An Economic and Social History of the Netherlands, 1800–1920

Demographic, Economic and Social Transition

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1 Demographic indicators

1.1 Population increase and vital statistics

One of the most eloquent indicators of the state of an economy is the physical well-being of its population. The demographic history of the Dutch in the modern period has some distinctive characteristics, while remaining clearly rooted in the mainstream pattern of European development. The European population increased approximately fourfold between 1750 and 1950, from 144 million to 574 million. There was considerable variance in the rate of increase across the regions of Europe, and the Netherlands tended to fit into the pattern of faster growth which characterized some of the northern European nations like the United Kingdom, Scandinavia, northern Germany and the Low Countries.[1] Between the beginning of the nineteenth century and the outbreak of the Second World War, the world population is estimated to have grown by a factor of 2.4, the European by a factor of 2.9, while the Dutch managed to expand their numbers by a factor of no less than 4.4.[2]

Indeed, a whole string of more subtle demographic indicators than the gross population increase show the Netherlands to have been something of a demographic maverick: not only did it possess one of the highest growth rates, but it also has had some of the highest birth rates and the lowest death rates in the world, and in the twentieth century its life expectancy has also been among the highest. All this has meant that the Netherlands is now the most densely populated country in the OECD area.[3] Two factors lie at the root of this prominence of the Netherlands within the European pattern: the rapidity and extent of the decline in mortality since the middle of the last century, and the relatively late and gentle decline in fertility rates.[4] The Dutch population started growing earlier, and applied the brakes to its growth much later than most of its

[1] Tuma, *European economic history*, 202–3. [2] Heere, 'De tegenwoordige', 4.
[3] At 390 persons per km^2 in 1971 (Table I.1), and 432 in 1987 (Wintle, 'The Netherlands economy', 356). Heeren and Van Praag, *Van nu tot nul*, 76–7; and Van Heek, *Het geboorte-niveau*, 190–1.
[4] Engelen and Hillebrand, 'Vruchtbaarheid', 248.

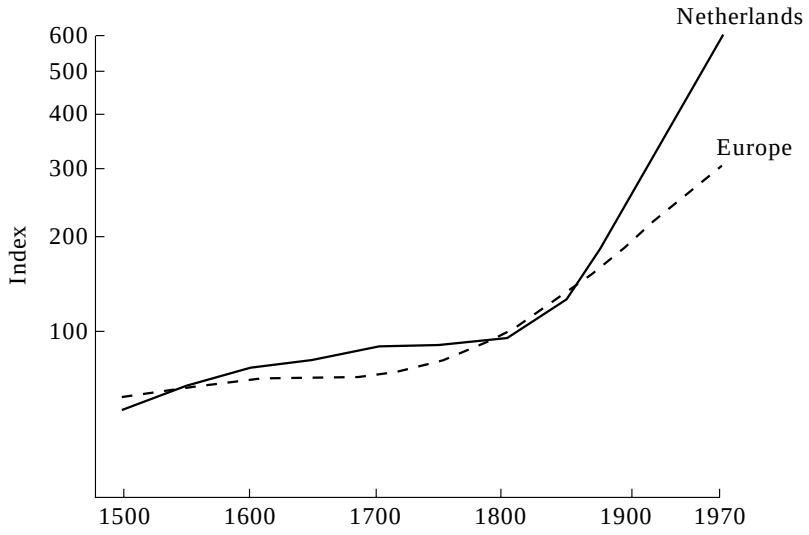

Figure I.1 The Dutch and West European population, 1500–1970; index (1800 = 100).

Source: Goodman & Honeyman, *Gainful pursuits*, 20; and Mitchell, *European historical statistics*, 3–8.

European counterparts. The details of and reasons for this state of affairs will form the principal themes of this chapter.

Population in the Netherlands (present borders) increased from just over 2 million in 1795 to 5.1m. at the turn of this century, and then to 15.4m. in 1994 (Figure I.1 and Table I.1). The annual rate of increase stayed well below 1 per cent per annum until the 1870s, when it leapt from 0.82 per cent in the 1860s to 1.21 per cent p.a. in the next decade (see Table I.1). Thereafter the annual rate of increase continued to rise until the 1930s, since when it has subsided. How can we explain what has been called this 'bizarre demographic development'?[5] The first objective is to determine what happened in the 1870s to allow the population to 'take off' in such a fashion.

Aggregate birth rates in the Netherlands (Table I.2) fluctuated around the mid-thirties per thousand population between 1815 and the 1870s, and then entered a long decline which has only been briefly interrupted by the 'baby-boom' after the Second World War. In other words, if we are seeking an explanation for the rise in the Dutch population which began to accelerate from the 1870s onwards, the birth rate alone is not

[5] Drukker, *Waarom de crisis*, 249.

Table I.1. *Population in the Netherlands at census counts, 1815–1971, with sex ratio and average annual rate of increase.*

Year	Total × 1,000	Males × 1,000	Females × 1,000	Sex ratio F/M	Total population index (1830 = 100)	Population per km^2	Average annual rate of increase
1830	2,613	1,278	1,335	1.045	100	80	
1840	2,861	1,401	1,460	1.042	109	88	0.95
1849	3,057	1,499	1,558	1.040	117	94	0.76
1859	3,309	1,629	1,680	1.031	126	101	0.82
1869	3,580	1,764	1,815	1.029	136	109	0.82
1879	4,013	1,983	2,030	1.023	152	122	1.21
1889	4,511	2,228	2,283	1.024	173	139	1.24
1899	5,104	2,521	2,584	1.025	192	154	1.31
1909	5,858	2,899	2,959	1.021	224	180	1.48
1920	6,865	3,410	3,455	1.013	263	211	1.72
1930	7,936	3,943	3,993	1.013	304	244	1.56
1947	9,625	4,838	4,878	1.008	368	296	1.25
1960	11,462	5,754	5,802	1.008	439	352	1.47
1971	12,709	*6,465	*6,493	*1.004	486	390	0.99

Sources: CBS, as reported in Van der Woude, 'Bevolking en gezin'; and Bos, 'Long-term demographic development'.
* Figure for 1969.

very helpful. If the birth rate were determining the size of the total population, then we would expect the latter to fall heavily from the 1870s onwards, whereas what in fact happened was an unprecedented rise. Birth rates (and fertility rates) may conceal all manner of vital information about the dynamics of the Dutch population, especially at local and regional level, but as far as the national rise in population is concerned, the explanation lies for the main part with other factors. Theoretically, it is possible that the population increase came about from the 1870s onwards as a result of in-migration, with the number of immigrants outstripping the emigrants. Again, migration holds the key to a number of vital issues, but not to the total population increase in the nineteenth century: there was a slight immigration surplus early in the nineteenth century which then reversed into one of emigration (not large), which lasted until the First World War and beyond (Table I.3; see below, section I.6, on migration). We are left, then, with the death rates.

Death rates in the Netherlands (Table I.2) fluctuated around a slightly declining trend from the time of Waterloo to the time of the Paris Commune in 1870, and then went into free fall. With a blip for the First

Table I.2. *Birth rates, death rates, infant mortality rates and marriage rates in the Netherlands, ten-year intervals, 1840–1955.*

Period	Marriages (per 1,000 average annual population)	Births	Deaths	Deaths under 1 year per 100 births
1840–49	7.3	33.1	26.3	18.2
1845–54	7.7	33.0	26.1	18.8
1850–59	7.9	33.8	25.5	19.5
1855–64	7.9	33.8	26.1	19.9
1860–69	8.2	34.7	24.9	19.8
1865–74	8.2	35.5	25.0	20.7
1870–79	8.1	36.2	24.5	20.4
1875–84	7.6	35.8	22.6	19.1
1880–89	7.1	33.5	21.3	18.3
1885–94	7.1	33.5	20.3	17.0
1890–99	7.3	32.7	18.7	16.0
1895–04	7.5	32.1	17.0	14.7
1900–09	7.5	30.9	15.6	13.0
1905–14	7.4	29.1	13.9	11.1
1910–19	7.4	26.9	13.0	9.7
1915–24	8.1	26.2	12.5	8.3
1920–29	8.0	25.1	10.5	6.6
1925–34	7.5	22.6	9.5	5.2
1930–39	7.6	21.0	8.8	4.2
1935–44	7.7	21.0	9.5	4.0
1940–49	8.4	23.9	9.9	4.2
1945–54	8.9	24.0	8.5	3.3
1950–55	8.4	22.0	7.4	2.3

Source: CBS.

World War and rather more than a blip for the Second (see Figure I.2), they have continued to fall ever since. In aggregate terms, then, the main reason at national level why the Dutch population rose, and rose rapidly after the 1870s, was a fall in mortality. In brief, relatively few people were dying, rather than more babies being born: the Dutch were living longer.

Life expectancy did indeed rise rapidly (Table I.4). In the 1840s a Dutchman could be expected to reach the age of thirty-six on average; women would live slightly longer, to about thirty-eight and a half. By the 1920s, these figures had leapt to sixty-two and sixty-four respectively, and then rose further, nearly doubling in little more than a century. The major acceleration in this improvement of prospects began – as we are coming to expect – in the 1870s; a detailed study of Utrecht has confirmed that there was no improvement at all before 1860.[6] But the concept of an average

[6] Mandemakers and Boonstra, eds., *De levensloop*, chapter 3.

Table I.3. *Migration surplus/deficit in the Netherlands, 1815–1909 (× 1,000).*

Date	Population growth	Birth surplus	Deduced migration balance	CBS-calculated migration balance	Overseas migration balance
1815–19	79	92	−13	—	—
1820–29	301	211	90	—	—
1830–39	237	215	22	—	—
1840–49	196	202	−6	−9.3	−12.4
1850–59	252	261	−9	−10.3	−15.8
1860–69	271	346	−75	−66.8	−23.8
1870–79	433	449	−16	−13.0	−2.8
1880–89	498	566	−68	−67.0	−34.9
1890–99	593	675	−82	−82.0	−56.0
1900–09	754	841	−87	−85.0	−84.1
1840–1909	2,997	3,340	−343	−333.4	−229.8

Source: Stokvis, 'Nederland en de internationale migratie', 72.

Figure I.2 Mortality rates in the Netherlands, 1816–1975, quinquennial averages, deaths per thousand population per annum.

Source: Van der Woude, 'Bevolking en gezin', 30.

Table I.4. *Life expectancy at birth in the Netherlands, male and female, 1840–1952.*

Period	Males	Females
1840–51	36.2	38.5
1850–59	36.4	38.2
1860–69	37.2	39.1
1870–79	38.4	40.7
1880–89	42.5	45.0
1890–99	46.2	49.0
1900–09	51.0	53.4
1910–20	55.1	57.1
1921–30	61.9	63.5
1931–40	65.7	67.2
1947–49	69.4	71.5
1950–52	70.6	72.9

Source: CBS.

life expectancy at birth is of course a spurious one: the most likely fate to befall the Dutch newly born in the nineteenth century was one of death before reaching the age of twelve months. Once the infant had passed its first birthday, chances of survival improved slightly, and after the age of five they began to look quite rosy.[7] But with extremely high death rates for most of the nineteenth century, a worryingly prominent role was played by infant mortality. At national aggregate level, with death rates at over twenty-five per thousand per annum for nearly all of the period up to the 1870s, something like 20 per cent of those deaths were of infants under the age of one year (Table I.2). Locally, these mortality rates could rise to and remain at truly awesome levels, so much so that it is difficult for Western historians today to imagine life under such conditions.

National death rates were above twenty per thousand for almost the whole of the century, and only began to come down after the 1870s (Table I.2); by far the worst areas, especially in the middle of the century, were the coastal provinces of Groningen, Friesland, Noord- and Zuid-Holland, and especially the infamous Zeeland.[8] Zeeland had mortality rates of up to thirty-eight per thousand per annum in the period before the 1870s, and in some of its villages the statistics took on proportions that can only be described as horrific. In the forties and fifties of the last

[7] Van der Woude, 'Bevolking en gezin', 35. On infant mortality and its eventual decline in the nineteenth century in the town of Tilburg, see Van der Heijden, *Het heeft niet willen groeien*.

[8] Heere, 'De tegenwoordige', 6–7; and De Vooys, 'De sterfte'.

century, in Wissekerke, the rate was no less than forty-seven, and in Wolphaartsdijk it actually reached the psychologically devastating level of fifty.[9] For most of the nineteenth century the regional differences in the death rates of the Netherlands, which were considerable, are largely to be explained by variances in the child and infant mortality rates. In summary, the death rates were high until the 1870s, then declined rapidly, and after 1914 were not exceptional in comparison with other European countries. From that point on there was little regional variation.[10] Three questions pose themselves: why were the rates so high, why did they vary so much from province to province, and what brought them down so rapidly after 1870?

The 'demographic transition'

These are questions about what has come to be called 'the demographic transition': the switch from a population which maintained relative stability, with high death rates compensated for by high birth rates, to a society where population growth was relatively restricted again, but now with low death rates cancelling out low birth rates. The watershed period, with both birth rates and death rates plummeting, was usually a period of enormous population growth, for while fewer children were being born, the decline in mortality proceeded much faster, with the result that the new survivors outstripped the now unborn with great rapidity.[11] The theory of the demographic transition has been much disputed, but still determines most of the parameters of discussion and research; there is evidence that fertility rates were often anything but passive in the 'transition', and we shall study them in detail here, but it is still the rapid rise in population and fall in the death rate which continues to attract much of the attention of historians.[12]

1.2 Explaining the decline in mortality

Three general sorts of explanations have been put forward for the fall in mortality in the nineteenth century: those which concern the food supply, those which stress improvements in medicine and health care,

[9] De Vooys, 'De sterfte', 236. See also De Man, *Bijdrage tot de kennis*; De Man, 'Het sterftecijfer'; and Broes van Dort, *Bijdrage tot de kennis*. For a general summary of these discussions about Zeeland, see Wintle, *Zeeland and the churches*, 41–3.

[10] Van der Woude, 'Bevolking en gezin', 35–8.

[11] The classic formulation of this analysis was in 1945: Notestein, 'Population'.

[12] Note, for example, the recent inaugural lecture of one of the Netherlands' foremost demographers: Van Poppel, *Statistieke ontleding*. Other texts are very numerous; a good introduction in English is Petersen, 'The demographic transition'.

and those which deal with the improving public-health environment. Few would dispute the importance of improvements in the quantity and quality of food to the health of the population. If we accept a classic Malthusian situation in a country like the Netherlands which did not undergo an iron- and coal-led Industrial Revolution, then a massive increase in the food supply would permit and even cause an expansion of the population, by improving the diet of Dutch men, women, and particularly children, and thus by keeping them alive longer. It can be objected that the Dutch agricultural sector, and the commercial sector which connected the Netherlands to other sources of agricultural supply, were far from primitive and had been highly developed for several centuries, and that therefore the food supply was not in the least inelastic: the Malthusian concept of a direct and inevitable relationship between domestic farming and the level of the population simply did not pertain in the Netherlands of the nineteenth century. The food supply will be dealt with in more detail in chapter 2; meanwhile it is clear that the doubling of the population in the nineteenth century must have been affected by an increasing availability of better food. For example, the introduction of the potato to European diets is accepted as having acted as an important extender of life from the late eighteenth century onwards,[13] and the impact of the agricultural golden years of the 1850s and 1860s, lasting into the 1870s, with harvests and yields at unprecedented levels, cannot have failed to exert an influence on the decline in mortality from the 1870s onwards. The import of increasing quantities of cheap grains from the world's wide-open spaces from the 1870s onwards further continued this trend of there being larger amounts of cheap food available to the people of the Netherlands. This, then, was an enabling factor: economic expansion, especially in agriculture and trade, permitted the population to grow, as well as being at least partially caused by that growth. However, the 'Malthusian' explanation seems to operate more as a background factor, and less as a direct cause for the rapid decline in mortality, especially from 1870 onwards.

There is an attraction in the directness of taking an approach which embraces medical advances as the great cause of the defeat of disease, and indeed medical historians of earlier generations have tended to ply their trade as one which charts the gradual but increasing success of medicine in the battle against mortality. Smallpox was one of the greatest killers, and especially of children; Peter Razzell in particular has suggested that the role of the introduction of inoculation and even more of vaccination against it was critical in bringing down death rates in England.[14] There

[13] De Meere, *Economische ontwikkeling*, 114.
[14] Razzell, *The conquest*; and Razzell, *Edward Jenner's cowpox vaccine*.

was a spate of laws across Europe making smallpox vaccination compulsory after the epidemic at the beginning of the 1870s, including one in the Netherlands in 1872, which seems to fit perfectly with the decline of infant and general mortality from that point.[15] Further, one can point in the Netherlands to a law of 1865 which limited quackery in medicine by introducing compulsory training for physicians, and to the radical improvements and professionalization of hospitals in the course of the nineteenth century.[16] These medical improvements certainly had an impact, although the effectiveness of vaccination has been heavily disputed; the problem is generally one of timing. The effects of most of the advances in the nineteenth century were probably limited to the upper classes, and only in the present century did medicine progress far enough to alter dramatically the death rates of ordinary families.

Without dismissing these explanations related to the food supply and to medical advances, it remains to assess the virtues of the third category: that of various environmental changes, man-made and otherwise, which improved the condition – and the length – of life in the Netherlands in the last century. They covered a wide range: one of the most important must have been that a number of potentially lethal contagious diseases had declined in their effectiveness against the human race, such as the bubonic plague.[17] There are discernible trends in long-term biology which point to the decline in the virulence of certain diseases in the nineteenth century; unfortunately we know too little about these developments to be categorical. On the other side of the equation, immune systems seem to have become stronger against these diseases, and that is readily understandable in terms of the increase in quality and quantity of the food supply: an adequate and regular diet helped build up the kind of constitution which could shake off attacks from endemic diseases like fevers or even smallpox. The process of industrialization meant that, over time, personal hygiene could improve: such articles as soap and cotton underwear became mass-produced and therefore cheap and available to virtually all people.[18] The public-health reforms engineered by Edwin Chadwick in England from the 1840s onwards came later in the Netherlands, but then so did the large-scale industrialization and urbanization which made the reforms so vital, with the result that the Dutch were able to benefit quite directly from such environmental improvements as sewers and running water.[19]

[15] See Rutten, '*De vreeslijkste aller harpijen*'; and section 2.3 below.
[16] Brugmans, *Paardenkracht*, 427–8; and Verdoorn, *Het gezondheidswezen*.
[17] Noordegraaf and Valk, *De gave Gods*; and Baudet and Van der Meulen, *Kernproblemen*, 133.
[18] Lee, ed., *European demography*, 15.
[19] Petersen, *Planned migration*, 22.

It is wise to assess the causes of declining mortality in terms of a matrix of factors which combines all three types of reasons: medical, agricultural and environmental, with an emphasis on the last category. An authoritative study on the health of the town of Utrecht attributed the fall in the death rate, and especially in infant mortality, to a combination of factors, including the vaccination law of December 1872, the increasing popularity of buttermilk (which reduced the occurrence of salmonellas), the improved quality of the care of the poor and sick as a result of the overhaul of the system of local government and the Poor Law, and a generally improving and modern mentality.[20] There was therefore a multiplicity of factors at work.

But two of the factors in particular command more specific attention in the case of the Netherlands: the condition of the water, and the attitudes of the Dutch to breastfeeding. The key to the problem appears to lie in the very substantial regional differences in the death rates – especially the child mortality – which existed between the various parts of the Netherlands.

Water and mortality

The figures in Table I.5 show where the danger areas were. The high rates before the 1870s were to be found in the west of the country: these are the low-lying, damp or even wet Holocene clay-soil areas.[21] Much of the land in these parts had been reclaimed from sea or river; some of it was poorly drained, and even waterlogged for much of the year. The problem was particularly acute in the worst area, the province of Zeeland, but applied to most of the coastal, western half of the Netherlands which is at or under sea-level (very roughly equivalent to the sea-clay area, shown in Figure I.3). Polders surrounded by dikes are meant to drain naturally, and usually a mud-flat was not encircled with a dike until it had become high enough to drain itself at low water. However, in the course of the centuries the sea-level had risen, and auxiliary pumping became necessary. Before the days of steam pumps this meant that certain areas were characterized by marshy or boggy conditions or even by open water, which was poorly circulated and thus prone to stagnancy, and also affected by salination and thus brackish. These conditions are not good for producing drinking water, but they also form the perfect breeding ground for the larvae of the mosquito which carries and transmits malaria: the *Anopheles maculipennis atroparvus*, or short-winged variety. This insect breeds in salt or brackish water, which makes the Netherlands

[20] Bosschaert, *De stad Utrecht*, 80–1.
[21] Van der Woude, 'Bevolking en gezin', 57.

Table I.5 *Death rates in the Netherlands and its provinces, five-yearly periods, 1816–1975 (per 1,000).*

	1816–20	1821–25	1826–30	1831–35	1836–40	1841–45	1846–50	1851–55	1856–60	1861–65	1866–70	1871–75	1876–80	1881–85	1886–90	1891–95
Groningen	21.4	21.0	32.1	21.0	21.6	22.0	26.3	22.7	25.8	21.8	21.7	23.0	20.4	17.9	17.4	17.2
Friesland	20.3	21.1	33.0	23.1	21.0	21.2	25.6	20.2	25.3	22.7	19.8	20.9	19.3	17.7	17.7	16.7
Drenthe	20.7	19.2	25.2	20.5	22.1	21.7	27.3	20.2	20.2	21.9	22.1	20.6	19.9	19.6	19.7	19.8
Overijssel	25.7	24.0	26.4	24.2	24.1	24.0	26.5	22.4	24.2	23.6	24.1	24.1	22.4	21.5	21.4	20.9
Gelderland	22.9	21.0	22.2	22.7	22.4	22.6	23.9	20.5	22.4	22.5	22.5	22.8	20.4	19.3	19.6	19.7
Utrecht	27.3	26.0	28.7	30.0	27.8	25.9	32.8	26.4	27.6	25.1	29.0	27.8	24.3	23.1	22.0	20.9
N-Holland	31.6	32.0	37.5	34.3	31.9	30.1	36.7	27.2	30.7	25.3	26.8	26.7	24.6	23.1	20.9	18.5
Z-Holland	31.6	29.3	31.7	33.7	29.5	30.0	36.8	30.8	31.0	29.4	30.3	30.9	26.5	24.5	22.3	20.5
Zeeland	37.0	33.7	38.0	34.4	30.9	31.5	34.7	30.9	31.5	28.6	26.2	26.4	22.4	19.3	18.8	18.7
N-Brabant	23.6	21.1	23.4	25.4	22.4	21.7	23.2	21.7	23.4	23.4	22.8	24.3	22.8	22.4	22.1	22.4
Limburg	—	—	—	—	—	22.9	23.7	23.3	22.7	22.4	22.2	22.9	21.7	20.3	19.0	20.8
Netherlands	*27.0	*25.7	*28.0	*25.8	*25.8	25.6	29.7	24.9	26.7	24.8	25.0	25.5	23.0	21.6	20.6	19.7

	1896–1900	1901–5	1906–10	1911–15	1916–20	1921–25	1926–30	1931–35	1936–40	1941–45	1946–50	1951–55	1956–60	1961–65	1966–70	1971–75
Groningen	15.0	14.8	13.0	12.3	13.5	9.9	9.8	8.9	8.9	10.7	8.3	8.0	8.4	8.7	9.2	9.2
Friesland	14.8	14.4	13.1	11.9	13.0	10.5	10.4	9.8	9.9	11.1	9.1	8.6	8.7	8.9	9.4	9.6
Drenthe	16.9	16.4	14.9	13.5	14.5	10.3	10.2	8.8	8.5	10.1	7.5	6.8	7.1	7.2	7.8	8.2
Overijssel	17.9	17.0	14.7	12.7	13.9	10.5	9.9	8.7	8.7	10.3	8.0	7.2	7.4	7.5	7.8	8.0
Gelderland	17.4	16.4	15.0	13.3	14.1	11.3	10.7	9.5	9.5	12.6	8.3	7.8	7.6	7.9	8.3	8.2
Utrecht	18.1	16.7	14.4	12.9	13.6	10.5	9.7	9.2	9.3	12.4	8.4	7.8	8.0	8.2	8.3	8.1
N-Holland	16.4	14.7	12.9	11.7	12.6	9.8	9.5	8.7	8.9	11.8	8.0	7.8	8.1	8.4	9.0	9.1
Z-Holland	17.6	15.7	13.7	11.8	12.7	9.4	9.2	8.4	8.5	11.2	7.5	7.4	7.6	8.0	8.5	8.7
Zeeland	16.8	15.2	13.8	12.7	12.9	10.2	9.7	9.3	9.8	11.7	9.1	9.2	9.0	9.3	9.7	9.6
N-Brabant	20.1	19.6	17.9	16.6	16.5	12.7	11.5	9.8	8.9	10.8	7.8	6.9	6.7	6.7	6.8	6.8
Limburg	18.3	18.6	17.3	16.0	15.0	11.5	10.4	8.9	8.6	10.8	7.5	6.9	6.8	6.8	7.0	7.4
Netherlands	17.3	16.2	14.4	12.9	13.6	10.4	10.0	8.9	9.0	11.4	8.0	7.5	7.6	7.8	8.2	8.3

Source: CBS, reported in Van der Woude, 'Bevolking en gezin', 30.
* Excluding Limburg.

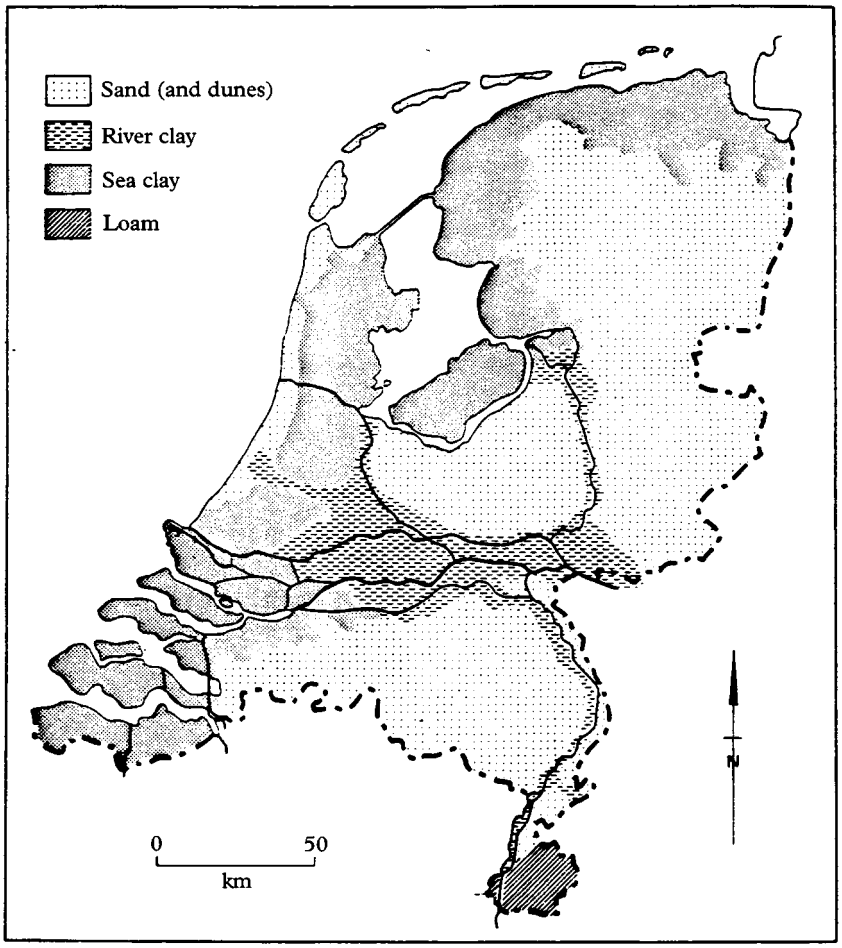

Figure I.3 General soil map of the Netherlands.

coastal area one of the most infested by malarial fevers in northern Europe, at least until the widespread availability of quinine. The long-winged variety breeds in fresh water, and is considerably less malarious.[22] This disease in various forms was virtually endemic in the Netherlands until the 1870s, and there is a clear link between the areas of land reclamation, salination, malaria and high mortality in the early part of the nineteenth century.[23] However, there were other problems afoot: as H.

[22] Swellengrebel and De Buck, *Malaria*, 6, 26–8, 119. See also Brouwer, 'Malaria'.
[23] Hofstee, *Korte demografische geschiedenis*, 66–7 and 69–72; on Zeeland see Wintle, *Zeeland and the churches*, 42–3.

Brouwer has observed, one of the provinces worst affected by the high mortality was Zuid-Holland, which suffered little from salination problems. There the culprit was again the water, but this time it was the drinking water.[24]

Some Dutch tap-water nowadays comes from collection plants in the dunes, and is of excellent quality; much of the rest, although chemically safe, is so heavily treated because of its origins in some of Europe's most polluted rivers that its taste is quite repellant. For much of the nineteenth century not only was the taste dubious, but the hygienic quality of the drinking water was deplorable. The contemporary nineteenth-century accounts of the local drinking water supplies make sobering reading, and the damning reports are by no means limited to industrial towns: they also cover market towns and villages, and even the open countryside. It should be borne in mind that the really lethal municipalities mentioned above, like Wissekerke and Wolphaartsdijk, were about as rural as it was possible to get in the western part of the Netherlands. Reports speak of fetid open sewers full of decomposing faeces, putrid canals full of rotting fish and industrial effluent, great open dung-pits adjacent to the water, and foul-smelling dank bogs and marshes.[25] In most of the western Netherlands, there was an almost complete lack of sweet, swift-running water; salination and poor circulation rendered much of it stagnant, and (as we have seen) a breeding ground for insects. In his masterly survey of the demographic history of the Netherlands since 1815, Van der Woude concludes that in the west of the country, up to the 1870s, malaria and bad water were principally responsible for the horrendous mortality rates, especially the ones for children.[26]

These appalling public-health circumstances began to improve from the late 1860s onwards. Quinine became widely and affordably available, and one of the main sources of supply was the Dutch East Indies. By 1930 it was supplying 97 per cent of the world market. Pharmacists succeeded in producing quinine in the Netherlands in 1832, but production was not commercially viable until well after the mid-century. Eventually, it was instrumental in bringing down the fatalities caused by malaria.[27] From the 1850s onwards steam pumps began to replace windmills in existing polders in some of the river areas, increasing the circulation and regulating the level of the water in the polders and drainage ditches; in the 1860s this practice became more widespread in the coastal provinces, and grew as the century progressed. These developments had important

[24] Brouwer, 'Malaria', 156–7; and Van der Woude, 'Bevolking en gezin', 57.
[25] Caland, *Beschouwingen* (1857); and Broes van Dort, *Bijdrage tot de kennis* (1861).
[26] Van der Woude, 'Bevolking en gezin', 58.
[27] Algera-Van der Schaaf, 'Quinine cultivation'; Headrick, *The tools of empire*, 71–2; Headrick, *The tentacles of progress*, 230–7; and Swellengrebel and De Buck, *Malaria*, 26–8.

consequences for agricultural production, as the water content of the heavy alluvial soils could be properly regulated, but also had considerable effects on the general health of the local population.[28] At the same time, in the last quarter of the nineteenth century, the medical reports began to be heeded, and the supply of drinking water improved, partly because of piped water for urban areas, and partly because of better drainage and some elementary control of pollution.[29] All this, together with medical improvement and enhanced quantity and quality of diet, went some way to improve the atrocious conditions found in the west before the 1870s.

Breastfeeding and mortality

Nonetheless, water does not provide a total explanation: piped water had reached only the larger towns by 1900. In the Zeeland case, it was only the towns of Middelburg and Vlissingen,[30] but the countryside of that infamous province saw its mortality rates drop from as early as the 1860s. It then witnessed a sharp relative fall to rates around the national average within twenty years (Table I.5). Steam pumps must have played a role, but Van der Woude concludes that the other crucial factor was diet.[31] Given the fact that the regional differences in mortality in the main concerned children, and infants in particular, it is relevant to examine the changes in infant diet in the nineteenth century.

The incidence and duration of breastfeeding has formed the subject of several research projects in the Netherlands,[32] since the beginning of this century, and indeed it is clear that the medical profession was aware even in the last century that breastfeeding was to be preferred to bottle-feeding infants, with a view to their chances of survival. There was indeed an inverse relationship between the incidence and duration of breastfeeding and the infant mortality rate, and this was generally true across Europe.[33] The content of the bottle-feed was generally lacking in nutrition, and was often made up with water which was potentially lethal. There was a major campaign launched, amounting to a veritable civilization offensive, dedicated to spreading the word among Dutch peasants and workers.[34] One of

[28] Van Zanden, *De economische ontwikkeling*, 236–7. On steam power, see section 5.2 below.
[29] See Vogelzang, *De drinkwatervoorziening*; Jansen and De Meere, 'Het sterftepatroon', 203–10; and Lintsen *et al.*, ed., *Geschiedenis van de techniek*, vol. II, pp. 76–7. For a detailed account of the coming of piped water to Tilburg, see Van der Heijden, *Kleurloos*.
[30] Vogelzang, *De drinkwatervoorziening*, 4.
[31] Van der Woude, 'Bevolking en gezin', 58–9.
[32] Vandenbroecke, *et al.*, 'De zuigelingen- en kindersterfte'; and Van Eekelen, *Naar een rationele zuigelingenvoeding*.
[33] Van Eekelen, *Naar een rationele zuigelingenvoeding*, 218–19; Lee, ed., *European demography*, 17.
[34] Van Eekelen, *Naar een rationele zuigelingenvoeding*, 213 and 220–3; and Van der Woude, 'Bevolking en gezin', 59.

the most celebrated campaigners was active – according to his own version of events – right at the beginning of the century, in 1809, in no less a personage than the King, Louis Napoleon, brother of the French Emperor and installed as monarch of the satellite Kingdom of Holland between 1806 and 1810. During a royal 'progress' through the towns and villages of the south-west of his domain in May 1809, Louis recalled in his memoirs that,

> The King [Louis] remarked with pain and surprise, that many of the country-women, instead of bringing up their infants on their first and natural food, gave them cow's milk and pap; and enjoined the ministers of religion, to use all their efforts to remove this abuse. He interrogated many of the Zeeland women respecting this custom; and perceived with astonishment, that it was become a system among a people, whose women are almost without exception excellent mothers and faithful wives. The magistrates avowed the inutility of their endeavours to alter this practice. The women of Zeeland are accustomed to wear a sort of half-veil of very fine linen, which falls over the back part of the head and the temples, but does not descend lower upon the face than the forehead, where it is fixed by a slip of gold, which the married women wear on one side of the forehead, and the unmarried on the other. Without infringing on this custom, the King ordered, that those women who suckled their infants should alone be permitted to wear a complete circle of gold on the forehead; and that three rich ornaments of this kind should be distributed annually to the three mothers, who should have suckled the greatest number of infants.[35]

No doubt the story improved with the telling, and the spectacle of the foreign-born king quizzing the buxom matrons of Zuid-Beveland about their suckling habits raises a smile, but it is clear that interest was shown in the subject at the highest level. And indeed the king had something to be concerned about: figures two years later for Zeeland, in 1811, show the province to have had infant mortality figures of 375 per thousand live births: a truly chilling level.[36]

Later in the century the medical and social elite was still just as keen to encourage breastfeeding amongst a recalcitrant peasantry whose womenfolk had to work, often far away in the fields, and who therefore left the feeding of the children and infants to older children, and ancient grandmothers.[37] Many a pamphlet was issued by local worthies condemning the state of the dry-nursing profession as ignorant and even dangerous, and urging improvements, as well as the extension of breastfeeding itself.[38] In their investigation into the nature of and regional differentiation in infant mortality in Belgium and the Netherlands, Vandenbroeke, Van Poppel and Van der Woude concluded that variation in the incidence

[35] Bonaparte, *Historical documents*, vol. III, pp. 111–12.
[36] Vandenbroecke, *et al.*, 'De zuigelingen- en kindersterfte', 482.
[37] Blok, *et al.*, ed., *Algemene geschiedenis der Nederlanden*, vol. XII, pp. 141–2.
[38] E.g. *De verbetering van den bakerstand* (1851).

and duration of breastfeeding was the most important variable explaining the differing levels of mortality, backed up by the quality of the local water given to the infants when they were weaned.[39] In a subsequent study, Van Poppel examined the correlation between membership of the Roman Catholic Church and high mortality, and concluded that much of it had to do with a reluctance to breastfeed on the part of Roman Catholic women, especially in the south of the country.[40] The peak in infant mortality occurred nationally in 1873, a year which is generally seen as the zenith of the economic boom of the third quarter of the century in the European economy; the relative decline in the demand for labour thereafter, especially in agriculture, ensured that more women remained at home to suckle their young, and the first factory act of 1874 began to exclude children from factories and to keep them and their mothers at home, which may also have led to more breastfeeding.[41]

So much, then, for the negative side of the demographic transition in the Netherlands: the appalling death rates of the earlier part of the nineteenth century reached their peak in the 1870s, and were caused mainly by ecological factors to do with the water supply, together with the inability and reluctance of mothers to breastfeed their babies. Mortality began to decline around 1870, and did so for a complex matrix of reasons, some of them (for example the improved food supply, and to some extent improved medical technology) increasing the resistance of the population to the ravages of disease and labour, and others diminishing the lethal characteristics of the environment, like the water and the atmosphere. But what of the positive components of the demographic matrix: births, fertility and marriage?

1.3 Marriage and fertility

In aggregate terms the birth rate declined, from higher than thirty-eight per thousand population per annum after the Napoleonic Wars, to twenty-one in the 1930s (Table I.2). But what of regional variation within the national aggregate: what can this side of the demographic coin tell us about the changes undergone in Dutch society in the last two centuries?

Table I.1 shows the gender division of the Dutch population in the last 200 years; as is usual, there has been a slight preponderance of women over men. Marginally more male children were born than female ones, but a higher mortality and a higher emigration rate among men resulted

[39] Vandenbroecke, *et al.*, 'De zuigelingen- en kindersterfte', 484–5.
[40] Van Poppel, 'Religion and health', 244–52.
[41] Vandenbroecke, *et al.*, 'De zuigelingen- en kindersterfte', 489–90. See also Van Poppel, *Trouwen*, chapter 2.

in the slight prevalence of women.[42] This prevalence, however, declined to only about eight per thousand by the Second World War.

As for marriage, the Netherlands falls into the European marriage pattern of relatively late wedlock, with some not marrying at all; this is thought to relate to the need to establish a means of support before launching into matrimony. Nationally, nuptuality was relatively stable for the duration of the nineteenth century, with between seven and nine marriages per thousand population taking place per year (see Table I.2), with between 13 and 15 per cent of people remaining unmarried, and with the marriage age around twenty-eight or twenty-nine for men, and twenty-six or twenty-seven for women.[43] The age at marriage fell slightly around the 1860s,[44] and began to drop faster in the twentieth century; the marriage rate began to increase after the Second World War.[45] Peaks in the marriage rate are perceptible in the 1820s, in the 1850s and 1860s, and after 1900, all readily identifiable with end of war or with economic boom.[46] There were some important regional variations, which were broadly coincidental with religious distribution. Thus marriage was at a later age and less frequent in much of Catholic Brabant, Limburg and Gelderland; in the western, urban Noord-Holland, and in northern Protestant Friesland, Groningen and Drenthe, people married earlier and more frequently. Remarriage was also more likely in the west (mixed but predominantly Calvinist) than in the south (Catholic). The explanation lies partly perhaps in the dogmatic content of the faiths concerned, but also in the availability of partners for marriage in the different regions, for there were considerable variations in the male–female ratio across the country, as a result of migration movements.[47] We shall examine the regional characteristics which can be discerned in nuptuality and marriage age[48] more closely when we come to deal with marriage fertility below.

The decline in the birth rate began in the later 1870s (see Table I.2), and slightly postdated the fall in death rate.[49] The drop was as crucial to the demographic transition as was that of the death rate: the fact that the two rates fell together meant that eventually the Dutch population achieved relative stability, but the fact that the birth rate fell more slowly and later than the death rate accounted for the enormous surge in the

[42] Van der Woude, 'Bevolking en gezin', 23–4.
[43] Heeren and Van Praag, *Van nu tot nul*, 99.
[44] Van Poppel, *Trouwen*, chapter 5.
[45] Van der Woude, 'Bevolking en gezin', 47; and Heeren and Van Praag, *Van nu tot nul*, 93–115 (essay by F. van Poppel).
[46] Hofstee, 'De demografische ontwikkeling', 45.
[47] Van Poppel, *Trouwen*; for the regional variations in m/f rations, see pp. 218–20 and 271.
[48] Hofstee, 'De demografische ontwikkeling', 46–7.
[49] Knippenberg, 'De demografische ontwikkeling', 59–60.

total population between 1815 and 1950. After the Second World War the birth rates continued to decline, but only fell really rapidly after 1964, which eventually brought them into line with the rest of Europe: before that date, Dutch birth rates had been high, and slow to fall.[50] The questions which beg of the development in birth rates, therefore, are why they started to decline in the nineteenth century, and why they declined more slowly than in most other European countries. The same applies to marital fertility figures, which are a much more sophisticated and nuanced indicator of reproduction behaviour than the crude birth rate. The birth rate is affected by the proportion of married women of child-bearing age in a given population, by the illegitimacy rate, and by the marital fertility rate, that is, the number of live legitimate births for each thousand married women of child-bearing age (usually taken as under fifty years of age).

1.4 Regional differences

Table I.6 shows the average fertility rates for each province in the Netherlands for quinquennial periods between 1850 and 1914. In the course of that period, the national average moved from 304 births per annum for every thousand women of childbearing age in 1850/54 up to a peak of 310 in 1875/79; thereafter it fell decisively to 228 in 1910/14. The rate continued to fall thereafter, and reached 173.5 in the late 1930s: the steepest decline dates from the 1890s.[51]

But far more interesting are the local figures. In the 1850s, the highest rates were to be found in the south-west of the country, in the provinces of Zuid-Holland, Utrecht and Zeeland. By the time of the 1880s, the high-rated provinces had increased in number: not only were the original three well above average, but they had been joined by the two southern provinces of Noord-Brabant and Limburg. By the time of 1910/14, the original three most fecund provinces of Zuid-Holland, Zeeland and Utrecht had dropped to average levels, while Limburg and Noord-Brabant had radically increased their fertility and had become clear leaders of the field: meanwhile Drenthe and Gelderland had entered the league as well above average in the fertility ratings. One of the major commentators, John Buissink, expressed these considerable differences in the 1850s in terms of birth control.[52] Provinces with a marital fertility rate of more than

[50] Knippenberg, 'De demografische ontwikkeling', 68.
[51] Deprez, 'The Low Countries', 275. Deprez prints a longer series of fertility rates than the ones presented in Table I.6 here; it is from mixed sources, but is convenient for long-term national estimates. The more accurate data in Table I.6, taken from Buissink's work, are more suitable for the provincial analysis.
[52] Buissink, 'Regional differences', 365.

Table I.6 *Marital fertility. Average annual number of legitimate live births per 1,000 married women under fifty years of age in the Dutch provinces and the kingdom by successive five-year periods, 1850-1914.*

	1850–54	1855–59	1860–64	1865–69	1870–74	1875–79	1880–84	1885–89	1890–94	1895–99	1900–04	1905–09	1910–14
(a) Absolute figures													
Groningen	285.7	275.7	272.0	279.2	285.5	294.2	270.3	266.4	263.5	258.8	252.2	236.0	212.9
Friesland	276.4	266.4	267.6	282.5	281.3	278.9	249.9	249.0	241.6	233.3	226.9	209.6	193.5
Drenthe	273.7	274.8	273.8	269.0	275.0	282.7	270.3	277.7	285.5	286.5	286.6	275.0	258.2
Overijssel	285.2	276.5	281.7	284.2	284.5	290.8	281.8	286.6	284.7	285.0	278.0	256.2	229.8
Gelderland	289.5	286.9	293.3	294.3	289.1	301.8	301.7	299.5	292.9	294.7	284.6	270.9	246.9
Utrecht	323.8	306.7	310.5	311.7	310.0	322.7	317.9	321.4	307.8	299.7	269.2	237.6	231.8
N-Holland	301.1	277.7	284.7	284.3	280.1	295.2	289.3	282.0	261.4	243.5	226.4	202.3	181.1
Z-Holland	343.6	314.6	319.7	322.6	324.7	330.1	321.6	314.3	296.1	283.8	273.2	250.0	223.7
Zeeland	339.6	313.0	328.0	332.2	339.0	331.0	304.2	303.4	296.5	288.5	226.4	202.3	212.0
N-Brabant	307.0	287.4	304.6	317.8	324.8	336.1	330.8	330.0	329.6	337.9	346.0	328.5	308.5
Limburg	285.6	289.3	295.9	305.8	314.5	330.7	320.3	319.4	322.9	334.8	341.4	328.8	314.3
Netherlands	304.2	289.8	296.1	300.6	302.7	310.2	299.5	296.9	286.6	280.2	271.1	250.5	228.5
(b) Index: Kingdom = 100.0													
Groningen	93.9	95.1	91.9	92.9	94.3	94.8	90.3	89.7	91.9	92.4	93.0	94.2	93.2
Friesland	90.9	91.9	90.4	94.0	92.9	89.9	83.4	83.9	84.3	83.2	83.7	83.7	84.7
Drenthe	90.0	94.8	92.5	89.5	90.8	91.1	90.3	93.5	99.6	102.3	105.7	109.8	113.0
Overijssel	93.8	95.4	95.2	94.5	94.0	93.8	94.1	96.5	99.3	101.7	102.5	102.3	100.6
Gelderland	95.2	99.0	99.1	97.9	95.5	97.3	100.7	100.9	102.2	105.2	104.9	108.1	108.1
Utrecht	106.5	105.8	105.0	103.7	102.4	104.0	106.1	108.3	107.4	107.0	104.8	101.7	101.4
N-Holland	99.0	95.8	96.2	94.6	92.5	95.2	96.6	95.0	91.2	86.9	83.5	80.8	79.3
Z-Holland	113.0	108.5	108.0	107.3	107.3	106.4	107.4	105.9	103.3	101.3	100.8	99.8	97.9
Zeeland	111.7	108.0	110.8	110.5	112.0	107.7	101.5	102.2	103.4	103.0	99.3	94.8	92.8
N-Brabant	100.9	99.2	102.9	105.7	107.3	108.3	110.4	111.2	115.0	120.6	127.6	131.1	135.0
Limburg	93.9	99.8	99.9	101.7	103.9	106.6	106.9	107.6	112.6	119.5	125.9	131.2	137.5

Source: Buissink, 'Regional differences', 367.

290, like Utrecht, Zuid-Holland and Zeeland, were not employing any restrictions on fertility at all. They were, in another way of measuring these things, close to the highest attainable fertility in Western societies where records have been kept: that achieved by Hutterite women in North America.[53] The figures for Zuid-Holland in the early 1850s mean that every married woman would on average give birth every three years between the age of marriage and the age of fifty: that represents, as can easily be imagined, little attempt at contraception. The middle group, with fertility rates between 270 and 290 in the 1850s, including all the other provinces, would be practising some limited form of birth control, most usually in the form of abstinence from sexual intercourse, or *coitus interruptus*, but only on a small scale by limited numbers, and with sporadic effects. Only when the rates dropped below 270 does Buissink consider that there was evidence of modern birth control in widespread practice: this only happened after 1900 in the Netherlands as a whole, and even at provincial level was still limited just to Friesland in the early 1880s.[54] However, in incidental cases, the voluntary limitation of the chances of conception within marriage is as old as society, and it was certainly far from unknown to the Dutch in the nineteenth century. The Neo-Malthusian League was campaigning for an increase in (rather than a launch of) contraception in the 1880s,[55] and Van Poppel concludes in one of his comprehensive studies of differential fertility that some limited form of contraception was being practised across the nation before the 1870s.[56]

An early analyst of these problems was E. W. Hofstee, who argued that each region in the Netherlands experienced the following phenomenon: a rise in birth and fertility rates, followed by a fall. This was undergone first by the northern and western coastal provinces, and then by the central provinces, and finally by the inland southern provinces, in a gradual movement across the country from the coast to the south-east between about 1850 and about 1950. His explanation was that 'proletarianization' gradually entered the country from the coastal area, diffusing slowly across the country until its effects had reached as far as southern Limburg. Proletarianization resulted in a rapid rise in demographic activity: the marriage age dropped, and birth and fertility rates soared. This was followed, within a generation or two, by a more modern and moderate approach.[57] This 'thesis' dictated the course of debate for a generation,

[53] Deprez, 'The Low Countries', 247.
[54] Buissink, 'Regional differences', 365; and Table I.6.
[55] Van Houten, *Maatschappelijke en wettelijke stelling*, 226–45 (essay by J. D. Brouwer, 1883). See also Röling, '*De tragedie*'.
[56] Van Poppel, 'De differentiële vruchtbaarheid ... sociale status', 244.
[57] Hofstee, 'De groei van de Nederlandse bevolking' (1968); Hofstee, 'De demografische