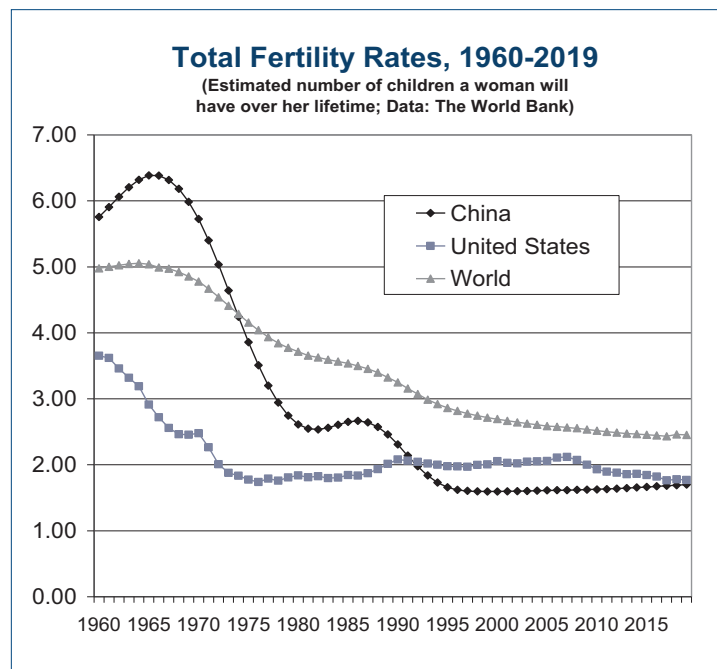


HUMAN FERTILITY AND CLIMATE CHANGE

An NPG Forum Paper
by Edwin S. Rubenstein

Thomas Malthus warned that human population growth would outstrip the food supply. That fear largely dissipated when fertilizers, pesticides, and mechanized agriculture lowered the price, and increased the quantity, of foodstuffs. But today the very things that bailed us out of the Malthusian population trap are linked to global warming and plunging birthrates.

Has climate change reduced population growth? It's hard to imagine that these two mega-trends are not inter-related. The circumstantial evidence is overwhelming. Total fertility rates – the number of children a woman will likely have over her lifetime – have been below the 2.1 “replacement” rate for more than 25 years in China and the U.S., though they remain stubbornly above that level in the rest of the world:



A different fertility metric – births per every 1,000 women of childbearing age – fell to a record low of 59 in the U.S. in 2018, according to the National Center for Health Statistics.¹ The rate has fallen about 15% since 2007.

Fertility rates tend to fall during hard economic times, as people postpone having babies, and then rise as the economy recovers. That is what happened during and after the Great Depression of the 1930s. But this time around, the birthrate has not recovered. A brief uptick in 2014 did not last.

Even population experts are puzzled. **“It’s hard for me to believe that the birthrate just keeps going down,”** Kenneth M. Johnson, a demographer at the University of New Hampshire, says.² Mr. Johnson estimates that 5.7 million more babies would have been born in the U.S. since 2007 had birth rates remained stable since then.

Birth rates have declined for all age groups, except for women in their late 30s and early 40s. More than half of women who gave birth at these ages had college degrees, a much higher share than among women who had children in their 20s – suggesting that women increasingly postpone childbirth to complete their education.

Meanwhile, the 2010s were the hottest decade on record, and 2019 the second warmest year ever. Average global surface temperatures last year were nearly 1.8 degrees F. above the average at the middle of the last century. Since the 1960s

each decade has been warmer than the previous one, by significant amounts. The trend is driven mainly by emissions of CO₂ and other heat-trapping emissions from the burning of fossil fuels.

News Flash #1: Hot weather reduces the chances of getting pregnant, and this will get worse because of global warming.

News Flash #2: Fathers, not mothers, may be the major reason for this trend.

August and September – nine months after the coldest part of the year – are the peak months for births in the U.S., according to an analysis of U.S. birth data by UCLA’s Institute of Environment and Sustainability.³ **“We find that days with a mean temperature above 80°F cause a large decline in birth rates 8 to 10 months later.”**⁴

It’s not that people have less sex in hot weather – in fact, data show the opposite, people have more sex when temperatures rise. Rather, the trend likely reflects the impact of heat on male fertility. Studies show that sperm production falls in hot weather, says environmental economist Alan Barecca, co-author of the UCLA study.

Fertility is declining across all regions of the country, with hot states like Arizona showing the same monthly patterns as cooler ones. In fact, the summer birth spike is more pronounced in northern states than warmer ones, a fact Barecca says may reflect the relative lack of air conditioning in the north.

Having fewer children is the most effective step a family can take to reduce CO₂ emissions. We do not know whether women and their partners actually take this into account when

deciding on family size. Surveys suggest the linkage is widespread: Thirty-eight percent of U.S. citizens ages 18 to 29 feel couples should consider climate change when contemplating a family, according to an online survey of more than 1,000 people for *Business Insider* website in March 2019.⁵ And about the same percentage (33%) of those polled by New York Times/Morning Consult in 2018 said they expected to have fewer children because of worries over climate change.

CHILDREN ARE VULNERABLE

Children are particularly vulnerable to the health threats posed by a warmer world. It starts at birth. Barecca projects global warming will shift more births from spring to summer months, increasing the health risks facing newborns.⁶ Hot weather during the third trimester of pregnancy negatively impacts fetal health, as measured by birth weight, Barecca says.

Infants who survive the trauma of birth face a lifetime of health issues related to climate change.

A recent report from the medical journal *Lancet* compared human health consequences under two scenarios: one where the world met the commitments laid out in the Paris Climate agreement, and one in which it did not. If the world follows the Paris roadmap **“...a child born today would see the phase-out of all coal in the UK and Canada by their sixth and 11th birthday; they would see France ban the sale of petrol and diesel cars by their 21st birthday; and they would be 31 years old by the time the world reaches net-zero [carbon emissions] in 2050...”**⁷

The *Lancet* report finds the world is following a “business as usual” pathway: **“A child born**

today,” the Lancet experts warn, “... will experience a world that is more than four degrees warmer than the pre-industrial average, with climate change impacting human health from infancy and adolescence to adulthood and old age.”

In poor countries warming of this magnitude portends food shortages “**...with infants often the worst affected by the potentially permanent effects of undernutrition.**”⁸

Less widely known is the impact of air pollution that accompanies the burning of fossil fuel. Children in all countries – rich and poor alike – are at risk because of their underlying physiology. Their hearts beat faster than adults, and their breathing rates are higher. They also spend more time outdoors. As a result, children absorb more air pollution relative to their body size than adults.

Air pollution killed 7 million people worldwide in 2016 alone, according to the report. More than half (3.8 million) of these deaths are estimated to be from household air pollution, mainly from coal, wood, charcoal, and biomass, used for cooking.

Almost 3 billion people live without access to clean fuels and technologies for cooking.

The 2019 Lancet report is the first to examine the health consequences of wildfires.

Since 2015 there has been a 77% increase in the number of people exposed to wildfire smoke worldwide, according to the report. Most of that growth has been in India and China. But the 2018 California fire season, when the Camp Fire became the state’s deadliest and most destructive in terms of acres burned, and 2019’s wildfire season, confirm that the U.S. is a major contributor to this pollution.

Across the Western U.S. wildfires have exacerbated air pollution enough to roll back the air quality gains from the 1990 Clean Air Act.

“You have young kids escaping fires that are going to be, in effect, challenged for life,” Gina McCarthy, a former administrator for the Environmental Protection Agency, is quoted as saying. **“There are mental health issues happening as a result of these climate events and fires and floods that children have never had to face, certainly not to the frequency and intensity that they have to face now.”**⁹

“This may be the first time in the history of the United States that there are children wondering whether they are going to have a future, whether they should have children as a result of the potential for climate change to get worse and worse,” Ms. McCarthy says.

The report identified many links between climate change and mental health, including the loss of property and the loss of livelihoods, but stopped short of quantifying the impact.

There are glimmers of hope in the Lancet study: the share of global electric power fueled by coal continues to fall, renewables account for a whopping 45% of new power generation, per capita electric vehicle use has soared.

Unfortunately, these favorable percentages and per capitas are no match for population and economic growth. The bottom line, per the 2019 report: **“...greenhouse-gas emissions from fossil fuel combustion have returned to a growth trajectory, rising by 2.6% from 2016 to 2018. Limiting warming to 1.5°C would require a 7.4% year on-year reduction from 2019 to 2050.”**¹⁰

SOME MILLENNIALS ARE ON “BIRTH STRIKE” DUE TO CLIMATE CHANGE

‘Eventually the environment was the most important factor for me. I struggled, of course. We love children – my husband is also a teacher. ...But I’m certain I made the right decision.’ – Jessica Johannesson, a schoolteacher from Bath, England¹¹

Ms. Johannesson is part of a small, but growing movement among young people who vow not to have a family because of the environmental consequences. She and her husband, Adam Leylange, had gone back and forth on the baby question for all the usual reasons – including money and time – before deciding that the time had finally come. Then, in October 2018, a UN report warned that even half a degree of warming **“...will significantly worsen the risks of drought, floods, extreme heat and poverty for hundreds of millions of people.”**¹²

The report prompted Adam and Jessica, who were already involved in climate change activism, to join BirthStrike, a mostly online community of about 300 people that was founded in England by 33-year-old singer/songwriter Blythe Pepino. Members of the group **“declare our decision not to bear children due to the severity of the ecological crisis and the current inaction of governing forces in the face [of] this existential threat.”**¹³

Pepino says that BirthStrike is not part of the anti-natalist movement (which says that bringing children into this world is morally wrong because sentient life is so awful), and does not discourage people from having children or condemn those who have them already, but strives to communicate the urgency of the crisis. **“We are hoping to galvanize political will by making our decisions...public in this way.”**

Reality Check #1: The relationship between population, emissions, and climate change is not as neat and tidy as BirthStrike activists might think. In poor countries, children are viewed as a source of labor essential to household survival. Thus Niger, one the world’s poorest (and hottest) countries, has the world’s highest total fertility birth rate; an average of seven children are expected to be born to Niger women over their lifetime. Sub-Saharan heat waves may induce Niger’s women to have additional children in anticipation of increased child mortality – so-called “insurance effects.” Similarly, periods of rain and good harvests may also increase demand for children needed as harvesters and food sellers.

Bottom line: A zero-child pledge is a luxury that most people on this Earth simply cannot afford.

Reality check#2 Even a universal one-child policy, imposed immediately in all countries, would not prevent global population from rising significantly by 2100. A 2014 study by the National Academy of Sciences (NAS) makes this point:

“The planet’s large, growing, and overconsuming human population, especially the increasing affluent component, is rapidly eroding many of the Earth’s natural ecosystems. However, society’s only real policy lever to reduce the human population humanely is to encourage lower per capita fertility.

How long might fertility reduction take to make a meaningful impact? We examined various scenarios for global human population change to the year 2100 by adjusting fertility and mortality rates (both chronic and short-term interventions) to determine the plausible range of outcomes. Even one-child policies imposed worldwide and

catastrophic mortality events would still likely result in 5–10 billion people by 2100. Because of this demographic momentum, there are no easy ways to change the broad trends of human population size this century.”¹⁴

The term “**demographic momentum**” conveys the essence of our problem – namely, that human population is already too large to be controlled by the end of this century: “**So rapidly has been the rise in the human population (i.e., from 1.6 billion in 1900), that roughly 14% of all of the human beings that have ever existed are still alive today,**” write NAS authors Bradshaw and Brook.¹⁵

A 2017 NAS study pushes the date for environmental sustainability back another 100 years:

“What about the future beyond 2100? Recent model calculations, which assume that during the second half of this century all parts (of) the world will have fertility levels of 1.5–1.75—which is the current average of industrialized countries, including China—show that...world population in 2200 would come to lie within a range of 2–6 billion... But this would only be possible if Africa experienced a rapid education expansion followed by economic growth.”¹⁶

NPG has long maintained – and the NAS study confirms – that a world population of 1.5 to 2 billion is needed for long-term sustainability.¹⁷ What we missed is the time needed to reach those population goals. What we thought would take “several decades” has morphed into nearly two centuries per the latest NAS report.

A world of 2 billion humans in 2200, while sustainable, could face a different set of problems. Loneliness, the principle NAS author speculates, may be one:

“...this scenario provides the positive vision of the real possibility of a world of 2–6 billion well-educated, and therefore healthy and wealthy people, who will (be) able to successfully cope with the consequences of already unavoidable climate change. I would much rather see my great grandchildren living in such (a) world than in a [three degree warmer] world, even if the absolute number of decedents carrying my genes should be smaller. And the danger that in the distant future people start to have lower levels of wellbeing because they feel lonely on this planet does not seem to be a likely problem for the foreseeable future and might be easily solvable by communication technology.”¹⁸

In 1900 there were fewer than 2 billion people on Earth, no digital social networks, and as far as we know, no reports of mass loneliness. People lived near one another. Not a bad life compared to the cataclysm that awaits 2200 if global population continues to grow.

BUT, BUT...CHINA DID IT IN LESS TIME

For years the Chinese communist party implemented policies designed to slow population growth – most notably by limiting the number of children to one. The one child regime worked – too well, as it turns out. A recent report by the Chinese Academy of Social Sciences warns that declining birth rates and longer life expectancy means that there will soon be too few workers to support an enormous aging population.

While many countries – including our own – are struggling with low fertility rates and aging populations, these issues are more pressing in China, because the country’s underdeveloped social safety net means that most older adults rely heavily on their families to pay for health

care, retirement and other expenses. Many young married couples are expected to shoulder the burden of taking care of their parents, in-laws and grandparents, without the support of siblings.

Making matters worse, China's main state pension fund, which relies on tax revenues from its work force, could run out of money by 2035. That would be a major blow to a government that has lured millions of workers from farms to industrial cities with promises of generous retirement benefits.

Recognizing the worrisome demographic trend, in 2013 the government began waiving the one child policy in certain cases, for example, for families where the husband or wife is an only child. Then, in 2015, it raised the limit to two children for all families, in hopes of encouraging a baby boom. It did not work.

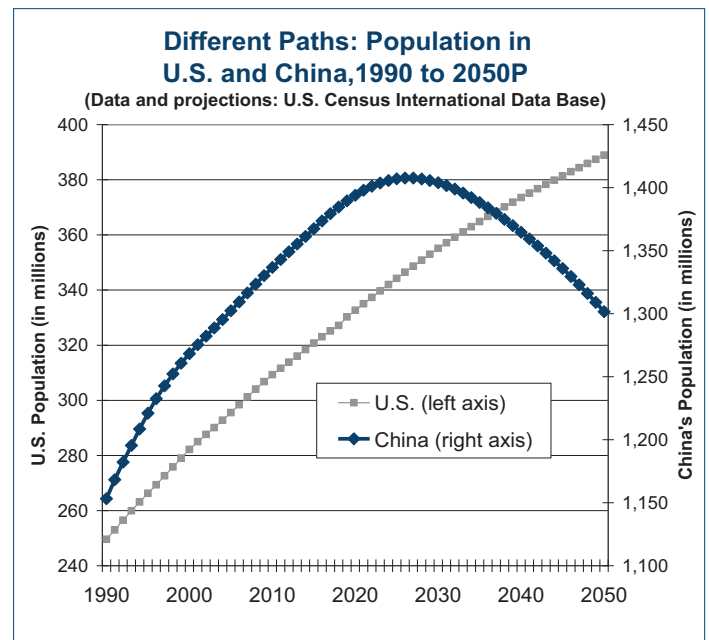
About 14.6 million babies were born in China in 2019, according to the National Bureau of Statistics. That was a nearly 4 percent fall from the previous year, and the lowest official number of births in China since 1961, the last year of a widespread famine in which millions of people starved to death. That year, only 11.8 million babies were born.¹⁹

Births in China have now fallen for three years in a row. They rose slightly in 2016, a year after the government abandoned its one-birth policy, but slumped after that.

China and the U.S. have a lot in common on this issue. Both governments rely on retirement systems that are run like Ponzi schemes, requiring an ever larger number of workers to pay benefits for an aging population. Millennials, in China and the U.S., are marrying later, having fewer children, and devoting more time and money to educating them.

Total fertility rates in both countries have been below replacement for decades, and are

expected to drift lower for the indefinite future. Yet U.S. population is projected to increase steadily through 2050, while China's is projected to decline after the early 2030s:



The reason? Immigration.

Net international migration (the number of persons entering a country less the number leaving) has long been negative in China, and positive in the U.S. From 1980 to 2019 11.6 million more people left China than entered, while 25.1 million more people entered the U.S. than left, according to the U.S. Census Bureau's International Data Base.²⁰

China is a country of mass emigration. Historically, we have been a country of mass immigration.

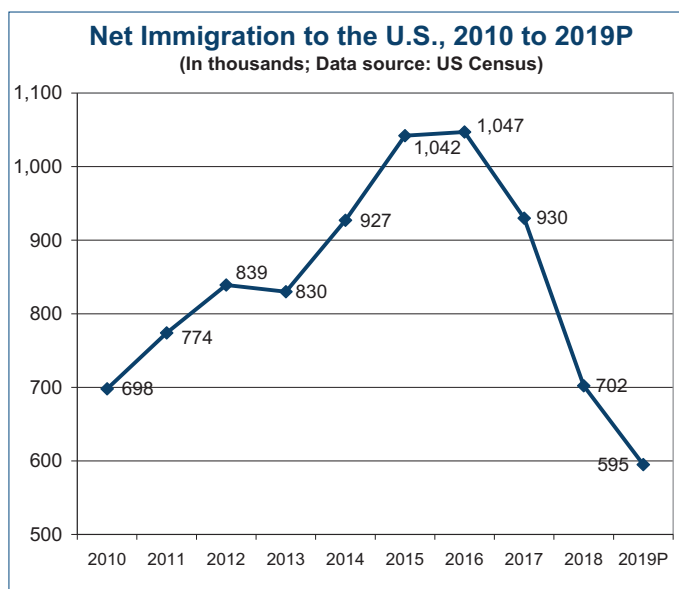
In 2018 China replaced Mexico as the largest source of immigrants coming to the U.S. The U.S. is the top destination for Chinese immigrants, accounting for about 27% of the of the more than 12 million Chinese living outside of China. The influx of Chinese nationals to the U.S. has enabled China and the U.S. to maintain their status as the world's largest source, and destination, of immigrants, respectively.

The Chinese government has long sought to engineer its population, reducing quantity in order to improve “quality.” These efforts increasingly focus on educating its citizens to compete in the global economy. Notions of what constitutes a quality child, or a quality worker, are increasingly linked to higher education, preferably one obtained at an American college or university.

It should come as no surprise, then, that China is the main source of foreign students enrolled in U.S. higher education, and its nationals received the second-largest number of employer-sponsored H-1B temporary work visas, after Indians, in 2018.²¹

NET IMMIGRATION TO THE U.S. IS FALLING, AND COULD GO NEGATIVE

Annual net immigration to the U.S. slowed between 2015 and 2016, and has been declining since. Net immigration of 595,000 is projected for 2019, a nearly 50% drop from the decade’s high of 1,047,000 in 2016:



Two policies implemented earlier this year could push net immigration down to negative territory. The travel ban has been expanded to six additional countries, including Africa’s most populous, Nigeria. But the wealth test – AKA the

public charge rule – may be far more consequential.

Before February 24, 2020 legal immigrants were banned from applying for a Green Card only if they failed to demonstrate income above 125% of the poverty line. Now immigration officials can weigh dozens of factors, including age, health, English language skills, credit score, and health insurance coverage.²² According to an analysis by the Migration Policy Institute, the changes could cut legal immigration by up to 65%, and increase the emigration rate of immigrants already here.²³

A sustained period of negative net immigration would enable U.S. population to eventually shrink. As the world’s largest per capita CO₂ emitter, this would be a milestone in the war against global warming.

SUMMARY

Having children is something most humans aspire to. So is survival. In a world of finite resources, there are inevitable conflicts between these two goals. Two centuries ago, Malthus warned that population growth would overwhelm the food supply. Technology resolved that issue.

Today we face a different shortage – of time – the time required to reduce global population to a sustainable level. Not so long ago this was measured in decades. As warming proceeded faster than anticipated, population models pushed sustainability back to 2100, or even 2200.

One way or another, global population will fall. The only question is, how? Will humans control the decline with smaller families, higher levels of education, and increased female empowerment? Or will it be controlled for us by environmental calamity.

The jury is still out.

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NOTE: The views expressed in this article are those of the author and do not necessarily represent the views of NPG, Inc.



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