

7 the roots of human population growth

What has caused the incredible boom in human population? Is it the culmination of a gradual increase whose geometric proportions have only recently become evident? Or does it result instead from some really radical change in human ecology?

One's sense of intuition rebels at the complete acceptance of the gradualistic notion. There was no severe population trouble for the first two million years of human existence. Two hundred and perhaps even one hundred years ago, almost all the world was truly underdeveloped. Then in a brief flash of geological time, in an instant of even man's existence as *Homo sapiens*, we are sinking in a sea of humanity. In five or six generations we have lost our elbow room, our privacy, our horizons, our frontiers.

In this case intuition is perfectly reliable. In most places, for most of man's history, population did not increase. Increases have instead been sporadic. They have been preceded by ecological change (often caused by major advances in civilization). There are even cases known in which change brought a decrease in population.

EIGHTEENTH-CENTURY JAPAN

A classical example of a steady-state population was Japan. It is known that at least from 1720 to 1850, Japan did not grow. Her 1721 estimated census was 26 million; in 1852, she estimated her population at 27.2 million. Figure 7-1 depicts the known Japanese censuses during this period. This "is one of the longer and closer approaches to stationary population equilibrium at a subsistence level found in recorded demographic history" (Bronfenbrenner and Buttrick, p. 169, emphases mine).

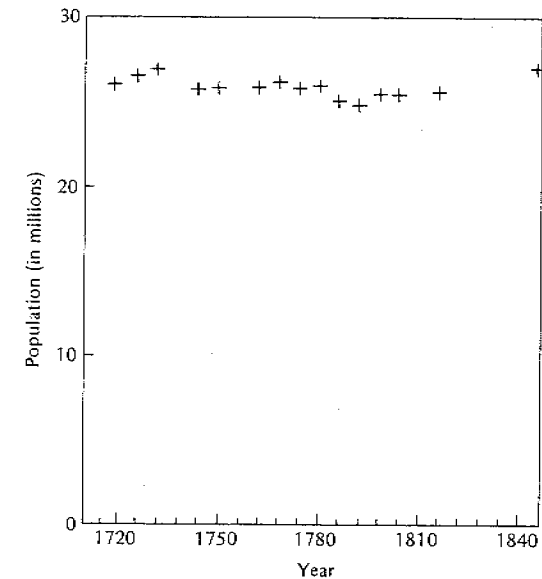


Fig. 7-1 Japanese population in the Tokugawa period. (Data from Droppers.)

What controlled Japanese population size? Disease and famine. From 1690 to 1740 there were eight famines, four very destructive. From 1741 to 1790 there were seven, five destructive. From 1791 to 1840 there were six, only two destructive (Droppers).

Years of particularly destructive famines in Japan

| | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|
| 1702 | 1710 | 1721 | 1732 | 1749 | 1757 | 1780 | 1783 | 1787 | 1825 | 1836 |
|------|------|------|------|------|------|------|------|------|------|------|

During times of famine, smallpox and measles did their grisly work with aid from dysentery and typhus.

Regional censuses before 1720 indicate that Japanese population grew steadily during the 1600s and probably even during the first decade or two of the 1700s. But the limits of the Japanese archipelago to support human life were eventually reached. The common Japanese suffered the consequences.

The 1732 famine was "caused" when a fly ravaged the rice of western Japan. Three-fourths was destroyed. Over 2.5 million Japanese went on relief, but at least 200,000 died anyway.

Worst of all was the series of famines from 1780 through 1787. Examples of the destruction of both human life and human spirit were rampant and have been preserved by contemporary Japanese authors.

One town of 800 homes declined to 30. A traveler met a man who bragged he could live without eating humans because he had a rich uncle.

Dogs and rats fetched exorbitant prices over the meat counters, but a rare work of art couldn't even be traded for a single cup of rice. Stealing and looting became accepted practice (Droppers).

Since people who died of starvation were not very nutritious (their muscles having wasted away), those doomed were killed outright and pickled. A story is told of a farmer who counted the loss of his wife and son to starvation. He pleaded with a neighbor to kill his other son, since he too was doomed to die. There being no food, the neighbor agreed after first extracting the promise of half the boy's body. The neighbor killed the son and was in turn killed by the farmer "in revenge." The farmer of course pickled both (Droppers).

In the face of such degradation, the Japanese retaliated by practicing contraception, prostitution, and *mabiki* (Bronfenbrenner and Buttrick). *Mabiki* means "thinning out," a not too delicate, but brutally realistic agricultural euphemism for outright infanticide. A farmer looked at his crops, counted his children, and did what he had to do to preserve those to whom he was already committed. As we have seen in this century, the alternative is for most or all the older children to die or be stunted by PCM. Unhappily, that also would have been the likely fate of the infant had his life been spared.

Japanese population is now about 105 million. This increase occurred after the Japanese finally allowed themselves contact with Western civilization. They learned to trade for food grown elsewhere. So *mabiki* became temporarily unnecessary and was abandoned.

In the last quarter of a century, as the Japanese teetered artfully atop one of the most precarious ecological promontories in the world, they have had to reinstitute *mabiki*. But today it is possible to perform it sooner, call it abortion, and render it infinitely less traumatic to everyone concerned. Biologically, abortion is accomplishing the same function as *mabiki* in much the same way. To those with respect for human life, there is only the hope that abortion can be minimized. The Japanese are showing that concern.

EXAMPLES OF OTHER NONGROWING HUMAN POPULATIONS

Few ages have been more disastrous to civilization than the sixth century A.D., when the triple scourge of war, pestilence, and famine, afflicted the subjects of Justinian; and his reign is disgraced by a visible decrease of the human species, which has never been repaired in some of the fairest countries of the globe (Gibbon).

There are many European communities known whose populations have remained constant for nearly the last thousand years. These areas are literally carpeted with people. Occasionally wars or plagues have created small, fleeting vacuua (Langer). Often these communities have exported their surplus. Unwanted masses went to the Americas, to South Africa. Emma Lazarus' lines are well-chosen: "Give me your tired, your poor, your

huddled masses yearning to breathe free, the wretched refuse of your teeming shore. Send these, the homeless, tempest-tossed to me." Too bad we have run short of golden doors. There is no more market for surplus people. And occasional wars and plagues are unacceptably devastating. Consequently, in the past three decades, Europe has begun to grow rapidly.

Permanent or nearly permanent decline from ecological change is known in several arid regions. The Bible records a census for what is now Israel and Jordan during Solomon's reign. Starting from its figures of adult Israelite men, one can estimate that the region supported about five million (Huntington, p. 263). In the last century, its population was about 500,000 and steady. This difference, a whole order of magnitude, may be larger than the truth, but there definitely had been a decline. Ancient farms, carefully terraced for arboriculture, lay unused. Forests were gone. Cities, once alive, had become archaeological treasures. Recently, the introduction of modern techniques of agriculture and afforestation have supported a large population increase. The area now supports about as many as it did in Solomon's time.

In Arizona, another arid-zone civilization, the Hohokam was once a large and complex Indian nation. A relic of its past can be seen at Casa Grande National Monument. Dilapidated structures on the monument are typical of dozens of similar Hohokam towns. Despite their former splendor, they have decayed and disappeared. Even assuming Hohokam houses held only one person, these people were overwhelmingly more abundant than their descendants, the Pima.

The Pima live along the Salt River near Phoenix. They have had a bad time from the wretched refuse (Webb). But the white man did not destroy their ancestors, the Hohokam. He found the Pima already restricted to the Salt River valley.

Archaeologists tell us that the Hohokam were dependent on earthen irrigation ditches. They fed themselves in Arizona's hot, dry center by channeling water to their fields. But the water carried with it a normal quantity of salt, and as the water evaporated or was used by the food plants, the salt remained behind in the soil. It formed an impenetrable layer because the area is underlain with an impervious clay. The land became alkaline and waterlogged. Excavated Hohokam granaries show signs of having been elevated again and again—presumably to keep their contents dry (Shetrone). But there was no way the Hohokam could maintain the fertility of their fields in the face of the environmental changes which they themselves had unwittingly wrought. Faced with declining resources, their population crashed and its remnant retreated to the Salt River valley.

A better known case of population decline is recorded in the history of Ireland. In the seventeenth century, Ireland had about 2 million people. Then the potato was introduced from the Americas to her farmers. Her population quadrupled (Boulding).

In the 1840s, Ireland's potato crop was decimated by a merciless competitor—potato blight. Millions of Irish—some one-third of the popula-

tion—starved to death. Another third left, most to come to America. In the past century, by marrying in their middle and late 30s, the Irish have managed to hold down their population to the several million their island can support. That is of course very nearly the same as the prepotato population some 400 years ago.

Late marriage is not without its human costs. Woman is adapted to having children earlier than age 35 or 40. Certain congenital defects including one that causes mongoloid idiocy are much more common in children whose mothers have passed 35. Yet, no one can condemn the Irish for their experiment. They have avoided a repetition of the far more consequential miseries that were inflicted upon them over 100 years ago.

MIXED BLESSINGS

Since it is apparent that human population has often in the past reached its steady state, we must look for a great ecological change to explain our population explosion. The change is basically twofold and to a small extent threefold. First, modern medicine has eliminated the greatest part of once-dreadful infant mortality rates. Second, agronomists have discovered methods of increasing the yield of food per acre by the use of new strains of plants and animals, by husbandry of the soil, and by combating parasites and pests—our competitors. Third, the Industrial Revolution has provided man with machinery and power, which greatly increases the productive capacity of each farmer. We examine these in reverse order.

The Industrial Revolution is least important. Its main effect has been to allow fewer men to raise food for all. Thus, it has made urban life possible. It has fostered a different life-style, but not a different number of lives. Occasionally it has perhaps allowed land to be worked that could not have been before machinery became motorized.

The agricultural revolution has no doubt raised our steady state. It has most definitely provided us with a greater resource supply. At any substantial density of people, their nutrition will be better. Thus their capacity for birth will be higher. And their stronger resistance to disease will minimize their death rate. In other words, the equality of birth and death occurs at a higher population density.

Yet the increase in agricultural capacity has not been as large as most people seem to think. It has not resulted in a world where even 10 times as many can live, but instead it has perhaps doubled our world's ability to support people. In the United States and Canada, where there has been truly remarkable progress in technology, plant breeding, and crop-pest and disease control, a doubling of wheat yield per acre was achieved in the pivotal years 1934–1965 (Borgstrom, pp. 46, 47). A similar experience was recorded in Australia from 1900–1965 (Borgstrom, p. 55). That's about the best we can hope for in the rest of the world, too. Perhaps more will come, but more cannot be counted on. (See Fig. 7-2.)

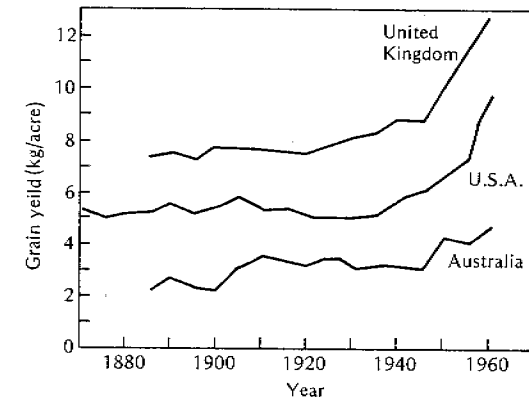


Fig. 7-2 Grain yields in developed countries have about doubled overall as a result of the agricultural revolution. In restricted places for certain grains like corn, the increase has been fourfold or fivefold. In other cases the increase has been much more modest. The differences between countries reflect differences in climate for the most part. (From Miles.)

A great deal of the land that was once too poor to be planted has been artificially fertilized and now supports human life. Borgstrom (p. 26) estimated that about 600 million people (about one of every six people alive today) owe their very existences to land reclaimed with artificial fertilizer. Despite this, he concludes that most of the increase in the world's supply of food comes from greater intrinsically fertile acreage being farmed and from increased planting of more than one crop per year (multicropping). As we have seen, we are almost out of "new" land. And multicropping has only limited additional applicability. Agricultural promises must be kept realistically conservative.

The growth in human population would have occurred with agricultural advancement alone, but it would have been slower if medical progress had not also occurred. Medicine has provided womankind with the extra punch that threatens to knock out our natural environments in our own lifetime.

Previously each woman produced about five live babies on the average. Actually, the rare women who married young (15) and lived to die of old age, averaged about a dozen children. But since many delayed marriage, many were sterile or celibate, and many died in childbirth and of various diseases, the average woman had only five live births (Sauvy). Of those five children, a very large number died in infancy or early childhood. The actual average number of surviving children per woman was thus only 2.4 (Sauvy). My paternal grandmother, when she immigrated to the United States from Poland in the early part of the century, had already lost two of her four sons to a plague. They had been healthy and normal, but they died in a week in which most of the town's children were destroyed. Who can think about birth control in such an environment?

The difference between modern and not-so-ancient mortality statistics is astonishing. Sauvy relates the statistics from various countries from 1937 and 1957 while their women were absorbing some benefits of modern medical technology.

Decrease in the maternal death rate per thousand confinements in one 20-year period

| Country | 1937 | 1957 |
|--------------------|------|------|
| Ceylon | 20.5 | 4.1 |
| Mauritius | 11.6 | 1.6 |
| Chile | 9.2 | 2.8 |
| U.S.A. (nonwhites) | 8.9 | 1.3 |
| Colombia | 8.4 | 3.7 |

During the mid-1950s, in countries that had already fully implemented medical advances, the maternal death rate was only 0.5 per thousand confinements.

Lovely as those statistics are, they do not account for very much of the population explosion. Actually, the vast and remarkable medical achievement has been in lowering mortality of infants and toddlers. It is these saved little babies that are the source of our mammoth growth. In Western countries today, when care is provided, only 15 to 20 of every thousand live-born die within their first year. Even where care is poor, such as in black urban ghettos, mortality rarely exceeds 40 or 50 per thousand.

Compare that to the mortality statistics in Latin America, Turkey, Uganda, the Philippines. The infant mortality rate is ten times as high in those countries (see Chapter 5) as it should be.

TABLE 7-1 INFANT MORTALITY RATES

| Country | 1940 | 1950 | 1960 | 1964 |
|---------------|-------|------|------|------|
| Sweden | 39.2 | 21.0 | 16.6 | 14.2 |
| Netherlands | 39.1 | 25.2 | 17.9 | 14.8 |
| Finland | 88.3 | 43.5 | 21.0 | 16.9 |
| Denmark | 50.2 | 30.7 | 21.5 | 18.7 |
| Switzerland | 46.2 | 31.2 | 21.1 | 19.0 |
| New Zealand | — | 27.6 | 22.6 | 19.1 |
| Australia | 38.4 | 24.5 | 20.2 | 19.1 |
| France | 95.3 | 52.0 | 27.4 | 23.4 |
| United States | 47.0 | 29.2 | 26.0 | 24.2 |
| Canada | 56.4 | 41.5 | 27.3 | 24.7 |
| West Germany | 64.1 | 55.6 | 33.8 | 25.3 |
| Belgium | 93.2 | 53.4 | 31.2 | 25.8 |
| U.S.S.R. | — | 81.0 | 35.0 | 30.9 |
| Italy | 102.7 | 63.8 | 43.9 | 35.5 |
| Hungary | 130.1 | 85.7 | 47.6 | 39.2 |
| Ceylon | 148.9 | 81.6 | 56.8 | 52.8 |
| Mexico | 125.7 | 96.2 | 74.2 | 66.3 |
| Portugal | 126.1 | 94.1 | 77.5 | 69.0 |

Source: Oiso.

The trend to lower infant mortality rates has been worldwide, however. Table 7-1 from Oiso ought to demonstrate that to anyone's satisfaction. Figure 7-3 shows graphically the decline in Japan's and in England and Wales's infant mortality rates from 1896 to 1969: typically remarkable, very recent, and clearly explosive. The same trend has been evident in later years of life. The following table (adapted from Bengoa) shows how much better Sweden does in maintaining life than several other poorer countries where medical care and food is scarcer. The figures from the UAR may be closest to those of mankind before medical science.

| Country (year) | People who die before 1 year (%) (infant mortality/10) | People who die from 1 to 4 years (%) |
|--------------------|--|--------------------------------------|
| Sweden (1962) | 1.6 | 0.3 |
| Venezuela (1961) | 6.0 | 1.8 |
| Philippines (1960) | 6.8 | 3.1 |
| Chile (1960) | 11.9 | 3.4 |
| U.A.R. (1961) | 21.9 | 11.6 |

Is it true that all this decrease has been caused by increasing standards of public health? Yes, because often the decrease in mortality can be traced

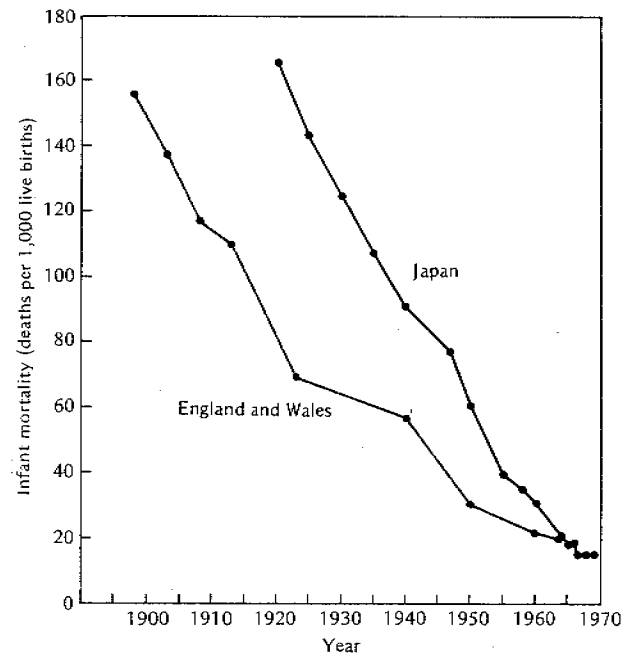


Fig. 7-3 In nations with modern medical care, infant mortality has plummeted.

to the establishment of one medical institution. For example, Williams notes that after a children's health service was established in Malta, the infant mortality plummeted. In 1942, it was 280/1000; in 1956 it was 40, and in 1962, 30.

Quite spectacular evidence that western medicine is responsible comes from the Middle East. In the 1920s a wave of Jewish immigration to what is now Israel brought with it an influx of European medical practice. Infant mortality responded rapidly (Sereni and Ashery, p. 79).

In 1924 and 1925, and again in 1933, the following infant mortality rates (per thousand) were measured in Palestine's three religious groups:

| | Moslem | Christian Arab | Jew |
|-----------|--------|----------------|---------|
| 1924-1925 | 200 | 152-162 | 131-160 |
| 1933 | 157 | 129 | 69-82 |

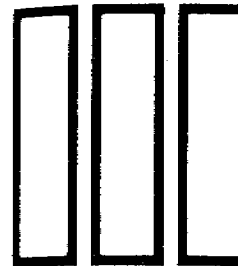
Meanwhile in Jordan (then Transjordan) the infant mortality rate was still 200 in 1931-1933. And in Iraq during 1931 to 1933, Baghdad lost 273 of every 1000 infants; Batzra, 233; and Mosul, 389 (Sereni and Ashery). In the 1950s, the Iraqi infant mortality rate was still about 300 (Patwardhan and Darby). And we have seen above that in the U.A.R. in 1961 it was 219 (that is, 21.9%).

But there is more. Moslem towns close to Jewish settlements were really the only Palestinian towns whose infant mortality dropped. In 1931, Hebron and Gaza, far from Western medicine, had infant mortalities of 237 and 246. But Acre, near the Jewish settlements in the valley of Jezreel and the city of Haifa, had an infant mortality of only 110, quite similar to that of their Jewish neighbors (Sereni and Ashery).

Can you still doubt the role medicine plays in supporting the population explosion? Suppose medical knowledge saves 20% of all babies. Then every generation has 1 1/4 as many people as it would have otherwise had. In three generations, about a century, there will be $1\frac{1}{4} \times 1\frac{1}{4} \times 1\frac{1}{4}$ or about twice as many people as there otherwise could have been.

Such a profound change in our limitation by disease has accelerated the population explosion. Not only can we grow to a higher density, we can do it much faster. The potential increase was already being born. Medicine converted it to reality by preventing deaths.

Often an examination of the causes of a problem, suggests a reasonable solution. Not this time. In fact, this time we can see a solution to be avoided. Do we eliminate good medicine and let babies die? Do we outlaw the practice of agronomy and force people to starve to death? Either would be sheer stupidity. Death is what we are trying to avoid. Deprivation is what we seek to prevent. Neither need be promulgated by men; nature will do that job if we let her.



goals

Someday when the world is cemented over, a blade of grass will break through a tiny crack and through that crack freedom will grow again.

Ilya Ehrenburg, *Thor*