

Population Earth: Enough already?

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It has been dubbed the "baby gap", the "birth dearth" and the "demographic slump". Whatever they choose to call it, many politicians and commentators have whipped themselves up into a frenzy about shrinking populations. Across the developed world, governments are using taxpayers' money to encourage women to have more babies. French women get an extra £675-a-month tax break if they have a third child. The Polish government has recently approved a one-off payment of almost £200 for each new baby. Couples in Singapore who have a child before the age of 28 get a £7000 tax break. Meanwhile, Australia's finance minister Peter Costello has gone one step further: as well as instigating a "baby bonus", which now stands at almost £900, in 2004 he also appealed to people's patriotism, urging young women to have one child for themselves, one for their husband, and "one for Australia".



As concern turns to panic, alarmists predict that there will be too few customers to sustain today's levels of consumer spending, too few workers to keep wages low, too few soldiers for national security and a loss of prestige. There are dire warnings that the baby gap will lead to economic stagnation or even collapse. "Populations will age, the customer base will shrink, there will be labor shortages, the tax base will decline, pensions will be cut, retirement ages will increase," writes Ben Wattenberg in his recent book, *Fewer*. Even *Science* highlighted the issue in June in a special report (vol 312, p 1894). "Population losses could bring a raft of negative economic consequences in the industrialized world as well as greater stress on social security and health care systems," the article stated.



But hold on. Unless you are foolish enough to believe that the human population can grow forever, it is obvious that sooner or later we will have to face the consequences of changing age structures. If civilisation is to persist on our finite planet, impending resource shortages and the mounting environmental costs of overpopulation make it imperative that we gradually and humanely reduce our numbers. By how much is a matter of debate. A decade ago, working with our Stanford University colleague Gretchen Daily, we took a first cut at answering the question: what constitutes an optimal human population? Assuming more or less contemporary aspirations and technological capabilities, highly efficient energy systems and resource use, and a closing of the rich-poor gap, we came up with a figure of around 2 billion - less than a third of today's population. Radical? Certainly. Utopian? Perhaps. Yet 2 billion is the number of people who were alive in the 1930s, and we believe it is an excellent and achievable target to aim for over the long term. The baby gap is the first sign that things are moving in the right direction. Far from being a crisis, it is an opportunity both for nations whose populations are falling and for the planet as a whole.

It is half a century since demographers realised that humanity will not go on growing indefinitely. Based on changes in industrialising nations in the 19th century, they predicted an eventual shift from high birth and death rates to lower birth and death rates worldwide. Better basic sanitation and healthcare, reduced infant mortality and improvements to women's education, status and prospects would combine to decrease birth rates and increase life expectancy. Although on a global scale the population explosion is far from over (see "More and still more"), this so-called "demographic transition" has now happened in many industrialised societies.

In a developed country the break-even point for a population comes at around 2.1 children per couple. This is the total fertility rate (TFR) at which the number of births just replaces the parent generation.

Such levels were achieved several decades ago in much of Europe, which now has some of the lowest birth rates in the world. TFR stands at 1.28 in Italy and Spain, and just 1.25 in Poland. Europe is not alone, though. Japan's TFR is 1.27 and South Korea's 1.25. Australia and Canada come in at 1.76 and 1.61 respectively. Yet despite such low figures, increasing longevity means that the projected population declines in many of these countries will be less than 10 per cent by 2050. Indeed, countries with relatively high immigration, such as the UK - TFR 1.71 - and Australia, are likely to face a significant population increase over the next several decades.

In some other parts of the world, however, numbers are falling rapidly. In Russia and several eastern European nations, fertility rates are similar to the lowest in western Europe, but life expectancies are lower and emigration outweighs immigration. That translates into projected population declines of between 20 and 35 per cent by 2050. Russia's faltering national health system and widespread health problems such as alcoholism, poor nutrition and exposure to toxic pollutants mean that infant mortality is three times as high as in western Europe and the life expectancy for men is just 59 years - 20 years lower than in the west. Meanwhile housing shortages, low wages and poor job security all discourage couples from having children. With a TFR of 1.28, the population is shrinking by 700,000 each year.

The US is the exception among developed nations. With a TFR of 2.09 and a high rate of immigration, the population is growing by 1 per cent per year, leading to a projected population increase of 42 per cent by 2050. Interestingly, the population of Mexico, the leading "donor" nation of immigrants to the US, is projected to rise by a more modest 30 per cent by 2050, despite its higher, though falling, TFR of 2.5. Passing the 300 million mark this year, the US has the third largest population in the world after China and India, and is projected to reach 420 million people in 2050, with no end to growth in sight.

Wherever countries are going through the demographic transition, the inevitable consequence of fewer babies born and longer lives is an increase in the average age. Demographers project that by 2050 the number of people in the world over the age of 60 will more than triple from about 600 million now to nearly 1.9 billion - more than 20 per cent of the projected population and as much as 30 to 40 per cent in some countries with dwindling populations.

Coping with this change will doubtless create challenges, but there will also be benefits. Whereas in a developing nation with high birth rates as many as half its citizens may be under the age of 15, in industrialised societies there are typically fewer than 20 per cent. Commentators raising alarms about ageing populations neglect to mention that with fewer children, far less of their society's resources will be needed to support and educate them. In addition, fewer young people means lower crime rates, because crimes - including terrorist acts - are overwhelmingly committed by people aged between 15 and 30. In the US, crime rates fell markedly from about 1990 on - 18 years after a big drop in the birth rate. We don't think this is a coincidence.

Other advantages of a non-growing population include less pressure to expand national infrastructure - roads, buildings, housing, schools, hospitals and the like - or to keep creating more jobs. While several European countries perceive labour scarcity in a negative light, it could provide an incentive to increase efficiency and productivity. Globally, of course, there is no shortage of labour. Immigrants augment the workforces of western Europe and the US and, as globalisation proceeds, skilled jobs are being increasingly "outsourced" to developing countries, which have large cohorts of young people, many of them well educated. Both processes also contribute to the development of poor countries and help narrow the global rich-poor income gap. As a knock-on effect, this trend will bring increased opportunities for education and jobs, especially for women in developing countries, which is one of the surest ways to lower birth rates.

The indisputable downside of the demographic transition is in the provision of pensions. This has caused growing concern, bordering on panic, in some countries. Such hysteria has even afflicted the US where, despite continued population growth, the post-war "baby boomers" are now beginning to reach retirement age and will be dependent on a smaller proportion of working-age people for their support.

Rather than attempting to turn back the clock and revive population growth as some observers advocate, societies with ageing populations would be better advised to revise their retirement and social security arrangements. After all, people do not become incapacitated after the age of 65. Few older people are dependent in the sense that young children are, and in industrialised countries they are significantly healthier and fitter today than were their counterparts a generation ago. They already make a large, and often undervalued, contribution to society through volunteer programmes working for charitable, civic and public interest organisations.

The experience and expertise of retired people is increasingly being recognised, with many industries and businesses rehiring their retirees at least part-time. The utility industry in the US, for instance, has found that retirement of its ageing workforce will produce key job shortages in the next few years and has begun inaugurating "career-extension and geezer-retention policies". Such policies may require employers to experiment with more flexible working hours and part-time jobs - which will also benefit workers with children. On the other side, social security programmes could save money by establishing more flexible retirement policies for the many people willing and able to continue with paid

work beyond the age of 65.

There is no doubt that in the coming decades changing age structures and labour pools will present genuine problems of equity, with consequences for patterns of consumption, employment, migration and the like - all tied to the philosophical question of how we should live our lives. Is it fair to expect 25-year-olds to pay very high taxes to support perfectly healthy 70-year-olds in retirement? Is it reasonable to import a lot of young, cheap labour from poor nations to readjust national age structures? The economic dislocations that rapidly changing age structures can cause must also be considered. These are not, however, insoluble problems. Given their increasingly international nature, they demand open discourse within and between all nations, followed by sustained ameliorative action.

Despite the challenges, we see population shrinkage in industrialised nations as a hugely positive trend. It is, after all, the high-consuming rich in these regions who disproportionately damage humanity's life-support systems, and wield their economic and military power to keep their resource demands satisfied, without regard for the costs to the world's poor and to future generations. The more people there are, the more climate change humanity will face, with a concomitant loss of biodiversity and the crucial ecosystem services it helps provide (see "Apocalypse soon?").

There is no compelling reason to postpone the inevitable end to population growth, and every reason to welcome it. Indeed, the needs of our children and grandchildren for a habitable Earth give us no other realistic choice.

More and still more

Whatever happened to the population explosion? With all this talk of the "baby gap" you might be forgiven for thinking it is over. In fact, it is still very much happening. Although birth rates have fallen in almost every country over the past few decades, they have not fallen equally fast or far everywhere.

Most countries in Africa, Asia and Latin America have not yet reached replacement reproduction, the level at which each generation gives birth to just enough children to ensure the next generation is no more (or less) numerous. Some are not even close. Demographers project that by 2050 the global population will increase by 2.5 billion to 9 billion, and then continue growing, though at a slackening rate.

In the fastest-growing populations - mainly in sub-Saharan Africa and several Middle Eastern nations - the proportion of people under the age of 15 can be as high as 45 or 50 per cent. These are the parents of tomorrow, who quite likely will produce an even larger cohort in the next generation, even if each couple has fewer children than their parents did. It is difficult to predict when reproduction will reach replacement levels in such countries, but it is unlikely to occur in the next few decades. Even when it does, it will take a lifetime - 70 years or so - before growth stops. This momentum results from previous higher birth rates that produced ever larger generations of people, who then become parents and grandparents living alongside their children and grandchildren before dying in old age.

Even when a country's fertility falls below replacement level, there is still a lag, although a shorter one, before growth stops and the population slowly begins to shrink. China, for example, has had below-replacement fertility for more than 15 years, yet it may still add another 160 million people - equivalent to the populations of Germany, France and the Netherlands combined - before numbers peak around 2025. Nevertheless, China is one of a handful of developing countries that have already begun to face the problems of an ageing population.

Apocalypse soon?

Much of today's population growth is occurring in rural regions in the developing world, sparking tension both within and between nations as increasing numbers of young people migrate to cities and to wealthier countries looking for a better life. In the US, where large numbers of illegal immigrants enter the country in search of work, opinions on immigration are already sharply divided. Western European nations have tended to accept limited immigration from developing countries as a way to augment their workforce. Here too illegal immigration is increasingly a problem, as thousands of people flee overcrowded labour markets in poor African and Asian countries in search of jobs. In many developing countries, numbers of young working-age people are rising by up to 3 per cent per year.

Dissatisfaction is inevitable where populations of mostly young people face high unemployment, poverty, poor healthcare, limited education, inequity and repressive government. Revolutions and political unrest most often occur in developing nations with growing populations. Unemployed, disaffected young men provide both public support and cannon fodder for terrorism. The majority of terrorists behind 9/11 and attacks in Europe, for instance, have been young adult men. This is

also the demographic group responsible for most crime globally.

Expanding populations also create rising demands for food, energy and materials. The strain this puts on ecosystems and resources in developing countries is compounded by demands from industrialised nations keen to exploit everything from timber and tropical fruits to metals and petroleum. Shortages of fresh water are increasingly common, jeopardising food production among many other problems. Rising oil prices may now be signalling the end of cheap energy, which also poses a threat to successful development. At the same time, mounting evidence of global warming makes reducing fossil-fuel use imperative.

If the 5 billion-plus people in developing nations matched the consumption patterns of the 1.2 billion in the industrialised world, at least two more Earths would be needed to support everyone. Politicians and the public seem utterly oblivious to what will be required to maintain crucial ecosystem services and an adequate food supply in the face of rapid climate change and an accelerated loss of biodiversity. The future looks grim, unless patterns of consumption change - with rich nations causing less environmental damage and poor ones consuming more, but adopting the newest, cleanest and most efficient technologies for energy use and production of goods and services.

It seems likely that by 2050 nuclear, biological and chemical weapons of mass destruction will be in the hands of most nations and many subnational groups. Imagine a well-armed world, still split between rich and poor, with unevenly distributed resources and a ravaged environment. Unless we act now, future generations will not have to imagine.

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