81. Deficiencies in essential residential services, mainly water and sewerage, as well as inadequate location and overcrowding rather than lack of shelter as such are the key housing problems in Brazil. Available data for recent years show that a large majority of families live in residential structures characterized in census and survey data as "durable". However, this minimum shelter standard (of durability) fails to reflect the precarious location (on steep hillsides, in areas subject to periodic flooding, or subject to hazardous environmental pollution) and overcrowding of many dwellings as well as their lack of essential services. Given the modesty of this standard, those families living in structures which fail to classify as "durable" (15 percent of urban and 42 percent of rural dwellings in 1970) must make do with very inadequate living conditions.

82. The lack of readily accessible water and adequate sanitation facilities affects very substantial proportions of the population. These inadequacies not only reduce the quality of life of the affected people, but more important threaten their health and survival. Pronounced regional and rural-urban differences in the availability of water supply and sanitation services in Brazilian homes have prevailed throughout past decades and remain to the present. But since 1950, progress has generally been most rapid in those regions (the Northeast and the Frontier) and locations (rural as opposed to urban) that were lagging farther behind in terms of these services at that
time. The percentage of urban dwellings with piped water rose from almost 40 percent in 1950 to 53 percent in 1970; the percentage of rural dwellings, from less than 2 percent to 6 percent respectively. The absolute number of dwellings without this service also rose during this period, more than doubling in urban areas and increasing by 11 percent in rural locations. Coverage ratios for all dwellings with sewerage or septic tank connections increased from 24 percent in 1960 to 27 percent in 1970. The absolute number of dwellings without such services increased by almost 90 percent during that decade. Compared with other countries in the same per capita income class, Brazil’s standing with respect to the water supply indicator was below the average in 1970, a reflection of its very low level around 1950. Since 1970 Brazil’s progress in water supply has been quite rapid with the implementation of the National Sanitation Plan, but comparable statistics will not be available until the publication of the 1980 census.

III. PUBLIC POLICIES AND PROGRAMS

A. Population Policy

83. Official Brazilian policy on population was, until 1974, implicitly pro-natalist. As noted earlier, the traditional official view, dating back to colonial times, had been that Brazil would benefit from a rapidly growing population to complement her vast territory and natural resources.

84. The position articulated by the Brazilian delegation to the 1974 World Population Conference in Bucharest and, at about the same time in the Second National Development Plan, was that population growth — even at the current rapid rate — is not a serious threat to economic development. Together with this somewhat weaker reaffirmation of the traditional view, which may be regarded as a perceptible movement from a pro-natalist to a laissez-faire stance, the official statements went on to recognize that the government had a responsibility to provide family planning services to certain individuals. Such persons would be those who wanted, of their own free choice, to plan their families, but were too poor to pay for the privately available services.

85. Federal authorities have given tacit approval to a number of state level family planning programs organized by the Sociedad Civil de Bem-Estar Familiar do Brazil — BEMFAM (the Brazilian affiliate of the International Planned Parenthood Federation), but it was not until 1977 that the first step was taken by the federal government to provide family planning services to the poor. This was the announcement that the 1978-81 plan for maternal and child health would include family planning in instances where pregnancies would involved a high health risk (e.g., those to women with previous complications of pregnancy, with particular health problems, etc.). The amount earmarked for this purpose was the equivalent of about US$3.3 million to be spread over the four year plan period, which would allow for coverage of about 54,000 women. Thus, this program can only be regarded as a cautious first move towards implementing the family planning policy enunciated in 1974.
86. Should the government resolve to move decisively in the implementation of that family planning policy, it would in all likelihood do so by incorporating birth control services through the network of health service facilities operated by the social security systems. Mexico followed this route, and for Brazil the incremental costs for reaching a sizable share of the population would be comparatively small, since the basic infrastructure for serving the urban population is already largely in place. Meanwhile, the bulk of family planning services rendered in Brazil will probably continue to be delivered by the private sector to those who can afford it and by BEMFAM.

87. BEMFAM was created in 1965 by a group of Brazilian gynecologists with financial support from the International Planned Parenthood Federation and other private foundations. It began by opening clinics in several medical schools and by 1973 it had 86 clinics in operation and 130,000 new acceptors. Since 1973, BEMFAM has been moving towards community based distribution programs organized under agreements with certain state governments. To date, such agreements have been entered with five states: four in the Northeast and one in the Southeast regions. New acceptors increased to over 200,000 by 1976. Data to determine the total number of women covered by BEMFAM programs are not available. Under the most optimistic assumptions, however, it would not amount to more than a tiny share of the estimated 20 million or so Brazilian women who are currently in child bearing ages and married.

88. At this point, it appears unlikely that BEMFAM will be able to multiply its coverage of the Brazilian fecund population by any large factor during the next decade or so. Similarly, the evolution thus far of official measures to implement the 1974 family planning policy does not warrant forecasts of an imminent major breakthrough in the provision of family planning services by government agencies. The outlook could change if the government which took office in March 1979 were to adopt a more activist policy. But even if it does, the time lags normally involved between operational policy shifts in these matters, the implementation of the new policies, and any measurable effect on actual fertility suggest that the path of Brazilian birth rate in the coming decade is much more likely to reflect changing socio-economic conditions than any sort of direct public action. This assumption is reflected in the demographic simulations undertaken in connection with this report.

B. The Public Health Sector

1. Structure and Growth

89. Despite notable progress achieved during World War II, public activity in the health sector was still at a low level in the immediate postwar period. As of 1949, total resources devoted to this end amounted to only slightly more than 1 percent of GDP. Over the past 25 years, however, public expenditures on health have grown fifteen-fold in real terms and in 1976 equaled about 2.5 percent of GDP. The organizational structure remained essentially the same during this period, but its two principal components, which may be called the "collective-preventive" and "individual-curative"
subsystems, grew at widely divergent rates. The former subsystem is composed of the Ministry of Health and the state Secretariats of Health, which concentrate on endemic disease control at the federal level and other types of disease prevention and cure at the state level, and the latter is comprised of the social security institutes and funds which are now grouped under the Ministry of Social Security and Welfare. This phenomenon has had an important impact on the nature of health care.

90. Since World War II, the collective-preventive subsystem has lagged increasingly behind the individual-curative subsystem. The former's share of total public health expenditure fell from 87.1 percent in 1949 to about 30 percent in 1975. If all investment expenditures on water supply and sanitation under the National Sanitation Plan (see Annex IV) were included, the 1975 figure would rise to 39 percent. The clear trend has been the progressive marginalization of the Ministry of Health, whose budgetary allocation actually declined in real terms over the period 1965-1975. One plausible explanation of this phenomenon is the generally low priority accorded to preventive health care (especially in rural areas) observed in postwar plans and budgets. Starting in 1976, however, the Ministry of Health began implementation of two major new programs, the first to provide a system of rural health posts in the rural Northeast staffed by locally-recruited paramedical personnel, and the second to control schistosomiasis. These two programs alone would double the Ministry of Health's real expenditures over the four year period 1976-1979, so that implementation capacity rather than funding may now be the effective constraint on expansion of the collective preventive subsystem.

91. The vacuum left by the decline of the Ministry of Health has been progressively filled by the social security institutes, i.e., the National Social Security Institute (INPS) and the Social Security Institute for Public Servants (IPASE), and more recently by the Rural Worker Welfare and Social Security Fund (FUNRURAL). From 1949 to 1975 their combined real expenditures on medical assistance, which started from a relatively small base, have risen at an average annual rate of nearly 19 percent. Over the decade 1965-1975 the real rate of increase was more than 11 percent.

92. The factors explaining this phenomenon may be classified in three broad categories: financial, demographic, and philosophical-administrative. First, in contrast with the Ministry of Health and state Secretariats of Health (which fund their programs from general revenues), the three components of the individual-curative subsystem derive their financial resources from earmarked taxes (payroll taxes from INPS and IPASE and a combination of urban payroll taxes and rural products taxes for FUNRURAL). This has provided the individual-curative subsystem with a guaranteed and highly elastic revenue base, which has effectively shielded it from the vagaries of legislative review. The basic demographics of the postwar period favored the expansion of INPS and IPASE since their clientele (the urban labor force) has increased at a considerably faster rate than the population as a whole. Finally, successive reorganizations have extended the potential coverage of the individual-curative subsystem from selected occupationally defined urban groups, to the entire urban and then rural populations. By 1975 almost 80 percent of the urban population was covered and available statistics for
FUNRURAL suggest that up to 40 to 60 percent of the rural population (depending on the region) may have received some health services (usually urban-based) from FUNRURAL.

93. The growth pattern described above has given rise to a relatively high cost, urban-centered, curative care-oriented public health system. This allocation pattern for health resources is not peculiar to Brazil. It is common to many developing countries and even to the United States. The fragmentation of health resources among numerous administrative entities also constitutes a barrier to the formulation of a national health policy. Over 70 such entities operate at the federal level alone, giving rise to an institutional setting characterized by overlapping jurisdictions and interagency antagonisms. Fragmentation of the public health sector has also constituted an important barrier to the formulation of a national health policy.

2. Emerging Health Policy Issues

94. Though public expenditures on health have grown rapidly, it is evident that the Brazilian health sector is still fraught with serious problems. Among the most important identified are (i) a lack of coordination between government agencies responsible for health matters, (ii) a bias towards high-cost curative care, (iii) an urban and regional concentration of facilities and manpower, and (iv) a lack of success in reducing the incidence of certain endemic diseases, especially schistosomiasis and Chagas' Disease. Recent government documents and pronouncements show that officials are aware of these problems. The central policy issues of the late 1970s concern the appropriate manners in which to deal with them. One of the most difficult problems to solve will be that of coordinating public activity in the health sector. As a first step a 1975 federal law formally established a national health system. But this "system" appears to simply formalize the allocation of responsibilities which has evolved informally over the past decades. At present, it is difficult to ascertain whether the new health system will solve the coordination problem and thus permit the formulation of a coherent national health plan. Even if it does, questions will arise as to the nature and direction of future growth in the system.

95. Two broad options appear to be open: (i) a continuation of past trends, with the urban-based individual-curative subsystem increasingly dominating the collective-preventive subsystem; or (ii) a new strategy giving more emphasis to primary health care for rural inhabitants and/or poorer regions. There is presently some official willingness to experiment with the second option. The Program for Grass Roots Health and Sanitation Actions in the Northeast (PIASS) was established in 1976 and is directed by an interministerial committee under the coordination of the Ministry of Health. The guiding principles of PIASS are that a large variety of health problems may be successfully prevented and/or treated at the community level, without recourse to expensive hospitalization in urban areas, and that preventive and simple curative services should be integrated with more complex curative services through well-defined institutional channels.
96. As originally conceived, PIASS would operate at three levels. The first level of the system would be composed of rural health posts to be established in communities of 500-2,000 inhabitants and staffed by locally-recruited auxiliaries. The second level of the system would be the health center, which on the average, would serve three health posts (4,500 people) and normally be staffed by a nursing attendant, a sanitation auxiliary, and a doctor who would visit one day per week. The third level of the system would consist of a larger regional health center attached to a hospital also serving the urban population where it is located. Each regional health center would serve an average of four second level health centers and 12 health posts—about 18,000 rural dwellers—and be staffed by several doctors (one of which would travel daily to second level centers on a rotating basis), a nurse, dentists, auxiliary nurses, attendant nurses, administrative auxiliaries, and a driver.

97. In practice, the PIASS program appears to be evolving along somewhat different lines, with two rather than three levels in most areas (health posts and health centers). The health centers apparently vary considerably in degree of sophistication and staffing, and often serve as the entry point to the FUNKRURAL "individual-curative" system. In most cases the centers are located in the county seats with health posts being established in smaller towns. The health centers are sometimes staffed at least part time by a doctor who visits the health posts. Data for 1978 show that the density of the network of operating health posts and health centers was still considerably short of the original goals for the 25 percent of the target population considered as covered. For this "covered" population there was on the average one health post per 5,100 people and one health center per 9,900.

98. As of mid 1978 start-up problems and difficulties in interagency coordination have slowed the implementation of PIASS, and it is highly unlikely that the program will be fully and effectively implemented by the end of 1979 as planned. The key problems involve management and training of medical and paramedical personnel. The problems are in principle resolvable, but this will require time and political priority for PIASS at all levels to ensure better quality management personnel and adequate financial resources. The success or failure of PIASS is likely to influence the future direction of health policy, since it is viewed by many as a possible model for a national rural health system.

99. The appropriate manner in which to deal with the continued high incidence of the three major endemic diseases has also emerged as an important policy issue in the late 1970s. In this area, the Ministry of Health's first priority is the containment and eventual eradication of schistosomiasis. To achieve this goal, a special program was inaugurated in 1976. The eventual success of this program hinges on its ability to treat a proportion of the infested population large enough (probably over 80 percent) to control transmission. This is likely to be an extremely difficult task. The drug being used for chemotherapy does not prevent reinfestation of people who have already been cured. Hence, the key to effective schistosomiasis control is the construction of adequate sanitation facilities and their use by the affected population.
C. Evolution of Policies and Program Affecting the Nutritional Status of the Population

100. Assuring an adequate supply of food at reasonable prices has been an ongoing concern of policy makers in postwar Brazil. Until very recently, however, the nutrition problem was viewed almost entirely in terms of production and marketing considerations. As a consequence, the important causal relationships between nutrition status and poverty received scant attention, at least explicitly. This posture has changed markedly during the present administration. Though a preoccupation with supply (abastecimento) still persists, policies of the mid 1970s explicitly recognize that malnutrition is most severe among the poor and that direct interventions designed to increase food consumption of the poor are justified. The clearest manifestation of this new thrust is the National Food and Nutrition Program (PRONAN), first established in 1973 but upgraded and restructured in February 1976.

101. Since the early 1960s the agricultural sector has been increasingly viewed in terms of its contribution to the national balance of payments. While this goal was considered important by the writers of the Second National Development Plan of 1975-1979, it has since been accorded even greater priority due to greater balance of payments difficulties (particularly through rising petroleum prices), an uncertain demand for Brazilian manufactured exports, and a buoyant international market for certain agricultural products such as soybeans, cocoa, and fruit juices. The Brazilian government has sought to avoid potential conflicts between policies to increase foreign exchange earnings through agricultural exports and those aimed at assuring an adequate, reasonably priced domestic food supply.

102. In recent years internal food prices have been rising at a faster rate than the general price index. Furthermore, the per capita supply and yields of some important food products have been stagnant or falling. The data strongly suggest that some major components of the domestic food supply are subject to inelasticities, and that real price increases may have had a negative impact on the poor. Recent Brazilian research reviewed in Annex III suggests that important government efforts to promote agricultural exports, as well as price controls on foods, may to some extent have conflicted with efforts to assure an adequate domestic food supply. The issues remain controversial, however, and considerably more research is needed. In any case, the survey data reviewed above indicate that even relatively poor people often spend less than half their income on food, and even the relatively well off are inefficient in meeting recommended nutritional standards. To the extent this remains the case, a better supply would not necessarily produce better nutrition.

103. In contrast to general food production and marketing policies, specific nutrition programs of the mid 1970s reflect a growing concern with the distributional aspects of development. They also acknowledge the shortcomings of national agriculture policies which give preference to landholders producing crops for export, and the limited success so far achieved in establishing cooperatives and agricultural colonies. The principal new program in the nutrition area is PRONAN. This program, administered by the National Food
and Nutrition Institute (INAN) has a budget of Cr$1.5 billion at 1975 prices for the 1976-1979 period. The World Bank is helping support PRONAN through INAN's Nutrition Research and Development Project.

104. PRONAN combines the "shortcut" approach to alleviating malnutrition through provision of food supplements directly to "biologically vulnerable" target groups (i.e., pregnant and lactating women and preschool-aged children from low-income families) with a longer-term approach aimed at improving the viability of small-scale food production in Brazil's poorer regions. Official documents make it clear that the food supplement subprogram is only temporary and that the long-term social content of PRONAN lies in its attempt to redirect agricultural policy. Owing to its newness, it is probably premature to make any assessment of PRONAN.

105. One way to promote calorie-adequate diets may be to decrease the prices of "basic foods" which account for large share of poor people's expenditures. Based on ENDEF data available at the time of writing, 16 items of food expenditure constitute around 70 percent of total food expenditures for families in the 20th lowest percentile. With the exception of wheat-based products, virtually the entire supply of this preliminary selection of basic foods is obtained from domestic production. Of these, four staples of the Brazilian diet -- rice, cassava, beans, and maize -- which are grown by almost all small farmers (who are themselves usually among the poor) account for roughly one third of food expenditures in rural areas and one fifth in urban areas for families at about the 20th lowest percentile of the subregional expenditure distributions. The proportion of calories consumed by these same families which are derived from these four commodities is twice as high.

106. Policies aimed at reducing the cost of producing, processing, and marketing these four staples alone through improved research, extension, and marketing could trigger an agricultural development process with significant nutritional benefits, so long as it is assured that production is profitable for the farmers. The resulting income effect would also generate demand for other foods with higher income elasticities. Such a strategy is implicit in several PRONAN subprograms dealing with production, marketing, food processing technology, and food distribution. Hence, careful monitoring and evaluation of PRONAN should be most helpful in planning future Brazilian nutrition programs.

107. At the consumption end of the food chain, the major issues which should be resolved are: first, the definition of the basic food needs of the population, and second, the design of programs which would be most effective in meeting these needs. The analysis of ENDEF data suggests that many low and moderate income Brazilians do not consider meeting calorie requirements as important as the consumption of meat, coffee, cigarettes, and consumer durables. Certainly there are strong cultural traditions as well as contemporary commercial pressures underlying these phenomena, which merit further research. But there is no doubt that any program to reduce or eliminate malnutrition will be

1/ The use of subsidized agricultural credit and price controls, however, can have a negative impact on employment and income distribution and is not to be recommended.
cheaper the more the population is willing to fulfill their calorie intake requirements before satisfying other needs. The issue then is whether an effort should be made to change these consumption habits in conjunction with other actions aimed at reducing malnutrition.

108. As dietary habits are largely the result of tastes and preferences, the acceptability of public intervention in the formulation of these habits is clearly a political question. Nonetheless, it could have important economic consequences. Even without any other nutrition intervention or further growth in incomes, both of which could contribute importantly to the reduction of malnutrition, the nutritional status of the Brazilian population could be significantly improved simply by modifying the way families spend their income. This suggests that increasing the population’s awareness of the nutritional consequences of their consumption habits should be a part of public nutrition policy. Education is already a component of most PRONAN programs. It is especially important in two types of programs currently in the experimental stages: targeted food subsidy programs (such as food stamps) and direct distribution of food supplements. Two major problems inherent in such programs are first, the potential for substitution of free or subsidized food for that which would have been purchased anyway, and second, the diversion of free or subsidized food to persons less needy than the intended beneficiaries. These problems are minimized with the nutritional motivation and awareness of the target population, which can be achieved through education.

D. Education: Public Programs and Policy Issues

1. Formal Education

109. During the period 1960-73, the student population increased from 9 million to 19 million; the proportion of students in the first eight grades decreased from 96 to 86 percent. There are significant differences among regions—particularly between the Northeast and the Southeast.

Basic Education

110. Progress in basic education coverage since the early 1950s has been apparent in all regions. This is particularly striking in the Southeast, where rates approaching universal coverage now exist. The Northeast has lagged behind all other regions but there, again, the enrollment rate increased from 34 percent in 1955 to 67 percent in 1974, while absolute enrollment went up from 1.3 million to 4.5 million. For Brazil as a whole, the enrollment rate went up from 54 percent to 85 percent while enrollment increased from 6.2 million to 18.6 million during the same 1955-74 period. The population in basic education age (7-14 years) grew at a rate of 3.4 percent per year from 11.5 million in 1955 to 21.7 million in 1974.

111. Despite this effort, educational opportunities still remain limited and are related to the social and economic status of the client population. Rural education lags behind urban to a very substantial degree. Enrollment rates for grades 1-8 in rural areas in the year 1974 were about half the level in urban areas.
112. The schooling experience of rural children in the Northeast and Frontier is largely limited to one grade. Enrollment in first grade in the rural locations of the Northeast and Frontier account for at least 60 percent of their respective totals. In the rural Southeast, this share is very much lower (44 percent). In the urban areas, however, the enrollment profile is similar in all three regions.

113. Though showing some improvement over each of three successive periods (1951-58, 1958-65, 1964-71), grade progression for the class finishing in 1971 was still very inadequate. Only 24 percent of all entrants into first grade in 1964 had made it to the fourth grade by their fourth year in school, for those who had entered in 1951, the corresponding proportion was 16 percent.

114. Although individual traits and socioeconomic characteristics of students play a major role in determining schooling and learning achievement, it is clear that the quantity and quality of educational services offered also play an essential role. The supply of education is largely the result of policy. In terms of supply, the realities of Brazilian formal education in the rural areas are bleak. Consider the following stylized description of the typical rural school. The school is a one-room house where groups of students (officially in different grades) sit and stare. The instructor is unlikely to have advanced beyond basic level education and is paid less than the minimum wage. She is supposed to teach the entire program of studies in all grades, but her knowledge of the subjects is, at best, a product of sheer repetition. The room is overcrowded. There are no textbooks: some volumes were produced but have not been distributed; they are too expensive. Unquestioning repetition of the teacher's words is equated with learning. When this is achieved, the reward is moving to the intermediate or back rows in the classroom (a sign of grade promotion). The price of failure is to stay in the same row or drop out.

115. The magnitude of the problem is large. Seven out of ten of the 165,000 school buildings in Brazil in 1972 were one-room, one-teacher school houses. These were the schools attended by nine out of ten rural students. In these schools about 12 percent of the students drop out during the school year, an even greater proportion drop out between grades and an additional 25 percent fail the course at the end of the year. Only 50 percent of students in the first grade are promoted at the end of the year. Since not all those who are promoted enter the second grade in the following year, the loss exceeds 50 percent.

Secondary Education

116. From 267 thousand in the year 1960, total enrollment in grades 9-12 grew at an average rate of 13.4 percent per year in Brazil to just over 2 million students in the year 1976. These 2 million students, however, were less than 17 percent of the estimated number of persons aged 15-19 in the year 1976. In 1960 the comparable percentage was less than 4 percent. Regional differences in this indicator narrowed from 2.6 to 1 in 1960 to 2.0 to 1 in 1976. In both years the maximum value was for the Southeast and the minimum for the Northeast.
117. Great care is required in interpreting these statistics. There may be fewer differences in quality of instruction than in the case of primary education, but differences in the content and orientation of the instruction are greater. It should be generally true, however, that the bulk of individuals who have made it to secondary education (grade 9 or above) can be regarded as being functionally literate and potentially capable of productive work using modern technology.

118. In 1971 substantial changes were initiated in both the length and content of secondary education. Its first cycle (grades 5 to 8) was officially shifted into primary education, thus leaving its length reduced from 8 to a maximum of 4 grades (9 to 12; corresponding to ages 15 to 18). Since the reform, the educational system has been gradually phasing out the pure general education stream in favor of curricula leading to "sub-professional" certification level (teacher training, agriculture, industry and commerce) or to a general curriculum with considerable practical activities in a so-called family of skills. This new structure is still in process of adoption by the various states so that all kinds of intermediate and transitional structures are to be found.

119. Enforcement of this controversial program has been very uneven. Some schools have not complied, being too poor to afford the added costs. The best schools set up higher quality programs, but few students took interest in the vocational content of the program, the university entrance being their only goal. In between, diverse combinations are found.

120. Data are poor, but there is no doubt that considerable change is taking place in the direction of a larger proportion of vocationally oriented enrollment, even though the latter's efficacy has not been sufficiently demonstrated. The 1971 Educational Reform initiative intended to turn the middle level into one large sector of technical education. Since 1974 this extreme position has changed perceptibly. It was recognized that available resources were insufficient to provide all the prescribed specialisations. The current orientation is to organize instruction around occupational clusters and to focus on basic skills which are expected to be complemented with on-the-job training.

121. Many unanswered questions remain about how far to go in orienting education to specialized labor markets or what might be a reasonable timetable for implementing any such strategy. Nevertheless, progress in developing a strong function-oriented middle-level educational program in the coming years will be hampered by strong competition from a rapidly expanding higher educational system. The preferences of students are bound to be crucial in resolving these issues.

Higher Education

122. The demand for a university degree gathered momentum in the 1940s. By 1960, enrollment in Brazilian universities stood at 93 thousand; by 1975 it had mushroomed to almost 1 million. Especially since the passage in 1968 of a law reforming higher education, pressures to improve its quality were added to
the ever increasing demands for expanding its availability. The 1968 law envisaged a process for meeting both objectives. In the event, the surge in demand for higher education overwhelmed the trade-off between quantity and quality; with some notable exceptions, quality has suffered.

123. In varying degrees, the intended quality improvements have been met in the public universities, which achieved high academic excellence. This has not been generally the case in the "isolated institutions." This latter group has been absorbing the major portion of incremental enrollment since 1968. They offer comparably few disciplines and most of them are in the social sciences, administration, and law. Their academic standards are often lax. Typically, students admitted to public universities belong to the higher socioeconomic strata. There they receive the best education available at a highly subsidized private cost, which naturally exacerbates their original social and economic advantage. By contrast, those who end up in private isolated institutions have to bear the full cost of their education, which tends to be of much lower quality.

124. Graduate programs have also surged in recent years. Between 1970 and 1976, the number of Masters and Ph.D. programs grew almost six times (from 106 to 569); their enrollment increased over seven times to a total of about 36 thousand in 1976. Not surprisingly, this spectacular growth has not always been accompanied by high quality.

2. Non-formal Education and Training

125. Diversity among activities officially included under the category of non-formal education (the Brazilian official label is "ensino supletivo," but the term seems misleading) is so great, that just about the only common characteristic element is that they are aimed at the adult population. Governmental responsibilities for these activities are scattered over many agencies. They include four main clusters of programs dealing with, respectively: (i) adult literacy and other basic skills ("literacy" for short); (ii) dropouts from primary and (non-vocational) secondary education who want to obtain "equivalent" instruction or certification ("equivalency"); (iii) instruction through radio, television and correspondence ("distance learning"); and (iv) "vocational" training outside of the formal system ("vocational").

Adult Literacy

126. Government programs to "eradicate illiteracy" among the adult population in Brazil have a long tradition. Many such programs preceded the Brazilian Literacy Movement (MOBRAL) which began operations in September 1971; the program has been dominant among other such activities ever since.

127. Many conceptual and statistical problems hamper attempts to provide reliable quantitative assessments of MOBRAL's effectiveness against illiteracy. Nevertheless, it seems clear that its impact has been substantial.
128. According to MOBRAL data, cumulative enrollment over the 1970-75 period amounted to around one quarter of some 76 million eligible Brazilians. But surely this magnitude greatly exaggerates MOBRAL's impact on literacy. High rate of failure in achieving functional literacy, probably even higher rate of subsequent reversion to illiteracy, and double counting are only some of the sources of exaggeration. Moreover, the program appears to have lost momentum: available data show certifications peaking in 1972 and enrollment peaking 1973. The data also indicate that less than half of participants obtain certificates. For some, the record has been disappointing and several reasons for this have been suggested, including: (a) unsatisfactory training of instructors (they are trained in a course lasting only a few days); (b) the rigid structure of the literacy courses, which does not allow for any regional adjustment, has been blamed for loss of interest by participants after initial enthusiasm; (c) the injection of seemingly political objectives by MOBRAL instructors, provoking a negative reaction among some participants; and, the most important factor of all, (d) failure, in the vast majority of cases, to follow-up through educational or cultural actions after the initial basic literacy course.

129. Despite these shortcomings, MOBRAL undoubtedly has had an impact in spreading literacy. Also significant is the mobilization of community resources for education that has taken place in all of the nearly 4,000 municipalities of Brazil. In creating a precedent for community action, MOBRAL's impact may go beyond the magnitudes associated with enrollments and certifications.

Educational "Equivalency"

130. The second cluster of non-formal programs is designed to further educational achievement (mostly adult) through instruction and certification originally intended to be equivalent in substance to that received in primary and secondary formal education programs. Poor as they are, the available data suggest that the equivalency educational program suffers from problems similar to those in the regular track, particularly excessive drop-out and failure rates. In addition, the expansion of the regular track and the perception that this program provides second rate instruction and lesser opportunities for jobs and social mobility have weakened demand for it. Consequently, its strong expansion in the coming years is doubtful.

131. A related goal in the system of equivalency education has been to experiment with non-conventional technologies (particularly, the use of radio and television and correspondence) for the delivery of instruction. A study on educational radio indicates that the scope of these activities is still quite small in relation to potential users. Nevertheless, based on recent research some experts feel that these technologies hold considerable promise for Brazilian education.

132. The clients of these programs are persons whose school attainment is above the average and are around the middle of Brazil's socioeconomic structure. While they can lead to higher levels of instruction, the evidence suggests that the probabilities of failure in the university entrance examination, and of dropping out of the university if admitted, are much higher for graduates from the non-formal programs than for others.
3. Vocational Training

133. Vocational training has a long tradition in Brazil. Its history may be traced back to the 1910s when the first technical schools were set up in Sao Paulo and Guanabara. The National Service for Industrial Apprenticeship (SENAI) and National Service for Commercial Apprenticeship (SENAC) were set up in the 1940s. Others have followed. The Intensive Program for Manpower Training (PIPMO) was added in 1963 to meet additional training needs for industrial service and was later expanded to serve all production sectors. More recently The Brazilian Technical Assistance and Rural Extension Enterprise (EMBRATER) was created to replace a previously existing agency in providing rural training through agricultural extension. SENAI and SENAC have a great deal of financial and operational autonomy, deriving their income from a payroll tax on industrial and commercial firms with 500 or more employees. PIPMO is controlled by the Ministry of Labor.

134. An important feature of current policies is the provision of incentives to enterprises to set up their own training activities. Thus far, the most important incentive is to allow firms to deduct twice their training costs from their taxable income, once such activities are approved by the Ministry of Labor. SENAI carries out its activities in 245 training centers and in "on-the-job" training arrangements. Its organization and management are highly decentralized; its 430,000 certified participants in 1975 ranged from managers to semi-skilled workers. Because of SENAI's wide ranging geographical coverage and decentralization, the courses differ in content, method, duration, and quality standards. However, the quality of SENAI's courses are generally held in high esteem.

4. Educational Costs and Benefits

Financing Public Education

135. Total education expenditures as a proportion of GDP increased from 1.6 percent in 1960 to 2.8 percent in 1974. A characteristic of this evolution has been a decentralization of public educational financing: the federal government's share declined from 33 percent to 22 percent between 1960 and 1974, while the municipalities increased theirs from 8 percent to 11 percent. Partly, this was due to a constitutional provision adopted in 1969 requiring municipalities to allocate 20 percent of their budgets to education. Despite the growth of municipal education outlays, however, municipalities as a group spend less than the stipulated 20 percent.

136. During the last ten years an increasing number of special funds and transfer mechanisms have been set up to finance Brazilian education. In 1977 there were 15 specifically identifiable sources of (earmarked) public funds for this purpose plus "miscellaneous" categories at each of the federal, state and municipal levels of government. These sources include items such as: import duties, income tax, federal lottery, sports lottery, rural property tax, sales tax.
137. State educational expenditures per resident grew quite rapidly during the period 1965-73 in all three regions, more than doubling in the Northeast and Southeast and almost quadrupling in the Frontier. By 1973, differences between regions remained great, with the Southeast index four times greater than for the Northeast.

138. Comparisons of other educational finance and related indicators between states grouped by total state revenue show that the six wealthiest states made up 83 percent of all education outlays in 1965, and 79 percent in 1973 while accounting for only 70 and 65 percent shares in total enrollment in the respective years. At the other extreme, the poorest states, which in 1965 had 5 percent of enrollment and 6 percent in 1973, made up 2 and 3 percent of education outlays respectively. Federal transfers earmarked for education seem to have been moderately effective in redistributing resources to the poorest states. During the same 1965-73 period they received 24 percent of all such funds while their share in total enrollment averaged only 6 percent.

Costs per Student

139. It has been estimated that student unit costs of state-run primary schools in the Southeast were between 50 to 100 percent higher than in the Northeast and Frontier in 1960. Similarly, if the Northeast’s unit costs had been equivalent to that in the Southeast, the required outlays would have had to be about 3.7 times greater than they were. Reported differences in unit costs are also large between the municipal and the state networks within specific states, as well as between municipal schools in low-income municipalities (usually rural) and high income (usually urban). Differences as great as 1 to 75 between municipalities have been reported. Information for the period 1965-70 indicates that for Brazil the unit costs of middle-level education (roughly, grades 5 through 12 at that time) were four times those of the primary level, while the unit costs in higher education were, on average, over 40 times higher than the unit costs of primary.

140. Part of these differences can be attributed to inherent differences in the educational service rendered in each level. For example, university teachers take longer to train and thus their salaries tend to be higher; instruction materials (including laboratories and computers) are naturally far more expensive in university training. All such pedagogically related factors, however, when taken into account, still leave much of the unit cost differences unexplained. This remainder is due to expenses that appear related mainly to consumption demands by students and staff. Consider, for example, that while most rural primary schools must do without piped water and basic sanitation facilities, almost all public universities in Brazil have swimming pools, sports facilities, pleasant cafeterias and other social amenities. Such glaring differences in the physical environment of public universities compared to public primary schools seem difficult to justify on pedagogical or equity grounds.
Effects of Income on Education

141. Not surprisingly, the composition of the classroom by the socio-economic background of students changes markedly with grade and level progression. Recent studies indicate that by and large, the parents of first grade students replicate the occupational structure of society, except in backward rural areas where initial enrollment is still far from universal. This corresponds to a proportion of "working class" (unskilled, skilled and supervisory of manual occupation workers) students of about 60-70 percent. This proportion falls progressively until it reaches about 20 percent at the end of secondary education. About 10 percent of university entrants have fathers in these occupational categories. It seems clear that public subsidies to universities are therefore mostly benefitting higher income families.

142. Another study shows that families in the two highest categories of income spend over 57 times more on education than families in the two lowest categories in Rio de Janeiro, 55 times more in Recife, 58 times more in Porto Alegre, and 66 times more in Sao Paulo. Income elasticity of educational expenditures, derived from survey data (not adjusted for differences in family size) ranges between 1.3 in Sao Paulo and 1.6 in Rio de Janeiro. Moreover, private educational expenses are tax deductible and thus subsidized. The record of tax deductions applicable to education outlays in the year 1972 shows that the bulk of benefits went to households in the middle to upper income range: 75 percent of all deductions were given to the groups located between 8 and 44 minimum wages.

Effects of Education on Income

143. The commonsense and empirical associations between education and income are generally very strong. Few would doubt that the incomes of Brazilians are not only closely correlated with but also caused, at least partially, by corresponding levels in the quantity and quality of the education they had received. To the extent that education may indeed be a strong determinant of an individual's earnings in Brazil, it would seem a powerful policy variable to raise the income of the poor. This, in turn, would enable them to expand their basic consumption. Besides being able to afford more of these basic goods, there is also a presumption that more educated people would be more efficient consumers. To what extent, then, is income affected by education? More importantly, to what extent could certain changes in the provision of public education be relied on to bring about substantial improvement in the income of the poor?

144. In his 1973 book, Langoni concluded that education was indeed such a strong determinant of income in Brazil, that the reported concentration of personal income during the 1960s could be largely attributed to increasing inequality in the distribution of education. Although some authors have questioned this rather extreme view, few would deny that education had an effect on the distribution of income in Brazil.

145. Rate of return calculations on investment in primary and lower secondary education for a cross section of various socioeconomic groups using data collected in 1970 and 1972 shed additional light on this relationship.
For Brazil as a whole, the computed social rate of return for primary education ranges from 14 percent (for rural women) to 31 percent (for females with low socioeconomic background). For lower secondary education, these rates range from 6 percent (for males with low socioeconomic background) to 13% (for non-farm males). Subject to many qualifications the reported rates of return do lend support to the view that education has been an important determinant of income among Brazilians.

146. A somewhat different question concerning the effect of education on income is addressed in a recent World Bank publication. 1/ To what extent has income growth since 1960 differed across educational achievement groups? Specifically, to what extent have individuals with little or no formal schooling shared in Brazilian economic growth since 1960? The study’s qualified answer is that income growth has lagged for illiterates, although it has not been insignificant. For those among the poor having some primary education, income growth had been faster.

147. In conclusion, the educational attainment of Brazilians has been an important factor in determining both their income and their income growth in recent years. It seems likely that these relationships will tend to persist during the next couple of decades.

5. Current Policy Issues

148. The sharp contrasts that characterize Brazilian socio-economic development are clearly reflected in the realm of education. Geographical disparities in literacy and enrollment rates are wide; with respect to resources devoted to education per student, inequalities are even wider. Important geographical dimensions of these disparities are: (i) regional -- the Northeast and Frontier are far worse off than the Southeast; (ii) rural-urban; and (iii) municipal or district units within any of the preceding broader categories. Place of residence is a very powerful factor determining the quality of (public) education obtained by students. Many Brazilians feel that such a factor is neither efficient nor equitable in allocating educational opportunities.

149. While socioeconomic status and place of residence of families are not at all independent of each other, socioeconomic status seems to have a strong independent effect on a child's progress through the educational system. The probability of successful progression to the upper levels of the educational system are far smaller for the child from a household of low socioeconomic status than for his well-to-do neighbor. Although this association between socioeconomic background and school performance is virtually universal, some people think that it is somewhat more extreme in Brazil and that efforts to counter the disadvantages of children from poor families should be greatly strengthened.

150. A third area of great contrast in Brazilian education concerns the magnitude and equality of resources per student across the different levels of the educational system. Representative secondary schools tend to spend much more per student than primary schools. And quality standards bear close relation to expenditures per student. Differences in this and other

indicators of relative resource allocation between either of these two levels and universities seem gigantic. These have been characterized as contrasts between squalor and opulence by some Brazilians that feel that such differences cannot be justified in terms of either equity or efficiency.

151. Alongside these inequalities, other regressive forms of public spending on education also exist. Individual municipalities spend more per student on the schools located in the most affluent or urbanized areas within the municipal boundaries. States' transfers to municipalities tend to benefit the most central and prosperous among these. In contrast, the federal government is presently carrying out a neutral to slightly progressive redistribution policy among states. However, because of the great difference in unit costs by level, and the greater participation of students from the top socioeconomic layers in the higher educational levels, the subsidy per capita built into the free public education system clearly benefits the more affluent families. In addition, income tax deductions for education represent a regressive transfer.

152. Perhaps the most disappointing feature of Brazilian education is the poor results of basic education. While the proportion of urban children who never attend school is by now fairly small, low attendance in the rural areas is still a big problem. The most pervasive and obvious failure, however, is the high dropout rate in the initial grades. More students abandon school before reaching the second grade than in any other level. If four or five years of schooling are required for functional literacy, Brazil is faring very poorly in view of the small proportion of students reaching this level.

153. There is some consensus on at least two broad reasons for the poor performance of basic education. One is the very low expenditures (and consequent meager resources) per student in most primary schools, particularly outside of the urban Southeast. Another is the high proportion of students from very low socioeconomic backgrounds, who are almost universally difficult to guide through a successful educational experience. However, some Brazilian experts feel that relatively little has been done to compensate such difficulties by means of good quality schools and creative pedagogical strategies. In contrast, the attention and imaginative schemes found in higher levels of Brazilian education basic resources such as school furniture and textbooks are often unavailable in a large proportion of primary schools.

154. It is important to realize that many of the difficulties with Brazilian education have less to do with current management than with past policies and shortcomings. Current growth in overall enrollment is impressive—and in some cases exaggerated. Enrollment in elementary schools is growing more than twice as fast as population (although, given the data available, it is not possible to say whether enrollment rates in rural areas are improving at a comparable pace, which is a critical issue); secondary education grows five times as fast. University enrollment grows even faster. Whether such a structure of growth rates is appropriate, moreover, is a matter of debate. In educationally mature countries higher levels grow faster because lower levels achieved nearly universal coverage. This is hardly the case in
Brazil, where functional literacy (4 to 5 years of schooling) is not being achieved by roughly two-thirds of the school age population. Moreover, the explosive growth of university enrollment is sucking into the system students who are ill-prepared for higher education. The concurrent decline in average academic standards in universities supports this view. Some observers find that such growth rates are less the result of a definition of social priorities than a structure of (career) incentives facing decision makers. Indeed, the truly vocal and alert groups pressing the education system aim their demands at the university level. Much political will on the part of the society as a whole will be required to compensate for the very weak incentives to improve the educational levels that need it most.

155. Government strategy to contain pressure for higher education has been to give vocational content to secondary education. There is no clear indication that this has resulted in less pressure for university enrollment. Nevertheless, making secondary education more directly useful to employment opportunities appears sensible in its own right. The implementation of the policy to increase the vocational content of secondary education, however, is sometimes criticized. For example, much effort has been devoted to improve the academic and technological levels of industrial technical schools. Paradoxically, such excellent quality education seems to have motivated students to pursue higher education. As a result these schools are enhancing the pressures for even greater expansion of higher education, which is quite the opposite of the original intent. There are other paradoxes. Regular high schools are supposed to add vocational content to their curricula. The best schools do add potentially useful vocational instruction, but their students are uninterested since their goal is the university. The poorer schools, attended by students motivated to pursue vocational training, lack the resources and know-how to provide meaningful programs. Although, by and large, graduates from secondary schools feel academically overeducated to enter manual occupations, those who would like to take these jobs are underqualified due to insufficient school training. Of course some do benefit from the vocational content of certain secondary school curricula, and it is unlikely that it can do any harm. In sum, it is a very perplexing situation where no final and easy judgments are available. These must await additional evaluations. Moreover, the diversity of situations is likely to require correspondingly diverse solutions.

156. Brazil has long been a leader in non-formal systems for training industrial labor. SENAI, in particular, has developed some of the most successful schemes for training highly skilled workers since its creation some 30 years ago. In sharp contrast with the erratic attempts of the formal system, SENAI has closely monitored labor market demand and responded with creative and sound programs. Without sacrificing quality, the flow of graduates has been increasing over the years, reaching today very impressive numbers.

157. Not all non-formal programs have been so successful however. MOBRAL, is particularly controversial. While many have undoubtedly benefited from their literacy courses, original expectations have not materialized.
Among the main problems, drop out rates seem very high; only a very small proportion of those enrolled and certified are offered anything beyond the basic 200 hours program. And consequently, it is estimated that only about half of the graduates retain their literacy after a couple of years of taking the course. Recent experience from similar programs in other countries, however, suggest that MOBRAL is not along concerning some of its most negative results. Perhaps there are no shortcuts to a solid basic education program.

E. Housing, Water Supply and Sewerage: Institutions and Programs

1. Establishment and Expansion of the National Housing Bank (BNH)

158. The rapid progress of urbanization and industrialization experienced in Brazil during the post World War II period, and accelerating inflation in the early 1960s, brought Brazil's housing finance institutions as well as public companies providing water supply and sewerage to a state of virtual financial collapse by 1964. In that year the National Housing Bank (BNH) was established to orient and control the Housing Finance System (SFH), which was created at the same time. The BNH is a public enterprise under the Ministry of the Interior, but with financial and administrative autonomy, subject to the oversight of the Central Bank of Brazil. The SFH's principal objective was defined to be "to promote the construction and acquisition of owner-occupied homes, especially for the lower income classes."

159. Since 1964 the SFH has grown rapidly in complexity as well as scope and volume of operations, to the point that, in addition to the BNH and a system of 22 Popular Housing Companies (COHABs), in 1976 it also included the world's fourth largest savings and loan system (Sistema Brasileiro de Poupança e Emprestimo - SBPE) composed of 81 savings and real estate credit agencies. The BNH has expanded its activities to include all kinds of urban infrastructure, but especially water supply and sewerage after the establishment of the Sanitation Finance System (SFS) in 1968. Today the BNH is better characterized as an urban development bank than a housing bank, though its activities in urban infrastructure, including mass transportation, can be related to housing services, broadly conceived.

160. The BNH's US$2.5 billion in commitments were for water supply, sewerage, and drainage, and the percentage of total BNH planned commitments budgeted for these services in 1977-79 was 18.5 percent. In 1976 "housing and its complements" (including urbanized lots and construction materials loans) accounted for 48.5 percent of total BNH commitments; this proportion was budgeted to rise to 61.9 percent in 1977-79 with a greater emphasis on popular housing, including an expanded sites and services program, and less investment in mass transportation and other urban infrastructure with the exception of water supply and sewerage. Total BNH commitments in 1976 were the equivalent of about 1.7 percent of GDP. The increase in the value of outstanding loans of the SFH in the same year was the equivalent of 3.1 percent of GDP or 11.4 percent of the country's gross fixed capital formation.
The institution of monetary correction (designed to maintain the real value of BNH, SFH, and SFS assets and liabilities in an inflationary environment) has been a key factor in establishing viable long-term capital markets serving urban development activities. The other major factor underlying the expansion of the BNH's activities was the establishment of the Time-on-Job Guarantee Fund (Fundo de Garantia do Tempo de Servico - FGTS) in September 1967. The FGTS, a form of forced savings financed by an 8 percent tax on payrolls, is deposited in the BNH (generally in the form of individual accounts bearing 3 percent interest and monetary correction) and can be withdrawn by workers only under specified conditions, including involuntary unemployment, purchase of housing, sickness in a worker's family, retirement, etc. In 1977 FGTS deposits were over two thirds of total BNH liabilities.

2. The Housing Finance System (SFH)

Over the period 1964-77 the SFH made a total of 1.8 million loans for finished housing, urbanized lots, and construction materials. Of these, 30 percent were for "popular" housing. The definition of popular housing loans has been broadened over time, and since 1975 has included loans up to about US$6,650 (average 1977 values and exchange rates) for families with incomes up to five minimum wages. Assuming all housing loans resulted in a new housing unit, the total of all such units associated with total housing loans through the SFH would have amounted to 25 percent of the increase in the number of urban households over the period 1964-77. But an undetermined number of loans were for upgrading existing housing, and the increase in urban families understates potential demand by failing to include substandard units which should be replaced. Therefore, the measure given overstates the extent to which the SFH satisfied the potential demand for housing. The performance of the SFH has varied both as regards the percentage of popular housing loans and the total number of loans per year, with 1973-74 clearly being a low period for popular housing, and the years 1975-77 showing a marked improvement both for total housing loans and especially for popular housing, though the expanded definition of the latter coincides with the beginning of this period. Throughout the period 1964-77 there was a marked tendency for both total and popular housing goals to exceed achievements.

Four basic institutional and economic factors underlie the relatively poor performance of the BNH in financing popular housing. They are (a) Brazil's high proportion of poor families, which means that a majority of urban families have not been able to afford the kind of popular housing financed by the BNH, at least until the advent in 1975 of a sites and services program; (b) the fact that the BNH does not receive any major funds for which it does not have to pay monetary correction plus at least 3% interest means that there are only limited possibilities for direct BNH subsidization of low income housing by charging lower than average interest rates to low income borrowers; (c) land and construction costs have risen considerably faster than the general price index or the minimum wage, thus raising the real cost of housing; and (d) at least until 1973 many COHABs were not financially viable and did not have the technical capacity to carry out large scale operations.
164. Government housing policy, as set forth in planning documents and executed largely through the BNH, has not been unresponsive to the problems mentioned. In particular, major evaluations of popular housing programs were undertaken in 1972 and again in 1974 and a wide range of corrective measures were taken. In general the policy responses of the Brazilian housing authorities designed to bring some form of officially financed housing within financial reach of the low income population fall into five basic categories: (a) changing the terms of loans (maximum loan size, interest rates, maximum family income, repayment systems, and system of monetary correction); (b) attempts to monitor and influence construction and land costs; (c) introduction of subsidies from outside the BNH-FGTS system financed by general government revenues; (d) introduction of new programs to support self-help housing construction; and (e) strengthening of the COHABs, both financially and technically. In 1975 these measures combined to produce a rapid expansion in popular housing loans by the BNH and the expansion has continued since that year.

165. Though some measures, such as increasing the maximum size of loan and family income qualifying for "popular" housing loans, did not actually make housing finance more accessible to the poor, others—especially a new system of Treasury-financed subsidies, the sites and services program, and a new program for financing construction materials acquisition by low income borrowers—have had this effect. Together they represent a new approach to low income housing emphasizing the provision of basic water, sewerage, and electricity services to prepared housing sites on which self-help housing can be constructed. This new approach recognizes that traditional finished "popular" housing is, in the vast majority of cases, priced out of reach of families with incomes of two minimum wages or less, \(^1\) that the provision of basic water and sanitation services should have first priority on available resources, that the majority of the urban poor are already involved in self-help housing construction without any assistance from official sources, and that it is better to upgrade existing settlements through loans for construction materials than to demolish them.

166. Despite these improvements, and without considering broader questions such as general urban development policy, employment generation, and income distribution, there are a number of measures which could be taken to further strengthen the popular housing program. They include increasing the redistributive character of the fiscal support system for housing, strengthening incentives to the COHABs to produce sites and services projects, developing a broader variety of housing options within housing projects while at the same time opening up greater possibilities for direct cross-subsidization within such projects, improving land use and taxation legislation to reduce urban land prices and speculation, reducing construction costs, and expanding the popular housing loan system toward smaller cities and rural areas.

\(^1\) The equivalent of about US$1700 per year in the Rio and Sao Paulo metropolitan areas in calendar 1977 at the average exchange rate for that year, assuming 24 monthly minimum wages.
3. The Sanitation Finance System (SFS)

167. The National Sanitation Plan (PLANASA), which sets national objectives for water supply and sanitary sewerage, was formulated and formal execution begun by the BNH in 1971. Already in 1968 BNH began to finance water supply systems through the SFS and the first BNH investments in sanitary sewer systems took place in 1970. PLANASA grew out of an analysis of the deficiencies of the previous arrangements for planning, financing and executing water supply and sanitary sewerage systems in Brazil. Among the problems which PLANASA sought to attack were a chronic lack of financial resources; application of resources without recovery; uncoordinated action and multiplicity of municipal, state, and federal agencies involved in these activities; absence of overall planning; and lack of an adequate and realistic tariff system.

168. The SFS is oriented and controlled by the BNH, which has financed just under half of its investment program over the years 1968-76. The remainder comes from state and municipal governments either directly as grants or from the state governments through the State Water and Sewerage Funds (FAEs) which together with the BNH make loans for water supply and sanitary sewerage investments to state sanitation companies (one per state) that provide water and sewerage services at metropolitan and municipal levels.

169. PLANASA's long-term objectives include the elimination of the deficit in the water supply and sanitary sewerage sectors and creation of new capacity to meet growing demand once the deficit is met. Its financial structure is designed so as to eventually become self-sustaining. PLANASA seeks to realize economies of scale through stimulating the expansion of state-wide water companies. Cross-subsidization takes place between states only through the interest rates charged on SFS loans. Within states, it may occur through the tariff structure. Current short-term goals include providing safe drinking water to at least 80 percent of the urban population in at least 80 percent of Brazilian municipalities and all nine metropolitan regions by 1980 and the provision of adequate sanitary sewerage systems by 1980 to the metropolitan areas, state capitals, and cities over 50,000. While statistics on PLANASA implementation present serious problems of interpretation, the water supply goal may be within reach if a vigorous effort is maintained through 1980. This would be an impressive achievement. Sewerage investments are more complex and costly and have not received the same priority as water supply in implementation.

170. As of January 1978, BNH statistics show that over 1800 municipalities (almost 60 percent of the 1980 goal) have joined PLANASA, which generally means transferring decisions over operations, investment, and rate setting to the state sanitation companies. Investments already financed would provide enough capacity to connect over 70 percent of the 1980 target population to general network water systems. In contrast, only 129 municipalities had received the benefits of PLANASA's sewerage program by January 1978 and financing approved as of that date would allow construction of enough capacity to connect 56 percent of the 1980 target population, assuming no major cost overruns. BNH officials warn that translating capacity into effective connections is more problematic in the case of sewerage than for water supply. In neither case is
the process automatic, and therefore, both felt needs of the population and ability to pay the rates required may limit effective capacity utilization by the poor. The total investments required during the period 1978-80 to meet the 1980 goals for both water supply and sewerage according to SFS officials may not seem high as a percent of GDP—less than 0.4 percent assuming 6 percent GDP growth over this period (historically, investment in water and sewerage peaked at 0.4 percent of GDP during 1977). However, the amount is equal to 73 percent of total PLANASA investments for water supply and sewerage over the period 1968-77.

171. All the major factors which affect the performance of the popular housing finance system also affect PLANASA/SFS performance. However, there are some notable differences inherent in the collective nature of water and sewer systems and the financing mechanisms of PLANASA. Under PLANASA guidelines, the combined minimum water and sewerage tariffs for residential connections cannot exceed 7 percent of the regional minimum wage. For water alone the minimum tariff cannot exceed 5 percent of the regional minimum wage. Tariff setting may pose a dilemma to the state sanitation companies. On one hand they are supposed to recover their costs and exercise strict financial discipline. On the other, social criteria, including public health considerations, suggest they expand their service to the poorest strata of the urban population.

172. Assuming fixed terms for BNH and FAE loans to sanitation companies, there are in essence two ways in which the rate constraints may be met if a system appears financially unviable. The first is cross-subsidization through the tariff structure at any level of the system (state, metropolitan, or municipal) controlled by the state sanitation companies. In general, this method works in the richer, more industrialized states where there are enough industrial and high income residential customers to allow very low minimum tariffs for the poor. But in poorer states, particularly those with large numbers of relatively small cities and towns, tariffs that are affordable by many of the poorer communities may be incompatible with an overall tariff structure that would allow the companies’ financial viability. The other option is the application of budgetary resources on a grant basis to subsidize the sanitation companies at any level. Both are possible within the PLANASA framework, and greater use of these mechanisms is likely to be necessary, especially if rates are to be affordable for families with incomes below two minimum wages. A method similar to that used in the electric power sector for transferring financial resources between rich and poor states might allow at least partial resolution of this problem. There, a special fund is used to subsidize the poorer state power companies and a federal regulatory agency carefully monitors physical performance indicators to assure efficient use of the funds supplied. If no transfer mechanism within the sanitation sector can be developed, the financial situation of states and municipal governments, which deteriorated over the 1970s, suggests that the poorer states and municipalities are likely to require more assistance than they are already getting through Brazil’s revenue sharing system and the SFS if PLANASA’s ambitious goals are to be achieved.
Government's basic sanitation policy has been expressed in the original PLANASA documents, in important revisions made in PLANASA in April 1975, and in the quantity of resources made available for basic sanitation investments—largely through the SFS. The principal changes in response to the constraints referred to include changing BNH loan terms through the SFS so as to provide greater subsidization of poorer states, and establishing in 1977 a system to implement water supply systems on a large scale in small communities. PLANASA does not seek to provide water supply and sanitary waste disposal in rural areas. In the case of water supply to small communities some progress is evident which may pave the way for expansion in these areas in the 1980s.

IV. THE FUTURE: SIMULATIONS

A. The Future of Brazilian Population Growth

Official Brazilian demographic projections (designated here as the IBGE projections) arrive at state-level population estimates by prorating nationally projected future growth according to each state's share in total growth in the period 1960-70. This technique does not account for interstate and interregional differences in fertility, mortality and migration patterns which, as seen earlier, are very considerable. For this and other reasons spelled below, alternative demographic simulations ("projections") for each of the three regions were done for this report. Far from being forecasts, these are intended as arithmetical exercises to answer "what-would-happen-if" sorts of questions. Various approaches can be taken to the stipulation of the "ifs", or assumptions, depending on the purpose of the simulations. In this case, there are three major objectives:

- To derive certain additional implications from the demographic assumptions underlying the IBGE projections; the "Baseline" simulations serve this purpose.

- To explore the likely demographic impact of alternative trajectories in the coverage of certain social services -- such as basic education and water supply -- which are important determinants of fertility and mortality. Simulations "A" and "B" address these objectives.

- The third objective arises from the analysis of results derived in pursuit of the first objective. The assumptions underlying the IBGE projections were found to produce a rate of population growth in the Northeast that seems to be beyond the upper bounds of reasonable likelihood. Thus simulations "A-Mig" were prepared assuming faster migration out of the Northeast.

Method and assumptions underlying each of these projections are spelled out in Annex I (Section V.A).
1. **Results**

175. According to the simulations, the consequences of slow versus rapid evolution of the socio-economic indices on mortality and fertility are substantial, especially in the Northeast. For this region, results project a difference in life expectancy of almost 10 years by the end of the projection period. The difference is even more pronounced in the case of infant mortality, where the rate under projection A is almost twice as great as in B. For the Southeast, at the other extreme, the corresponding difference in life expectancy is of less than 2 years. Total fertility differences between these two projections by the year 2000 range from 18 percent (lower in projection B) in the Northeast to 7 percent in the Southeast.

176. Despite substantial differences in the underlying assumptions, proportional differences in the total population across the four projections are not great. This happens largely because mortality and fertility differences between projections tend to cancel each other out in their effect on population growth. Thus, the largest difference in total population by the year 2000 is between the IBGE (202 million) and projection A (209 million; or less than 4 percent of the former). Differences in population size that do occur across projections are concentrated in the younger age groups. Thus they are much sharper when comparisons focus on this category. The population age 0-14 in projection A is nearly 10 percent greater than in projection B. Such a difference takes on added significance in terms of consumption dependency for the provision of age-related services as education, and later on, to employment opportunities.

177. Total population in the year 2000 is about 3 percent smaller in projection B than in projection A. Thus, the more rapid mortality decline in projection B, induced by its faster improvement in the socio-economic indices, is more than compensated in its effect on population growth by century’s end, by the more rapid fertility decline.

178. All the projections except A-Mig incorporate the IBGE assumptions on interregional population distribution and result in very large increases in the Northeast population between 1970 and 2000 -- a more than doubling in the 30 year period. Though between 1940 and 1970 the Northeast’s population almost doubled, it is questionable that the region’s resource base will support continued growth at this rate. The IBGE assumptions are consistent with Government objectives to reduce migration into the Southeast from 1950-1970 levels. If Northeastern cities cannot absorb the large proportion of the population growth indicated in the projections (the equivalent of 125 cities of 200,000 inhabitants), then interregional flows will clearly be much larger than envisaged in official planning documents.

179. The possibility that migration out of the Northeast will in fact be much larger than official expectations is explored in projection A-Mig, which assumes a level of interregional migration which is double the amount assumed in the other projections. In A-Mig, the Northeast’s share of total population would drop from 30 percent in 1970 to 22 percent in 2000, rather than only 28 percent in the other projections.
2. Implications

180. When considered together with officially stated objectives concerning population coverage targets for various social services and productive employment, the current laissez-faire policy towards population growth implies acceptance of the aggregate costs required to meet these objectives given the population increases associated with this policy. These aggregate costs will obviously be higher than required to meet the coverage targets for the smaller population increments that would presumably result from an activist policy to slow population growth. Looked at in a slightly different way, to the extent that Brazil is willing and able to allocate a certain quantum of resources to meet the stipulated coverage targets under the laissez-faire regime, an activist and effective population policy would allow it to shorten the time required to meet such targets. While the logic underlying these observations is elemental, the welfare tradeoffs they highlight are eminently complex.

181. Another important type of tradeoff between demographic and other national objectives is also apparent in the Brazilian case: that between interregional population distribution and export growth. One illustration bears on the land use policy for the Frontier region. Current policy for this region emphasizes expansion of large scale, export-oriented agriculture and mining as an important part of the broader policy to foster export growth. Products (mostly soybeans, cattle, forest products, and minerals) and production technologies suitable for this purpose are land and capital intensive; labor use is scant. While local processing of these products may employ some additional labor, the employment potential is still rather limited. There are probably no alternatives in the case of mining, but alternative crops, technology, and land tenure patterns could augment labor use in agricultural activities by some unknown amount. Insufficient research has gone into defining the most appropriate land use patterns in this heterogeneous region, which includes wide variations in climate, soils, and other ecological conditions. Consequently planning development so as to balance potentially conflicting national objectives is difficult. It is clear, however, that the present thrust of development in the region militates strongly against the objective of having the Frontier region absorb the bulk of the natural population increase generated in the Northeast -- currently on the order of one million persons per year.

182. According to the projections discussed here, Brazil's total population in the year 2000 will be between 202 and 209 million, and its annual rate of growth, between 2.2 and 2.4 percent. Barring an unforeseen catastrophe of major proportions, it is quite unlikely that these boundaries will be seriously violated under a continuation of the standing policy. Taking also into account the projected ranges of age structure and total fertility for century's end, demographic theory and experience of other countries virtually guarantee that the Brazilian population will continue to grow at least until the second half of the 21st century and that it will not cease its growth until a population of no less than 300 million is reached. This is more than 2.5 times the estimated size of the current population. It is difficult to imagine how such a staggering increase in population could occur without detrimental effects to
Brazil's ecological systems and hence to its environment. Current concerns for air and water pollution in the major metropolitan areas; and for soil leaching and erosion caused by overcropping and overgrazing in many agricultural regions, to name only a few, seem to be fully warranted in the light of current conditions. These, in turn, may well be very favorable compared to the quality of the environment that would accompany a much more affluent population than today's and 2.5 times its size.

B. Growth and Distribution in the Long Run

183. The third section of Annex II focuses on one specific issue of Brazilian growth: what is the maximum plausible rate of low skill labor absorption into a broadly defined modern sector of the economy over the period 1970-2000. Underlying this question are two alternative hypotheses about the nature of Brazilian development. According to the first, productivity increases in some part of the economy spread over to the rest. Therefore, fast growth in some region or sector is beneficial from the point of view of employment and income generation for the economy as a whole. According to the second, productivity increases do not spread over, so that fast growth in some region or sector does not appreciably affect employment or the income of the poor and it increases income inequality.

184. The analysis of these two competing hypotheses about growth and distribution in Brazil is very complex. It encompasses the characteristics of production technologies, the forms of industrial organization, the evolution of demand patterns, and the working of factor markets. The present state of data and knowledge makes it impossible to tackle all of these at once. Therefore a model is developed in Annex II which focuses on one aspect of "trickle-down" or "spill-over" effects from modern sector growth: its demand for low skilled labor. Given fast population growth (faster the poorer the population group according to the statistical analysis contained in an appendix to Annex II) that linkage is an important one. If the demand for labor does not grow fast enough, the channels for spillover effects have to be looked for elsewhere.

185. The model, or projection framework, consists of three relationships that follow from the saving investment equilibrium condition, an aggregative production function for the modern sector and profit maximization. They contain the following assumptions: (a) physical capital and high skill labor can be combined into a total capital index; (b) there is no saving out of labor incomes, and a given saving rate out of the income from total capital; (c) there is a constant rate of technical progress.

186. It is then asked: what are the rates of growth of low skill labor demand and its marginal productivity associated with a given rate of growth in the output of the modern sector? These questions are given a numerical, illustrative answer using the orders of magnitude for the Brazilian modern sector in 1970 as initial conditions. Rates of growth of demand for low skill labor and its marginal productivity, its share in value added and the rate of return to total capital are projected at five year intervals for the period 1970-2000.
187. The results obtained illustrate the following properties of the projection framework: (a) in the short run, demand for low skill labor is very sensitive to changes in output growth; (b) in the short run, total capital may grow much faster than unskilled labor demand, depending upon the difference between the rate of return to capital and the ratio of the output growth rate to the saving rate. The following results also emerge: (c) the rate of absorption of low skill workers into the modern sector is lower than the natural rate of growth of the low income population; (d) the associated increases in their marginal product are higher than observed increases in real wages in the recent past—which means that the projection framework needs to be completed with a proper treatment of the unskilled labor supply.

188. These characteristics of the projections put in perspective some of the consequences of a growth strategy based on incentives to fast growth of the modern sector. It is unlikely that such a strategy would produce widespread increases in the standard of living directly through the employment of unskilled labor. Modern sector growth does not appear to provide by itself an answer to the employment problem facing the Brazilian economy in the decades ahead, even with a very broad definition of that sector.

189. The projection framework developed cannot, of course, be applied to the overall process of growth and distribution in Brazil. Growth of the "nonmodern" sector was not considered, nor were the consequences of improvements in the quality of unskilled labor—say through nationwide implementation of a full primary education program. In addition, the creation of high skill labor was dealt with implicitly, through its impact on total capital. More explicit treatment is not essential for the purposes of this exercise, given the initial conditions on high skill labor. In 1970, 14 percent of the labor force had more than primary education, and changes in this percentage over time are fairly predictable.

190. Another major conclusion of Annex II is that future work on growth and distribution processes in Brazil should emphasize the interrelationships between "modern" and "nonmodern" sectors of the economy and what they imply for the supply curve of unskilled labor. The broad and illustrative definitions used may not be useful in that context.

C. Extending Basic Health Care Coverage

191. The basic assumptions underlying the optimistic simulation are: (i) that GDP growth averages 7 percent per year over the period 1980-2000; (ii) that a strong effort is made both to extend a PIASS type rural health care delivery system to the entire rural population of Brazil; and (iii) the coverage of the urban population is completed through a restructured urban health care system. The pessimistic simulation assumes that GDP growth averages 4 percent per year over the period 1980-2000 and that the effort to extend both the urban and rural health systems is less intense. The simulations of both rural and urban basic health care costs are made in four steps. First, the type of service considered as meeting basic needs is defined.
Second, the percentage of the population in each of the three regions to be covered is estimated for each year from 1976 through 2000 for each simulation. Third, unit costs for each component of the health care delivery system are estimated by region and year in 1976 US dollars. The final step is to multiply the per capita cost estimates for each year by the covered population using the "baseline" demographic projections to simulate total basic health care system costs. In estimating costs, an effort is made to err on the high side so that the possibility of underestimating total costs is reduced.

192. The problem of extending basic health care to the full urban population is neither coverage (since the INPS/IPASE system already covers over 85 percent of the target population) nor financial resources (which are already being mobilized), but rather restructuring so as to place less emphasis on doctors and hospitals (the most expensive part of the system) and more on paramedical personnel, preventive medicine, and outpatient care (which are not only cheaper, but more efficient at delivering many services to the persons who most need them). The cost per capita of covered population should be less in the restructured system than the present one, but in line with the determination to make cost estimates at the upper end of the plausible range, the actual 1976 per capita costs were used as the base for the simulations. A 1 percent per year increase in real per capita costs is assumed in the pessimistic simulation and a 2 percent increase in the optimistic (faster growth) simulation. Coverage of the urban population reaches 100 percent in 1980 in the optimistic simulation, and in 1990 in the pessimistic one.

193. The greatest opportunities for increasing coverage, and hence the principal differences between the optimistic and pessimistic simulations, are found in the rural sector. Here the approach adopted was to assume that a PIASS-type system will be progressively implemented in all regions, starting in the Northeast (where the effort began in 1976) and spreading to the other regions beginning in 1981. Cost estimates are based on World Bank experience in rural development projects in the Northeast; but the basic costs are augmented by a generous 30 percent administrative overhead charge to allow for better management of the system, and substantial regional cost differentials are assumed in the Southeast and Frontier regions (in line with differences in average minimum wages between these regions as compared with the Northeast). In the rural system both current and capital costs (including training) are considered explicitly. The rate of implementation is essentially a function of per capita GDP growth and development strategy. Both lead to faster implementation in the optimistic simulation, with full coverage attained in all regions by 1990. In the pessimistic simulation full coverage is not attained in all regions even by the year 2000.

194. Total (rural and urban) basic health care system costs would not exceed 2.6 percent of GDP in any five year period between 1976 and 2000 for either simulation. Since public health systems already cost about 2.5 percent of GDP in 1976, money does not appear to be the problem in extending the basic health care system at the rates indicated in the two simulations. Indeed, given the deliberate upward bias in the cost estimates, it is quite likely that the percentage of GDP required would at no time before the end of the century exceed that observed in 1976. Thus, if the public health care system
grew at the estimated rates, and assuming unitary income elasticity of the taxes which now finance public health care, there could be a dividend left over for further acceleration of coverage increases and/or average quality improvements without any increase in taxation rates.

195. The real challenge in improving Brazil's health care system is organizational rather than financial. Increasing access to the system by the poor, especially in rural areas, and strengthening the collective-preventive components so as to raise overall system efficiency are the major measures required. They are not costless, but the costs are likely to be offset, at least in part, by efficiency improvements. Once full coverage is realized, the real financial effort required to provide basic health care, expressed as a percentage of GDP, should fall.

D. Reducing or Eliminating Malnutrition

196. Given that defining basic nutrition needs in the Brazilian context and designing socially acceptable, cost-effective nutrition programs are issues which should be resolved before a truly massive national effort is made to eliminate or reduce malnutrition, projecting the costs of programs with these objectives is an even more hazardous endeavor than in the case of extending basic health services to the urban and rural population. The simulations which follow must therefore be considered highly tentative. They are intended simply to explore the orders of magnitude of costs which meeting certain goals (which are themselves tentative) might imply, under certain conditions.

197. Two major assumptions underlie these simulations. The first is that diets typical of families just meeting their calorie requirements and also diets composed of the same mix of foods as consumed by 20th percentile families but in sufficient quantities to meet calorie requirements (Type 1 and Type 2 diets respectively) will also guarantee sufficient proteins, vitamins and minerals. That is, in the Brazilian context, adequate calorie consumption is the binding constraint on achieving satisfactory nutrition. This assumption appears to be supported by the ENDEF data and other less comprehensive surveys.

198. The second assumption is that unless there are changes in Brazil's relative income distribution (in the direction of increasing equality), and/or significant changes in dietary habits, income growth and additional "basic" food output alone will not be sufficient to wipe out malnutrition (defined here as consumption below the FAO/WHO Low calorie requirements) by the end of the century. This assumption is itself based on two "baseline" simulations. They assume no large-scale nutrition interventions are undertaken, that the relative income distribution implicit in the ENDEF expenditure distributions does not change, and that GDP grows at 4 percent (pessimistic simulation) or 7 percent (optimistic simulation). The pessimistic baseline simulation shows that 42 percent of the Brazil population in the year 2000 would have calorie deficits under 400 calories per person per day, but only 4 percent would have
deficits over 400 calories. The absolute number of Brazilians with small and moderate deficits would increase by 61 percent compared with 1975, but the population with large deficits would fall to 47 percent of its 1975 level. In the optimistic simulation the picture is much brighter, but 22 percent of the population would still have deficits up to 400 calories, and only 0.5 percent would have deficits above 400 calories. These findings suggest that even if the goal is only to eliminate the deficits over 400 calories per person per day by the end of the century, some kind of government intervention will probably be necessary.

199. Four additional simulations were performed (using the "baseline" simulations as a starting point) to estimate the cost of eliminating calorie deficits through direct distribution of diet supplements during the period 1980-2000, using first Type 1 diet supplements (the mix of foods consumed at the prices paid by families in each ENDEF subregion who met their calorie requirements in 1974/75) and then the cheaper Type 2 supplements (the mix of foods consumed at the prices paid by families at the 20th percentile of each subregional expenditure distribution). It is assumed that no diversion or substitution takes place, but that the real costs of supplements are increased by 50 percent over the real prices actually paid by consumers in 1974/75. This allows a margin for administrative costs, price increases, and educational campaigns.

200. For each type of supplement, two simulations were performed. In both it was assumed that food supplements sufficient to eliminate all calorie deficits are distributed free of charge to the deficit population. The only difference between them is the rate of GDP growth assumed--4 percent in the "pessimistic" simulations and 7 percent in the "optimistic" ones. In all four simulations it is assumed that income distribution is "neutral" and that no changes occur in the consumption patterns observed in the ENDEF data other than increased food consumption from supplements and the changes associated with higher income. Gradual implementation of the distribution programs is assumed, and this is arbitrarily defined as spending 10 percent of full coverage costs in 1980, 40 percent over the period 1984-85, 80 percent over the period 1986-1990, and 100 percent from 1991-2000.

201. On these assumptions, the highest financial effort (defined as percentage of GDP required to carry out the programs) in any period between 1980 and the year 2000 would be in the pessimistic simulation for the periods 1986-1990 and 1991-2000 when about 1.2 percent of GDP would be required for Type 1 supplements and about 0.9 percent with Type 2 supplements. Potential costs have been deliberately and consistently stated on the high side to avoid under-estimates. First, the measure of requirements may be slightly high for the adult Brazilian population. Second, relatively cost-inefficient foods were included in the supplements, in accord with observed Brazilian dietary habits. Third, a full 50 percent was added to the retail prices observed in each subregion. Finally, direct distribution of food supplements is more expensive than food stamp programs or other forms of partial subsidy. Any improvement in relative income distribution would reduce costs further.
202. It may be concluded that the costs of massive nutrition programs, with the objective of totally eliminating calorie deficits by 1990, would probably not require inordinate expenditure even if totally free distribution were used, assuming real GDP grows at least 4 percent per year for the remainder of this century. But much remains to be learned about how to organize and administer such programs so as to achieve their objectives efficiently.

E. Increasing Basic Education Enrollments

203. Nationwide enrollment and operating cost projections to the year 2000 for basic education (grades 1 to 8; "normative" ages 7 to 14) are described in Appendix D of Annex III. Based on these projections, plausible ranges of magnitude for enrollment and operating cost in selected future years and comparisons of the projected cost with projected GDP values are discussed here.

204. Unlike other sectoral projections in this report, there is only one set of basic assumptions underlying the detailed projections of future levels of the service in question—enrollment. This set of assumptions can be described as a continuation with modest improvements of current trends with respect to key projection parameters such as admission, repetition, promotion and desertion coefficients. As such, they can be regarded as being intermediate in the "pessimistic-optimistic" spectrum. The limiting values of the "plausible ranges" of future enrollment reported have been derived as a 10 percent interval above and below the values computed by the detailed method described in Appendix D of Annex III. Alternative recurrent cost-per-student values are taken from Appendix D of Annex III. They are assumed to rise significantly over the projection period, almost doubling in the optimistic simulation, to allow for increased quality in basic education. As indicated above, the projections are not geographically disaggregated; they apply only for Brazil as a whole. Since very wide geographical disparities in enrollment and cost indices are lost in the aggregation, the projections are not at all representative of the evolution of these indices in most geographical areas. Thus the only purpose of the projections is to suggest possible orders of magnitude for the cost of achieving certain aggregate enrollment goals. Other tools of analysis must be used to take into account regional disparities.

205. According to the projections, total enrollment would grow from about 28.6 million students in 1974 to between 34 and 42 million in 2000 (or average annual growth rates of from 2.3 percent to 3.2 percent for the 1974-2000 period; this compares with an average of 5.9 percent during the 1955-74 period). This decline in the growth of gross enrollment rates includes the effect of reducing the number of overage students. But more important, as most of the children aged 7-14 become enrolled, the rate of growth of enrollment tends to the limit set by the rate of growth of the population in this age group. The (midpoint) enrollment projections imply that the proportion of 7 year olds admitted into the system would grow from 87 percent in 1975 to 100 percent in 2000. In the urban areas of the Southeast, this proportion is already very close to 100 percent. Under current trends, it is unlikely that universal coverage of 7 year olds in the rural Northeast would be attained before the 1990s; universal coverage of the 7 year old population might be approached by the end of this century.
Combining the alternative average operating cost (per student), projections with correspondingly low and high projections of enrollment and GDP, results in GDP shares devoted to the purpose ranging from 0.8 percent to 1.0 percent in any one year between 1980 and 2000. Once again, financial resources do not appear to be the most serious constraint in achieving universal primary education before the end of the present century if better redistribution of funds for basic education to achieve targets in poor areas can be brought about. Much remains to be learned about how to organize and administer federal and state programs in basic education so as to achieve this objective efficiently.

F. Improving Housing, Water Supply and Sewerage

In spite of deficient historical data on basic residential services and the key role of non-economic factors in determining their supply, it is of interest to explore questions concerning the future evolution of these services. Simple (and in some ways simplistic) arithmetical exercises, or simulations, are a convenient way of dealing with some such questions.

The specific objectives of the simulations reported here are to derive broad boundaries on the range of plausible values for: (i) time paths involved in expanding coverage of basic residential services in the remainder of this century; and (ii) maximum amounts of public sector outlays that might be required to meet coverage targets for specified years in the future. Moreover, since it is of interest to explore the likely demographic impact of alternative future paths in the coverage of these services, the exercises are useful in providing some rough notions concerning what might be plausible limits within which such paths can be expected to fall. The simulations deal with the three basic residential services of central concern to the report: (i) adequate dwellings, (ii) access to water and (iii) sewerage. The definition of each differs according to the urban or rural location of the dwelling.

Depending on whether "optimistic" or "pessimistic" assumptions are made concerning the (long run) rate of Brazilian economic growth during the last two decades of this century (7 percent or 4 percent per annum, respectively), and concerning certain quantitative historical relationships between per capita income and coverage of these residential services, simulation results suggest that by century's end probably:

- 10 percent to 30 percent of all Brazilian households would be living in dwellings that are considered "sub-standard" by most Brazilian policy-makers today -- for urban households, these proportions would be somewhat higher; the corresponding percentage for 1970 is about 45 percent;

- between less than 10 percent and 30 percent of urban dwellings would lack connections to a general water network; in 1970 46 percent lacked such connections;

- one half to two thirds of rural dwellings would lack piped water, compared to 94 percent in 1970;
40 percent to 60 percent of urban dwellings would lack connections to a general sewerage network, compared to 78 percent in 1970;

20 percent to 50 percent of all rural dwellings would lack any sanitary device, compared to 75 percent in 1970.

210. To some observers of Brazilian social development, even the optimistic simulation results might appear disappointing. For these, the question of what would be the rough dimensions of the financial outlays that would be required by the public sector to attain certain coverage targets that are more ambitious than the optimistic simulation results would be of some interest. A related question is whether such financial outlays would imply an unrealistic fiscal stress. These sorts of questions beg the crucial issue of the role of non-financial constraints -- such as organizational, staffing and logistical bottlenecks -- in drastically accelerating the pace at which coverage for the services is extended. Yet it may still be of interest to explore the extent to which "money is a problem". A second set of simulations address such preoccupations.

211. For the purpose of investigating whether the magnitude of financial requirements may present a binding constraint on attaining coverage targets that are ambitious by historical standards, these simulations are based on assumptions tending to overstate the required amounts. These simulations indicate that only a small proportion of GDP would be required as financial outlays by the public sector to substantially accelerate the expansion of basic housing services in Brazil during the next couple of decades and approach full coverage by century's end. Based on assumptions that systematically sought to produce upwardly biased projections of such public sector outlays, the simulations suggest that less than one and a half percent of GDP would be required during each of the two decades between 1980 and 2000, assuming GDP growth of 4 percent per year. Under 7 percent annual growth, GDP share would be about 40 percent lower by the decade of the 1990s. (In recent years some 1.7 percent of GDP were devoted to such expenditures.) There is no a priori reason to believe that this share of GDP would have to be substantially exceeded in any particular year during the entire simulation period.

212. These simulations also indicate that of the three housing sub-sectors included in the exercises (dwellings, water and sewerage), dwellings would take the lion's share in attempting to approach full coverage in the three sub-sectors by century's end. This share (for dwellings) would probably exceed 50 percent of public sector outlays for these housing related services over the remaining period to the year 2000. In turn, urban dwellings would probably absorb over 80 percent of the total dwelling's share.

213. In conclusion, the simulations indicate that, compared to historical trends, a substantial acceleration in coverage of basic housing services might not involve a serious strain in the Brazilian economy. However, institutional and other factors pose obstacles to rapid future progress in these sectors. Important among these are legal and financial constraints on the capacity of public sector agencies to provide these basic services to families that cannot afford them under the current rules. Other potential constraints relate to the supply of scarce non-financial resources (e.g., top- and middle-level managerial talent) which may prove insufficient under current incentive
patterns. Consequently, an effort of the magnitude implied by these ambitious simulations would probably require increasing financial subsidies to these sectors from outside the BNH system and finding ways to overcome institutional and other impediments, especially in rural areas. Analysis of the policy, program and administrative measures that could be taken to deal with such other constraints seem to warrant top priority for further work in this area.

G. Basic Needs Satisfaction or Investment in Human Resources: Conclusions

214. Improving access of the poorer Brazilians to basic health services, sufficient food, adequate housing, safe water, and excreta disposal may be looked at as raising basic consumption standards, or alternatively, as investment in Brazil’s human resources. We are inclined to argue that there is a strong investment component in basic consumption, since when basic needs of workers are not met, their productivity also tends to be below that of healthy, well-fed, and adequately housed workers. The learning capacity of school-age children, and hence their future productivity is also impaired. But even if there were no investment component, it can be argued that the basic consumption needs of the entire population should be satisfied if possible.

215. The simulations reported above suggest that for each service considered, a national effort to meet the minimum needs of the Brazilian population would not impose inordinate costs which would have to be met through public sector outlays. Is this true in the aggregate as well as for each service? The table that follows adds up the total cost, measured as a percentage of GDP, for basic health care, nutrition, basic education, housing, water supply, and sewerage estimated in the simulations found in Annexes III and IV for both pessimistic and optimistic GDP growth rates over the period 1981-2000. In no case is full coverage of the target population attained from the outset. But the simulations are based on realistic trajectories toward this goal. More specifically, the simulations assumes the following services and coverage rates.

<table>
<thead>
<tr>
<th>Service</th>
<th>Pessimistic Simulation</th>
<th>Optimistic Simulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Urban Health Care</td>
<td>100 percent coverage by 1990</td>
<td>100 percent coverage by 1980</td>
</tr>
<tr>
<td>Basic Rural Health Care</td>
<td>85 percent coverage by 2000</td>
<td>100 percent coverage by 2000</td>
</tr>
<tr>
<td>(all 3 levels)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutrition Programs</td>
<td>Distribute Type 1 diet supplements sufficient to</td>
<td>Distribute Type 1 diet supplements sufficient</td>
</tr>
<tr>
<td></td>
<td>eliminate all calorie deficits by 1990</td>
<td>eliminate all calorie deficits by 1990</td>
</tr>
<tr>
<td>Basic Education</td>
<td>Gross enrollment 85 percent of the population aged 7-14 by 2000</td>
<td>Gross enrollment 103 percent of the population aged 7-14 by 2000</td>
</tr>
<tr>
<td>Adequate Housing</td>
<td>100 percent coverage by 2000</td>
<td>100 percent coverage by 2000</td>
</tr>
<tr>
<td>Safe Water</td>
<td>100 percent coverage by 2000</td>
<td>100 percent coverage by 2000</td>
</tr>
<tr>
<td>Sewerage</td>
<td>100 percent coverage by 2000</td>
<td>100 percent coverage by 2000</td>
</tr>
</tbody>
</table>
PESSIMISTIC AND OPTIMISTIC SIMULATIONS: SUMMARY OF PUBLIC SECTOR OUTLAYS FOR HEALTH, NUTRITION, BASIC EDUCATION, HOUSING, WATER SUPPLY, AND SEWERAGE BY URBAN/RURAL LOCATION AS PERCENT OF GDP BY DECADES, 1981-2000

<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>Pessimistic</td>
<td>Optimistic</td>
<td>Pessimistic</td>
<td>Optimistic</td>
</tr>
<tr>
<td>Health Care</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>2.05</td>
<td>1.92</td>
<td>2.13</td>
<td>1.60</td>
</tr>
<tr>
<td>Rural</td>
<td>0.41</td>
<td>0.44</td>
<td>0.37</td>
<td>0.49</td>
</tr>
<tr>
<td>Subtotal, health b/</td>
<td>2.46</td>
<td>2.36</td>
<td>2.50</td>
<td>2.09</td>
</tr>
<tr>
<td>Nutrition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>0.88</td>
<td>0.52</td>
<td>1.09</td>
<td>0.35</td>
</tr>
<tr>
<td>Rural</td>
<td>0.13</td>
<td>0.09</td>
<td>0.11</td>
<td>0.04</td>
</tr>
<tr>
<td>Subtotal, nutrition b/</td>
<td>1.02</td>
<td>0.61</td>
<td>1.20</td>
<td>0.40</td>
</tr>
<tr>
<td>Education (Subtotal)</td>
<td>0.86</td>
<td>0.93</td>
<td>0.76</td>
<td>0.85</td>
</tr>
<tr>
<td>Dwellings</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Urban</td>
<td>0.57</td>
<td>0.46</td>
<td>0.52</td>
<td>0.32</td>
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<tr>
<td>Rural</td>
<td>0.13</td>
<td>0.11</td>
<td>0.11</td>
<td>0.07</td>
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<tr>
<td>Subtotal, dwellings b/</td>
<td>0.69</td>
<td>0.57</td>
<td>0.62</td>
<td>0.39</td>
</tr>
<tr>
<td>Safe Water</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>0.19</td>
<td>0.16</td>
<td>0.12</td>
<td>0.08</td>
</tr>
<tr>
<td>Rural</td>
<td>0.08</td>
<td>0.07</td>
<td>0.10</td>
<td>0.06</td>
</tr>
<tr>
<td>Subtotal, water b/</td>
<td>0.27</td>
<td>0.22</td>
<td>0.23</td>
<td>0.14</td>
</tr>
<tr>
<td>Sewerage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>0.28</td>
<td>0.23</td>
<td>0.28</td>
<td>0.18</td>
</tr>
<tr>
<td>Rural</td>
<td>0.01</td>
<td>0.01</td>
<td>0.02</td>
<td>0.01</td>
</tr>
<tr>
<td>Subtotal, sewerage b/</td>
<td>0.30</td>
<td>0.24</td>
<td>0.30</td>
<td>0.19</td>
</tr>
<tr>
<td>All Services b/</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban c/</td>
<td>3.97</td>
<td>3.29</td>
<td>4.14</td>
<td>2.53</td>
</tr>
<tr>
<td>Rural c/</td>
<td>0.76</td>
<td>0.72</td>
<td>0.71</td>
<td>0.67</td>
</tr>
<tr>
<td>Total all services</td>
<td>5.60</td>
<td>4.93</td>
<td>5.61</td>
<td>4.06</td>
</tr>
</tbody>
</table>

a/ Figures are accumulated public sector outlays for each service over 10 year periods, divided by accumulated GDP over the same periods. Real GDP is assumed to grow at 4 percent per year in the pessimistic and 7 percent per year in the optimistic simulations, beginning in 1980. Real GDP growth is assumed to be 5 percent in 1978 and 1979. Education expenditures are not disaggregated by urban/rural location.

b/ Items may not equal sum of components owing to rounding.

c/ Excludes Education.

Sources: Annex III, Tables 13, 33, and 54 and Annex IV Tables 37-42.
216. The table indicates that the total costs of the simulated public sector programs in these sectors as a percentage of GDP are highest in the pessimistic (4 percent per year GDP growth) simulations, about 5.6 percent over both the 1980s and the 1990s. Use of Type 2 rather than Type 1 diet supplements would take 0.3 percentage points off nutrition program costs in the pessimistic simulation over the 1980s, 0.2 percentage points for the optimistic simulation over the same period, and 0.4 and 0.1 percentage points respectively in the pessimistic and optimistic simulations for the 1990s. When GDP growth is faster (7 percent per year) more is accomplished, and the cost is less relative to GDP, 4.9 percent in the 1980s and 4.1 percent in the 1990s. The reader should bear in mind that these estimates necessarily indicate only rough magnitudes of costs which might be involved.

217. It must be stressed that the cost estimates include only public sector expenditures. The level of services provided is not generally the best possible if cost were not a consideration, but rather a realistic approximation to the concept of basic. Implementation rates are also constrained to realistic estimates of what is possible. Further, the relatively low cost when measured as a percentage of GDP reflects the fact that even in the pessimistic simulation GDP grows at 4 percent, while population growth begins to slow from the current estimate of 2.8 percent. Finally, particularly in the optimistic simulations, 100 percent coverage ratios for some services are achieved relatively early in the period. Once 100 percent coverage is attained, costs generally do not grow much faster than population, hence the effort required measured as a percent of GDP declines.

218. In Annex III it was argued that the health programs could be financed with existing taxation and that basic education costs could also be financed without new taxation if the explosive growth of higher education is controlled. Based on data in Annex IV, a rough estimate of the maximum amount of subsidies from outside the BNH/FGTS system required for housing, water supply, and sewerage programs is 0.6 percent of GDP. Assuming that nutrition programs would have to be financed through new taxation, the likely maximum additional taxation required in either decade would be 1.8 percent of GDP in the 1990s in the pessimistic simulations, and the lowest would be 1.0 percent in the 1990s in the optimistic simulations. The new taxation required is likely to be on the order of 1.2 percent of GDP for the optimistic simulations in the 1980s and 1.6 percent the pessimistic simulations in the 1980s. Use of Type 2 diet supplements would bring the new taxation required below 1.5 percent of GDP for both simulations in both decades.

219. But the binding constraints, as has been argued throughout this report, are likely to be non-financial. Organizational, staffing, and logistical bottlenecks are likely to retard the pace at which service coverage is extended, at least in the short run. High level management personnel, for example, are in short supply in Brazil, and their opportunity costs are high. Shifting such scarce human resources from one sector of the economy to another may well have significant costs, but these are not easily estimated. On the other hand, not meeting the urgent needs of the poor for adequate diets, health care, education, shelter, safe water, and excreta disposal may provoke even costlier social tensions.