Is Demography Destiny?

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Demography, like many topics that involve numbers, may seem to be dull. As a social science, demography analyzes the information that describes the characteristics and changes that occur in a population. This is typically done over time or space. After my presentation, I hope that you'll be somewhat persuaded that demography, even if still dull to some of you, can provide some important insights into future issues that affect human populations. Moreover, I hope that you will understand how ignoring trends in demography can lead to unanticipated and perhaps to even more unfortunate outcomes.

I became interested in demography when I worked in West Africa in a disease-control program. We were studying the characteristics of the populations of the disease vector—which was a biting fly; the pathogen that causes it—which was a worm; and the humans that suffer from the disease and who experienced severe itchiness, discolored skin, and, ultimately, blindness. It's a severe disease that left 30% of the villagers living near rivers blind. In this program, demographic studies were a major factor that helped us to understand what influenced the spread of this disease, and finally how to control it. When I understood how valuable demography was in these studies, I became interested in how it can be applied in a variety of situations, especially to human populations.

When I look at a demographic study, in a way it's like reading an engrossing spy novel or a mystery. The studies often require travel to exotic places. There's a lot of sex in these studies, and often deaths. Only demographers use other terms—they use migration for travel, fertility for sex, and mortality for death. These terms cover the key events that determine the size of populations.

Demography attempts to answer deep questions about both current and future trends in populations. Popular topics today include the influence of policy changes on human population growth, and the implications of race, gender, and class in economic and social trends, both locally and worldwide.

Demographic analysis was key during the covid pandemic. Demography provided accurate mortality statistics by extrapolating information about the excess deaths that occurred during the pandemic years compared to numbers of deaths that occurred in pre-covid years. In the United States, for example, there was almost a 15% shortfall in identifying covid-related deaths in terms of the excess mortality that occurred during the pandemic and that was not attributed to covid infections. However, in many countries where data collection and reporting were poor, the actual death toll during the pandemic was orders of magnitude higher than estimated.

Almost all of us are old enough to remember living through the era of Zero Population Growth championed by Stanford University's Paul Ehrlich and his wife Ann in their popular 1968 book

The Population Bomb. This book in essence repeated the Malthusian-catastrophe argument that population growth will outpace food production unless population size is controlled.

But today, we are in an era where the problems facing many countries are the opposite--not sky-high birth rates but birth rates that are far too low to sustain current population sizes. Among other consequences, this decrease in birth rate has resulted in an unbalanced ratio between working and non-working segments of the population. As we will see later, an imbalance in age structure can have powerful economic implications and consequences.

Let's start by looking at some of the key principles of demography in terms of birth rates and their influence on population size. The key term to remember is the average number of births per female in a particular population. For a population to be stable in size, the average woman must produce 2.1 offspring during her lifetime. If the number of births per female is below 2.1, the population size decreases. If above 2.1, the population size increases. The current birthrate in the United States is 1.75 children per female, so the population size should be decreasing. But in fact, the US population is increasing. This is because of immigration. We'll come back to the issue of immigration later.

Worldwide, birthrates have dropped greatly in our lifetime. From 1950-55, it was about 5 children per female. In 1975-80, it dropped from 5 to 3.9. By 2005-2010, it dropped from 3.9 to 3.5. Today, it's 2.7 worldwide. By 2050, demographers anticipate a worldwide drop to 2.3, and that rate will continue to fall. By 2100, it will be less than 2.0 offspring per female. Remember 2.1 is the replacement rate.

Today, the 15 largest economies in the world all have birth rates that are less than 2.1. In fact, even in 2010, 98 countries, which is almost one-half of the number of countries in the world, had birth rates that were less than the replacement number of 2.1. Today, the number of countries below replacement has jumped from 98 to 124. And by 2030, that number should jump to 136 countries that have subsequent population decline.

Countries with very low birth rates such as South Korea, Japan, Taiwan, and Singapore have tried various means to increase the birthrate. Singapore, for example, provides direct grants of $8,300 to each of the first two children in a family, then $9,000 for a third. These benefits are in addition to tax rebates and subsidized childcare. Even with these incentives, Singapore's birth rate of 1.0 offspring per female has not budged.

If we look at current birthrates by continent, Sub-Saharan Africa has the highest rates, 4.9-5.5 births per female, depending on the region. This rate decreased from the 1985 rate of 6.9 offspring. Latin America is slightly above replacement at 2.3. North America and Europe are below replacement at 1.9 and 1.6, respectively.

In the United States, the number of births began to plummet about 15 years ago and continues to decline. Recently, The World Economic Forum noted the results of a survey by the Pew Research Center about why women don't want to have children. Non-parent American women, that is those that don't have children, between 18 and 65 gave the following reasons for not having or planning

to have children: 56% simply said that they just didn't want them; 19% said for medical reasons; 17% for financial reasons; 15% because of no partner; 14% because of the current state of the world; and 10% because of their age. Interestingly, only 2% indicated that it was because their partners didn't want children. This adds up to over 100% because respondents were able to give multiple reasons.

Other studies have looked at declining US birthrates across married and unmarried women. These studies concluded that improved contraception, higher education levels, the desire of women to stay in the workplace, personal finances, and especially the high cost of childrearing were major reasons for their desire to not have children or to not have additional children.

A second feature that affects the size of the population is the gender ratio or the proportion of females in the population. At birth, 105 males are born for every 100 females. By 5 years of age, the ratio is equal because of higher mortality among males that occurs in these early years. Why this sex or gender ratio is skewed at birth has been the topic of much research. One explanation is that because the Y-chromosome has so much less genetic material on it than the X chromosome, it's lighter in weight. So, sperm containing the Y-chromosome can swim faster than the genetically richer, and heavier, sperm containing the X chromosome. Therefore, sperm with Y-carrying chromosomes fertilize the X-chromosome carrying egg more often. So, males, which have an X and a Y chromosome, are more common than females, which have two X-chromosomes at birth.

From 2000-2005, China had 121 male births to 100 female births. Today the figure in China is 113 male-to-female births. Remember the expected number is 105. There could be several reasons for this pattern but the one-child policy implemented in 1979 is often implicated. The Chinese-government effort to control the size of families, coupled with a strong son-preference, resulted in a neglect of girls and in some cases led to female infanticide. The Chinese did not appear to be systematizing sex-selective fertilization or other pre-conception practices. Rather, the 8% of female children that go missing do so at some point after conception, such as from sex-selective abortions.

In China, the consequences of the skewed gender ratio are apparent. Wifeless men, who are referred to as "bare branches" or "bare sticks", are common. Moreover, Chinese women more often chose to marry into higher socioeconomic groups. This leaves the least educated and poorest men with greatly reduced marriage prospects. Sociologist have also predicted, with support of statistics, that increased crime, sex trafficking, and HIV transmission have resulted from this imbalance.

On August 10 of this year, President Biden said that China's economic and demographic problems are a "ticking time bomb". In perhaps his often, over-the-top language, Biden commented that "When bad folks have problems, they do bad things". He may have been referring to the strong statistical correlation between a high proportion of unmarried young men in a population and the likelihood that wars occur.

A third demographic feature that influences population size is the age at which females in the population begin reproducing. If females reproduce early, then their offspring can reproduce early. Think of this like compounded interest in a bank account. When this occurs, the time between generations is reduced, and the population can increase more rapidly. The Organization for Economic Cooperation and Development, or the OECD, includes the most economically developed countries worldwide. Among the member countries, the average age at which a woman has her first child is 27.8 years. In the United Kingdom and Germany, it's 30 years. This is the opposite of the pattern that will result in increased population size.

A final consideration that affects population size is the mortality rate. The increases in mortality rates during the recent pandemic is an example of this phenomenon. In the US, life expectancy dropped from 79 in 2019 to 76.1 in 2021. Likewise, in Africa, the average life expectancy was reduced to what it was 50 years earlier because of the AIDS epidemic.

Let's now look at the implications of the reduced birth rates that result in shifts in population age structure. The first effect is economic, and this is usually expressed as the dependence ratio. This is the proportion of the population that is of working age, defined as 20-64 years-old, compared to those 65 and older. Currently in the OECD countries, three younger people work for every person that is over 65. Demographers predict that based on the reduced birth rates, in approximately 25 years, or around 2050, there will be two or less people working for every one that is 65 or older.

The demographic changes in Japan over the last several generations present an insight into how demographic shifts can occur quite rapidly. During the late 1930s and in the post-World War II period, Japan was experiencing a baby boom. If we look at the age structure of the Japanese population in 1950, 35% were less than 14 years of age, 60% between 15 and 64, and 5 % over 65. By 2010, the number below 14 years of age had dropped from 35% to 13%. In 2050, at current birth and death rates the number of youths less than 14 years will drop from 13% to 8%. If we look at the over 65 age-group in Japan, it increased from 5 % in 1950 to 23% in 2010 and is predicted to be 40% of the population in 2050. Is the resulting dependence ratio economically sustainable?

Currently in Japan, deaths exceed births by 300,000 per year. 400 schools closed this year, and many of these former schools have been converted into retirement centers. At current rates, by 2065 there will be a loss of over 30% of the population.

Another factor affecting birth rates in Japan is that only 2-3% of births occur outside of marriage. In developed countries this figure is 30-60%. In the United States births outside marriage are 40%. I could add that in the United States, the issue of questionable paternity—in other words, the genetic father is not the one listed on the birth certificate--is considered to be 10%.

In Japan, the attitude of young people is quite discouraging in terms of possible increases in birth rate. In a 2015 survey of Japanese 18 to 34 years old: 30% of men and 26% of female respondents indicated that they were not currently looking for a relationship. 70% of unmarried men and 60% of unmarried women were not in a relationship. And 47% of unmarried 20-to 24-year-old Japanese

men had never had sex with a woman. In 2003, just twenty years ago, it was 34%. This represents a decrease of 13%.

There are many examples that indicate how birth rates can strongly affect not just local populations economically but have political consequences as well. In 2004, anticipated shifts in African birth rates suggested to demographers that there would be about 1 billion Africans by 2100. However, recent prediction based on the lower than predicted declines in birth rates in Africa increased the projected number of Africans from 1 billion to 4.5 billion by 2100! Two out of every five humans on earth will be African. In the1990s, Europe and Africa had the same population size. But at current birthrates, by 2100 there will be 7 Africans for every 1 European. Given the confounding effects of climate change on the habitability of parts of Africa, huge changes are inevitable. Vast numbers of migrants leaving Africa and Malthusian catastrophes are possibilities. Alternatively, there could be massive shifts to industrialization. The resources for this shift are certainly available in Africa. It is important to note that the 2004 underestimation of the decrease in African birthrates also points out that some demographic projections may be wrong.

A country that still has a higher-than average birth rate is Israel. However, various religious and ethnic groups in Israel have different birth rates, as has been reported by the Israeli Statistical Agency. The highest birth rate is among the Ultraorthodox Jews or the Haredi with a birth rate of 6.6 children per female. Those identifying as religious Jews have a rate of 4.0. Arab Israelis have a rate of 3.0. Secular Jews, however, have a far lower birth rate of only 2.0.

Yasser Arafat once made a statement that the womb of the Arab woman was his strongest weapon. In terms of demographic trends and predictions of population size in the future, his crude comment currently applies more to the Haredi or Ultraorthodox Jews than to the Palestinians. Currently, 24% of the Israelis under four years of age are Haredi.

The low birth rate of secular Jews relative to other groups indicates major changes ahead for Israel. If birth and death rates remain the same---in 2059 over one-half of the population of Israel will be Haredi Jews and Israeli Arabs. This is only 26 years away. This shift will drastically change the complexion of Israel. Moreover, the high birthrate in Gaza and the West Bank, 3.8 children per female, further complicates the merging of these areas with Israel.

Let's now look at the other important factors in demography that determine population size—immigration and emigration--the movement of people into a population or out of a population. Populations increase or decrease by migrations. With the United States low birth rate, how has the population of our country been able to continue to increase? It is because of immigration from other countries. Immigration of course is a major political issue throughout the developed world, including our own country. The opposite trend, emigration, is a major consideration in the very city that we're enjoying dinner together tonight.

We can look at human migrations in terms of push and pull factors and divide these between economic and non-economic issues. The "push" factors that encourage emigration whereby people leave their own geographical area to move to another include: poverty and low wages; high

taxes (and we've seen many Californians move to Nevada for this reason), high unemployment, and the millennia-long driver of emigration, overpopulation. Likewise, there are economic "pull factors" encouraging immigration: a demand for labor; high wages; generous welfare benefits; good healthcare and education; and lower cost of living.

But there are also non-economic factors that "push" people to migrate: war or oppression; discrimination; crime; compulsory military service; and natural disasters. Non-economic "pull" factors include: the presence of family and friends; the desire for law and order; and the amenities that living in a particular place offer.

Currently, the number of migrants from war-torn areas is enormous and at the same time, the rich world is in the middle of a migration boom. In the United States, the foreign-born segment of the population is higher than at any point in our history. Unemployment rates in the rich world are at a decades' low—4.8%. Locally, everywhere we look in the Bay Area, we see signs advertising for new employees. Countries with an aging population need immigrants to combat the loss of the aging population from the work force. Increasing immigration is the most straightforward approach to solving this problem.

I want to address a thought that perhaps may be floating around this room. Some of you may be thinking that a smaller population worldwide or even locally may not be a bad thing. Many environmentalists and others interested in population issues, dating back to Malthus, have taken this position—that a smaller population is better.

Unfortunately, this approach has often had racial or class overtones. While many developing countries with high birth rates have derided these approaches as imperialistic and racist, most of them have supported population control efforts.

To examine this, let's look at three different views of population and especially overpopulation in terms of both their local and global impact. First, there is the Neomalthusian view. This approach evaluates the impact of a population in terms of resource use. To these advocates, the impact of population size is expressed as the product of the number of individuals in the population, times the resource use by individuals in the population, times the environmental cost of technology to produce those resources. So, if we consider fossil-fuel use, a person in Bangladesh may have about $1/150^{th}$ impact as a person living in North America or Western Europe. In terms of electricity usage, the average African consumes approximately the same amount of electricity as a household refrigerator in the United States. For almost any resources we consider, the impact of a person in the United States or Europe is far great than that of people in developing countries.

From the Neomalthusian approach, a reduction in population size in rich countries where a lot of resources are used per person is far more important than decreases in population size in poorer countries because of the lower resource use. However, at the local level, overpopulation becomes a problem when available resources do not meet the needs of a population in a particular place and at a particular time. This more often takes place in poorer countries such as the recurring famines in Ethiopia.

A second approach is the Marxist viewpoint. To them, overpopulation is the result of too many children being born because they are needed for survival of the family unit or group. Marxists then blame overpopulation on the failure of political and social systems to act properly.

Finally, we have what is called the Neoconservative economic approach. They argue that technology will solve problems of overpopulation, along with food and resource shortages. With more people, simply put, there is more chance of a genius to come up with technological innovations to solve these shortages. The classic position of this group was advocated during one of Newt Gingrich's presidential bids when he argued that overpopulation could be eliminated by building human colonies on the moon. Elon Musk is currently taking a similar position with extraplanetary colonization as a solution to climate change.

Of these three paradigms, most demographers dealing with human population issues today favor the Neomalthusian approach. But they also acknowledge that the Marxists are right in that political and social systems need to be effective. The neoconservatives are also right in that technology leads to improvement in people's lives. But this improvement is not true for all people, especially in the developing and newly industrialized world. Of course, virtually all economists go back to the need to consider the dependency ratio when there are reduced birth rates, declining populations and increases in the proportion of older people.

In conclusion, I hope that I've provided a somewhat convincing argument that demography and its predictions can provide information that can be extremely useful to governments and policy makers. But, by its nature, demography is not a field that offers solutions or even judgments about issues. Consider the figure that I gave of the demographic issues arising from differential birth rates, such as 7 Africans compared to each European in 2100 or that Ultraorthodox Jews and Israeli Arabs will be the dominant segment of the population in Israel in 2059. Demographic analysis describes what can be expected but does not over any judgments or conclusions beyond presenting those figures. Action or policy implementations, if any, are for others to decide.

I strongly believe that demography can clearly give us a view into future consequences of different actions that may be taken. But, perhaps more importantly, demography gives us a view into what can happen if no action is taken. This may be demography's greatest value. And when no action is taken, demography can clearly become destiny.

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