

good world. Philosophers have debated these issues for many years; one position, argued by the philosopher and economist John Broome, is that once people are above some basic subsistence point that makes life worth living, then having more such people makes the world a better place.<sup>11</sup> The world is supporting more total wellbeing. If so, and provided that life was worth living for most people—admittedly a large proviso—the long Malthusian era from the invention of agriculture up to the eighteenth century should be regarded as a period of progress, even if living standards and mortality rates showed no improvement.

### **Life and Death in the Enlightenment**

Fast-forward a few thousand years to a period for which we begin to have good data on mortality. The British historical demographer Anthony Wrigley and his colleagues have reconstructed the history of English life expectancy from the parish registers that recorded the births, marriages, and deaths (hatches, matches, and dispatches) of the population.<sup>12</sup> These parish records are not as good as a vital registration system—the study covered only a sample of parishes, there are issues with people moving from one parish to another, newborns who died very soon after birth may not have shown up at all, and parents sometimes reused the names of such children—but they provide by far the best record that we have for any country before about 1750. The line in Figure 3 shows the estimates of the life expectancy of the general population of England from the middle of the sixteenth century to the middle of the nineteenth century. Although there are sharp fluctuations from year to year associated with epidemics—smallpox, bubonic plague, and the “sweating sickness” (possibly influenza, possibly some other virus that no longer exists)—there is no clear trend over the three hundred years of the reconstruction.

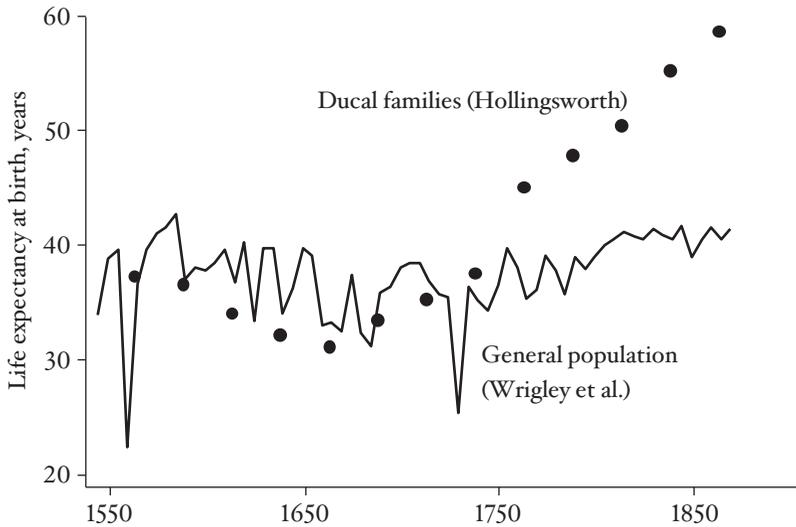


FIGURE 3 Life expectancy for the English population and for ducal families. (After Bernard Harris, 2004, “Public health, nutrition, and the decline of mortality: The McKeown thesis revisited,” *Social History of Medicine* 17(3): 379–407.)

The circles in the figure show the life expectancy of the English aristocracy for each decade of the same three centuries; these data were assembled by the historical demographer T. H. Hollingsworth in the 1960s from the typically meticulous records of births and deaths kept by the British peerage.<sup>13</sup> The idea of superimposing the peers on the populace comes from the social historian Bernard Harris, who first drew this wonderfully informative diagram.<sup>14</sup> From 1550 to about 1750, the life expectancy of the dukes and their families was similar to, or perhaps a little lower than, that of the general population. This in itself is perhaps surprising; richer and higher-status populations often have better health than poorer and lower-status populations, a phenomenon that is known as the health “gradient”; there is evidence of this as far back as Ancient Rome. So the first les-

son is that this “gradient” in health is not universal and was not present in Britain for at least two centuries.

There is little doubt that the British aristocrats got more to eat than did the common people; courtiers of Henry VIII at Hampton Court consumed 4,500 to 5,000 calories a day in the sixteenth century, and the king himself eventually became so obese that he could not move without assistance. Henry was not alone, and in some other European courts people consumed even more.<sup>15</sup> Yet more food—or at least more food of the kind that the aristocrats consumed—did nothing to protect against the bacteria and viruses that brought plague and smallpox, or from the poor sanitation that did away with their children. So the comparison with the peasantry suggests that, in England from 1550 to 1750, it was disease, not lack of nutrition, that set the limits to life expectancy. Of course, disease and undernutrition compound one another—it is hard to digest food when you are sick—but there is no evidence that the consistently high nutrition levels of the aristocracy protected them or their children against the infectious diseases of the day.

After 1750, the life expectancy of the aristocracy pulled away from that of the general population, opening up a nearly twenty-year gap by 1850. After about 1770, there is also some upward movement in life expectancy for everyone. Looking at this figure alone, the movement looks comparable to other ups and downs since 1550, but it is significant in hindsight because of what was to happen after 1850—a sustained increase in life expectancy for the whole population, an increase that continues to this day. Life expectancy at birth in England and Wales was to rise from 40 years in 1850 to 45 in 1900, and almost 70 by 1950. The aristocracy not only opened up a health gradient in the last half of the eighteenth century, they also got a head start on the general increase in life expectancy that was to come.

We do not know for sure *why* the gap opened up, but there are many good guesses. This was the British Enlightenment, summarized

by the historian Roy Porter as a time when people stopped asking “How can I be saved?”—a question that over the past century had brought little but mayhem, including a civil war—and asked instead “How can I be happy?”<sup>16</sup> People began to seek *personal* fulfillment, rather than seeking virtue through obedience to the church and “performing the duties appropriate to one’s place in society.”<sup>17</sup> Happiness could be pursued by using reason to challenge accepted ways of doing things, including obedience to the crown and the church, and by finding ways of improving one’s life, including both material possessions and health. Immanuel Kant defined the Enlightenment by the mottoes “Dare to know! Have the courage to use your own understanding.” During the Enlightenment, people risked defying accepted dogma and were more willing to experiment with new techniques and ways of doing things. One of the ways in which people began to use their own understanding was in medicine and fighting disease, trying out new treatments. Many of these innovations—in this earlier age of globalization—came from abroad. The new medicines and treatments were often difficult to obtain and expensive, so that, at first, few could afford them.

Inoculation for smallpox, or variolation, was one of the most important of these innovations.<sup>18</sup> Smallpox was a leading cause of death in Europe in the eighteenth century. In cities that were large enough for the disease to be permanently present, almost everyone caught smallpox in childhood, and those who survived had lifetime immunity. The inhabitants of towns and villages would often escape the disease for many years, but would have no immunity during an epidemic, and large numbers of both children and adults died. In Sweden in 1750, 15 percent of all deaths were due to smallpox. In London in 1740, there were 140 smallpox burials—mostly of children—for every 1,000 baptisms in the city.

Variolation is not the same as vaccination, which was developed by Edward Jenner only in 1799, was widely and rapidly adopted thereafter, and is credited with major reductions in mortality. Variolation was an ancient technique, practiced in China and India for more than a thousand years, and also long established in Africa. Material was extracted from the pustules of someone suffering from smallpox and scratched into the arm of the person to be protected; in the African and Asian versions, dried scabs were blown into the nose. The inoculee developed a mild case of smallpox but became immune thereafter; according to the History of Medicine Division of the U.S. National Institutes of Health, only 1–2 percent of those variolated died, compared with 30 percent of those exposed to smallpox itself.<sup>19</sup> The technique has always been controversial, and it is likely that some of those who were variolated could spread smallpox to others, and perhaps even start a full-fledged epidemic. No one would advocate the practice today.

The introduction of variolation in Britain is credited to Lady Mary Wortley Montague, who, as wife to the Turkish ambassador, had seen the practice in Constantinople and pressed for its adoption in Britain at the highest levels of society. Impressed, members of the royal family were variolated in 1721, although not before some condemned prisoners and abandoned children were pressed to serve as guinea pigs, variolated, and subsequently exposed to smallpox without ill effect. Variolation then spread widely among the aristocracy. The historian Peter Razzell has documented how, over the next three-quarters of a century, variolation started out as a very expensive technique— involving several weeks of isolation and substantial charges by the inoculators—and eventually became a mass campaign that inoculated ordinary people. Local authorities even paid to have paupers inoculated, because it was cheaper to inoculate them than to bury them. By

1800, the number of smallpox burials per baptism in London had fallen by half.

In the United States, variolation crossed the middle passage in the slave ships; the population of Boston was completely inoculated by 1760, and George Washington inoculated the soldiers of the Continental Army. Smallpox epidemics in Boston had killed more than 10 percent of the population in the late 1600s and in 1721, when variolation was first tried, but there were relatively few smallpox deaths after 1750.

The late eighteenth century saw other health and medical innovations, described by the medical historian Sheila Ryan Johansson.<sup>20</sup> Cinchona bark (quinine) was first introduced to Britain from Peru as a treatment for malaria, “holy wood” (guaiacum) was brought from the Caribbean and used as a treatment for syphilis (supposedly more effective, and certainly more expensive, than mercury), and ipecac was brought from Brazil as a treatment for “the bloody flux.” Professional (male) midwives were used for the first time by the wealthy, an innovation imported from France. This was also the time of the first public health campaigns (for example, against gin), the introduction of the first dispensaries, and the beginnings of city improvement. In my home town of Edinburgh in Scotland, a New Town was built starting in 1765; the old city was not destroyed, but its central and heavily polluted North Loch was drained, and a new, spacious, and salubrious town was built to the north. Sir Walter Scott, who was born in the old town in 1771, lost six of his eleven brothers and sisters in infancy, and he himself contracted polio as a child, yet his family could not be described as impoverished; his mother was the daughter of a professor of medicine and his father, a solicitor.

We have no way of quantifying the effects of these innovations on mortality, and even the one most likely to have had the largest

impact—variolation—remains controversial. Yet there is a plausible case that these innovations—all the result of better scientific knowledge, and born of the new openness to trial and error—were responsible for the better health of the peerage and the royal family at the end of the seventeenth century. At first, because they were expensive and not widely appreciated, they were confined to those who were wealthy and well informed, so that new inequalities in health were opened up. But those inequalities also signaled that general improvements lay just ahead, as the knowledge spread more widely, as the medicines and methods became cheaper, and as they led to new and related innovations that could cover the whole population, such as vaccination against smallpox after 1799 or the sanitarian movement that cleaned up the cities. We shall meet other examples of new knowledge opening up health inequalities that presaged general benefits, including the spread of the germ theory of disease at the end of the nineteenth century and the understanding of the health effects of cigarettes after the 1960s.

### **From 1800 to 1945: Nutrition, Growth, and Sanitation**

If the improvements in life expectancy in the eighteenth century were muted and unequally distributed, no one could have missed the enormous and general improvements at the end of the nineteenth century and beginning of the twentieth. Figure 4 shows the progress of life expectancy for England and Wales, Italy, and Portugal; the data start earlier in Britain, with Italy following around 1875 and Portugal only in 1940. There are earlier data for the Scandinavian countries, and for France, Belgium, and Holland, but they would not be easily distinguishable from England on this graph. As we shall see, it is no accident that the countries that led the fight against mortality are those with the best and earliest data.