



# Global Population: Milestones, Hopes, and Concerns

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The rate of world population growth has declined to the point where the total human population may stabilize far short of the 12 billion mark once forecast for early in the next century. 9.5 billion is the number that the UN now considers most likely. Even at these reduced levels, however, growing populations will place greater stresses on the global environment and on socioeconomic stability. The challenge of providing basic existential requirements for the world's poor will become greater, while increasing per capita consumption in the US and other wealthy countries will put a disproportionate claim on global natural resources and the integrity of the biosphere. [M&GS 1998;5:105-108]

World population growth has been marked by a number of striking milestones: before the 19th century these turning points passed completely unnoticed as there were no global counts and no reliable understanding of population dynamics. Nobody knew when the global count passed half a billion people—an unrecognized event that occurred perhaps as early as the time of European New World discoveries or as late as the second half of the 16th century [1]. The one billion mark, reached just a few years after the beginning of the 19th century, went similarly unnoticed. Some intriguing reconstructions of historic trends have been done during the past 150 years and we now have an enormous amount of 20th century demographic data of generally improving quality. Yet the two great demographic milestones of the latter half of the 20th century—hitting the peak in relative rate of population growth and achieving

rapid declines in fertility—have received surprisingly little attention.

## Rate of Population Growth

In 1900 the global count stood at a bit more than 1.6 billion people; by 1963 it had doubled to 3.2 billion people. At that time standard long range population projections agreed that the next doubling would be accomplished before the end of the century, and yet another doubling of the global total, taking an even shorter period of time, was forecast during the early decades of the 21st century. We now know that the first forecast will definitely fall short of its mark (most likely the total will not reach 6.1 billion) and that there is very high probability that the second projection will never materialize. The two great milestones explain why.

The first key turning point in the 20th century was reached during the late 1960s when the *relative* rate of world population growth peaked at just over 2% a year (the 1965-1970 mean [Figure 1] was 2.04%) [2]. At that time between 70-75 million people were being added each year [Figure 2]. The global growth rate had fallen to 1.72% a year one decade later (more than a 15% drop), but because of the higher population totals (3.3

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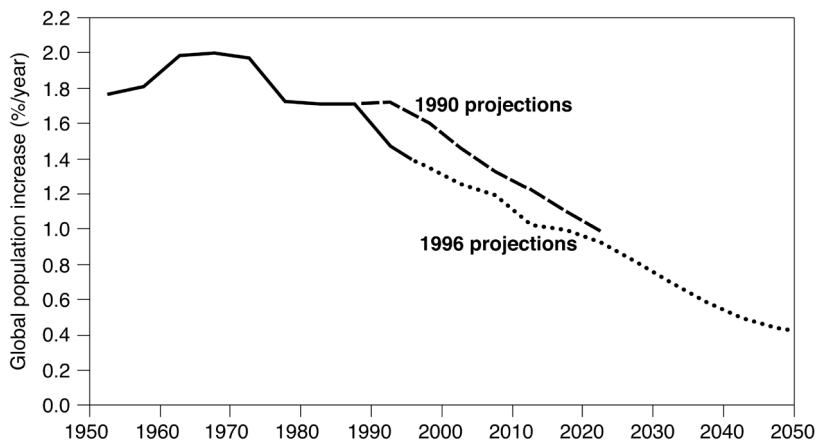


Figure 1. Declining rates of population growth.

billion in 1965, 4.1 billion a decade later, and 4.8 billion by 1985), absolute annual additions kept on increasing. They surpassed the 80 million mark during the early 1980s and had reached 90 million a year by the year 1990.

In 1991 the medium variant of the United Nations forecast put the average annual growth at 1.73% during the first half of the 1990s and at 1.63% for the years 1995-2000 [3]. In absolute terms this would have meant additions of almost exactly 100 million people a year by 1995 and more than 100 million people a year during the late 1990s. This prospect only strengthened the longstanding arguments in favor of resolute action advocated by proponents of drastic population controls and by many environmentalists [4].

### Unexpected Decline in Fertilities

But then an unexpectedly rapid decline in fertilities reversed the trend. In 1994 UN demographers revised their forecasts, lowering the expected growth rate for the first half of the 1990s from 1.73% down to 1.57%, a 10% cut [5]. The latest edition of the UN's World Population Prospects has concluded that the actual rate was just 1.48%, about 6% below the

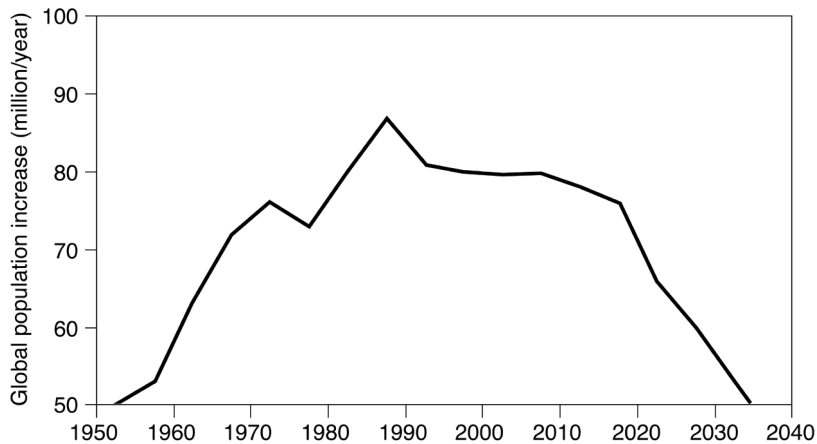


Figure 2. Declining population growth—absolute numbers.

revised estimate [2] [Fig. 1]. This means that the global population increase peaked at 87 million people a year during the late 1980s and then fell to less than 85 million by the year 1995—and that the annual growth has now begun declining even in *absolute* terms [Fig. 2].

Given the fact that the total base is still growing, even the anticipated steady decline in fertilities means that the absolute annual growth rate of about 80 million people will remain fairly stable for at least another 15 years. But there is a fairly high probability that the absolute rate may never rise again—and that the growth curve of our species is now approaching its asymptote faster than was anticipated by demographers even just a few years ago. After millennia of very slow but steady increase (the initial flat phase of the growth curve), and after a few centuries of rapid additions, reflected by a steeply rising segment of the growth curve, we are now finally beyond the midpoint of the S curve with the asymptote discernible only a few generations away [Figure 3].

While there can be no doubt that the transition to low fertility—a shift completely accomplished in all affluent countries and well advanced in much of Asia and Latin America—is now under way even in sub-Saharan Africa, the largest remaining region of very high fertilities, the eventual outcome of this global shift cannot be forecast with high accuracy. Depending on the future course of fertility declines, global population may stabilize at anywhere between 7.5 and 11 billion people, with 9.5 billion being the number that the UN now considers most likely. This outcome is predicated on the assumption that by the year 2050 almost all countries will have a total fertility rate of 2.1, compared to the current global mean of 2.79.

Although such reductions would require steep fertility declines in a number of populous countries with high fertilities—most notably Nigeria and Pakistan, whose current fertilities are, respectively, 5.9 and 5.0—they would not be unprecedented. China cut its fertility from around 6 in the mid-1960s to less than 2 by the mid-1990s and a number of smaller Asian countries accomplished their demographic transition even faster. One can easily argue that similar performances are much less likely throughout the sub-Saharan Africa or in the parts of the Middle East. Consequently, the possibility that the global population will surpass 10 billion people by the year 2050 cannot be excluded—but even the UN's high forecast variant of 11 billion means that the current total of 5.8 billion people would not double.

The conclusion that yet another doubling of world population is unlikely has

recently received independent confirmation from a probabilistic appraisal using expert opinions on fertility, mortality, and migration trends [6]. Simulations used to derive probability distributions of population sizes and age structures for 13 regions of the world indicate that there is about a 66% probability that the world's population is not going to double during the 21st century.

### Impact of Population Growth

All of this is most welcome news. But while we may be glimpsing the beginning of the end of world population growth, this momentous transition provides no grounds for complacency. Growing populations [Fig. 3] will place greater stresses on the global environment and they will require expanded levels of services, including health services. There will be unavoidable consequences for socioeconomic stability. When seen from these perspectives, four aspects of the coming population growth are particular reasons for concern:

- all world population growth between now and the year 2050 will occur in today's low income countries;
- about 40% of the future population growth will originate in only a handful of large countries;
- more than a third of the additional 3.7 billion people will be added in Africa;
- the future growth of the US population will have global effects surpassing those stemming from China's population increase.

According to the UN's medium variant forecast, the population of the world's wealthier nations in 2050 would be smaller than the 1995 total by about 10 million people. This means that all of the nearly 3.7 billion people to be added during the next two generations would be born in low-income countries—an addition that would greatly surpass the total of 2.8 billion people added throughout the poor world during the past 50 years. We may be moving toward a stabilized global population faster than anticipated, but the challenge of providing basic existential requirements for the world's poor will become greater, not smaller, in absolute terms.

### Inequity Breeds Uncertainty

#### Poverty in Africa and Asia

Unequal spatial distribution of the increase will make the challenge even more difficult. Two fifths of the total increase will originate in just five countries—India (about

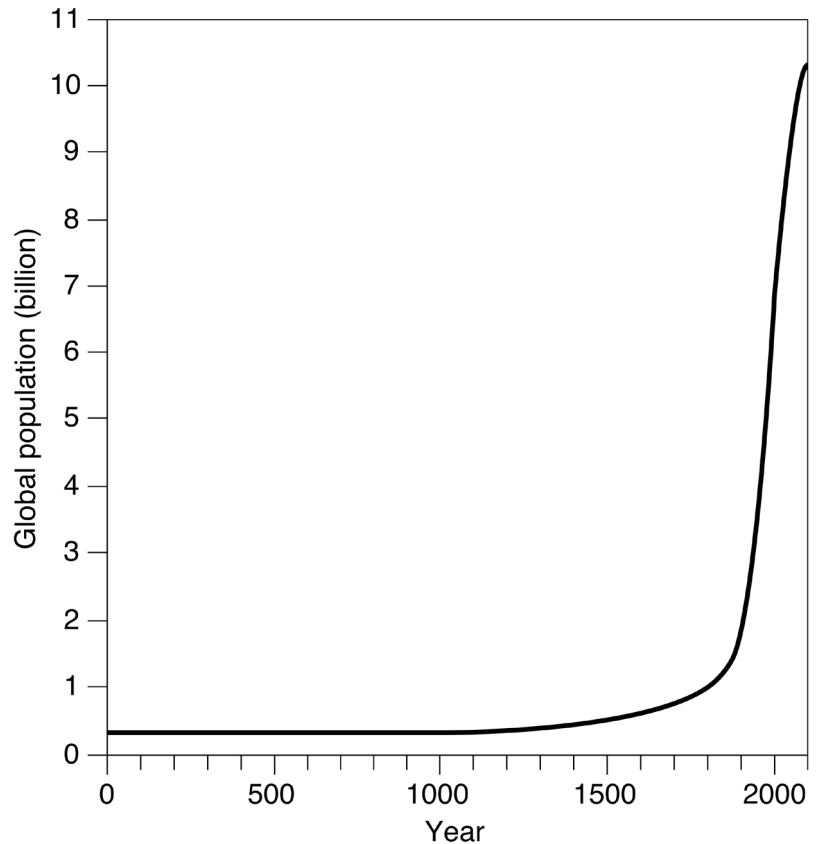


Figure 3. Total population continues to grow, before ultimately stabilizing, despite declines in growth rates.

600 million more people), China (an additional 300 million), Nigeria and Pakistan (each about an additional 220 million) and Ethiopia (an additional 160 million). Advances in China during the past 20 years make it plausible that the country will be able to sustain (albeit at a slower pace) its bold modernization drive [7]—but there is much more uncertainty about India's ability to cope with another 600 million people, and the recent experiences of the three remaining population growth giants inspire even less hope that they will be able to keep their economies, their environments, and their political systems moving toward the rewards of modernization.

The African population increases will be particularly worrisome because of harsh realities that are nearly ubiquitous throughout the continent. Despite the recent cessations of several long lasting internal conflicts (most notably those in Angola and Mozambique) and despite some movement toward greater political accountability, most African countries remain perilously prone to violence and are economically mismanaged [8]. Environmental and health problems will greatly compound these difficulties: water scarcity and HIV epidemics have already reached levels unmatched elsewhere in the world.

Massive water scarcity is already threatening countries with about two thirds of Africa's population. Malin Falkenmark expressed her astonishment at how very little was being done to deal with this problem a decade ago [9] and little has changed during the intervening years. The worst-affected countries include not only those in the Arab north, but also all of eastern Africa except for Tanzania and Uganda, as well as Lesotho and Namibia in the south and along the Sahelian belt (Mauritania to Niger) in the west. The effects of HIV-AIDS on the continent's economic performance and on its social cohesion will not ease anytime soon: sub-Saharan Africa now contains two-thirds of all HIV-infected people and about 90% of all HIV-infected children [10]. The most telling sign of the infection's impact is the fact that average life expectancies in several African countries have been actually falling.

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### *Overconsumption in the West*

Different concerns arise at the opposite end of the human development spectrum. The UN's median forecast shows the US population growing by another 80 million people by the year 2050. Two largely unpredictable factors—the rates of legal and illegal immigration, and the future course of nonwhite and Hispanic fertility—could push this number much higher. The UN's high forecast variant, which also excludes immigration, projects an increase of about 140 million people; rising immigration could bring this total closer to 200 million.

Current average US per capita consumption of commercial energies (fossil fuels and electricity) and common mineral resources is more than tenfold that of low-income countries; the difference is approximately fivefold in terms of crop production, largely attributable to much higher intakes of animal foodstuffs requiring more cereal and leguminous feed [11]. Even if these gaps were to be halved during the coming 50 years and even if the total US population increase were not to surpass 100 million people, this increase would put an overall claim on global natural resources, environmental services, and the integrity of the biosphere at least as large as that imposed by India's additional 600 million people and considerably larger than that imposed by 300 million additional Chinese.

### **Conclusion**

Faster-than-expected fertility decreases,

the onset of declining absolute global growth rates, and a high likelihood of avoiding yet another doubling of the world's population are signs of hope. Not everyone will see these new trends in a positive light: cornucopian techno-optimists have always believed that an unlimited population growth is a boon, creating short-range problems but bringing enormous long term opportunities [12,13].

If you happen to share the techno-optimism of the late Julian Simon's cornucopian visions, then such a prospect is merely a matter of appropriate socioeconomic adjustments [14]. If you agree with Paul Ehrlich, Simon's most vocal opponent, then any additional population growth likely fills you with catastrophic forebodings [15]. The actual outcome is not preordained: our actions (or inactions) can shift it considerably toward one or the other extreme of that wide spectrum. ■

### **References**

1. Durand JD. 1974. Historical Estimates of World Population: An Evaluation. Population Studies Center, University of Pennsylvania, Philadelphia; McEvedy, C. and R. Jones. 1978. Atlas of World Population History. Allen Lane, London.
2. United Nations. World Population Prospects: The 1996 Revision. UN, New York. 1998.
3. United Nations. World Population Prospects 1990. UN, New York. 1991.
4. Ehrlich PR, Ehrlich AH. The Population Explosion. New York: Simon & Shuster. 1990.
5. United Nations. World Population Prospects: The 1994 Revision. UN, New York. 1995.
6. Lutz W, Sanderson W, Scherbov S. Doubling of world population unlikely. Nature 1997;387:803-805.
7. World Bank. China 2020: Development Challenges in the New Century. Washington, DC: World Bank, 1997.
8. Finnan WW, Jr (ed). Africa. Current History 1998;97:193-237.
9. Falkenmark M. The massive water scarcity now threatening Africa—why isn't it being addressed? Ambio 1989;18:112-118.
10. Mann JM, Tarantola DJM. HIV 1998: The global picture. Scientific American July 1998:82-83.
11. World Resources Institute. World Resources 1996-97. New York: Oxford University Press. 1996.
12. Smil V. Cycles of Life, Civilization and the Biosphere. New York: Scientific American Library. 1997.
13. Cincotta RP, Engelman R. Economics and Rapid Change: The Influence of Population Growth. Washington, DC: Population Action International. 1997.
14. Simon JL. The Ultimate Resource 2. Princeton: Princeton University Press. 1996.
15. Ehrlich P. Betrayal of Science and Reason: How Anti-Environmental Rhetoric Threatens Our Future. Washington, DC: Island Press. 1996.