

Chapter 3

Implications of World Population Growth

Contents

	<i>Page</i>
Abstract	43
Resource Demands and Environmental Degradation	44
Food	44
Water	45
Energy	46
Environmental Effects	47
Economic and Social Impacts	48
Political Consequences	50
Chapter 3 References	52

LIST OF TABLES

<i>Table No.</i>	<i>Page</i>
7. Projected per Capita Water Availability in the Year 2000	46
8. Average Annual Growth of Labor Force for Selected Countries	49
9. Population Trends in Selected Countries Involving U.S. Security Interests	51

Implications of World Population Growth

Abstract

Less developed countries (LDCs) are experiencing severe environmental and resource pressures to which more developed countries (MDCs) substantially contribute because their fewer numbers consume the greater proportion of the world's resources. Lower consumption levels in MDCs plus agricultural and other developmental aid to LDCs **would ease many of these pressures. The continuation of traditional land-use patterns by rapidly rising numbers of people has significantly weakened the resource base of many LDCs, whose governments must achieve huge future increases in agricultural production to keep pace with unprecedented population growth. Food resources are expected to be adequate to the year 2000, but distribution will remain a serious problem, and the burden of increased production will fall largely on marginal lands. Most LDCs are in one of four situations: 1) those with severely limited resources and heavy population pressures, 2) those with resource potential that are slow to exploit it, 3) those with periodic food surpluses, and 4) those with food shortages but the ability to import. World aquatic yield has declined slightly since 1970. Global water supplies, now about 10 times demand, are projected to fall to 3.5 times demand by 2000. Water supplies are already critical in some areas and international disputes over water rights are likely to intensify. International energy demands indicate a difficult future for LDCs; high oil prices, dwindling fuelwood supplies, and use of needed fertilizers (dung, crop residues) as fuels have contributed to decreasing rates of economic growth. Continuation of today's rate of deforestation, with its concomitant large-scale soil erosion and decreased soil productivity, could reduce the world's forests by 18 to 20 percent by 2000. Human intervention has so far altered some 15 to 17 percent of the Earth's land area; of the world's land surface, only 30 to 36 percent has significant life-support capability with present technology. The outcome of human impact on the global temperature is uncertain. less rapid population growth would reduce pressures to provide health care, education, and employment opportunities in LDCs. The impact of population growth on political stability depends on its interaction with the social, economic, and political structure of the society involved. Because rapidly rising numbers of people can limit the ability of governments to meet the expectations of their people, conflicts can have demographic roots. Growing populations of rural landless, explosive urbanization, and large-scale migration can exacerbate socioeconomic burdens in LDCs and influence stability in MDCs. High population growth rates influence the social, economic, and political factors that threaten the stability of many LDCs in which the United States has vital security interests; many contain such tangible commodities as oil, chromium, and vanadium. Less tangible but probably far more important is the significance of some of these countries to regional stability and the balance of global power. Rapid population growth is intensifying current environmental, food, energy, and resource pressures in LDCs. Its interaction with these problems has generated a new category of national security concerns, the implications of which remain largely unexplored.**

Resource demands and environmental degradation

LDCs are experiencing severe environmental and resource pressures. MDCs contribute substantially to these pressures because their far fewer numbers consume the greatest proportion of the world's resources. Effective efforts to curb consumption levels in MDCs combined with agricultural and other developmental aid to LDCs would ease some of the most serious stresses faced by the developing world.*

In many LDCs, farmers subsist by clearing forestland that has marginal productivity, quickly wearing out the soil, and moving on to clear more forest. The traditional use of wood and charcoal for cooking cuts further into the tree cover, and forested areas rapidly disappear. The Philippines lose an estimated 200,000 hectares of forest each year and Thailand's forests are vanishing at the rate of 250,000 hectares annually. Droughts have become more frequent and severe; floods are unmoderated by forest buffers; erosion is extensive; irrigation and hydroelectric systems are silting in. India, Brazil, Indonesia, Costa Rica, Burundi, the Ivory Coast, Burma, Haiti, Honduras, and Nepal are among the nations facing similar problems. Yet these countries must achieve huge increases in agricultural production in the years ahead to keep pace with their rapid population growth.

Although its most direct effect is seen in the pressures exerted on agricultural systems, rapid population growth exacts a heavy toll on other important resources. It also points to complex interrelationships between the demands on food, water, and fuel resources and their resulting impacts on the environment, on the social and economic progress of developing nations, and on the political stability of the world at large.

Food

Most experts estimate that world food resources will be adequate to 2000, but many countries will have severe production and

distribution problems. MDCs presently have sufficient surplus production to be able to export to LDCs, but distribution systems in these countries are inadequate to ensure the receipt of food by those in greatest need. In the future, some of the wealthier LDCs will be able to import food, but many poor LDCs will have insufficient financial resources and are likely to experience continued food deficits.

Food production to 2000 is projected to increase by 2.8 percent per year in Africa, 3.0 percent per year in Latin America, and 2.6 percent per year in Asia (6). Whether LDCs can by then be relatively self-sufficient will depend to a great extent on the magnitude of their population growth. In Africa, domestic food production can currently meet 86 percent of calorie requirements. Depending on whether the high or low population projection becomes reality by 2000, this proportion either decreases to 80 percent or increases to 92 percent. In Latin America, domestic production, currently at 84 percent of food requirements, would increase in either the high or low population projections, but the difference would be between meeting 87 or 101 percent of food requirements. In Asia, the increase would be from 9.5 percent today to either 110 or 120 percent by 2000.

Even when total production approaches 100 percent of food requirements, caloric intake is often insufficient among large segments of the population because of losses in storage and transit and the proportion of those whose intake is above average. Although food production may rise sufficiently to meet minimum calorie requirements in some poor LDCs, severe problems of distribution are likely to continue.

Most LDCs are in one of four situations:

1. Countries with severely limited resources (land and technology) to increase food production, most of which face heavy population pressures and have little unused arable land (e.g., Bangladesh, Pakistan, Egypt).
2. Countries that have potential but are slow to exploit it. They have land available for agricultural development, good climate,

* The projections on the impacts of population growth in LDCs included in this chapter were prepared for ODA by the Population Group (9). A full report is published as a working paper.

solid infrastructure, and an abundance of other natural resources (e.g., the majority of Latin American countries).

3. Countries with periodic food surpluses (e.g., Thailand, Brazil).
4. Countries that have food shortages but are able to import (e.g., South Korea, Saudi Arabia).

Food production increases are achieved by increasing yields of lands now under cultivation and by opening new lands. Because the most productive lands have already been brought into production in most areas, pressures to increase production will fall on marginal lands, with consequent need for far-higher use of irrigation, fertilizers, pesticides, herbicides, and higher yielding crop strains than for productive lands.

Production from another important source of food, the World's oceans, lakes, and rivers, has declined since the peak year of 1970 (3). The contribution of the aquatic yield to global food requirements is about 25 percent of required protein. Even if the total aquatic yield could be increased from its present 70 million to 100 million metric tons by 2000, through the exploitation of new species and the emergence of a large marine-culture industry, the world's population will increase at a slightly higher rate.

Water

An adequate supply of water is the most important factor in raising agricultural production in large areas of the world. Global water supplies are now about 10 times demand. Projected growth of irrigation and domestic water use would reduce these supplies to about 3.5 times demand by 2000. Irrigation for food production is the major use of water, accounting for 70 percent of total water use in Africa, 88 percent in Asia, and 60 percent in South America.

The water supply is already critical in various areas of the world for different reasons. In areas such as the Middle East, population densities are low (the Nile River valley is an exception), but water is very scarce because people are crowded close to the few available water

sources. In other areas, although there may be considerable seasonal variability, large quantities of water are available, but populations are also very large. The Ganges River basin, for example, is expected to contain more than half a billion people by 2000. In still other areas, water is used for many purposes, straining supplies even though population density in the immediate area is not high. For example, the United States uses Colorado River water for irrigation, municipal, and industrial purposes, sharply reducing the down-river flow into Mexico and increasing the salt content of what remains.

Table 7 compares 60 LDCs by per capita water availability (assumed needs: 1,000 cubic meters per capita per year) in 2000. North Africa and the lower Middle East already have severe water supply problems, and most of their populations are expected to double by 2000. Much of Asia and the rest of Africa are in similar positions.

International disputes over water rights are likely to intensify. Worldwide, 148 of the world's major river basins are shared by two or more countries. For example, there are long-standing disputes over the Jordan River (Jordan and Israel), the La Plata (Brazil, Argentina, Uruguay), the Euphrates (Syria, Iraq), the Indus (India, Pakistan), and the Ganges (India, Bangladesh).



Photo credit Agency for International Development

Haitian farmers plant tree seedlings in efforts to restore eroded hillside

Table 7.—Projected per Capita Water Availability in the Year 2000
(thousand cubic meters per capita per year)

Per capita water availability	Sub-Saharan Africa	Asia	Latin America	North Africa and Middle East
High availability (above 10)	Angola Cameroon Ivory Coast Madagascar Zaire Zambia	Burma Kampuchea Malaysia	Bolivia Brazil Chile Colombia Costa Rica Ecuador Honduras Peru Venezuela	
Medium availability (5 to 10)	Mali	Nepal Philippines	Argentina Guatemala	
Low availability (1 to 5)	Ethiopia Ghana Kenya Mozambique Niger Senegal Tanzania Uganda Upper Volta	Afghanistan China India South Korea Sri Lanka Thailand	Cuba Dominican Republic El Salvador Mexico	Iran Iraq Sudan Turkey
Very low availability (0 to 1)	Malawi Morocco	Bangladesh Pakistan	Haiti	Algeria Egypt Saudi Arabia Tunisia

SOURCE: Futures Group, 1980; contractors report to Office of Technology Assessment.

Energy

The global energy situation signifies a difficult future for much of the developing world. While many of the industrialized countries have raised the prices of their exported goods, thereby buffering the impact of higher costs for oil imports, most LDCs have not been able to effectively do so. They have suffered a double hardship by paying higher prices for both oil and other imports.

Consumption of commercial energy (oil, gas, coal, etc.) is more closely tied to economic growth and level of development than to population growth. But the demand for "noncommercial" fuels is directly related to population growth.

Wood is the most widely used noncommercial fuel and supplies the majority of all energy used in many LDCs. Worldwide, wood burned for fuel provides energy equal to that derived from all hydroelectric sources. LDCs consumed about 90 percent of all fuelwood used in 1974, which provided between 30 and 60 percent of their total energy (1).

Wood can be a renewable resource, but encroachment on forests for farming and fuel has resulted in widespread shortages. Charcoal is frequently adopted as a fuel when deforestation extends beyond distances from which fuelwood can be economically transported, because charcoal contains about four times the energy per unit weight as wood. But because much of the energy value of wood is lost in the process of charcoal manufacture, intensified charcoal use will accelerate the problem of deforestation.

Rising commercial fuel costs and diminishing supplies of fuelwood are forcing many people in LDCs either to greatly reduce fuel consumption or to find alternative fuel sources. Among these are dried dung and crop residues. Because of fuel shortages, increasing numbers of people have only these materials to burn. Yet they are needed to maintain soil productivity, as subsistence farmers can rarely afford commercial fertilizers, and when they are burned, energy is gained at the expense of land productivity.

Burning of dung and crop residues is already extensive in India, Nepal, other parts of Asia,

and in the Andes of South America. Worldwide, between 150 million and 400 million metric tons of dung are burned for fuel every year. As about 50 kilograms of additional food grain can be produced from land fertilized by a ton of dung, this burning represents a potential loss of between 8 million and 22 million metric tons of food grain.

Population growth can make a substantial difference in the "affordability" of commercial energy on the economy. Although supply-price constraints are likely to depress economic growth and gains in living standards, at a given level of economic growth, gains in living standards can be much higher when population growth rates are lower. A higher population growth rate means that roughly the same amount of gross national product (GNP) must be divided among a larger number of people.

Commercial energy requirements have historically been closely linked with growth in GNP. A 1-percent increase in GNP is associated with a 0.95-percent increase in commercial energy requirements. The tremendous oil price increases that most oil-importing LDCs have had to pay have meant large balance-of-payment deficits and increased debts to finance decreasing, rather than increasing, rates of economic growth. The World Bank has estimated that GNP growth rates collectively fell by more than 60 percent in LDCs between 1973 and 1975, from an annual growth rate of 7.6 to 3 percent. Higher rates of population growth require more commercial energy, necessitating more rapid growth in GNP-growth that cannot always be assured and that appears unlikely to occur in some countries.

Environmental effects

Forests now cover about one-fifth of the world's land surface but are being depleted at a rate of 18 million to 20 million hectares per year, a reduction rate of about eight-tenths of 1 percent per year. If this rate were to persist to 2000, forests would be reduced by 18 to 20 percent, or to one-sixth of the world's land surface. very little forested area remains in such heavily populated countries as India and Pakistan. Deforestation has razed about 10 percent of Brazil's forests, 30 percent of those in Hon-



Photo credit: Agency for International Development

Makeshift housing characterizes the outlying areas of most cities in LDCs

duras, and over 90 percent of those in Haiti. The removal of the forest canopy results in large-scale soil erosion, decreased soil fertility, landslides, silting-in of reservoirs and irrigation channels, drought, desertification, and the extinction of forest plant and animal species.

Direct human intervention has caused the transformation of some 9 million square kilometers (km²) of savanna to desert; 600.00 km² of forest to fields, grassland, or savanna; and 1 million km² of fields or forests to paved areas and urban buildings—a total alteration of some 15 to 17 percent of the Earth's land area (8). Much of the best agricultural land lies near urban centers and is being used for urban and industrial development. These alterations are important because only 30 to 36 percent of the Earth's total land area is fit for agricultural activities or has significant life support capabilities with present technologies.

The U.S. Department of Agriculture estimates that the rapidly rising growth of cities in the developing world is cutting arable land in LDCs by 0.03 hectare per capita per year (1 hectare equals 2.47 acres). If the most likely population projection becomes reality, this rate would lead to a loss of 49 million hectares of arable land

from food production by 2000, an amount presently calculated to feed some 165 million people. If the low projection is achieved, the quantity of land lost would fall to 41 million hectares, but if population totals rise to the high projection, this loss would reach 56 million hectares by 2000, an amount that could have fed 188 million people.

The impact of converting arable land is graphically illustrated by the case of Egypt, where the current total of 25,000 hectares of cultivable land lost each year is expected to rise as the pace of urbanization quickens. Despite large investments to expand the country's irrigated land area with water from the Aswan Dam, irrigated land totals remain essentially unchanged because old producing lands are lost at about the same rate that new hectares are irrigated. If its present population growth rate continues, Egypt's goal of food self-sufficiency will be difficult to achieve.

The increased pollution that accompanies rapid urbanization has overwhelmed the ability of many LDC governments to provide sanitation and other public services. In 1976, fewer than one-third of LDC city dwellers lived in housing connected to sewer systems and less than 4 percent of this housing was connected to some form of sewage treatment facility. Air pollution problems have become critical in the urban centers of such cities as Mexico City, Sao Paulo, and Bombay.

Economic and social impacts

The numerous pregnancies, closely spaced pregnancies, and additional pregnancies at comparatively late ages that are associated with rapid population growth are also associated with higher rates of illness and death for both mothers and infants.

An important health side effect of high fertility is nutritional deficiency. Each additional child in a poor family may be believed by the family to provide greater social security for the parents' old age, but available food must also be divided among a larger number of people. Malnourished children are more vulnerable to disease and their physical and mental growth may be retarded.

The leading cause of the transformation of productive land into deserts is overgrazing. Overgrazing and overcropping, combined with drought, are rapidly expanding deserts in the Sudan and Sahelian regions of Africa.

Irrigation often causes long-term problems of loss of soil productivity through waterlogging, salinization, and alkalinization. These problems occur when irrigation systems provide poor drainage or where there is improper use of fertilizer. Evaporation of water from soil surfaces leaves residues of salt that form a mineral crust on the surface that can kill plants or inhibit their growth.

Anthropogenic land-use changes are said to have played a role in depressing the global temperature by about 0.20 C over the past 25 years, and this temperature could fall by another full degree by the end of the century (8). Other studies suggest that the release of chemicals, particulate) and carbon dioxide into the air—the most serious human-induced threat to climatic stability—could instead result in a gradual warming trend (7). Still others project little or no effect on global temperatures. There is no doubt that humans have caused significant changes in the environment, but whether these changes extend beyond the microclimates of specific regions is still being debated.

When women are malnourished during pregnancy, they are likely to develop maternal depletion syndrome, * and while infants derive important benefits from breastfeeding, the practice further compromises the nutritional status of malnourished mothers. There is a high incidence of infant mortality and low birth weights in almost every part of the world where

* Maternal depletion syndrome is characterized by several disease states including anemia, osteomalacia, and iodine deficiency goiter. It is caused by multiple pregnancies occurring while the woman is suffering protein/calorie deprivation. Its effects are cumulative and contribute to low birth weight infants, failure to gain sufficient weight during pregnancy, and a decrease in subcutaneous fat and muscle tissue. The process undoubtedly plays a part in the premature aging and early death often seen among women in LDCs.



Photo credit: Agency for International Development

Young mother in Bangladesh holds her malnourished child

fertility rates are high. The percentage of infants weighing less than 2,500 grams (the weight index for prematurity in MDCs) rises from 4 to 7 percent in MDCs to 10 to 20 percent in Latin America, 10 to 15 percent in Africa, and 10 to 30 percent in Asia (6). Low birth weights are strongly associated with infant morbidity and mortality.

Education is a primary vehicle for economic development, and leads to a better trained, more productive work force. It is a top priority in most LDCs, which face the double burden of increasing enrollment rates while trying to keep pace with soaring growth in numbers of school-age children. There is also a strong feedback relationship between education and population growth rates, as education, particularly for females, is related to lower fertility rates.

In a rapidly growing population, the number of dependents is large compared to the number of workers. In most LDCs, 40 to 50 percent of

the population is under age 15. This group of 1.4 billion people will enter their economically active years during the next 15 years. But the International Labor Organization estimates that the underemployed already account for almost 30 percent of the labor force in Latin America and 36 to 38 percent in Asia and Africa. Reductions in fertility and mortality for the African countries will be particularly significant because of the difference between the high and low projections of population growth (table 8). In Kenya, for example, annual new job requirements in 1975 were about 170,000. By 2010, the number of new jobs needed annually, primarily for young people just entering the job market, would rise more than fivefold under the high projection—to 900,000—as compared with 530,000 under the low projection of population growth.

Per capita income increases only to the extent that gross domestic product (GDP) growth exceeds the rate of population growth. But rapid population growth requires high rates of investment at the same time that it makes domestic savings more difficult.

Table 8.—Average Annual Growth of Labor Force for Selected Countries

	1970-77	2000-2025		
		Low variant	Medium variant	High variant
Sub-Saharan Africa:				
Ethiopia.....	1.8	1.9	2.7	3.1
Kenya.....	2.8	2.7	3.4	3.9
Nigeria.....	2.0	2.8	3.4	3.7
Tanzania.....	2.3	2.5	3.2	3.5
Zaire.....	1.9	2.1	2.4	2.9
Asia:				
Bangladesh.....	2.3	2.2	2.6	3.0
India.....	1.7	1.3	1.6	1.9
Indonesia.....	2.0	1.3	1.7	2.0
Malaysia.....	3.6	1.1	1.3	1.6
Pakistan.....	2.4	2.2	2.6	2.9
Philippines.....	2.1	1.6	1.9	2.3
Sri Lanka.....	2.1	0.7	0.8	1.1
Latin America:				
Argentina.....	1.2	0.5	0.7	0.9
Brazil.....	2.8	1.6	2.3	2.9
Colombia.....	3.5	1.2	1.9	2.4
Mexico.....	3.3	2.5	2.9	3.2
Venezuela.....	3.3	1.7	2.1	2.6
North Africa and Middle East:				
Egypt.....	2.2	1.6	1.8	2.2
Iran.....	2.5	2.0	2.3	2.6
Morocco.....	2.7	2.3	2.6	3.0

SOURCE: The Futures Group, "The Impacts of Population Growth on Less Developed Countries," report prepared for the Office of Technology Assessment, 1980.

The extraordinary period of the 1960's and 1970's illustrates this point. World population growth, at an average annual rate of 1.9 percent, was greater during these two decades than at any other period of human history, and the economic growth rate of more than 5 percent per year was also unparalleled in human history. World income per capita grew rapidly, averaging about 3.2 percent per year.

Although economic performance in terms of aggregate growth of output was about the same for LDCs and MDCs, a substantial difference in demographic growth gave MDCs a marked advantage in per capita income. The LDC population grew by 1.2 billion people during this period, at an annual rate of more than 2 percent, while MDC numbers rose by fewer than 200 million, at a rate of less than 1 percent. MDC per capita income growth exceeded 4 percent annually, but LDC growth remained below an annual rate of 3 percent. The absolute income gap between LDCs and MDCs widened significantly between 1960 and 1978, but the relative gap—as measured by per capita income—widened to a far greater degree (4).

Thus, population growth, even when rapid by historical standards, does not necessarily pre-

vent significant and even very high rates of per capita income gain. But to overcome the economic burden of rapid population growth requires rates of economic advance that exceed the rate of natural population increase by a substantial margin. Given the demands for services, employment, etc., by constantly rising numbers of people in the next two decades, declines in rates of economic growth are likely. Thus, population growth aggravates the economic problem of many countries that have had to borrow from outside sources, and their increasing debts are now becoming a hindrance to development.

The combined benefits of slowing population growth—on health, education, and the economy—are all interrelated. A smaller child population makes it easier to provide quality education and health care to young children. It also reduces dependency ratios, which can lead to increased savings. A healthier, better educated work force is more productive. Increased savings can lead to more investment, more capital per worker, and, again, higher worker productivity. The resulting higher output and income can, in turn, make it possible to provide still better health care and education to the young population.

Political consequences

The impact of population growth on political stability depends on its interaction with the social, economic, and political structure of the society involved. The ability of any government to meet the needs and demands of its people is clearly a critical element in that government's medium- and long-term survival. There is general agreement that political stability is jeopardized when the expectations of individuals and groups are not fulfilled. Resultant frustrations can then lead to political and social unrest as increasing numbers of people place ever greater demands on the limited capacity of national governments and economies to provide desired goods and services.

Although demographic factors such as rapid population growth do not act alone or directly cause conflicts, conflicts that have been viewed as primarily due to political causes can have

demographic roots (2). Religious, social, and racial differences are important contributors to violence and conflict, and differential rates of population growth among separate ethnic, linguistic, or religious groups can generate serious political strains.

Rapid population growth in rural areas can jeopardize political stability in several ways. As rural population densities rise, existing agricultural acreage must either be divided into ever smaller parcels or an increasing proportion of the rural populace must be left landless. Either result can lead to political unrest as living standards decline and frustrations grow. Rural population growth also stimulates migration from rural to urban areas, as people search for the better economic and educational opportunities that urban centers are more likely to provide. Explosive urbanization in turn strains service

systems, disrupts sociocultural networks adapted to village life, and throws diverse ethnic and tribal groups into unaccustomed proximity and competition. Tensions in urban areas can be further exacerbated when there are large numbers of unemployed or underemployed persons, whose frustrations create opportunities for turmoil. Such groups are often vulnerable to exploitation by extremist factions.

Another demographic factor, emigrant and refugee movements, is as old as the history of human settlements. What is new in the present situation is the scale—the immense numbers of people involved—and the lessened capacity of nations to absorb these migrations. Large-scale movements of emigrants and refugees can occur either directly in response to economic distress and political persecution or indirectly as a consequence of civil or international strife. Examples include the refugee flight from East Pakistan to India in 1971-72, the migration from Mexico and the Caribbean to the United States, the flight of refugees from Vietnam to other countries of Southeast Asia, and the movement of Palestinians, Egyptians, and others within the Middle East.

For LDCs overburdened by the strains of rapid population growth, large numbers of new arrivals exacerbate an already difficult situation. Growing ethnic consciousness and nationalism can also reduce the absorptive capacity of a society. In MDCs there is a growing consensus that their capacity to absorb new immigrants under the economic conditions of the 1970's and 1980's is increasingly limited. After years of encouraging the inflow of Turkish and other "guest workers," West Germany has reversed its policy and has tried to induce these laborers to return to their countries of origin. This mirrors

a parallel tightening of already stringent immigration policies by other European countries. The United States still accepts immigrants on a large scale, but that policy is the subject of increasing debate, in part because illegal immigrants match or exceed legal immigrants. The era has passed when large, sparsely populated, and resource-rich lands—such as Australia, the United States, and Canada—were willing to absorb the excess populations of other countries.

National security and international stability are also affected when recipient countries take actions to block or expel unwanted entrants. The decision of India to invade Pakistan in 1971 may have been to some degree influenced by a determination to stop the flow of 9 million to 10 million Pakistani refugees into West Bengal (India). This refugee influx was due to political unrest in West Pakistan, which in turn has been attributed to that area's population pressures (2).

High population growth rates influence the social, economic, and political factors that threaten the stability of many of the LDCs in which the United States has vital security interests. These interests include such tangible commodities as oil, chromium, and vanadium imported by the United States. Less tangible but probably far more important is the significance of several of these countries to regional stability and the global balance of power (table 9).

In sum, rapid population growth is an intensifier of current environmental, food, energy, and resource pressures in LDCs, and its interaction with these problems is generating a new category of national security concerns. The implications of this interaction for national security, a term which is itself changing, remain largely unexplored.

Table 9.—Population Trends in Selected Countries Involving U.S. Security Interests

Country	Total population mid-1981 (millions)	Annual population increase ^a (percent)	Total population doubling time (years)	Population under age 15 (percent)	Annual urban population increase (percent)	Urban population doubling time (years)	
All MDCs	1,138	0.60/0	113	24 %/o	1.40/0	50	
LDCs	3,357	2.1	34	39	4.0	17	
Selectad countrios: Stratagic Importance							
Bangladesh							
	Collapse or political realignment would have destabilizing effect on Indian subcontinent	91.4	2.60/.	27	440/0	6.70/,	10
Bolivia	Source of tin, antimony, tungsten . .	5.7	2.5	28	42	4.3	16
Brazil	Source of manganese ore, columbium and iron ore; size; leadership role in Latin America	130.0	2.4	29	41	4.0	17
Central America	Panama Canal; excessive emigration to U. S.; proximity	95.9	2.7	26	46	4.1	17
Egypt	Key to U.S. strategies for peace in Middle East	43.1	3.0	23	40	3.4	20
India	World's second largest country; key to stability Indian Ocean region and U.S.-Soviet balance . .	709.8	2.1	33	41	3.8	18
Indonesia	Major source of U.S. oil imports; fifth largest country in world; strategic location as U.S. ally in Southeast Asia	155.4	2.0	35	42	4.2	17
Kenya	Leader of pro-Western African states; U.S. military access agreement	17.0	3.9	18	50	7.1	10
South Korea	U.S. military ally; potential staging area; possible North Korean threat	38.6	1.7	41	38	4.1	17
Mexico	Size; proximity; major source of strontium, cadmium, and major potential source of oil and gas; large labor migration to the U.S.	72.4	2.5	28	46	4.4	16
Morocco	Major source of potassium; U.S. friend in North African conflicts	21.0	3.0	23	46	4.8	14
Nigeria	Second largest source of U.S. oil imports; one-fourth of total African population.	79.7	3.2	22	47	5.6	12
Pakistan	Principal bulwark against Russian move into Gulf of Oman and Indian Ocean	85.1	2.8	25	46	4.7	15
Philippines	Source of chromite and copra; military ally with key U.S. bases; strategically important . . .	52.5	2.4	29	43	4.1	17
Somalia	Strategic location; U.S. friend in conflicts over Horn of Africa	3.8	2.8	25	44	5.4	13
Thailand	Source of tin, tungsten and tantalum; military ally; strategic importance in Southeast Asia.	49.0	2.0	35	43	4.2	17
Turkey	Eastern anchor of NATO; strategic window on the U.S.S.R.	46.5	2.2	32	40	4.3	16
Venezuela	Source of oil and vanadium	15.4	3.0	23	43	3.9	18
Zimbabwe	Major source of chrome; key to political stability in Southern Africa	7.7	3.4	21	47	6.3	11

^aNatural increase, exclusive of emigration and immigration.

SOURCES: Draper Fund, 1981; U. N., 1979-World Population Trends and Prospects by Country, 1950-2000: Summary of the 1978 Assessment.

Chapter 3 references

1. Brookhaven National Laboratory, "Energy Needs, Uses and Resources in Developing Countries," prepared for the U.S. Agency for International Development under PASA No. F. RDA/TAB-995-18-76 with the U.S. Department of Energy, March **1978**.
2. Choucri, N., *Population Dynamics and International Violence; Proposition, Insights and Evidence* (Lexington Mass.: Lexington Books, 1974).
3. Council on Environmental Quality and the Department of State, *The Global 2000 Report to the President: Entering the Twenty-First Century, The Technical Report*, vol. 2 (Washington, D. C.: U.S. Government Printing Office, **1980**).
4. Demeny, P., "The North-South Income Gap: A Demographic Perspective," *Population and Development Review*, vol. **7**, No. 2, June 1981, pp. **297-310**.
5. Draper Fund, "World Population Growth and U.S. Security Interests" (Washington, D. C.: Draper Fund, **1981**).
6. Food and Agricultural Organization, *Agriculture: Toward 2000* (Rome: FAO, 1979).
7. National Academy of Sciences, *Understanding Climatic Change: A Program for Action*, U.S. Committee for the Global Atmospheric Research Program, National Research Council (Washington, D. C.: NAS, 1975).
8. Sagan, C., Toon, O. B., and Pollack, J. B., "Anthropogenic Albedo Changes and the Earth's Climate," *Science* 206(4425): 1363-1367, 1979.
9. The Futures Group, *The Impacts of Population Growth on Less Developed Countries*, report prepared for the Office of Technology Assessment, Washington, D. C., 1980.