3 Malthusian Era Living Standards

(Tierra del Fuego, 1832) These poor wretches were stunted in their growth….. If a seal is killed, or the floating carcass of a putrid whale is discovered, it is a feast; and such miserable food is assisted by a few tasteless berries and fungi (Darwin, 1839, ---).

(Tahitian, 1769) These happy people may almost be said to be exempt from the curse of our forefather; scarcely can it be said that they earn their bread with the sweat of their brow when their cheifest sustenance Bread fruit is procurd with no more trouble than that of climbing a tree and pulling it down (Banks, 1962, 341).

The logic of the Malthusian economy is clear. There should be no systematic gain in living standards on average across societies between earliest man and the world of 1800 on the eve of the Industrial Revolution. Disease, war, infanticide and customs regulating marriage and sex could elevate material living standards. But on balance the happy circumstances that made for Tahiti in 1769, or the unhappy ones that made for Tierra del Fuego in 1832, were no more likely in 1800 as in 100,000 BC. In this chapter I consider the empirical evidence for this first crucial contention of the Malthusian model of society. Were material living standards truly no better on average in 1800 AD than in 10,000 BC or even 100,000 BC?

Real Wages before 1800

Since the poorest half of any society typically lives on their wage alone, without any property income, measures of real wages

provide a good index of living standards in any society. However comprehensive measures of wages are available for only a few societies before 1800, and only in a few rare cases can we get good measures as early as 1200.

Pre-industrial England, however, has a uniquely well documented wage and price history. The relative stability of English institutions after the Norman Conquest of 1066, and the early development of markets, allowed a large number of documents with wages and prices to survive. Using these we can estimate of nominal wages, the prices of consumption goods, and thus real wages, for England back to 1209. To set the context here, 1209 was in the reign of the famously "bad" King John, just six years before he was forced by the barons to codify their rights in the Magna Carta of 1215.

Figure 3.1 shows the real day wage of building laborers and farm workers in England by decade from 1200 to 1809 as an index with 1800-9, at the end of the Malthusian Era, set at 100 for farm workers. The real wage is just a measure of how many units of a standard basket of goods these laborers could buy with one day's earnings through these 60 decades.[30]

The composition of that basket of goods is shown in table 3.1. It was determined by expenditure studies done for farm workers and others in the 1790s, a decade in which the poverty of farm workers had become an issue of some concern because in part of the growing burden of the Poor Laws.[31] These studies revealed that even around 1800 English farm workers spent three

[30] These real wages are drawn from the series derived in Clark, 2005 and Clark, 2006a. These series are the most comprehensive measures available for living standards in any pre-industrial economy, including goods whose prices are typically not measurable such as housing.

[31] Clark, Huberman and Lindert, 1995. Clark, 2001.

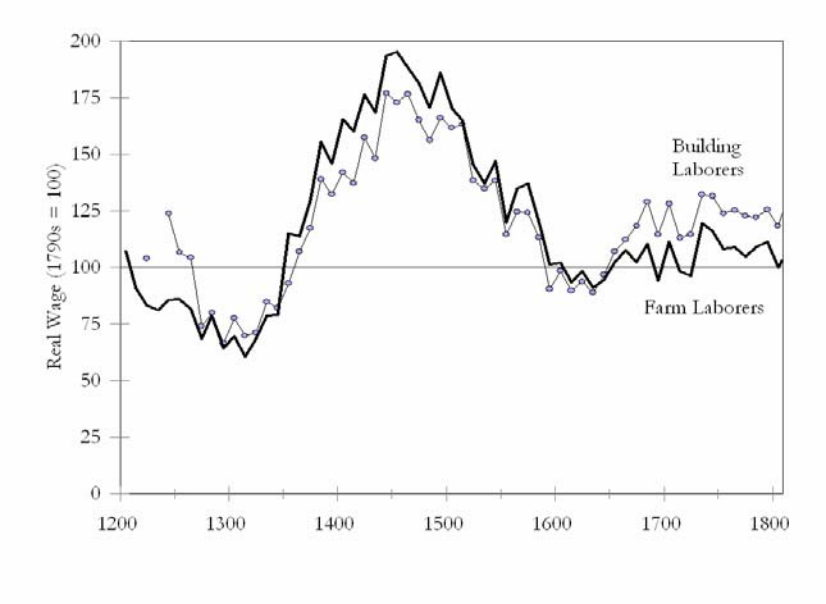

Figure 3.1 English Laborer's Real Wages 1209-1809.

Table 3.1 Expenditure Shares of Laborers before 1800

Category of Expenditure	Share (%)
Food and Drink:	**75**
Grains/Starches	44
Meat	9
Dairy	10
Sugar and Honey	3
Drink	8
Salt and Pepper	1
Housing	**6**
Heating	**5**
Light and Soap	**4**
Clothing, Bedding	**10**

quarters of their income on food, with starches such as bread accounting for the bulk of that expenditure at 44 percent of the entire budget. The other quarter of their expenditures was devoted to the basics of shelter, heating, light, soap and clothing and bedding. This despite the fact that by the 1790s English workers earned more than workers in most other European economies, and also significantly more, as we shall see, than workers in India, China or Japan.

Real wages in England showed remarkably little gain in the 600 years from 1200 to 1800. The fluctuations within the six hundred years are much more dramatic than any long run upward trend. Thus in 39 of the 60 decades between 1200 and 1800 real wages for farm workers are estimated to be above their level in 1800. The highest real wages are found in the interval 1400-1549, long before 1800. The years around 1300, before the onset of the plague years in England in 1349, do show lower wages than in 1800. But wages in the early thirteenth century, are close to their level of 1800.

It should be stressed that this wage index incorporates the arrival of new goods such as sugar, pepper, raisins, tea, coffee, and tobacco. Even allowing for the gains in real income from the decline in prices of all these new goods in the years 1500 to 1800, workers in the late middle ages were still much richer.

The English experience also shows that while the Malthusian economy displayed stagnating material living standards, these were not necessarily low standards of living, even by the measure of many modern economies. Though the consumption pattern of the pre-industrial English worker around 1800 may seem fairly primitive, it actually implies, by its shares devoted to different goods, a reasonably high living standard. Over 40 percent of the food consumption, for example, was for luxury goods like meats,

milk, cheese, butter, beer, sugar and tea (see table 3.1). All of these are very expensive ways to derive the calories and proteins necessary to work and to maintaining the body. Very poor people do not buy such goods.

The comparative affluence of the pre-industrial worker in England can be illustrated in two ways. First we can compare the day wages of English farm workers and construction laborers before 1800 to those of some of the poorer countries of the current world.[32] Table 3.2 shows the wages of construction laborers in Malawi in 2001 and 2002, compared to the prices of some major items of consumption, along with to the comparative data for construction laborers in England in 1800.

Only food prices are available for Malawi, but since these were 75 percent of English farm workers' expenditures they provide a fair approximation of living standards. The second column shows the day wage in England as well as prices in England. The fourth column gives the same data for Malawi in 2001-2. Columns 3 and 5 show how much of each item could be purchased with the day wage in each country. Thus the day wage in England in 1800 would purchase 3.2 kg. of wheat flour, while the day wage in Malawi would purchase only 2.1 kg. of inferior maize flour.

English workers of 1800 could purchase much more of most goods than their Malawian counterparts. The last row shows the cost of the English basket of foods in d. (assuming that all income was spent on food) and the equivalent cost in Malawi (in Kwacha). If a Malawian tried to purchase the consumption of the English worker in 1800 he could afford only 40 percent as much. Thus living standards in England in 1800 were 2.5 times greater than

[32] This data is not so easy to obtain as might be assumed, since modern poor countries tend to have poor statistic gathering bureaucracies.

Table 3.2 Wages and Prices in Malawi, 2001-2, and England, 1800[33]

	England, 1800 (d.)	England, 1800 Units per day	Malawi 2001-2 (Kwacha)	Malawi 2001-2 Units per day
Wage	23.9	-	69	-
Prices				
Flour (kg)	7.5	3.2	33	2.1
Bread (kg)	5.9	4.0	46	1.5
Potato (kg)	1.2	20.4	16	4.2
Beef (kg)	17.4	1.4	123	0.6
Eggs (doz)	11.1	2.1	84	0.8
Milk (l)	2.4	9.9	48	1.4
Sugar (kg)	26.3	0.9	42	1.7
Beer (l)	4.1	5.8	93	0.7
Tea (kg)	219.5	0.1	248	0.3
Salt (kg)	9.1	2.6	24	2.8
Cost of English Basket	23.9	1.0	178	0.4

those of current day Malawi. Figure 3.2 shows a rural village in Malawi now. Yet the wage in Malawi is still above the subsistence level for that economy, since the Malawian population continues to grow rapidly.

For a much wider range of countries we have estimates of real national income per person in 2000. It is also possible for

[33]Source: Malawi, International Labour Office, Geneva. October Enquiry data on wages and retail food prices.

Figure 3.2 A rural village in Malawi.[34]

England to estimate national income per person back to 1200, so we can compare average income per person in pre-industrial England with the range in the modern world. Table 3.3 shows the results of that comparison. England in 1200-1800 had as high, or higher, an income per person as large areas of the modern world. Countries with more than 700 million people in the year 2000 had incomes below the average of pre-industrial England. Another billion people in India had average incomes only 10 percent above England before the Industrial Revolution. Some modern countries are dramatically poorer. Hundreds of millions of African now live on less than 40 percent of the income of pre-industrial England.

The reductions in mortality from modern vaccines, antibiotics, and public health measures in these poor countries since 1950 have been rightly celebrated as a significant triumph of interna

[34]Hans-Peter Kohler, University of Pennsylvania.

Table 3.3 Comparative Incomes per Person, 2000[35]

Country	Population 2000 (m.)	Income per person (2005 $)	Relative Income (%)	Population Growth Rate (%)
Tanzania	34	569	20	2.1
Burundi	7	717	25	2.9
Ethiopia	64	832	29	2.3
Sierra Leone	5	849	30	2.3
Malawi	10	935	33	2.4
Nigeria	127	956	34	2.4
Zambia	10	972	34	2.1
Madagascar	16	1,014	36	3.0
Rwanda	9	1,129	40	2.4
Burkina Fasa	11	1,141	40	3.0
Mali	11	1,150	41	2.3
Benin	6	1,417	50	2.7
Kenya	30	1,525	54	2.6
Ghana	19	1,590	56	2.1
Nepal	23	1,809	64	2.2
Senegal	10	1,945	69	2.3
Bangladesh	131	2,052	73	2.2
Nicaragua	5	2,254	80	2.0
Cote D'Ivoire	16	2,345	83	2.0
Pakistan	138	2,497	88	2.2
Honduras	6	2,505	89	2.3
Moldova	4	2,559	90	0.3
Cameroon	15	2,662	94	2.0
England pre 1800	-	**2,828**	**100**	**0.1**
Zimbabwe	13	3,016	107	0.6
India	1,016	3,103	110	1.4
Bolivia	8	3,391	120	1.6
China	1,259	4,446	157	0.6

[35] Income, Penn World Tables. Population, United Nations.

tional aid efforts. Life expectancy was 40 in developing countries in 1950, but 65 by 2000.[36] One side effect of this, however, has been that even at wages well below those of pre-industrial England, population in these countries is still growing with a rapidity never seen in the pre-industrial world, as table 3.3 shows. The subsistence wage, at which population growth would cease, is many times lower in the modern world than in the pre-industrial period. This is one factor leading to the Great Divergence in incomes discussed in the last section of the book. Given the heavy dependence of many sub-Saharan African countries on farming still, health care improvements are not an unmitigated blessing, but exact a cost in terms of lower material incomes.

This information on English living standards before 1800 illustrates that within any society under the Malthusian constraints wages and living standards can fluctuate by large amounts. Societies subject to Malthusian constraints were not necessarily particularly poor, even by the standard of today.

Figure 3.2 shows long run real English builders' day wages in comparison to those in North and Central Italy, and those of the Netherlands. Wages in both Italy and the Netherlands were significantly higher in the years before 1800 than they were in 1800 itself. They were also typically even higher than wages in England. Again there is no secular increase in real wages.

Information on real wages for societies earlier than 1200 is more fragmentary. But table 3.4 shows a very simple measure of wages, the equivalent of the wage in pounds of wheat, for unskilled laborers in a variety of earlier societies all the way back to Ancient Babylonia in the second millennium before Christ. Wages on this same wheat basis are shown for England 1780-1800. There is a lot of variation in these earlier wages, but they

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[36] Levine et al., 2004, 9.

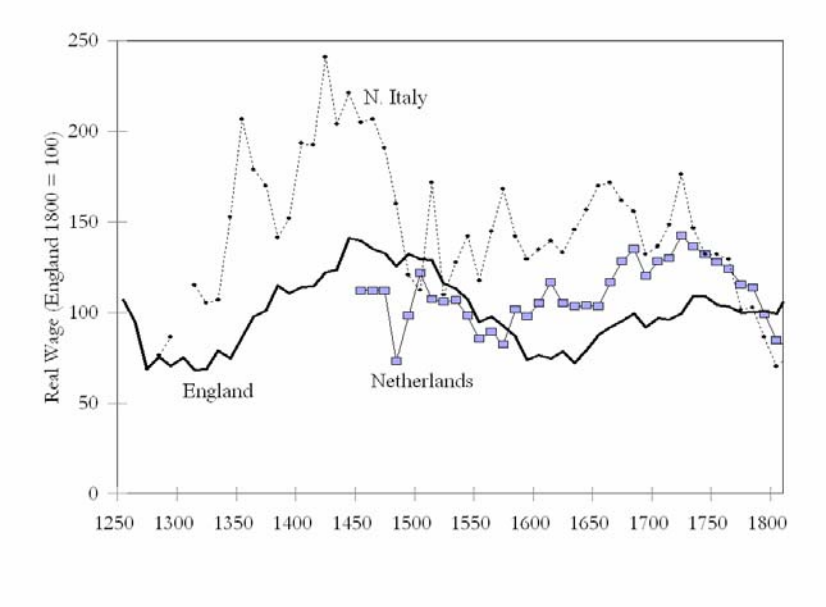

Figure 3.2 Comparative European Real Wages, 1250-1809[37]

are easily as high as in England on the eve of the Industrial Revolution, even those 3,000 years before this.

Table 3.5 shows in the same terms wheat wages around the world in the late eighteenth century. In the case of China, Japan, Korea and India the wheat wage is calculated by calculating the wheat equivalent of a pound of rice.

Two things stand out. First the great range of wage levels around 1800, in the order or 4 or 5 to 1. These variations, in the Malthusian framework, should have no relation to the technological sophistication of the society, and instead be explained by

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[37] North and Central Italian wages are from Federico and Malanima, 2002. Dutch wages are from de Vries and van der Woude, 1997, 609-628. The relative level of these wages to English in 1800 was fixed by assuming wages were proportionate to real GDP in each country relative to England in 1910 and 1810 respectively.

Table 3.4 Laborers' Wages in Wheat Equivalents[38] *farm wage

Location	Period	Day Wage lbs of wheat
Old Babylonia[a]	1800-1600 BC	15*
Assyria[b]	1500-1350 BC	10*
Neo Babylonia[a]	900-400 BC	9*
Classical Athens[c]	408 BC	30
Classical Athens[c]	328 BC	24
Roman Egypt[d]	c. 250 AD	8*
England[e]	**1780-1800**	**13**
England[f]	**1780-1800**	**11***

differences in fertility and mortality conditions across societies. The wage quotes from 1780-1800 do seem to confirm that the technological sophistication of the society is not the determinant of wages. English wages, for example, are on the high side, but not any higher than for such technological backwaters then as Istanbul, Cairo and Poland.[39] English wages on average were about the same for ancient Babylon and Assyria, despite the great technological gains of the intervening thousands of years. In the next two chapters we will ask whether fertility and mortality

38 [a]Powell, 1990, 98, Farber, 1978, 50-1. [b]Zaccagnini, 1988, 48. [c]Jevons, 1895, 1896. [d]Rathbone, 1991, 156-8, 464-5. [e]Clark, 2005. [f]Clark, 2001.

39 The limitations of the grain wages as a measure are revealed in the comparison to Poland, however. Grain was the great export crop of eastern Europe and was relatively much cheaper there than elsewhere in Europe. A more comprehensive wage measure would show lower eastern European wages.

Table 3.5 Laborer's Wages circa 1800 in Wheat Equivalents. [40]

Location	Period	Day Wage lbs of wheat
Amsterdam[a]	1780-1800	21
Istanbul[b]	1780-1800	18
London[c]	1780-1800	16
Antwerp[a]	1780-1800	16
Cairo[b]	1780-1800	15
England[c]	**1780-1800**	**13**
Warsaw[a]	1780-96	13
Leipsig[a]	1780-1800	13
Danzig (Gdansk)[a]	1780-1800	11
England[d]	**1780-1800**	**11***
Vienna[a]	1780-1800	10
Paris[a]	1780-1800	10
Madrid[a]	1780-99	9.0
Naples[a]	1780-1800	7.6
Valencia[a]	1780-5	6.8
China – Yangzi Delta[e]	1750-1849	6.6*
Korea[f]	1780-1799	6.0
Milan[a]	1780-1800	5.6
South India[e]	1750-1790	5.1
Japan (Kyoto)[g]	1791-1800	4.5

conditions are consistent with these wage variations. In particular why were Asian societies such as Japan so poor compared to England in 1800?

[40]Silver wages in Europe 1780-1800 were deflated by the wheat prices in the Allen-Unger data set (see Allen (2001)). [a]Van Zanden,1999, 181-185. [b]-------- [c]Clark, 2005. [d]Clark, 2001. [e]Broadberry and Gupta, 2006, 17, 19. [f]Ho and Lewis, 2006, 229. [g]Bassino and Ma, 2005, Appendix table 1 (assuming 45 lbs of wheat flour per 60 pounds of wheat).

Second there is no sign of any improvement in material conditions for settled agrarian societies as we approach 1800. There was no gain between 1800 BC and 1800 AD, 3,600 years of history. Indeed the wages for east and south Asia and southern Europe for 1800 stand out by their low level compared to Ancient Babylonia, Ancient Greece, or Roman Egypt. The evidence on pre-industrial wages is consistent with the Malthusian interpretation of the previous chapter.

Calories, Proteins and Living Standards

A proxy for living standards in the distant past is the living standard of surviving forager and simple agrarian societies. However, since these societies do not have labor markets with wages we need another metric to compare their material conditions to those of pre-industrial societies around 1800.

One such index of living standards is food consumption per person, measured as calories or grams of protein per person per day, shown in table 3.6. As income rises in poor societies, characteristically calorie consumption per person also increases. How did calorie consumption in rich societies like England or Belgium in 1800 compare to earlier societies?

The evidence we have for England is from surveys of poorer families, mainly those of farm laborers, made in 1787-96 as part of a debate on the rising costs of the Poor Law.[41] The poor consumed an average of only 1,508 kilocalories per day. The average income per head in these families at £4.6 per head, however, was only about 30 percent of average English income per person then of £15. We can estimate the average consumption in England

[41] Eden, 1797.

Table 3.6 Calories and Protein per Capita[42]

Group	Years	Kcal.	Grams Protein
England, farm laborers[a]	1787-96	1,508	27.9
England, all[a]	1787-96	2,322	48.2
Belgium, all[b]	1812	2,248	-
Ache, Paraguay[c]	1980s	3,827	-
Hadza, Tanzania[h]	-	3,300	-
Alyware, Australia[h]	1970s	3,000	-
Onge, Andaman Islands[h]	1970s	2,620	-
Aruni, New Guinea[e]	1966	2,390	-
!Kung, Botswana[c]	1960s	2,355	-
Bayano Cuna, Panama[g]	1960-1	2,325	49.7
Mbuti, Congo[h]	1970s	2,280	-
Anbarra, Australia[h]	1970s	2,050	-
Hiwi, Venezuela[c]	1980s	1,705	64.4
Shipibo, Peru[f]	1971	1,665	65.5
Yanomamo, Brazil[d]	1974	1,452	58.1

using the income elasticities of calorie and protein consumption derived from this data. This is shown in the table also.[43] This is close to the average consumption calculated for Belgium in 1812

The information we have for the likely consumption of earlier societies comes from modern forager and shifting cultivation societies. These reveal considerable variation in calorie consump-

42 [a] Clark, et al., 1995, 223-4. [b]Bekaert, 1991, 635. [c]Hurtado and Hill, 1987, 183. Hurtado and Hill, 1990, 316. [d]Lizot, 1977, 508-512. [e]Waddell, 1972, 126. [f]Bergman, 1981, 205. [g]Bennett, 1962, 46. [h]Jenike, 2001, 212.

43 Clark et al., 1995, 223-4. Since the income elasticities would fall to almost zero for very high incomes, I assume the median consumer has an income of £12 per head.

tion across the groups surveyed, ranging from a modest 1,452 kilocalories per person per day for the Yanomamo, to a kingly 3,827 kilocalories per day for the Ache. But the median is 2,340, implying that hunter-gatherers and subsistence agriculturalists ate as many calories as the median person in England or Belgium circa 1800. Primitive man ate well compared to one of the richest societies in the world in 1800. Indeed British farm laborers by 1863 had just reached the median consumption of these forager and subsistence societies.

Further the English diet of the 1790s typically had a lower composition of protein than these more primitive societies. Since the median forager ate as well as the English, they must have been eaten much better than the poorer Asian societies.

Variety of diet is another important component of human material welfare. The European diet by 1800 had been enriched by the introduction of spices, sugar, tea and coffee from Asia, and potatoes and tomatoes from the New World. But for the typical European that enrichment was quite limited. In England in 1800 the daily diet had been supplemented on average by 0.85 ounces of sugar, 0.07 ounces of tea, 0.004 ounces of coffee, and 0.05 ounces of tobacco.[44] The overwhelming bulk of the diet was the traditional daily monotony of bread, leavened by modest amounts of beef, mutton, cheese, and beer. In contrast hunter gatherer and subsistence cultivation diets were widely varied. The diet of the Yanomamo, for example, included monkey, wild pig, tapir, armadillos, anteaters, alligators, jaguar, deer, rodents, a large variety of birds, many types of insects, caterpillars, various fish, larvae, freshwater crabs, snakes, toads, frogs, various palm fruits,

[44] Mokyr, 1988, 75.

palm hearts, hardwood fruits, brazil nuts, tubers, mushrooms, plantains, manioc, maize, bananas, and honey.[45]

Engel's Law and Living Standards

When the Prussian statistician Ernst Engel (1821-96), not to be confused with his rabble rousing contemporary Friederich Engels (1820-95), undertook studies of German working class budgets in the he found a simple but powerful empirical relationship, now called Engel's Law. The poorer a family, the larger the share of its income was spent on food. This relationship has been confirmed by numerous subsequent studies. For the poorest societies food can represent more than 80 percent or more of all expenditures, while for the richest spending on the actual food content of meals is a mere 5-10 percent of income.

Even within the food category of expenditures, there are further variants of the original Engel's Law. When people are very poor, so that hunger is ever present, they consume the cheapest forms of calories available – grains such as wheat, rice, rye, barley, oats, maize and beans or potatoes – consumed in the cheapest possible way as porridge, mush, or bread. Their diet is also extremely monotonous, with little spent on flavorings. Thus Irish farm laborers in the years before the famine lived on a diet that was composed almost entirely of potatoes. At the lowest incomes the share of the cheapest calorie sources in income is very large. But as incomes increase a larger and larger share of food consumption is for more expensive calories - milk, cheese,

[45]Chagnon, 1983, 57-8. In addition Yanomamo men were daily consumers of tobacco and a hallucinogenic snuff.

butter, eggs, meat, fish, beer and wine – or for spices of no calorific value such as pepper, tea, and coffee.

For the ordinary people of the poorest societies meat seems to have been the pre-eminent luxury item. It was reported, for example, that the Sharanahua foragers of Eastern Peru

> *…are continually preoccupied with the topic of meat, and men, women and children spend an inordinate amount of time talking about meat, planning visits to households that have meat, and lying about the meat they have in their households (Siskind, 1973, 84).*

In this and a number of other forager societies meat would be traded by hunters for sexual favors from women. "The successful hunter is usually the winner in the competition for women."[46]

These consumption patterns can be portrayed using the device of the Engel curve, as in figure 3.3. An Engel curve shows how consumption of any good changes with income, with the implicit assumption that relative prices are kept constant. Goods such as food, called necessities, are a much larger share of the consumption of poor people than of rich people. Indeed for many of these goods, such as basic starches, as income increases the absolute amount spent on the good will decline. Other goods are luxuries. Their share in consumption expenditure rises with income, at least for some range of incomes.

Differences in relative prices can induce deviations from the Engel's Law regularity, but a good general index of living standards is thus either the share of income spent on food, or the share of the food budget spent on basic starches as opposed to meats, alcohol, and refined sugars.

Table 3.7 shows the shares of food expenditures devoted to these categories for farm laborers in England in the 1790s. With only 61 percent of their food expenditures devoted to basic

[46]Siskind, 1973, 95-6.

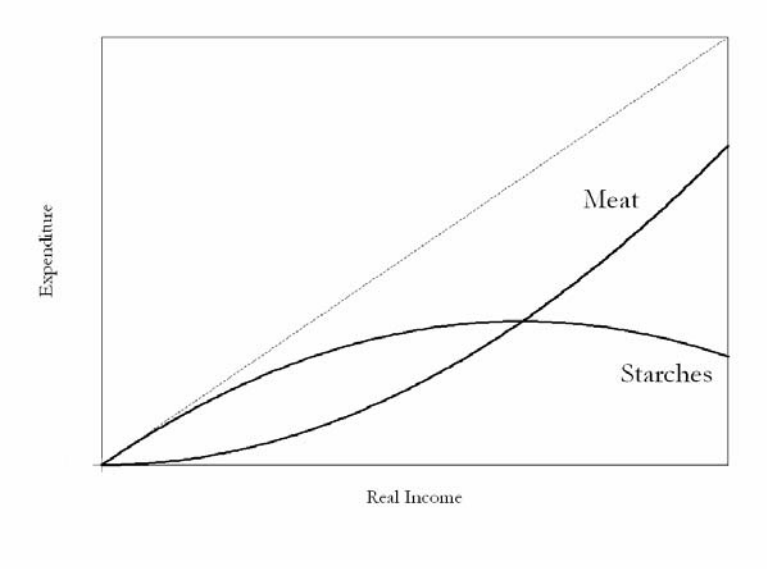

Figure 3.3 Engel Curves

Table 3.7 Share of Different Products in Food Consumption of Farm Workers[47]

Location	Years	Cereals and Pulses (%)	Sugar (%)	Animal products, fats (%)	Alcohol (%)
England[d]	1250-99	48.0	0.0	40.2	11.8
England[d]	1300-49	39.7	0.0	43.0	17.0
England[d]	1350-99	20.8	0.0	55.3	24.0
England[d]	1400-49	18.3	0.0	46.4	34.3
England[a]	**1787-96**	**60.6**	**4.7**	**28.4**	**1.3**
Japan[c]	c. 1750	95.4	0.0	4.6	0.0
India[b]	1950	83.3	1.6	5.4	0.8

47 [a]Clark, Huberman and Lindert, 1995, [b]All-India Consumer Expenditure Survey, [c]Bassino and Ma, 2005, [d]Dyer, 1988.

starches these workers reveal themselves to be living well, even compared to Indian farm laborers circa 1950. They also seem to have been much better off than Japanese laborers in the eighteenth century. For England we get evidence on the consumption patterns of agricultural workers back to the thirteenth century because of the custom of feeding harvest workers. The diets of harvest workers from 1250 to 1450 imply an even higher standard of living for earlier centuries than for England in the 1790s. After the onset of the Black Death in 1348-9 harvest workers were fed a diet that was composed only about 20 percent in cost of basic grains, the rest being dairy products, fish and beer.

Engel's Law, though a simple empirical relationship, has profound importance in explaining world history. In the Malthusian era incomes were bound to remain low, and so food dominated expenditures. Apart from the effect this may have had on conversation, the high share of food expenditures before 1800 ensured that these early societies were largely dispersed and agrarian. If 80 percent of income in the pre-industrial world was spent on food, then 80 percent of the population was employed in agriculture, fishing, or hunting.[48] Agricultural production also demanded a population that lived close to the fields, so pre-industrial societies were predominantly rural, with small urban populations. Around 1450 in England, for example, the average parish would have had 230 residents. Unlike modern high income economies people would encounter strangers rarely.

If the great majority of income was spent on food then there was also little surplus for producing "culture" in terms of buildings, clothing, objects, entertainments, and spectacles. As long as

[48]This would not necessarily hold once countries traded substantial quantities of foodstuffs. But such substantial trade was rare before 1800.

the Malthusian Trap dominated the great priority of all societies was food production.

But the link between consumption and production implies that another index of living standards, at least for societies where trade possibilities were limited, was the proportion of the population engaged in agriculture. Again the comparative prosperity of early England shows up in the high shares of the population, even at early dates, occupied outside of the agricultural sector in areas such as clothing production or building. Thus in the county of Suffolk in England in 1620-35 only 63 percent of male testators were engaged in farming or fishing.[49] In comparison in Tanzania in 2000 83 percent of males were occupied in farming and fishing.[50]

Human Stature and Material Living Standards

Information on real day wages, food consumption, or occupations is available for only a small share of pre-industrial societies. Wage labor was absent from very early societies, and later ones with labor markets have often left no records. To measure living standards for most of the pre-industrial era we must resort to more indirect measures. One such is average heights. The most obvious effect of better material living standards is to make people taller. If you travel even now to a poor country, such as India, it is immediately striking how short people are. The current average height of Dutch and Norwegian males is 178 cm (70 in), with British and American males slightly smaller at 175 cm (69 in). In contrast males in southern India in 1988-90 had an average

[49]Allen, 1989, Evans, 1987.
[50]ILO statistics.

Figure 3.4 Stature of Westerners, Japanese and Manchurians in 1904. The third, shorter woman in the background is Japanese. *Source:* Hare, 1905, ---.

height of only 164 cm (64.4 in.), a full 14 cm shorter than the Dutch.[51] Figure 3.4 shows the height gap between rich and poor societies. Portrayed are two English nurses visiting a Japanese run hospital in Feng Wang Cheng in Manchuria in 1904 along with Manchurian bearers and Japanese soldiers. The two English nurses tower over the locals.

There is little sign in modern populations of any genetically determined differences in potential statute, except for some rare groups such as the pygmies of Central Africa. And the positive correlation between health measures and height is well docu-

[51]Brennan, McDonald and Shlomowitz, 1997, 220. The states were Kerala, Tamil Nadu, Karnataka and Andhra Pradesh. Males aged 25-39.

mented.[52] Stature is determined by both childhood nutrition and the incidence of childhood illness. Episodes of ill health at growth phases can stop growth, and there is only partial catch up later. But both nutrition and the incidence of illness depend on material living conditions.

There is evidence on the stature of the living from only a few pre-industrial societies, and then typically not for long before 1800. But through measurement of the long bones in skeletal remains we can get evidence on the stature of a much earlier set of pre-industrial societies.

Table 3.8 shows a summary of this evidence on the stature of living males for the years around 1800 for a range of countries, given in order of average heights. The heights were drawn from a variety of sources: military recruits, convicts, freed slaves, and indentured servants. Indian heights in 1843, for example, are those of indentured servants recruited for labor in Mauritius. But since these Indian workers were being selected for heavy manual labor abroad, there is no reason to expect they were smaller than the general population. These Indian indentured servants were significantly smaller than indentured servants recruited in England for service in North America in the eighteenth century. Similarly the Chinese heights are for immigrants to Australia who were later imprisoned. But their heights were significantly less than those of eighteenth century English convicts transported to America or Australia. The African heights are those of slaves freed on route to the Americas by British ships.

Clearly at the onset of the Industrial Revolution heights of European males were intermediate between those of the modern US and Europe, and those of modern India. Malthus himself, from his time as a country parson, knew that living conditions for

[52] Steckel, 1995.

Table 3.8 Estimated Average Height of Adult Males in pre-Industrial Societies[53] (* birth years).

Period	Location	Type	Ages	Height (cm)
1830s	Sweden[a]	Soldiers	Adult	172
1710-59*	England[f]	Convicts	23-60	171
1710-59*	England[f]	Indentured	23-60	171
1830s	England[a]	Soldiers	Adult	169
1830s	N. Italy[a]	Soldiers	25-40	167
1830s	Bavaria[a]	Soldiers	Adult	167
1830s	France[a]	Soldiers	Adult	167
1830s	Netherlands[a]	Soldiers	Adult	167
1770-1815	England[b]	Convicts	23-49	166
1830s	Hungary[a]	Soldiers	Adult	166
1830s	Austria[a]	Soldiers	Adult	164
1819-39	W. Africa (Yoruba)[d]	Slaves	25-40	167
1819-39	Mozambique[d]	Slaves	25-40	165
1819-39	W. Africa (Igbo)[d]	Slaves	25-40	163
1800-29*	S. China[e]	Convicts	23-59	164
1843	S. India[c]	Indentured	24-40	163
1842-4	N. India (Bihar)[c]	Indentured	24-40	161
1883-92	Japan[g]	Soldiers	20	159

the laboring classes in England were poor enough around 1800 that they resulted in stunting. Thus,

53 [a]A'Hearn, 2003, table 3. Adjusted to adult heights. [b]Nicholas and Steckel, 1991, 946. [c]Indentured Servants, Brennan, McDonald and Shlomowitz, 1997, 220. [d]Slaves freed from ships transporting them. Eltis, 1982, 459-60. [e]Morgan, 2006, table 4a. [f]Komlos, 1993, 775. [g]Yasuba, 1986, 223. Adjusted from age 20 to adult heights.

It cannot fail to be remarked by those who live much in the country, that the sons of labourers are very apt to be stunted in their growth, and are a long while arriving at maturity (Malthus, 1798, 94)

Heights in Asia seem to have been generally much lower than in Europe: 162 as opposed to 167 cm. Thus again the evidence is of inferior living conditions in Asia as compared to Europe around 1800. However heights for Africa, despite the presumably much inferior technology there, were at 165 cm not much below the European average. A world average for heights around 1800 would thus be about 164 cm.

In tropical Africa, nature itself supplied high material living societies through high death rates from disease. For Europeans, and indeed almost as much for the native Africans, tropical Africa was deadly. Half of British troops stationed on the coast of West Africa in the eighteenth century died in their first year in station.[54] When the journalist Stanley made his famous journeys across Equatorial Africa in the late nineteenth century, the special ability that allowed him to make his discoveries was not any particular ability with guns or languages, but his ability to withstand the many illnesses that killed all of his white companions.

How do these heights at the end of the pre-Industrial Era compare with earlier societies? As a guide to likely living conditions before the arrival of settled agriculture we have average heights for modern foraging societies. Franz Boas in particular collected height observations from hundreds of native American tribes in the late nineteenth century. As table 3.9 shows, there is a range of variation that is similar to that in agrarian societies around 1800. Some hunter-gatherers were significantly taller than

[54] Black Americans who colonized Liberia after 1823 also had extraordinarily high death rates, suggesting that Africans had little genetic protection against the disease environment. McDaniel, 1992.

Table 3.9 Heights of Adult Males in Modern Foraging and Subsistence Societies[55] * = heights adjusted to ages 21-40.

Period	Group	Location	Ages	Height (cm)
1892	Plains Indians[e]	USA	23-49	172
1970s	Anbarra[c]	Australia	Adults	*172
1970s	Rembarranga[i]	Australia	Adults	*171
1910	Alaskan Inuit[d]	USA	Adults	*170
1891	Shoshona[g]	USA	20-59	166
1890	N. Pacific Indians[f]	USA	Adults	*167
1944	Sandawe[j]	Tanzania	Adults	*167
1970s	Fox Basin Inuit[i]	Canada	Adults	*166
1880s	Solomon Islanders[h]	Solomon Is.	Adults	*165
1906	Canadian Inuit[d]	Canada	Adults	*164
1969	!Kung[a]	Bostwana	21-40	163
1980s	Ache[b]	Paraguay	Adults	*163
1970s	Hadza[i]	Tanzania	Adults	*163
1985	Hiwi[b]	Venezuela	Adults	*156
1980s	Batak[i]	Philippines	Adults	*155
1980s	Agta[i]	Philippines	Adults	*155
1980s	Aka[i]	C.African R.	Adults	*155

the nineteenth century Chinese, Indians, Japanese and many Europeans. The median of the heights for these forager societies is 165 cm, very little less than in Europe in 1800, and significantly above Asia circa 1800.

[55]The heights of all !Kung males averaged 2 cm less than those 21-40 (Lee and deVore, 1976, 172). [a]Lee and DeVore, 1976, 172, [b]Hurtado and Hill, 1987, 180-182, [c]Kelly, 1995, 102, [d]Hawkes, 1916, 207, [e]Steckel and Prince, 2001, [f]Boaz, 1891, 27. [g]Boaz, 1899, 751. [h]Guppy, 1886, 267. [i]Jenike, 2001, 223. [j]Trevor, 1947, 69.

The Tahitians of the 1760s, with their stone-age technology, seem to have been as tall, or taller, than their English visitors with all their marvelous European technology. The explorers certainly thought them tall, remarkably enough that Joseph Banks, a scientists on the Endeavour expedition of 1769, measured the height of a particularly tall Tahitian at 75.5 inches (192 cm). In England in 1800 only one adult male in 2,500 would be 192 cm or more.[56] Since on his short visit he likely saw only a few hundred adult males, given the length of his stay and the low population densities of Tahiti, average heights in Tahiti were with strong probability greater than in eighteenth century England.

Thus the thousands of years of advance representing the difference between forager technology and that of agrarian societies around 1800 did not lead to any signs of a systematic improvement in human material living conditions.

To look at living conditions in the actual historical past, as opposed to equivalent societies now, we have inferred male heights from skeletal remains. Figure 3.4 summarizes the published evidence available on average heights from skeletal remains in Europe from 1 AD to 1800, where the average height estimate has been controlled for gender, for regional effects, and in a limited way for age at death. The century long averages summarize data from 9,477 sets of remains. There is no trend in this series. Also shown are the heights of male conscripts by birth year for Sweden from 1820 on, and the heights of native born US males, from 1710 on. The gains in income after 1800 show up clearly in the heights of the living.

Table 3.10 shows measures of the average male stature from skeletal collections from locations outside Europe in 1 AD to

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[56] Banks, 1962, 334. The height range in England is calculated assuming the standard deviation of heights was the same as in modern Britain.

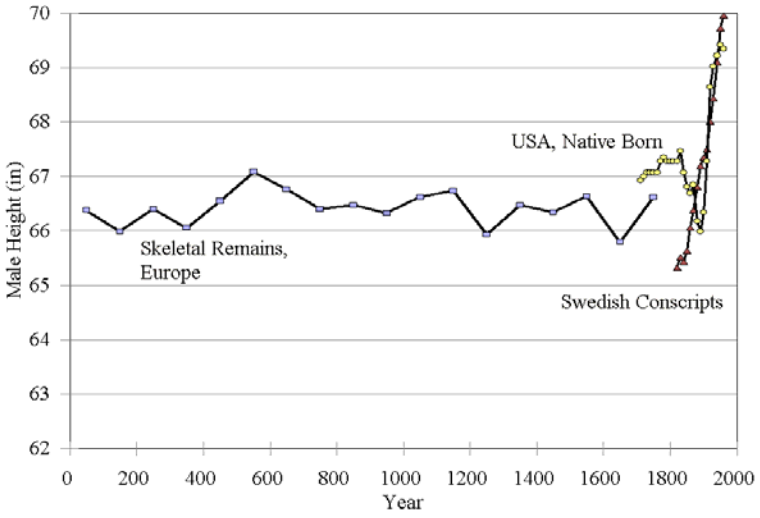

Figure 3.4 Male heights from skeletons in Europe, 1 AD to 2000[57]

1800 AD. The small size of many of these collections, their potentially unrepresentative economic status, and the errors in inferring stature from the lengths of long bones, all imply large potential errors in inferring specific population heights from these samples. But the overall pattern is clear. Average heights in the skeletal record before 1 AD were just as great as those for

England and the Netherlands, the most advanced Malthusian economies in the world in the eighteenth century. The simple average of the heights in the collections dating before the birth of Christ in table 3.7 is 168 cm (66 inches) for males. This is greater than for skeletons in eighteenth century England and the Netherlands. This was about three inches less than for the richest

[57] Koepke and Baten, 2003, Steckel, 2001, figures 3 and 4.

Table 3.10 Heights from Skeletal Remains by Period[58]

Period	Location	Observations	Height (cm)
Mesolithic[a]	Europe	82	168
Neolithic[a]	Europe	190	167
Neolithic[b]	Denmark	103	173
1600-1800[h]	Holland	143	167
1700-1800[h]	Norway	1,956	165
1700-1850[h]	London	211	170
Pre-Dynastic[c]	Egypt	60	165
Dynastic[c]	Egypt	126	166
2500 BC[d]	Turkey	72	166
1700 BC[e]	Lerna, Greece	42	166
2000-1000 BC[f]	Harappa, India	-	169
300 BC – 250 AD[i]	Japan – Yayoi	151	161
1200-1600[i]	Japan – Medieval	20	159
1603-1867[i]	Japan – Edo	36	158
1450[g]	Marianas, Taumako	70	174
1650[g]	Easter Island	14	173
1500-1750[g]	New Zealand	124	174
1400-1800[g]	Hawaii	-	173

modern economies, but exceeds heights for the poorer modern economies, such as India in the nineteenth and twentieth century, and Japan in the nineteenth century. Heights, and hence by implication living standards, did fluctuate somewhat before 1800.

58 [a]Meiklejohn and Zvelebil, 1991, 133, [b]Bennike, 1985, 51-2, [c]Masali, 1972, [d]Mellink and Angel, 1970, [e]Angel, 1971, [f]Dutta, 1984, [g]Houghton, 1996, 43-45, [h]Steckel, 2001, [i]Boix and Rosenbluth, 2004, table 6.

But the variations, as predicted in the Malthusian model, have no connection with technological advances.

Thus Europeans in parts of the medieval period seem to have been taller than those in the classical period, or in the eighteenth and early nineteenth centuries. Polynesians in the period before contact with the outside world were also tall by pre-industrial standards, according well with the inference drawn above from Banks' report. Yet there is no doubt that the technology of the Polynesians was far behind that of the Europeans. Polynesia still was a Neolithic economy without metals. Fish hooks were laboriously fashioned from bone or coral. The preferred weapon of war was a wooden club. Canoes had to be fashioned from tree trunks using fire and stone axes. The canoes were sometimes mounted with sails, but not rigged in such a way that they could sail into the wind. Thus long ocean voyages were hazardous. There was little or no earthenware. There was no system of writing. Cloth was made from tree bark, but little clothing was required in the equatorial climate.

The natural environment of Polynesia was benign. The scourge of the tropics, malaria, did not exist on the islands until imported along with the mosquito by white mariners. Thus the British and French crews spent months ashore in Polynesia with few if any deaths from local diseases. But where nature failed them, the Polynesians seem to have supplied their own mortality.[59]

[59]The reason for the high living standards, as we shall see in chapter 5, seems to have been high death rates from infanticide, internal warfare, and human sacrifice. Polynesia was paradise for the living, but a paradise with a cost.

The Industrious Revolution

Consideration of early forager societies, through skeletons, and of remnant forager societies now, suggests that material living conditions were if anything better for these societies than for the settled agrarian societies on the eve of the Industrial Revolution.

But another dimension of living conditions was how long people had to labor to get their daily bread, and the types of labor they performed. Here the arrived of settled agrarian societies probably reduced human welfare. A world of leisure for the original foragers gave way to a world of continuous labor by the eve of the Industrial Revolution. Not only was this labor continuous, it was also much more monotonous than the tasks of the foragers. But this change in the quantity and quality of work long preceded the arrival of modern technology.

In England on the eve of the Industrial Revolution the typical male worked 10 or more hours per day for 300 or more days per year, for a total annual labor input in excess of 3,000 hours. For building workers we know the length of the typical work day from the fact that employers charged for their services both by the hour and by the day. The ratio of daily to hourly wages suggests the typical hours per day. Table 3.11 shows this evidence. Average daily hours of paid labor for these workers over the whole year would be nearly 9 per day. Agricultural workers seem to have had similarly long numbers of hours per year. Comparing the wages paid to day workers with those paid to annual workers suggests that annual workers were putting in a full 300 day year.[60] Workers were kept in employment throughout the winter with such tasks as hand threshing of grains, ditching, hedging, and mixing and spreading manure.

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[60]Clark and van der Werf, 1998.

Table 3.11 Work Hours per Day of English Builders[61]

Period	Towns	Hours
1720-39	1	10.4
1740-59	1	8.3
1760-79	1	11.0
1780-99	2	11.1
1800-19	5	10.4
1820-39	9	10.1
1840-59	10	10.0
1860-69	8	10.0

Joachim Voth in an interesting study of time use in Industrial Revolution England used summaries of witness statements in criminal trials which often contain statements of what the witness was doing to estimate annual work hours in 1760, 1800 and 1830. His results for London, where the information is most complete, are shown in table 3.11. They suggest men in London in 1800 worked 9.1 hours per day.[62] Thus a labor input of 9 hours per day of the year, for paid labor alone, seems to have been the norm in England by 1800.

To put this work efforts in context, time studies that include study, housework, child care, personal care, shopping and com

[61] Clark, 2005.

[62] Voth, 2001, 1074.

Table 3.12 Male Labor Hours per Day[63]

Group	Group or Activity	Hours
Tatuyo[k]	Shifting cultivation, hunting	7.6
Mikea[i]	Shifting cultivation, foraging	7.4
Ache[b]	Hunting	6.9
Abelam[a]	Subsistence agriculture, hunting	6.5
!Kung[g]	Foraging	6.4
Machiguenga[h]	Shifting cultivation, foraging, hunting	6.0
Xavante[f]	Shifting cultivation, hunting	5.9
Aruni[c]	Subsistence agriculture	5.2
Mekranoti[f]	Shifting cultivation, hunting, foraging	3.9
Shipibo[j]	Subsistence agriculture, fishing	3.4
Bemba[d]	Shifting cultivation, hunting	3.4
Hiwi[e]	Hunting	3.0
Yanomamo[k]	Shifting cultivation, hunting, foraging	2.8
Median		**5.9**
Britain, 1800[n]	Farm laborers, paid labor	8.2
England, 1800[o]	Building Workers, paid labor	9.0
London, 1800[p]	All Workers	9.1
UK, 2000[q]	**All, 16-64**	**8.8**

muting suggest that modern adult males (16-64) in the UK engage in 3,200 hours of labor per year (8.8 hours per day). Thus work efforts in England by 1800 were at modern levels.

63[a]Scaglion, 1986, 541. [b]Kaplan and Hill, 1992. [c]Waddell, 1972, 101. [d]Minge-Klevana, 1980. [e]Hurtado and Hill, 1987, 178-9. [f]Werner et al., 1979, 311 (food only). [g]-----. [h]Johnson, 1975. [i]Tucker, 2001, 183. [j]Bergman, 1980, 209. [k]Lizot, 1977, 514 (food only). [n]Clark and van der Werf, 1998. [o]Clark, 2005, 1322. [p]Voth, 2001. [q]UK, Office of National Statistics, Time Use Survey, 2000.

The term *Industrious Revolution* was coined by Jan de Vries, who argued that the high labor hours of Industrial Revolution England were a new phenomenon, created by the increase in variety of consumption goods available.[64] Voth in support finds evidence that work hours in London were much lower in 1760. However, the evidence of building workers hours in table 3.11 shows no evidence of any rise in the length of the workday in the eighteenth century. Evidence from the English farm sector suggests a much slower and less dramatic increase in hours. Hours were already high in agriculture by 1770.[65] Despite popular images of the Industrial Revolution herding formerly happy peasants into a life of unrelenting labor in gloomy factories, this transition seems to have occurred significantly before the Industrial Revolution rather than as a result of it.

Anthropologists have long debated how much work people had to do to achieve subsistence in pre-industrial societies.[66] The earlier anthropological tradition assumed that hunter gatherers lead hard lives of constant struggle to eke out a living. The Neolithic agricultural revolution, by increasing labor productivity in food production, reduced the time needed to attain subsistence, and allowed leisure, craft production, religious ceremonies and other cultural expressions.

However, the innovation of systematic time allocation studies of hunter-gatherer and subsistence cultivation groups in the 1960s, showed labor inputs in these societies to be surprisingly small. For example, the Hiwi, a foraging group from Venezuela, consumed a modest 1,705 kilocalories per day and often complained

64 De Vries, 1994.

65 Clark and van der Werf, 1998.

66 See, for example, Gross, 1984.

of hunger. Yet men would generally forage for less than 2 hours per day, even with high returns from each hour of work.[67]

Indeed work time in these societies is considerably less than in settled agrarian societies. Table 3.12 also shows estimates of the total work input of males per day in modern societies where foraging or hunting were still significant activities. For these societies median hours of work per day by males, including food preparation and child care, were just 5.9, or 2,150 hours per year. Thus males in these subsistence societies consume at least 1,000 hours more leisure per year than in affluent modern Europe.

Such low work inputs need not be maladaptive for foragers. Ecologists have calculated how many hours a day various bird and mammal species engage in "work" - foraging, moving, defending territory or even socializing – as opposed to resting. If we just take the species closest to man – apes and monkeys – work hours per day averaged only 4.4.[68]

The typical low work effort of subsistence societies helps explain why Polynesia appeared such an idyll to European sailors, and why Captain Blyth had trouble getting his sailors on board again after their stay in Tahiti. The main food supplies in Polynesia were from breadfruit trees and coconut palms, supplemented by pig meat and fish. But all the labor that was required for the breadfruit trees and the palms was to plant the tree, tend it till it grew to sufficient height, and then harvest the fruits when ripe. Like the subsistence societies of table 3:11 the Polynesians apparently labored little.

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[67]Hurtado and Hill, 1987, 1990.

[68]Winterhalter, 1993, 334. Chimpanzees, the hardest working of the ape and monkey families, did work as much as modern man at 9 hours a day.

The Industrious Revolution and Welfare

Suppose a Malthusian economy where workers work 2,100 hours per year experiences an "industrious revolution" which increases labor inputs to the 3,200 hours per year typical of English workers in the Industrial Revolution period. What is the long run effect of this on living standards? Figure 2.7, showing the effects of a technological advance in the Malthusian era actually covers this situation also. Higher labor inputs would generate higher annual material output, and thus a short run situation where births exceeded deaths, and hence population growth. Eventually with enough population growth the economy would again attain equilibrium, with the same annual real income as before, but workers now laboring 3,200 hours per year for this annual wage as opposed to the previous 2,100 hours.

Indeed a community which had cultural norms which prevented people from working more than 1,900 hours per year would be better off than one where people were allowed to work 3,200 hours. The prohibitions of work on Sundays and Holy Days by the Catholic Church, or of work on the Sabbath in Judaism, improved welfare in the pre-industrial era. More enforced holidays would have made living conditions even better.

In comparing forager living standards with those on the eve of the Industrial Revolution we need to make some correction for this difference in hours. Another way to measure the real living standards of people in 1800 relative to those of the pre-documentary past is to consider the number of kilocalories such societies produced per hour of labor when producing their major food staples. This is a measure of their consumption possibilities as opposed to their realized consumption, which depends also on hours of work.

The surprise here is that while there is wild variation across forager and shifting cultivation societies, many of them had food production systems which yielded much larger numbers of calories per labor-hour than the English agriculture in 1800, at a time when labor productivity in English agriculture was probably the highest in Europe. In 1800 the total value of output per man-hour in English agriculture was 6.6 d., which would buy 3,600 kilocalories of flour, but only 1,800 kilocalories of fats and 1,300 kilocalories of meat. Assuming English farm output was then half grains, one quarter fats and one quarter meat this implies 2,600 calories output per worker-hour on average. Since the average person eats 2,000 kilocalories per day, this means each farm worker could feed 13 people, so labor productivity was very high in England.

Table 3.13 shows in comparison the energy yields of foraging and shifting cultivation societies per worker-hour. The range in labor productivities is huge, but the minimum average labor productivity, that for the Ache in Paraguay is about 2,000 kilocalories per hour, not much below England in 1800. And the median yield per labor hour is 4,500 kilocalories, nearly double English labor productivity.

Some of the reported labor productivities are astonishing, such as for shifting cultivation of maize by the Mikea of Madagascar. These societies, many of them engaging in the most primitive of cultivation techniques, thus typically had greater potential material outputs, at least in food production, than England on the eve of the Industrial Revolution. For example, the Peruvian Shipibo's staple crop, providing 80 percent of their calorie intake, was bananas cultivated in shifting patches of forest land. The technique of cultivation was extremely simple. The land was burned, and the larger trees felled. Banana seedlings were planted

Table 3.13 Calories produced per worker-hour, Forager and Subsistence Societies versus England, 1800.[69]

Group	Location	Staple Foods	Kcal. per hour
Mikea[f]	Madagascar	Maize	110,000
Mikea[f]	Madagascar	Tuber foraging	1,770
Mekranoti[d]	Brazil	Manioc, Sweet Potato, Banana, Maize	17,600
Shipibo[g]	Peru	Banana, Maize, Beans, Manioc	7,680
Xavante[d]	Brazil	Rice/Manioc	7,100
Machiguenga[e]	Peru	Manioc	4,984
Kantu[c]	Indonesia	Dry Rice	4,500
Hiwi[b]	Venezuela	Game (men)	3,735
Hiwi[b]	Venezuela	Roots (women)	1,125
Ache[a]	Paraguay	Palm fiber, shoots (women)	2,630
Ache[a]	Paraguay	Game (men)	1,340
Foragers, median			**4,740**
England, 1800		Wheat, milk, meats	2,600

among the fallen trees and stumps. The land was periodically weeded to prevent weeds choking out the banana trees. Yet in these tropical conditions the yield was more than 60 lbs of

69 [a]Kaplan and Hill, 1992. [b]Hurtado and Hill, 1987, 178. [c]Dove, 1984, 99. [d]Werner et al., 1979, 307. [e]Johnson, 1975. [f]Tucker, 2001, 183. [g]Bergman, 1980, 133.

bananas (15,000 kilocalories) per labor-hour. This is just an illustration once more of the Law of Diminishing Returns. With a vast land area at their disposal even foragers with a very primitive agricultural technology can have very high outputs per worker.

These foraging and shifting cultivation societies were typically not materially more wealthy simply because their labor input was on average only about 60 percent of that of England in 1800. Whatever material prosperity the English had in 1800 was wrested from the soil by hard work and long hours. The evidence seems to be that Marshall Sahlins was substantially correct when he controversially claimed that foraging and swidden societies had a form of "primitive affluence," which was measured in the abundance of leisure as opposed to goods.[70]

Thus if anthropologists are correct about the low labor inputs of hunter-gatherer societies then while we would expect material living standards to be the same between 10,000 BC and 1800 AD, real living conditions probably declined with the arrival of settled agriculture because of the longer work hours of these societies. The Neolithic agricultural revolution did not bring more leisure, it brought more work for no greater material reward.

That still leaves a puzzling question to address. Why as the Industrial Revolution approached had labor inputs in some societies increased so much? This is addressed in chapter 9.

Asia Versus Europe

European travelers of the seventeenth and eighteenth centuries routinely reported that Chinese and Indian living conditions were below those of northwest Europe. This is assumed in both

[70]Sahlins, 1972.

Smith and in Malthus. While a recent collection of historians, called oddly enough the California School, has argued that living conditions in Asia were just as good as in northwest Europe, the evidence presented above contradicts this.[71] Both in terms of wages, stature, diet, and occupations Japan, China and India seem much poorer in 1800 and earlier than Europe. This conclusion is backed by evidence on the incidence of famines in England versus Japan. The last significant nationwide famine to strike England was in 1315-17, when the grain harvest across northern Europe failed for two years in a row. After that tough there were local dearths, famine deaths on a national scale were negligible, even though the central government did little to promote grain storage for scarce years. In contrast Japan in the Edo period (1603-1868) witnessed at least seven nationwide famines. Those of 1783-7 and 1833-7 are both estimated to have killed more than 4 percent of the population.[72]

There are suggestions in the genetic data that this disparity in living standards between Europe and East Asia may stem back over thousands of years. Hunter-gatherers consume meat, but not milk. Thus arrival of settled agriculture with animal domestication created the possibility of large scale consumption of milk from animals for the first time. However, people at very low income levels do not typically consume many dairy products. Milk, butter and cheese are all expensive ways of getting calories, much more favored by the rich. Grains and starches are much cheaper calorie sources. Geographic factors that make the relative cost of production of animals and arable crops also play some role, but in general only relatively rich pre-industrial agrarian economies would consume milk regularly.

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[71] See, for example, Pomeranz, 2000.

[72] Jannetta, 1992, 428-9.

Consequently populations that never developed settled agriculture, such as Australian Aboriginals, almost all lack a genetic mutation that permits adults to digest lactose. In contrast people from northwest Europe almost all have this mutation. However the Chinese, despite the very long history of settled agriculture and the variety of climate zones within China almost all lack the mutation that creates lactose tolerance, suggesting that milk was never a large part of the Chinese diet.[73]

Conclusion

There is ample evidence in the historical and skeletal record to support the key contention of the Malthusian model. Living conditions before 1800 were independent of the level of technology of a society. But living standards did vary substantially across societies before 1800. Medieval Western Europe, for example, in the period between the onset of the Black Death in 1348 and renewed population growth in 1550, was extraordinarily rich, rich even by the standards of the poorest economies of the world today. Polynesia before European contact also seems to have been prosperous. In contrast China, India and Japan in the eighteenth and nineteenth centuries appear to have been very poor. Chapters 4 and 5 consider the causes of these variations, which lay in the determinants of fertility and mortality.

[73] Stinson, 1992.