Population Trends and Prospects

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Summary. For the next 20 years there is likely to be a slowing of population growth rates for all areas of the world except Africa. The present population of developed countries is expected to increase by about 12 percent by the year 2000; that of all developing countries is expected to increase by about 50 percent. The momentum of population growth is strong; a few analysts suggest that growth may cease at 8 billion, but a figure of more than 10 billion seems much more likely.

The population of the world increased by 75 percent in the past 30 years, from 2.5 billion in 1950 to 4.4 billion in 1980. In 1950, one-third of the population lived in developed countries—Europe, Northern America, the Soviet Union, Japan, and Australia—and two-thirds lived in developing countries. The increase during this period was quite small in Europe, fewer than 100 million added to its population, for an increase of 23 percent. The United States and the Soviet Union grew at about the same rate, slightly less than 50 percent. The developing countries grew much more, both in numbers and rates. Their populations almost doubled, increasing from 1.7 to 3.3 billion. The increase was most rapid in Latin America, an increase of 125 percent from 164 million to 368 million. Africa also more than doubled its population, from 219 million to 469 million (+114 percent). In 1950 the population of Asia numbered almost 1.4 billion, and today it is almost 1.2 billion larger, an increase of 85 percent to about 2.6 billion.

The prospects until the year 2000 are for a slowing of growth rates for all areas except Africa, but the numbers to be added will be enormous. Population projections of the United Nations anticipate a rapid slowing of population growth in the developed countries, an increase of less than 8 percent in Europe, about 17 percent in the United States and in the Soviet Union, and about 12.5 percent for all developed countries. The less developed countries are likely to increase their population by one-half, with the largest proportionate increase being in Africa (+76 percent), next in Latin America (+65 percent), an increase of little more than one-half in South Asia (55 percent), and appreciably less in East Asia (+24 percent). Thus, half a century's growth may well show an increase in the population of developed countries of just over one-half the 1950 numbers (from 832 to 1272 million). In the developing countries the increase will be far greater; the projected figures show an increase of more than 3.2 billion (193 percent) from 1.7 to 4.9 billion.

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Adequacy of Data

There is much that we do not know about the world's population size and growth. Our best estimate is that the population of the world is about 4.5 billion, but that figure could be in error by 200 million—and is likely to be too low rather than too high. We cannot be sure, for example, that China's population is within the range of 950 to 1000 million (its census in 1981 will give a more reliable figure), or that Nigeria's population is within the range 70 to 85 million. Even in the United States the net undercount of the census is about 5 to 7 million, and for the most part the census figure is used although a larger figure is known to be more nearly correct. Fertility and mortality rates are particularly deficient for Black Africa, and for many countries we do not know whether fertility rates are going up or down—or, more likely, are changing hardly at all. Knowledge about mortality rates is in some respects even more deficient, and again, particularly for Black Africa. Despite the lack of precise information, however, a great deal is known about population size and growth and about mortality (*1*, *2*) and fertility (*3*, *4*) trends. There have been major improvements during the past 15 years or so in the collection of data both through censuses and sample surveys (*5*) and in analytical techniques (*6*). At the time of this writing, early in 1980, the latest date for which population data are generally available for the more developed countries is 1978, and for the developing countries 1975 to 1977 or earlier. For convenience, and with no great loss in accuracy, for the most part I shall use the United Nations' (*7*) projected figures for 1980 to describe current levels.

Mortality

The very large increase in population during the past several decades is primarily the consequence of a very rapid decline in mortality throughout the world. With today's population we would have more than 80 million deaths a year if 1950 mortality rates were unchanged instead of fewer than 50 million that result from today's population and mortality rates. In 1950, life expectancy at birth was about 65 years in developed countries, and perhaps 42.5 years in developing countries. Today it is 7 years more for developed countries, and perhaps 13 years more in developing countries, or about 72 and 55 to 56 years, respectively. The gain has been largest in developing countries, but the gap between the two groups of countries remains very large.

Mortality rates are highest in Africa, particularly Black Africa, although life expectancy at birth increased by 12 years, from about 38 in 1950 to almost 50 today, and the crude death rate dropped from almost 27 to 16 per 1000 per year. Infant mortality remains very, very high, perhaps 200 or more per 1000 per year in Black Africa and about 150 in North Africa. The figures for South Asia are comparable. Life expectancy was just under 40 years in 1950, and today is about 53; the crude death rate decreased from about 25 to 13.3. Life expectancy in East Africa is 65 to 66 years, a remarkable increase of 18 years from 47.5 in 1950. Life expectancy in Latin America also registered major gains from 52 to more than 64 years.

The lowest crude death rates are found in some of the developing countries such as Taiwan, South Korea, Hong Kong, and Singapore, rather than in developed countries. This is so despite the fact that in developed countries death rates are lower age for age than in the developing

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countries. This apparent anomaly results from the combination of relatively large proportions of persons in the young age groups and low proportions of older persons in the developing countries. The reverse is true in developed countries. Mortality rates are quite low in the young ages such as 5 to 20, and of course are high in the older ages. The result is that crude death rates of 5 per 1000 per year are not unusual in such developing countries. By contrast, in developed countries crude death rates are almost double, or about 10 per 1000 per year.

Although the largest improvements in mortality rates during the past three decades have been made in developing countries, the improvements in developed countries are also significant. Declines in infant mortality in developed countries have been remarkable, with rates often being reduced by one-half, and more. In 1950, very few countries had infant mortality rates under 25 per 100 per year, and many had rates ranging up to 50, and more. Today, six countries have rates below 10, and 25 countries have rates below 20. The United States has a rate of 13 to 14, one-half its rate in the early 1950's, but with noticeable remaining differences between blacks and whites (about 23 for the former and 12 for the latter).

Curiously, the causes of these very large changes in mortality are not well known. The increases in the number of physicians and other medical personnel, and of medical facilities, have not been sufficiently large or rapid to account for much of the change. There have been improvements in economic conditions, but Preston's (*1*) analysis concludes that only 16 percent of the change from the 1930's to the 1960's was attributable to economic factors. He also concludes that improved nutrition was not a major cause of the decline. Lacking even reasonably hard evidence, students of these changes have come to say that the reduction in mortality rates is due to a combination of causes such as improved communication and transportation, more responsive governments, improved sanitation, the widespread use of the insecticide DDT, and the availability of antibiotics.

Currently, there is controversy as to whether mortality declines have slowed appreciably. The United Nations (*3*) reports that mortality did not improve as rapidly in the decade from 1960–1965 to 1970–1975 as it had in the previous decade. In some areas improvements during the past decade or so appear to be negligible (*8*), and at least one author has wondered if this signals "The end of an era"? (*2*). Another view is that the data are so poor for Africa that no one knows what the trends in mortality are, although it is known that mortality levels are very high. In most countries of Latin America life expectancy at birth is more than 60 years, and some slowing in improvements in mortality rates is to be expected after this life expectancy is reached. Countries in Asia vary greatly in their mortality levels and trends; however, overall improvements in life expectancy have been very rapid—at the rate of an increase of 0.7 years in life expectancy at birth each calendar year. The latest figures for Asia suggest continuing rapid, though slower, change, a little more than one-half-year increase in life expectancy at birth each calendar year.

Mortality differentials are at least as great within countries as among different countries. Studies in Asia (*9*), Africa (*10*), Latin America (*11*), and the United States (*12*) show that child mortality is two to five times as high among mothers with no education as among mothers with high school education. Differentials increase as education of the mother increases. Mortality differentials are also associated with other socioeconomic indices such as income and life expectancy, but the differentials are particularly strong with education of the mother.

Life expectancy at birth in the United States increased modestly from 1948 to 1960 (67.2 to 69.9), and increased hardly at all during the 1960's. In the period 1968 to 1978, however, there was a rapid increase from 70.2 to 73.3. Female life expectancy at birth is very much higher than that of males. The difference is particularly marked among male and female nonwhites, a difference of 8.4 years (65.3 and 73.7), but is also large among white males and females, a difference of 7.5 years (70.2 and 77.7). The trend has been toward a narrowing of white-nonwhite differences, but a slow widening of the differences between males and females.

International Migration

During the last decade there have been large-scale movements of refugees, a large flow of "guest" workers into Western Europe, a similar movement of workers into the Arab OPEC (Organization of Petroleum Exporting Countries) countries, and of migrants to the United States, Canada, and Australia. There are problems of definition and collection of data for each of these groups, but rough estimates are available for the major flows.

The United States has long been the main receiving country of "permanent" migrants, and except for short-term, large-scale flows of population such as between India and Pakistan around 1950, it probably receives as many migrants as all other countries of the world combined. The annual quota for the United States is about 400,000, but in recent years it has also received 100,000 to 150,000 refugees per year, primarily from Indochina, 50,000 to 60,000 migrants from the Western Hemisphere as the result of a special ruling, plus perhaps 100,000 to 250,000 "net" illegal migrants. (Some observers think the net number of illegal migrants is much larger.) The total of 650,000 to 860,000 incoming migrants is offset by about 100,000 foreign-born, and 25,000 to 50,000 native-born emigrants; thus, during the past year or two, the United States has had net additions from migration of the order of 500,000 to 700,000. In a "typical" year the net additions of legal migrants are of the order of 300,000. There is much dispute about the volume of illegal, or undocumented, migrants. A recent study by the U.S. Bureau of the Census concludes that "The total number of illegal residents in the United States for some recent years, such as 1978, is almost certainly below 6.0 million, and may be substantially less, possible only 3.5 to 5.0 million. . . . The Mexican component of the illegally resident population is almost certainly less than 3.0 million, and may be substantially less, possibly only 1.5 to 2.5 million (*13*).

Although the United States is the primary receiving country as measured by the total number of migrants, several other countries have a much larger proportion of foreign-born persons living within their borders. The foreign born are a little less than 5 percent of the population of the United States but about 15 percent of the populations of Canada and New Zealand, 20 percent of Australia, and more than 50 percent of the populations of Kuwait and Israel (*14*). The last two cases are quite different. In Kuwait the foreign born are mostly noncitizens; in Israel most of the foreign born are now citizens.

Until the early 1950's, the main migratory streams were from Europe to North and South America, Australia, and New Zealand, but the direction has shifted, and the main currents are now toward the industrialized countries from the less developed countries. For example, in 1960 there were only about 3.2 million immigrants from less developed countries living in the more developed

countries, but in mid-1974 there were about 9.5 million. Somewhat more than half (about 5.3 million) of these live in the United States and Canada, Australia and New Zealand. In recent years, the major flow of migrants into the United States has been from Latin America and Asia, rather than from Europe.

Within Europe, a large volume of short-distance migration has developed in which countries of Southern Europe have been exporting labor to the more industrialized Western and Northern European countries. At the peak of this migration in the mid-1970's there were 5.5 million immigrants from Southern Europe (Italy, Yugoslavia, Spain, Portugal, and Greece), of whom 3.1 million were workers. In addition, 4.2 million immigrants from less developed countries were residing in Northern and Western Europe, primarily from Turkey and Northern Africa. Western Germany and France were the primary importing countries. Also, more than 1 million immigrants from the new Commonwealth countries were living in the United Kingdom. The numbers of guest workers in Northern and Western Europe have diminished somewhat during the past several years because of poorer economic conditions. The 5 to 6 million guest workers in Northern and Western Europe make up 5 to 10 percent of the labor force of countries in Northern and Western Europe except in Switzerland where, at the peak, the foreign workers were almost one-quarter of the total (*15*).

The problem of refugees is as old as human history, and today refugees move across the globe by the millions. Refugees in Africa are the result of instability, conflict, and tension that characterize the domestic politics of many African countries. In some, the oppressiveness of the regime creates refugees; in others, tribal, religious, racial, or ideological conflicts lead to refugee flight. Famine also has played an important part in refugee movements. Similarly, Asian refugee problems are the result of religious, ethnic, and ideological conflicts. In Latin America political and ideological differences, as well as economic conditions, lead to refugee situations (*16*).

Many refugee situations are resolved in a relatively short period of time, as in the case of refugees from Bangladesh to India at the time of the war between Pakistan and Bangladesh. Most of the 2 million refugees who fled to India were resettled shortly after the end of the war, as were the additional millions temporarily displaced from their homes. The Palestinian refugees, however, have been displaced for decades. Thus, the world

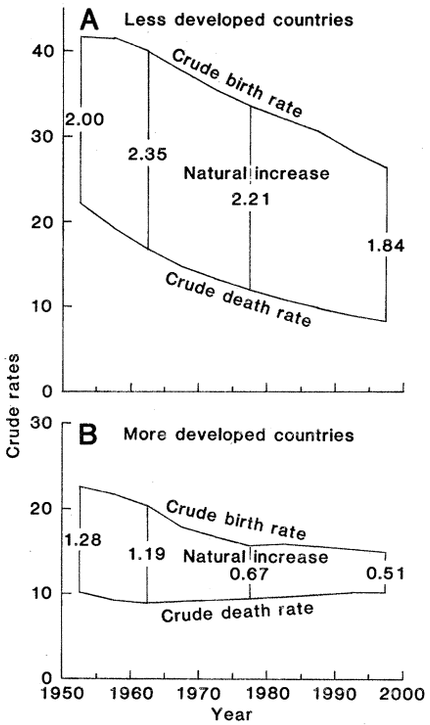


Fig. 1. Crude birth and death rates and percentage natural increase, 1950 to 2000 (United Nations medium assumptions).

total of refugees fluctuates greatly over time, but the numbers are large and have been increasing in recent years. Estimates of the numbers vary widely. A low estimate is that of the United Nations High Commissioner for Refugees (*17*), and includes "only" the 4.7 million refugees coming under his jurisdiction. The U.S. Committee for Refugees (*18*) includes persons displaced from their homes but still living in their home country, and its estimate was 13.2 million refugees in 1978. The Congressional Research Service of the Library of Congress estimates that the number of refugees is at least 8.1 million, and may be as high as 10.9 million (*16*, p. 13).

Major groups of refugees in the Middle East include 1.7 million Palestinians registered with the United Nations; 300,000 Kurds forcibly resettled by or who have fled from Iraq; 200,000 Greek Cypriots and Turkish Cypriots who were displaced as a result of the Greek-Turkish dispute; 400,000 displaced Lebanese within their homeland. Many groups of refugees are found in Africa; more than half a million Ethiopians, probably several hundred thousand from Angola, and very substantial numbers from Zaire, Rhodesia, Rwanda, Equatorial Guinea, and Uganda. More than 1.5 million refugees have fled their homelands in Vietnam, Laos, and Kampuchea in recent years. Some 200,000 Muslims have fled from Burma to Bangladesh. The major flows of refugees from Latin America have been from Cuba and Haiti with perhaps three-quarters of a million from each country. Those flows were virtually halted by the mid-1970's, with most of the Cuban refugees living in the United States, and most of the Haitians living in the Dominican Republic or the United States. However, the flow of Cuban refugees resumed in the spring of 1980. Many other countries should be included in a listing of the origin of refugees, but in this brief overview I seek only to show the magnitude of the problem and to show how widespread and persistent refugee problems are.

Fertility Trends

Overview. The crude birth rate of the world was about 36 births per 1000 population per year in 1950; it has been reduced by about 20 percent and is below 30 today. But the world is divided into high and low fertility countries, with the developing countries having both high fertility and the bulk of the population (74 percent, or 3.3 billion persons).

The more developed countries had moderately low fertility in 1950, an average crude birth rate of about 23, but there has been a remarkable decline in fertility in almost all developed countries since then. The average decline has been almost one-third (32.3 percent), and the level of crude birth rates today is about 16 (Fig. 1). A few of the developed countries have more deaths than births (both of the German states), and many have rates of reproduction that if continued would result in no or negative growth. The average rate of growth of population among these countries is well under 1 percent, and is likely to decrease further during the next few decades. Thus, population growth among the more developed countries poses few problems in terms of maintenance of current levels of living, but there are many problems of urbanization and distribution.

The developing countries present a different picture. In 1950 their populations numbered 1.7 billion, and death rates were high, more than 23 per 1000 population per year. The revolution in mortality has reduced the crude death rate almost by half to 11 or 12. Fertility was high in 1950, about 42 per 1000. Thus, the rate of growth was slightly less than 2 percent per year in 1950. Major changes in fertility have also occurred in many developing countries, though overall fertility changes have been less marked than the decline in mortality. The figures show a decline in the crude

birth rate from 42 to 33—a decrease of 9 points, or about 20 percent. Changes in fertility have been dramatic in Asia and the Pacific, substantial in Central and South America, and hardly noticeable in Africa (Fig. 2). In Asia, where the bulk of the population lives, the crude birth rate declined by 25 percent from more than 41 to 31 per 1000 population per year. In the Americas the decline was about 16—from more than 41 to less than 35 per 1000 per year. The data for many African countries are woefully inadequate, and both rates and trends may not be accurately reflected in the figures available, which suggest a crude birth rate of about 48 in 1950, and perhaps dropping a couple of points to 46 in 1978. Only two countries in Africa—Tunisia and Mauritius—have had appreciable changes in fertility over the 30-year period. Egypt had a decline in its crude birth rate in the late 1960's and very early 1970's, but since that time the crude birth rate has increased. Most of the changes in its crude birth rates are attributable to changes in the number of persons marrying; a small part of the change is due to a modest decline of 7 to 8 percent in marital fertility from the mid-1960's to the mid-1970's.

Developed Countries

All developed countries experienced fertility declines from 1950 to 1978 with the sole exception of Ireland. Declines ranged from about 10 percent in Spain to more than 25 percent for 22 countries (Table 1). Overall, fertility declined about one-third (32.3 percent) in developed countries. The two largest developed countries, the Soviet Union and the United States, had similar rates at both periods, with the United States having slightly lower rates in 1950, and even lower rates in 1978 (see Table 2). Decreases in fertility rates were common to large and small countries, to capitalist and socialist, to European and non-European populations, to Catholics and Protestants.

The current levels of fertility are remarkably low for almost all of the developed countries. The Federal Republic of Germany has a birth rate of less than 10, well below the replacement level (*19*), and 13 additional countries have rates of less than 15. These are Sweden, Austria, Switzerland, Luxembourg (less than 12); Demark, the United Kingdom, Belgium, Italy, Netherlands, and Norway (less than 13); Finland, France, and Eastern Germany. All of these countries plus Canada, the United States, and Japan have below replacement levels of fertility. Indeed, the fertility level for all developed countries is barely at replacement level.

A few developed countries do not have low fertility. Albania, with a crude birth rate of 33 per 1000 population per year when last reported, and Israel and Argentina, with rates of 25, are the major exceptions. Ireland and Uruguay also have crude birth rates above 20. All other developed countries have crude birth rates of 20 per 1000 population per year or less.

The pattern of decline in fertility rates in developed countries has not been uniform during the past 30 years. For example, fertility rose dramatically in the United States from 1950 to 1957, declined relatively slowly until about 1965, then declined more rapidly for several years, and has been level at a crude birth rate of about 15 per 1000 population per year for 7 years. In general, fertility declines were more rapid during the 1960's than during the 1950's. Given that fertility rates are so low in most of the developed countries, one would expect further decreases to be small, and in some instances fertility is likely to rise. But the expectation is that once low rates have been attained they are likely to remain relatively low, with perhaps occasional upsurges.

While major developing countries are seeking to reduce their birth rates, a small number of developed countries, chiefly in Eastern Europe (where legalized abortion came to be associated with, or indeed produced, a quite low

Table 1. Fertility rates in selected developed countries.

Country	Population 1980 (in thousands)	Crude birth rate		Percentage change in crude birth rate 1950 to 1978
		1950	1978*	
The Americas				
Argentina	27,056	25.4	25.4	
Canada	24,073	27.8	15.2	−45.3
United States	222,159	24.8	15.3	−38.3
Uruguay	2,925	23.2	20.9	− 9.9
Subtotal	276,213	25.1	16.3	−35.0
Asia and the Pacific				
Australia	14,487	23.0	15.7	−31.7
Israel	3,950	32.5	25.2	−22.5
Japan	116,364	23.7	15.1	−36.3
New Zealand	3,268	25.7	16.3	−36.6
Subtotal	138,069	23.9	15.5	−35.1
Europe and the Soviet Union				
Albania	2,734	38.9	33.3	−14.4
Austria	7,481	15.6	11.3	−27.6
Belgium	9,920	16.9	12.4	−26.6
Bulgaria	9,007	25.2	15.5	−38.5
Czechoslovakia	15,336	23.3	18.3	−21.1
Denmark	5,105	18.7	12.2	−34.8
Finland	4,818	24.5	13.5	−44.9
France	53,450	20.5	13.8	−32.7
Democratic Republic of Germany	16,864	16.9	13.8	−18.3
Federal Republic of Germany	60,903	16.5	9.4	−43.0
Greece	9,329	20.0	15.9	−20.5
Hungary	10,761	20.9	15.7	−24.9
Iceland	231	28.7	18.5	−35.5
Ireland	3,307	21.3	21.4	
Italy	56,959	19.5	12.6	−35.4
Luxembourg	358	13.9	11.4	−18.0
Netherlands	14,082	22.7	12.6	−44.5
Norway	4,075	19.1	12.7	−33.5
Poland	35,805	30.7	19.0	−38.1
Portugal	9,856	24.3	15.8	−35.0
Romania	22,268	26.2	19.6	−25.2
Spain	37,378	20.2	18.0	−10.9
Sweden	8,262	15.6	11.2	−28.2
Switzerland	6,310	18.1	11.3	−37.6
Soviet Union	266,666	26.7	18.2	−31.8
United Kingdom	55,888	16.3	12.3	−24.5
Yugoslavia	22,328	30.2	17.3	−42.7
Subtotal	749,481	22.8	15.7	−31.1
Total	1,163,763	23.5	15.9	−32.3

*The latest available figures for Romania and Spain are for 1977; for Argentina and Uruguay, 1976; and for Albania, 1971.

birth rate), are making determined efforts to increase theirs, with occasional signs of success. Both negative and positive means are used in an effort to increase fertility. Negative measures include tightening of restrictions relating to induced abortions and reduction in the availability of contraceptives. Positive measures are a liberal increase in monthly wages for couples having three or more children, interest-free loans for purchase of an apartment or house and of household furnishings, with, for example, 20 percent of the loan being cancelled at the birth of the first child, 30 percent for the second, and the remaining 50 percent for the third child, if born within 8 years. Measures such as these are made available in Czechoslovakia, Eastern Germany, Bulgaria, Hungary, and Romania.

In addition, a number of other developed countries have pronatalist ambitions or milder policies: Israel, for obvious internal and regional reasons of a politico-ethnic character; France, with a target since 1975 of attaining replacement fertility or slightly higher; Finland, with quantitative targets to prevent a decline in population in any of its counties; Greece, with a target of ensuring a population growth rate not much lower than 1 percent per annum; Argentina, with various pronatalist measures such as cash subsidies and housing and medical benefits. The Netherlands reports the goal of achieving a stationary population and Japan, that a stationary population is "estimated and expected."

Developing Countries

There are 92 developing countries with a population of 1 million or more, but 2.6 billion, or 80 percent of the population of all developing countries live in 16 countries. Population data, crude birth rates, and percentage changes for 1965 and 1975 are given for those countries in Table 3 (reliable vital statistics are not available for Vietnam, which therefore is not included). Together the 15 listed countries contain a population of more than 2.5 billion, more than half that of all the world, and 78 percent of the developing world. These countries vary enormously in ethnic origin, culture, level of development, population policy, and changes in fertility. Brazil and Nigeria do not seek to reduce the rate of population growth, but in recent years have adopted a policy of supporting family planning for reasons of health and as a human right. Iran had a policy to reduce its rate of population growth, but it is unlikely that the present government will continue that policy. Burma has a pronatalist attitude. It recognizes family planning as valid on maternal and child health grounds, but contraceptives are not easily available. The importation of contraceptives is illegal and family planning clinics are not allowed. All the other countries have adopted policies to reduce the population growth rate.

There has been no significant reduction in fertility in Bangladesh, Burma, Iran, Pakistan, or Nigeria, but there is evidence of change in each of the other ten countries. The decline has been particularly strong (more than 25 percent) in China, South Korea, and Thailand, and has also been quite impressive (more than 20 percent) in Brazil, Indonesia, and the Philippines. The data on which these estimates are based are quite recent for several countries including Brazil, Mexico, and the Philippines.

The rate of population growth in developing countries is down from its recent peak, but not by much (Table 4). It is now about 2.2 percent per year with a country range from about 1 percent to well over 3 percent.

Fertility declined more rapidly than mortality after 1965 in Asia and Latin America, and the rate of natural increase was smaller in Latin America and much smaller in Asia during the last 5 years than during 1960 to 1965. Fertility and mortality declines were about equal in

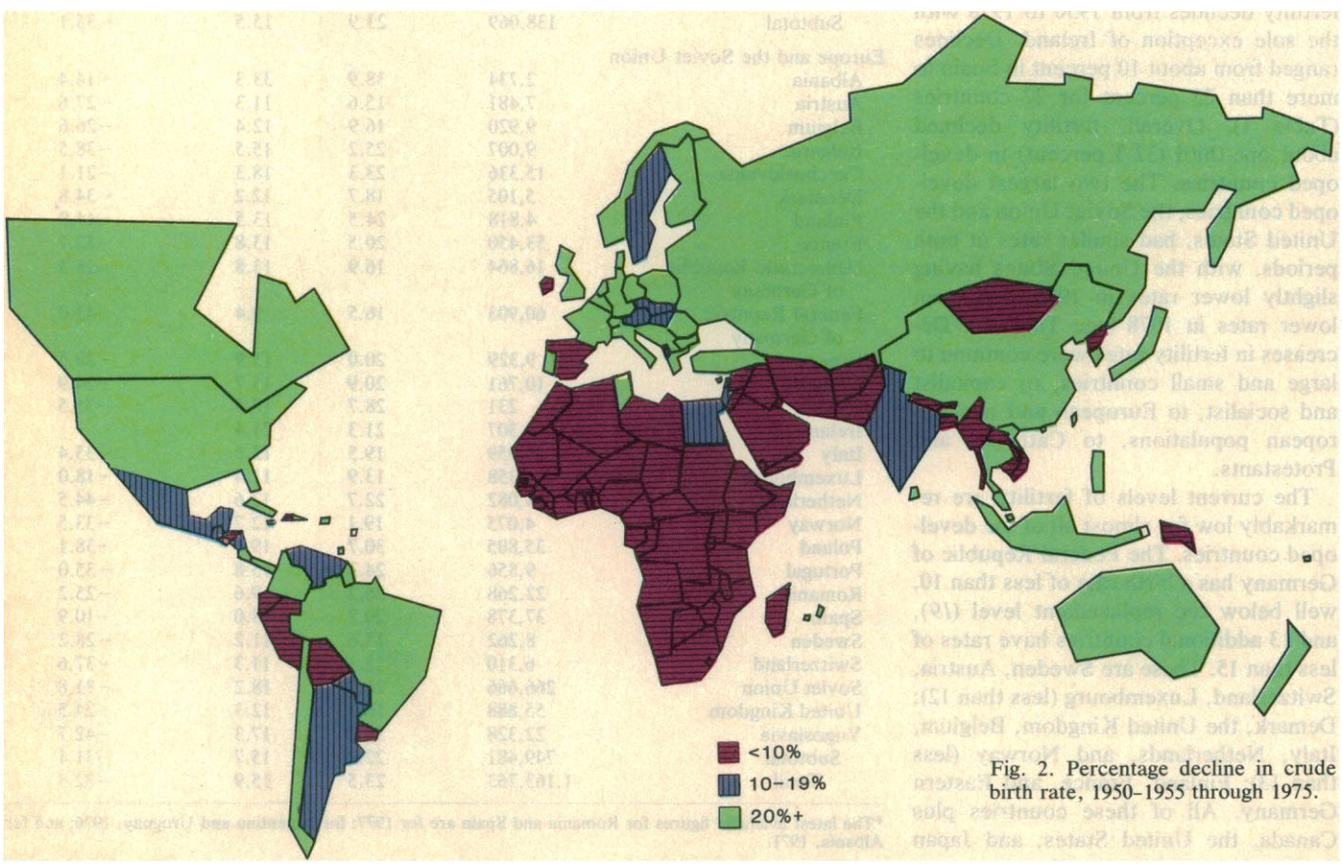


Fig. 2. Percentage decline in crude birth rate, 1950–1955 through 1975.

North Africa and the Middle East, but in sub-Saharan Africa fertility did not decline whereas mortality probably did, and thus the rate of natural increase there continued to climb to an estimated 2.9 percent per year.

The net effect of these differing trends in the developing countries was a modest decrease of about 6 percent in the rate of natural increase, from 2.35 percent in 1960 to 1965 to 2.21 percent in 1975 to 1980, according to the United Nations (Fig. 1). Fertility decreases were significantly larger, a decrease from 40.0 to 33.6, or −16 percent. Mortality rates also declined from a crude death rate of 16.8 in 1960 to 1965 to about 12 during the past 5 years. In developed countries there has been a continuing decrease in fertility, but mortality rates have more or less stabilized for the present—the countervailing product of continuing improvement in mortality offset by population aging. Rates of natural increase have thus fallen with fertility decline and are now only about two-thirds of 1 percent per year. Regardless of any realistically favorable developments of the next years, the demographic momentum in the developing sector remains particularly strong.

China's reconciliation of a Marxist "theory" of population with "planned" population growth has attracted far less attention than has the sheer magnitude of its population. There has been great interest in and speculation about the rate of growth of population in The People's Republic. This is because of curiosity as to how the transformation in the social and economic structure of the country has affected fertility and mortality and the rate of population growth, because of concern and awe at how large that population has become, because of conflicting signs since the mid-1950's about China's perceptions of the interrelationships of population and development, and because of partial reports about vigorous programs to lessen rates of population growth. It has been clear for a number of years that China seeks to lessen rates of population growth through late marriage, the availability of abortion and contraceptive services, emphasis on planning the number of children born each year, and, recently, a campaign strongly advocating a one-child family.

The recognition that rapid population growth is detrimental to the economy of China did not come easily or quickly. In June 1957, Professor Ma Yinzhu, an economist, then president of Beijing University, published a "New Population Theory," arguing that population growth in China should be controlled.

Table 2. Crude birth rates in the Soviet Union and United States for 1950 and 1978.

Year	Soviet Union	United States
1950	26.7	24.8
1978	18.2	15.3
Percentage decline	− 31.8	− 38.3

He was denounced in the press, and in 1960 was removed from his post as president of Beijing University. By 1974 Chinese officials had begun talking about the need for planned births as well as planned production. In March 1978 the Chinese announced that their goal was to reduce the annual rate of population growth to less than 1 percent within 3 years, and reinforced the importance of population growth by adding to the Constitution the statement that "The state advocates and encourages family planning" (Article 53). On 5 June 1979, *The People's Daily* referred to Professor Ma's "New Population Theory," the first public mention since 1960. In mid-July a public apology was made to Professor Ma, and he was officially told that "the two criticisms of your new population theory before 1958 and after 1959 had both been erroneous. Practice (actual events) has validated the correctness of your new population theory of controlled fertility. The Party wants to institute a thorough rehabilitation and restore your reputation."

The official view in China today is that population growth has been, and is, too rapid, and must be reduced. The stated goal is to reduce the rate of growth from 1.2 percent in 1978 to 0.5 percent in 1985 and to zero by the year 2000. Population growth is viewed as being detrimental to the development of the economy because it is detrimental to increasing the speed of capital accumulation; it hinders the rapid elevation of the scientific and cultural level of the entire population, and it is detrimental to the improvement of the people's livelihood (*20*). Decreases in rates of population growth are to be achieved by reducing and then eliminating the third- and higher-order births and by promoting the practice of terminating childbearing after one rather than two children. The means are mobilization of party committees on all levels; strengthened propaganda and education;

Table 3. Crude birth rates and crude birth rate decline for 1965 (or later) in less developed countries with populations of 35 million or more.

Country*	1980 population (millions)	Crude birth rate		Percentage change in crude birth rate 1965 to 1975 (or later)
		1965	1975 (or later)†	
China	975	34	22[8]	−35
India	694	43	36	−16
Indonesia	152	46	36	−22
Brazil	122	42	33[7]	−21
Bangladesh	89	48	48	‡
Pakistan	82	47	47	‡
Nigeria	77	49	49	‡
Mexico	70	44	37[8]	−16
Philippines	51	44	34[7]	−23
Thailand	48	44	33	−26
Turkey	45	40	34	−16
Egypt	42	41	37	−10
Iran	38	45	45	‡
South Korea	38	32	22	−29
Burma	35	40	40	‡
Total	2523	40	33	−20

*Excludes Vietnam with an estimated population of 52 million; information on vital rates over time is not thought to be reliable. †The crude birth rates are for 1975 unless a later year is specified with a superscript 7 or 8 for 1977 and 1978, respectively. ‡No significant change.

Table 4. Rates of population growth.

Area	Percentage of natural increase			Percentage change 1960 to 1965/ 1975 to 1980
	1950 to 1955	1960 to 1965	1975 to 1980	
World	1.77	1.99	1.81	− 9.0
More developed	1.28	1.19	0.67	−43.7
Less developed	2.00	2.35	2.21	− 6.0
Africa	2.16	2.49	2.91	+16.9
Latin America	2.72	2.77	2.66	− 4.0
Asia	1.88	2.06	1.37	−33.5

Table 5. Crude birth rate declines (in percentages), from 1965 to 1975 in 94 developing countries. The data are arranged by social setting and program effort; these data were compiled somewhat earlier than those in Table 3 and therefore differ in a few instances. [Adapted from Mauldin and Berelson (*22*)]

Program effort								
Strong		Moderate		Weak		None		Total
Country	Decline	Country	Decline	Country	Decline	Country	Decline	
				High social setting				
Singapore	40	Cuba	40	Venezuela	11	North Korea	*	
Hong Kong	36	Chile	29	Brazil	10	Kuwait	*	
South Korea	32	Trinidad and	29	Mexico	9	Peru	*	
Barbados	31	Tobago		Paraguay	6	Lebanon	*	
Taiwan	30	Colombia	25			Jordan	*	
Mauritius	29	Panama	22			Libya	*	
Costa Rica	29							
Fiji	22							
Jamaica	21							
Mean	30	Mean	29	Mean	9	Mean	*	19
Median	30	Median	29	Median	9.5	Median	*	22
				Upper middle social setting				
China	24	Malaysia	26	Egypt	17	Mongolia	9	
		Tunisia	24	Turkey	16	Syria	*	
		Thailand	23	Honduras	7	Zambia	*	
		Dominican	21	Nicaragua	7	Congo	*	
		Republic		Zaire	6			
		Phillipines	19	Algeria	*			
		Sri Lanka	18	Guatemala	*			
		El Salvador	13	Morocco	*			
		Iran	*	Ghana	*			
				Ecuador	*			
				Iraq	*			
Mean	24	Mean	18	Mean	6	Mean	*	10
Median	24	Median	20	Median	*	Median	*	7
				Lower middle social setting				
North Vietnam	23	India	16	Papua	*	Angola	*	
		Indonesia	13	New Guinea		Cameroon	*	
				Pakistan	*	Burma	*	
				Bolivia	*	P.D.R. of	*	
				Nigeria	*	Yemen		
				Kenya	*	Mozambique	*	
				Liberia	*	Khmer/	*	
				Haiti	*	Kampuchea		
				Uganda	*	Ivory Coast	*	
						Senegal	*	
						Saudi Arabia	*	
						South Vietnam	*	
						Madagascar	*	
						Lesotho	*	
Mean	23	Mean	14	Mean	*	Mean	*	*
Median	23	Median	14.5	Median	*	Median	*	*
				Low social setting				
				Tanzania	*	Laos	*	
				Dahomey	*	Central African	*	
				Bangladesh	*	Republic		
				Sudan	*	Malawi	*	
				Nepal	*	Bhutan	*	
				Mali	*	Ethiopia	*	
				Afghanistan	*	Guinea	*	
						Chad	*	
						Togo	*	
						Upper Volta	*	
						Yemen	*	
						Niger	*	
						Burundi	*	
						Sierra Leone	*	
						Mauritania	*	
						Rwanda	*	
						Somalia	*	
				Mean	*	Mean	*	*
				Median	*	Median	*	*
Mean	29	Mean	21	Mean	*	Mean	*	9
Median	29	Median	22	Median	*	Median	*	*

*No significant change.

a system of awards and penalties inducing conformity to the stipulated fertility norms; and improving family planning services and programs.

Most estimates of the population of China fall within the range 950 million to 1000 million, but a reasonably firm figure must await the 1981 census. The Chinese have announced a crude birth rate of 18.34 and a death rate of 6.29, and thus a growth rate of 1.2 percent in 1978. These figures are said to be estimates derived from incomplete data, and there may be some undercounting. Some scholars speculate that the crude birth rate might be as high as 22 and the death rate as high as 8 per 1000 population. Whatever the precise figures it is evident that China has achieved a remarkable improvement in health conditions and in the reduction of fertility. The reduction of fertility has been achieved in part by persuasion and through an extensive network that provides information about, and means of, fertility control, but also in considerable part through very strong community and official pressures.

South Korea and Thailand have had crude birth rate decreases of more than 25 percent since 1965, although Thailand's current rate is still moderately high, in the low 30's. South Korea has had a rapidly growing economy and also a vigorous family planning program since the early 1960's. Thailand has had less rapid economic development but has had a sustained, moderately strong family planning program.

Indonesia has a very low per capita income, a low rate of economic growth, and high fertility. It also has an inadequate statistical system and, hence, annual data on births and deaths are not available. It is thought that fertility changed but little from 1950 until the late 1960's, but there are some harbingers of change since that date. In 1968 Indonesia embarked on a large-scale family planning program which has been well organized since 1970; indeed, it is commonly thought to be one of the most vigorous family planning programs in the world. The number of family planning acceptors has been very high in several areas, particularly in Java and Bali. With the large number of family planning acceptors, one would expect some decrease in fertility particularly inasmuch as continuation rates of family planning acceptors in Indonesia are higher than in most other countries. There is considerable lag between collection of data from sample surveys and detailed analysis of the results; and there is controversy as to how much Indonesia's fertility has fallen, but not as to whether or not it has fallen during the 1970's.

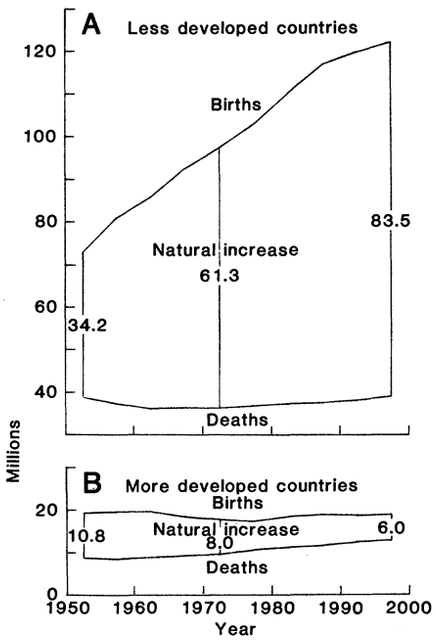


Fig. 3. Average annual number of births, deaths, and population increase, 1950 to 2000 (United Nations medium assumptions).

India is among the poorest countries in the world and, despite ambitious development plans starting in the early 1950's, per capita income and many other indices of development remain low. India was the first country in the world to adopt a population policy designed to reduce rates of population growth. That was in 1952. A relatively small family planning program was begun in the 1950's and was expanded to a large-scale program in the mid-1960's. Despite the magnitude of the family planning program, expressions of disappointment were frequent in the early 1970's, and there was serious talk of coercive measures in the mid-1970's. The family planning efforts have been heavily dependent on male sterilization in some states. Strong pressure, and perhaps coercion, led to a tremendous increase in the number of sterilizations in 1976, and these strong measures were a principal factor in the subsequent overthrow of the government.

The evidence is unmistakable that fertility has fallen significantly in India during the past 15 years even though the level of fertility is not known with precision. The current level of the crude birth rate, estimated at 36 per 1000 population per year, is known with more accuracy than the rate during the early and mid-1960's. The level at the earlier dates may have been closer to 45 or 46 than to the 43 shown in Table 3.

This account is concentrated on large countries because that is where most of the people of the world live. Fertility declines in smaller countries have often been near spectacular and some of these have been highly publicized. Fertility declines in Hong Kong, Singapore, and Taiwan are frequently mentioned, but equally impressive declines have occurred in Cuba, Mauritius, Chile, Colombia, Panama, and Costa Rica. A more complete listing is given in Table 5 where countries are classified by social setting and family planning effort. Social setting combines ranks on seven socioeconomic variables—adult literacy, school enrollment, life expectancy at birth, infant mortality rate, per capita gross national product, percentage of males employed in nonagriculture, and percentage of population living in cities of 100,000 or more.

The causes of recent fertility declines, in both developing and developed countries, will probably remain in some dispute for at least several years; such is the nature of causal analyses of highly complex circumstances. But some degree of consensus seems to be emerging to the effect that:

1) Marital patterns (age at marriage, proportion of reproductive age spent within marriage) account for a substantial part of the recent decline, perhaps 35 to 45 percent in developing countries, but marital fertility itself is the major component even against a slight drag from age structure.

2) Social setting or development has a substantial relationship to fertility decline, certainly on a holistic basis and probably selectively with regard to health and educational status.

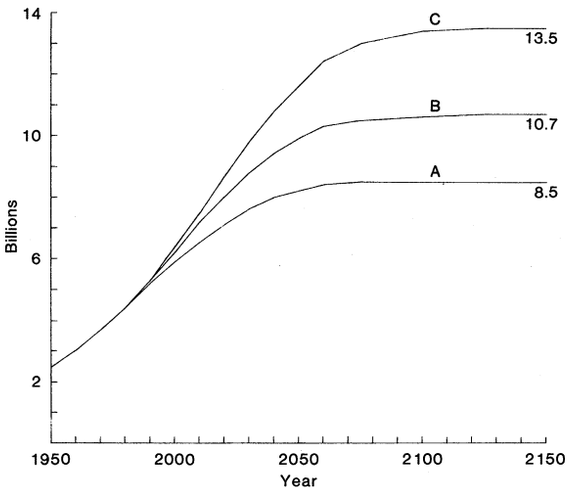
3) Family planning programs have a significant, independent effect, certainly in developing countries with favorable social settings and also under certain conditions in countries with less favorable settings (including the three largest: China, India, and Indonesia). Moreover, the longer the program and the clearer its demographic intent, the greater its effect.

4) Social setting and family planning programs together predict or "explain" a large part of fertility decline.

Prospects

Despite the uncertainty about predicting the future, there is consensus on several major points:

1) Growth rates in developed countries are low, and it is likely that they will



If the world attained replacement fertility in	World population would then stand at	And world population could be expected eventually to stabilize at
(A) 2000–2005	5.9 billion (2000)	8.5 billion
(B) 2020–2025	8.0 billion (2020)	10.7 billion
(C) 2040–2045	10.8 billion (2040)	13.5 billion

Fig. 4. Momentum of world population growth. The fertility decline is assumed to begin in all cases with the 1975 to 1980 level of population growth. Thus, replacement-level fertility (2.1 to 2.5 births per woman) by 2000 to 2005, for example, implies a gradual reduction of fertility over a 20-year period. [From (*23*)]

remain so. Fertility could increase, but the two-child family seems to be more nearly the norm than a three-child family. The present population of developed countries is just over 1.1 billion; 20 years from now it is likely to be less than 1.3 billion. Few serious analysts disagree with this generalization.

2) Growth rates in developing countries are high. These will be moderated somewhat during the next two decades, but the momentum of population growth is high, and this momentum will lead to larger and larger absolute increases in the population of the developing countries during the remainder of this century even though fertility rates continue to decline (see Figs. 1 and 3). This momentum of population growth is caused by an age structure with a relatively large proportion of young persons who will move into and increase the number in the reproductive ages for at least 15, and more likely more than 20, years. The amount of momentum is a function of present and future mortality rates, present and future fertility rates, and the current age structure. A typical country with past high fertility and a current crude birth rate of about 40 per 1000 per year would increase its population by 60 percent even if replacement fertility were immediately achieved. It would increase by 2.5 times if replacement fertility were delayed by 15 years. Thus, it is almost certain that many countries will increase their population by at least 2.5 times before achieving stability.

3) Most population projections for the year 2000 cluster around 6 billion. The United Nations produces three projections: just under 5.9 billion, 6.2 billion, and 6.5 billion. Thus, it is projected that the population of the world will increase by about 1.4 billion to 2.0 billion during the next 20 years. Most analysts favor figures that imply a growth of 1.5 billion ± 200 million.

4) The medium assumption of the United Nations projects a population increase of 40 percent by the year 2000. Africa is expected to have the most rapid growth, more than 75 percent, and Latin America the next most rapid with about 65 percent growth. South Asia would grow by 55 percent and East Asia by 24 percent according to these projections. Northern America and the Soviet Union would grow by 17 to 18 percent. Europe would grow very slowly, by only 7 percent. The record of population growth since 1950 by major areas, and projected growth until the year 2000 are shown in Table 6.

5) There is lack of consensus as to when fertility will begin to decline, and at what rate, in Black Africa, Bangladesh, and Pakistan. There is no adequate theoretical basis for assessing when fertility will begin to decline in high fertility countries, nor is there sufficient empiri-

Table 6. Population trends in the eight major areas of the world, 1950 to 2000, as assessed in 1978. [From (*7*)]

Year	World	Africa	Latin America	Northern America	East Asia	South Asia	Europe	Oceania	Soviet Union
				Population (millions)					
1950	2513	219	164	166	673	706	392	13	180
1955	2745	244	187	182	738	775	408	14	196
1960	3027	275	215	199	816	867	425	16	214
1965	3344	311	247	214	899	979	445	18	231
1970	3678	354	283	226	981	1111	460	19	244
1975	4033	406	323	236	1063	1255	474	21	254
1980	4415	469	368	246	1136	1422	484	23	267
1985	4830	545	421	258	1204	1606	492	24	280
1990	5275	630	478	270	1274	1803	501	26	292
1995	5733	726	541	281	1340	2005	510	28	302
2000	6199	828	608	290	1406	2205	520	30	312
				Average annual rate of increase (percentage)					
1950 to 1955	1.77	2.16	2.72	1.80	1.85	1.86	0.79	2.25	1.71
1955 to 1960	1.95	2.36	2.78	1.78	1.99	2.24	0.84	2.18	1.77
1960 to 1965	1.99	2.49	2.77	1.50	1.94	2.44	0.90	2.09	1.49
1965 to 1970	1.90	2.61	2.67	1.11	1.75	2.52	0.66	1.96	1.09
1970 to 1975	1.84	2.71	2.64	0.87	1.62	2.45	0.61	1.82	0.84
1975 to 1980	1.81	2.91	2.66	0.83	1.32	2.49	0.39	1.47	0.94
1980 to 1985	1.80	2.97	2.65	0.96	1.16	2.44	0.36	1.41	0.94
1985 to 1990	1.76	2.93	2.58	0.91	1.14	2.31	0.35	1.37	0.85
1990 to 1995	1.66	2.81	2.46	0.76	1.01	2.13	0.37	1.30	0.70
1995 to 2000	1.56	2.64	2.34	0.61	0.95	1.91	0.38	1.19	0.64

cal experience in similar countries that make reasoning by analogy reliable. This lack of consensus is an important contributor to differences in projections that venture 80 to 100 years into the future.

6) Nor is there consensus as to what the size of the world's population will be when it ceases to grow. A few optimistic analysts set the figure around 8 billion, but a population of 10 billion to 12 billion seems more realistic. For example, if replacement fertility were reached in every country of the world by the year 2000 the population would grow to 8.5 billion. But such a rapid decline in fertility seems very unlikely. If replacement fertility were achieved by the period 2020 to 2025, the population of the world would grow to 10.7 billion. If the achievement of replacement fertility were further delayed, say to the period 2040 to 2045, the population of the world would grow to 13.5 billion (see Fig. 4). There seems to be an emerging consensus that if the leaders of the major developing countries view rapid population growth as an impediment to economic development and act accordingly, and if the donor community (*21*) also continues and perhaps increases assistance to such countries, the population of the world might plateau around 10 billion. But larger numbers are all too possible.

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World Food and Nutrition: The Scientific and Technological Base

Sterling Wortman

In the mid-1960's, the ominous nature of the world food problem began to be recognized widely in academic and governmental circles. Brown (*1*) presented disquieting food supply projections to the year 2000. Africa, Asia, and Latin America, which as regions had been net exporters of food grains (their major staple foods) prior to World War II, were becoming increasingly dependent on imports, and alarmingly so. Many developing countries were viewed as losing the capacity to feed themselves (*2*).

In the United States, a major "official" study of the world food problem was first undertaken in 1967 under the auspices of the President's Science Advisory Committee (PSAC) (*3*). This landmark review, the result of the combined efforts of 125 of the nation's most knowledgeable authorities, remains as one of the major balanced and readable analyses of a complex phenomenon. Its conclusions, in the first volume, still are generally valid, even if still ignored.

Total world food output has continued to rise, but so have numbers of people to be fed. The increase of food output, varying among countries and from year to year because of weather, has not been great enough to permit desired improvements in food availability per person, and today the actual number of undernourished and malnourished people is believed by some observers to be greater than at any time in history. Most of these people are in the poorer countries, particularly in the tropics and subtropics. Rates of increase of food output in the developing regions except for Africa have in recent years been as high or higher than in developed countries, but gains in the low-income countries largely have been offset by higher rates of population growth. Consequently, food production per person in most developing countries has been rising very slowly.

Recent projections by the International Food Policy Research Institute indicate that if there is no improvement in staple food production, primarily cereal grain, in countries with developing market economies and if income growth continues at the present low rate, the developing countries will have a food deficit of 120 million tons and the net world food deficit could reach 84 million tons by 1990 (*4*). Clearly, greatly stepped-up production of food, especially in the developing countries, is essential to the alle-

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