

World faces challenge as technologies lengthen life expectancies, biologist says

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In the 21st century, state-of-the-art anti-aging technologies may extend human lifespans at an unprecedented rate, bringing with them a host of social and economic challenges, says biologist Shripad Tuljapurkar of Stanford University.

The combined impact of these medical advances would have major implications for the global community in the new century. Tuljapurkar, the Dean and Virginia Morrison Professor of Population Studies, gave a talk Feb. 17 on the demographic and economic consequences of anti-aging therapies at the annual meeting of the American Association for the Advancement of Science in St. Louis.

"Some people believe we are on the brink of being able to extend human lifespan significantly, because we've got most of the technologies we need to do it," Tuljapurkar said.

There is hope in the scientific community that extending life also will prolong the healthy and active years of life, he said, adding, "That's where I come in."

Ageing populations around the world

In his research, Tuljapurkar selected representative populations from different countries around the world and examined relationships between historical trends in aging, population growth and economic activity. His

analysis combined these data with forecasts on the future of anti-aging treatments from leading researchers in the field.

The result? "We've come up with a scenario: Starting around 2010, we could see lifespan increase dramatically," he predicted.

Tuljapurkar estimated that between 2010 and 2030, the modal, or most common, age of death will increase by 20 years if anti-aging therapies come into widespread use. This projected increase reflects a lifespan growth rate that is five times faster than the current rate, increasing the modal age of death in industrialized countries such as the United States from roughly 80 years to 100.

"We studied different countries around the world that are representative of different situations and took a look at where they'd end up," Tuljapurkar said. "One thing that happens right away, which nobody seems to have thought of, is that the total global population increases dramatically. From an original projection of 8 billion we end up topping out at 10 to 11 billion. In many countries, this would have an enormous, and not necessarily positive, impact. For example, the idea that China would go from 1.5 to 1.8 billion, just because of this, is a bit frightening."

On the other hand, he said, a longer-lived population could be good news for many European countries with low fertility rates. "Countries like Sweden and Italy have been having this huge debate for many years over population decline," Tuljapurkar explained. "A lot of the debate is about immigration: People have been telling them they need to increase immigration in order to keep the economy going."

However, an increase in citizenry is only one factor in determining a nation's socioeconomic health, he noted. Even countries with stable populations will see the age composition of the citizenry undergo a

dramatic shift toward the elderly, who are frequently retired or disabled.

To factor in this phenomenon, Tuljapurkar examined the effects of anti-aging technologies on the national dependency ratio—the proportion of retired people (age 65 and over) to working people (age 20-65) in a population. This ratio is a crucial factor in determining Medicare and Social Security policies in the United States, he said.

Current worries over the fate of Social Security center on the impending retirement of the Baby Boom generation. By 2035, the U.S. dependency ratio is projected to double from approximately 1:5 to just above 2:5. Increased boomer lifespans will add an alarming extra weight to an already sagging system. Factoring in increased lifespans, Tuljapurkar calculated that current forecasts for dependency ratios could fall short by a factor of two—meaning that in America, the ratio will actually quadruple to 4:5.

"It's staggering to think about the fiscal effects of this," he said.

Inequality

The situation is equally troubling on a global scale. While science may be on the brink of unlocking the mysteries of the aging process, Tuljapurkar worried that the world is unprepared for the inequalities that this new knowledge may generate between the world's rich and poor.

"Are some people going to be left behind? Are we going to make society far more unequal than it is now?" he asked. Tuljapurkar predicted that the lifespan boom will be confined to wealthy countries, where citizens can afford anti-aging technology and governments can afford to sponsor scientific research. This disparity complicates the current debate over access to healthcare, as the rich become increasingly distanced from the poor, not only in quality but length of life.

Tuljapurkar warned that the distribution of anti-aging technologies is likely to be in the hands of companies that have a history of focusing solely on profit rather than the imperative to distribute medicines to those who need them most.

"Big pharmaceutical companies have a well-established track record of being very difficult when it comes to making things available to those who can't pay for them," he said.

If anti-aging technologies are distributed in the unchecked free market, "it's entirely likely to me that we'll wind up with permanent global underclasses, countries that will get locked into today's mortality conditions," Tuljapurkar said. As the gap widens and rich countries continue to invest in anti-aging technologies, the developed world may become increasingly less willing to disseminate the technology to other nations, he said: "If that happens, you get negative feedback, a vicious circle. Those countries that get locked out stay locked out."

Medical technologies around the globe

An example of this inequality, Tuljapurkar said, is the lack of availability of AIDS antiretrovirals in Africa. Although these medications are widely available in the West, they are out of reach for many African patients, who make up more than 60 percent the world's AIDS cases. "If we can't deal with AIDS in Africa, the chance that we'll be able to deliver these anti-aging technologies to other nations is pretty slim," he said.

In the final analysis, Tuljapurkar stressed the need for scientists and policymakers alike to confront the full environmental and sociological implications of anti-aging technologies, with an awareness of the potential costs and challenges in addition to the benefits.

"What we've tended to do historically with medical advances is to take the reasonable position that we should implement everything that comes along," Tuljapurkar said. "However, we are now approaching a stage where it's necessary to look the implications before we rush in—at least so we can prepare ourselves. We need to confront the prospect of inequality head-on, instead of waiting 10 years and then saying, 'What a surprise!'"

Source: Stanford University, by Melissa Fusco

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