UC SANTA BARBARA

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Rejecting the Status Quo

The global population has been growing steadily since the end of the last ice age, but in the past 200 years it has skyrocketed. Current projections by the United Nations suggest that by the year 2100, as many as 11.2 billion people may call Earth home.

And that leads UC Santa Barbara population ecologist Bill Murdoch to two questions: How big is it going to get? And how soon will it start declining? The answer, according to his research, may lie in improved standards of living.

Although the upward trend is clear, projections are only as accurate as the assumptions that underlie them. Take for example the population model Murdoch and his UC Santa Barbara collaborators developed for a group of 37 mid-African countries, all of which have particularly high fertility rates. The team's analysis revealed that improving the wellbeing of the poorer segments of the population can reduce the region's population growth and future size to below the UN's projections. The situation, Murdoch claims, is potentially much less dire than other projections predict. The study appears in the journal PLOS ONE.

The UN population model for this region of the world places great weight on its historically high and slowly-declining fertility rates. Murdoch thought new insights could improve the projections. So, the authors constructed a new version of the model for the mid-African countries in the light of the demographic history of 61 other developing countries, and based on a relationship they uncovered between improving wellbeing and declining fertility.

“We are saying, ‘What if we don’t assume everything is just a projection of the status quo?’” said Murdoch, a research professor in UC Santa Barbara’s Department of Ecology, Evolution and Marine Biology. “What if you assume that these African countries could do as well as other developing countries have done for the last 60 years? What would happen then?”

What happens is a 1.1 billion-person drop in the projected population by the end of the century compared with the UN’s predictions for this region. This all hinges on the fact established by the authors that in both the 37 African and the other, comparable developing countries, fertility rates have declined as general wellbeing has improved — and they have declined at the same rate in the two groups in relation to improved wellbeing.

“When you’re poor, it makes sense to have a lot of children because children are a source of income,” explained Murdoch. “They go to work from an early age, and they’re a source of security in old age.”

But factors shift as life improves. Rather than serving as a source of labor, children are more frequently sent to school to develop skills. Education influences fertility, said Murdoch. “Parents who’ve got more education understand the value of education. They know its costs,” he said. “Now their motivation isn’t to have more children; their motivation is to have higher-achieving children, and fewer of them.”

The researchers used infant survival rate as a proxy for general wellbeing, as it is influenced by a variety of disparate factors, from overall nutrition to access to medical facilities and level of education. In addition, variation in infant survival rate among developing countries explains (statistically) 70 percent of the variation in their fertility rates, Murdoch said.

People had thought that fertility rates in mid-African countries responded differently to changing influences than those in the rest of the world, explained Murdoch. UN data suggest that fertility improved later and more slowly in mid-African countries than in other developing nations. But after looking at the data, Murdoch’s team found that the two fertility rates declined at the same speed as infant survival rates increased. These African fertility rates have declined later and more slowly because wellbeing has increased later and more slowly, Murdoch said. The only difference was a fertility level of half-a-child more, on average, in mid-African countries, at a given level of infant survival. Murdoch predicts this gap will disappear as infant

survival rates approach percentages in the high 90s.

After establishing that the two groups of countries followed the same tendencies, the researchers investigated what would happen if wellbeing were to increase in these African countries as fast as it has done in the set of comparable developing countries. They substituted the trends of the other developing nations into the projections for each of the African countries in question. This yielded a median total projected population of 2.86 billion individuals by the year 2100, which is 1.1 billion people fewer than the UN projection for this region. Under these circumstances, the world population in 2100 would be 10.1 billion people, and would have stabilized by the year 2085.

“It’s pretty clear that fertility declines when people are better off,” Murdoch said. “So if you’re going to reduce the population growth rate you have to help these people get into a situation where they no longer need to have a lot of children.”

Although many of these countries are poor and undemocratic with high levels of inequality and corruption, results from other countries with the similar challenges show that improving wellbeing is quite feasible. For instance, Bangladesh achieved key 2015 UN Millennium Development Goals, such as reducing maternal and childhood mortality and the fraction of the population in poverty, at extremely low average income levels and high levels of corruption, the researchers note in the paper.

The violence of the mid-African region may also be less of a hurdle than it seems. Nepal achieved its relatively rapid increase in infant survival rates despite a similar level of violence between 1996 and 2006. In fact, these African nations show no relationship between improvement in infant survival and measures of conflict.

Wellbeing in these African nations could actually increase faster than it did in the other developing nations, said Murdoch. They’ve already reached 90 percent infant survival rates at roughly half the average per-capita income it took the comparable group of developing countries to achieve this.

“I think fertility rates absolutely can decline fast once you’ve set up the conditions for them to decline,” said Murdoch. “And setting up these conditions isn’t an insuperable problem at all.”

About UC Santa Barbara

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