
Leonid Gavrilov and Natalia Gavrilova are population biologists who specialize in the mechanisms of mortality, longevity, and aging. Their research has unearthed surprising and intriguing demographic trends. At the OCF conference, they spoke with OCF Fellow Luis Guachalla – a post-doctoral researcher in molecular medicine whose work involves uncovering the biological causes of aging and death – about the links between longer lives and global population growth.

Guachalla: It's not that common for younger researchers to have an opportunity to sit down and interview senior scientists, so I'm really happy to be here. I was interested in your latest paper that showed the consequences of extending life span. There are many fears that extending life span will lead to overpopulation of the world, but your results indicate that may not happen. In fact, your model suggests that in 100 years, there won't be any change in the world's population, partly because people are having fewer children even as they live longer lives. But how would it be in a longer time frame – for example, 200 years, 300 years, 400 years? Would it still be the same trend?

Gavrilov: Well, it depends on the particular model. For example if you consider the situation where you have less than two children per family, the population growth increment keeps decreasing. But in other specifications, there might be different scenarios. The key issue is the number of children per family, on average. Overpopulation depends more on fertility than on mortality. Even in the most radical life span extension scenario, you cannot get big population growth.

Gavrilova: I met the chair of our session, Professor Karl Lenhard Rudolph, director of the Institute of Stem Cell Aging at Ulm University, and I found out that he, for example, is more interested in realistic scenarios of increases in life span up to 100



Luis Guachalla, born in 1980, works at the Research Center for Molecular Medicine at the Austrian Academy of Sciences.



Population biologist Natalia Gavrilova is a research associate at the Center on Aging, NORC (National Opinion Research Center) at the University of Chicago.

years than in the very radical forecasts of life span extension. So, I made a prediction program for another scenario, which shows continuation of the current increasing trend in life span expectancy ...

Gavrilov: She worked with her computer overnight, and produced completely new data. One of the great benefits of conferences like OCF is not just people coming and presenting their results, but interacting with each other during the conference to produce new results.

Gavrilova: ... The consequence will be that the population will still decline, but there will be more very long-lived people and 100 years from now it will not be surprising to find people who live up to 120. But what is interesting is that usually demographers underestimate longevity, and they underestimate the growth of life expectancy. Demographers are usually afraid to assume that people will live past 110, and for this reason they usually underestimate future populations. I made no such assumptions in my predictions. This is simply a continuation of the trend of increasing life expectancy.

Guachalla: In your paper you use the example of Sweden, a very well-developed country. You're already showing a declining population. Can extending longevity maintain the population, or do Swedes need to increase their reproduction rate as well?

Gavrilov: This is very important, because people are very concerned about overpopulation, and often objections to life extension are made on the basis of "there will be too many people in the world." What they do not understand is that in developed countries like Sweden and Germany, the real problem is not overpopulation but on a long time horizon you have a drastic decline in native-born population. You have a demographic catastrophe. Of course you can solve this problem with immigrants, but then you can lose your cultural identity, you can lose your language. Life-extension technology is not a part of the problem, but part of the

solution. Any intervention that increases healthy human life span would really help in this situation.

Guachalla: One observation to this point – extension of life span is not always associated with improved health quality. If human beings reach 130 years of age, what would be your recommendations on retirement age? There’s a hot debate in Europe right now on this topic. The French for example, are complaining that they are not willing to work two, three or five years longer. But if people live to be 130 and keep the current retirement age, it means that they will only spend half their life working.

Gavrilova: The main consequence of longevity is accelerated population aging. Current societies are not ready for this challenge. But I believe that it is not only a challenge, it is an opportunity. Older people have more experience and knowledge, maybe require only short education for new jobs. This is an asset to society. But current regulations do not encourage older people to work, and sometimes there is even forced retirement after a certain age. Governments are doing this in a not very gentle way, just raising the retirement age without giving people a choice. But you could, for example, give people who want to work longer some incentives and let people who are frail or don’t want to work that option. Currently, though, Western societies are not ready for the challenges of an aging population.

Guachalla: Ideally, it would be nice to not only live longer but also have a good quality of life. The aim is being 80 or 90 but still being able to do tasks a young person can do. We can live until we’re 130 or 140, but we don’t want to be trapped in bed connected to oxygen tubes. I think there’s a lot of effort to extend life span and also improve quality of life in the elderly.

Gavrilova: The few people who survived to old ages in the past were much healthier at age 80, because otherwise they would have succumbed to disease at an earlier age.



Leonid Gavrilov is a research scientist at the Center on Aging, NORC at the University of Chicago.

Guachalla: I come from a developing country, Bolivia. Would you say the same rules would apply for life span extension in a developing country as in a developed country?

Gavrilov: This is a more political question than scientific. It seems to me there is a lot of low-hanging fruit, so to speak. It is much easier to clean water to avoid cholera epidemics, for example, than apply expensive antiaging treatments. There are so many things that can be done in developing countries to increase healthy lifespan that it would be a waste of resources to push the idea of anti-aging interventions at this point. In many countries with short life span, there are much easier ways to add years of healthy life than high tech antiaging interventions.

Gavrilova: It’s interesting, because the trends are diverging in the developing world. Take Malaysia: We found that in Malaysia the life expectancy is close to Western countries. They’re really healthy, even though it’s a rapidly developing country. On the other hand, Russia, which is considered a highly industrialized country, has a very, very low life expectancy. For men it is 59 years, lower than in China.

Gavrilov: It has to do with heavy, heavy alcoholism. It would be insane to make some antiaging intervention before you eradicate alcoholism from the culture in Russia. They simply refuse to do the easy part.

Guachalla: Talking about external factors, something that has been discussed a lot is climate change. Do you think climate change will have an impact on life expectancy?

Gavrilov: Just recently, there were extreme heat waves near Moscow that hadn’t been seen in 100 years. There was a spike in mortality among older people, and there are different estimates but the most conservative estimate is that the death rate increased by a factor of two. Climate, if it becomes a systematic problem, really adds to the pressure on life expectancy.