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Stopping at Seven Billion

In early 2003, U.N. demographers announced that the HIV/AIDS epidemic has reduced life expectancy for the 700 million people of sub-Saharan Africa from 62 to 46 years. For the first time in the modern era, the rise in life expectancy has been reversed for a large segment of humanity, marking a major setback in the march of progress. Is this an isolated development? Or does this reversal mark the beginning of a new era where the failure of societies to manage other life-threatening trends, such as falling water tables and rising temperatures, will also disrupt progress and reduce life expectancy?¹

Over the last three decades, some 35 European countries and Japan have reduced fertility and achieved population stability. Indeed, in many of these countries population is projected to decline somewhat over the next half-century. In all these cases population growth ceased because rising living standards and expanding opportunities for women were reducing births. But now populations are projected to decline in some countries for the wrong reason. In countries with the highest HIV infection rates—Botswana, South Africa, and Swaziland—rising death rates are projected to shrink populations in the decades ahead.²

After peaking at an all-time high of 2 percent in 1970, world population growth slowed to 1.2 percent in 2004. This is the good news. The bad news is that part of the slowdown has come from more deaths, mostly from AIDS. Perhaps more important, even slower-growing populations are still outstripping the carrying capacity of the earth's natural systems—its fisheries, forests, rangelands, aquifers, and croplands. Once the demands of a growing population surpass the sustainable yield threshold of an ecosystem, any growth in human numbers is a matter of concern. For example, whether the population-driven demand on a fishery exceeds the sustainable yield by 1 percent or 10 percent a year makes little difference over the long term. The end result is the same: depletion of stocks and collapse of the fishery.³

For some areas, population growth now threatens food security. In developing countries, land holdings are parceled out among heirs with each successive generation until they are so small that they can no longer feed a family. The pressure of a larger population can mean a shrinking water supply, leading to hydrological poverty—a situation where there is no longer enough water to drink, to produce food, and for bathing. The continuing growth of population in resource-scarce, low-income countries is undermining future food security in many of them.⁴

A New Demographic Era

Nearly 3 billion people are expected to be added to our world during the first half of this century—slightly fewer than the 3.5 billion added during the last half of the twentieth century. There are some important differences in these numbers, however. Whereas the growth in 1950–2000 occurred in both industrial and developing countries, the growth in the next 50 years will be almost entirely in the developing ones. Big additions are project-

ed for the Indian subcontinent and sub-Saharan Africa, which together will account for nearly 2 billion of the 3 billion total increase.⁵

As noted, populations are projected to shrink in some developing countries, but for the wrong reasons. Whereas the populations of Russia, Japan, and Germany are projected to decline by 2050 by 30, 13, and 3 percent, respectively, due to falling fertility, those of Botswana, South Africa, and Swaziland are expected to decline by 43, 11, and 2 percent because of rising mortality. Are these three African countries an aberration or are they merely among the first of many countries where HIV/AIDS, spreading hunger, the loss of water supplies, and possibly civil conflict lead to rising death rates and population decline?⁶

Another major shift will come as record variations of national population growth and decline redraw the world demographic map. A comparison of the 20 most populous countries in 2000 and those projected for 2050 illustrates these changes. (See Table 2–1.) To begin with, the two largest countries—China and India—will trade places as India’s population, projected to grow by over 500 million by 2050, overtakes that of China sometime around 2040.⁷

In the four most populous industrial countries after the United States—Russia, Japan, Germany, and the United Kingdom—populations are projected to be smaller in 2050 than they are today. Indeed, only Japan and Russia will remain among the top 20 by mid-century. Germany and the United Kingdom will drop off the list, as will Thailand, a developing country that is approaching population stability.⁸

The three countries on the list with the greatest growth, with each expected to more than double by 2050, are Pakistan, Nigeria, and Ethiopia. The three newcom-

Table 2–1. *The World’s 20 Most Populous Countries, 2000 and 2050*

2000		2050	
Country	Population (million)	Country	Population (million)
China	1,275	India	1,531
India	1,017	China	1,395
United States	285	United States	409
Indonesia	212	Pakistan	349
Brazil	172	Indonesia	294
Russia	146	Nigeria	258
Pakistan	143	Bangladesh	255
Bangladesh	138	Brazil	233
Japan	127	Ethiopia	171
Nigeria	115	Dem. Rep. of the Congo	152
Mexico	99	Mexico	140
Germany	82	Egypt	127
Viet Nam	78	Philippines	127
Philippines	76	Viet Nam	118
Iran	66	Japan	110
Egypt	68	Iran	105
Turkey	68	Uganda	103
Ethiopia	66	Russia	102
Thailand	61	Turkey	98
United Kingdom	59	Yemen	84

Source: See endnote 7.

ers on the top 20 list in 2050—the Democratic Republic of the Congo, Uganda, and Yemen—are each projected to triple their populations by mid-century.⁹

What these demographic projections do not take into account are the constraints imposed by the capacity of life-support systems in individual countries. In many cases, the projection clearly exceeds the country's apparent ability to support its population. For example, the notion that Yemen—a country of 21 million people, where water tables are falling everywhere—will one day be able to support 84 million people requires a stretch of the imagination. Is Pakistan, with 158 million people today, likely to add nearly 200 million by 2050, making it larger than the United States today? And is it really possible that Nigeria will have 258 million people by 2050—almost as many as the United States has now?¹⁰

Population, Land, and Conflict

As land and water become scarce, we can expect mounting social tensions within societies, particularly between those who are poor and dispossessed and those who are wealthy, as well as among ethnic and religious groups, as competition for these vital resources intensifies. Population growth brings with it a steady shrinkage of life-supporting resources per person. That decline, which is threatening to drop the living standards of more and more people below survival level, could lead to unmanageable social tensions that will translate into broad-based conflicts.

Worldwide, the area in grain expanded from 590 million hectares (1,457 million acres) in 1950 to its historical peak of 730 million hectares in 1981. By 2004, it had fallen to 670 million hectares. Even as the world's population continues to grow, the area available for producing grain is shrinking.¹¹

Expanding world population cut the grainland area per person in half, from 0.23 hectares (0.57 acres) in 1950 to 0.11 hectares in 2000. (See Figure 2–1.) This area of just over one tenth of a hectare per person is half the size of a building lot in an affluent U.S. suburb. This halving of grainland area per person makes it more difficult for the world's farmers to feed the 70 million or more people added each year. If current population projections materialize and if the overall grainland area remains constant, the area per person will shrink to 0.07 hectares in 2050, less than two thirds that in 2000.¹²

Having less cropland per person not only threatens livelihoods; in largely subsistence societies with nutrient-depleted soils, it threatens survival itself. Tensions among people begin to build as land holdings shrink below that needed for survival. The Sahelian zone of Africa, the broad swatch of the continent between the Sahara Desert and the more lush forested land to the south, which

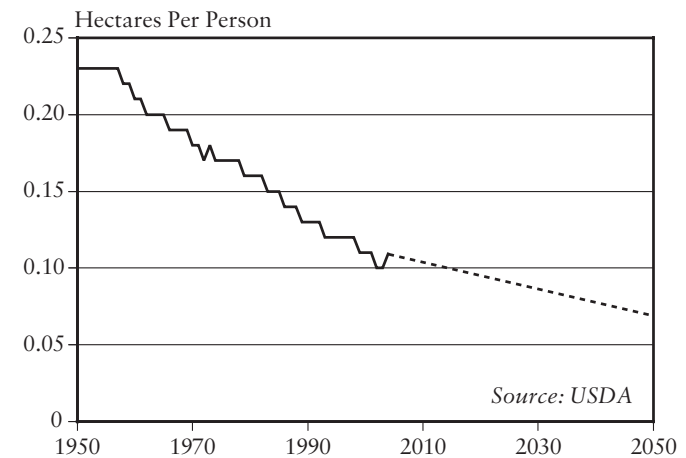


Figure 2–1. World Grainland Per Person, 1950–2004, With Projection to 2050

stretches from Sudan in the east through Mauritania in the west, has one of the world's fastest-growing populations. It is also an area of spreading conflicts.¹³

In troubled Sudan, 2 million people have died in the long-standing conflict between the Muslim north and the Christian south. The conflict in the Darfur region in western Sudan in 2004 illustrates the mounting tensions between two Muslim groups—Arab camel herders and black African subsistence farmers. Government troops are backing Arab militias, who are engaging in the wholesale slaughter of black Africans in an effort to drive them off their land, sending them into refugee camps in Chad.¹⁴

In Nigeria, where 130 million people are crammed into an area not much larger than Texas, overgrazing and overplowing are converting 351,000 hectares (1,350 square miles) of grassland and cropland into desert each year. The conflict between farmers and herders in Nigeria is a war for survival. As the *New York Times* reported in June 2004, “in recent years, as the desert has spread, trees have been felled and the populations of both herders and farmers have soared, the competition for land has only intensified.”¹⁵

Unfortunately, the division between herders and farmers is also often the division between Muslims and Christians. This competition for land, amplified by religious differences and combined with a large number of frustrated young men with guns, has created what the *New York Times* describes as a “combustible mix” that has “fueled a recent orgy of violence across this fertile central Nigerian state [Kebbi]. Churches and mosques were razed. Neighbor turned against neighbor. Reprisal attacks spread until finally, in mid-May, the government imposed emergency rule.”¹⁶

Similar divisions exist between herders and farmers in northern Mali, the *Times* noted, where “swords and

sticks have been chucked for Kalashnikovs, as desertification and population growth have stiffened the competition between the largely black African farmers and the ethnic Tuareg and Fulani herders. Tempers are raw on both sides. The dispute, after all, is over livelihood and even more, about a way of life.”¹⁷

Water, too, is a source of growing tension. Although much has been said about the conflicts between and among countries over water resources, some of the most bitter disagreements are taking place within countries where needs of local populations are outrunning the sustainable yield of wells. Local water riots are becoming increasingly common in countries like China and India. In the competition between cities and the countryside, cities invariably win, often depriving farmers of their irrigation water and thus their livelihood.¹⁸

The projected addition to the earth's population of 3 billion people by 2050, the vast majority of whom will be added in countries where water tables already are falling and wells are going dry, is not a recipe for economic progress and political stability. Continuing population growth in countries already overpumping their aquifers and draining their rivers dry could lead to acute hydrological poverty, a situation in which people simply do not have enough water to meet their basic needs.¹⁹

The Demographic Transition

In 1945, Princeton demographer Frank Notestein outlined a three-stage demographic model to illustrate the dynamics of population growth as societies modernized. (See Figure 2–2.) He pointed out that in pre-modern societies, births and deaths are both high and essentially in balance with little or no population growth. In stage two, as living standards rise and health care conditions improve, death rates begin to decline. With birth rates remaining high

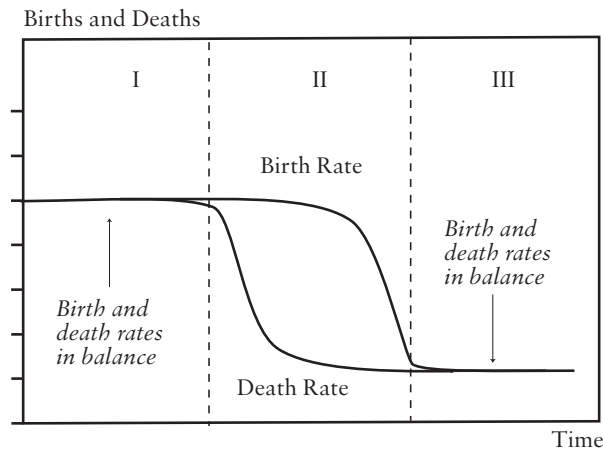


Figure 2-2. *The Three-Stage Process of the Demographic Transition*

while death rates are declining, population growth accelerates, typically reaching 3 percent a year. Although this may not sound like much, 3 percent a year results in a twentyfold increase per century. As living standards continue to improve, and particularly as women are educated, the birth rate also begins to decline. Eventually the birth rate drops to the level of the death rate. This is stage three, where population is again stable.²⁰

Of the 180 countries in the world today, some 36, with a combined population of 700 million people, have made it to stage three. With births and deaths essentially in balance, they have reached population stability. This leaves more than 140 countries—and 5.6 billion people—in stage two. Many with rising incomes and steadily declining birth rates are moving toward the population stability of stage three. Among them are China, Thailand, South Korea, and Iran. But many others in this group are not doing as well. After two generations of rapid growth,

progress has largely come to a standstill. Living conditions in these largely rural societies are either improving very little or are deteriorating as family plots, divided and then subdivided, have left many families with too little land to sustain them.²¹

Stage two of the demographic transition, particularly the early part, is a politically risky place for countries to be. A study by Population Action International, *The Security Demographic: Population and Civil Conflict After the Cold War*, surveys the work of social analysts searching for advance indicators of political instability. One of the better known of these initiatives, a group known as the State Failure Task Force and set up by the Central Intelligence Agency in the 1990s, tried to determine what social, political, economic, and environmental variables could help anticipate what they termed “state failure.” This, in effect, is a form of social disintegration, a collapse of order in a society. Of all the indicators analyzed by the task force, high infant mortality correlated most closely with political instability.²²

The second best indicator of political volatility was a disproportionately large share of the population in the young adult category, those in their late teens and twenties. The prospect that large numbers of young adults would foster social conflict and political instability was much stronger in societies where educational and economic opportunities were lacking.²³

Once countries have moved into the final stage of the demographic transition, when both mortality and fertility are low and essentially in balance, the chance of civil conflicts diminishes sharply. This suggests that it is in the global interest to help those countries that are stalled in stage two to get moving and make it into stage three as soon as possible.

The progression through stage two of the demo-

graphic transition is not a smooth one and it is by no means automatic. While there is no evidence of a country that has made it to stage three falling back into stage two, there is growing evidence that countries remaining in stage two for an inordinate amount of time are falling back into stage one.²⁴

Governments in countries that have experienced rapid population growth for nearly two generations are showing signs of “demographic fatigue.” Worn down by the struggle to feed, clothe, educate, and provide health care for an ever-expanding population, they are unable to respond to new threats, such as HIV/AIDS.²⁵

Countries that remain in stage two, with its rapid population growth, risk being overwhelmed by land hunger, water shortages, disease, civil conflict, and other adverse effects of prolonged rapid population growth. Yemen, Ethiopia, the Democratic Republic of the Congo, Somalia, and Afghanistan all fall into this category. Among the countries that are sliding back into stage one—where high death rates offset high birth rates, thus preventing any population growth—are Botswana and South Africa.²⁶

Within the next two decades or so, most of the countries in stage two will either have made it into stage three or fallen back to stage one. What is not clear is exactly what combination of events and forces will push countries backward demographically. At this point, it is obvious that the HIV epidemic is responsible for the handful of countries that are moving back toward stage one, where rising mortality may not merely balance fertility but exceed it, leading to an absolute decline in population. Countries where a fifth or more of adults are HIV-positive will lose a comparable share of their adult populations within the next decade or so. For each adult sick with AIDS, another adult typically provides care. As

the virus spreads, the number of people able to till the fields shrinks, until eventually food production falls. At this point, disease and hunger reinforce each other in a downward spiral leading countries into a demographic dark hole.²⁷

The Demographic Bonus

In contrast to these countries whose future is fading, countries that have quickly reduced birth rates are benefiting from what economic demographers have labeled a “demographic bonus.” When a country shifts quickly to smaller families, the number of young dependents—those who need nurturing and educating—declines sharply relative to the number of working adults. In this situation, household savings climb, investment rises, worker productivity increases, and economic growth accelerates. Since European countries did not experience the rapid population growth of today’s developing countries, and therefore no rapid fall in fertility, they never experienced a demographic bonus.²⁸

Virtually all countries that have quickly shifted to smaller families have benefited from the demographic bonus. When Japan cut its population growth rate in half between 1951 and 1958, for instance, it became the first country to benefit from this bonus. The spectacular economic growth in the 1960s, 1970s, and 1980s, unprecedented in any country, raised Japan’s income per person to one of the highest in the world, making it a modern industrial economy second in size only to the United States.²⁹

South Korea, Taiwan, Hong Kong, and Singapore followed shortly thereafter. These four so-called tiger economies, which enjoyed such spectacular economic growth during the late twentieth century, each benefited from a rapid fall in birth rates and the demographic bonus that followed.³⁰

On a much larger scale, China's sharp reduction in its birth rate created a large demographic bonus and a population that saves more than 30 percent of its income for investment. This phenomenal investment rate, coupled with the record influx of private foreign investment and accompanying technology, is propelling China into the ranks of modern industrial powers.³¹

China is the most highly visible of a second wave of countries that are likely to benefit from the demographic bonus. The Population Action International study indicates that other countries with age structures now favorable to high savings and rapid economic growth include Sri Lanka, Mexico, Iran, Tunisia, and Viet Nam.³²

After a point, growth in the labor force begins to slow as the results of the falling birth rate are reflected in the shrinking number of entrants into the labor force. This in turn leads to higher wages. Women respond to these by entering the work force, which contributes to a further decline in fertility—one that in some countries is leading to an actual decline in population size.³³

Two Success Stories

Some countries with fast-growing populations that face fast-shrinking water and cropland availabilities per person fail to slow their population growth and, as a result, experience spreading hunger and political instability. Other countries see the handwriting on the wall and move to quickly slow their population growth.

The good news is that countries that want to reduce family size quickly can do so. Two of the best examples of this are Thailand and Iran. These two middle-sized countries have been remarkably successful in slowing population growth, although they have very different cultures and economies. While Thailand's farm economy is rice-based, Iran's is wheat-based. Thailand is humid and

subtropical, while Iran is semiarid and temperate. One nation is predominantly Buddhist, the other Muslim.³⁴

Thailand's success can largely be traced to one individual, Mechai Viravaidya, who eventually became known nationwide simply as Mechai. During the 1970s Mechai saw that if Thailand did not rein in its population growth, it would eventually be in serious trouble. He recognized early on that family planning, reproductive health, and contraception were topics that people needed to feel comfortable talking about.³⁵

One of his first goals was thus to promote the discussion of population and family planning issues. He gave talks to any group who would listen. He worked with educators to get population examples in elementary school math books. He wanted even Thailand's children to understand the consequences of prolonged exponential growth.³⁶

He popularized the condom, one of the first contraceptives available in Thailand, and promoted its manufacture and distribution. He helped people understand the role of condoms in preventing births and disease. Schoolchildren played games with condoms inflated as balloons. Taxi drivers in Bangkok had condoms in their cabs, offering them to their passengers for free. At a 1979 conference of Parliamentarians on Population and Development that I attended in Colombo, Sri Lanka, Mechai boarded a bus to the meeting site and went down the aisle with a small box filled with condoms, offering them to various members of Parliament—men and women alike—teasing them about the colors they wanted or the size that would be best for them. He was thoroughly entertaining—and certainly disarming—which is no doubt why “Mechai” is now slang for condom in Thailand.³⁷

Mechai's enthusiasm could not be curbed. The bottom line was that he mobilized the resources of the Thai

government to introduce family planning programs throughout the country. In 2000, Mechai was elected to the Senate by the people of Thailand.³⁸

Today, women in Thailand have access to a full range of family planning services. Instead of a population growth rate of 3 percent a year—or twentyfold per century—Thailand’s annual population growth rate is 0.8 percent. With the average number of children per woman in Thailand now less than 2, it is only a matter of time until Thailand’s population stabilizes. Its current population of 63 million is projected to stop growing at around 77 million by 2050, an increase of 22 percent. This compares with the projected growth of 38 percent for the United States by 2050.³⁹

Iran’s dramatic gains in reducing family size have come more recently. In scarcely a decade, Iran reduced its population growth from the world’s highest of nearly 4 percent a year to just over 1 percent. The country’s roller-coaster population policy began when Ayatollah Khomeini replaced the Shah in 1979. One of the first things Khomeini did was to dismantle the family planning programs the Shah had introduced in 1967. Khomeini then advocated large families. Between 1980 and 1988, Iran was continuously at war with Iraq, and Khomeini wanted large families to produce more soldiers. His aim was eventually to field an army of 20 million troops. As women were urged to have more and more children, the population growth rate hit 4.4 percent in the early 1980s, close to the biological maximum and one of the highest ever recorded.⁴⁰

A decade later, Iran reversed its population policy by 180 degrees. The country’s leadership had crossed a threshold, recognizing that their record population growth was burdening the economy, destroying the environment, and overwhelming schools. They then started a family planning program to reduce family size.⁴¹

Overnight they launched a new program that quickly became one of the most comprehensive efforts to slow population growth ever adopted in any country. This program was not left to the family planners alone. The government also mobilized the ministries of education and culture to help convince the public of the need to shift to smaller families and to slow population growth.⁴²

Iran Broadcasting played a prominent role, releasing a steady drumbeat of information encouraging smaller families and extolling their benefits. Radio and television broadcasts informed people that family planning services were available. Indeed, it let them know of the 15,000 new “health houses” available in villages to provide family planning guidance and services. The national female literacy rate climbed from roughly 25 percent in 1970 to over 70 percent today.⁴³

Religious leaders were mobilized to convince couples to have smaller families. Mullahs who once were on the front lines urging women to have more children were now encouraging them to have fewer. Iran pioneered with a family planning program that offered the entire range of contraceptive practices and materials. Contraceptives, such as the pill, were free of charge. Iran also became the first Muslim country to offer male sterilization. And uniquely, in Iran couples must take a two-day course in family planning and contraception in order to get a marriage license.⁴⁴

Average family size has dropped from seven children to fewer than three. The population growth rate was cut in half from 1987 to 1994, putting Iran in the same category as Japan and China—the only other two countries that have succeeded in halving their population growth rates in such a short period of time. In 2004, Iran’s population was growing only modestly faster than that of the United States.⁴⁵

If Iran, with its strong undercurrent of Islamic fundamentalism, can move so quickly toward population stability, then there is hope for countries everywhere. Over the long term a sustainable population means two children per couple. The arithmetic is simple. Any population that increases or decreases continuously over the long term is not sustainable.

Eradicating Poverty, Stabilizing Population

Stabilizing population is the key to maintaining political stability and sustaining economic progress. And the keys to stabilizing population are universal elementary-school education, basic health care, access to family planning, and, for the poorest of the poor countries, school lunch programs.

The United Nations has established universal primary school education by 2015 as one of its Millennium Development Goals. This means educating all children, but with a special focus on girls, whose schooling has lagged behind that of boys in almost all developing countries. The more education girls get, the fewer children they have. This is a relationship that cuts across all cultures and societies. As educational levels go up, fertility levels come down.⁴⁶

Closely related to universal primary school education is basic health care, village-level care of the most rudimentary kind. It includes rural clinics that provide childhood immunization for infectious diseases, oral rehydration therapy to cope with dysentery, reproductive health care, and family planning services along the lines of Iran's rural "health houses." In the poorest of the poor countries, where infant mortality rates are still high, parents remain reluctant to have fewer children because there is so much uncertainty about how many will survive to adulthood to look after them.⁴⁷

School lunch programs are needed in poor countries for two reasons. One, they provide an incentive for poor children, often weakened by hunger, to make it to school. Two, once children are in school, having food helps them learn. If children are chronically hungry, their attention spans are short.⁴⁸

We all have a stake in ensuring that countries everywhere move into stage three of the demographic transition. Countries that fall back into stage one are likely to be politically unstable—ridden with ethnic, racial, and religious conflict. These failed states are more likely to be breeding grounds for terrorists than participants in building a stable world order.

If world population continues to grow at 70 million or more people per year, the number of people trapped in hydrological poverty and hunger will almost certainly grow, threatening food security, political stability, and economic progress. The only humane option is to move quickly to a two-child family and try to stabilize world population at closer to 7 billion than the 9 billion currently projected. Against this backdrop, the time has come for world leaders, including the Secretary-General of the United Nations, the President of the World Bank, and the President of the United States, to recognize publicly that the earth cannot support more than two children per family over the long term.

Data for figures and additional information can be found at www.earth-policy.org/Books/Out/index.htm.