Is Starvation Just an Inevitable Fact of Life?[i]

Elise is worried about the state of the world. She genuinely wants to see sustainable development but wonders if the task is too much for human beings. She has studied a bit about the animal world and is familiar with models that show how populations of animals might grow and fall with greater or fewer resources. In her research, she once spoke to someone at a coffee shop who argued that there are simply too many people in the world. We should expect nasty times ahead as the world population crosses the limits of available resources. According to the opinionated coffee shop patron, starvation is just an inevitable fact of life.

Population and Starvation

This argument is troubling to Elise. She doesn't want to think that continual famine is the future of the planet.

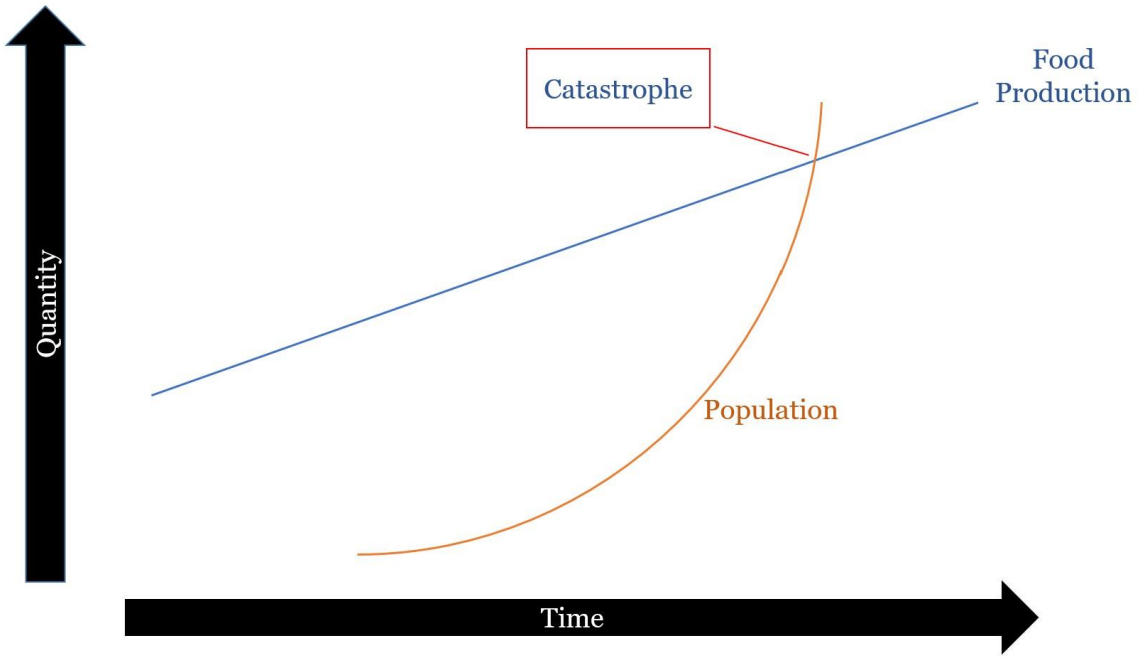
After doing some reading, Elise finds that a lot of this thinking goes back more than two hundred years to an old English cleric named Thomas Malthus. Malthus argued that food—how much humans can grow—would increase only a little each year as technology improved (linear growth). There would be a bit of improvement here, a bit there. More food would be produced, but only so much more.

On the other hand, human population would tend to rise more rapidly (exponential growth). As more people were born they would have more children, who in turn would have many more. Theoretically, population could double each generation. "Preventative checks" on the population could also occur. But Malthus did not see much hope in persuading the populace to adopt his preferred solution: abstinence, the deliberate limiting of human sexual activity. Thus, he did not expect birth rates would fall.

Exploding human populations combined with a slowly growing food supply, Malthus argued, would inevitably lead to disaster. At this stage, "positive checks" on the human

population would come into play. Populations that exceeded the capacity of the land they lived on would meet catastrophe (see Figure 1). Such positive checks included disease from squalid conditions, war as people fought over food, and mass starvation. The inevitable future of humanity was mass starvation.

Figure 1. Malthus' View of Human Population Over Time



Modern Thought

Looking for more modern thinking on the subject, Elise finds that many people are very worried about overpopulation.

A survey by the Global Challenges Foundation asked:

- How much do you agree or disagree that the following may be considered a global catastrophic risk? Population Growth: 62% Top Two Box Agreement[ii].

The top box is the percentage of respondents who answered "Agree completely" and the second box is "Agree to some extent." Thus, a top two box agreement, a common way of

assessing survey results, is the percentage who answered “Agree completely” or “Agree to some extent.”

Many of the public are clearly worried about population growth. Sir David Attenborough, the renowned TV naturalist, has claimed, “We’ve overrun the planet”[iii]. This has become his most popular tweet[iv].

Societal Reactions

Worried about the effect of population growth on economic development, countries have adopted a variety of coercive policies. The best known example is China, which introduced a one-child-per-couple policy in 1979[v]. Couples who had more than one birth faced sanctions, social pressure, and even more coercive measures such as forced abortions and removal of children from their families[vi]. The one-child policy ended in 2015 and was replaced by a two-child policy. This in turn was replaced by a three-child policy in 2021 in order to boost birth rates[vii].

In a number of countries, attempts to limit births through governmental or social pressure or general concerns about resources have led to skewed populations.

The measure of men to women in a society is called the sex ratio[viii]. (Gender ratio is also a commonly used, though outdated, term). It can be one thing to create the statistics, but another to understand them. Understanding the sex ratio is complicated, since it is biologically natural for more men to be born than women. Furthermore, women tend to live longer than men. Thus, increasing proportions of women tend to be seen within higher-age cohorts. In an aging population, we should expect to see decreasing sex ratios, representing relatively more women when the population is older.

Another complication is that many societies value male children more than females. When faced with significant governmental or social limits on family size, many parents abandon or abort their female babies. As a result, several major countries have ended up with an excess of men compared to women—a potentially unstable situation for a population. For example, after its one-child policy, China was thought to have 30

million “forced bachelors,” men who wanted female partners who were unavailable[ix]. India, the second largest country by population, also has concerns about an excess of men in the population, though there is some evidence of progress being made in returning the population to a more natural balance[x].

Demographic Transition

Demographic transition is a term that comes up frequently in discussions about population change. This concept suggests that human populations tend to go through distinct phases of change.

> *“Rapid population growth is a typical feature of the demographic transition from high to low levels of mortality and fertility. For many countries, this transition has already ended, and the population is growing slowly if at all; for many others, the demographic transition is still at an early or intermediate stage, and the population is growing rapidly.”* United Nations, Department of Economic and Social Affairs[xi].

At low levels of development, high fertility and high mortality go hand in hand. Because child mortality is high, parents have a lot of children, partly to be sure that some survive to look after them when they age. Before a demographic transition, there is a stable population with high birth rates and a low life expectancy.

A demographic transition starts with improvements in living conditions. Healthcare improves and the country experiences falling mortality. Fertility does not instantly drop, and it remains common to have large families. Eventually, as parents become confident that children will survive, combined with access to information, contraception, and women becoming more empowered, social norms change and fertility drops. Eventually, the population becomes stable with relatively low mortality and relatively low birth rates.

Many countries are now seeing birth rates at or below the replacement fertility level. (The replacement rate is the birth rate at which a population is stable; births only replace deaths.)

> *"The total fertility rate is the number of children that would be born to each woman if she were to live to the end of her child-bearing years and if the likelihood of her giving birth to children at each age was the currently prevailing age-specific fertility rate. It is generally computed by summing up the age-specific fertility rates defined over a five-year interval. A total fertility rate of 2.1 children per women—the replacement level—broadly ensures a stable population size, on the assumptions of no migration flows and unchanged mortality rates." OECD*[xii]

The demographic transition has been so dramatic with increasing wealth that many in richer countries have started to worry about having too few births.

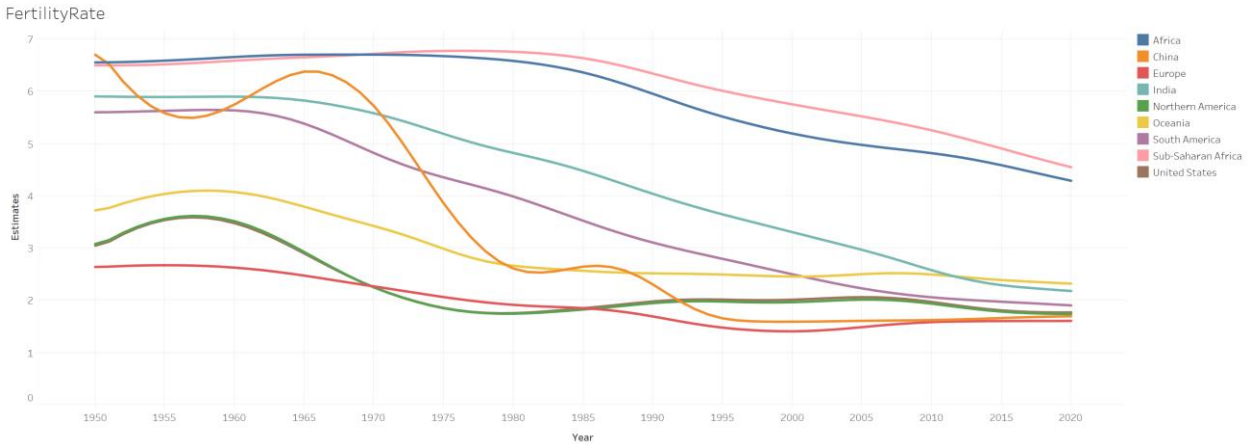
> *"[In 2020] The total fertility rate is below the estimated replacement level—the number of children per woman needed to keep the total population constant—of about 2.1 in developed countries, in 36 out of 38 OECD countries." OECD*[xiii]

The US, which has a relatively high birth rate compared to many rich countries, has also seen falling birth rates[xiv], but the decline has been less dramatic than in some other countries.

Looking at the Data

Elise looks at the data, in the hope of seeing a pattern (see Figure 2). Will the world population always rise exponentially? Are catastrophes inevitable? Is there anything we can do to prevent mass starvation?

Figure 2. Estimated Fertility Rates of Select Regions and Countries



Endnotes

[i] Case written by Neil Bendle (neilbendle.com). You are free to use it in any way you wish.

[ii] Global Catastrophic Risks and International Collaboration Opinion poll 2020, Novus, Global Challenges Foundation, https://globalchallenges.org/wp-content/uploads/GCF_Global_Challenges_2020-High.pdf, accessed June 21, 2022

[iii] BBC News, 28 September 2020, 'We've overrun the planet' – Attenborough, https://www.bbc.com/news/av/science-environment-54319449, Accessed June 21, 2022

[iv] Sarah Manavis, The New Statesman, David Attenborough's claim that humans have overrun the planet is his most popular comment, 4 November 2020, updated 21 Sep 2021

[v] Kristal Sotomajor, 2020, PBS, The One Child Policy Legacy on Women and Relationships in China, https://www.pbs.org/independentlens/blog/the-one-child-policy-legacy-on-women-and-relationships-in-china/, Accessed June 21, 2022

[vi] NPR, How China's One-Child Policy Led To Forced Abortions, 30 Million Bachelors, February 1, 2016, https://www.npr.org/2016/02/01/465124337/how-chinas-one-child-policy-led-to-forced-abortions-30-million-bachelors, Accessed June 21, 2022

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[viii] Gender Ratio by Hannah Ritchie and Max Roser, June 2019, https://ourworldindata.org/gender-ratio, Accessed June 21, 2022

[ix] NPR, How China's One-Child Policy Led To Forced Abortions, 30 Million Bachelors, February 1, 2016, https://www.npr.org/2016/02/01/465124337/how-chinas-one-child-policy-led-to-forced-abortions-30-million-bachelors, Accessed June 21, 2022

[x] Ruchika Chitravanshi and Ishaan Gera, 2021, November 26th, India now has more women than men but sex ratio at birth still low, https://www.business-standard.com/article/current-affairs/india-now-has-more-women-than-men-but-sex-ratio-at-birth-still-low-121112501539_1.html, Accessed June 21, 2022

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[xii] OECD, Fertility, https://www.oecd-ilibrary.org/sites/b15fef68-en/index.html?itemId=/content/component/b15fef68-en, Accessed June 21, 2022

[xiii] OECD, Pensions at a Glance 2021 : OECD and G20 Indicators. https://www.oecd-ilibrary.org/sites/b15fef68-en/index.html?itemId=/content/component/b15fef68-en, Accessed June 21, 2022

[xiv] Stephanie Murray, (2021) How Low Can America's Birth Rate Go Before It's A Problem? , June 9th, https://fivethirtyeight.com/features/how-low-can-americas-birth-rate-go-before-its-a-problem/, accessed June 21, 2022