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9 Paradoxes of Modernization and Material Well-Being in the Netherlands during the Nineteenth Century

J. W. Drukker and Vincent Tassenaar

9.1 Introduction

In the following chapter we will attempt to sketch the pattern of modernization in the Netherlands during the nineteenth and early twentieth century, with special emphasis on the questions of when and how the material conditions of the Dutch people were affected by modernization. We will focus on two points: First, we will try to establish a time pattern for the whole country showing when conditions improved or deteriorated. Second, we will look at regional differences within this time pattern. Now and then we will interrupt our story to speculate on possible explanations for the—in our opinion—rather surprising specific relative regional shifts in material well-being. Of course, these possible explanations are no more than very hypothetical attempts to relate

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The authors are grateful for permission granted by E. Horlings to use data on the Dutch population first presented in Horlings (1993) and by E. Horlings, J. P. Smits, and J. L. van Zanden to use data on Dutch national income first presented in Horlings, Smits, and van Zanden (1995). The authors emphasize on behalf of Horlings et al. that these figures are very preliminary and are not the official results of the Historical National Accounts Project of the Posthumus Instituut.

our findings in some way to the more general “optimists versus pessimists” controversy on the early consequences of modernization for the standard of living (see, e.g., Mokyr 1988).

9.2 The Netherlands in the Nineteenth Century: A Retarded Late-Comer

Most foreign economic historians who have not given special attention to the economic and social history of the Netherlands after the so-called Golden Age (approximately 1600–1675) will probably have a distorted picture of the nation at the beginning of the nineteenth century. Of course, there is unanimous agreement that during the first three-quarters of the seventeenth century, the “Republic of the Seven United Provinces” was both the richest country in the world (measured in real income per capita) and a very “modern” country (characterized by high average labor productivity, a high rate of urbanization, a high stage of economic specialization, and a fair amount of large-scale, market-oriented agriculture; see, e.g., Maddison 1982, esp. 29–34). There is also no disagreement on the point that the Netherlands is today, in the last quarter of the twentieth century, again among the richest countries on earth. This is suggested not only from an orthodox economic point of view (real per capita income), but also by factors that a social biologist would probably prefer: average life expectancy is very high, child mortality belongs to the lowest known figures, and last but not least, the Dutch are among the tallest people in the world. For nonspecialists, therefore, it sometimes comes as a surprise that this “splendid position at the top” has not always been a characteristic feature of Dutch society in the period between the Golden Age and the present day. On the contrary, there are strong indications that in the early nineteenth century the Netherlands was a retarded nation, far more backward for instance than Belgium. So something must have gone wrong somewhere between the last quarter of the seventeenth century and the early nineteenth century. Although there is no dispute *that* something went wrong, *what, when, where, and why* things went wrong are still hotly debated issues in Dutch economic history. It is, for instance, not clear whether the Dutch economy underwent an absolute decline in the eighteenth century, or whether there was a long period of stagnation while other nations improved their lots substantially during the same years. This last view was put forward by de Vries in 1959, and it is still widely accepted (de Vries 1959). It is at least not contradicted by Maddison, who estimated that, although real income per capita around 1700 had been 50 percent higher in the Netherlands than in the United Kingdom, Dutch GDP showed a very slight decline (less than 1 percent) between 1700 and 1760 while the English figure almost doubled during the same years (Maddison 1982, appendix A, table A4). Although Dutch labor productivity was still roughly equal to the U.K. level as late as 1785 (Maddison, 1982, 30, graph 2.1), the United Kingdom was at that very moment on the verge of a soaring

secular rise in productivity, while stagnation continued in the Netherlands for well into the nineteenth century, producing remarkable features of a retarded, aging "rentier society": "In 1790 . . . foreign investment was probably over three times the size of the domestic product. . . . As a result of this, the income distribution was disequalized, with pauperism and unemployment in the old industrial areas, and an increase in the share of the wealthy" (Maddison 1982, 33).

It was not before the second half of the nineteenth century that modernization took hold of the Dutch economy. When it finally did, it was not—as one might have expected—in the most urbanized region of the nation, the few large cities in the western provinces, Noord- en Zuid-Holland, that had been the core of the Republic in the seventeenth century. Industrialization started in the most traditional and rural areas of the nation: in the southern province of Noord-Brabant and an area called "Twente" in the eastern part of the province of Overijssel (Mokyr 1976). Serious modernization of the urbanized regions in the west started even later, at a time when the "infant industries" in Brabant and Twente were well on their way into puberty. A boom in infrastructural modernization, for instance, occurred between 1862 and 1885. Here the locus of investment activity was indeed first concentrated in the western parts of the nation, with central government playing a decisive role, aimed at improved connections with the sea for the main ports, Amsterdam and Rotterdam, an improved intraurban transport system, and efficient connections with the important industrialized German regions east of the border (Groote 1995). How this retarded process of modernization affected Dutch national income will become clear in the near future: a large-scale research project, intended to reconstruct on a yearly basis Dutch national accounts in the nineteenth century, was started some years ago in a cooperative effort by three teams of economic historians from the universities of Utrecht, Groningen, and Nijmegen under the guidance of the "Posthumus Instituut," the Dutch National Research Institute for Economic and Social History. Preliminary results of this project have been circulating among a limited number of interested scholars (Horlings, Smits, and van Zanden 1995).

What are the main reasons for the retarded modernization process of Dutch society in the nineteenth century? The answer to that question sounds like a classical paradox: the main reason is, it seems, that the Netherlands were already remarkably "modern" at a time when other European countries (like Belgium or Germany) were on the verge of a transformation process from a premodern society to a modern one, characterized (among other things) by rapid industrialization. By and large, this "premodern modernity" was the lasting result of Holland's Golden Age. De Vries, for instance, has argued that the delay in the construction of Dutch railways was mainly caused by the existence of a remarkably efficient "premodern" Dutch transport system: canals and barges (de Vries 1981). It is well documented that, while the Dutch agrarian sector had already been among the most productive in the world in the seven-

teenth century (de Vries 1974), Dutch farmers continued to improve on productivity during the years of decline and stagnation in the rest of the economy, with the result that “by the end of the eighteenth century, Dutch peasants had acquired a level of knowledge that could not be improved upon at the time” (van der Poel 1972, quoted by Mokyr 1975, 294, n. 4). There existed a very rich rentier class (another leftover of the Golden Age), which suggests that there was never a shortage of funds to finance a “timely” process of industrialization. The point was simply that these rentiers profited from modernization processes elsewhere in Europe by foreign investment. As Joel Mokyr has aptly put it: “The reason the Dutch industrialized so slowly was simply that they did not need the modern industry. After all, why should they have undertaken large investments in industry, not to mention all the unpleasant side-effects thereof, while they could make in general a good living out of agriculture and what was left over of the maritime sector” (Mokyr 1975, 298).

So, with the present state of affairs, we know now, more or less accurately, *when* modernization started in the Netherlands, *where* it started, and *how*. We will know in the near future, when the results of the Historical National Accounts Project are published, *what* quantitative effects modernization exactly had on the level of economic activity on a year-to-year basis. We know a lot less—in fact very little—about how the material circumstances of the Dutch people were affected by the retarded modernization process. It is here that we come across many problems and apparent contradictions, which we summarized above in the phrase “what, where, when, and why things went wrong.”

As we have already stated, there is no controversy on the point that in the heyday of the Republic, not only rich merchants profited from the fact that Holland was the richest country in the world; laborers, craftsmen, and peasants were also well off compared with their colleagues in other countries at the time. The same holds for the 1960s, the period that was nicknamed by Maddison the “Golden Age of Managed Capitalism,” when the Netherlands not only enjoyed high real income per capita, but was—together with the Scandinavian countries—also among the Western countries with the lowest inequality in income distribution, due to its very redistributive tax system. With the return to neoliberalism in the 1980s, and the preceding shift in the Netherlands from having traditionally been a net emigration country to becoming a net immigration country, the problem of poverty has returned as a serious issue on the Dutch political agenda, but no one denies that the problem of poverty in the nineteenth century was so completely different in nature from the present situation that it defies any reasonable comparison.

9.3 Paradoxes in the Dutch Standard of Living Debate

What, then, are the main problems and contradictions concerning the assessment of the pattern of changing material circumstances of the Dutch population in the nineteenth and early twentieth centuries, apart from the central issue

that the Dutch people lived both in the seventeenth century (and probably also during a good part of the eighteenth) and in the 1960s apparently under—for the time—very favorable circumstances, while their fate is much less clear during the years in between? Let us try to summarize in the first place, two paradoxes in this field: the first is that the Netherlands was famous for its high level of wages not only during the golden years of the Republic (which is understandable, given the high level of productivity at that time), but also during the years of stagnation or decline. This was probably the result of an elaborate system of poor relief that was (it goes without saying: for the time) considered exceptionally generous: “[In the early 1820s] the average pauper in the Netherlands received *three times* the support of his Belgian counterpart” (Mokyr 1975, 293; emphasis added). Although, as Mokyr states, the high level of wages hampered early industrialization, it is also clear that high wages and generous relief in itself would have mitigated a deterioration of the standard of living, in spite of its detrimental effects on a rise in productivity in the long run.

But how, then, can we explain the fact that in the same period (say, from the end of the eighteenth century well up into the second half of the nineteenth) pauperism and a sharp decline in the material conditions of a great majority of the people were considered by a multitude of contemporary observers to be among the most pressing social problems of the time? What else than a deep concern for the public health situation could have inspired the Dutch government to create in 1818 a complete national health monitoring system, essentially consisting of Provinciale Commissies van Geneeskundig Toezicht (Provincial Committees for Medical Control and Prevention), an integrated system of regional teams of medical doctors whose tasks were to supervise medical practice, to set professional exams for general practitioners entering the profession with a less than university background, to control the quality of poor relief, and to report on (and, if possible, control) the spread of epidemic diseases (Houwaert 1993, 19–45, esp. 19–25).

It would be a mistake to interpret the installation of these committees by the government as in itself evidence that common health care was of prime governmental importance. At least during the first years after the installation of these committees, their reports were never seriously analyzed at a central governmental level, nor is there anything known about a national health *policy*, coordinated by the different chairmen of these Provinciale Commissies and based on conclusions from their reports. The fact that the epidemic situation in the Netherlands was a rather stable one during the first two decades of the nineteenth century may serve as a partial explanation for this apparent neglect of health policy on the part of the government. However, things changed dramatically during the 1830s and 1840s. Because of consecutive crop failures and the following years of increasing misery and hunger, the incidence of smallpox suddenly increased, followed in the 1840s by an epidemic of typhoid fever. Together with the sudden appearance of cholera in the Netherlands in 1832 and 1848, its spread being completely enigmatic and erratic in light of

generally accepted medical views at the time, the deteriorating situation caused panic among the population and laid bare the almost complete absence of adequate general health policy.

It was in these years of rapidly worsening health conditions that a group of young medical doctors, working mainly among poor people, and calling themselves “Hygienists,” called for action and, in the course of time, gained influence. They asked for a radical reform of the public health system in which a general improvement of sanitary and dietary conditions was of central concern. Apart from that, they developed a completely new vision of the medical discipline: that it could be improved by elaborate statistical investigations into the living conditions of the people. It was the results of these investigations that indicate that material circumstances in general were indeed rapidly worsening in the Netherlands during the 1830s and 1840s, as we will show in the following sections.

Another apparent contradiction concerning the development of Dutch living standards applies to the circumstances of people living from agriculture. We have already pointed to the fact that, even during the era of stagnation or decline, it was not agriculture in the first place that suffered from worsening conditions: “During the French period, agriculture was the only sector that was not subject to a severe crisis, and appeared the most advanced in Europe with respect to technical knowledge. The period after 1813 is described as one of increasing prosperity for peasants, of technological progress and continuous investment in land improvement and augmentation” (Mokyr 1975, 294). We do not disagree with Mokyr’s general picture, but the same picture is hiding some nasty problems concerning the development of the standard of living in the Dutch agricultural community.

In the first place, one should not forget that, according to contemporaries, the material situation of peasants in at least some of the agricultural provinces (Drenthe, Gelderland, and parts of Overijssel and Noord-Brabant are notorious in this respect) was so bad in the nineteenth and early twentieth centuries that it was commonly described as “inhuman.” Until the present day, a well-known Dutch proverb states that the people of Drenthe have been “labouriously wrought from peat, gin, and suspicion,” which sounds a bit less arcadian than Mokyr’s description. But even if one is not willing to lend uncritical support to contemporary commentaries, abundant in number and congenial as they may be, one could point to the fact that even Mokyr needs some “Verelendung” (pauperization) among the peasants in order to get his explanation of the industrialization process in the Netherlands (Mokyr 1976) firmly rooted in the historical ground. At the core of Mokyr’s view, after all, is the observation that Dutch industrialization—when it finally took off—started in Noord-Brabant and the Twente region of Overijssel: typical rural-traditional regions characterized by a relatively low wage level. Low wages were needed to ensure high profits, while high profits were needed to lure domestic capital out of foreign investment into domestic industry. However, what was true for the new entre-

preneurs was in another sense also true for the workers. When Mokyr correctly observes the Dutch rentier or capitalist's reluctance to spend his money on domestic industry, the same must have been true for peasants: why should *they* have entered the low-wage labor market as industrial workers (for whom the side effects were even more unpleasant), if it was not for the one good reason that they could *not* make a living out of agriculture anymore? In other words, Mokyr's view of Dutch industrialization in itself implies that something must have gone wrong (in an absolute or relative sense) with the living conditions of the peasants in the area where and the years during which the new industries were born.

In the rest of this paper, we will try to shed some light on these issues. We do realize, however, that the limited scope of this paper, and the fact that there is at this very moment a wealth of undiscovered historical materials hidden in the archives, will ensure that much will remain shrouded in mist. Before we jump into the figures, however, it seems wise to interrupt our discourse for a moment to say something about the pattern of regional variation in the Netherlands. For regional differences are of core importance in an explanation of the Dutch pattern of changing living conditions in the nineteenth and early twentieth centuries.

9.4 The "Three" Netherlands: Regional Differentiation

There are two good reasons why the Netherlands is one of the very few countries that is written as a plural. The first is, of course, that the name is a historical reminder of the fact that the nation started as a union of different and, politically speaking, rather independent provinces, as is indicated in its first official name, "Republic of the Seven United Provinces." The second reason is that, small as the country is, there were—and, to a certain degree, still are—large regional differences in physical geography, economic structure, and social conditions (see map 9.1). And although the pattern of regional differentiation could be refined, no doubt without end, the crudest, but also most common regional division is threefold: urban, modern agricultural, and traditional rural. The urban region consists of the provinces of Noord-Holland and Zuid-Holland and is characterized by relatively large towns, some of which were known as centers of urban industry as early as the Middle Ages but declined substantially thereafter (like Delft or Leyden) while others gained their reputations as international ports during the Golden Age of the Republic (like Amsterdam or Rotterdam). Together with the province of Zeeland in the southwest, Noord- and Zuid-Holland constituted the core of the maritime empire in the seventeenth century. Of course, agriculture also existed in Holland and Zeeland in the days of the Republic, and it continued to do so when the waning of the Dutch empire set in: agriculture in these regions was dominated by horticulture and advanced dairy farming. With the decline of the seaports of Zeeland (e.g., Middelburg and Veere) after the seventeenth century, agriculture



Map 9.1 Urban, modern agricultural, and rural traditional regions in the Netherlands in the nineteenth century

grew in relative importance, so that at the beginning of the nineteenth century, Zeeland was generally considered to belong to the modern agricultural regions, of which the other part is to be found in the northern provinces of Groningen and Friesland. Large-scale, specialized, market-oriented, “capitalistic” agriculture, dairy farming, and animal husbandry dominated the picture in these regions as early as the seventeenth century and continued to do so in the following centuries, in fact up until the present day. Broadly speaking, the modern urban and modern agricultural provinces of the nation consisted of rich, alluvial soils, while the rest of the country, the traditional rural provinces of Drenthe, Overijssel, Gelderland, Utrecht, Noord-Brabant, and Limburg, located in

the east and southeast, were characterized by poor, diluvial soils. It is important to realize that the famous “modernity” of the seventeenth-century Republic hardly applied to these so-called land provinces. In fact, these regions were more or less isolated from the rest of the country, except for the interregional export of peat, the main industrial fuel. A traditional rural economy dominated the picture on a smaller scale. Local and regional markets played a more important role than national—let alone international—markets, and the system in general was more geared to self-sufficiency, especially during times when market prices deteriorated. This traditional system persisted during the nineteenth and even during the first decades of the twentieth century. In the second half of the nineteenth century, it was in parts of this traditional rural economy that Dutch industrialization started, but it is important to realize that industrialization became dominant only in a tiny fraction of the eastern and southern provinces (the aforementioned areas of Twente and Noord-Brabant), while by far the largest parts of these regions were hardly touched by modern industry and urbanization. Indeed, even at the beginning of the twentieth century, the great majority of the counties in the traditional rural provinces of the Netherlands could not be characterized as “modern” by any standard.

This peculiar regional differentiation played an important part in the specific pattern of modernization of the Netherlands in the nineteenth century, as we will show. Let us look first, however, at the national picture.

9.5 The Dutch Pattern of Heights, 1817–1940

Although quantitative data for reconstruction of the development of the material circumstances of the Dutch population in general are rather limited and often of a scattered nature, this does not apply to data on the height of conscripts. Brinkman, Drukker, and Slot (1988) published the median heights of Dutch conscripts on a yearly basis from 1863 up to 1940, based on national height distributions. These data were revised (and for some years corrected) by Mandemakers and van Zanden (1990, 1993). Although earlier authors (e.g., de Meere 1982) were convinced that in these national data conscripts coming from the upper social echelons of society were underrepresented, Brinkman, Drukker, and Stuurop (1989) demonstrated that these figures reflected accurately the whole male population at the age of conscription.

Yearly figures on the median height of conscripts can, however, be extrapolated even further back in time by using fairly large samples collected by Oppers (1963). Oppers collected samples of the average height of boys at the age of conscription for consecutive conscription years between 1817 and 1896 from town archives in the cities of Groningen and Goes (modern agricultural regions), Assen, Nijmegen, and Roermond (traditional rural regions), and Rotterdam and Leyden (urban regions). Sample size differed from 312 observations in total for 1817 to more than 900 observations at the end of his research period. The overlapping period (1863–96) between Oppers’s selected town

samples and the national median heights was used to run a simple regression equation, and the results were used to estimate median height for the years 1817 up to 1892 (for details on calculations see the appendix). Some suspicion is warranted as far as the accuracy of the series of median heights estimated from Oppers's town samples is concerned: as we shall demonstrate, there are indications that health conditions in Dutch cities in the first half of the nineteenth century were generally worse than in the countryside, but that this contrast gradually faded away, and finally reversed during the second half of the century. This is, for instance, suggested by the changing pattern of regional differences in mortality (see fig. 9.9, below). This pattern is in itself no great surprise: Mokyr and Ó Gráda, for instance, found similar differences for Dublin and London (Mokyr 1988; Mokyr and Ó Gráda 1994). If it is true that conscripts coming from the countryside are absent from Oppers's samples, or at least severely underrepresented (this seems plausible from the text, but Oppers is not completely clear on this point), then one should expect the figures before 1863 to be somewhat downward biased. The high degree of covariability between the national median and the median estimated from Oppers's samples for the overlapping years 1863–96, however, strongly suggests that the pattern of rising heights from 1818 up to 1830, and rapidly declining heights thereafter, which is displayed by the estimated median heights for the years 1818–63, accurately reflects the national movement over time.

From figure 9.1, where the results of this analysis are summarized, a clear picture of growth, stagnation, and decline in national height can be deduced.

The first phase, 1817–30, is a bit surprising: This period falls definitely in the premodern era of the Dutch economy. Nevertheless, the data show a continuous and remarkably sharp rise in median height. Apparently, even during years of economic stagnation, substantial improvements in the material circumstances of the population could be realized. We will return to this curious phenomenon to speculate on a possible explanation.

From 1830 up to 1857, a sharp and continuing decline manifests itself. We should keep in mind, however, that the figures represent median height at the year of conscription, so that the data reflect some deterioration in the material circumstances *during the years before* actual measurement, rather than deterioration *in the year of* measurement: Conscripts did not suddenly “shrink” because circumstances worsened in the year they were measured. Nevertheless, if we are asking ourselves what, when, where, and why things went “wrong” with the Dutch living standard, the years between 1830 and somewhat before 1857 are apparently the years that we should concentrate on first.

In the years from 1857 up to 1887, steady improvement of the material conditions of the Dutch population can be inferred from the steep rise in median height. According to these figures, however, it was not before the end of this period that the stature of Dutch conscripts equaled that of their counterparts in 1830. There is a controversy among economic historians as to whether the

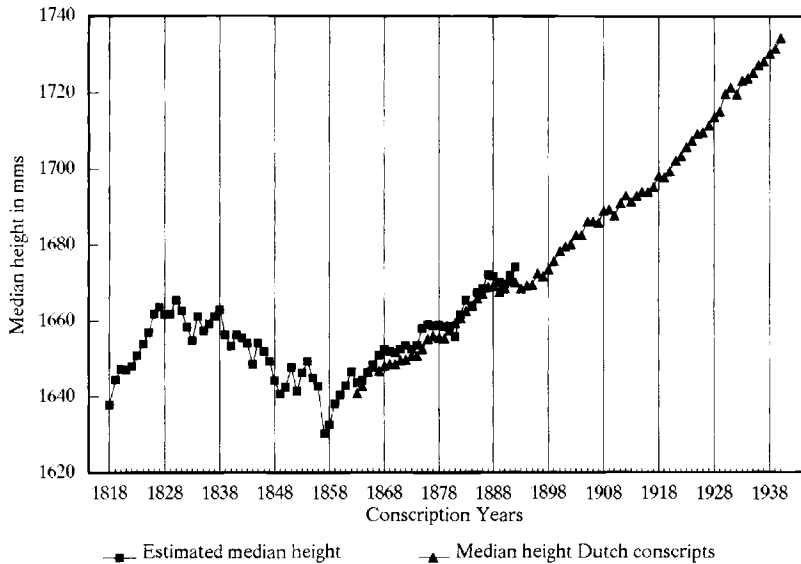


Fig. 9.1 Median heights of Dutch conscripts, 1818–1940

Note: See table 9A.1 for data.

Dutch economy experienced an absolute decline or merely a period of stagnation during the first half of the nineteenth century. The answer from the viewpoint of standard of living must be, it seems, that material circumstances deteriorated so badly (in an absolute sense) after the third decade of the nineteenth century, that it took only a little less than half a century to regain the level of the late 1820s.

A 10-year period of stagnation is visible from 1887 up to 1897. Finally, a seemingly endless period of steadily rising heights presents itself from 1897 to 1940, interrupted only by three years of more than marginal decline: 1910, 1913, and 1932.

Now that we have a clear periodization of increase, stagnation, and decline in stature, the question arises as to what this national pattern means in comparative perspective. Just because it is an undisputed fact that the Dutch at the moment are among the tallest people on earth—the average height of 20-year-old Dutch boys was well over 183 cm in 1992 (on the scale of fig. 9.1, well above the top of the page)—the question of whether this has always been the case becomes interesting: If it is true, the presumed retardation and backwardness of the Dutch economy in the first half of the nineteenth century can have had surprisingly little effect on the living conditions of the Dutch people. If it is not true, the contemporary concern of the Dutch government and the Dutch “Hygienists” (Coronel 1862a, 1862b, 1862c; *Rapport der Commissie* 1869;

Zeeman 1861) about the extremely poor physical state of the Dutch population in the middle of the nineteenth century seems to be supported by comparative empirical evidence.

9.6 Have Dutchmen Always Been Giants?

Even a superficial glance at figure 9.2 reveals that there is a clear answer to the question in the heading of this section: No. Compared with their Italian and French counterparts, Dutch male adolescents started to become exceptionally tall some 20 years after the Netherlands began its recovery from the long period of declining stature of 1830–57. Comparison of Dutch and French heights up to 1857 suggests that the Netherlands were indeed hit by a sort of subsistence crisis in the period between 1830 and 1857: Dutch conscripts were much taller (some 2 cm) than French ones in 1835, but during the years thereafter, French height remained more or less stable, while Dutch height fell rapidly, with the result that Dutch conscripts were markedly smaller than their French colleagues in 1857 and 1858. When the years of recovery set in, Dutch and French conscripts remained for years more or less of the same stature because French conscripts also started to grow in the late 1850s. It was only after 1877 that the French and the Dutch growth figures started to diverge.

Rough comparisons with height figures of other countries confirm the point that Dutch conscripts were exceptionally small in the third quarter of the nineteenth century: The 15-year moving average height of 20-year-old Swedish

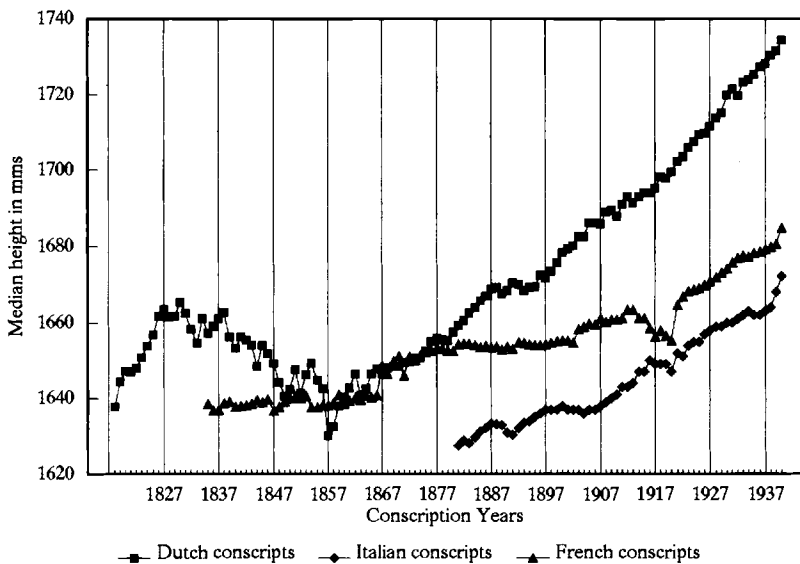


Fig. 9.2 Median heights of Dutch, French, and Italian conscripts, 1818–1940

Note: See table 9A.2 for data.

boys is well above 65 inches (i.e., 165.1 cm) for every conscription year between 1830 and 1870 (Sandberg and Steckel 1994), while the median height of 20-year-old Dutch boys is below the 165.0 cm level for each and every year between 1847 and 1873. In 1855 20-year-old Danish conscripts were on average 165.5 cm tall, while their Norwegian colleagues were even taller in the same year: 168.0 cm (Twarog 1994, 33, table 6), which means a difference of 1 and 3.5 cm, respectively, from the Dutch figure for that year.

The conclusion of this section is therefore straightforward: In the last quarter of the nineteenth century, the Dutch gradually became giants. In the preceding period, there had been times (e.g., around the end of the first quarter of the nineteenth century) when they were rather tall compared with other Europeans. During the intervening period (the second quarter of the nineteenth century), however, they were more or less dwarfed in comparative perspective, and it took them a long time (roughly, the third quarter) to recover from the apparently very poor living conditions that had prevailed during the foregoing years.

9.7 Population, Stature, Mortality, and the Price of Food

One should expect the pattern of changing material conditions suggested by the height data to be reflected in some way—at least in the premodern period—in the development of the Dutch population. Thanks to the work of Hurlings (1993), rather accurate yearly data on population and crude birth and death rates, both nationally and by province, have been made available for the nineteenth century. Concentrating first on the national figures, it is clear that the periodization of good and bad times, as suggested by the fluctuations in the median height of conscripts, is indeed rather accurately reflected in periods of demographic growth and stagnation until the middle of the nineteenth century (see fig. 9.3).

Years of demographic stagnation or near stagnation are visible from 1805 until 1815, interrupted by a severe demographic crisis in 1808. Although we lack information on stature for this period, it would surprise us if this period were characterized by rising heights. The contrary seems more plausible.

The second phase, from 1815 up to 1860, has to be split into different sub-periods. The first years (1815–24) were characterized by steady growth of the national population. The upward trend of the growth rate was reversed between 1825 and 1833, but increasing population growth returned thereafter (1834–45), until growth was suddenly halted by a serious subsistence crisis in the second half of the 1840s. The high rate of 1850 declined rapidly during the following years, as a result of which the 1850s overall must be seen as a decade in which population growth again gradually approached a near standstill in 1859.

The first phase of the Dutch demographic transition seems to have set in at the start of the 1860s, after which Dutch population seems to have grown at an ever increasing pace.

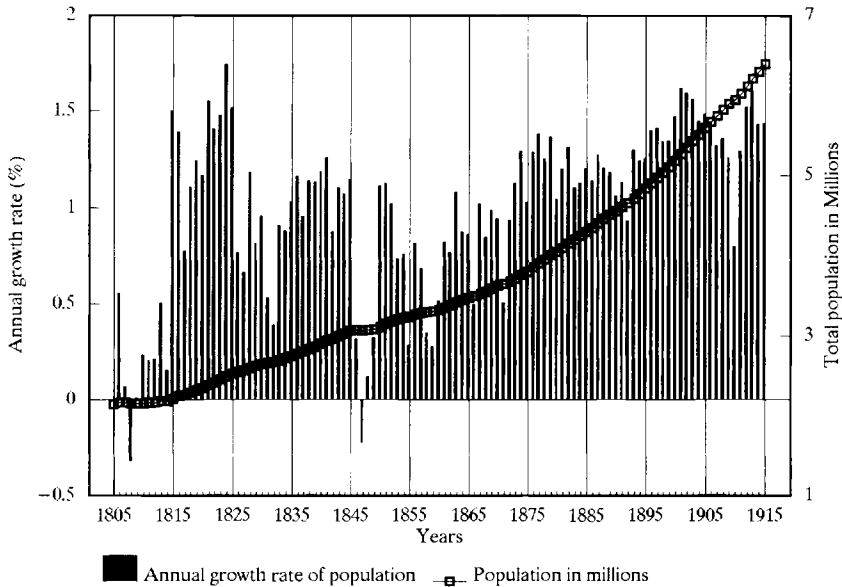


Fig. 9.3 Dutch population and population growth, 1805–1915

Note: See table 9A.3 for data.

There are some indications that the second phase of the demographic transition manifested itself somewhere around the end of the nineteenth century, but even as late as 1913, the growth rate was well above 1.5 percent per year, which seems surprisingly high in comparative perspective.

That the dawning of the demographic transition in the Netherlands started in the early 1860s is confirmed by the changing pattern of birth and death rates from 1860 onward (fig. 9.4). Before that year, both births and deaths displayed large and erratic fluctuations, although the deviations of the death rate around its trend are much greater (as expected) than those of the birthrate. It should be noted that both national rates for the whole period before the 1860s are typical for a premodern society in a demographic sense, including the recurrent demographic crises. After 1863, the birthrate stabilized quickly at the high level of around 35 births per 1,000 inhabitants per year, and around the same time the death rate started to decline, showing less erratic fluctuation from the last quarter of the nineteenth century onward. This is also the period during which the birthrate began to follow a slowly decreasing trend.

Should the demographic pattern of the Netherlands before 1860 indeed be seen as an important “sign of the times,” in the sense that the Dutch economy should be regarded up to at least the middle of the nineteenth century as a backward, retarded, stagnating, in one word, as a traditional society? That remains to be seen. If it were true, one would expect at least three things: First, in the absence of substantial increases in labor productivity, real wages should

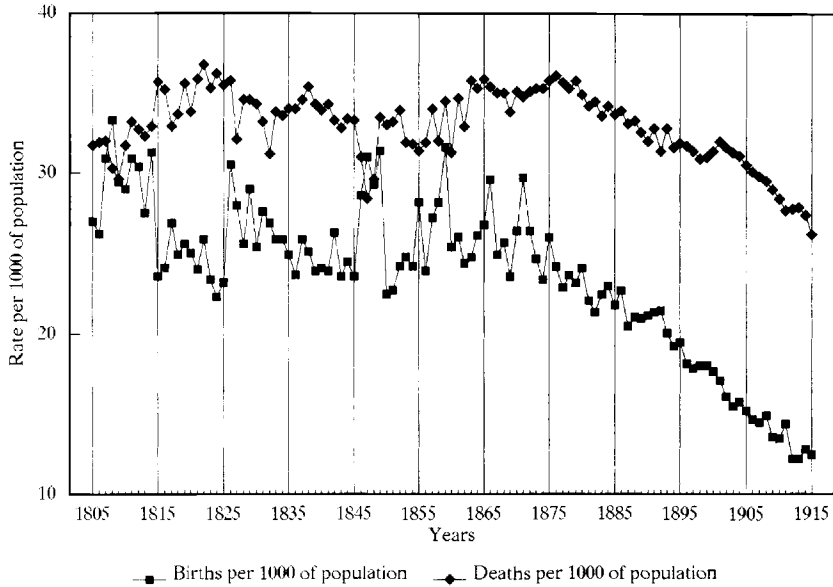


Fig. 9.4 Crude death rates and birthrates, 1805–1915

Note: See table 9A.4 for data.

fluctuate around some horizontal trend. Second, we should expect long-term fluctuations in population growth to at least roughly coincide with ups and downs in the standard of living, in the sense that some years of improving material conditions would be immediately reflected in an increase in the growth rate of the population and, vice versa, that a worsening of living conditions would mirror itself in a downturn in the growth rate of the population. In the third place, we should (following Pierre Goubert's dictum that in a premodern society the price of food is a precise demographic barometer) expect to find some evidence that demographic crises had indeed the character of subsistence crises, that is, that a rise in the long-term value of the price index for foodstuffs would be accompanied by an upward trend in the death rate.

It is not necessary to devote many new arguments here in defending the first point: It is a commonly accepted—and fairly well documented—fact that nominal wages remained remarkably stable from the middle of the seventeenth century onward up to the beginning of the 1860s (see, e.g., Noordegraaf 1980; Nusteling 1985). Recently, new national wage estimates for the period 1820–1913 (Vermaas 1995) were put forward, while Paping (1995) published new wage series for the northern, modern agricultural region of Groningen. Both series confirm the point mentioned above: nominal wages were fairly stable before 1860, and fluctuations in the real wage rate were therefore dominated by changes in the cost of living (cf. Horlings 1995, 197, graph 6.2).

If one is willing to accept yearly fluctuations of sex- and age-specific median

height as a sensitive proxy for changes in the standard of living, then, from figure 9.5, it seems that the second point cannot be denied: between 1817 and 1857, Dutch population growth and lagged median height—the value in a given conscription year reflecting *past*, not present, conditions—moved broadly in the same direction. Up to 1823 improving material circumstances were accompanied by increasing population growth. Then a long period of worsening conditions set in and lasted at least until the late 1850s, only interrupted by a small, short-term improvement between 1847 and 1852. During the same years, population growth gradually and steadily declined, almost to a complete standstill at the middle of the century.

Was it indeed a rising long-term death rate that caused the decrease in the population growth rate, and were shifts in the trend of the death rate dominated by a shifting trend in food prices? Figure 9.6 suggests that this was indeed the case, at least up to the 1830s. The trend of both the death rate and the price index of agricultural products fall sharply between 1810 and 1820, and together they rise again between 1825 and 1831. The pattern suggested by figure 9.6 is, however, less clear than the relationship presented in the previous graph. This is hardly surprising; no one will deny that factors other than the trend value of the price of food are also influencing the death rate. It is worth mentioning in this respect that these other factors seem to become of increasing importance as we move ahead in time: after 1833, the death rate continues to fall up to 1840, while food prices remain more or less the same. From 1840

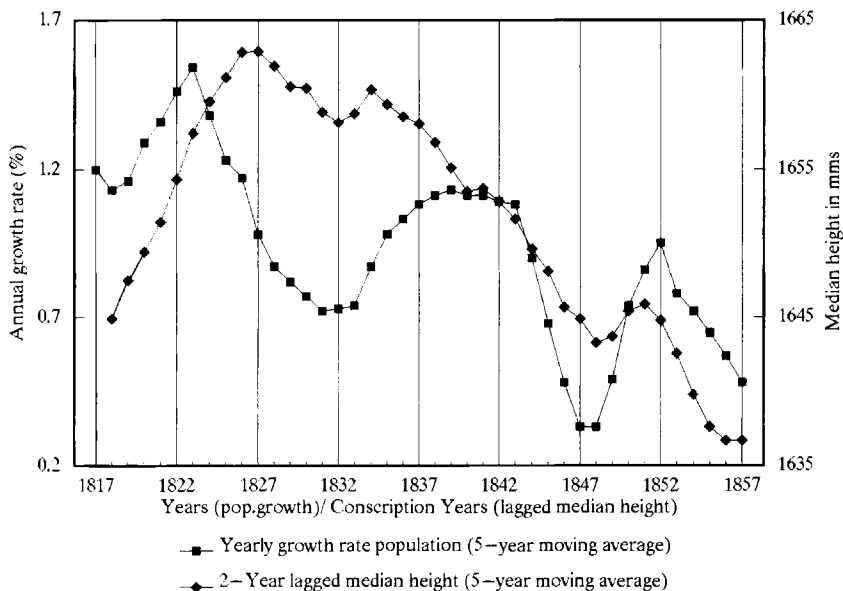


Fig. 9.5 Population growth and median heights, 1817–57

Note: See table 9A.5 for data.

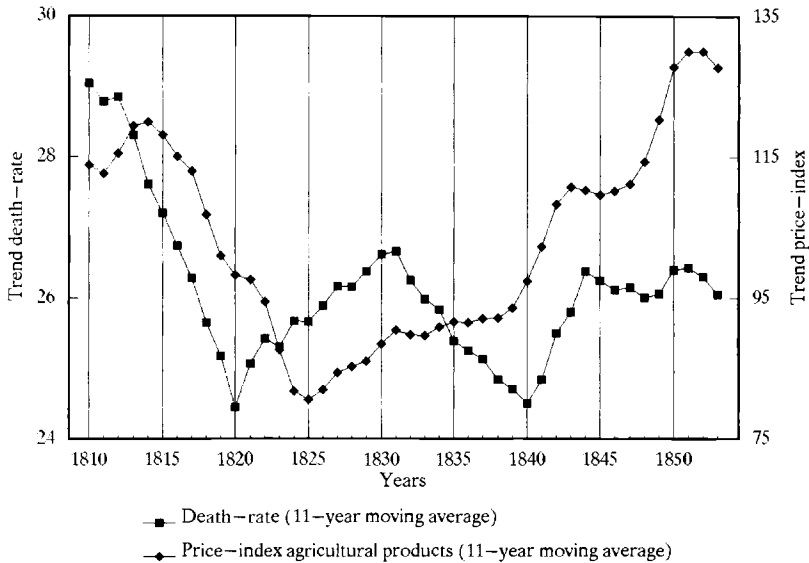


Fig. 9.6 Death rates and agricultural price indexes, 1810–53

Note: See table 9A.6 for data.

onward, rising food prices are again accompanied by rising death rates, but it is important to notice that the death rate in the meantime seems to have shifted to a substantially lower trend value: it does not return to its high level of the early 1830s, let alone its peak value of around 29 deaths per 1,000 in 1810.

Summarizing so far, we must conclude that Dutch society, seen from a national point of view concentrating for the moment on demographic aspects, and on sex- and age-specific height as a proxy for material conditions, presents itself, from the beginning of the nineteenth century up to 1860, in every aspect as a stagnant, retarded, and backward nation; it was a traditional society in the true sense of the word, showing for some subperiods serious signs (as seen from the sharply declining heights between 1830 and 1857) not only of stagnation, but of apparent decline. It is not inconceivable that some very small improvements in material conditions could be noticed during the 1840s (as seen from a marked fall in the trend of the death rate), but overall it seems safe to conclude that serious modernization did not start before the 1860s.

9.8 Real National Income and the Standard of Living: Two Paradoxes

Although it is, at the time this text is written, too early to make a detailed comparison between the development of real national income and the standard of living in the Netherlands for the whole of the nineteenth century, for the simple reason that accurate yearly estimates of Dutch national income will

only become available in the near future, with the results of the Dutch Historical National Accounts Project (cf. Horlings et al. 1995), it is too tempting not to speculate a bit on this relationship on the basis of some preliminary results of this project.

Recently, Horlings et al. (1995) published initial and—as the authors themselves stress—very preliminary yearly figures of Dutch GNP for the base year 1807 and the consecutive years 1850–1900. Given the recently published revised yearly population figures by Horlings (1993), the only thing missing in order to be able to calculate preliminary estimates of real income per capita for the same years is a proper GNP deflator. Although such a deflator has not yet been put forward, we can rely on an index of wholesale prices based on miscellaneous sources, published earlier by van Stuijvenberg and de Vrijer (1980), as a rough proxy. It is true that the accuracy of this series has been questioned, but a brand-new GNP deflator for the years 1800–50 published by Horlings (1995) suggests at the least that the van Stuijvenberg–de Vrijer series is probably more precise than most scholars would have guessed: Horlings's deflator sets the price level of GNP in 1807 at 179, compared with his base year 1850. Recalculating the van Stuijvenberg–de Vrijer index on an 1850 basis yields an average price level of 170 between 1805 and 1809 (cf. Horlings 1995; van Stuijvenberg and de Vrijer 1980, 9, col. 1).

A confrontation of these “guestimates” of real national income per capita, based on the nominal GNP figures published by Horlings et al., with the national data on median height yields some surprising, and also rather paradoxical, results (fig. 9.7).

The growth pattern of real per capita income seems to confirm, from an economic viewpoint, what we concluded on the basis of demographic changes and height data: real per capita income clearly was stagnating from 1850 up to 1865. In the middle of the 1860s, it started to grow steadily until the middle of the 1880s, when a downturn set in that lasted for almost a decade. Thereafter, growth resumed its earlier pace.

That changes in height are indeed a sensitive indicator of changing material circumstances is corroborated by the fact that this downturn of the growth rate of real income is clearly reflected by a sudden stunting of the height figures between 1888 and 1895. Even the much shorter and less pronounced slowdown of real income growth in 1870 and 1873 is mirrored in stagnating height figures between 1876 and 1879. In the period between 1850 and 1900, it seems, there was a surprisingly precise relationship between the development of real per capita income and the standard of living, as indicated by changes in the stature of conscripts, as was suggested in 1988 by Brinkman et al. (1988). A three-year moving average of their estimates for 1850–1913, purely derived from median heights of conscripts for the second half of the nineteenth century, related to income per capita by means of a polynomial-distributed, lagged ALMON regression equation and the recent figures by Smits, Horlings, and van Zanden, estimated by conventional methods, yields an R^2 of 0.90, which

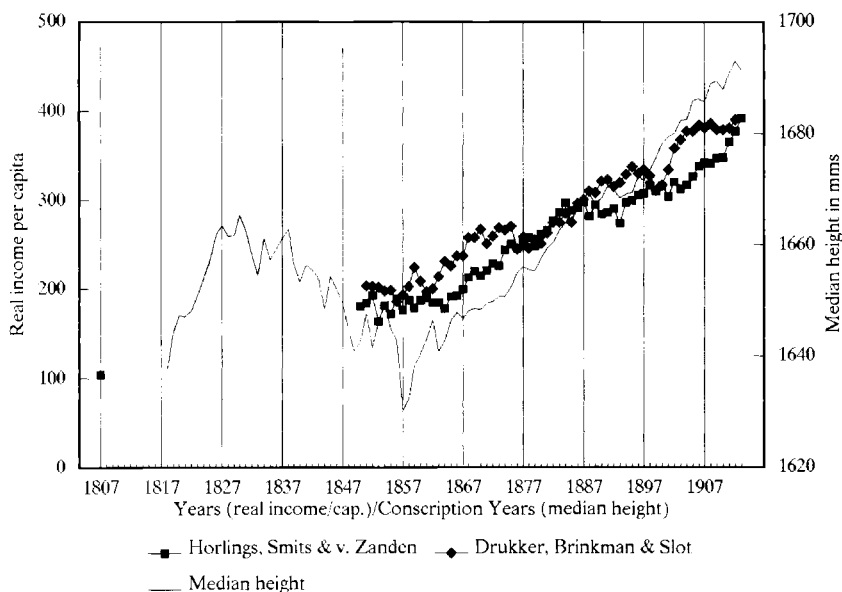


Fig. 9.7 Real per capita income and median heights, 1807–1913

Note: See table 9A.7 for data.

is for the time being probably the best (in any case, the shortest) reply to the severe criticism by Mandemakers and van Zanden (1990, 1993) of earlier estimates by Brinkman, Drukker and Slot.

There are, however, also two points to be mentioned that seem—in our opinion, at least—rather puzzling. Although real income per capita was stagnating for the years 1850–65, the standard of living over the same period apparently was not: a stagnation in median height is visible between 1850 and 1853, but then the figure drops sharply to its lowest value for the whole century (1857), as far as we have data, followed by a surprising sharp recovery from 1858 onward. Of course, the continuing sharp decline in heights between 1853 and 1857 could have been caused by years of dramatically falling real income figures *before* 1850, but that does not seem very likely: According to Horlings, value-added at constant prices for the whole service sector of the Dutch economy grew between 1840 and 1850 at an average rate of 1.6 percent per year (Horlings 1995, 476, table 16.1), while Groote estimated a yearly growth percentage of net capital formation in infrastructure between 1841 and 1850 of 1.1 percent (Groote 1995, 63, table 3.3). But even if it becomes evident with the publication of all final results of the Historical National Accounts Project that real income per capita had dramatically fallen during the 1840s, it would help us to explain the shrinking of conscripts up to 1857, but would make the next point only more mysterious.

The picture of a retarded, stagnating economy during the first half of the

nineteenth century is clearly at odds with the estimate of real per capita income in 1807: If both the estimates for 1807 and 1850 are roughly correct, then real national income in the Netherlands increased during the first half of the nineteenth century at an average rate of approximately 2 percent per year, while real income per capita increased during the same period at more than 1 percent per year! Clearly, we have stumbled upon a typical phenomenon of Dutch economic development in the early nineteenth century that was aptly characterized by Richard Griffiths as “sneaky growth” (Griffiths 1979, 1980). The development was, however, not only sneaky in the sense that contemporary observers did not seem to notice it, it was also quite sneaky in the sense that material conditions for the great majority of the population apparently did not even remain more or less the same, but *worsened* very badly after 1830, as suggested by the continuously falling median height between 1830 and 1857 and the rising death rate between 1847 and 1865. As we have said, lack of adequate data at this moment prevents a detailed analysis of these two paradoxes, but with the newly available evidence, we can at least try a shot in the dark.

9.9 A Shot in the Dark

Thanks to the painstaking work of Horlings (1995) a yearly series of value-added at constant prices for the service sector is now at our disposal. Let us suppose for a moment that real national income between 1807 and 1850 grew at exactly the same pace as real value-added in the service sector. Given that real value-added in services grew on average 1.6 percent per year, and real national income on average 2.15 percent per year during the same period, it is clear that on the basis of this hypothesis, we will provide ourselves with an unrealistically *low* estimate of the development of real per capita income in the first half of the nineteenth century (fig. 9.8). It is nevertheless interesting to follow the pattern of income development stemming from this unrealistic assumption: Stagnation or even a slight decline from 1807 up to 1816; rapid growth between 1816 and 1823; a second period of stagnation between 1823 and 1831; a real growth spurt between 1831 and 1834; and finally, a long period of stagnation from 1834 onward. Over the same period, heights rose rapidly until 1830 and fell continuously thereafter. Now, knowing that sectors of the Dutch economy other than services must have been growing (per capita!) at a much faster pace than our “unrealistic” real income guesses to compensate for the huge difference between our “unrealistic” income estimate and the “real” real income estimate in 1850, it remains a mystery so far why heights did not at least remain the same after 1830. It seems wise, in trying to determine *why* things went wrong with the standard of living sometime during the late 1820s to concentrate first on the question of *where* things went wrong. In other words, let us see whether regional differences can shed some light on the

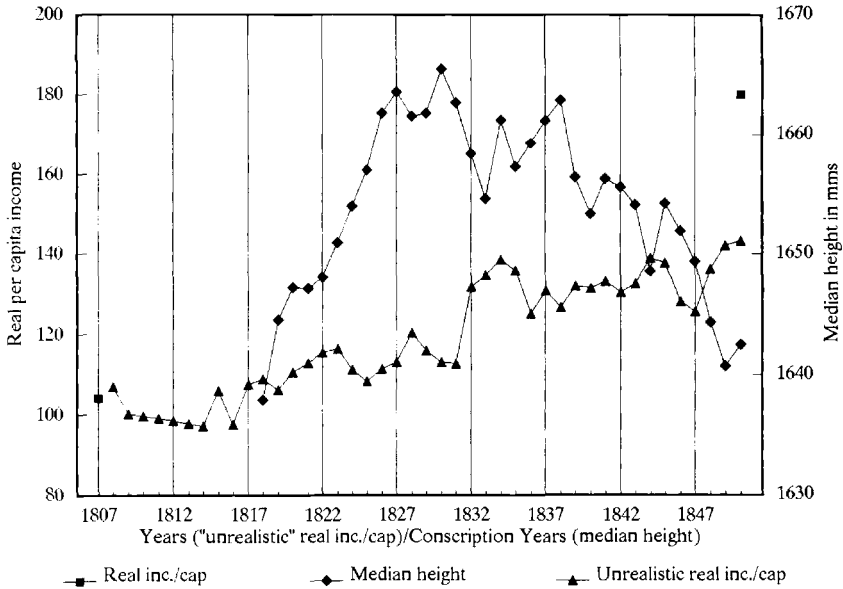


Fig. 9.8 “Unrealistic” real income per capita and median heights, 1807–50

Note: See table 9A.8 for data.

mystery of the shrinking conscripts during a period in which there must have been more than marginal growth in real per capita income.

9.10 Regional Differences in Mortality and Height

Figure 9.9, where regional differences in the death rate for the nineteenth century are presented, has some surprising features.

There were enormous differences in mortality between the modern urban, the modern agricultural, and the traditional rural regions in the Netherlands for the greater part of the nineteenth century; only in the last quarter of the century did regional death rates seem to converge.

Up to 1888, the death rate was highest in the modern urban region consisting of the provinces of Noord-Holland and Zuid-Holland, that is to say, in the core regions of the Golden Age of the Republic of the seventeenth century. After that year, mortality in the modern urban region dropped rapidly, with the result that the lowest death rates in the Netherlands at the beginning of the twentieth century were to be found in exactly the same region where life had apparently been extremely unhealthy for most of the nineteenth century.

Although life in the modern agricultural provinces of Groningen, Friesland, and Zeeland seems to have been much healthier than was that of city dwellers in the west of the country, it was, at least during the first half of the nineteenth

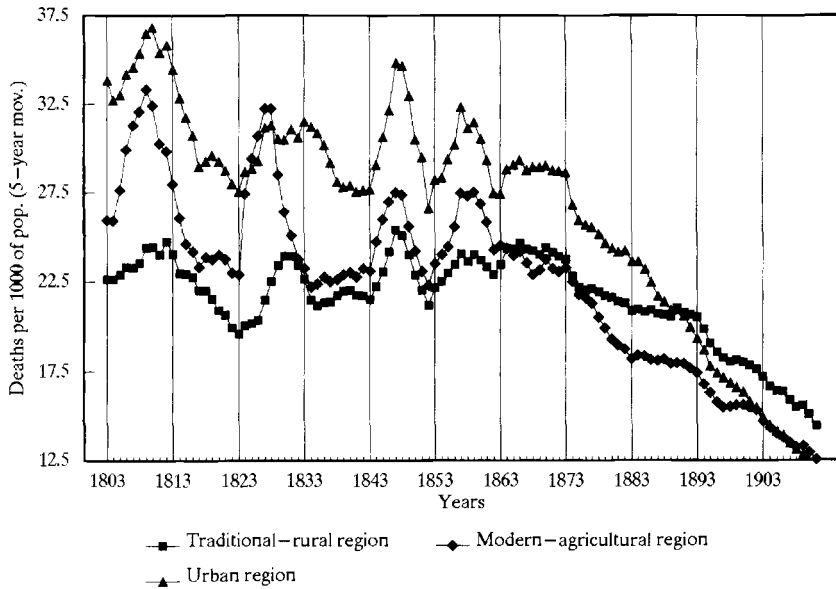


Fig. 9.9 Regional differences in mortality, 1803–1911

Note: See table 9A.9 for data.

century, and in fact up to 1863, not as merry and joyful as one might have expected from the much praised high level of agricultural technology that prevailed in these regions. The enormous up-swings of the death rate around 1810, 1828, 1848, and 1858 were felt not only in the modern urban regions but in the modern agricultural regions as well. In short, the national subsistence crises that we encountered in figure 9.5 were almost exclusively caused by severe increases in mortality in the modern “sea provinces” of the nation and not in the traditional rural “land-provinces.”

The most surprising aspect of figure 9.9 is that the traditional rural regions of the Netherlands had by far, for each and every year, both the lowest death rates and the smallest fluctuations in mortality for the first 75 years of the nineteenth century. Then, for the last quarter of the century, the “traditional” death rate suddenly stagnated, while during the same years, the “modern” death rate fell, with the result that at the start of the twentieth century, mortality in the traditional rural regions was higher than anywhere else in the country.

Is this strange pattern corroborated by data on the height of conscripts? Although the data are a bit scattered, figure 9.10 strongly suggests that this is indeed the case.

Up to 1829, all regional heights moved sharply upward. After that year a sharp deterioration set in, and regional differences seem to have become increasingly dominant. What is striking is the pattern of regional differentiation in height up to 1833: all conscripts became smaller, but the situation was appar-

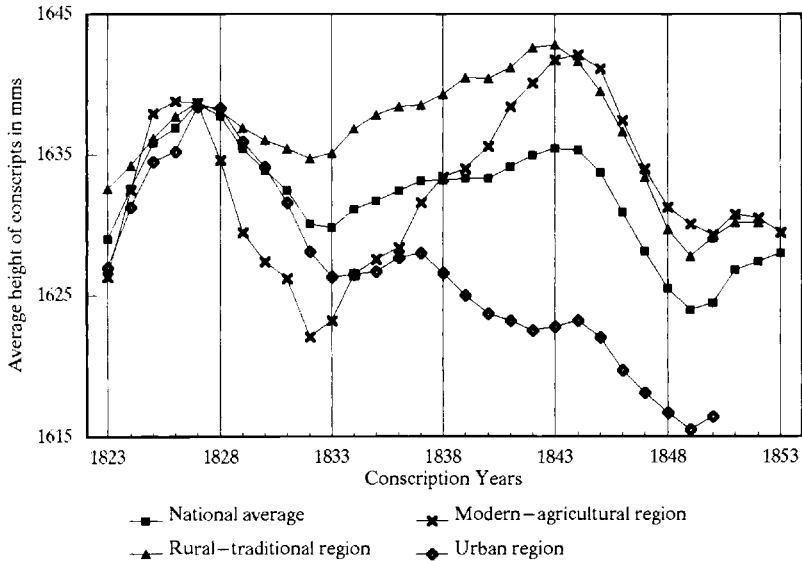


Fig. 9.10 Regional differences in height, 1823–53

Note: See table 9A.10 for data.

ently becoming much worse in both the modern urban and the modern agricultural regions, while the traditional rural regions seem to have been much less affected by the worsening circumstances.

During the next period, when things seem to have been improving again, the same pattern is—vice versa—again visible: All conscripts became a bit taller between 1833 and 1838, but in the modern urban region the height increase was hardly noticeable at all, and while heights increased fastest in the modern agricultural regions, this rapid increase was not enough to allow them to match the, relatively speaking, very tall conscripts in the traditional rural regions. Therefore, another five years are necessary.

From 1838 up to 1843 a slight improvement in the traditional rural regions was visible, while the standard of living in the modern agricultural provinces was still moving sharply upward. During the same years, life in the modern urban regions was worsening badly.

The years between 1843 and 1848 were characterized by a sharp deterioration of material conditions: seen also from the viewpoint of stature, these years are aptly called “the hungry forties.” It is clear that the agricultural diseases of this period were affecting the standard of living in all regions more or less in the same degree. As a result, there was not much difference by the end of the 1840s in the height of conscripts between the modern and the traditional agricultural regions, but the difference between these two and the urbanized western provinces was striking.

9.11 Some Conclusions, More Speculations

Let us try to offer some very rough and speculative elements for an explanation of the paradox of worsening standard of living in the Netherlands during roughly the 1830s and 1840s, as suggested by the rising trend in the death rate and the continuing decline in the heights of conscripts, simultaneously with increasing real per capita income.

First, it should be noted that the national picture of worsening material conditions is dominated by the continuous deterioration of the standard of living in the most urbanized areas in the west: it was city life, rather than rural life, that was bad during the first half of the nineteenth century, and in some respects (heights) it became worse. An exception must be made for the disease-ridden years after 1843: during these years almost everyone was affected for the worse.

In the modern agricultural regions, material circumstances worsened during the years between 1827 and 1833 but improved substantially thereafter, until the “great overall potato crisis” of the second half of the 1840s. The drop in the standard of living before 1833 is easily explained: A sharp and continuous fall in agricultural prices between 1818 and 1829 (at the end of the period the price level was roughly 50 percent of what it had been at the beginning) caused a severe drop in real income per capita in the modern agricultural regions. This last point is confirmed by Paping (1995) in his recently published, brilliant analysis of the modern agrarian province of Groningen between 1770 and 1860. It is neatly reflected in the fact that between 1827 and 1833 heights fell more in the modern agrarian regions than in the urban regions (see fig. 9.10), where city dwellers could at least partly compensate for worsening circumstances by low food prices. The long-term drop in agricultural prices also accounts for the increase in national median height (see fig. 9.8) between 1818 and 1830. Finally, it is to be expected that the more self-sufficient peasants in the rural traditional regions were least affected by the price fall: they simply turned away from the market and increased their rate of self-sufficiency. This point is also reflected in figure 9.10.

From 1830 to 1848, conditions improved in the modern agrarian regions, not in the first place because agricultural prices were rising again, but mainly as the result of technologically induced productivity increases. This is reflected in a continuous and rapid rise in height in the modern agricultural provinces. It also helps to explain the presumed rise in per capita income: according to Paping, real national income per capita in the province of Groningen rose by 63 percent between 1830 and 1848, that is, an average yearly growth percentage of 1.85. A squeaky example of sneaky growth, as far as dairy farming was involved! The traditional rural regions also profited from the improvement in agricultural conditions but (probably because of the small-scale nature of their farms and lack of capital) to a far lesser degree than the modern agricultural regions. The urban regions, however, did not profit at all from these changes,

simply because the locus of this early phase of modernization was in agriculture and hardly at all in industry or services (cf. fig. 9.8). As a consequence, modern urban heights continued to fall up to the “hungry forties,” and then the grim years that followed did the rest to push the standard of living to its lowest level at the middle of the 1850s.

After the middle of the century, serious modernization of the urban regions finally started. During this phase, traditional rural regions could not catch up with the modernization process, being stuck, as it were, at a premodern ceiling as far as the standard of living is concerned. Their death rate started to stagnate at some 23 deaths per 1,000 per year and was finally passed by the falling rates of the two other regions. At the beginning of the twentieth century, conscripts in the rural—and now, indeed, backward—regions of Drenthe and Brabant were among the smallest in the whole of the nation, while they had been comparative “giants” for most of the nineteenth century.

Appendix

The tables in this appendix correspond to the consecutive numbered figures in the paper. So table 9A.1 contains the data for figure 9.1, and so forth. Missing data are indicated in the tables by “n.a.”

Table 9A.1 Median Heights and Estimated Median Heights of Dutch Conscripts (conscriptio years; in millimeters), 1818–1940

Year (1)	Estimated Median Height (mm) (2)	Median Height (mm) (3)	Year (1)	Estimated Median Height (mm) (2)	Median Height (mm) (3)	Year (1)	Estimated Median Height (mm) (2)	Median Height (mm) (3)
1818	1,637.88	n.a.	1859	1,638.00	n.a.	1900	n.a.	1,678.21
1819	1,644.55	n.a.	1860	1,640.39	n.a.	1901	n.a.	1,679.46
1820	1,647.24	n.a.	1861	1,642.90	n.a.	1902	n.a.	1,680.02
1821	1,647.14	n.a.	1862	1,646.49	n.a.	1903	n.a.	1,682.46
1822	1,648.05	n.a.	1863	1,643.57	1,640.89	1904	n.a.	1,682.51
1823	1,650.94	n.a.	1864	1,644.27	1,642.70	1905	n.a.	1,686.09
1824	1,653.97	n.a.	1865	1,646.34	1,646.38	1906	n.a.	1,686.20
1825	1,656.96	n.a.	1866	1,648.48	1,647.85	1907	n.a.	1,685.68
1826	1,661.77	n.a.	1867	1,650.81	1,646.76	1908	n.a.	1,689.03
1827	1,663.54	n.a.	1868	1,652.55	1,648.09	1909	n.a.	1,689.45
1828	1,661.50	n.a.	1869	1,652.00	1,648.53	1910	n.a.	1,687.85
1829	1,661.76	n.a.	1870	1,651.44	1,648.40	1911	n.a.	1,690.92
1830	1,665.48	n.a.	1871	1,652.46	1,649.48	1912	n.a.	1,693.07
1831	1,662.63	n.a.	1872	1,653.55	1,649.75	1913	n.a.	1,691.38
1832	1,658.39	n.a.	1873	1,652.43	1,650.79	1914	n.a.	1,692.98
1833	1,654.63	n.a.	1874	1,653.46	1,650.75	1915	n.a.	1,694.06
1833	1,661.17	n.a.	1875	1,658.05	1,652.48	1916	n.a.	1,694.04
1835	1,657.32	n.a.	1876	1,658.90	1,655.07	1917	n.a.	1,695.27
1836	1,659.24	n.a.	1877	1,658.50	1,656.00	1918	n.a.	1,698.35
1837	1,661.14	n.a.	1878	1,658.80	1,655.52	1919	n.a.	1,697.93
1838	1,662.86	n.a.	1879	1,658.29	1,655.33	1920	n.a.	1,699.54
1839	1,656.41	n.a.	1880	1,658.55	1,657.56	1921	n.a.	1,702.34
1840	1,653.31	n.a.	1881	1,655.78	1,659.46	1922	n.a.	1,703.47
1841	1,656.30	n.a.	1882	1,661.49	1,660.58	1923	n.a.	1,705.83

1842	1,655.55	n.a.	1883	1,665.38	1,662.68	1924	n.a.	1,707.56
1843	1,654.07	n.a.	1884	1,663.55	1,663.99	1925	n.a.	1,709.29
1844	1,648.56	n.a.	1885	1,667.44	1,665.82	1926	n.a.	1,709.64
1845	1,654.20	n.a.	1886	1,668.50	1,666.92	1927	n.a.	1,711.60
1846	1,651.93	n.a.	1887	1,672.09	1,668.79	1928	n.a.	1,713.80
1847	1,649.38	n.a.	1888	1,671.60	1,669.17	1929	n.a.	1,715.18
1848	1,644.32	n.a.	1889	1,670.00	1,667.54	1930	n.a.	1,719.91
1849	1,640.70	n.a.	1890	1,669.60	1,668.47	1931	n.a.	1,721.47
1850	1,642.52	n.a.	1891	1,671.79	1,670.50	1932	n.a.	1,719.60
1851	1,647.72	n.a.	1892	1,674.01	1,670.05	1933	n.a.	1,723.33
1852	1,641.52	n.a.	1893	n.a.	1,668.50	1934	n.a.	1,723.82
1853	1,646.29	n.a.	1894	n.a.	1,669.22	1935	n.a.	1,725.16
1854	1,649.21	n.a.	1895	n.a.	1,669.46	1936	n.a.	1,727.21
1855	1,644.84	n.a.	1896	n.a.	1,672.39	1937	n.a.	1,728.18
1856	1,642.54	n.a.	1897	n.a.	1,671.60	1938	n.a.	1,730.19
1857	1,630.14	n.a.	1898	n.a.	1,673.52	1939	n.a.	1,731.53
1858	1,632.48	n.a.	1899	n.a.	1,675.78	1940	n.a.	1,734.31

Sources: Col. (2), Estimated median heights of 19-3/4-year-old Dutch conscripts in millimeters (conscript years): Weighted average heights of 19-year-old (conscript years 1818–61) and 20-year-old (conscript years 1862–92) conscripts were calculated from Oppers (1963, 55, table 12; 56–57, table 13; 57–58, table 14; 59–60, table 15; 61–62, table 16; 62–63, table 17; 64–65, table 18; 65–66, table 19), corrected for some apparent miscalculations in age, using the yearly fluctuating size of Oppers’s different town samples as weights. Average heights of 19-year-old conscripts were standardized to estimated average heights of 20-year-old boys by adding 30 mm (according to Oppers 1963: graphical annexe, graph 18), using the graph for 1850, and shifting the resulting average height one year ahead. For the overlapping years (1863–92) with the data from col. (3) (median heights), a simple regression was run ($R^2 = 0.96$), and the result was used to estimate median heights of 20-year-old boys for the conscription years 1818–61.

Col. (3), Median heights of 19-3/4-year-old Dutch conscripts in millimeters (conscript years): Original median heights calculated in Brinkman et al. (1988, 72–74, bijlage: “Lengte en reëel inkomen per hoofd van de bevolking, 1845–1940” (Appendix: Height and real income per capita, 1845–1940), col. 1). Refined and corrected figures for some years from Mandemakers and van Zanden (1990, 19–21, bijlage “Verschillende berekeningen van de mediaan van de lengte van keurlingen, 1863–1940” (Different calculations of the median height of conscripts, 1863–1940), col. 3).

Table 9A.2 Median Heights of Dutch, Italian, and French Conscripts (conscriptio years; in millimeters), 1818–1940

Year (1)	Dutch (mm) (2)	Italian (mm) (3)	French (mm) (4)	Year (1)	Dutch (mm) (2)	Italian (mm) (3)	French (mm) (4)	Year (1)	Dutch (mm) (2)	Italian (mm) (3)	French (mm) (4)
1818	1,637.88	n.a.	n.a.	1859	1,638.00	n.a.	1,641.00	1900	1,678.21	1,638.00	1,655.40
1819	1,644.55	n.a.	n.a.	1860	1,640.39	n.a.	1,638.70	1901	1,679.40	1,637.00	1,655.40
1820	1,647.24	n.a.	n.a.	1861	1,642.90	n.a.	1,639.40	1902	1,680.02	1,637.00	1,654.70
1821	1,647.14	n.a.	n.a.	1862	1,646.49	n.a.	1,640.20	1903	1,682.46	1,637.00	1,658.30
1822	1,648.05	n.a.	n.a.	1863	1,640.89	n.a.	1,639.60	1904	1,682.51	1,636.00	1,659.00
1823	1,650.94	n.a.	n.a.	1864	1,642.7	n.a.	1,640.90	1905	1,686.09	1,637.00	1,659.80
1824	1,653.97	n.a.	n.a.	1865	1,646.38	n.a.	1,640.30	1906	1,686.20	1,637.00	1,659.50
1825	1,656.96	n.a.	n.a.	1866	1,647.85	n.a.	1,640.90	1907	1,685.68	1,638.00	1,661.10
1826	1,661.77	n.a.	n.a.	1867	1,646.76	n.a.	1,648.60	1908	1,689.03	1,639.00	1,660.20
1827	1,663.54	n.a.	n.a.	1868	1,648.09	n.a.	1,646.40	1909	1,689.45	1,640.00	1,660.80
1828	1,661.50	n.a.	n.a.	1869	1,648.53	n.a.	1,649.89	1910	1,687.85	1,641.00	1,660.70
1829	1,661.76	n.a.	n.a.	1870	1,648.40	n.a.	1,651.31	1911	1,690.92	1,643.00	1,661.10
1830	1,665.48	n.a.	n.a.	1871	1,649.48	n.a.	1,646.10	1912	1,693.07	1,643.00	1,663.30
1831	1,662.63	n.a.	n.a.	1872	1,649.75	n.a.	1,651.10	1913	1,691.38	1,644.00	1,663.30
1832	1,658.39	n.a.	n.a.	1873	1,650.79	n.a.	1,650.02	1914	1,692.98	1,647.00	1,661.10
1833	1,654.63	n.a.	n.a.	1874	1,650.75	n.a.	1,651.40	1915	1,694.06	1,647.00	1,661.10
1834	1,661.17	n.a.	n.a.	1875	1,652.48	n.a.	1,652.30	1916	1,694.04	1,650.00	1,658.50
1835	1,657.32	n.a.	1,638.67	1876	1,655.07	n.a.	1,652.70	1917	1,695.27	1,649.00	1,656.30
1836	1,659.24	n.a.	1,636.80	1877	1,656.00	n.a.	1,653.40	1918	1,698.35	1,649.00	1,657.90
1837	1,661.14	n.a.	1,637.00	1878	1,655.52	n.a.	1,653.10	1919	1,697.93	1,649.00	1,656.60
1838	1,662.86	n.a.	1,638.90	1879	1,655.33	n.a.	1,652.70	1920	1,699.54	1,647.00	1,655.40
1839	1,656.41	n.a.	1,639.20	1880	1,657.56	n.a.	1,652.60	1921	1,702.34	1,652.00	1,664.60
1840	1,653.31	n.a.	1,637.80	1881	1,659.46	1,627.50	1,654.40	1922	1,703.47	1,651.00	1,666.80
1841	1,656.30	n.a.	1,638.10	1882	1,660.58	1,629.00	1,654.60	1923	1,705.83	1,654.00	1,668.19
1842	1,655.55	n.a.	1,638.30	1883	1,662.68	1,628.20	1,654.60	1924	1,707.56	1,655.00	1,668.60
1843	1,654.07	n.a.	1,638.70	1884	1,663.99	1,629.80	1,654.20	1925	1,709.29	1,655.00	1,669.09

1844	1,648.56	n.a.	1,639.60	1885	1,665.82	1,631.30	1,653.60	1926	1,709.64	1,657.00	1,669.91
1845	1,654.20	n.a.	1,639.10	1886	1,666.92	1,632.10	1,653.90	1927	1,711.60	1,658.00	1,670.88
1846	1,651.93	n.a.	1,639.90	1887	1,668.79	1,633.40	1,653.60	1928	1,713.80	1,659.00	1,671.92
1847	1,649.38	n.a.	1,636.80	1888	1,669.17	1,633.10	1,653.70	1929	1,715.18	1,659.00	1,673.06
1848	1,644.32	n.a.	1,637.70	1889	1,667.54	1,632.90	1,652.90	1930	1,719.91	1,660.00	1,674.10
1849	1,640.70	n.a.	1,639.30	1890	1,668.47	1,631.00	1,653.70	1931	1,721.47	1,660.00	1,675.78
1850	1,642.52	n.a.	1,640.10	1891	1,670.5	1,630.40	1,653.20	1932	1,719.60	1,661.00	1,676.94
1851	1,647.72	n.a.	1,640.50	1892	1,670.05	1,632.10	1,654.90	1933	1,723.33	1,662.00	1,677.43
1852	1,641.52	n.a.	1,640.00	1893	1,668.5	1,633.60	1,654.70	1934	1,723.82	1,663.00	1,677.00
1853	1,646.29	n.a.	1,640.70	1894	1,669.22	1,634.00	1,654.40	1935	1,725.16	1,662.00	1,678.08
1854	1,649.21	n.a.	1,637.60	1895	1,669.46	1,635.20	1,654.10	1936	1,727.21	1,662.00	1,678.55
1855	1,644.84	n.a.	1,637.60	1896	1,672.39	1,636.00	1,654.10	1937	1,728.10	1,663.00	1,679.06
1856	1,642.54	n.a.	1,638.20	1897	1,671.6	1,637.00	1,654.40	1938	1,730.19	1,664.00	1,679.67
1857	1,630.14	n.a.	1,638.30	1898	1,673.52	1,637.00	1,654.80	1939	1,731.53	1,668.00	1,680.55
1858	1,632.48	n.a.	1,638.90	1899	1,675.78	1,637.00	1,655.10	1940	1,734.31	1,672.00	1,684.70

Sources: Col. (2), Median heights of Dutch conscripts in millimeters (conscription years): 1818–62, identical to data of table 9A.1 col. (2); 1863–1940: identical to data of table 9A.1 col. (3).

Col. (3), Median heights of Italian conscripts (standardized to 20-year-old) in millimeters (conscription years): For a summary of the data on height of Italian conscripts, see ISTAT (Istituto Nazionale di Statistica), *Sommario di Statistiche Storiche 1926–1985* (Roma, 1986); and ISTAT, *Sommario di Statistiche Storiche Italiane 1861–1955* (Roma, 1958). For the underlying work on these data see M. Cappieri, “La statura degli Italiani durante il secolo,” *Rivista di Antropologia* 47 (1960): 295–300; A. Costanzo, “La statura degli Italiani ventenni nati dal 1845 al 1920,” *Annali di Statistica* 8, no. 2 (1948): 63–123; R. Livi, “Sulla statura degli Italiani,” *Archivio per l’Antropologia e l’Etnologia* 13 (1883): 243–90, 317–77; R. Livi, *Antropometria militare*, 3 vol. (Roma: Presso il Giornale medico del Regio Esercito, 1896–1905); C. Lombroso, “Sulla statura degli Italiani in rapporto all’antropologia ed all’igiene,” *Archivio per l’Antropologia e l’Etnologia* 3 (1873): 373–429; G. de Rossi, “La statura degli Italiani e l’incremento in essa verificatosi nel periodo 1874–1898,” *Archivio per l’Antropologia e l’Etnologia* 33 (1903): 18–533.

From 1875 onward, all Italian male citizens were liable to be conscripted, which meant they had to appear at a medical examination. The mean height of Italian conscripts therefore refers to all conscripts, whether declared unfit for military service or not. However, not all Italian boys did appear at the medical examination. These cases of absenteeism can be divided into three categories: those which were canceled from the drafts (because of decease, errors, and so on); those which were

(continued)

Table 9A.2

(continued)

abroad, or legally absent; and those who were illegally absent. But this last category was relatively small (4.52 percent of all conscripts born between 1854 and 1879), and the absentees were not considered as a source of a (systematic) bias of the mean height of the population of conscripts (see de Rossi 1903, 26–29, 58; Livi 1883, 248–50). The age at which Italian boys were measured varied over the period between 18 and 22 years. Since changes in the age of measurement obscure the evolution of height of conscripts over time, Costanzo standardized the height of conscripts at an age of 20 years (see A. Costanzo, “La statura degli Italiani ventenni nati dal 1854 al 1920,” *Rendiconti dell’Accademia Nazionale dei Lincei (classe di Scienze fisiche, matematiche e naturali)* 8 [1947]: 707–12). The standardization was based on the average increase in height between ages 20 and 24 of Danish conscripts listed in a study by Mackeprang (see E. P. Mackeprang, “De vaernepligtiges Legemshøjde i Danmark,” *Meddelelser om Danmarks Antropologi* 1 [1907–11]: 10–149, esp. 33). For the actual age at which the conscripts were measured see P. Grassivaro Gallo, “L’evoluzione della statura in Italia: Analisi sui conscritti delle leve tra il 1927 e il 1949,” *Genus* 28 (1972): 171–203; and L. Terrenato and L. Ulizzi, “Genotype environment relationships: An analysis of stature distribution curves during the last century in Italy,” *Annals of Human Biology* 10 (1983): 335–46.

Col. (4), Median heights of French conscripts (standardized to 20-year-old) in millimeters (conscript years): For the basic source on heights of French conscripts, see *Annuaire Statistique, Statistiques Générales de la France 42me Vol. résumé rétrospectif* (Paris, 1926), and the work of J. Ch. M. Boudin, “De l’accroissement de la taille en France,” *Mémoires de la Société d’Anthropologie de Paris* 1 (1863): 221–59; P. Broca, “Deuxième discours sur la population française,” *Mémoires d’Anthropologie* 1 (1871): 498–520; and M. Tschouriloff, “Étude sur la dégénérescence physiologique des peuples civilisés,” *Revue d’Anthropologie* 5 (1875): 605–64. After 1922, the heights of French conscripts were no longer published by the military authorities. Only a few estimates by anthropologists and medical doctors exist for the period after 1922. The data on (mostly mean) height for this period were found in the work of the following authors: M.-C. Chamla, “L’accroissement de la stature en France de 1880 à 1960: Comparaison avec les pays d’Europe Occidentale,” *Bulletins et Mémoires de la Société d’Anthropologie de Paris* 6 (1964): 201–78; M.-C. Chamla, “L’Évolution récente de la stature en Europe Occidentale (période 1960–1980),” *Bulletins et Mémoires de la Société d’Anthropologie de Paris* 10 (1983): 195–224; G. Oliver, “The increase of stature in France,” *Journal of Human Evolution* 9 (1980): 645–49; G. Olivier and G. Devigne, “Données nouvelles sur la stature et la corpulence en France,” *Cahiers d’Anthropologie et de biométrie humaine* 3 (1985): 111–23; P. Sempé and M. Sempé, *Croissance et Maturation Osseuse* (Paris, 1974); and J. Sutter, R. Izac, and T. N. Toan, “L’évolution de la taille des polytechniciens (1801–1954),” *Population* (Paris) 3 (1958): 373–406. See also M. A. van Meerten (1990).

Table 9A.3 Dutch Population (in millions of inhabitants) and Dutch Population Growth (in percentages per year), 1805–1915

Year (1)	Population Netherlands (2)	Yearly Growth (%) (3)	Year (1)	Population Netherlands (2)	Yearly Growth (%) (3)	Year (1)	Population Netherlands (2)	Yearly Growth (%) (3)
1805	2.149651	n.a.	1829	2.620932	0.82	1853	3.205992	0.74
1806	2.161582	0.56	1830	2.646000	0.96	1854	3.230345	0.76
1807	2.163092	0.07	1831	2.660091	0.53	1855	3.239542	0.28
1808	2.156215	-0.32	1832	2.670481	0.39	1856	3.265989	0.82
1809	2.156407	0.01	1833	2.694734	0.91	1857	3.288374	0.69
1810	2.161439	0.23	1834	2.718406	0.88	1858	2.299879	0.35
1811	2.165902	0.21	1835	2.746399	1.03	1859	3.308969	0.28
1812	2.170531	0.21	1836	2.778269	1.16	1860	3.326088	0.52
1813	2.181494	0.51	1837	2.804792	0.95	1861	3.353453	0.82
1814	2.184849	0.15	1838	2.836740	1.14	1862	3.379216	0.77
1815	2.217626	1.50	1839	2.868759	1.13	1863	3.415727	1.08
1816	2.248563	1.40	1840	2.902807	1.19	1864	3.445573	0.87
1817	2.266016	0.78	1841	2.939344	1.26	1865	3.475110	0.86
1818	2.291116	1.11	1842	2.965025	0.87	1866	3.492326	0.50
1819	2.319601	1.24	1843	2.997746	1.10	1867	3.527880	1.02
1820	2.346663	1.17	1844	3.029807	1.07	1868	3.557812	0.85
1821	2.383111	1.55	1845	3.064479	1.14	1869	3.592858	0.99
1822	2.416647	1.41	1846	3.074237	0.32	1870	3.626790	0.94
1823	2.452365	1.48	1847	3.067435	-0.22	1871	3.645118	0.51
1824	2.495136	1.74	1848	3.071164	0.12	1872	3.679189	0.93
1825	2.533014	1.52	1849	3.081118	0.32	1873	3.720699	1.13
1826	2.552483	0.77	1850	3.115421	1.11	1874	3.768703	1.29
1827	2.569405	0.66	1851	3.150484	1.13	1875	3.807338	1.03
1828	2.599737	1.18	1852	3.182526	1.02	1876	3.856362	1.29

(continued)

Table 9A.3 (continued)

Year (1)	Population Netherlands (2)	Yearly Growth (%) (3)	Year (1)	Population Netherlands (2)	Yearly Growth (%) (3)	Year (1)	Population Netherlands (2)	Yearly Growth (%) (3)
1877	3.909692	1.38	1890	4.559247	1.06	1903	5.430942	1.57
1878	3.958700	1.25	1891	4.610839	1.13	1904	5.509660	1.45
1879	4.012693	1.36	1892	4.653772	0.93	1905	5.591412	1.48
1880	4.054591	1.04	1893	4.714154	1.30	1906	5.672232	1.45
1881	4.103159	1.20	1894	4.772655	1.24	1907	5.747263	1.32
1882	4.156988	1.31	1895	4.832527	1.25	1908	5.825198	1.36
1883	4.202759	1.10	1896	4.900232	1.40	1909	5.898429	1.26
1884	4.250151	1.13	1897	4.969566	1.41	1910	5.945525	0.80
1885	4.301200	1.20	1898	5.036267	1.34	1911	6.022476	1.29
1886	4.350137	1.14	1899	5.103979	1.34	1912	6.114300	1.52
1887	4.405526	1.27	1900	5.179233	1.47	1913	6.212701	1.61
1888	4.458704	1.21	1901	5.263232	1.62	1914	6.301760	1.43
1889	4.511415	1.18	1902	5.347190	1.60	1915	6.392237	1.44

Sources: Col. (2), Population of the Netherlands in millions of inhabitants (yearly; end of year): 1805–1900, yearly figures, corrected for frontier changes, constructed by Horlings (1993) on the basis of original ten-year census data, revised by C. A. Oomcns, “De loop van de bevolking van Nederland in de negentiende eeuw” (The development of the population of the Netherlands in the nineteenth century), *Statistische Onderzoekingen van het Centraal Bureau voor de Statistiek* (Statistical Research, published by the Dutch Central Bureau of Statistics), no. M35 (1989). These new figures differ considerably from: E. W. Hofstee (1978), *De demografische ontwikkeling van Nederland in de eerste helft van de negentiende eeuw: Een historisch-demografische en sociologische studie* (The demographic development of the Netherlands in the first half of the nineteenth century: A historical-demographic and sociological study) (Deventer: van Loghum Slaterus, 1978); 1900–1915: Dutch Central Bureau of Statistics, *Jaarcijfers voor Nederland* (Statistical yearbook of the Netherlands) (The Hague, 1901–16 eds.).

Col. (3), Yearly growth of the Dutch population in percentages per year: Calculated from col. (2).

Table 9A.4 Crude Death Rates and Birthrates in the Netherlands (yearly; per 1,000 population), 1805–1915

Year (1)	Death Rate per 1,000 Population (2)	Birthrate per 1,000 Population (3)	Year (1)	Death Rate per 1,000 Population (2)	Birthrate per 1,000 Population (3)	Year (1)	Death Rate per 1,000 Population (2)	Birthrate per 1,000 Population (3)
1805	31.7	27.0	1828	34.6	25.6	1851	33.2	22.7
1806	31.9	26.2	1829	34.6	29.0	1852	33.9	24.2
1807	32.0	30.9	1830	34.3	25.4	1853	31.9	24.8
1808	30.3	33.3	1831	33.2	27.6	1854	31.8	24.2
1809	29.6	29.4	1832	31.2	26.9	1855	31.4	28.2
1810	31.7	29.0	1833	33.8	25.9	1856	31.9	23.9
1811	33.2	30.9	1834	33.6	25.9	1857	34.0	27.2
1812	32.7	30.4	1835	34.0	24.9	1858	32.0	28.2
1813	32.3	27.5	1836	34.0	23.7	1859	34.5	31.6
1814	32.9	31.3	1837	34.6	25.9	1860	31.3	25.4
1815	35.7	23.6	1838	35.4	25.1	1861	34.7	26.0
1816	35.2	24.1	1839	34.3	23.9	1862	32.9	24.4
1817	32.9	26.9	1840	33.9	24.1	1863	35.8	24.8
1818	33.7	24.9	1841	34.3	23.9	1864	35.3	26.1
1819	35.6	25.6	1842	33.3	26.3	1865	35.9	26.8
1820	33.8	25.0	1843	32.8	23.6	1866	35.4	29.6
1821	35.9	24.0	1844	33.4	24.5	1867	35.0	24.9
1822	36.8	25.9	1845	33.3	23.6	1868	35.0	25.7
1823	35.3	23.4	1846	31.0	28.6	1869	33.8	23.6
1824	36.2	22.3	1847	28.4	31.0	1870	35.1	26.4
1825	35.5	23.2	1848	29.6	29.3	1871	34.8	29.7
1826	35.8	30.5	1849	33.5	31.4	1872	35.1	26.4
1827	32.1	28.0	1850	33.0	22.5	1873	35.3	24.7

(continued)

Table 9A.4 (continued)

Year (1)	Death Rate per 1,000 Population (2)	Birthrate per 1,000 Population (3)	Year (1)	Death Rate per 1,000 Population (2)	Birthrate per 1,000 Population (3)	Year (1)	Death Rate per 1,000 Population (2)	Birthrate per 1,000 Population (3)
1874	35.3	23.4	1888	33.3	21.1	1902	31.6	16.1
1875	35.8	26.0	1889	32.6	21.0	1903	31.3	15.5
1876	36.1	24.2	1890	32.0	21.2	1904	31.1	15.8
1877	35.7	22.9	1891	32.8	21.4	1905	30.5	15.2
1878	35.3	23.7	1892	31.4	21.5	1906	30.1	14.7
1879	35.8	23.2	1893	32.8	20.1	1907	29.8	14.5
1880	34.9	24.1	1894	31.6	19.3	1908	29.5	14.9
1881	34.2	22.1	1895	31.9	19.5	1909	29.0	13.6
1882	34.5	21.4	1896	31.7	18.2	1910	28.4	13.5
1883	33.6	22.5	1897	31.4	17.9	1911	27.7	14.4
1884	34.2	23.0	1898	30.9	18.1	1912	27.8	12.2
1885	33.7	21.8	1899	31.0	18.1	1913	27.9	12.2
1886	33.9	22.7	1900	31.4	17.7	1914	27.4	12.8
1887	33.1	20.5	1901	32.0	17.1	1915	26.2	12.5

Sources: Col. (2), Crude death rate of the Netherlands per 1,000 total population (yearly, end of year): See table 9A.3, col. (2).

Col. (3), Crude birthrate of the Netherlands per 1,000 total population (yearly, end of year): See table 9A.3, col. (2).

Table 9A.5 Five-Year Moving Average of Dutch Population Growth (in percentages per year) and Two-Year-Lagged, Five-Year Moving Average of Median Height of Dutch Conscripts (in millimeters), 1817–57

Year (1)	Yearly Growth Percentage of Dutch Population (5-year moving average) (2)	Two-Year-Lagged Median Height (5-year moving average) (3)	Year (1)	Yearly Growth Percentage of Dutch Population (5-year moving average) (2)	Two-Year-Lagged Median Height (5-year moving average) (3)
1817	1.20	n.a.	1838	1.11	1,656.8
1818	1.13	1,644.9	1839	1.13	1,655.1
1819	1.16	1,647.5	1840	1.11	1,653.5
1820	1.29	1,649.4	1841	1.11	1,653.7
1821	1.36	1,651.4	1842	1.09	1,652.8
1822	1.46	1,654.3	1843	1.08	1,651.6
1823	1.54	1,657.4	1844	0.90	1,649.6
1824	1.38	1,659.5	1845	0.68	1,648.1
1825	1.23	1,661.1	1846	0.48	1,645.7
1826	1.17	1,662.8	1847	0.33	1,644.9
1827	0.98	1,662.9	1848	0.33	1,643.3
1828	0.87	1,661.9	1849	0.49	1,643.7
1829	0.82	1,660.5	1850	0.74	1,645.4
1830	0.77	1,660.4	1851	0.86	1,645.9
1831	0.72	1,658.8	1852	0.95	1,644.8
1832	0.73	1,658.1	1853	0.78	1,642.6
1833	0.74	1,658.7	1854	0.72	1,639.8
1834	0.87	1,660.3	1855	0.65	1,637.6
1835	0.98	1,659.3	1856	0.57	1,636.7
1836	1.03	1,658.5	1857	0.48	1,636.7
1837	1.08	1,658.0			

Sources: Col. (2), Five-year moving average of yearly growth of the Dutch population in percentages per year (end of year): Calculated from table 9A.3, col. (3).
Col. (3), Five-year moving average of median heights of Dutch conscripts in millimeters, two years lagged: Calculated from table 9A.1, col. (2).

Table 9A.6 **Eleven-Year Moving Averages of Crude Death Rate and of Price Index of Agricultural Products (1831–50 = 100) in the Netherlands, 1810–53**

Year (1)	Crude Death Rate per 1,000 Population (11-year moving average) (2)	Price Index of Agricultural Products (11-year moving average) (1831–50 = 100) (3)	Year (1)	Crude Death Rate per 1,000 Population (11-year moving average) (2)	Price Index of Agricultural Products (11-year moving average) (1831–50 = 100) (3)
1810	29.05	113.750	1832	26.25	89.836
1811	28.78	112.510	1833	25.99	89.654
1812	28.85	115.420	1834	25.84	90.954
1813	28.30	119.350	1835	25.39	91.681
1814	27.60	119.900	1836	25.25	91.581
1815	27.20	117.980	1837	25.14	92.072
1816	26.75	114.940	1838	24.84	92.218
1817	26.29	112.870	1839	24.71	93.572
1818	25.65	106.740	1840	24.50	97.445
1819	25.18	101.070	1841	24.84	102.330
1820	24.45	98.327	1842	25.50	108.350
1821	25.07	97.654	1843	25.81	110.750
1822	25.43	94.490	1844	26.38	110.300
1823	25.31	87.672	1845	26.25	109.650
1824	25.68	81.745	1846	26.13	110.180
1825	25.66	80.563	1847	26.15	111.100
1826	25.90	82.009	1848	26.02	114.310
1827	26.16	84.363	1849	26.07	120.300
1828	26.16	85.218	1850	26.41	127.840
1829	26.39	86.000	1851	26.44	130.000
1830	26.63	88.490	1852	26.31	130.000
1831	26.67	90.445	1853	26.05	127.650

Sources: Col. (2), 11-Year moving average of the crude death rate of the Netherlands per 1,000 total population (yearly, end of year): Calculated from table 9A.4, col. (2).

Col. (3), 11-Year moving average of the price index for agricultural products in the Netherlands (1830–51 = 100): An 11-year moving average was calculated from a Dutch agricultural price index published by Paping (1995, 406, table G.6). The price index was constructed on the basis of price movements of rye, wheat, oats, barley, potatoes, rape, beans, peas, and buckwheat in the northern part of the Netherlands. See Paping (1995, 364–71).

Table 9A.7 Dutch Real Per Capita Income (different estimates) and Dutch Median Height of Conscripts, 1805–1913

Year (1)	Horlings et al. Real Income per Capita (2)	Brinkman et al. Real Income per Capita (3)	Median Height of Conscripts (mm) (4)	Year (1)	Horlings et al. Real Income per Capita (2)	Brinkman et al. Real Income per Capita (3)	Median Height of Conscripts (mm) (4)
1807	104.08	n.a.	n.a.	1830	n.a.	n.a.	1,665.4
1808	n.a.	n.a.	n.a.	1831	n.a.	n.a.	1,662.6
1809	n.a.	n.a.	n.a.	1832	n.a.	n.a.	1,658.3
1810	n.a.	n.a.	n.a.	1833	n.a.	n.a.	1,654.6
1811	n.a.	n.a.	n.a.	1834	n.a.	n.a.	1,661.1
1812	n.a.	n.a.	n.a.	1835	n.a.	n.a.	1,657.3
1813	n.a.	n.a.	n.a.	1836	n.a.	n.a.	1,659.2
1814	n.a.	n.a.	n.a.	1837	n.a.	n.a.	1,661.1
1815	n.a.	n.a.	n.a.	1838	n.a.	n.a.	1,662.8
1816	n.a.	n.a.	n.a.	1839	n.a.	n.a.	1,656.4
1817	n.a.	n.a.	n.a.	1840	n.a.	n.a.	1,653.3
1818	n.a.	n.a.	1,637.8	1841	n.a.	n.a.	1,656.3
1819	n.a.	n.a.	1,644.5	1842	n.a.	n.a.	1,655.5
1820	n.a.	n.a.	1,647.2	1843	n.a.	n.a.	1,654.0
1821	n.a.	n.a.	1,647.1	1844	n.a.	n.a.	1,648.5
1822	n.a.	n.a.	1,648.0	1845	n.a.	n.a.	1,654.2
1823	n.a.	n.a.	1,650.9	1846	n.a.	n.a.	1,651.9
1824	n.a.	n.a.	1,653.9	1847	n.a.	n.a.	1,649.3
1825	n.a.	n.a.	1,656.9	1848	n.a.	n.a.	1,644.3
1826	n.a.	n.a.	1,661.7	1849	n.a.	n.a.	1,640.7
1827	n.a.	n.a.	1,663.5	1850	n.a.	180.67	1,642.5
1828	n.a.	n.a.	1,661.5	1851	184.28	203.66	1,647.7
1829	n.a.	n.a.	1,661.7	1852	192.38	203.00	1,641.5

(continued)

Table 9A.7 (continued)

Year (1)	Horlings et al. Real Income per Capita (2)	Brinkman et al. Real Income per Capita (3)	Median Height of Conscripts (mm) (4)	Year (1)	Horlings et al. Real Income per Capita (2)	Brinkman et al. Real Income per Capita (3)	Median Height of Conscripts (mm) (4)
1853	163.76	202.33	1,646.2	1884	297.50	285.66	1,663.9
1854	181.05	197.66	1,649.2	1885	288.86	275.33	1,665.8
1855	171.78	198.33	1,644.8	1886	291.18	297.00	1,666.9
1856	189.32	185.33	1,642.5	1887	298.43	301.33	1,668.7
1857	176.38	193.66	1,630.1	1888	282.08	310.30	1,669.1
1858	187.13	202.66	1,632.4	1889	294.87	308.66	1,667.5
1859	178.62	224.33	1,638.0	1890	284.91	322.00	1,668.4
1860	187.15	209.00	1,640.3	1891	286.11	323.33	1,670.5
1861	189.64	197.33	1,642.9	1892	290.65	315.33	1,670.0
1862	184.56	200.00	1,646.4	1893	273.98	320.00	1,668.5
1863	184.68	214.00	1,640.8	1894	297.76	329.66	1,669.2
1864	177.58	231.00	1,642.7	1895	300.17	338.00	1,669.4
1865	191.55	226.33	1,646.3	1896	305.88	330.66	1,672.3
1866	192.63	237.00	1,647.8	1897	307.94	334.66	1,671.6
1867	199.73	237.66	1,646.7	1898	317.04	328.00	1,673.5
1868	213.53	258.00	1,648.0	1899	310.39	311.33	1,675.7
1869	220.49	258.00	1,648.5	1900	316.90	317.33	1,678.2
1870	215.29	267.66	1,648.4	1901	304.18	334.66	1,679.4
1871	220.95	251.33	1,649.4	1902	320.82	359.00	1,680.0
1872	228.78	259.33	1,649.7	1903	313.02	368.33	1,682.4
1873	226.18	269.00	1,650.7	1904	317.53	378.00	1,682.0

1874	243.83	267.00	1,650.7	1905	327.06	377.66	1,686.0
1875	251.51	270.66	1,652.4	1906	339.33	384.66	1,686.2
1876	246.35	245.33	1,655.0	1907	342.48	381.33	1,685.6
1877	251.62	258.66	1,656.0	1908	341.81	386.00	1,689.0
1878	257.83	246.00	1,655.5	1909	347.47	379.00	1,689.4
1879	248.98	255.66	1,655.3	1910	348.29	379.33	1,687.8
1880	262.02	251.00	1,657.5	1911	365.90	381.33	1,690.9
1881	266.58	263.33	1,659.4	1912	377.80	390.66	1,693.0
1882	277.29	275.33	1,660.5	1913	392.01	n.a.	1,691.3
1883	286.18	275.33	1,662.6				

Sources: Col. (2), Dutch income per capita according to Horlings, Smits, and van Zanden, in constant prices (1900–10 = 100): This series of real per capita income is based on the recently presented figures of nominal GNP at market prices of the Netherlands in Horlings et al. (1995, Bijlage 2: “Het bruto nationaal product tegen marktprijzen, 1850–1913 (lopende prijzen) [Appendix 2: Gross national product at market prices, 1850–1913 (current prices)]. Nominal GNP recalculated on a per capita basis by using population figures of Horlings (1993), reprinted in this appendix (table 9A.3, col. [2]). Nominal national per capita income recalculated at constant (1900–10 = 100) prices by using a price series published by van Stuijvenberg and de Vrijer (1980, 9–12, col. 1).

Col. (3), Dutch income per capita according to Brinkman, Drukker, and Slot, in constant prices (1900–10 = 100): This series is completely derived from median heights of conscripts for the second half of the nineteenth-century, by applying a polynomial distributed, lagged ALMON regression. For details, see Brinkman et al. (1988). Figures originally published in Brinkman et al. (1988, 264, cols. 4 and 5). The series reproduced in this appendix is a three-year moving average of the original Brinkman et al. series.

Col. (4), Median heights of Dutch conscripts in millimeters (conscript years): 1855–62, identical to data in table 9A.1, col. (2); 1863–1913, identical to data in table 9A.1, col. (3).

Table 9A.8 “Unrealistic” Real Income per Capita and Median Height of Conscripts (in millimeters) in the Netherlands, 1807–50

Year (1)	Horlings et al. Real Income per Capita (2)	“Unrealistic” Real Income per Capita (3)	Median Height of Conscripts (mm) (4)	Year (1)	Horlings et al. Real Income per Capita (2)	“Unrealistic” Real Income per Capita (3)	Median Height of Conscripts (mm) (4)
1807	104.08	n.a.	n.a.	1829	n.a.	115.950	1,661.7
1808	n.a.	106.920	n.a.	1830	n.a.	112.990	1,665.4
1809	n.a.	100.300	n.a.	1831	n.a.	112.640	1,662.6
1810	n.a.	99.720	n.a.	1832	n.a.	131.820	1,658.3
1811	n.a.	99.165	n.a.	1833	n.a.	134.640	1,654.6
1812	n.a.	98.607	n.a.	1834	n.a.	138.470	1,661.1
1813	n.a.	97.767	n.a.	1835	n.a.	135.930	1,657.3
1814	n.a.	97.275	n.a.	1836	n.a.	125.230	1,659.2
1815	n.a.	106.020	n.a.	1837	n.a.	130.940	1,661.1
1816	n.a.	97.650	n.a.	1838	n.a.	126.750	1,662.8
1817	n.a.	107.590	n.a.	1839	n.a.	131.960	1,656.4
1818	n.a.	108.840	1,637.8	1840	n.a.	131.480	1,653.3
1819	n.a.	106.160	1,644.5	1841	n.a.	133.130	1,656.3
1820	n.a.	110.590	1,647.2	1842	n.a.	130.430	1,655.5
1821	n.a.	112.950	1,647.1	1843	n.a.	132.610	1,654.0
1822	n.a.	115.310	1,648.0	1844	n.a.	138.940	1,648.5
1823	n.a.	116.300	1,650.9	1845	n.a.	137.790	1,654.2
1824	n.a.	111.090	1,653.9	1846	n.a.	128.200	1,651.9
1825	n.a.	108.270	1,656.9	1847	n.a.	125.650	1,649.3
1826	n.a.	111.360	1,661.7	1848	n.a.	136.270	1,644.3
1827	n.a.	113.110	1,663.5	1849	n.a.	142.200	1,640.7
1828	n.a.	120.420	1,661.5	1850	180	143.370	1,642.5

Sources: Col. (2), Dutch income per capita according to Horlings, Smits, and van Zanden, in constant prices (1900–10 = 100): Identical to data in table 9A.7, col. (2).

Col. (3), “Unrealistic” Dutch income per capita, estimated by extrapolating the Horlings et al. (1995) 1807 benchmark up to 1850, on the basis of the yearly growth rate of real value-added in the service sector, in constant prices (1900–10 = 100): The 1807 value of Dutch real income per capita (col. [2]) according to Horlings et al. (1995) was taken as the starting point from which to extrapolate a counter-biased series of Dutch real income per capita, by applying the yearly growth rate of real value-added in the Dutch service sector, as estimated by Horlings (1995). This procedure underestimates the growth of Dutch real income per capita between 1807 and 1850 since there is general agreement that the expansion of the Dutch service sector was lagging severely behind Dutch agriculture and industry during these years. This point is corroborated by the fact that the Horlings et al. (1995) estimate of Dutch real income per capita in 1850 is approximately 25 percent higher than the “unrealistic” estimate for the same year.

Table 9A.9 Five-Year Moving Averages of Crude Death Rates in Traditional Rural, Modern Agricultural, and Urban Regions of the Netherlands (yearly; per 1,000 population), 1803–1911

Year (1)	Traditional Rural (2)	Modern Agricultural (3)	Urban (4)	Year (1)	Traditional Rural (2)	Modern Agricultural (3)	Urban (4)
1803	22.7	26.0	33.8	1826	20.4	30.7	29.3
1804	22.6	25.9	32.7	1827	21.5	32.2	31.2
1805	22.9	27.6	33.0	1828	22.5	32.3	31.3
1806	23.3	29.9	34.2	1829	23.4	28.5	30.5
1807	23.3	31.3	34.6	1830	24.0	26.4	30.5
1808	23.6	32.1	35.4	1831	24.0	25.1	31.1
1809	24.4	33.3	36.5	1832	23.4	23.8	30.6
1810	24.5	32.4	36.8	1833	22.6	23.2	31.5
1811	24.0	30.3	35.4	1834	21.5	22.2	31.2
1812	24.8	29.8	35.8	1835	21.2	22.4	30.9
1813	24.1	28.0	34.5	1836	21.4	22.8	30.2
1814	23.0	26.1	32.8	1837	21.4	22.5	29.2
1815	22.9	24.6	31.8	1838	21.8	22.6	28.1
1816	22.8	24.2	30.7	1839	22.0	22.9	27.8
1817	22.0	23.3	29.0	1840	22.0	23.0	27.9
1818	22.0	23.9	29.3	1841	21.7	22.8	27.5
1819	21.6	23.8	29.6	1842	21.7	23.2	27.7
1820	20.9	24.0	29.3	1843	21.5	23.1	27.7
1821	20.7	23.7	28.8	1844	22.3	24.8	29.1
1822	20.0	23.0	28.0	1845	23.1	26.0	30.7
1823	19.6	22.9	27.6	1846	24.2	27.0	32.2
1824	20.1	27.4	28.7	1847	25.4	27.5	34.8
1825	20.2	29.4	28.8	1848	25.1	27.4	34.7

(continued)

Table 9A.9 (continued)

Year (1)	Traditional Rural (2)	Modern Agricultural (3)	Urban (4)	Year (1)	Traditional Rural (2)	Modern Agricultural (3)	Urban (4)
1849	24.0	25.6	33.0	1881	21.4	19.0	24.1
1850	22.9	24.2	30.5	1882	21.3	18.7	24.3
1851	22.1	23.1	29.5	1883	20.9	18.2	23.6
1852	21.2	22.3	26.6	1884	21.0	18.4	23.6
1853	22.2	23.5	28.2	1885	20.9	18.4	23.2
1854	22.5	24.0	28.3	1886	20.9	18.1	22.5
1855	23.0	24.5	29.4	1887	20.7	18.1	21.7
1856	23.5	25.6	30.2	1888	20.7	18.2	21.4
1857	24.1	27.5	32.3	1889	20.6	17.9	20.9
1858	23.6	27.3	31.1	1890	21.0	18.0	21.0
1859	24.0	27.5	31.5	1891	20.8	17.9	20.6
1860	23.7	26.9	30.5	1892	20.7	17.7	20.0
1861	23.3	25.8	29.3	1893	20.5	17.4	19.3
1862	22.9	24.3	27.5	1894	19.9	16.7	18.7
1863	23.4	24.6	27.4	1895	19.1	16.3	17.8
1864	24.4	24.4	28.8	1896	18.6	15.7	17.4
1865	24.3	24.0	29.1	1897	18.2	15.4	17.1
1866	24.7	24.2	29.3	1898	18.0	15.5	16.8
1867	24.3	23.6	28.8	1899	18.1	15.6	16.6
1868	24.2	22.9	28.9	1900	18.0	15.6	16.3
1869	24.0	23.2	28.9	1901	17.8	15.5	15.8
1870	24.4	23.7	29.0	1902	17.6	15.3	15.5
1871	24.1	23.2	28.7	1903	17.2	14.7	14.9
1872	24.0	23.1	28.7	1904	16.7	14.4	14.5

1873	23.8	23.3	28.6	1905	16.4	14.0	14.1
1874	22.8	22.5	26.8	1906	16.4	13.8	13.9
1875	22.2	21.8	26.0	1907	15.9	13.5	13.5
1876	22.1	21.6	25.7	1908	15.5	13.2	13.1
1877	22.1	21.3	25.6	1909	15.6	13.3	12.9
1878	22.0	20.5	25.2	1910	15.1	12.9	12.5
1879	21.7	19.9	24.7	1911	14.4	12.6	12.0
1880	21.6	19.3	24.4				

Sources: Col. (2), Five-year moving average of the crude death rate in traditional rural regions of the Netherlands per 1,000 total population (yearly; end of year): The series is derived from Horlings (1993, appendix 2, 18–22). The yearly mortality figures of the traditional rural regions are calculated as weighted averages of the figures for North-Brabant, Gelderland, Utrecht, Overijssel, Drenthe, and Limburg, with yearly total population figures of these provinces as weights. Yearly total population per province from Horlings (1993, appendix 1).

Col. (3), Five-year moving average of the crude death rate in modern agricultural regions of the Netherlands per 1,000 total population (yearly; end of year): For the sources for this series, see col. (2) sources. The yearly mortality figures of the modern agricultural regions are calculated as weighted averages of the figures for Zeeland, Friesland, and Groningen, with yearly total population figures of these provinces as weights.

Col. (4), Five-year moving average of the crude death rate in urban regions of the Netherlands per 1,000 total population (yearly; end of year): For the sources for this series, see col. (2) sources. The yearly mortality figures of the urban regions are calculated as weighted averages of the figures for Zuid-Holland, and Noord-Holland, with yearly total population figures of these provinces as weights.

Table 9A.10 Five-Year Moving Averages of “Guesstimates” of Average Height of Dutch Conscripts (conscription-years): National and for Traditional Rural, Modern Agricultural, and Urban Regions of the Netherlands (in millimeters), 1823–53

Year (1)	National (2)	Modern Agricultural (3)	Traditional Rural (4)	Urban (5)
1823	1,629.0	1,626.3	1,632.6	1,627.0
1824	1,632.6	1,632.5	1,634.2	1,631.3
1825	1,635.8	1,637.9	1,636.1	1,634.5
1826	1,636.9	1,638.8	1,637.7	1,635.2
1827	1,638.6	1,638.7	1,638.7	1,638.4
1828	1,637.7	1,634.6	1,638.1	1,638.3
1829	1,635.4	1,629.5	1,636.9	1,635.9
1830	1,633.9	1,627.4	1,636.0	1,634.1
1831	1,632.5	1,626.2	1,635.4	1,631.6
1832	1,630.1	1,622.1	1,634.7	1,628.1
1833	1,629.8	1,623.2	1,635.1	1,626.3
1834	1,631.1	1,626.5	1,636.8	1,626.5
1835	1,631.7	1,627.6	1,637.8	1,626.7
1836	1,632.4	1,628.4	1,638.4	1,627.7
1837	1,633.1	1,631.6	1,638.5	1,628.0
1838	1,633.2	1,633.4	1,639.3	1,626.6
1839	1,633.3	1,634.0	1,640.5	1,625.0
1840	1,633.3	1,635.6	1,640.4	1,623.7
1841	1,634.1	1,638.4	1,641.2	1,623.2
1842	1,634.9	1,640.1	1,642.6	1,622.5
1843	1,635.4	1,641.7	1,642.8	1,622.8
1844	1,635.3	1,642.1	1,641.6	1,623.2
1845	1,633.7	1,641.1	1,639.5	1,622.0
1846	1,630.9	1,637.4	1,636.6	1,619.7
1847	1,628.1	1,634.0	1,633.4	1,618.1
1848	1,625.5	1,631.3	1,629.7	1,616.7
1849	1,624.0	1,630.1	1,627.8	1,615.5
1850	1,624.5	1,629.3	1,629.1	1,616.4
1851	1,626.8	1,630.8	1,630.2	n.a.
1852	1,627.4	1,630.5	1,630.2	n.a.
1853	1,628.0	1,629.5	n.a.	n.a.

Sources: In table 9A.10 an attempt is made to roughly estimate of both national average heights for Dutch conscripts and three regional series of average heights for the years 1823–53.

Although the surviving Dutch height data for these years is generally considered to be a reliable approximation of all Dutch boys aged 19 3/4 years (see, e.g., B. Koerhuis and W. v. Mulken, “De militieregisters 1815–1922” [The registers of the militia 1815–1922], in *Broncommentaren*, vol. 5 [The Hague, 1986]), the data differ both in availability and quality for the different provinces. For the province of Drenthe, complete individual data are available, so for this particular province average heights, median heights, and percentage of undersized conscripts (both registered and measured) can be derived from the individual data. This was done by Tassenaar for the heights of conscripts in Drenthe in the period 1821–50 on the basis of the “Archive of the Governor of the King,” *Provincial Archive of Drenthe* (inv. no. 0040: f 450015–45005). The data for the other provinces are less detailed. For most provinces (Nourd-Holland, Zeeland, and Nourd-Brabant) only the percentage of undersized registered conscripts is available. For the provinces of Utrecht and Groningen, percentages of both measured and registered undersized conscripts are available.

Table 9A.10 (continued)

Essentially, the different series of average heights in table 9A.10 were derived by relating the available series of average heights and percentages of measured and registered undersized conscripts by ordinary regression.

Figures for Groningen from Zeeman (1861, 697, row 11).

Figures for Nour-Brabant from J. A. Boogaard, "Verslag namens de commissie voor statistiek der Nederlandsche maatschappij tot bevordering van de geneeskunst," *Nederlandsch Tijdschrift voor Geneeskunst* (1859) 3:475, col. 10.

Figures for Nour-Holland from J. A. Boogaard, "Bijdrage tot de militie-statistiek der provincie Zeeland," *Nederlandsch Tijdschrift voor de Geneeskunst* (1868) 12:317.

Figures for Utrecht were kindly made available through J. J. de Beer. The original data can be found in the Municipal Archive of Utrecht, "Staat der ingeschrevenen in de provincie Utrecht voor de Nationale militie en der vrijgestelden wegens gebrek aan lengte 1824-1851" (inv. no.: 853).

Figures for Zeeland from Boogaard (1868, 315, col. 5).

Col. (2). Five-year moving average of estimated average heights of Dutch conscripts in millimeters (conscriptio years): The series is a 5-year moving average of a weighted yearly series of data for the provinces of Groningen, Drenthe, Nour-Brabant, Nour-Holland, Zeeland, and Utrecht, with the yearly relative number of conscripts per province as weights.

Col. (3). Five-year moving average of estimated average heights of conscripts in millimeters (conscriptio years) in traditional rural regions: The series is a 5-year moving average of a weighted yearly series of data for the provinces of Drenthe, Nour-Brabant, and Utrecht, with the yearly relative number of conscripts per province as weights.

Col. (4). Five-year moving average of estimated average heights of conscripts in millimeters (conscriptio years) in modern agricultural regions: The series is a 5-year moving average of a weighted yearly series of data for the provinces of Groningen and Zeeland, with the yearly relative number of conscripts per province as weights.

Col. (5). Five-year moving average of estimated average heights of conscripts in millimeters (conscriptio years) in urban regions: The series is a 5-year moving average of a yearly series of data for the province of Nour-Holland.

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