

Sectoral Aspects of a Basic Human Needs Approach: The
Linkages among Health, Population, and Nutrition

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Introduction

The Basic Human Needs (BHN) approach to economic development focuses on improving human welfare within the context of broad-based macroeconomic growth. As part of this emphasis human capital considerations have achieved greater prominence as a means of generating and sustaining economic growth. Although not new, such an emphasis has ^{fostered} a reordering of development priorities, which has been reflected particularly in resource allocation decisions of foreign assistance donors.

Development targets have traditionally ^{and explicitly been} focussed on GNP growth, while poverty alleviation and improved individual welfare have implicitly been of secondary importance. The basic human needs approach addresses both issues directly, by stressing improvements in the quality of life as well as growth strategies to achieve those objectives; the focus is on the absolute poor, the group often overlooked in economic development strategies.

This paper places some ^{critical} components of a BHN approach in perspective - specifically addressing health, family planning, and nutrition (HPN). The interrelationships among these factors are emphasized as are their mutually reinforcing nature and their role

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on meeting individual and national development objectives.^{1/} The intent is also to familiarize the reader with the rationale behind the current emphasis on human capital investments in development and their importance in meeting the basic needs of the poor.

The chapter is divided into four sections. The introductory section (1) introduces the BHN concept, briefly discussing major issues; (2) estimates the costs of service delivery (in population, health and nutrition); and (3) provides information on current resource allocations from national and donor sources for HPN. The subsequent three sections present the major issues associated with each of three critical sectors in a BHN framework, including discussion of measurement tools, determinants, consequences, and policy and program options.

BHN Concepts

The objective of development strategies in the 1950 s and 1960 s was to achieve high rates of aggregate growth, and the assumption was that human welfare would be enhanced over the long run as the benefits of development "trickled down" to those at the bottom of the income scale. Over the last decade the notion that distribution concerns should be pursued in conjunction with macro-economic objectives has evolved from the realization that growth, although it encouraged development in some segments of the economy, left large portions of the population untouched. Thus it became apparent that growth and equity concerns must be pursued simultaneously if economic development and a more equitable distribution of the benefits of development are to emerge (Chenery et. al. 1974).

^{1/} Education as a sector has been excluded due to space constraints; however, its importance in achieving improvements in welfare has been addressed within the context of each of the included sectors. It should be stressed that education is of paramount interest in encouraging health and nutrition improvements and family size reduction. In addition, increases in education, either formal or nonformal (such as health, agricultural or family planning delivered by outreach workers) is one, or, if not the, most important factor in achieving basic needs.

The basic human needs approach to development was put forward by the International Labor Office in 1976 in an attempt to focus particular attention on the specific needs of the poor in developing countries (LDCs). Earlier, broadly consistent approaches were adopted by the World Bank and the Agency for International Development (AID), among other bilateral and multilateral donors, indicating the general acceptance of the notion that equity concerns do matter; by the late seventies donor policies had evolved further and were explicitly or implicitly aimed at BHN objectives.—^{1/}

Components of a BHN approach include: (1) minimum consumption of food, shelter and clothing; (2) access to services such as safe water, sanitation, health, family planning and public transportation; and (3) participation of people in decisions that affect them.—^{2/} This chapter will address the critical sectors of health, nutrition, and population.

^{1/} In 1973 the U. S. Congress enacted the "New Directions" legislation, requiring A.I.D. to focus its efforts on helping the LDC poor more directly. Amendments to the Foreign Assistance Act in 1978 called for a "program in support of countries which pursue development strategies designed to meet basic human needs and achieve self-sustained growth with equity". See the IBRD's 1980 World Development Report for a restatement of the World Bank's objectives.

^{2/} These are essentially the basic needs put forward by the ILO, with the addition of family planning.

Human Resources and Target Population

Resources in LDCs are generally scarce; natural resources may be few; capital and technology are inadequate; and labor, though abundant, is lacking in quality -- by which we mean it is characterized by low productivity because of ill-health, malnutrition, and inadequate training.^{3/} Thus human capital investments are efficient means of harnessing this large, untapped resource. Government investments in human capital provide the poor with the essential tools for improving their livelihood. These investments supplement incomes by subsidizing goods and services and enhance employment opportunities by increasing labor productivity. Investment in health, family planning, nutrition and education are particularly relevant for enhancing human capital and contributing to achievement of employment and income goals.

The investments in human capital that underly a basic needs raise labor's capability through improvements in nutrition, health and education. Such improvements which raise productivity stimulate private sector demand for labor. A skilled, healthy worker is more employable and productive, than is an unskilled, undernourished laborer, and consequently is better able to generate income. The issue of employability is thus a central objective of efforts to meet basic needs and improve welfare, for it enhances income earning ability.

^{3/} We shall use training, instruction and education interchangeably as all represent education in the broadest sense, all are in short supply in LDCs and are all of equal importance to development objectives.

A BHN strategy is aimed at the lowest absolute income group in a given country, those having inadequate purchasing power to satisfy their basic needs. This means reaching anywhere from 20 to 60 percent of the population. In a country like Sri Lanka the target group would be close to 20%; in Nepal the proportion might exceed 60%. And, the International Bank for Reconstruction and Development (IBRD) estimates that roughly 700 million people in the developing world fall into this category.

Individuals lacking access to services and/or sufficient purchasing power to fulfill their basic needs constitute the specific target group. As a result a BHN approach favors rural areas, where services such as health and family planning are less likely to be available,^{4/} over urban areas. The areas in which governments prefer to provide services may not reflect preferences of the target group. Providing health centers, family planning services, water and sanitation supplies and schools may not now reflect local priorities, but in supplying these services at subsidized rates the government encourages use: for example, from witch doctor to paramedic, from folk methods to modern contraceptives, or from household employment to student.^{5/} Lower costs encourage use, providing an inducement for consuming new and unfamiliar services.

^{4/} Urban areas are rapidly attracting rural migrants, swelling the "urban poor" population and placing increasing pressure on existing services. Although urban poverty is, and will continue to be, a pressing development issue, services are far more likely to be available there than they are in rural areas. Furthermore, existence of greater demand will encourage governments to provide services; such leverage is rarely possible in rural areas.

^{5/} Demand for these services differs across countries, incomes and cultures. For example, if schooling is a high family priority, parents will send their children to school, and may be willing to finance books and supplies; if education is not perceived to be a priority, even free schooling will not be consumed. It cannot be said that low income groups don't demand any of these services; many do, but it cannot be taken for granted.

Merit Goods

Merit goods are relevant for the discussion of HPN, and serve to incorporate issues of minimum consumption, service access and participation within that context.

Clothing and transportation on the other hand are goods and services best provided by the private sector, as they are not characterized by the "jointness of supply" or "external economies" criteria of public goods, nor by the uncertainty or informational gap nature of merit goods.—^{6/} (Head 1974). Rises in absolute income and purchasing power is a preferable means for stimulating private sector supply of these goods and services, although a role for government in transportation can be justified. Shelter fits the merit good criteria, but will not be addressed here.

Government adoption of a BHN approach does not necessarily occur in response to public demand, but rather from a realization that the poor, especially in rural areas, will not be able to meet their basic needs without increased transfers and/or additional income. In providing transfers, governments feel obliged to impose constraints and encouragements to specific kinds of consumption; since certain goods and services are considered meritorious (merit goods), these are provided free or at highly subsidized rates to encourage use.—^{7/} Provision of merit goods stems from government's perception that certain goods and services are underconsumed due to inadequate knowledge and/or information, and to high uncertainty associated with consuming unfamiliar and often costly services. (Head 1974)

^{6/} Jointness of supply, implying that a given unit is indivisible and external economies, where exclusion of any individual (citizen) is impossible, characterize public goods (See Head 1974 for a detailed explanation of public goods and related topics).

^{7/} A good example of a merit good in the developing country context are food supplement programs which encourage consumption of more nutritious foods. See Leipziger and Lewis (1977) for a discussion of merit goods in a BHN context.

Although merit goods are encouragements to consume particular goods and services, it is not correct to say that the poor are consistently irrational in their decision-making. Possibly the best documented evidence of rational behavior is in nutrition, where increases in income have consistently led to improvements in nutrition.^{8/} (Berg, 1979; Pinstrip - Anderson and Caicedo, 1978). For those whose demand for modern health-care, family planning, and nutrition services, is below minimally acceptable levels, the BHN approach aims at making services accessible and affordable; subsidizing consumption should encourage changes in behavior and actual demand for such services. Once sufficient demand exists, as a result of income generation and learning, the private sector can more efficiently participate in providing some of these services.^{9/} Thus governments are proposing substantial expenditures for a given period of time, with the expectation that demand for such services will evolve, allowing institutions of fees or private sector involvement both of which reduce public sector subsidies.

^{8/} In rural areas perverse effects can occur where increased output of nutritious food is sold and the family subsists on inadequate, low nutrient foods. In effect, the opportunity cost of consumption is too high and consequently nutrition suffers. As discussed below, however, a considerable proportion of but not all additional income is used for food.

^{9/} We are also assuming here that BHN investments will eventually generate the income to enable families to purchase services, and that public provision of many services can be phased out. An exception is health services which generally is a joint public-private effort.

Costs

Efforts have been made to estimate the worldwide costs of providing adequate health and food to the poor in LDCs. Burki and Voorheuve (1977) have estimated the average annual capital and recurrent costs of health care (including provision of water and sewage disposal) and adequate food at \$9.2 billion (US 1975 dollars) and \$7.1 billion respectively. But, these aggregate figures are not particularly useful in designing country or regional programs.

Project design determines the extent of service outreach (essentially "rural house calls") to be provided range of health-related services, both of which contribute substantially to the costs of integrated health services. The greater the number of services provided the higher the recurrent costs--those costs required to keep the program operating after the initial investment has been made. The fixed costs of building facilities, stocking clinics, setting up referral and supervision systems and training personnel are large, one-time investments.^{10/}

Recurrent costs need special attention since they tend to become the long term responsibility of the developing country; and, if recurrent expenditures are high, and budgets constrained, programs have limited prospects for continuation and ultimate success.

^{10/} Traditionally, planners have largely limited their concern to the fixed costs, since these required considerable external funding and technical assistance. However, in the past decade the potentially enormous burden of recurrent costs has been realized and is beginning to be addressed. See Heller (1978)

In recent years a number of experimental service delivery/research projects have been completed, providing "soft" cost estimates of vertical and integrated health, family planning and nutrition programs.^{11/} Table 1 lists the per capita costs of delivering various mixes of HPN services. Given the differences in project design and the wide variation in costs of living,^{12/} the costs basically only convey orders of magnitude. However, Gwatkin, Wilcox and Wray (1979) contend that these figures are roughly comparable to LDC national per capita health expenditures. Health represents between .5 and 2.0 percent of per capita GNP in the selected countries in Table 1, which is well within the .5 and 3.0 percent range observed in many LDCs, and listed in Table 3. But, as the authors point out, since the national (and project) figures include only a small portion of the population, the actual per capita costs of extending HPN services to the unserved urban and rural areas will be different and possibly considerably higher than the figures in Table 1 imply.^{13/}

^{11/} A recent paper by Gwatkin, Wilcox and Wray (1979) reviews the completed health field experiments in eight countries.

^{12/} A major factor in cost of living is the medical doctor's salaries. See Robinson (1979) for relative MD pay scales in LDCs.

^{13/} A major limitation of the project figures concerns economies of scale, i.e. a project for the whole country will require a substantially greater investment since it is done on such a large scale that the economies made possible by a relatively small; regional program are no longer applicable.

TABLE I

Per Capita Costs of Integrated Service
Delivery Experiments

<u>Location/Services Provided</u>	<u>Annual Per Capita Costs of Services (US Dollars)</u>
Imesi, Nigeria MCH,N,NEd	\$1.50 (1967)*
Etimesgut, Turkey H	\$3.17 (1972)
Naragwal, India H,N	\$1.80(1973)
Rural Guatemala H,N (N Costs Not Included)	\$3.50 (1972)
Hanover, Jamaica N,NEd	\$2.50/Child (1974)
Kavar, Iran N,MCH,FP,HEd	\$3.54 (1972)
Danfa, Ghana H,HEd,FP,N	\$4.39 (1976)

Source: Gwatkin, Wilcox and Wray (1979) and Danfa Project Final Report (1979)

Note: These costs are rough estimates of capital and recurrent costs. Also, it should be noted that each program contained a slightly different mix of services, inhibiting comparison of per capita service costs across experiments.

Legend: MCH = Maternal and child health; H = health services;
N = nutrition services; NEd = nutrition education;
FP = family planning services; HEd = health education

* Dates in parentheses refer to dates of publication.

The costs of individual components of a health program are described in detail in Grosse et. al. (1979) and Heller (1975) for Indonesia and Malaysia respectively, and will not be covered here. However, the former project provides some interesting additional data on the relative costs and cost effectiveness of different interventions. Figure 1 provides data on the trade-offs between crude death rate (declines) and five year per capita expenditures on health interventions in rural Indonesia. The graph presents an optimal program mix for a given budget level. Hence, the best mix at \$5.00 per capita over five years (or \$1.00 per capita per year) includes a main center (assumed for all six points), 25 village health workers and immunizations; the 8.8 crude death rate associated with the \$5.00 per capita expenditure represents the maximum benefit obtainable at that budget level.^{14/} (Grosse et. al., 1979). In each category the program mix represents the most cost effective approach, the one which will have the greatest dampening effect on the crude death rate^{15/} for the investment. Such exercises are extremely useful tools in planning for integrated health services because they help to maximize the use of resources.

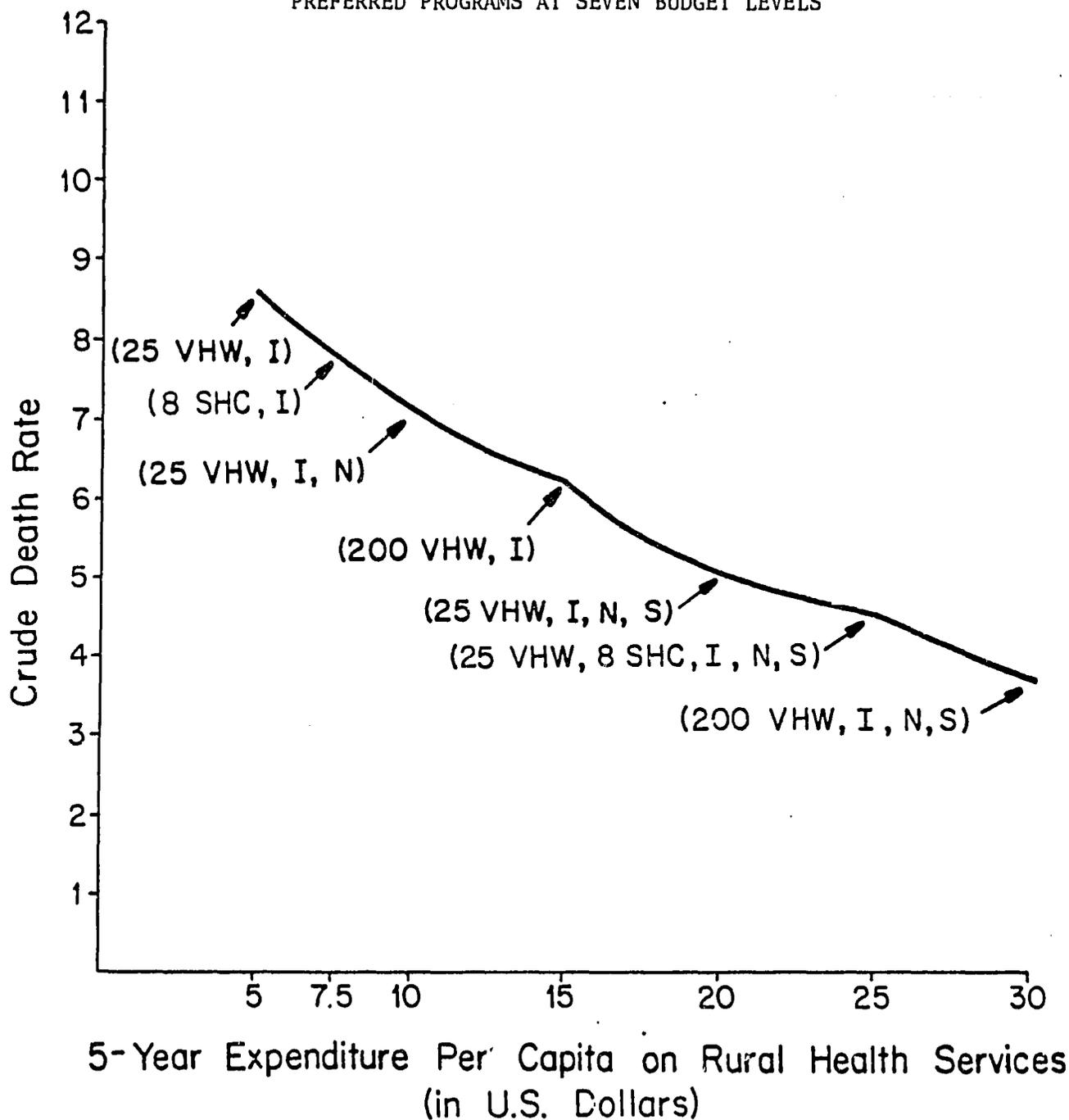
An issue of critical importance in health planning and in cost estimation is the extent of demand for health care: Heller (1976) has measured demand for health in Malaysia - a country with a relatively high per capita income and an established, nationwide health system. Although these factors

^{14/} Underlying the selected optimal interventions is extensive analysis which identified the most efficient mix of services. Unfortunately, family planning has not been included in the analysis. See Grosse et. al. (1979) for further discussion.

^{15/} See the nutrition and health sections for discussion of the importance of the crude death rate as an indicator of well-being.

Figure 1

PREFERRED PROGRAMS AT SEVEN BUDGET LEVELS



Each rural health program plotted includes a health center plus one or more of the following designations:

- 25 VHW = 25 Village Health Workers
- 200 VHW = 200 Village Health Workers
- 8 SHC = 8 SubHealth Centers
- I = Immunization
- N = Nutrition
- S = Sanitation

SOURCE: Grosse et. al., 1979

distinguish Malaysia from other LDCs, Heller's analysis is instructive. He found that as incomes rise, households tend to shift their demand away from traditional practitioners toward modern medical facilities.^{16/} Travel time appears to decrease utilization, although time costs (i.e. waiting time) do not significantly affect consumption of health services. Most significant is the apparent inelastic demand for medical services, indicated by the fact that fees do not significantly deter utilization.

Heller's (1976) results imply that where sufficient demand exists, fees for services can be instituted, which can help reduce recurrent costs. But it also becomes clear that a critical minimum level of income must be attained before the shift in demand behavior can occur, either because health and health related services become affordable or because attitudes and preferences change as income increases.

^{16/} However, this phenomenon may be due to factors associated with rising incomes rather than the income increases themselves. As discussed later, uneducated, poor families tend to have greater trust in traditional healers, and are reluctant to embrace "modern" medical care without justification. One of the more compelling incentives for using public facilities is low fees; hence subsidized services should work to encourage usage at lower levels of income.

An integrated approach is particularly relevant in the BHN context, for such a strategy can most efficiently meet complementary needs, while at the same time minimizing costs. The need to provide merit goods may raise costs in the short run, but if ^{income and} demand rises as anticipated, fees can be introduced to cover some portion of service costs. The BHN approach should not be seen as a welfare dole, but as an investment in human capital which will produce a more productive population and will help to meet the basic needs of the poor. Hence the cost of HPN services are essentially long term investments in human capital.

Resources

Assessing the actual cost burden of HPN services is difficult without knowing their relative claim on LDC government budgets. One reflection of government commitment is per capita government public health expenditures and the proportion of federal and local budgets devoted to health services. Table 2 provides both statistics, along with the percent of Gross National Product devoted to public health, for selected developing countries. The range is considerable. For example, health as a percent of total public expenditures ranges from 1.2 percent in Korea to 14.7 percent in Honduras. The gap in per capita resources is even greater, with India providing \$.46 per citizen versus Singapore's \$40.04 each.^{17/} Nepal spends only \$.79 per capita, but health represents a relatively high 6.7% of its national budget, indicating the relative importance of health in budget allocation and the extent of central responsibility for health.

^{17/} Some of the discrepancy, particularly in the case of India, is due to local (or state) responsibility for the financing of health care.

TABLE 2

Government Health Expenditures of Selected LDC's

Countries	Health Expenditures As % of Total Public Expenditures 1976	Public Health Expenditures As % of GNP 1976	Public Health Expenditures Per Capita (US\$) 1976
Ethiopia	4.5	0.8	.87
Burma	6.6	0.9	1.12
Chad	4.2	0.8	.95
Nepal	6.7	0.7	.79
Zaire	3.8	1.2	1.68
India	2.2	0.3	.46
Pakistan	1.8	0.3	.56
Tanzania	7.0**	2.1**	3.49**
Sri Lanka	6.1**	2.1**	3.92**
Kenya	8.2	1.8	4.24
Yemen Arab Rep.	2.9*	0.3*	.50*
Thailand	4.3	0.7	4.39
Bolivia	8.0	1.3	5.06
Honduras	14.7	2.9	11.15
Philippines	5.0	0.7	2.86
Zambia	7.0	2.7	11.92
Morocco	3.3	1.3	7.05
Guatemala	8.4	0.9	5.60
Ecuador	7.2	1.0	6.58
Korea, Rep. of	1.2	0.2	1.48
Nicaragua	4.1	0.7	5.11
Dominican Rep.	8.9	1.5	11.44
Peru	5.8	1.0	7.69

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Countries	Health Expenditures As % of Total Public Expenditures	Public Health Expenditures As % of GNP 1976	Public Health Expenditures Per Capita (US\$) 1976
Tunisia	6.6	1.9	15.75
Malaysia	5.7	1.5	13.15
Turkey	2.5	0.6	5.68
Costa Rica	5.6*	0.8*	7.07*
Mexico	4.2**	0.9**	9.14**
Brazil	6.0**	0.3**	3.37**
Uruguay	3.8	0.7	10.00
Iran	3.3	1.2	23.16
Venezuela	4.9	1.4	37.15
Singapore	7.7	1.5	40.04

Sources: World Atlas 1977, IBRD; International Financial Statistics 1978, IMF;
Government Finance Statistics Yearbook, Vol 2, 1978, IMF

However,

these figures can also be misleading measures of government commitment to health care and the poor. First of all, it should be noted that "health expenditure" can mean anything from integrated services with nutrition, health education and family planning as components to vertical, curative health services for the elite.^{18/} Secondly, the amounts do not reflect an equal geographic distribution of resources; expenditures may be distributed across rural and urban communities of rich and poor or be concentrated in wealthy, urban centers. As such, expenditure levels represent the emphasis the government places on health services, but says nothing of the government's target group or their success in satisfying the basic needs of the poor.

^{18/} See health section.

As the BHN approach or some variant of it has been embraced by bilateral and multilateral donors, the relative and absolute budget levels devoted to PHN by donor has increased. Table 3 lists the resource levels devoted to health, population and nutrition by the four largest donors: the U.S. Agency for International Development (AID), the United Nations Fund for Population Activities (UNFPA), the World Health Organization (WHO) and the International Bank for Reconstruction and Development (IBRD).

AID's emphasis on these areas and their perceived importance is apparent from the relative resource allocations listed in Table 3. Roughly 30% of AID's total development assistance budget has been devoted to HPN over the last few years, and the trend can be expected to continue.

The IBRD has only recently begun to (modestly) raise the proportion of its budget going to HPN, despite shifts in articulated policy emphasizing human resource investments. However, the establishment of a health programming sector in FY1979 and the themes of the recent annual World Development Reports bode well for future directions.

Although UNFPA ostensibly supports population activities exclusively, its mandate and activities are much more broadly defined. In 1982 almost 50 percent of the budget will go to family planning programs, many of which are aimed at providing maternal and child health (MCH) and pre and post natal care, as well as contraceptives. WHO is almost exclusively a health organization although many of its programs have nutrition components.

TABLE 3

Health, Population and Nutrition Resource Allocation by Major Donors
(millions of US dollars)

Fiscal Year 1/	AID					
	Population	Health	Nutrition	HPN Subtotal	Total 3/ Budget	Percent of Budget
1977	140.3 2/	83.6	n.a.	n.a.	848.1	n.a.
1978	160.5	96.8	12.0	269.3	1,008.6	27%
1979	185.0	133.0	11.0	329.0	1,147.2	29%
1980	185.0	131.3	21.0	337.3	1,152.4	30%
1981	238.0 *	159.2 *	30.5 *	427.7 *	1,409.2 *	30%

Fiscal Year	IBRD			UNFPA 5/	WHO
	HPN Subtotal 4/	Total Budget	HPN Percent of Budget	Total Budget	Total Budget
1977	61.5	7,100.0	.87%	81.4	132.3
1978	55.0	8,400.0	.66%	100.3	165.0
1979	114.0	10,000.0	1.14%	114.6	175.7
1980	143.0 *	12,000.0 *	1.19%	136.0	192.7
1981	n.a.	n.a.	n.a.	159.0 *	232.3 *

* estimate

- 1/ The U.S. government and IBRD fiscal years were both July-June through 1976, when the U.S. shifted to an October-September fiscal year. WHO and UNFPA funding follow the calendar year.
- 2/ The family planning and health budgets were combined until FY 1978; the agriculture and nutrition budget are a combined category, and FY 1977 breakdowns are not available.
- 3/ Includes development assistance only, and excludes the Sahel Development Program.
- 4/ These are committed funds for HPN.
- 5/ Includes all estimated obligations for activities funded under the regular budget and other sources for each fiscal year.

Sources: IBRD, World Bank Annual Report, 1977-79; AID, Congressional Presentation, 1977-81; WHO, Proposed Programme Budget, 1974-1978; UNFPA, Annual Report, 1977-79.

These aggregate data incorporate a wide range of activities, including, among others: family planning clinics, health clinic construction, (tropical) disease research and eradication activities, water and sanitation installation, health and nutrition education, demographic data collection, and research on means of delivering service(s) and encouraging their use. The coverage is broad, and size of funding for sub-categories tends to reflect regional and sectoral needs, as perceived by donors and host governments in the developing countries.^{20/}

The trend in the proportion of funding going to HPN by multi-sector donors appears to be on the upswing, despite high inflation rates in donor countries and stagnating real foreign assistance budgets. The need to address human resource issues is beginning to receive the rhetorical and financial attention it deserves, and budget allocations of the past few years reflect this shift in or reaffirmation of priorities. Hopefully this movement will continue, especially since the rapid growth in LDC populations in the next few decades will be adding service recipients at an increasing rate. The expected growth in population will require more resources just to maintain current, and admittedly inadequate, levels of service in nutrition, family planning and health.

^{20/} One particular population trend in AID's population policy, for example, is the ^{deemphasis} on census and vital statistics data collection, and the shifting of funds toward improving motivation for and delivery of family planning services. This response to changing circumstances is indicative of the kinds of policy changes made by decision makers in responding to changing LDC needs.

The following three sections will outline the major issues associated with population, nutrition and health, and their importance in the achievement of the basic needs objectives among the poor. The three areas are extremely broad and the issues chosen for discussion are somewhat arbitrary. The sources included in each section provide further references where more indepth information is desired.

Part Two: Population Issues

Introduction

Rapid population growth has been perceived as a major economic problem since the time of Malthus; his predictions of doom have never been realized in the developed countries, but many of his worries have become very real issues for development and health planners in the developing countries. High population growth has negative implications for the rate of economic development and both factors directly affect human welfare and the attainment of basic needs.—^{1/} In the bulk of the developing world rapid population growth is impeding economic progress and development; as Table 1 shows, although a number of less developed countries (LDCs) experienced advances in Gross Domestic Product (GDP) between 1970 and 1976, their per capita income growth lagged. The strain on national budgets of high fertility rates inhibits extension of services, including health, education, safe water and transportation services, particularly to rural areas where the bulk of LDC populations live. (See Conroy and Folbie, 1976 for a good survey of the literature; Morawetz, 1978). Population pressures may well prevent LDC governments from providing essential services to their populations regardless of the intensity of their commitment to meeting the basic human needs of their people. ^{2/}

^{1/} Although a high rate of population growth may impede economic growth, it can reflect a rational choice on a household level.

^{2/} In Kenya where roughly 30% of the national budget is allocated to education, the education requirements of a population growing at 4% per year will stymie government's attempt to increase the minimum amount of free schooling available to all children. Even if an increase were accomplished, quality as well as other competing services might well suffer.

TABLE 1
LDC Population and GNP Growth Rates

	GNP per capita (U S Dollars) 1977	Average Annual Growth of GNP per capita (percent) 1960-1977	Average Annual GDP Growth (percent) 1970-1977 ^{a/}	Population (millions) mid-1977	Average Annual Growth of Population (percent) 1970-1977
Low Income Countries	170	1.4	3.2		2.3
1 Bhutan	80	-0.2	..	1	2.2
2 Cambodia	..	..	..	8	2.5
3 Bangladesh	90	-0.4	2.3	81	2.5
4 Lao PDR	90	..	..	3	1.1
5 Ethiopia	110	1.7	2.5	30	2.6
6 Mali	110	1.0	3.5	6	2.5
7 Nepal	110	0.2	2.8	13	2.2
8 Somalia	110	-0.4	1.2	4	2.3
9 Burundi	130	2.2	1.4	4	2.0
10 Chad	130	-1.0	0.8	4	2.2
11 Rwanda	130	1.0	3.9	4	2.9
12 Upper Volta	130	0.6	3.3	5	1.6
13 Zaire	130	1.1	1.9	26	2.7
14 Burma	140	0.9	3.7	32	2.2
15 Malawi	140	3.0	6.3	6	3.1
16 India	150	1.3	3.0	632	2.1
17 Mozambique	150	0.9	-5.0	10	2.5
18 Niger	160	-1.4	1.8	5	2.8
19 Viet Nam	160	..	..	51	3.1
20 Afghanistan	190	0.2	4.5	14	2.2
21 Pakistan	190	3.0	3.6	75	3.1
22 Sierra Leone	190	1.3	1.9	3	2.5
23 Tanzania	190	2.6	4.5	16	3.0
24 Benin	200	0.2	2.0	3	2.9
25 Sri Lanka	200	2.0	3.1	14	1.7

^{a/} Excludes countries with populations under one million.

SOURCE: IBRD, World Development Report, 1979

	GNP per capita (U S Dollars) 1977	Average Annual Growth of GNP per capita (percent) 1960-1977	Average Annual GDP Growth (percent) 1970-1977 ^{a/}	Population (millions) mid-1977	Average Annual Growth of Population (percent) 1970-1977
Low Income Countries	170	1.4	3.2		2.3
26 Guinea	220	1.3	5.3	5	3.0
27 Haiti	230	0.1	3.8	5	1.7
28 Lesotho	240	5.8	5.2	1	2.4
29 Madagascar	240	-0.2	-0.3	8	2.5
30 Central African Emp.	250	0.2	0.9	2	2.2
31 Kenya	270	2.5	6.2	15	3.8
32 Mauritania	270	3.6	2.3	2	2.7
33 Uganda	270	0.7	0.1	12	3.0
34 Sudan	290	0.1	5.0	17	2.6
35 Angola	300	2.3	-10.4	7	2.4
36 Indonesia	300	3.3	7.7	134	1.8
37 Togo	300	3.8	3.1	2	2.7
Middle Income Countries	1,140	3.6	6.1		2.6
38 Egypt	320	2.1	7.9	38	2.2
39 Cameroon	340	2.9	3.4	8	2.2
40 Yemen, PDR	340	-4.8	5.1	2	1.9
41 Ghana	380	-0.3	0.4	11	3.0
42 Honduras	410	1.5	3.5	3	3.3
43 Liberia	420	1.8	2.7	2	3.4
44 Nigeria	420	3.6	6.2	79	2.6
45 Thailand	420	4.5	7.1	44	2.9
46 Senegal	430	-0.3	2.8	5	2.6
47 Yemen Arab Rep.	430	..	7.8	5	1.9
48 Philippines	450	2.5	6.4	44	2.7
49 Zambia	450	1.5	2.8	5	3.1
50 Congo, People's Rep.	490	1.1	5.6	1	2.5
51 Papua New Guinea	490	3.4	5.0	3	2.4
52 Rhodesia	500	1.8	3.3	7	3.4

	GNP per capita (U S Dollars) 1977	Average Annual of GNP per capita (percent) 1960-1977	Average Annual GDP Growth (percent) 1970-1977 ^{a/}	Population (millions) mid-1977	Average Annual Growth of Population (percent) 1970-1977
Middle Income Countries	1,140	3.6	6.1		2.6
53 El Salvador	550	1.8	5.1	4	2.9
54 Morocco	550	2.2	4.8	18	2.8
55 Bolivia	630	2.3	6.0	5	2.9
56 Ivory Coast	690	3.3	6.5	7	5.9
57 Jordan	710	1.8	7.0	3	3.3
58 Colombia	720	2.7	6.4	25	2.1
59 Paraguay	730	2.4	7.2	3	2.9
60 Ecuador	790	3.1	9.2	7	3.0
61 Guatemala	790	2.8	6.0	6	2.9
62 Korea, Rep. of	820	7.4	10.4	36	2.0
63 Nicaragua	830	2.5	5.8	2	3.3
64 Dominican Rep.	840	3.6	9.1	5	2.9
65 Peru	840	2.3	4.6	16	2.8
66 Tunisia	860	4.3	8.4	6	2.0
67 Syrian Arab Rep.	910	2.3	7.0	8	3.3
68 Malaysia	930	3.9	7.8	13	2.7
69 Algeria	1,110	2.1	5.3	17	3.5
70 Turkey	1,110	4.1	7.4	42	2.5
71 Mexico	1,120	2.8	5.0	63	3.3
72 Jamaica	1,150	2.1	(.)	2	1.7
73 Lebanon	..	..	..	3	2.5
74 Chile	1,160	1.0	0.1	11	1.7
75 China, Rep. of	1,170	6.2	7.7	17	2.0
76 Panama	1,220	3.5	3.5	2	2.7
77 Costa Rica	1,240	3.2	5.7	2	2.5
78 Brazil	1,360	4.9	9.8	116	2.9
79 Uruguay	1,430	0.8	1.6	3	0.3
80 Iraq	1,550	3.8	10.8	12	3.4
81 Argentina	1,730	2.7	2.9	26	1.3
82 Iran	2,160	7.9	7.8	35	3.0
83 Trinidad and Tobago	2,380	1.6	3.4	1	1.2
84 Hong Kong	2,590	6.5	8.2	5	2.0
85 Venezuela	2,660	2.7	5.7	14	3.4
86 Singapore	2,880	7.5	8.6	2	1.5

High fertility is by no means universal in all developing countries, although it is a grave issue for many. A recent monograph by Tsui and Bogue (1978) reports a comprehensive drop in total fertility in the developing world. With few exceptions they perceive a growing momentum toward smaller families worldwide, ostensibly based on national statistics. Although decreases in fertility have occurred in some countries, the generalization that fertility is experiencing a sustained downward trend in the LDCs is questionable. Fertility has been reduced in a number of LDCs, but the rosy predictions of Tsui and Bogue appear unlikely given recent experience and rising fertility in some areas, notably Africa.^{1/}

Demographic Indicators

While the science of demography has spawned a wide range of measures relating to population size and distribution, in this discussion we will confine ourselves to those indicators which are most relevant in the developing countries context. In applying demographic principles to LDCs, a major constraint is data availability, and therefore one's choice of measure(s) is frequently dictated by data availability.

Although a few LDCs have experienced declines in birth rates, the average rate of population growth in LDCs exceeds 2.5% per year, implying a doubling of the population in less than 30 years.^{2/}

^{1/} See Demeny, 1979 for an excellent critique of this "new" trend in fertility decline.

^{2/} Rate of population growth is defined as the rate of national increase adjusted for net immigration and emigration.

Completed family size in many developing countries is over seven and the average crude birth rate (CBR) is over 40 per thousand population.^{1/} A less commonly used but perhaps preferable indicator of fertility change, because it takes age distribution into account, is the total fertility rate, defined as the average number of children a woman will have if she experiences a given set of age-specific birth rates throughout her reproductive life (usually considered between the ages 15-49).^{2/}

Table 2 shows aggregate data for all three indicators of population growth as well as the crude death rate for the developed and developing countries. The overall discrepancy between developed and developing countries is acute. The population growth rate for the wealthy countries is well below 1%, whereas the developing countries exhibit rates of about 2.5%. The similarity between the developed countries and the Middle Income Countries' (MICs)^{3/} death rates is striking, indicating a rapid decline in mortality as GNP rises.^{4/} The pattern between the middle and low income countries is mixed, for although the total fertility rates

^{1/} Crude birth rate is defined as the number of live births per year per 1,000 of population.

^{2/} A related measure is age-specific fertility, the number of live births per age cohort of women over a given time period.

^{3/} Middle income countries are countries with annual per capita income above U.S. \$300 in 1977, (IBRD, 1979).

^{4/} Even among the MICs, there is considerable disparity in CDRs. Those above \$700 GNP per capita tend to have CDRs closer to the developed countries. Those at the lower end are closer to the Low Income Country average.

TABLE 2

	Population Growth Rate 1970-1975	Crude Birth Rate 1975	Crude Death Rate 1975	Total Fertility Rate 1975
Low Income Countries	2.4	47	20	6.2
Middle Income Countries	2.7	40	12	6.1
Developed Countries	.8	16	10	2.3

Source: IBRD, World Development Report, August 1978

are almost identical, the other measures show considerable divergence. Essentially differences in base populations and mortality account for the disparity; childbearing women have roughly the same number of children as indicated by the similar total fertility rates, but a much lower death rate explains the higher rate of population growth in the MICs.

The highest fertility is observed among the poorest segments of the population. The poor tend to have neither the means nor the motivation for smaller families. The former can be ameliorated by contraceptive availability, but the latter is extremely difficult and the issues involved will be discussed below. But, even where national rates appear to be dropping, it does not suggest lowered fertility among all income groups. Hence it may well reflect selective economic progress rather than widespread reductions in poverty.

As Table 1 shows, population growth rates are highest for countries at the upper end of the Low Income category and for some in the Middle Income group, implying that as countries' incomes begin to rise, as is the case in the MICs, so does fertility. Because fertility and mortality are closely correlated, as mortality levels fall due to improvements in health care, education and income, fertility rates rise concomitantly, although often with a considerable lag period^{1/} and, this lag can result in a spurt of population growth, which is most common in those countries having experienced a rapid rise in income and improved health status.

^{1/} Decreases in mortality in LDCs means primarily a drop in infant mortality as life expectancy tends to respond more slowly than mortality to development advances. Infant mortality rate is the annual deaths of infants 0-12 months per 1,000 live births during the same year. Though often used, this measure tends to be an extremely rough estimate since many infant births and deaths are under-reported in LDCs, particularly in rural areas. (See section on Health for further elaboration).

High fertility and falling infant mortality have been the major causes of the population surge in the LDCs since the end of World War II.

Dramatic rises in population sap national resources by constraining per capita public expenditures, inhibiting investments in human capital, and thereby creating a high dependency ratio.^{1/} This issue is at the heart of government attempts to provide basic needs. The dependency ratio measures the burden of the non-productive population on the productive members, indicating the extent of resources being channeled to the young, who are considered unproductive resources in an economic sense.^{2/} This moves resources away from economically productive and development enhancing activities and simultaneously discourages savings and thereby investments (See Leff, 1969).

The severity of the population problem as an impediment to economic development is a function of the rate of increase as well as the size of the base population. For example, in Table 3, Bangladesh, with a growth rate of 2.1 and base population of 80.4 million will have a population exceeding 160 million in 25 years, whereas Niger, with a similar growth rate will only have 9.4 million people by the year 2000. Similarly, in 33 years India's population will double to 1.24 billion and Chad's population will approach 8.2 million.^{3/}

^{1/} The dependency ratio is defined as the number of persons of 14 years or under, plus 65 years or over (largely a nonissue in most LDCs as life expectancy is usually below age 65), divided by the productive population, defined as those between age 15 and 64 years.

^{2/} The age at which children become a net bonus to the family, particularly in rural areas, varies, but an accepted rule of thumb is 14 years. Prior to that age children often help around the house, but they consume more than they produce.

^{3/} Population doubling is approximately $69 (\log 2)$ divided by the population growth rate.

TABLE 3

COMPARISON OF BASE POPULATION AND
POPULATION GROWTH RATES FOR
SELECTED COUNTRIES

	<u>Population (millions) 1976</u>	<u>Population Growth Rate 1970-75</u>	<u>Estimated Population in 2,000 at 1975 Growth Rate (millions)</u>
Bangladesh	80.4	2.1	160.4
Rwanda	4.2	3.6	10.2
Chad	4.1	2.1	6.9
Nepal	12.9	2.1	21.7
Zaire	25.4	2.7	49.4
India	620.4	2.1	1043.1
Niger	4.7	2.7	9.2
Pakistan	71.3	3.0	149.3
Indonesia	135.2	2.4	244.6
Kenya	13.8	3.5	32.6
Egypt	38.1	2.2	65.6

Source: IBRD, World Development Report, August 1978

These figures indicate the importance of the base population, for it is clear that India grapples with a problem of greater magnitude than, say, the Ivory Coast which has a higher birth rate but a considerably lower population and thus greater land and resources per capita.^{1/}

An even more critical consideration than the base-growth rate ratio is the amount of arable land per capita, particularly since the majority of the labor force in developing countries is involved in agriculture. The International Bank for Reconstruction and Development (IBRD) estimates that in 1970 85% of low income and 51% of middle income countries' labor forces were employed in agriculture. Arable land influences the amount of food that can be produced for domestic consumption and the level of food exports;^{2/} as population increase, land, particularly arable land, becomes scarce and as it is cultivated more intensively, the soil becomes depleted and less productive. Table 4 gives some indication of the gross land/population pressures in the developing countries. Of particular relevance for a BHN strategy would be disaggregation of landownership by income group as an indication of the effect of arable land availability on poverty alleviation.

^{1/} The extent of a nation's population problem is also an inverse function of natural resource endowments. For example, those countries with extensive mineral deposits will be less constrained by high rates of population growth than will those with limited resources. Hence a high rate of population growth in Chad may pose more serious difficulties to development than a high base population in a resource rich country like Indonesia.

^{2/} A food exporting country like Nepal will soon be importing food as the population increases and forces consumption of previously exported rice. Kenya with a population growth rate of 4% in 1979 will double its population in less than 18 years. All available arable land is under cultivation and farmers are moving into arid and semi-arid regions of the country where yields are lower and the soil more fragile. Kenya cannot escape importing food (and therefore placing additional strains on foreign exchange earnings leading, *ceteris paribus*, to reduction of other imports) in the near future, for land will simply not feed the rapidly expanding population.

TABLE 4

POPULATION, ARABLE LAND AND HECTARES PER CAPITA
FOR THE LDCs AND SELECTED DCs

	Total Pop. 1977 (000)	Total Arable and Perm. Crop Hectares (000)	Arable Hectares Per Capita
<u>LOW INCOME COUNTRIES</u>			
Bhutan	1202	252F	.210
Cambodia	8349	3046F	.365
Lao PDR	3381	961F	.284
Ethiopia	28854	13730*	.476*
Mali	5842	9800F	1.678
Bangladesh	75529	9392F	.124
Rwanda	4362	939F	.215
Somalia	3258	1065F	.327
Upper Volta	5716	5613*	.982*
Burma	31992	9996	.312
Burundi	3863	1260F	.326
Chad	4016	7000*	1.743*
Nepal	12877	2024F	.157
Benin	3160	2950F	.934
Malawi	5035	2288F	.454
Zaire	25098	6150F	.245
Guinea	4527	4170F	.921
India	628834	168880F	.269
Viet Nam	44412	5600F	.126
Afghanistan	19796	8535F	.431
Niger	4732	15000*	3.170*
Lesotho	1173	355F	.303
Mozambique	9461	3080F	.326
Pakistan	72859	19420F	.267
Tanzania	15872	6290F	.396
Haiti	4626	870	.188
Madagascar	8263	2860F	.346
Sierre Leone	2840	4094F	1.442
Sri Lanka	14282	1979	.139
Central African Emp.	1829	5910*	3.231*
Indonesia	139635	19418	.139
Kenya	13701	2160F	.158
Uganda	11701	5380F	.460
Yemen Arab Rep.	5467	1570F	.287

F=FAO Estimate

*=Unofficial

	Total Pop. 1977 (000)	Total Arable and Perm. Crop Hectares (000)	Hectares Per Capita
<u>MIDDLE INCOME COUNTRIES</u>			
Togo	2312	2285F	.988
Egypt	36292	2826F	.078
Yemen, PDR	1710	172F	.101
Cameroon	6571	7345F	1.118
Sudan	15674	7495F	.478
Angola	6561	1830F	.279
Mauritania	1465	1005F	.686
Nigeria	64887	23840F	.437
Thailand	43490	17650F	.406
Bolivia	4639	3336F	.719
Honduras	2876	890F	.309
Senegal	5111	2404F	.470
Philippines	43468	8000F	.184
Zambia	5167	5008F	.960
Liberia	1594	336*	.211*
El Salvador	4239	669	.158
Papua New Guinea	2783	353F	.127
Congo, People's Rep.	1380	662F	.480
Morocco	18038	7830F	.434
Rhodesia	6493	2480F	.382
Ghana	10161	2700F	.266
Ivory Coast	6878	9160F	1.332
Jordan	2779	1365F	.491
Colombia	24453	5160F	.211
Guatemala	5678	1735F	.306
Ecuador	7319	5096	.696
Paraguay	2724	1035F	.380
Korea, Rep. of	35340	2238	.063
Nicaragua	2396	1505	.628
Dominican Rep.	5291	995F	.188
Syrian Arab Rep.	7490	5672	.757
Peru	15777	3330F	.211
Tunisia	5893	4410F	.748
Malaysia	12454	6004F	.482
Algeria	16100	7110F	.442
Turkey	40908	27699	.677
Costa Rica	2018	490*	.243*
Chile	10441	5828F	.558
China, Rep. of	6852565	129500F	.152
Jamaica	2058	265F	.129
Lebanon	2959	348F	.118

	Total Pop. 1977 (000)	Total Arable and Perm. Crop Hectares (000)	Hectares Per Capita
<u>MIDDLE INCOME COUNTRIES (cont.)</u>			
Mexico	61196	27790F	.454
Brazil	112890	37630F	.333
Panama	1725	595F	.328
Iraq	11453	5290F	.462
Uruguay	2827	1905F	.674
Romania	21446	10518	.490
Argentina	25719	35000F	1.361
Yugoslavia	21560	8005	.371
Portugal	8804	3600F	.409
Iran	31880	15950	.500
Hong Kong	4283	11	.003
Trinidad and Tobago	1019	157*	.157*
Venezuela	12575	5322F	.423
Singapore	2284	8	.004
<u>INDUSTRIALIZED COUNTRIES</u>			
United Kingdom	56074	6975	.124
France	52915	18730	.354
United States	215118	188330F	.875

SOURCE: 1977 FAO Production Yearbook

Consequences of High Fertility

Excessive pressures on land have side effects that create a disequilibrium in the locational distribution of people and in the quality of the environment. As land is split up among children and jobs become scarce, migration to urban areas accelerates; migration may be the only alternative to joblessness and rural poverty.—^{1/} Urban drift refers to crowding in one or two urban areas where services are in short supply, migrants are generally unskilled and job opportunities few.

Underemployment is common, and as the labor force continues to expand, the numbers of un- and under-employed will rise disproportionately if fertility rates continue at current levels.—^{2/} (See Sinha, 1976). If indeed they do, efforts to upgrade the labor force through investments in health and education will be frustrated by the sheer numbers entering the labor force.

Growth in urban populations averaged over 4% per annum in the developing countries between 1970 and 1975, and the trend does not appear to be abating. The United Nations estimates LDC urban growth rates will remain at around 4% for the next decade; compared with a 1.5 rate of population growth in rural areas, this implies continued rural urban migration (Findley, 1977). These patterns of urbanization are particularly relevant to a basic needs approach because the 1980's may well witness a shift from rural to urban poverty in many LDCs, requiring refinements in strategy and a different target population.

^{1/} See Richard Rhoda, 1979; Findley, 1977; and Findley and Orr, 1978 for good surveys of the literature and Todaro, 1967 for the classical economic rationale for migration.

^{2/} This effect can be mitigated through concurrent LDC government policies stressing labor intensive growth strategies. This has not necessarily been the case in the past; however, the BHN approach may encourage greater emphasis on labor force development, thus making labor intensive investments a more attractive option.

The environmental effect of population pressure is also striking. Through the relentless felling of trees for fuel and construction (without reforestation) and the intense and suboptimal cultivation of the soil techniques applied, the renewable resource base is deteriorating.^{1/} Soil erosion and depletion, siltification of rivers and dwindling firewood supplies can all be linked to the growth in population.

High population growth can undermine any development strategy by depleting resources rapidly and making human capital investments difficult. A BHN strategy which aims at improvements in individual welfare and advances in macroeconomic growth is impeded on both fronts by excessive rates of population growth. Depletion of available natural resources removes a necessary input to production on a household level and inhibits growth on a national level.

Determinants of Fertility

Why couples choose to have large families is not entirely clear, but decisions are made as to (1) a minimum desired number of children; and, (2) "insurance" births to ensure the survival of a desired number;^{2/} extra births that are not actively sought, but

^{1/} Fertilizers have mitigated this problem somewhat in some countries, but the use of fertilizers is not a viable long run solution given oil price increases and scarcity of other fertilizer inputs. Other means will have to be found to regenerate or preserve agricultural land. High yield crops have reduced land pressure, but this requires additional capital that may not be available.

^{2/} There is not a clear distinction among these factors, however, births are the result of an implicit (or explicit) decision based on these kinds of considerations.

are either not avoided or are a result of a lack of misinformation about contraceptives, also helps to determine family size. Large families, often a rational choice on a family level, can be costly on a national level.

A few LDCs have reduced their population growth rates, notably Taiwan, Korea, Singapore, Hong Kong, Costa Rica and Colombia, and the experience has led to a considerable literature attempting to explain the phenomenon.—^{1/} Overall development obviously is an important factor, as evidenced by the particular countries experiencing a drop, but it is a more complex issue, for a number of countries (or areas within countries) have also achieved lower birth rates despite modest increases in aggregate economic growth.—^{2/}

The factors most often associated with falling fertility rates are:

(1) status of women and female labor force participation; (2) education; (3) income; (4) economic value of children; (5) health care; (6) family planning programs; (7) biological phenomena, and (8) urbanization.—^{3/}

^{1/} Rich, 1973; Mason and David, 1971; McGreevey and Birdsall, 1974; Birdsall, 1977; Ridker et al., 1976; Cassen, 1976, for surveys of the literature and synopses of issues.

^{2/} Of particular note are Kerala (State of India) and Sri Lanka both of which have population growth rates below 2%. India's national population growth rate is above 2% and countries with per capita incomes comparable to Sri Lanka's tend to exhibit much higher population growth (see Table 1).

^{3/} The order in which the variables are listed bears no relationship to their individual importance since different variables tend to exhibit greater causality in different settings and under application of different analytic techniques.

Where infant mortality rates are high, generally fertility is as well. Both behavioral and biological factors play a role in this phenomena. Improvements in health practices and nutrition encourage survival of mother and child, which in turn reduces the net costs to couples of many births. Parents assume a certain number of births will ensure survival of a desired number, and may not respond to or perceive initial decreases in infant mortality. These positive effects on fertility are most apparent as mortality begins to fall; however, over the long run fertility tends to be reduced as parents adjust to the reality that a greater number of infants survive (Shultz, 1976).—^{1/}

Women in many developing countries are entirely dependent on parents or husbands for economic support and social status, often being excluded from family decision making and protected from influences outside the (extended) family. Education is not considered critical to childraising and resources are commonly reserved for males. (Germaine, 1975; Dixon, 1975.) Analysis over the last decade or so has indicated the importance of women's education and labor force participation (Williams, 1976; Shields, 1980; and McGreevey and Birdsall, 1974) in reducing fertility. As women become better educated, enter the wage economy and control their earnings expenditures, their role in the family and the community is enhanced, and their ability to exercise influence in fertility decisions increases.

^{1/} This phenomena is often referred to as the "infant survival hypothesis".

Education lowers fertility over the long run, but perverse effects have been observed with marginal increases, particularly when the educational attainment is restricted to the lower elementary grades. For example, a recent paper by Evenson, Rosenzweig and Wolpin (1980), shows a small negative effect on fertility of increased female education among Indian women, but a much greater dampening effect among Philippine mothers. The marginal educational increases occurred at the lower elementary grades for Indian women, but in the Philippines the increments were in the later high school years. These results help to explain the confusing results between mother's education and fertility. This is consistent with available evidence which indicates that high school education in particular (especially for girls) negatively affects fertility, and tends to support the view that the relationship between education and fertility is non-linear (Cochrane, 1979).

Educational attainment and labor force participation are closely correlated and employment, especially that which is incompatible with child rearing, raises the opportunity costs of raising children. Education acts to broaden women's horizons as well as their acceptance of new methods and ideas. Investments in a few children, use of family planning and later marriage all appear to be more acceptable to women who have some education and all are correlated with lower fertility.

The role of income in bringing birth rates down is a controversial topic in the fertility determinants literature. As discussed earlier, as aggregate income rises so does fertility, but the threshold where the trend reverses has not been pinpointed. Available information indicates a stronger relationship between improved income distribution and lower population growth than between absolute income increases and fertility declines (Repetto, 1974; and, Kocher, 1976). The former observed relationship is not easily explainable but could be attributed to the income distribution variables acting as a proxy for socio-economic change or availability of public services. If this is the case it is an important finding for a BHN approach because it means that income gains alone, unless complemented with health and family planning services and education, will not serve to reduce population growth rates.

Children are desired for their lifetime earning potential, social security function, household labor, and obviously the joy and comfort they provide. The long run, net economic benefits of children accruing to parents often do not outweigh the costs, but in societies where children are a major source of old-age support and a cheap source of seasonal labor they are perceived as valuable commodities.—^{1/}

^{1/} This implies that families may have an economic cost benefit ratio that is unfavorable, but this ignores certain qualitative benefits.

Little work has been done that satisfactorily clarifies these relationships, but they are perhaps the best explanations for why couples have large families, particularly in rural areas (Liebenstein, 1974; Mueller, 1976).

The role of family planning in fertility reduction is a controversial issue that has only recently approached a compromise.—^{1/} The total supply of children is determined by biological limitations, social restrictions and, to some extent, contraceptive availability. Regardless of the high parity levels apparent in most developing countries, women generally do not achieve their maximum biological fertility potential (Bongaarts, 1975). Part of the explanation is social. Sexual taboos on intercourse and explicit rules regarding behavior before, during and after marriage - as well as age of marriage - impose regulations on frequency and timing of intercourse and thus on conception and births (Davis and Blake, 1956). A woman's health and nutritional status determines her fecundability, the likelihood of sterility and spontaneous abortion, the ages of menarche, menopause and death (Butz and Habicht, 1976). Also inhibiting is post-partum amenorrhea, (short term post-birth sterility) which can be extended by breastfeeding. (See Nutrition Section)

^{1/} Briefly, the controversy centers around the relative benefits of supply (contraceptive availability) and demand (behavior/ attitude toward contraceptive use) factors. Supply proponents believe contraceptive inundation to be the only means to reduce fertility; the demand side of the debate asserts that only development factors affect fertility levels (See Mauldin and Berelson, 1976 for discussion of this complex issue)

The availability of modern contraceptives such as the IUD, the "pill", and sterilization, among others, has made the decision to restrict family size far easier. Some have attributed recent declines in fertility entirely to contraceptive availability (Brackett, Ravenholt and Chao, 1978). However, evidence on the causality among socio-economic development, contraceptive availability and fertility has demonstrated the close relationship between socio-economic change and reductions in fertility (Mauldin and Berelson, 1976).

Family planning services and information can therefore be an important factor in reducing fertility but its availability must occur in conjunction with other development factors. (Freedman and Berelson, 1976; Mauldin and Berelson, 1976; Berelson, 1979). When, where and how family planning services are introduced will also have a bearing on their effectiveness in individual country settings, and thus the stage of socio-economic development is particularly critical for the success of family planning efforts (Birdsall, 1977). On the whole, country efforts in family planning have been programs aimed at making contraceptives available without firm evidence that it is a cost effective means of controlling fertility.—^{1/} However, family planning services are a necessary component for reducing fertility, the question is when, what and how services should be made available, and how much emphasis should be placed on family planning delivery in a given context.

^{1/} A few studies have attempted to estimate the costs of births averted through family programs; most notable is the work of Enke, 1966.

There is a clear discrepancy between urban and rural fertility; those who migrate to urban areas generally exhibit lower fertility either because of the characteristics of the people who elect to move (selectively) and/or because of their adoption of urban norms (adaptation). Children are also more costly in urban settings and their productivity is less valuable. It is difficult to separate out the effect of urbanization in couples' family size decisions but it appears to have a dampening effect on fertility (Findley, 1977).

Thus there are a multitude of factors which operate jointly in perpetuating high fertility. The relative importance of each are culture and country specific. What is critical is the realization that fertility levels are a function of a number socio-economic variables that are not intuitively linked to birth rates.

Policy Implications

The brief survey above outlines some of the salient ongoing discussions on the determinants of fertility, but little of these research endeavors have provided policymakers with firm guidance. The patterns which emerge do not allow an easily adaptable framework for controlling population, and, more importantly, introduce considerable uncertainty with regard to what kinds of programs will indeed reduce fertility levels.

The highest rates of population growth occur in the Middle Income LDCs; there, mortality rates have fallen (due largely to improvements in public health and to increased availability of health services), and birth rates have largely remained at levels in keeping with earlier mortality rates.

Countries and income groups at the bottom end of the income scale are generally not the major sources of high population growth, although birth rates are highest in this group (see Tables 1 and 2). High mortality and poor maternal health and nutrition - both correlated with poverty - contain population growth at low levels of national income. If BHN policies are to be successful in improving the health and nutrition status of the lower income groups, the result will be an increase in population growth, unless simultaneous efforts are made to encourage smaller families. And, it is the poor who suffer most from high parity, as high fertility and low income combine to reinforce existing poverty. Such an emphasis on the poor is in keeping with BHN objectives to improve the wellbeing of the lowest income cohorts.

Embracing a BHN approach requires particular attention to questions of employment and income if people are to satisfy their basic needs through means other than transfers. Any attempt to redistribute land, to increase farmer's incomes, or to generate off-farm employment must take into account the size of the labor force and thus by implication the growth of population. Thus, controlling population

growth is a vital concern in encouraging economic growth and enhancing welfare, but the actual means for mitigating its impact are far from clear. Differing socio-economic contexts, levels of development and resource availability determine what methods and policies are required to reduce fertility; and, as in any development strategy, a blueprint approach is only applicable in a general sense.

Population issues are closely intertwined with other sectors, and programs to encourage reductions in fertility must be designed to fit into the larger BHN scheme. To minimize development of conflicting policies, especially across sectors, and to allow realistic (long run) planning it is essential that fertility concerns be incorporated into a cohesive plan to improve wellbeing. BHN strategy relies on a complementary approach, emphasizing inter-dependence among sectors in achieving welfare and growth objectives.—^{1/} Hence population issues must be effectively integrated into the BHN strategy with a clear understanding of how fertility reduction fits into the overall strategy.—^{2/} (Family Health Care, Inc., 1979)

1/ A good example is manpower planning which relies heavily on accurate information on population growth and national health and nutrition status to ensure learning capability and effectively meet long-term labor force needs. The size of the dependent population (those under age 15) will determine if adequate health and education services can be supplied; in the event that population growth outstrips government resources manpower needs may well go unfulfilled and unemployment among the unskilled develop or persist.

2/ Abuses have occurred in the past such as the much heralded forced sterilization program in India in the later 1970s. Elimination of health services in the interests of controlling population growth has been suggested by some policymakers. But, both approaches generally prove detrimental in the long run; such proposals stem from narrow, short run perspectives which focus on reducing fertility per se, rather than on enhancing social and individual welfare.

Designing sensible approaches to reducing fertility requires consideration of a wide range of factors, both because fertility behavior responds in different ways to changes in socio-economic factors and because a BHN strategy involves activities in numerous sectors which may conflict with fertility reduction objectives in the short run. Programs must also reflect sensitivity to the level of development and the specific cultural milieu. For successful programs in Asia (such as Taiwan and Korea) any prove meaningless in the Middle East where women's status, income levels and social structure work to discourage smaller families. And, by the same token, countries at different stages of development respond differently to policy initiatives. Policies to elicit change in say farming methods are far different in Mexico than in Nepal, since new methods, literacy, formal learning, and transportation are far more common in the former and our grasp of the national context allows the development of a sensitive approach to behavior change. To a great extent the fact that the objective of this policy is to modify behavior implies that a country specific approach must necessarily be designed; even within countries, diverse tribal groups may suggest the development of various approaches.

Attempts to slow fertility directly through government programs and regulations is a slow process with dubious outcome, precisely because the means to elicit behavior change are not known. Providing safe, accessible and affordable family planning services is of considerable importance since motivation is only one component of a population policy. Encouragements to reduce family size are necessary but not sufficient; the means for controlling fertility must also be acceptable and obtainable if we are to expect women to be able to limit their

fertility. And, innovative approaches to delivering family planning services deserves greater exploration. For example, outreach workers in water and sanitation or agriculture could conceivably deliver family planning information and contraceptives. Particularly where health services are inaccessible or ineffective (in health and/or family planning), these mechanisms could play a major role in motivation and delivery.

Improving employability (through provision of health care and education) and increasing employment opportunities, especially for women, also work to reduce population growth over the long run because it encourages women to contracept. Women with high opportunity costs tend to exhibit lower fertility rates, and more educated women are more likely to demand a greater role in family decision-making, including fertility decisions. Hence raising the status of women, contributes to lower demand for children, especially in the long run.

Incentives, such as extension of social security programs, will probably have the greatest impact since it is in the household's economic interest to reduce family size when attractive alternatives are available.^{1/} The provision of free contraceptives is only one form of incentive. Measures such as those used in Singapore where low fertility couples receive preferential treatment in housing and some other public

^{1/} Little hard evidence exists on the actual impact of incentives, but the few studies that exist imply a strong relationship between incentives and lowered fertility. (See Muscat and Ridker, 1973, and IGCC, 1976 for examples of incentive schemes).

services and high fertility couples are penalized through the tax system, may be called for in some instances but such schemes are country specific and need to be carefully conceived and implemented. And, as mentioned earlier, incentives must be designed in tandem with other programs so as to not present conflicting incentives.

The importance of unchecked fertility growth in the BHN context has largely been ignored, but attainment of basic needs requires careful consideration of population issues, specifically fertility. To devise and implement a successful growth strategy and extend public services to the poor, population growth must be slowed for both objectives may prove impossible.

Part Three: Nutrition Issues

Introduction

Nutrition is possibly the most serious welfare problem facing the developing countries. Because nutrition status affects health, labor productivity, learning capacity and thus income, malnutrition also has significant implications for economic development as well as population growth. It is estimated that roughly 1130 million or 74% of the developing world's population in 1965 consumed below the minimum FAO/WHO daily calorie requirements (Reutlinger, 1972); recent projections for 1975 show a potential deficit for somewhere between 1073 and 1373 million people, or 55% to 71% of developing country populations (Reutlinger and Selowsky, 1978). Nutrition problems in the LDCs resemble those of the health sector in many ways. Aside from the synergistic relationship between health and nutrition outlined in the section on health, the determinants of nutrition encompass most of the factors determining a population's health. Uncontrollable events such as weather, fertilizer availability and the whims of international trade and finance play a large role in determining nutrition status; and, by influencing nutrition status these factors also affect health, but the initial and primary impact is on nutrition.

Malnutrition involves deficiencies in the quantity of food consumed as well as in food quality and variety. Although sufficient

food intake is a biological necessity, nutrient composition has profound implications for morbidity (illness) and mortality. The adverse consequences of poor nutrition (as opposed to undernutrition, the consumption of insufficient calories and proteins) -- such as blindness, lethargy and chronic disease -- point up the need to examine the specific causes of malnutrition. To accomplish this, measures of intra-household consumption are required, and such information is not widely available and is costly to collect.

Means to reducing malnutrition range from direct food subsidies to disease control and income supplements. On a macro-economic level governments can ensure adequate supplies and distribution of food during shortages, and have a role in promoting adequate nutrition through pricing policies and welfare measures. On the household level, however, government's role is less well defined. Major problems associated with both national and household-targeted nutrition programs include: (1) defining the malnourished population; (2) designing efficient programs to reach only the target groups; and (3) addressing needs in other areas which bear indirectly, yet significantly, on nutrition.

The most severely and most chronically malnourished are the poor, especially infants children and mothers. Malnutrition

is primarily a consequence of poverty, but at the same time it aids in perpetuating poverty. Poor nutrition impedes learning and reduces productivity, and it inhibits attempts to raise income and increase employment through acquisition of new skills.

The Basic Human Needs (BHN) approach, with its stress on improving individual welfare, cannot overlook nutrition issues, both because it is related to sufficient food intake and because it is a major determinant of health status. If a BHN strategy is to prove successful, nutrition must form a central component for it is a major factor determining welfare in developing countries.

This section will concentrate on the major issues affecting malnutrition and its consequences for the LDCs. Health related topics will only be touched on as these have been covered to some extent in the section on health.

II. Measurements of Malnutrition

Malnutrition is defined as a pathological state resulting from inadequate or excessive consumption of one or more essential nutrients. Undernutrition and specific deficiency, both forms of malnutrition, stem from inadequate food (or food energy) consumption over time, and lack of individual nutrient(s), respectively (Jelliffe, 1966). Malnutrition in developing countries results directly from both undernutrition and specific deficiency.

Kwashiorkor and marasmus, severe forms of protein-calorie malnutrition in children, are perhaps the most widely recognized nutrition problems in developing countries,^{1/} although their incidence is considerably below the milder forms of malnutrition associated with chronic morbidity and debility, which are more difficult to determine. A wasted, apathetic child exhibits clear signs of severe malnutrition, but signs of milder forms of malnutrition are not as easily attributable. Nutritional problems are mostly due to deficiencies in a number of specific nutrients which impedes straightforward diagnosis. Often manifestations of malnutrition in adults are not severe enough to warrant the time and attention necessary for diagnoses and treatment. In children symptoms such as slow growth may not serve as a warning if malnutrition is a chronic community affliction. Hence, motivation and diagnosis can pose major impediments to diagnosing and controlling malnutrition.

Malnutrition can be identified and measured in a number of ways, none of them totally satisfactory, and many of them unsuitable in rural settings. Primary tools include (1) clinical examination; (2) anthropometric measures; (3) biochemical tests; and (4) indirect methods.

^{1/} Kwashiorkor occurs primarily in infants and children and is primarily associated with a diet low in protein; generally other factors are involved -- can include infections, which exacerbate nutrition deficiency. Marasmus stems from a grossly inadequate diet and exhibits itself in severe wasting of muscle and subcutaneous fat and stunted growth. (Jelliffe, 1966).

Clinical examinations provide the simplest and least expensive method of assessing nutritional status. (Jelliffe, 1966)

Careful, superficial examination and identification of malnutrition symptoms form the basis of clinical diagnoses. Clinicians must distinguish the physical signs of malnutrition from a well-nourished standard,^{1/} and major difficulties arise in differentiating nutritional deficiencies from diseases with identical symptoms. Application of supplementary techniques such as those described below may be mandatory if confusing symptoms are observed. Clinical tests are ideal in some circumstances, and their low cost and simple technology make them particularly appropriate in rural areas and LDCs.

^{1/} Specifically, clinical assessments look for abnormalities in hair quality and color, facial form and pigmentation, eyes and teeth conditions, skin texture, muscle mass and skeletal formation. However, it is extremely difficult to diagnose certain illnesses, due to the fact that different standards are applicable in different settings. Standards are generally measures based on a given not necessarily a representative population. "Standards" are often inapplicable to the population under analysis, and symptoms can be misleading or not apparent to the clinician.

Growth is determined by a number of biological and environmental factors, nutrition being among the most important. Nutrition influences physical dimensions, and anthropometric measures of body size (height), weight and composition (degree of fat and muscle) have proven to be useful tools in determining the existence and extent of malnutrition.—1/

Properly executed anthropometric techniques are generally reliable indicators of nutrition status.—2/ Comparing measurements at various ages is highly desirable especially with children. But age is often unknown and the normal nutritional standards of height and weight become difficult to apply in developing areas where malnutrition inhibits both measures.—3/

1/ Anthropometric measures to determine nutritional status vary on the basis of physical size and composition at a given age. Weight is a straightforward technique but accuracy in measurement is essential. Linear measurements use body length (height) and circumference of head and chest as indicators of growth and development. Substandard height and weight in children reflect current and/or chronic protein-calorie malnutrition. Small head circumference implies a history of malnutrition. The soft tissues (muscle and fat) vary most with current protein-calorie deficiencies. A tricep skin fold is commonly used to measure the degree of subcutaneous fat on the body; arm circumference size identifies poor muscle development or muscle wasting.

2/ In rural areas a string has been used to measure arms, chest and head circumference as a simple means of determining past or present malnutrition.

3/ The prevalence of malnutrition among children leads to considerable nutritional disparity among children of a given age, making diagnosis almost impossible, especially for chronic malnutrition where height for age is the principle measure.

Biochemical examinations tests measure the adequacy of dietary intake and identify lack of specific nutrient. Such tests pose difficulties in developing and applying standards, collection, storage and transportation of specimens and analysis; these and the high cost make its use somewhat impractical in rural areas.^{1/} Small sample analysis probably is the most sensible application of this technique.^{2/}

Nonmedical or indirect methods for assessing aggregate nutrition status include the infant mortality rate, aggregate figures on food production, income distribution, health status, educational attainment and household specific information on food distribution and consumption. These proxies for nutrition are used extensively in the economic development literature, being particularly useful for cross country comparisons; however, they are imperfect measures of nutrition status. But, for want of preferable, standardized measures, they are heavily relied upon for determining national nutrition needs.

^{1/} Biochemical measures are useful in diagnosing protein, iron and iodine deficiencies, but are often of limited usefulness since they cannot account and adjust for body stores.

^{2/} This section has drawn heavily on Jelliffe, 1966, a detailed source on all topics covered here.

Infant mortality rates (IMR) provide reasonably good indicators of overall malnutrition in childbearing women and infants, since it essentially reflects poor maternal nutrition; undernourished women produce low birth weight babies, who traditionally suffer high risk of death in the first year of life. Variations in infant mortality often indicate disparities in food availability or distribution and, as mentioned earlier, generally reflect health status.—^{1/} Food scarcity has been shown to raise mortality, as seen by the rapid rise in infant mortality experienced by Sri Lanka during the 1974 food deficit year. The comparative review by Gwatkin, Wilcox and Wray (1979) indicates the importance of health and nutrition programs in lowering infant mortality. Evidence from integrated programs in Imesi, Nigeria, rural Guatemala, Narangwal, India and Jomkhed, India and a food supplement program in northern Peru reveal infant mortality reductions of between 20 and 100 percentage points over the course of the programs.—^{2/} The IMR was also correlated directly with medical measures of malnutrition. Though admittedly a crude indicator of nutrition status, the IMR is a useful tool for conveying orders of magnitude and comparing malnutrition across countries.

^{1/} See Table 2 in Health Section

^{2/} Control groups also exhibited drops in infant mortality, but by small amounts. One drawback of these studies is their generally small sample size; however, it does illustrate the applicability of the IMR as an indicator of nutrition status.

Per capita daily calorie consumption estimates and requirements have been developed by the Food and Agriculture Organization (FAO) of the United Nations, and widely adopted by the international community as indicators of national per capita nutrition status. Table 1 presents data on calorie consumption, requirements and deficits for LDC regions. The variation among regions is substantial, and that observed inter-and intra-country is even greater. For instance, although Latin America registers a zero nutrition deficit, Bolivia, Ecuador and El Salvador exhibit daily calorie consumption levels well below 2,390 calories (Reutlinger and Selowsky, 1978). This distributional phenomena also exists within countries where "pockets" of poverty and malnutrition occur despite respectable national averages.—^{1/} Such distortion limit the usefulness of the data, but they are acceptable measures of calorie requirements for lack of more realistic statistics. In addition, such measures are rough indicators of aggregate nutritional deficits.

Official food supply statistics generally exist but are imperfect measures of nutrition as they neglect production of subsistence agriculture and again, implicitly assume an even distribution

^{1/} An additional problem is the variation in nutritional needs. The amount of energy expended determines calorie requirements, but this cannot easily be taken into account in national level data.

TABLE 1

Per Capita and Gross Calorie Deficits by Region, 1965

	Daily Per Capita			Gross Daily Calorie Deficits (1,000 Millions of Calories)	
	Calorie Consumption	Standard Calorie Requirements	Calorie Deficit (consumption- requirements)	Regional Average	Country Average
Latin America	2,472	2,390	0	0	19
Asia	1,980	2,210	230	202	213
Middle East	2,315	2,450	135	19	32
Africa	2,154	2,350	196	48	50
TOTAL			561	269	314

Source: Malnutrition & Poverty: Magnitude and Policy Options by Shlomo Reutlinger & Marcelo Selowsky, 1978.

of food supplies. Subsistence farming characterizes low income LDCs and food availability/affordability is highly skewed toward higher income families in most countries. Often calorie and protein supply figures are given as a percentage of (biological) requirements indicating something about "national" nutrition status. In the absence of preferable measures, food production data can give rough estimates of protein and calorie supplies, but they should be taken as means of unknown distributions.^{2/}

Household level measures of nutrition include consumer expenditure surveys (CES) and food consumption surveys (FCS). Both are difficult and costly to conduct, but constitute the only effective methods for collecting accurate information on family nutrition (other than direct medical examinations). The CES estimates malnutrition through information on calories and nutrients purchased; however, the role of cooking methods, intra-familial food distribution and general health status in reducing the full energy-nutrient values of household food supplies is not taken into account. FCS, on the other hand, records the food content and quality consumed by each household member in order to provide a description of family nutrition. The time and detail of such

^{2/} These data do not take into account issues of storage capacity, intra and inter-country transportation facilities and household level factors such as health status and food preparation methods, all of which affect the usefulness of agricultural output.

studies restrict them to small samples and their visible intrusion into family life may introduce a Hawthorne effect.^{1/} Further difficulties in selecting a representative sample and an unbiased time period (e.g. with regard to harvests) combine to make such studies somewhat rare, especially FCS. Though both survey methods pose major difficulties, they provide some insight into food consumption and expenditure patterns, and are a useful means of assessing potential sources of malnutrition.^{2/}

These foregoing measures of malnutrition relate to individual and household nutrition status and as such are of limited use in comparing the nutrition of populations. Their usefulness as indicators of national malnutrition is limited to those instances where samples cut across all income groups and geographic areas. More aggregate estimates of national per capita daily calorie and protein requirements are needed.

^{1/} Hawthorne effect refers to changes in subject behavior when under observation, implying unrepresentative information.

^{2/} Both CES and FCS have been conducted on community and national levels in various LDCs. The ILO has been instrumental in the collection of income and consumption data in conjunction with their efforts to construct consumer price indices for various countries. These surveys have been largely urban based and have stressed expenditures rather than food quantity, although the latter has not been totally neglected. In cooperation with national governments the Food and Agriculture Organization has conducted numerous FCS; notable among them are recent surveys in Brazil and Tunisia.

III. Sources of Malnutrition

Nutrition status derives from a wide range of factors determined by national and household level decisions, and both must be considered in a BHN approach. The quantity of food available obviously has a direct bearing on nutrition; but less apparent and equally important to nutrition status are household food preparation and distribution patterns, family health status, literacy and, probably most critical, income levels and land ownership.

Food Production. In 1975 the food deficit LDCs as a group experienced food shortfalls of about 37 million metric tons. By 1990 the International Food Policy Research Institute (1977) projects a major staples shortfall of between 120 and 145 million metric tons for these countries. The bulk of these shortages occur in those countries, with GNPs below \$300 (in 1975 terms) and rapid rates of population growth (International Food Policy Research Institute, 1977). Food shortfalls mean that food quantity not only declines but traditional distribution patterns biased against the poor tend to be reinforced. Net food importers are particularly hard hit by world food deficits (Isenman, 1980). Favorable food policies can help mitigate dependence on food imports by raising domestic food production; however, the prospects for alleviating malnutrition through national increases in food

production alone appear dim, since simply increasing output, although necessary, does not guarantee improved nutrition since consumption is affected by other factors (Reutlinger and Selowsky, 1978). Income, preferences and tradition play a major role in determining household consumption and nutrition. Course grains and roots form the basis of the diet of the poor and increased production of these crops will have a greater probability of enhancing the diets of the poor specifically. However, considerable controversy exists as to the acceptable minimum calorie and protein needs of children and infants, making production requirements difficult to determine. The FAO-WHO standards are considered to be highly unreliable, partly due to the noncomparable sample of children used to develop these standards.

An additional and fundamental issue under dispute is whether an acceptable protein-calorie balance already exists in the diet of low income groups and therefore the problem is merely one of quantity of food. Graham (1979) believes the mix to be neither optional nor complete, and points out specific deficiencies in typical diets, particularly those of children. A further point is the bulk of the diet which inhibits consumption of adequate calories and/or protein. Graham (1979) points to this as the major contributing factor of "marasmic" malnutrition among poor children.

The counter argument, largely of non-nutritionists, assumes an adequate protein calorie balance in the poor's diet; hence, the emphasis of nutrition interventions should be on increased calorie production (and consumption), particularly in high calorie foods such as cassava and corn. (Pinstrup-Anderson, 1976; Berg, 1979; Fleuret, 1979; Brown and Parisier, 1975)^{1/}

Although the potential community affects are disputed, the need to expand the food supply of the poor is not. Increasing the output of protein and expensive grains tends to supplement the diets of the adequately nourished as these costly and unfamiliar foods are generally beyond the purchasing power of the poor. A number of studies have shown that stimulating production of indigenous bulk crops specifically will have a

^{1/} The problem with this logical approach relates to Graham's (1979) concern with the difficulty in digesting these high bulk crops.

greater impact on the diets of the calorie-deficit poor^{1/}
(Pinstrup-Anderson, 1976; Berg, 1979). And, although it is not
the optional single program and can have detrimental effects,^{2/}
emphasizing increased calorie production (and consumption) may
provide the only realistic approach to improving the nutrition
of the lowest income groups through macro-economic food
policy.^{3/}

Traditional food preparation and distribution patterns within
the household also affect nutrition, and need to be considered
explicitly by those attempting to implement policies to achieve
BHN nutrition objectives. Overcooking and discarding of
nutritionally valuable food as well as taboos on certain kinds
of food (such as meats in Hindu societies) inadvertently reduces
the nutrient content of food consumed. Intra-familial food
distribution patterns favoring men and boys also contribute to

^{1/} Another reason for this emphasis is cost of production; protein
consumed by an undernourished individual is converted to calories
in the body and the beneficial effects of the protein is lost.
Such use of expensive protein for bulk (calories) is therefore
a costly misallocation of resources.

^{2/} Increased calorie production can result in stunted, overweight
children, due to a "balanced" deficit of protein and calories
caused by the bulkiness and poor digestibility of their diet
(Graham, 1979).

^{3/} Other national policies affecting nutrition include food
supplement subsidies, ration programs and school feeding
programs, which have had a generally positive effect on
nutrition status. These policy issues are discussed in
pages 28-33.

malnutrition, particularly among women and young children (Taylor, Newman and Kelly, 1976). These detrimental practices are grounded in social custom and are thus highly resistant to change, but they must be addressed as part of the nutrition problem in LDCs if malnutrition is to be alleviated. For this reason an aggregate or mechanistic approach to nutrition, and the costing out associated with it, is not sufficient to address the problem.

Health and Fertility. Health, fertility and education are influenced by and contribute to adequate nutrition. A recent review of nutrition, health and population programs in developing countries by Gwatkin, Wilcox and Wray (1979) points to the importance of integrating these sectors in order to improve nutrition. In eight countries (Guatemala, India, Iran, Jamaica, Nigeria, Turkey, and USA) experiments the effectiveness of nutrition and health interventions were evaluated. Although particular approaches, such as nutrition supplements for pregnant and lactating women and nutrition monitoring of children, seemed especially appropriate, the role of health services were of considerable importance. In fact, health care appeared to be as important or more important than nutrition interventions among older children and adults in the INCAP (Institute of Nutrition of Central American and Panama) program in Guatemala and the Narangwal program in India.

Much of the explanation for the importance of health and family planning interventions is essentially biological. Poor health impedes absorption of food nutrients, implying a need for more food without increased nutritional benefit; but ill-health has its greatest impact on maternal nutrition. Malnutrition during pregnancy can cause permanent damage in the mental and physical development of the fetus, and proves deleterious to a woman's long term health^{1/} (Caldwell, Campbell, Dunlop and Fiedler, 1978; WHO, 1965).

Lactation is reduced in quality and may be diminished in quantity by poor maternal nutrition. The extent of immunity passed to infants from mothers decreases and the amounts of fat, calories and protein in mother's milk is lessened when the special dietary needs of lactating women are unmet.^{2/} The consequences of the latter lead to increased malnutrition and mortality among infants and children (Jelliffe and Jelliffe, 1978; Baumslag, Kinsey and Sabin, 1978).

^{1/} Premature aging among high parity women is extremely common in the LDCs, due to poor health care, malnutrition and repeated childbearing.

^{2/} Breastfeeding practices are also strongly influenced by behavioral factors, which affects fertility since breastfeeding does act as a natural contraceptive. High market demand for female labor (increased value of a woman's time), easily available contraceptives and weaning foods, and a ready supply of substitutes for breastfeeding tend to negatively affect breastfeeding practices (Butz, 1977).

Evidence from Guatemala (Lechtig, 1975) and India (Parker, 1978) indicates that the most efficient and cost-effective method of raising birthweight and improving child nutrition is through supplementing maternal diets. In the Guatemala project a daily 1000 calorie supplement was given to pregnant women, and resulted in a 3 to 5 gram increase in birth weight; a halving of the infant mortality rate was attributed to women taking over 20,000 supplementary calories during pregnancy.

Fertility and nutrition are also closely linked. Nutritional status plays a role in determining fecundability (ability to produce children), since it is positively correlated with the incidence of spontaneous abortion and miscarriage, and negatively associated with completed pregnancy (Austin and Levinson, 1969). However, recent evidence shows a good deal of confusion exists on this issue and further research is essential (Zeitlin, et. al., 1980). Repeated pregnancy raises and broadens nutrition requirements that remain largely unmet, causing or exacerbating malnutrition among women and children. If, improved nutrition does result in higher fertility, it will place increased food demands on the household as it expands ^{1/}, and infants and

^{1/} As mentioned earlier, this tends to be a short run phenomena. The effect of prolonged lactation and the long term realization of increased child survival will work to offset improvements in fecundity (Delgado, Lechtig, Brineman and Klein, 1978).

younger children in large families often bear the brunt of the growing family food burden (Puffer and Serrano, 1975), which can have implications for future productivity and income generation. In order to minimize these perverse effects, emphasis needs to be placed on education as a component of nutrition programs.

Education. Level of educational achievement in both the formal and informal sectors has a decided impact on nutrition status. Concurrently, raised child nutrition improves mental concentration ability and is associated with reduce absenteeism in school. Evidence by Florencio and Smith (1969) indicates that better educated parents are more adapt at preparing a nutritious diet with a given income, since purchase, preparation, and intra-familial food distribution are more efficiently accomplished by those with more education. Education's effect on fertility and health also work to improve nutrition status through reduced pregnancies and better resistance to diseases. (Caldwell, Campbell, Dunlop and Fiedler, 1978).

In an encouraging finding related to food production, Jameson, Lau and Lockheed (1980) show that education is related to improved output. In a careful review of case studies, they found that in 31 of the 37 cases both formal and non-formal education had a significant positive effect on productivity. Their regression

results indicate that these effects are further enhanced by modernization.

Income. Income is necessary but not sufficient for acquiring and maintaining an adequate diet. Malnutrition is associated with poverty on a national as well as household level, but, its importance varies according to other economic circumstance.

On a community level, research has repeatedly found a significant relationship between low income and malnutrition (Fleuret, 1979). The direction and strength of the causal relationship, however, is unclear. A few rigorous analyses of the effect of changes in income on nutrition have been undertaken. A recent study on data from Candelaria, Colombia by Heller and Drake (1976) shows a small positive effect of increasing income on nutritional status, and a positive relationship between family income and children's nutrition status (weight for height). The same study also yields an income elasticity of food expenditure (the percentage change in the amount of food purchased for a given percentage increase in income) of .496, implying that food expenditures do not increase linearly with income. 1/

The latter finding is in keeping with Berg's (1979) contention that calorie intake rises less than half as rapidly as income.

1/ These findings are not surprising, and they are high since an income elasticity of one would mean the entire income rise would be allocated to food. The usefulness of these figures are somewhat limited, since for any given income item specific elasticities undoubtedly vary; hence, the regression results merely provide orders of magnitude.

Household expenditures as well as other goods and services rise with income; food does not claim even the bulk of the increase. Furthermore, households often purchase more expensive and potentially less nutritious foods as their income rise, for example, when polished rice replaces coarse grains and sugar enters the diet; however, families do tend to increase their consumption of animal protein and vegetables as their purchasing power grows.

On a more aggregate level, the relationship between malnutrition and GNP is consistently shown to be negative. Belli (1971) and the author find a positive correlation between protein supplies and income; more rigorous analysis by Correa (1975) and Correa and Cummins (1970) support these findings. The effect of income distribution on nutrition is less well examined. Belli (1971) attributes uneven income distribution to malnutrition because of the reduced learning ability and lowered productivity associated with an inadequate and unbalanced diet; and Leipziger and Lewis (1980) find a positive correlation between nutrition (protein per capita) and income distribution (Gini coefficient) in countries with per capita incomes above \$550 GNP, but a negative relationship below \$550 GNP. The evidence on this issue is too meager to draw any succinct conclusions, but income distribution does appear to be correlated with nutrition status, although per capita GNP levels may determine how much of an effect income distribution will have on the nutrition sector.

TABLE 2

Current Growth and Income Distribution Indicators and Required Growth Rates
for Eliminating Calorie Deficits in Selected LDCs

	Income Growth Required to Eliminate Calorie Deficit in 20 Years	GDP Growth Rate (1970-76)	Income Growth Required to Eliminate Calorie Deficit in the Lowest Decile in Number of Years ¹	Percent of Income Going to Lowest 40% of Income Earners (1970)	Gini Coefficient (1970)
Bangladesh	2.5	1.6	1.5 (79)	19.9	.33
Brazil	2.2	10.6	4.8 (31)	9.5	.57
India	2.1	2.7	2.6 (30)	13.1	.47
Morocco	2.2	4.8	4.2 (22)	n.a.	n.a.
Pakistan	2.2	3.6	3.1 (22)	20.4	.32
Colombia ²	.9 ²	6.5	18.6 (91)	10.4	.54

¹These figures assume constant food prices over time.

²The income growth requirements for Colombia are calculated for an instant elimination of calorie deficiency; the .9 figure assumes all proceeds from economic growth go to the lowest decile. Only the Colombia data are from Pinstrip-Anderson and Caicedo (1978).

Sources: Jain, Shail, Size Distribution of Income: A Compilation of Data (1975); IBRD, World Development Report, (1979); Berg, Alan (1979); Pinstrip-Anderson and Caicedo (1978).

Berg (1979) and Pinstруп-Anderson and Caicedo (1978) have estimated the level of economic growth required if income alone were to solve the nutrition problem in LDCs. Table 2 illustrates the projected needs by Berg for Bangladesh, Brazil, India, Morocco and Pakistan and by Pinstруп-Anderson and Caicedo for Colombia. With the exception of Colombia, the 20-year growth requirement figures in column two assume a distribution of income growth favoring the calorie deficit population. The .9 figure for Colombia measures the amount of income growth needed if the total income increase were distributed to the lowest decile of the population. The income growth needed to alleviate malnutrition in the lowest decile category assumes an equal distribution of income across income groups.

The data on income growth requirements for the six sample countries imply that the proportion of poorly nourished in each country is unrelated to income distribution measures. Requirements for Brazil, with the highest Gini coefficient, are identical to Pakistan's, the nation with the lowest Gini in the sample. Without considering distribution, growth in GDP promises elimination of calorie deficits in 22 to 79 years, assuming no other measures are taken to reduce malnutrition. Hence, countries interested in raising nutrition status can either distribute the benefits of income growth to the poor or design programs to

directly improve their nutrition. The time required to eliminate calorie deficiencies is a long one for most countries, even under these optimistic assumptions.—^{1/}

The determinants of nutrition thus encompass a wide range of issues; resolving them requires changes in national food policies, household food habits and food production. The prospects for positive change vary with circumstances and thus by country, but it is unreasonable to expect dramatic changes in nutrition status in the short run. Even embracing a BHN approach will not produce an adequately fed population in the short term; however, as in health, the close (synergistic) relationship between nutrition and its determinants will work to maximize positive externalities generated by improvements in other sectors. The BHN approach is thus an ideal mechanism for enhancing nutrition because it attempts to make the linkage and externalities explicit.

^{1/} The projections in Table 2 assume a constant rate of income growth, disallowing setbacks and ignoring the effects of external shocks such as world-wide recession and/or excessive oil price increases. The figures also presume adequate, domestic supplies of food which will keep pace with population increases.

IV. Economic Consequences and Implications of Malnutrition

The consequences of malnutrition were touched on in the previous section; however, the mental and economic effects of prolonged malnutrition bear special mentioning. A vast literature on the mental and physical damage caused by (grossly) inadequate diets, with particular reference to young children, has been generated over the past few decades.—^{1/}

Severe protein calorie malnutrition among infants and children has a direct negative effect on physical growth as indicated by the preponderance of low height-for-age and smaller than normal brain circumferences evidenced among malnourished children.—^{2/}

Results from a number of nutrition studies in Peru (Graham, 1976), Mexico (Cravioto and DeLicardie, 1968), Jamaica (Birch and Richardson, 1972), and Colombia (McKay and Sinisteria, 1973), point to lower height and smaller overall size among children receiving inadequate amounts of protein and/or calories (viz., see section on nutrition measurement).

^{1/} See Jane Rubey (1976) for an extensive annotated bibliography on "Malnutrition, Learning and Behavior" which covers the major findings of this multi-disciplinary field.

^{2/} Small head circumference is associated with a past incidence of malnutrition; current malnutrition is indicated by stunted growth.

Reduced intellectual ability and impaired cognitive development due to malnutrition and/or environmental factors has been even more thoroughly examined, and with few exceptions indicates clear positive relationships.—^{1/}

While growth retardation and lowered intellectual capacity is an expected outcome of severe malnutrition, controversy persists as to the importance of age in determining long-term effects. The dispute centers on the duration of the "critical period" of brain development in infants and children. Adequate pre- and post-natal nutrition are essential to proper brain development. Low birth weight infants - associated with nutritionally deprived fetuses - exhibit an abnormally high incidence of mental impairment (Birch, 1972).—^{2/} Pryor (1975), Graham (1968) and Winick (1970) show that the earlier in life malnutrition occurs the more severe and the more permanent the detrimental effects; duration beyond

^{1/} An unhealthy environment reduces resistance to disease, which encourages malnutrition. See the Health section.

^{2/} Learning impairments and poor education performance stem from: (1) high absenteeism, general apathy and lack of motivation toward learning; (2) interference with critical periods of learning and mental development; and (3) personality change (Cravioto and DeLicardie, 1973). Apathy is symptomatic of an inadequate diet and the morbidity attributable to poor nutrition contributes to poor school attendance (Birch and Richardson, 1972; Moncheberg, 1968 and Freeman, et. al., 1977).

duration beyond four months during the first year or so of life tends to intensify the negative effects of malnutrition and inhibit reversal^{1/}. Work by Hertziz, et. al. (1972) dispute these findings; their results imply no association between age and severity of malnutrition effects. However, experts seem to generally concur that although inadequate diet early in life may not prove permanently detrimental, insufficient nutrients can impair physical and mental development. This indicates a need for concentrating on maternal nutrition programs in a BHN strategy as an efficient means of investing in human capital in the long run.

Mental deficiencies and physical debility from malnutrition severely hamper children in formal and non-formal (social) learning. Studies have shown a positive correlation between mental ability, measured by IQ scores, and learning ability and productivity (Scrimshaw, Taylor and Gordon, 1968) and between IQ and productivity (Selowsky and Taylor, (1973)). The work by Selowsky and Taylor (1973) indicates a strong causal relationship between IQ levels and learning differentials. Low intelligence is traced to early malnutrition which retards learning abilities (IQ), thus producing a poorly educated wage earner of sub-normal intelligence. The effect of childhood/infant malnutrition on income is substantial: a 6 to 7% increase in wage earning is predicted for a 10% rise in IQ. (Selowsky and Taylor, 1973).

^{1/} Reversibility of physical and mental stunting is related to duration and timing (age), partly because malnutrition at "critical periods" impairs full brain development, which results in fewer brain cells.

These studies imply that nutrition programs can make future education expenditures more rewarding in a national sense, since returns to educational investments receive a higher return when learning ability is improved.

The discussion on productivity in the section on health applies to nutrition as well; productivity loss is attributable to inadequate diet as well as to poor health. Gains in productivity due to improved nutrition have been documented, in both the developed and developing countries; greater output per man has been observed in a number, if not all, settings when diets were increased and improved ^{1/}.

Measuring nutrition's effect on national development has been attempted by Correa (1975), Correa and Cummins (1970) and Belli (1971), with a consensus view emerging that nutrition contributes significantly to economic growth and development.^{2/} Malnutrition (inadequate calories per capita) helps perpetuate the poverty of low income groups by inhibiting earnings ability. Consequently, neglecting nutrition is essentially a disinvestment in human capital; reinforcing skewed income (and wealth) distribution patterns and slowing broad based economic growth.

Nutritional deficiency appears to affect the rate of development and economic growth. Belli (1971) shows a strong association between per capita protein supplies and individual income, and Correa and Cummins' (1970) regressions for nine Latin American countries indicate

^{1/} See Sorkin (1976), for a review of some rather dated but still relevant studies on the effect of nutrition on worker productivity.

^{2/} These analyses are plagued by poor data and statistical problems, but represent the best existing information on the subject.

that nutrition (increased calorie intake) has almost as great an effort on GNP growth as does education^{1/}.

An examination of these disaggregated results suggests that the poorer the country the greater the scope for increased calorie consumption to effect economic growth, both absolutely and relative to education. These results are consistent with our theoretical view of the economic structure of low income LDC's at lower income levels increased productivity is more dependent upon improved physical output, hence increased calorie consumption tends to have a stronger effect on economic growth in poorer LDCs. Those countries with higher national incomes tend to benefit more from educational improvements. Correa and Cummins (1970) substantiate these findings and the correlation analysis of Leipziger and Lewis (1980) complement them. In the latter analysis, countries with a per capita GNP below \$550 exhibited a somewhat significant positive relationship between growth (per capita income) and nutrition (per capita protein consumption) but no relationship emerged between income distribution and nutrition. The correlation for LDCs above \$550 per capita GNP indicates a strong positive relationship between improved income distribution and nutrition, but none between growth and increased protein consumption^{2/}. Hence income distribution appears to be significantly

^{1/} Nine Latin American countries, (Argentina, Brazil, Chile, Colombia, Ecuador, Honduras, Mexico, Peru and Venezuela) were included in the analysis; similar results for 10 developed countries indicates no effect on GNP growth from improvements in nutrition.

^{2/} Only 1970-71 correlation between literacy and per capita income for nutrition and growth is significant at the 5% level with a correlation coefficient of .120.

correlated with nutrition at higher levels of income, whereas growth is associated with improved nutrition in the poorest LDCs.

Prolonged malnutrition exacts a high personal and social cost over the long run, and unless policymakers are willing to intervene decisively, the cycle of poverty, undernutrition, reduced educability and productivity and low income will continue. The following discussion on policy will explore the possible interventions for mitigating this scenario.

Policy Implications

Nutrition considerations are at the heart of efforts to improve welfare under a BHN strategy. Achieving minimally acceptable levels of food consumption and adequate health status requires careful consideration of nutrition problems.

As discussed earlier, estimated national food supply needs are highly imperfect, and are often misleading indicators of malnutrition. National level data often belies prominent nutritional deficiencies among certain segments of the population⁽¹⁾. Projected national food needs convey nothing of intra-country food distribution, country/region specific nutrient deficiencies, or household level habits, all of which impede attainment of a nutritionally adequate diet. Although such data allows gross comparisons, it is not particularly helpful to policymakers on a national level; and, it can encourage maldistribution of international food supplies. The issue is then not only how much food

1

These estimates are particularly misleading in countries which show adequate food supplies. "Pockets" of malnutrition in food surplus countries can (and often do) reach 40% of the population. This is especially relevant in the middle income LDCs. (Reutlinger, 1977).

is required to meet minimal nutrition standards, but more importantly how the national population can achieve and sustain an adequate diet.

A BHN strategy is focussed on the lowest income group, where malnutrition is most prevalent. Berg (1979) points out, although all those suffering from malnutrition are poor, not all poor people suffer from calorie or nutrient deficiencies. Nonetheless the target population are the (chronically) malnourished poor. Attempts to reach this group have taken various forms and have met with mixed success.

National nutrition policies aimed at particular income groups or age cohorts essentially try to improve or prevent malnutrition through reductions in the costs of some (nutritionally desirable) foods, and through food supplement programs. Although problems arise with such programs they present the only sensible mechanism for reaching the very poor. Institutionalizing of food subsidies for income groups are often difficult to retract and often assistance continues beyond the period of financial need because it is politically unfeasible to end food subsidies. Limiting food distribution to those who are actually undernourished and discouraging substitution of supplemental feeding for meals pose additional problems. The latter has occurred frequently in school/clinic feeding programs for children, implying a need for nutrition education as a component of these programs to minimize potential detrimental effects.

A further complication of food programs is the possible negative incentive for agricultural production. (Isenman, 1980) Relying on food imports for adequate supplies is a dangerous practice and can prove disruptive during food shortfall periods. Hence, encouraging

growth in domestic food supply is essential if good subsidy programs are to survive. And, government efforts in stabilizing food supply on an annual and seasonal basis may be required to improve market efficiency and to minimize price variability. The government thus must encourage increased food production while providing free or subsidized food to low-income consumers. The need for carefully balanced policies is obvious, and impossible to dictate given wide variations in circumstances. (Berg, 1979).

Despite these problems target-oriented nutrition programs have become acceptable means of addressing the nutrition problem. Furthermore, food supplement and subsidy are a politically palatable approaches for both donors and national governments. Where politicians cannot condone direct income transfers to the poor, feeding hungry people is seen as a humanitarian gesture worthy of public funds. Targeted food transfers are even more appealing from a political standpoint.

School feeding programs, although widely adopted in the LDCs and the developed countries, have in some instances been shown to decrease child mortality and morbidity (U.S. Congress, 1975) and have had a positive effect on attendance and attentiveness of students; their nutritional impact is inconsistent. Supplementary school feeding programs have faced numerous difficulties; the logistics of food distribution have presented major stumbling blocks, especially in rural areas, and as mentioned, the incentive for families to substitute supplemental feedings for meals at home is quite strong and not uncommon. Health clinics and food-for-work programs also serve as food supplement distributors. The major drawback with these are the inaccessibility

of those who don't attend school, have access to or a perceived need for health care and are ineligible for or inaccessible to food-for-work programs. In short, target populations, those who are chronically undernourished, often are not within the purview of supplementary feed programs. (Singer and Marwell, 1978; Berg, 1979).

Programs lowering the cost of food to the target population through availability of subsidized food or through the distribution of food supplements have exhibited a clear positive effect on welfare. Although formidable distribution and cost problems occur with such programs, they have proven to be the single most effective means of reaching the malnourished poor. Analysis of the Sri Lankan experience, where food subsidy and ration programs have existed for sometime, shows a strong inverse relationship between food subsidy programs and death rates. (Isenman, 1980.) Food subsidy and ration efforts (along with supplementary feeding) have contributed substantially to relatively equal food grain distribution practices, leading to reduced malnutrition and improved welfare (1).

The success of Sri Lanka's¹ extensive food-ration program was due in part to complementary efforts in education and health care⁽²⁾.

1

Isenman (1980) notes that sharp curtailment of food supplies and concomitant price increases in the world food shortfall year of 1974 resulted in a significant rise in mortality.

2

Sri Lanka had a literacy rate of 78% in 1974 and an infant mortality rate of 45 per thousand in 1975, both are closer to rates reported by middle income LDCs.

The "package" approach successfully attempted by Sri Lanka (and Kerala, India) provide reinforcement for the notion that a strategy aimed at BHN objectives which include efforts in multiple sectors is a potentially efficient method of improving welfare.

The drawbacks of Sri Lanka's policies are equally noteworthy. Although the rice-ration program supplied roughly 20% of the calorie intake of the lowest income group, it essentially formed an income supplement for higher income groups. And, it required 16% of the government's total budget. (Berg, 1979)⁽¹⁾. In 1974, food import costs rose substantially forcing curtailment of the ration program contributing to a rising death rate. Targeting programs to the needy (particularly childbearing women and children) appears to be the most cost-effective means of improving the nutrition status of the poor. Both the Sri Lanka and Kerala experiences and the theoretical study of Reutlinger and Selowsky substantiate this view. Further tailoring by subsidizing the low cost, coarse grains commonly consumed by the poor can also cut costs, and without harming the diets of the target groups⁽²⁾.

1

For comparative purposes, Berg (1979) reports the fraction of budgetary expenditure allocated for food subsidies in Egypt - 21%, Korea - 19% and Morocco - 12%. The high proportion of the burden. However, the only other food subsidy program to be carefully analyzed is that of Kerala, India; thus hard evidence is unavailable on potential decreases in government food expenditure.

2

The targeting of foods outside the diets of the upper and middle-classes is in keeping with meeting basic needs through provision of merit goods. (Lewis and Leysziger, 1976).

Reutlinger and Selowsky (1978) have measured costs and cost-effectiveness of target group versus general food subsidy program. They estimate that the cost of targeted programs is roughly one to two times the price of the food whereas general price subsidies run 10 times the cost of the food. Food stamp programs appear to be the most cost-effective means of meeting nutritional needs followed closely by price subsidies. General price subsidies are shown to be roughly five times less cost-effective than either of the target programs mentioned.

The role of household income and economic growth has been discussed in the previous section, and available evidence indicated that in the long term income and development will have a major impact on nutrition. How development is pursued will determine how and when malnutrition will be considered. A BHN strategy aims at mitigating nutrition and health needs directly in the short run, thereby enhancing income generating potential and enhancing growth prospects. But to remain financially viable, as well as to maximize results, nutrition interventions should be part of a "package" approach geared to meeting the nutrition and health needs of the poor.

Part Four; Health Issues

Introduction

Health status is a good indicator of physical well-being and is an acceptable measure of overall national welfare. Attaining an acceptable health status for the population involves activities in a variety of sectors, in recognition of the complex of factors affecting health; many of these determinants include the BHN objectives described elsewhere in this paper. In a sense an inherently healthy population may indicate that people's basic needs have been met, at least on a minimal level.

A healthy population requires adequate consumption of food, shelter, health care and education, for all are jointly responsible for good health. The synergistic relationship between health and other factors makes attempts to upgrade health status dependent on improvements in complementary areas. Endogenous factors, such as fertility, health care, education and housing, can all affect health status directly, but exogenous factors of climate, topology and social custom determine the extent to which any of these factors contribute to poor health. But, so little detailed information exists on the costs and benefits to health of individual sectoral programs, that we don't really know how critical any particular intervention is to achieving and sustaining adequate health levels. General evidence is available, however, which shows that all these factors can be important, and that neglect of a complementary intervention may undermine the effectiveness of specific efforts to ensure a healthy population. (Grosse and Perry, 1979)

The rationale for investing in health status improvements is both humanitarian and economic. The former is well accepted and is increasingly seen as inextricable from the latter for two reasons - health is an investment as well as a consumption good. Health as a consumption good improves the quality of life; as an investment it is an effective means of upgrading productivity. A labor force which is uneducated and undernourished is less skilled, less motivated, and less productive. The quality of the labor force is a function of health status and, given the importance of labor force productivity to economic growth and development, labor force quality emerges as a major issue in the attainment of basic needs. (Balassa, 1977, ILO, 1977).

Because improvements in health status require involvement on a number of fronts, implementing strategies require either costly sectoral programs satisfying a range of needs bearing on health status or programs emphasizing an integrated approach to health care. The very fact that multiple factors determine health status and health affects other objectives highlights the need to pursue the latter approach, of addressing health within a broader BHN development context, rather than as a self-contained sector. This is particularly relevant in developing countries where resources are scarce and a substantial level of unmet need exists.

In order to cover the diverse issues related to health, we expand the measures, determinants and consequences categories used elsewhere in this paper. The section includes discussions of health problems and of current approaches to

delivering health care in rural settings. The additional detail is meant to clarify the importance of and difficulties associated with supplying health care services to the poor in developing countries; for many of the relevant interventions have either been dealt with elsewhere in this paper or are too complex to discuss in sufficient detail in this paper.

Measures of Health Status

Health status is a difficult concept to define and equally difficult to measure. Ironically, the most available and relevant measures of health relate to mortality, specifically life expectancy and infant mortality. Morbidity (illness) is difficult to quantify, particularly chronic disease and systematic measures are not readily available. Other indices such as per capita calorie consumption and health personnel and facilities per capita are indirect measures of health status, but are less reliable. Although crude, such health statistics as life expectancy and mortality rates provide the only information for determining the extent and magnitude of the (national) health problem in developing countries. Regional, age and income breakdowns of these data improve their usefulness in a policy context, since such specificity enables the design of policies and programs aimed at those in greatest need. However, as is the case in most sectors, such data are rarely available in developing countries.

The infant mortality rate (IMR), or the proportion of deaths of children from birth to age one, per 1,000 live births, has been widely used as a proxy for health status because data requirements are minimal, computation is straightforward and the magnitude of national health problems is reflected. Child mortality rates supplement the IMR and often

provide more accurate statistics, as under-counting is less common with children than with infants. 1/

Causes of high infant and child mortality in developing countries are associated with inadequate nutrition, unavailability of clean water and sanitation, and inadequate housing as much as with lack of health care per se. A child's environment can either foster or discourage survival, and a newborn infant, placed in unhealthy surroundings, has not developed sufficient immunity to ward off disease. Consequentially, death rates reflect the condition of the immediate environment, and thus indirectly indicates something about household living standards and income.

The crude death rate (CDR) 2/ is related to but is less concise than the IMR because it disregards age-specific mortality reflected in infant and child mortality rates. Table 1 contains infant and crude death rates for a number of countries.

Among the countries in Table 1 the CDR ranges from 8 in Thailand to 22 in Upper Volta. The range is small due to a number of factors. The death rate in the US is relatively high since a large proportion of the population is

1/ The child mortality rate is the proportion of deaths of children aged 1 to 5 per 1,000 population.

A high proportion of births go unreported in LDCs, particularly stillborn infants and those who die in the first month of life (neonatal mortality).

2/ The crude death rate is the number of deaths divided by the total population, per thousand. Cohort death rate is the death rate of a given age group or cohort.

TABLE 1

Rural - Urban Infant Mortality
Rates for Available Developing Countries

<u>Countries (IMR Date)</u>	<u>IMR Rates per Thousand</u>			<u>1977 Crude Death Rate per Thousand</u>
	Total	Urban	Rural	
<u>Africa</u>				
Chad (1964)	160	134	162	21
Guinea (1954-55)	220	190	220	21
Liberia (1971)	159	126	171	18
Malawi (1970-72)	142	n.a.	151	20
Rwanda (1970)	127	113	128	19
Upper Volta (1960-61)	n.a.	n.a.	263	22
<u>Asia</u>				
Bangladesh (1969-74)	153	127	156	18
India (1970)	127	90	136	14
Thailand (1974-75)	56	10	64	8
<u>Latin America</u>				
Bolivia (1971-72)	161	133	178	15
Dominian Republic (1970-71)	99	94	103	9
Honduras (1971-72)	117	86	127	12
<u>Near East</u>				
Afghanistan (1972-73)	220	143	232	22
Jordan (1972)	86	n.a.	n.a.	13
Morocco (1972)	162	n.a.	n.a.	13

n.a. = not available

Source: U. S. Bureau of the Census, 1980
IBRD, World Development Report, 1979

concentrated in the older age groups where mortality is high, in developing countries life expectancy is relatively short, and the populations are younger. For instance, in Malawi or Chad, a high rate of death in infancy is balanced by a young, hardy population that has survived infancy and experiences relatively moderate death rates. On the other hand, countries like Sri Lanka and Thailand have both low infant mortality and young populations (due to previous high rates of population growth), and hence exhibit the lowest death rates. Death rates have fallen substantially since World War II in all countries, but especially in the LDC's, where adoption of public health measures and introduction of modern medicine (at least in urban areas) has led to fewer deaths in the younger age groups, where LDC populations are concentrated.

The lower IMRs in Table 1 suggest relatively higher levels of national welfare. In general the IMR is a better indicator of well-being than the CDR because, as noted above, it takes age distribution into account to some degree, and reflects living standards and the level of pre and post natal care available to the high risk groups of childbearing women and infants.

Life expectancy is another commonly used indicator of health status which utilizes age specific death rates. Life expectancy estimates are derived from complicated life-table calculations, which project the probability of survival at any age based on a fixed, artificial population. (Shryock and Siegle, 1975). In effect, a life table outlines a probable mortality schedule, and the life expectancy calculation simply conveys the average chances of survival.

Life expectancy varies dramatically across countries and age groups due to differences in environment and changes in susceptibility to disease and disability over the life-cycle. Disparities in national socio-economic conditions and health care quality and accessibility produce a range of overall and cohort death rates, which can be clearly reflected in life expectancy figures if indicators are provided separately for rural and urban populations -- a rarity anywhere.

Table 2 provides an indication of the changes that occur in life expectancy over the life-cycle. Of particular note is the consistent rise in life expectancy for all countries from age zero (birth) to age one, implying that surviving the first year of life increases an individual's long term prospects. Life expectancy drops around age ten in LDCs as children become exposed to new debilitating diseases. Life expectancy drops as people age in both developed and developing countries.^{1/}

Additional health status indicators are available for some countries, such as population per physician or nursing person, population per hospital bed, and hospital bed occupancy rate. More useful in the developing country context is population per primary health worker, but these figures are available for only a few countries and definitions of "primary health worker" vary widely. The latter are measures related to hospital care, which cater

^{1/} Figures for the U.S., U.K., and U.S.S.R. are included in the table for comparative purposes, highlighting the considerable discrepancy in life expectancy between the LDCs and the developed nations.

TABLE 2

Expectations of Life at Specified Ages for Each Sex¹

Country	Year ²	0		1		5		10		15		20	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Bangladesh	70-75	35.8	35.8										
Bolivia	70-75	45.7	47.9										
Brazil	60-70	57.6	61.1			60.6	63.4	56.1	58.7	51.2	54.2	47.0	49.7
Chad	63-64	29	35	34	40	34	40	31	37			26	32
Chile	69-70	60.48	66.01	64.92	70.06	61.43	66.96	56.22	62.21	51.9	57.4	47.32	52.67
Colombia	70-75	59.2	62.7										
Egypt	60	51.6	53.8	56.2	59.9	60.5	66	56.6	62	52.2	57.5	47.7	52.9
El Salvador	60-61	56.5	60.4	60.7	63.9	60.8	64.2	56.8	60.2	52.2	55.6	47.9	51.2
Gabon	60-61	25	45	34	52	38	52	36	48			29	41
Ghana	60	37.08		47.95		45.46		43.37		39.35		35.84	
Guatemala	63-65	48.29	49.74	52.49	53.37	54.4	55.8	51.26	52.8	47.18	48.6	43.2	44.57

1/ Life expectancy is the average number of years of life remaining for persons at each age.

2/ The year(s) upon which the life expectancy figure is based vary but nonetheless provide a rough estimate of life expectancy. Given the general poor quality of the underlying data, this discrepancy should not have a substantial effect on the country's relative position.

Source: UN Demographic Yearbook, 1977

largely to the upper income groups who are able to afford the time and fees involved. And, the number of per capita health personnel is meaningless unless their distribution is known. From these figures we have no clear idea who is receiving care or if national health status is improving in a given LDC. Hence they are not of particular value unless the health care system is largely hospital and physician based.

Death rates in general and infant and child mortality rates (CMR) in particular are the basic measures of health status in developing countries. Comparable data are available for most countries, sometimes supplemented by life expectancy figures. Life expectancy and the IMR and CMR not only are generally reliable indicators of socio-economic status, but are also acceptable substitutes for one another. The CMR is closely related to both life expectancy and infant mortality. Correlations between the CMR and the latter two variables for 1970, using data from 29 developing countries, exhibit coefficients of .91 and .92 respectively. The strongest association between life expectancy and socio-economic variables using the same sample of LDCs was literacy with a correlation coefficient of .81. Similar efforts by Grosse and Perry (1979), Berg (1979) and Hicks (1979) substantiate this relationship, as indicated in Table 3. These statistically significant, simple correlations point up the substitutability among the health measures and their importance and relevance as indicators of socio-economic

status in developing countries. Taking this one step further, health indicators seem to accurately reflect advances in areas which indirectly touch on health, hence they reflect living standards as well as health status.

Table 3

Correlations of Life Expectancy and Literacy

<u>Life Expectancy</u>	<u>Literacy</u>
Lewis (1979)	.81
Grosse and Perry (1979)	.88
Berg (1979)	.91
Hicks (1979)	.96

Data Problems: Although the health statistics described above are heavily relied upon for a range of purposes, their accuracy is open to question. These measurements only convey orders of magnitude because collection of complete and accurate statistics is rare even in developed countries, and vital registration is generally incomplete in LDCs. A major drawback of LDC statistics in general is lack of rural-urban breakdowns and other distributional indicators. For although national health status may appear sound, regions or pockets may belie the national statistics. Sample surveys have shown rural areas to have lower life expectancy levels and considerably higher infant mortality rates than their urban counterparts; and, since data collection efforts are often concentrated in the more accessible and affluent urban areas, upward urban biases are not uncommon. (WHO, 1973).

Rural people are by and large outside the public health system and have neither the desire nor the incentive to report births and deaths.—^{1/}
Even those who do have access to services neglect to report deaths and often overlook the need to report births, particularly if the baby is stillborn or if infant deaths are a common occurrence. In short, there is no incentive to register births or deaths—^{2/} and consequently vital statistics are of questionable validity.

The only reliable means of determining health is on a community basis, but such an approach is extremely costly and hence somewhat uncommon. Some micro-level anthropological studies have been undertaken which provide insights

^{1/} Unequal distribution of health facilities/services leads to considerable discrepancies in quantity and quality of data. Ayurvedic and traditional medicine are far more common in rural areas of the developing world than are the national or private Western oriented health services which systematically collect morbidity and mortality data.

In some countries public health services are essentially competing with traditional deliverers of health care: druggists, injectionists, midwives, magicians and "medicine men". Modern medicine must prove itself as a reliable alternative in these circumstances.

^{2/} The only exception to this is school enrollment. In most countries, a birth certificate is required to enroll in school; however, this encourages late registration and doesn't capture children who die before school age.

into community health, but the results tend to be location-specific and involve small samples.

Health Problems in LDCs

Morbidity (illness) is a way of life in much of the developing world. Parasitic and other tropical infectious diseases are common, and simple illnesses such as blindness from Vitamin A deficiency or dehydration and death from common bacteria or cholera are equally visible. The complex and simple exist simultaneously, often causing long run chronic conditions that debilitate but do not cause death.

A number of LDC-specific factors inhibit preventive measures, facilitate disease transmission and retard prompt, effective medical solutions. Poverty, squalid living conditions, unsanitary personal habits, limited public health programs and services, and ignorance all contribute to an unhealthy environment. A clear understanding of disease transmission provides a starting point for understanding how and where preventive and curative programs should be established.

The World Bank (1975) has broken disease transmission into four categories:

- (1) fecally transmitted--typhoid, intestinal parasites and diarrheal diseases;
- (2) air-borne--tuberculosis, pneumonia, diptheria, meningitis, measles;
- (3) water-borne--infectious and parasitic disease; and

- (4) vector-borne (animal or insect transmitted)--malaria, trypanosomiasis (sleeping sickness), onchocerciasis (river blindness), schistosomiasis.

Prevalence of these diseases and disease categories show an irregular pattern geographically due to varying environmental conditions and social customs. Salient examples of these are discussed below within the context of specific disease categories.

The World Bank estimates that fecally borne diseases^{1/} are the most prevalent in developing countries, and frequently represent a major cause of mortality among young children and chronic infirmity and debility among adults. Communities lacking safe water supplies or sanitation facilities commonly experience a high incidence of these diseases, susceptibility being enhanced by substandard housing and unsanitary habits. These conditions are exacerbated by insufficient incomes and inadequate information/education on disease transmission.

Air-borne diseases also show a high prevalence and incidence in developing countries,^{2/} and are associated with cramped and unsanitary housing, lack of public health services (particularly immunizations) and poor personal hygiene practices.

^{1/} It is estimated that a quarter of the world's population is infected with round worms. (Van Bijsterveld, 1966).

^{2/} For example, according to an IBRD report on Latin America, 19% to 29% of reported deaths in Bolivia, Guatemala and Chile were traced to air-borne diseases. The extent of illness caused by these diseases is unknown.

Water and animal-borne disease prevalence is geographically determined; some areas suffer severely while others are left untouched.^{1/} Where they occur, vector borne diseases present severe problems in terms of high morbidity and mortality. Susceptibility to animal-carrying diseases is associated with substandard living conditions (for example, absence of screens on dwellings in tropical climates), proximity of breeding grounds to human communities and limited means of prevention. Infested areas are difficult to control and involve substantial costs. Costs are particularly high as infested regions are often rendered uninhabitable by man or beast. (See Taylor and Hall, 1967).^{2/}

^{1/} For example, the Niger River Basin has developed into a breeding ground for the black flies that carry onchocerciasis, which has forced families to relocate to uninfested but less fertile areas. Efforts by the Club des Amis du Sahel and other donors are attempting to reclaim the land by destroying breeding areas.

^{2/} Prevention is best accomplished through vector control measures (until new, resistant strains are introduced) — chemical spraying of breeding grounds and measures to inhibit areas from becoming conducive to vector reproduction. (Taylor and Hall, 1967). Human prevention through immunization is in its infancy for most vector-borne diseases, as is the development of curative drugs. Ongoing research is sparsely funded since most vector-borne diseases are virtually unknown in the developed world. Prevention through modifications in behavior, life styles or housing construction are difficult in the short run, often being alien to local custom. Current prevention centers on out migration from infested areas.

Determinants of Health

A number of factors seemingly unrelated to health status combine to determine health status. Most sources of disease in LDC's can be traced to factors directly associated with poverty; cases in point are the lack of sanitation facilities and substandard housing common in most low income LDCs.

The linkages observed between behavior patterns and ill health can be traced to low achievement in other areas, notably to lack of education, high fertility, malnutrition and an unhealthy environment. The inter-relationships among most of these factors are discussed extensively elsewhere in this paper, but their specific relationships to health are discussed here.

Education - Uneducated in the causes and control of disease and illiterate the LDC poor are illequipped to deal with their own health problems. General education helps to dispel socially grounded (superstitious) beliefs in the causes of disease, encourages experimentation with new health services and, through increases in literacy, dissemination of written material to improve health knowledge and practices. (Bryant, 1969)

Functionally targeted education programs (i.e. to health) are useful in improving habits which promote health.^{1/} Health outreach programs are particularly relevant for the poor whose lack of knowledge and low incomes perpetuate poor health (and nutrition), which in turn has implications for income generating ability.

^{1/} For instance, knowledge about optimal breastfeeding and weaning practices can significantly reduce malnutrition among infants and young children. Increasing the length of breastfeeding and introducing proper food supplements at the appropriate time improves the quantity and quality of infant and child diets. (Zeitlin, et. al., 1980)

Fertility - Fertility bears directly on health through the ill-effect of constant pregnancy on the health and mortality of childbearing women and their children. High parity (number of births) is associated with abnormally high levels of maternal mortality.^{1/} Numerous, closely spaced births deplete a woman's strength, endangering her and her children's health and jeopardizing future pregnancies. Furthermore, lack of pre- and post-natal care increases the incidence of infant mortality and contributes to high parity.^{2/} In order to encourage smaller families, family planning programs have been established to make contraceptives available. dissemination of family planning services has traditionally been accomplished via the health system and the absence of health care infrastructure inhibits effective dissemination of contraceptive information and services. (Butz and Habicht, 1976)

Nutrition - Malnutrition is a major contributor to morbidity and mortality, especially among children. For instance, Puffer and Serrano's (1971) work in Latin America showed malnutrition to be a major direct and/or contributing cause of mortality among children. Table 4 indicates the percent of deaths among children under age five, attributable to malnutrition, both as a primary and associated factor. According to the data in Table 4 malnutrition poses a more serious threat in rural areas and is generally an associated rather than a primary cause of death among children. Neither is surprising given lower

^{1/} High mortality among females in the childbearing ages (roughly ages 15-49) is a phenomena unique to developing countries, and is due primarily to poor maternal health and nutrition, both seriously exacerbated by repeated pregnancies. (See Shryock and Siegle, 1975 for discussion of this point).

^{2/} See the section on Population in this paper.

TABLE

Malnutrition as Primary or Associated Cause in Deaths of Children under Five,
Selected Latin American Countries (1971)

Area	Percent of deaths caused by malnutrition		
	Primary cause	Associated cause	Primary or associated cause
Argentina			
San Juan Province			
San Juan	3	37	40
Suburban	9	39	48
Rural	8	39	47
Brazil			
Recife	6	60	66
Sao Paulo	6	45	51
Ribeirao Preto	2	67	69
Colombia			
Cali	16	40	56
Cartagena	15	44	59
Medellin	11	51	62
Jamaica: Kingston	6	32	38
Bolivia: La Paz	4	41	45
Mexico: Monterrey	4	48	52
Chile: Santiago	6	39	45
El Salvador			
San Salvador	9	49	58
Rural	14	44	58
Average of all areas	8	46	54

Source: Pan American Health Organization, Inter-American Investigation of Mortality in Childhood, First year of Investigation, Provisional Report (Washington, 1971).

incomes and erratic (seasonal) food supplies in rural (and semi-urban) areas. Furthermore, mortality from severe malnutrition is far less common than the milder, debilitating forms of malnutrition which underlie the "associated causes" of death in Table 4.^{1/}

Inadequate quantities of food and insufficient nutrient intake combine to create severe nutrition and health problems, the direction of causality not being well understood. Morbidity, particularly infection, prevents the absorption of sufficient nutrients; at the same time malnutrition weakens the body's defenses against disease. Consequently, mortality is far more common among malnourished children, and nutritional deficiencies are correlated with disease incidence. The effect of malnutrition among adults is less well understood and will be explored in the section on nutrition. However, malnutrition cannot be overlooked in provision of health care, for quantity and quality of food figure prominently in determining health status in IDCs.^{2/}

Environment - The environment in which people live determines to a great extent, their susceptibility and exposure to disease. And, custom or ignorance can reinforce the detrimental effects of the environment. For example, water infested with bacteria and parasites is rarely if ever boiled, food is left to sit

^{1/} See Nutrition section

^{2/} For evidence on these issues see RTI, 1979; Puffer and Serrano, 1971, Serimshaw, Taylor and Gordon, 1968, and Puffer and Serrano, 1973.

uncovered often accessible to animals and insects, and, personal cleanliness is a problem, particularly since most water is hauled from distant locations and used sparingly. Furthermore, ramshakled housing allow mosquitos, flies and other disease vectors easy access to their human victims; lack of sanitation facilities encourages transmission of fecal borne disease; and unhygienic personal habits heighten the probability of acquiring these diseases.

Hence, custom, environment, and low income and education combine to encourage high disease prevalence. Efforts to improve health must address the multiple sectoral determinants as well as the unhealthy environmental conditions of the poor.

In sum, ill-health is attributable to numerous interrelated factors which encourage disease incidence. The most salient causes of morbidity being high fertility, malnutrition and unsanitary conditions. From the discussion above, the role of unsanitary conditions emerges as probably the major factor in the spread of disease. Low incomes (and unemployment) exacerbate the situation, and little education, poor health education (including family planning and nutrition information) and lack of clean water and sanitation facilities make interventions to reverse the pattern of high morbidity and mortality extremely difficult and costly. (IBRD, 1976; Barlow, 1979; Correa, 1975).

Economic Consequences of Health Investments

Mitigating human suffering is a worthy basis for providing health care, but a high incidence and prevalence of chronic disease has clear economic implications as well. Research in developed countries indicates a substantial loss in productivity due to chronic disease,^{1/} in the LDCs the effect is less documented if more obvious.

Mushkin (1962) has summarized the effects of illness on productivity into three categories: (1) deaths (loss of workers); (2) disability (loss of working time); and (3) debility (loss of productive capacity while at work). All three are common in developing societies and health promotion serves to mitigate the prevalence of all three.

Studies in LDCs have produced conflicting results on the effect of debility and disability on productivity. Part of the discrepancy is due to differences in samples, methodologies and disease prevalence. However, it is clear that chronic disease and malnutrition inhibit both working and learning capacity among children and adults.^{2/} For example, the high absenteeism associated with chronic illness negatively affects children's academic performance and labor's productivity. (Caldwell, et. al., 1978). Thus the indirect evidence in developing countries points to a heavy cost in terms of human capital when

^{1/} See discussion in Barlow, 1979, especially p. 56-58,

^{2/} See section on Nutrition.

health needs are neglected. Further evidence of the importance of preventive health measures on economic output comes from assessments of public health programs which have consistently shown a propensity to improve productivity in a cost effective manner in both developed and developing countries (Hall and Saunders, 1960 and Feldstein, Piot and Sandereson, 1973).

The generally poor productivity performance of the labor force in developing countries stems largely from low skill and education levels and poor health. The extent to which potential productivity becomes actual is a function of the availability of technology and capital and other inputs. Nonetheless improvements in income and welfare are seriously hampered by low productive capacity and substandard learning ability.

How much of an effect improved health status has on productivity is difficult to measure. Ram and Schultz (1979) have found that in India roughly 28% of agricultural productivity or output increases can be explained by reductions in mortality (which reflect improved health); and, a 1% drop in mortality results in a .3% increase in labor productivity or output. Although crude, this study represents one of the few attempts to quantify the direct relationship between health and productivity.

Documented experiences of industrialized countries and results from research in LDCs indicate firm linkages between health and productivity and between increased productivity and macro-economic growth. It seems likely, despite contradictory findings, that eradication of chronic, debilitating diseases will have a positive effect on productivity,

welfare and economic growth.^{1/} And, although we know that health does have a positive effect on development, the extent of effect, particularly relative to other inputs (such as technology or training), has not been quantified.

High costs of debility in terms of lost household resources also exists. Lack of health care encourages high fertility (with high child mortality parents often over-compensate to ensure survival of the desired number(s) of children) leading to short birth intervals associated with inhibited physical and mental development. (Caldwell, et. al., 1978). High fertility also implies stretching income further, perpetuating the cycle of low nutrition, poor health and high fertility. Investments in a large number of children, a high proportion of whom die, is a waste of physical and capital resources. Furthermore, a malnourished child requires more food than does a well-nourished child to reach and sustain similar growth and development levels. These factors constitute a waste of household resources; implying a reduction in welfare of the family, and in the aggregate, of the society.

Productivity concerns extend the need for health augmenting activities beyond humanitarian criteria. At the heart of decisionmaking is whether

^{1/} See Sorkin, 1976, p. 43-57, Barlow, 1979, Correa, 1975 p. 39-53 for discussions of these and other relevant issues and analyses on health and productivity in developing countries; the section on nutrition reviews the linkage between health/nutrition and macroeconomic growth, and available evidence points to a positive relationship between improved nutrition and productivity.

investments in human capital through various mechanisms which bear on health status (health, education, sanitation) make economic sense. For the economic effects of not investing in health include: (1) loss of labor and labor productivity; (2) reduction in land resources due to infestation by animal vectors of disease; (3) inhibited learning abilities and impeded skill acquisition; and, (4) wasting of economic resources through unproductive investments in children who die, and expenditures on children and adults who consume beyond their normal needs because of disease. Health care, broadly defined to include basic health services, especially for mothers and children, family planning, nutrition and health education, and information can be instrumental in mitigating these economic losses.

Low health status impedes achievement of basic needs objectives both as a component of core needs and as a mechanism for upgrading human capital. If learning and working are inhibited by poor health, agrarian and industrial labor productivity and incomes are affected. Hence the link between health (and nutrition) and productivity is of fundamental importance in efforts to improve welfare and spur economic growth.

Primary Health Care Delivery Experience

Possibly the most critical determinant of health status in LDCs is income.

As outlined in the introductory section, the concept of primary health care (PHC)^{1/} as an acceptable health priority in LDCs is a relatively recent one.

In the early 1960s donors and governments alike became aware of the total absence of reliable health care in rural areas, where the bulk of the poor live. This lack of facilities and trained health workers was particularly critical in low income LDCs where poor communications and transportation virtually isolated rural people from health care deliverers (i.e. physicians).

Furthermore, health complaints of the (rural) poor tended to be concentrated on a few relatively simple medical problems. Hence, high-cost physician-based care appeared inappropriate on social as well as economic grounds. Development of the primary health care concept was a response to these realizations.

Efforts over the last decade or so to deliver PHC have highlighted the preferred means for delivering health care and the necessity of including particular kinds of services in the PHC package. Less information has been garnered on the cost effectiveness of various PHC approaches and realistic evaluation methods.

^{1/} Primary care is defined as: "basic or general health care which emphasizes the point when the patient first seeks assistance from the medical care system and the care of the simpler and more common illnesses." Use of community health aids and other paraprofessionals is called for, and community participation is an important ingredient. (U.S. Congress, 1976)

Evidence from health care programs in Narangwal, India, Lampang, Thailand and rural Guatemala, among many others, indicates the necessity of delivering a range of integrated services including basic preventive and curative care as well as family planning, nutrition and health education services. It has also become clear that nurses, midwives, community health aids and other paraprofessionals are best suited for delivering most primary health care services. Doctors are in short supply and overqualified for most of the services required in rural areas.^{1/} For, as discussed earlier, the bulk of LDC health problems are simple ailments stemming largely from ignorance, poverty and the environment.

A hierarchical system of health care providers and facilities has come to be accepted as the most efficient method of delivering PHC.

Paraprofessionals generally deliver services on the village level, often covering a number of communities and providing essential preventive and curative care.^{2/} These entail immunizations, family planning services (depending on local and national sensitivities) basic maternal and child health care services, nutrition information; and diagnoses and treatment of

^{1/} Doctors are often newcomers to the community which discourages use of health facilities. Paraprofessionals chosen from the community, trained and sent back to their residents tend to have greater acceptance.

^{2/} Training varies by program. Some PHC programs have major, project specific, training programs. Others draw on the existing skills of nurses and midwives. Retraining often can be the most effective means of ensuring a well-trained, competent cadre of health workers. Improving post-partum care methods, for example, can easily be accomplished by retraining midwives in hygienic care of mother and child, and encouraging them to abandon potentially harmful practices.

diseases common to the locale as well as simple illnesses, such as diarrhea and dehydration (a particularly common complaint especially among infants and children). Complicated illnesses which the paraphysician cannot diagnose and/or treat are referred to a health center where a doctor is either in residence or available at certain times. The kingpin of this hierarchical referral system is a regional hospital serving a number of health centers.

A major component of local care is outreach services, achieved in various ways: periodic home visits, scheduled rotation of clinics, or health promoters scattered in small communities to encourage use of health care.^{1/}

The Overall importance of establishing a PHC outreach program varies but it has proven to be essential for encouraging consumption and overcoming fears of the unfamiliar health care services.

Implementation of PHC is still under experimentation and although practices such as those described above are becoming more common, a recipe-approach is unrealistic. The sociocultural milieu and economic constraints of individual countries and regions dictate how a program should be structured, and country-specific experiences only provide guidelines and highlight

^{1/} The preferred outreach approach is a function of custom and social structure as well as manpower availability. No program can be said to be "best" in all contexts.

potential pitfalls. Opportunities for replication of PHC programs exist, but only to a limited degree since local and national circumstances vary so considerably.

Policy and Financing Implications

Health status is thus determined by a multitude of factors and policy development must recognize and respond accordingly. The array of factors involved and the extent of unmet need in terms of geography and subpopulation in the LDCs makes policy design a formidable task. However adoption of a BHN strategy provides an ideal mechanism for promoting health, especially if an integrated approach is chosen, because of economics of scale in implementation and linkages in planning and policy activities.

The need for government involvement in promoting health is evident. Rural areas of LDCs are sparsely if at all served by health care. Private sector involvement ^{1/} in providing modern health care is minimal since profit potential is limited, although even in most developed countries health care is a joint public-private responsibility. Public health measures such as immunizations and sanitation (particularly in urban areas) are campaigns normally initiated and funded by government, mainly because of the externalities ^{2/} involved. Immunizations benefit communities as well as

2/ An externality is a (social) good which involves (external) consumption effects by more than one individual. Hence an immunization not only keeps the individual healthy, but protects the community from the incidence and spread of disease.

1/ The definition of private sector excludes the non-profit private voluntary organizations (PVO) who implement a number of health programs for bilateral and multilateral donors. PVOs generally run discrete, local projects rather than national programs.

individuals; water supplies and sanitation are usually public due to the indivisibility in consumption. And, since vector control is a costly venture which benefits entire populations, it is a cost governments must absorb, for individuals are reluctant to invest in programs that allow "free riders"^{1/} (Mushkin, 1962).

The previous sections briefly outlined the major problems facing the LDCs in attempting to provide their populations with adequate health care. A package approach delivering low cost,^{2/} primary health care is the preferred means to delivering health services, particularly in rural settings of developing countries. The essential components of a PHC system include: (1) basic preventative and curative care which can be delivered by community health workers; (2) delivery of integrated services, including nutrition, environmental sanitation, family planning and health education at a minimum, preferably with some outreach services; (3) careful health planning and evaluation to ensure efficient allocation of resources and maximization of access; (4) sound management and supervision; and (5) community participation. Government commitment to PHC is of critical importance to successful program implementation, particularly given the relatively weak position of most Ministries of Health. The WHO Conference on Primary Health Care in Alma Ata, USSR

^{1/} The "free rider" concept in economics indicates someone who consumes but does not pay for benefits. It was originally associated with the notion of driving to work. If I sacrifice by taking public transportation, my neighbor can drive with less traffic and he benefits but I don't (necessarily). By the same token, if I am immunized I protect my neighbor and I bear the pain, time and costs. His costs are nil unless he too is immunized.

^{2/} The goal of low-cost health care is a relative concept for per capita health costs will be high regardless, but basic care delivered by paraprofessionals is far less costly than extending the present delivery system which is comprised of high-technology, physician based hospital care.

in 1978 saw a pledge to renew efforts by donors and LDC governments to provide health care to all citizens. The adopted slogan "health for all by the year 2000" is admirable, if impossible, but the conference served to reconfirm and highlight the importance of primary health care in developing countries and provided a forum for exchanges of experience and ideas on delivery systems. In addition, the conference emphasized the importance of addressing health within the context of non-health programs, thereby reaffirming the BHN concept and broadening the approach to improving health.

Progress on implementation has been substantial over the past decade or so and will no doubt be extended in the 1980s. However issues of efficiency have been inadequately addressed, specifically those related to evaluation, costs and planning. Building evaluation and cost analysis into planned programs can allow adequate assessment of the individual health care delivery program. With few notable exceptions (Lampang, Thailand, Narangwal, India, rural Guatemala, and Danfa, Ghana being obvious exceptions) current programs are ill-equipped to produce useful feedback. Those that have generated useful information have been high cost pilot endeavors, which limits their replicability.^{1/}

Analytic approaches are few and generally geared to developed country data and technology (i.e. sophisticated computers requiring highly trained programmers). Simple recording of fixed and variable costs -- excluding research costs -- would be an important first step. Evaluation can take a

^{1/} The Thai government is currently developing a national program based on the Lampang experience, but it is necessarily pared down to fit available financial resources.

number of forms but has persistently focussed on supply factors, largely ignoring questions of demand, increased access, community impact and cost effectiveness.

Planning efforts bear some similarity to evaluation -- generally little planning is undertaken but where it exists it is done on an elaborate scale. Methodology in the developing country context is minimal although work by Grosse (1979) and others appear promising for developing appropriate means for rigorous health planning. Planning, though, is a difficult task, one many developed countries are still grappling with. But some level of evaluation and planning is essential to efficient/^{financing}and effective use of primary health care. 1/

Financing of "low-cost" primary care is a substantial burden for many LDCs, particularly those at the bottom end of the income scale. Table 2 in the introductory section provides comparisons of per capita expenditure and percent of the budget devoted to health, but, as discussed, they are poor indicators of health care quality and ^{the}equity of access. Expenditures may reflect costs of sophisticated urban care rather than basic nationwide health services used by the poor, and it is unclear whether investment or recurrent costs are involved in the computations. Country by country examination is required to obtain this kind of specificity.

1/ Evaluation and planning are particularly critical in the provision of merit goods, such as health care. By definition, there is inadequate demand for merit goods without the government's involvement in their provision, and thus supply decisions rely on cost effectiveness rather than exhibited demand information for guidance in determining funding and program levels.

Donors have been particularly active in assistance for development of health care systems and construction of necessary infrastructure, but substantially less involved in financing recurrent (operating) costs. As costs rise service quality and quantity suffer without support from donors. The burden of recurrent costs has recently been recognized as a development problem in general, and hopefully efforts to help countries alleviate some of the mounting annual costs will emerge as a result. An encouraging aspect of external finance is the growing emphasis on health within the Basic Human Needs context. Donors embracing BHN strategies (ILO, AID, IBRD for example) have increased health budgets. The World Bank has recently established a specific health program, supplementing its health-related activities in family planning and nutrition. The U.S. Agency for International Development has consistently increased its health budget over the past few years although overall budget levels have experienced only modest increases.^{1/}

Increased commitments to health, spurred by Alma Ata and BHN considerations bode well for future funding of health care, but issues of total cost as well as the cost effectiveness of particular approaches persists. Continued progress in smoothing bottlenecks in delivery can be expected and increased access for the poor should also occur. But the complex issues determining health clearly pose an impediment that will inhibit even concerted efforts to improve health. The Basic Needs framework is particularly useful and as a BHN strategy evolves some of the interrelationships can be more effectively addressed. The issue of how health status can be upgraded most efficiently and effectively remains a challenge to LDCs and donors alike.

^{1/} See Table 3 in the Introductory Section for recent budget levels of donors.

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