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Consistency in matters of life and death? Discriminating demographic patterns in Groningen, 1850-1920

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Introduction

Describing the province of Groningen in the nineteenth century as peripheral may be justified in a geographical sense, but otherwise it is a misnomer. Groningen, situated in the extreme north-east of the Netherlands, did participate to some extent in the increasing economic importance of industrial production and trade by the end of the century. The eastern part of the province – the peat districts – temporarily became an area of important industrial development in the Netherlands and, at that time, the city itself was an important centre of trade and distribution.¹ These developments, however, were based primarily on the local supply of agrarian products. The continued agricultural orientation elsewhere in the province did more to shape its later image as a peripheral area economically.²

Agriculture had for a long time been the main source of welfare in the clay soil area and continued to be so well into the twentieth century.³ Industrial developments took place in the late nineteenth and early twentieth centuries, particularly in the south-east peat districts, but failed to turn the province into one of the more industrialized regions of the Netherlands. The average income in the province increased less significantly than the average national income so that this coastal province is considered by some people

¹ P. Kooij, 'Het Noorden en de Nederlandse economie: trekpaard of wingewest?', in: K. van Berkel, H. Boels and W.R.H. Koops (eds.), *Nederland en het Noorden* (Assen/Maastricht 1991) 151-169; H.J. Keuning, *De Groninger Veenkoloniën: een sociaal-geografische studie* (Amsterdam 1933) 189-260; J.F. Voerman, *Verstedelijking en migratie in het Oost-Groningse veengebied 1800-1940* (Assen/Maastricht 2001) 95-159.

² H.J. Keuning, *Mozaïek der functies: proeve van een regionale landbeschrijving van Nederland op historisch- en economisch-geografische grondslag* (Den Haag 1955) 163-166.

³ P.R. Priester, *De economische ontwikkeling van de landbouw in Groningen, 1800-1910. Een kwantitatieve en kwalitatieve analyse* (Wageningen 1991); R.F.J. Paping, *Voor een handvol stuivers. Werken, verdienen en besteden: de levensstandaard van boeren, arbeiders en middenstanders op de Groninger klei, 1770-1860* (Groningen 1995).

nowadays to be a colony of the more dynamic western parts of the Netherlands and also to have been this in the past⁴

But was Groningen really such a static and traditional society or is this impression only formed by comparing this province with western and southern regions in the Netherlands? These regions experienced massive changes, either because industrialization was concentrated there, as was the case in the western provinces, or because the region finally became strongly integrated in the national economy. Groningen, however, had already formed part of the coastal and national economy for centuries.⁵ It had acquired its relative importance by providing agricultural products to others – this specialization prohibited, or at least proved a considerable obstacle to, industrialization. In other words, opportunities for significant changes were few, if any. This does not mean that the province did not participate in many of the fundamental changes that turned the nineteenth century into an age of transition.

Provincial, regional and municipal demographic patterns will be considered here to determine whether Groningen shared the demographic transition that radically changed population growth and composition.⁶ This paper has its roots in the Integral History Project and therefore focuses particularly on the Groningen countryside.⁷ This scale offers the opportunity of employing more complex statistical methods to reconstruct and analyse demographic developments. The ultimate aim of this exercise is to identify regionally concentrated demographic patterns, that could be analysed in terms of local economic and social factors.

Demographic developments in the province of Groningen will be compared with those in other provinces in order to place the demographic development in its proper perspective. As the province of Groningen has varying soil conditions the developments in the clay and peat districts in Groningen will be considered separately. Subsequently, to determine whether social and economic differences (based on differences in soil conditions) could provide explanations for different demographic patterns in the province of Groningen, the approach will be reversed. Individual municipalities will be clustered independently of the existing soil condition into several groups with

⁴ See, for example, H.J. ter Bogt and H. Coppinga, *Van agrarisch gewest naar moderne regio* (Groningen 1987); Kooij, 'Het Noorden', 153; M. Duijvendak, 'De provincie Groningen in de twintigste eeuw: een inleiding', *Gronings Historisch Jaarboek*, 7 (2000) 6.

⁵ For example, J. de Vries and A. van der Woude, *Nederland 1500-1815. De eerste ronde van moderne economische groei* (Amsterdam 1995) 58-60, 243, 245, 274-275, 815; Paping, *Voor een handvol stuivers*, 35-42.

⁶ See, for example, E.W. Hofstee, *Korte demografische geschiedenis van Nederland van 1800 tot heden* (Haarlem 1981) 142, Graph 1; J. Garssen and C. Harmsen, 'De toegenomen dynamiek van huishoudens', in: R. van der Bie and P. Dehning, *Nationaal goed. Feiten en cijfers over onze samenleving (ca.) 1800-1999* (Voorburg 1999) 219-231.

⁷ See P. Kooij (ed.), *Dorp naast een stad. Hoogkerk 1770-1914* (Assen 1993); P. Kooij (ed.), *Where the twain meet. Dutch and Russian regional development in a comparative perspective 1800-1917* (Wageningen/Groningen 1998).

similar demographic behaviour, in search of geographically determined processes.

Groningen in a national demographic perspective

The demographic transition that took place in most European countries started rather later and lasted longer in the Netherlands.⁸ Aggregated data for births and deaths shows 1875 to be the year in which this prolonged development began. In countries like England and France, the transition was by then already nearing its final phase. It is not until nearly a century later, thus extremely late, that the transition in the Netherlands can be considered as completed. More importantly, the delay in completion can be attributed to a slow and hesitant decline in the birth rate, in particular among Roman Catholics and orthodox Calvinists, which caused the comparatively large increase in population experienced in the Netherlands during this period.⁹

Moving from a national to a provincial perspective offers the opportunity of studying the initial shift from high birth and death rates to lower and decreasing rates in more detail. A provincial breakdown of the data will give a more realistic idea of what actually took place in the second half of the nineteenth century (Tables 1 and 2). This also allows the demographic developments that took place in the province of Groningen around the turn of the century to be placed in perspective.

The first point to note is that the figures on death and birth rates presented here do not necessarily accurately reflect the demographic transition as depicted earlier. The notion that 1875 was the turning point in the demographic behaviour is based primarily on the number of births and deaths each year. The rates in Tables 1 and 2 are presented here as 10-year averages so that in many cases the most remarkable changes appear to have taken place in a later decade than was perhaps expected.

Throughout Europe the demographic transition normally started with a *sustained* decrease in death rates and this was also the case in the Netherlands.¹⁰ Although the data per decade may hide relevant swings in the provincial death rates, it seems fair to suggest that in most provinces the downturn in the death rate occurred in the 1870s or later (Table 1). The two northern agricultural provinces of Groningen and Friesland and the western provinces of North and South Holland and Zeeland began the transition first,

⁸ Hofstee, *Korte demografische geschiedenis*, 142; Garssen and Harmsen, 'De toegenomen dynamiek'; E.A. Wrigley and R.S. Schofield, *The population history of England* (London 1981); M. Anderson (ed.), *British population history from the Black Death to the present day* (Cambridge 1996); J. Vallin, *La population française* (Paris 1994).

⁹ T. Engelen and J.H.A. Hillebrand, 'De daling van de vruchtbaarheid in de negentiende en twintigste eeuw. Een historiografisch overzicht met bijzondere aandacht voor Nederland', *Bijdragen en Mededelingen betreffende de Geschiedenis der Nederlanden*, 105 (1990) 354-367.

¹⁰ For instance, M. Anderson, *Population change in North-Western Europe, 1750-1850* (Basingstoke 1988).

i.e. decreasing birth rates occurred first in the clay zones of the Netherlands. It is tempting to suggest this is a common characteristic, but a comparison of the initial levels of death rates reveals a distinct split within these coastal provinces. The northern provinces started from a relatively low level of mortality, whereas the western provinces were the most unhealthy places to live in. Particularly instructive is the case of Zeeland, like Groningen and Friesland an agricultural province, but with an even higher level of mortality than the urban and industrializing provinces of Holland. Whatever their starting level, by the turn of the century all had reached a roughly comparable, substantially lower, level of mortality. Friesland and Groningen still stood out, also in comparison with the inland provinces that had a low initial death rate. None of these provinces experienced a comparable decrease in the death rate.

Table 1 Death rates in Dutch provinces, 1850 - 1900 (‰)

	1850-59	1860-69	1870-79	1880-89	1890-99
Groningen	24.34	24.16	23.84	19.38	17.46
Friesland	23.45	23.34	21.79	21.11	17.04
Drente	23.06	24.16	22.50	23.64	20.22
Overijssel	25.14	26.13	25.17	25.85	20.99
Gelderland	22.85	24.55	23.59	23.55	20.03
Utrecht	28.39	29.24	28.56	27.27	21.31
N. Holland	31.34	28.48	27.00	26.63	19.26
S. Holland	32.60	32.05	31.07	28.16	20.84
Zeeland	33.40	30.02	26.82	23.61	19.07
N. Brabant	23.78	24.81	25.83	26.95	22.97
S. Limburg	23.42	23.88	23.88	23.88	20.85
Netherlands	25.99	27.05	26.23	25.44	20.14

Source: Calculated from C.A. Oomens, *De loop der bevolking van Nederland in de negentiende eeuw*: CBS Statistische Onderzoekingen M35 (The Hague 1989).

According to conventional demographic wisdom, areas with a lasting relatively low death rate, such as Groningen and Friesland, also tend to have lower birth rates. As is sometimes the case with conventional wisdom, this is not quite true for either province (Table 2). Initially, neither had remarkably low or high birth rates compared to, on the one hand, the western provinces with high rates, and, on the other hand, the southern provinces of North Brabant and Limburg which had low levels of fertility.

Without exception, the Dutch provinces witnessed increasing birth rates during the third quarter of the nineteenth century. The increase varied from six per thousand for the period 1850 to 1880 in North Brabant, to one per

thousand in the case of North Holland. Most other provinces, including Groningen, saw an increase ranging from 2 to 3‰ in this 30-year period. The rise in birth rates continued in the next decade, except in the modern agricultural provinces of Groningen, Friesland and Zeeland. The agrarian depression of the 1880s and early 1890s seems to be a logical explanation for the cause of this downturn. By the end of the century, all provinces showed decreasing birth rates. The national average of just above 40‰ in the 1880s fell to a considerably lower level while provincial rates converged. The Groningen contribution was remarkably modest; the provincial birth rate had its sharpest drop a decade earlier. Just as in the case of provincial death rates, the two most northern provinces had the lowest birth rates and in addition, Groningen experienced its significant decrease in both rates a decade earlier than the other provinces.

Table 2 Birth rates in Dutch provinces, 1850-1900 (‰)

	1850-59	1860-69	1870-79	1880-89	1890-99
Groningen	34.19	35.47	37.15	33.78	32.22
Friesland	33.73	35.09	36.24	35.05	29.69
Drente	32.94	35.31	35.65	37.48	35.44
Overijssel	33.29	34.70	35.24	37.67	34.40
Gelderland	32.85	34.65	34.47	37.18	33.07
Utrecht	36.35	38.07	38.79	42.03	35.89
N. Holland	38.05	38.22	39.07	42.36	33.61
S. Holland	41.47	42.82	43.46	45.38	36.79
Zeeland	41.11	43.57	42.75	40.42	35.20
N. Brabant	29.20	32.20	35.20	37.97	34.25
S. Limburg	31.00	32.65	34.12	35.92	32.92
Netherlands	35.44	37.06	38.05	40.02	34.18

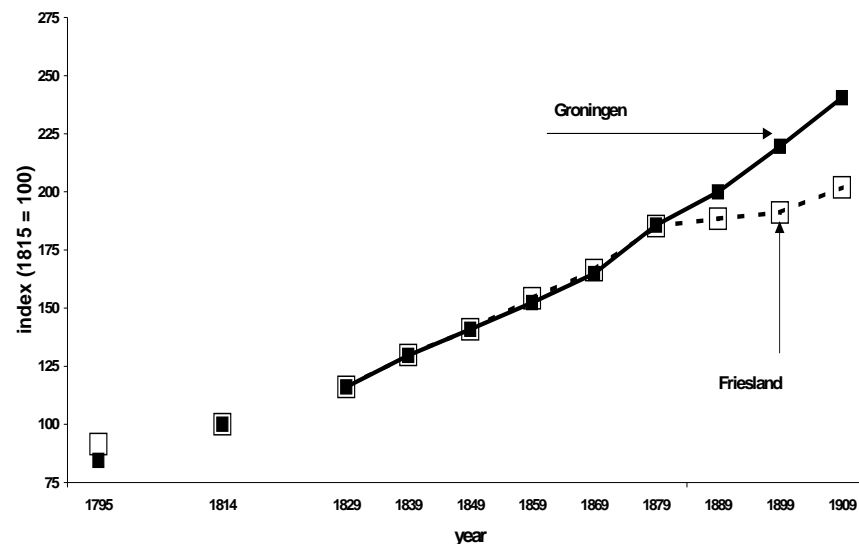
Source: see Table 1.

The demographic transition in the Netherlands, when viewed at a provincial level, was far from evenly distributed over the country. Historians and demographers usually explain this lack of a national pattern by pointing to the distinctly different developments in the southern parts of the country compared with those in the western provinces.¹¹ This seems justified in terms of their respective contributions to the national aggregate. The early phase in the northern provinces deserves more attention, however, when trying to understand the process of transition itself. In many respects these agricultural

¹¹ Hofstee, *Korte demografische geschiedenis*; A.M. van der Woude, 'De demografische ontwikkeling van de Noordelijke Nederlanden 1500-1800', in: D.P. Blok et al. (eds.), *Algemene Geschiedenis der Nederlanden* 5 (Haarlem 1980); O.W.A. Boonstra and A.M. van der Woude, 'Demographic transition in the Netherlands. A statistical analysis of regional differences in the level and development of the birth rate and of fertility', *A.A.G. Bijdragen* 24 (1984) 1-57.

provinces were ahead of developments by at least a decade. This is remarkable, because the northern area does not stand out for its economic or cultural dynamics.

Figure 1 Population growth in Groningen and Friesland, 1795-1910



The patterns of demographic change in Groningen and Friesland show clear parallels in both the level and the evolution of their birth and death rates in the nineteenth century. Seemingly, these areas had a demographic pattern of their own, identified by a kind of immunity to sharp swings in birth and death rates that occurred in most of the other provinces after 1850. Initially, birth rates did rise somewhat, but not to the extent that they did in the western provinces. The subsequent downward movement came at least a full decade earlier. Death rates also decreased, but the drop was modest in comparison with the national trend. Even so, by the turn of the century these provinces had the lowest rates in the Netherlands.

In fact, these areas showed clear agricultural, that is traditional, demographic behavior. The absence of an important non-agricultural economic sector restrained the increase in birth rates shortly after 1850, an increase normally associated with growing numbers of (industrial) labourers.¹² The

¹² For example, R. Lesthaeghe and C. Wilson, 'Modes of production, secularization, and the pace of fertility decline in western Europe, 1870-1930', in: A.J. Coale and S.C. Watkins (eds.), *The decline of fertility*

stability of the demographic pattern is emphasized when measured in terms of the resulting population growth (Figure 1).¹³ Both provinces experienced exactly the same population growth rate during most of the nineteenth century, but there was a significant difference from the 1880s onwards when the growth rate in Friesland fell to almost zero for two decades.

The agriculturally dominated economy in the northern area set strict limits on the number of people that could be supported. Birth rates could be used to accommodate population size to economic circumstances given the prevailing mortality rates. In the long term this can be an effective way of avoiding Malthusian dangers but in the short term, the efficiency of a marriage pattern dedicated to limiting the number of children is restricted. Outmigration was a more reliable answer, also for Groningen and Friesland, where the relatively small fluctuations in birth and death rates were compensated by changing migration rates.¹⁴

In the short term a sharp and sudden deterioration in economic circumstances, such as the depression which hit the capitalistic agricultural areas in the 1880s and early 1890s, cannot be balanced by an immediate drop in the number of children born. Economic hardships, therefore, result in increasing death rates and growing outmigration; both options result in adapting population size to the economic possibilities. Groningen and Friesland differed strongly in their reaction to the agrarian depression, resulting in a different growth pattern which lasted well into the next century. Birth and death rates in Groningen continued to fall substantially, whereas in Friesland in the 1880s the decline was not nearly as significant. At the same time, migration from both provinces increased, but here the Frisians outperformed Groningen. People already left Friesland in larger numbers before 1880, but in the 1880s and 1890s the rate was twice that for Groningen. Clearly, Friesland had more difficulty in mitigating the adverse effects of the agrarian depression. An increase in population size was not feasible under the depressed economic circumstances and large numbers of people had to leave the province to try their luck elsewhere. Although the economic consequences of the depression were the same for agriculture in Groningen, the province was able to support an uninterrupted growth in its population.

in *Europe* (Princeton 1986) 261–292; J.C. Brown and T.W. Guinnane, ‘Fertility transitions in a rural, Catholic population: Bavaria, 1880–1910’, *Population Studies*, 56 (2002) 35–49.

¹³ C.A. Oomens, *De loop der bevolking van Nederland in de negentiende eeuw*: CBS Statistische Onderzoekingen M35 (The Hague 1989) 46–49; *Uitskomsten der negentiende tienjaarlijkse volkstelling, gehouden op den een en dertigsten december 1909* (The Hague 1911).

¹⁴ Oomens, *De loop*, 35; R. Paping, ‘Groeï en stagnatie. De bevolkingsontwikkeling in Groningen’, *Gronings Historisch Jaarboek*, 7 (2000) 44–47; H. de Vries, *Landbouw en bevolking tijdens de agrarische depressie in Friesland (1878–1895)* (Wageningen 1971); A. Galema, *Frisians to America, 1880–1914: with the baggage of the fatherland* (Groningen 1996).

Dividing up the province

There is an obvious explanation for the ability of Groningen to maintain population growth during and after the agrarian depression. The province was less economically homogenous than Friesland and more comparable to a province such as Utrecht, with its many different economic zones. Large-scale, capitalistic agriculture dominated the sedate clay area in Groningen in contrast to the more lively peat districts where the industrial and service sectors were growing rapidly.¹⁵ Figure 2 shows the geographical division of municipalities in the province of Groningen into those in either the clay or the peat area.

Although this contrast plays down the role of the agricultural sector in the peat districts, it is fair to say that these districts offered more economic opportunities for starters on the labour market. These better economic prospects, together with the different economic structure, probably helped to reduce the provincial outmigration in the 1880s and 1890s. Firstly, the agrarian depression affected economic conditions in two opposing ways. Farmers in the peat districts were naturally also hit by declining agricultural prices, but this was (at least partially) offset by the resulting decline in cost-of-living for labourers and others who were not dependent on the agricultural sector. Secondly, the increasing importance of non-agricultural economic activities offered alternative opportunities for those who could no longer earn their income in agriculture. The same is true for those whose income was affected by the decline in spending power of the large farmers.

As well as offering possibilities for those who, under other circumstances, would have had recourse to migration, the existence of a large non-agrarian sector might have influenced overall birth and death rates. Economic growth in the peat districts was far less restricted by the availability of fertile land and the relatively slow increase in productivity in agriculture. Potentially, the peat districts offered possibilities for increasing numbers of industrial and service labourers, whereas in the clay area the possibilities for more labour declined, rather than increased. This might have resulted in a less strict marital pattern and higher fertility in the peat area, thus pushing up the birth rate. Death rates, on the other hand, were likely to be less influenced in the peat districts due to the absence of large urbanized areas, with their adverse effects on death rates.

¹⁵ Paping, *Voor een handvol stuivers*, passim; Keuning, *De Groninger Veenkoloniën*; P. Kooij, 'De eerste urbanisatie en industrialisatiefase in de Groninger veenkoloniën', in: H. Voogd et al., *Van het verleden naar de toekomst* (Groningen 1990) 109-134.

Figure 2 Groningen municipalities divided in to those on clay or peat

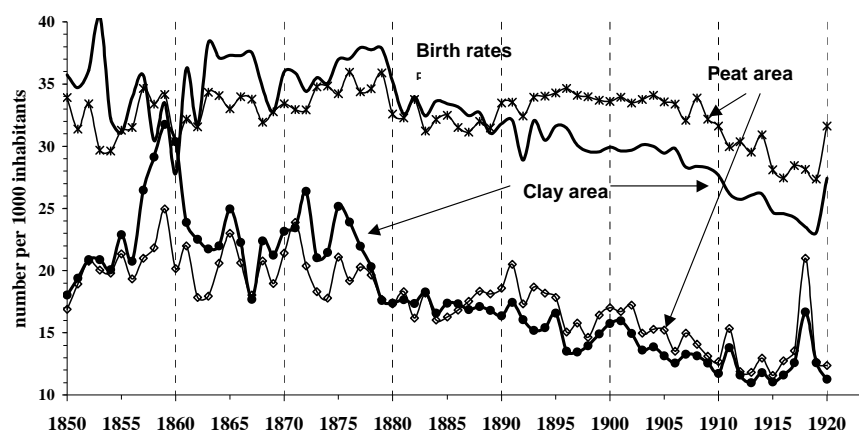


In order to disentangle different and possibly opposing demographic trends and to obtain a clearer view of demographic developments in the clay and peat areas the province of Groningen will be divided into many smaller areas. In the first instance, the consideration of different variables on an aggregate level will shed some light on demographic patterns in the clay and peat districts. After that an attempt will be made to validate the findings by building clusters of municipalities with the same demographic pattern. This clustering procedure is a way of testing the significance of results found at the aggregate level.¹⁶

¹⁶ Clustering here means the application of a statistical technique designed to bring together in distinct, but more or less (demographically) homogeneous groups all municipalities that make up the province of Groningen (excluding the city of Groningen and the town of Haren). See also Appendix A.

Dividing birth and death rates along the lines of clay and peat suggests that a reversal of the demographic position took place between 1880 and 1890 (Figure 3).¹⁷ Before that period, the clay area had consistently higher rates than the peat districts, but after 1890 the peat districts clearly showed a higher birth rate and a somewhat higher death rate. Close inspection reveals a pattern in the clay area which strongly resembles a classic demographic transition. Starting in the 1870s, the decrease in the death rate was somewhat greater than that of the birth rate, thus increasing the population pressure precisely at the time that the agrarian depression hit this area. On the other hand, changes were much more gradual in the peat districts, making it difficult to describe them in terms of a transition. Fluctuations became smaller, but the overall picture is one of a slowly decreasing death rate, combined with a stable birth rate. Consequently, population growth in the peat area outperformed that of the clay districts, in particular after 1880.

Figure 3 Birth and death rates in the clay and peat districts of Groningen, 1850-1920



The number of inhabitants in the peat area surpassed that of the clay area shortly after the turn of the century because of a slow down in the population growth in the clay area. As natural growth in the clay area tended to increase rather than decline, the slow down in population growth must be attributed to an enormous increase in outmigration which reached the same level as outmigration from Friesland. From the 1850s, the clay area experienced higher net outmigration than either the peat districts or the province as a

¹⁷ Calculated from *Statistiek van den loop der bevolking van Nederland over 1880-1900* (The Hague 1881-1901).

whole.¹⁸ Shortly before 1880, the number of people leaving the area and heading for the city, the newly industrializing peat municipalities or places further away or across the ocean, rose to an exceptionally high 1 per cent or more per year. This massive rate of departure lasted for more than the next 30 years and brought population growth in this agricultural area down to something less than an annual 0.5 per cent.

Although this growth rate was slightly higher than that for Friesland, it is safe to assume that the Groningen clay area and Friesland shared a common demographic pattern. Falling death rates forced down birth rates and when this was insufficient to balance the population in the short term within the limits of agricultural growth, increased emigration was the only solution.

The role of outmigration in adjusting population size to economic swings in an agricultural environment, however, is limited to short-term adjustments. In the long run, birth rates must and will adapt, thus minimizing the role of outmigration. Changes in birth rates reflect changes in marital fertility – the number of children born to 1,000 married women per year (MFR) – or by nuptuality, that is the number of women aged 15 and over being married (NUP). Marital fertility depends on a number of factors, including age at marriage and the use of contraceptives. Data on both marital fertility and nuptuality is available for the census years 1879, 1889 and 1909 for almost all the municipalities in the province of Groningen. Hans Hillebrand, who – published the data, calculated a 5-year average for the number of births based on these census years.¹⁹ He used census data to derive the number of married women as well as to determine the level of nuptuality. It should be emphasised here that both marital fertility and nuptuality mirror economic conditions and changes to a large degree. These demographic characteristics – can, therefore, be used as indicators of economic circumstances.

The number of children born per 1,000 married women each year decreased in the years between 1880 and 1910. The clay and peat districts again showed clearly different patterns in this respect (Table 3). Marriages in the clay area in 1880 were, on average, more fertile than those in the peat region, but a decade later there was almost no difference. It is tempting to suggest that this rapid decrease in marital fertility was caused by the agrarian depression, but other data indicates that this decrease had started at least a

¹⁸ R.F.J. Paping, 'Gezinnen en cohorten: arbeidsstrategieën in een marktgerichte agrarische economie: de Groningse kleigebieden 1830–1920', in: J. Kok et al., *Levensloop en levenslot. Arbeidsstrategieën van gezinnen in de negentiende en twintigste eeuw* (Groningen/Wageningen 1999) 17–88, esp. 29–31.

¹⁹ J.H.A. Hillebrand, *Van motivatie tot acceptatie. Een onderzoek naar de daling van de vruchtbaarheid in de provincies Utrecht en Groningen, 1879–1960* (The Hague 1991) Appendices B1 and B2.

decade before 1880.²⁰ No doubt, however, fertility in the clay area between 1880 and 1890 was also affected by the depressed economic circumstances.

Table 3 The Marital Fertility Rate (MFR) in the Groningen countryside, 1879-1909

		MFR 1879	MFR 1889	MFR 1909
Clay area N=36	Mean	202	184	146
	St. deviation	17.4	18.8	20.8
	Minimum	170	142	118
	Maximum	253	226	182
Peat area N=19	Mean	189	186	171
	St. deviation	9.0	14.8	29.8
	Minimum	177	152	91
	Maximum	210	205	225
Province N=55	Mean	198	185	154
	St. deviation	16.3	17.4	25.2
	Minimum	170	142	91
	Maximum	253	226	225

Source: Hillebrand, *Van motivatie*, Appendices B1 and B2.

The marital fertility rate in the clay region continued to decrease at much the same pace between 1890 and 1909. At the same time, a very slow decrease started in the peat area. The dispersion figures shown in Table 3, however, indicate a far from homogeneous marital fertility rate throughout the regions. The figures indicate that the pattern remained fairly consistent in the peat region only until 1890. When the number of children per marriage decreased in the following decades the variation among the municipalities increased here also. A logical explanation is that the process occurred at different times. This not only means that parts of the clay area were clearly ahead, but it also implies that in a part of the peat area the transition was most rapid after 1890.

Increasing numbers of women marrying, a characteristic of the demographic changes that took place in the nineteenth and twentieth centuries, tends to offset the effects of lower marital fertility. If more women in their productive years have fewer children, the relative weights of MFR and NUP determine whether birth rates will decrease or not. Both marital fertility and birth rates fell in Groningen and that might have improved the chances of marrying. In this respect, it is striking to see nuptuality decline during the 1880s in both regions (Table 4). If a case was needed to show the strong relationship between economy and demography in an agricultural setting, this

²⁰ Birth rates fell after 1870; the percentage of married women in the age groups 25-29 and 40-44 increased from 1869 onwards. Hofstee, *Korte demografische geschiedenis*, 122-123, 128-129.

is it! Young people not only deferred marriage, but also did not marry at all, at least until the late 1890s. As in the case of marital fertility, however, the pattern was not consistent throughout the province, as is clearly shown by the dispersion figures.

Table 4 The Nuptuality Rate (NUP) in the Groningen countryside, 1879-1909

		NUP 1879	NUP 1889	NUP 1909
Clay area N=36	Mean	531	517	550
	St. deviation	30.5	35.0	30.0
	Minimum	458	436	512
	Maximum	587	612	628
Peat area N=19	Mean	536	525	570
	St. deviation	30.5	35.5	30.0
	Minimum	495	462	507
	Maximum	594	578	613
Province N=55	Mean	533	521	560
	St. deviation	30.5	35.5	31.8
	Minimum	458	436	507
	Maximum	594	612	628

Source: see Table 3.

Table 5 Development of the death rate in the Groningen countryside, 1879-1909

		Death rate 1879	Death rate 1889	Death rate 1909
Clay area N=36	Mean	18.7	16.9	12.9
	St. deviation	1.6	1.3	1.6
	Minimum	14.8	13.9	9.7
	Maximum	21.7	20.7	16.6
Peat area N=19	Mean	18.4	18.5	13.9
	St. deviation	1.2	1.3	0.9
	Minimum	13.6	16.0	11.5
	Maximum	20.1	21.1	15.8
Province N=55	Mean	18.6	17.6	13.4
	St. deviation	1.5	1.5	1.4
	Minimum	13.6	13.9	9.7
	Maximum	21.7	21.1	16.6

Source: see Table 3.

Unlike marital fertility and the birth rate, nuptuality developed along more or less the same lines in both the clay and the peat regions after 1890 when more and more women could benefit from marriage. This explains why the

substantial fall in marital fertility resulted in a less significant decrease in birth rates for the province.

Death rates showed a more consistent pattern in the years between 1880 and 1910. The reversal in the relative positions in the 1880s, noted earlier in Figure 3, is reflected in Table 5 and the differences between the clay and peat districts are relatively small. Nonetheless, a wide variation in death rates, although only for a small number of municipalities and with no clear-cut pattern for either region, is seen when the ranges are compared.

When the demographic patterns for the clay and peat areas are considered independently, the main impression given by Tables 3 to 5 is one of tendencies rather than certainties. It seems that the clay area had more traditional characteristics to begin with, but from about 1870 onwards, it evolved rapidly along the lines of a demographic transition into a demographically modern area. The peat region, in contrast, was more modern to begin with. Levels of, and fluctuations in, the birth and death rates prior to the 1880s resembled those found for the clay area – and for other provinces – after that date. There was no distinct demographic transition, at least until well into the twentieth century. But this rather neat picture loses credibility when confronted with the data at the municipal level. Although the differences set out above are statistically significant overall, the variance within the two groups gives reason for concern.

Reconstructing the province

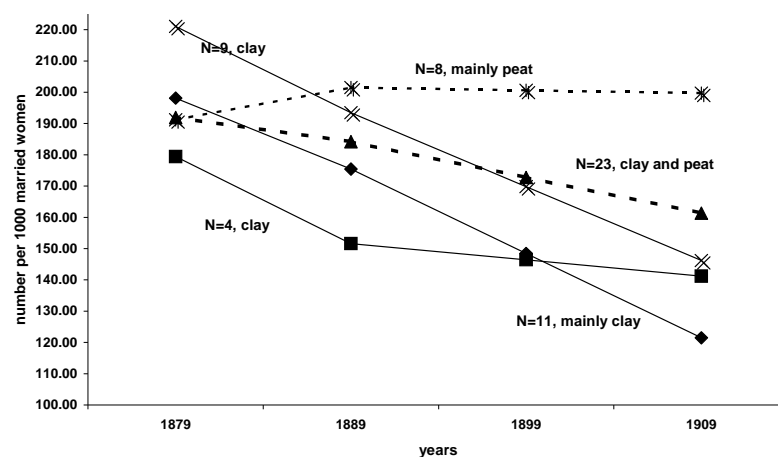
It must be emphasized that the greater part of what has been said above only holds if the existence of clear-cut demographic patterns, strongly related to (local) economic, social and cultural circumstances, is *a priori* expected. Differences within these areas become manifest when these districts, regarded as homogeneous in an economic, social and cultural sense, are split up into municipalities. Ultimately, both the peat and the clay areas can be divided into their separate municipalities, each with a slightly different demographic pattern. After a certain stage, however, it is more useful to invert the question and look for groups of municipalities sharing common characteristics that set them apart from other groups. The more difficult question concerns the boundaries between groups: which groups of municipalities balance internal cohesion with external discrimination?

Statistical approaches, such as clustering, can help to identify the right groups of municipalities. In this case, what is needed are groups of municipalities that have shared demographic characteristics and developments. If the number of clusters remains relatively small, it might be possible to identify areas with a common pattern or set of circumstances that determined the pattern. The clustering model applied here takes into account the initial levels and subsequent developments of marital fertility, death rate and nuptiality

(see Appendix A for a short explanation) but does not take into account changes in levels of outmigration for the municipalities. Migration emphasizes the tensions between population size and economic opportunities. As the clustering procedure is a way of determining patterns rather than their consequences, this is an important reason for leaving out migration.

The resulting clusters differ in both timing and the pace at which levels of marital fertility, death rates and nuptuality decreased, thus creating a representation of elements of a demographic transition. For the sake of brevity, results for marital fertility and death rates only are summarized here. Differences in nuptuality did exist, but all clusters to a large extent showed the same development of decreasing nuptuality, followed by a sizeable increase in the number of married women. A tendency for the clay area to have a smaller number of women ever getting married is perhaps revealed.

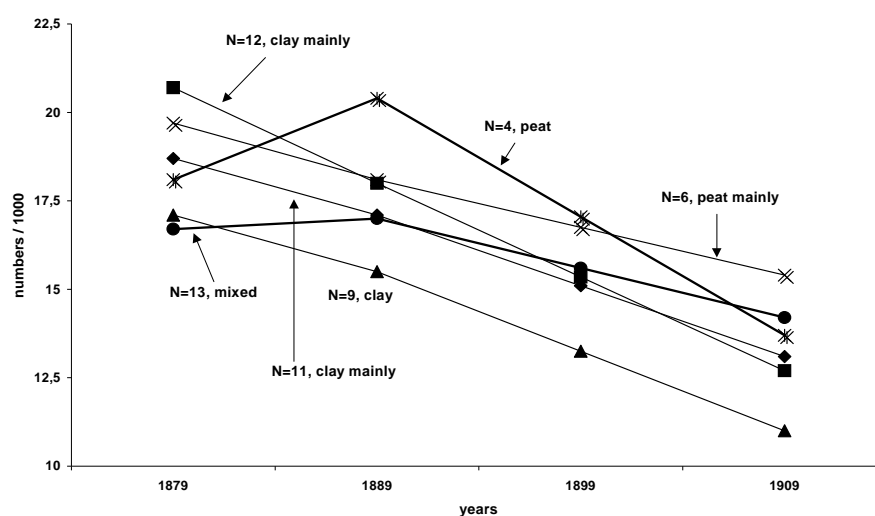
Figure 4 Clustering of Groningen municipalities based on developments in marital fertility



To begin with, marital fertility was found to have decreased overall, but clustering into five groups revealed the presence of 8 municipalities where marital fertility initially increased and then remained constant at a high level (Figure 4). These cases were concentrated in the south-eastern and south-western peat districts of the province. The majority of the municipalities were found in another cluster, characterised by a slow but continuous decrease in marital fertility. Although these municipalities were from all areas of the province, there was a concentration in the east and south-east region. None of the peat districts showed a fast and considerable drop in marital fertility and

such a development could be found in the clay districts only. In the 1880s, these communities showed the same rate of decrease in marital fertility, albeit at three different levels. The initial levels increased from west to east suggesting a difference in timing of this downward movement. This is corroborated by developments after 1880, when the decrease in marital fertility diminished in four western municipalities with the lowest initial level. Thus substantial decrease in marital fertility occurred mainly in the clay area and probably started as early as around 1860 in the western municipalities, thereafter spreading to the east.

Figure 5 Clustering of Groningen municipalities based on developments in death rates



Death rates present a rather difficult picture to elucidate in terms of geographical diffusion and the pattern followed (see Figure 5).²¹ All the clusters eventually showed tangibly lower death rates just before the outbreak of World War 1. The absence of convergence over the period and the rise in death rates in the 1880s in a significant number of villages is noteworthy. Higher mortality was found in both clay and peat districts, but the latter suffered from a more general and much more pronounced rise in death rates. After 1890 death rates there began to fall, thus partially bridging the gap between rates in the clay areas and those in the peat areas. Low and rapidly decreasing death rates were shown in the northern clay areas in particular and from here decreasing death rates spread southwards.

²¹ See Table 6 for the data used.

The pattern of decrease in marital fertility pointed towards diffusion from west to east as opposed to the diffusion of declining death rates from north to south. By the 1910s the peat areas, located in the south, south-west and south-east, were least affected by changing demographic circumstances. In this respect, the clustering procedure confirms the earlier findings of consistently different patterns for the clay and peat areas. More importantly, it helps to explain the variation within these two patterns by suggesting that differences in timing played a part. Helpful as this may seem, it is also a drawback. Given the directions of diffusion it is very likely that the overall clustering model will return fairly fragmented and indistinct clusters. The clash of diffusion directions could well result in the ruination of the model.

To determine whether local social, economic and cultural circumstances might indeed explain regional variation in demographic behaviour the three main demographic variables were used together in a multidimensional clustering procedure. The final clustering process stopped at four clusters in accordance with the decision rules set out in Appendix A. These clusters represent distinct demographic patterns, divided along the lines of both level of and change in marital fertility, death rates and nuptuality. At this point it should be remembered that the clustering procedure is not intended to create an explanation of demographic patterns.

There are two opposing clusters within the province of Groningen (Table 6), both showing regional concentration, one in the clay soil area and the other in the peat and sand districts (see Figure 2). Hence, it is safe to conclude that they represent different social and economic circumstances. The first cluster is located in the clay area only with all municipalities being adjacent and concentrated in the northern part of this area.²² Around 1880 there were relatively few married women in this more modern agricultural area. Although the likelihood of marriage increased towards the beginning of World War I, the number of married women remained low when compared with other regions in the province. Initially, those who married gave birth to a relatively high number of children. Family size on average must have been larger than elsewhere, given the moderate and decreasing death rate. Death rates decreased sharply towards the end of the century, resulting in very low death rates indeed. Family size did not, however, increase because of a substantial fall in marital fertility. In practice family size decreased, resulting in relatively small, mainly nuclear, families.

It is difficult to be precise without relating this pattern to data on local economic and social structures, but it seems that modern agricultural circumstances were largely responsible for the developments. Capitalist farmers

²² Cluster 1 comprises the municipalities of Kloosterburen, Eenrum, Baflo, Bedum, Kantens, Usquert and Uithuizermeeden.

dominated the area and provided labour opportunities for a good many other people.²³ Their income benefited the region either directly by hiring or indirectly by using services of local craftsmen. In the second half of the nineteenth century they increasingly used labour-saving equipment and thus provided income for fewer labourers. Because of increasing difficulty in providing a farm for more than one child, there were good reasons to restrict the size of their families. The labourers, faced with declining employment, may have reacted in much the same way. The rapidly decreasing death rate testifies to the success of this policy. Thus marital fertility and nuptuality, reinforced by outmigration during the agrarian depression of the 1880s, restricted population growth in this area.

Table 6 *Municipalities clustered by level and development of marital fertility rate (MFR), death rate and nuptuality (NUP), 1879 - 1909*

<i>Area</i>	<i>Year</i>	<i>MFR</i>	<i>Death rate ‰</i>	<i>NUP</i>	<i>N</i>
Cluster 1 Clay area only	1879	216	17.6	512	7
	1889	188	15.5	491	
	1899	163	13.2	510	
	1909	139	10.8	530	
Cluster 2	1879	201	18.6	552	20
	1889	186	16.9	540	
	1899	166	15.0	557	
	1909	147	13.0	574	
Cluster 3 Peat area only	1879	196	18.1	546	14
	1889	189	18.9	538	
	1899	186	16.7	561	
	1909	183	14.5	584	
Cluster 4	1879	187	19.3	504	13
	1889	177	17.4	484	
	1899	162	15.4	507	
	1909	147	13.3	530	

Source: Hillebrand, *motivatie*; CBS, *Volkstellingen*; Oomens, *De loop*; Departement Binnenlandse Zaken, *Statistiek*.

The opposite cluster (Table 6, cluster 3) shows clearly what demographic pattern must be held responsible for the continuing population growth in the peat area after 1880.²⁴ Nuptuality was nearly 10% higher in 1880 and increased towards the time of the outbreak of World War I. More impor-

²³ Paping, *Voor een handvol stuivers*; Priester, *De economische ontwikkeling*.

²⁴ Cluster 3 comprises the municipalities of Grootegast, Oldekerk, Marum, Leek, Muntendam, Meeden, Oude Pekela, Wildervank, Midwolda, Onstwedde, Vlagtwedde, Bellingwolde, Nieuweschans and Beerta.

tantly, the increasing number of women who married showed only a minor decrease in marital fertility; while the figure was just above average around 1880 it was very high for the Groningen province early in the twentieth century. Much the same is true for the local death rates; while they were moderate at the beginning of the period, the municipalities in this cluster were the only ones to show an increase in death rates in the 1880s. Despite the subsequent decrease, mortality was high for Groningen in 1909, although rather low in a national perspective. Hence, the relatively high number of larger families in these municipalities resulted in persistent population growth, only partially balanced by the local death rates.

It is tempting to identify this pattern with the persistence of traditional agricultural behaviour. The municipalities concerned are known neither for their industrial developments nor for their advanced agriculture.²⁵ On the contrary, small-scale and low productive agriculture was the norm. In some districts, peat digging still went on and stretches of uncultivated land were available. This short description will suffice to indicate that both farmer and labourer found it difficult to survive and the death rates corroborate this statement. On the other hand, labourers did not depend on agricultural labour only, peat and canal digging offered alternative sources of income. Early in the second half of the nineteenth century, young people had more opportunities for earning an income and these possibilities increased with the advent of small and large-scale agrarian industries. For those seeking employment as non-agricultural labourers in particular, there was no point in postponing marriage until a stable income position had been achieved. This may account for the higher nuptuality in these municipalities. Once married the tradition of restricting the family size was continued, but there was clearly no need felt to move to lower marital fertility.

Although this contrast between the clay and peat areas may seem to be convincing, the truth is that the majority of the Groningen communities seem to have shared a similar demographic pattern (Table 6, clusters 2 and 4). These municipalities can be found in both the clay and peat areas. Interestingly enough, they may be described as geographically intermediate zones between the clay and peat areas comprised of municipalities in clusters 1 and 3 respectively. They are located between the typical municipalities in the northern clay area and the typical peat municipalities in the west and east of the province of Groningen.²⁶

²⁵ See, for example, F. Post, A.C. van Oorschot and J.J. v.d. Heide, *De geschiedenis van Westerwolde 3: De middelen van bestaan* (Groningen 1993) 27-57, 96-125.

²⁶ Cluster 2 comprises the municipalities of Ulrum, Oldehove, Ezinge, Adorp, Hoogkerk, Noorddijk, Ten Boer, Stedum, 't Zandt, Bierum, Delfzijl, Termunten, Nieuwolda, Finsterwolde, Scheemda, Wedde, Noordbroek, Zuidbroek, Hoogezand and Slochteren. Cluster 4 comprises the municipalities of Grijpskerk,

These intermediate clusters share the same level and development of their respective death rates. They both had relatively high death rates around 1880 which then rapidly decreased to reach the same level shortly before the outbreak of World War I. Marital fertility levels in the 1880s in both clusters resemble the situation in the peat municipalities (cluster 3) but with a different development between 1880 and 1910. The pace of the decrease in marital fertility was more that of the typical clay area (cluster 1), resulting in a level of marital fertility in 1910 which was only slightly higher than in that area.

It is tempting to merge both clusters into one, but the difference in nuptuality between both clusters throughout the period is statistically significant. Although both clusters show a small increase in the number of married women towards 1910, the levels differ by as much as 5% or more. This difference could perhaps be attributed to a division into more agricultural areas on the one hand and more industrialized municipalities on the other. It would be reasonable to expect municipalities in cluster 2 – resembling those from the clay rather than the peat area – to be economically more dependent on modern capitalistic agriculture. By contrast, those in cluster 4 might be expected to depend more on non-agrarian economic activities, combined with small-scale agriculture. To some extent this is actually the case. However, the number of municipalities known to be dependent on modern agriculture, such as Leens, Warffum and Uithuizen, for example, appearing in cluster 4 (resembling the typical peat area) is reason for concern. It is true that they have the same level of nuptuality as municipalities in the clay area, but they also have a lower initial level of marital fertility and a smaller decrease. A relatively high death rate around 1880 also sets them apart from the typical clay area. To be able to pinpoint the reasons for this situation it would be necessary to investigate each municipality separately, which is beyond the scope of this paper.

Concluding remarks

The clustering procedure has resulted in elements of a true demographic transition being seen in different areas of the province. What stands out is a very strong connection between death rates and marital fertility, which moved in parallel and at the same pace in all the clusters. In this respect conventional wisdom about the demographic transition is confirmed once again. More interesting is that differences in economic and social circumstances are very helpful in explaining the observed demographic differences. Although no clear-cut dichotomy between the clay and peat regions resulted from the

Zuidhorn, Leens, Winsum, Warffum, Uithuizen, Middelstum, Loppersum, Appingedam, Sappemeer, Veendam, Nieuwe Pekela and Winschoten.

clustering procedure, the beginnings of such a dichotomy were found in clusters 1 and 3. Here it is safe to point to distinct socioeconomic systems as a plausible explanation.

Demographic patterns changed substantially everywhere in the province in the second half of the nineteenth century, but least so in those municipalities that comprised the typical peat districts in the south west and south east (south-Westerkwartier and Westerwolde). The main development here was a decrease in death rates, albeit a small one when compared with all other municipalities in the province. Economic and social developments here were apparently small and slow. In contrast, developments elsewhere were more pronounced, with those in some of the northern municipalities in the clay area (all situated in Hunsingo or the Hoogeland) being the most impressive. A rapid development of agricultural productivity together with the agrarian crisis of the 1880s may account for the pace of the demographic changes.

Whether or not the demographic patterns of the zones in between the northern clay and the southern peat areas can be attributed to local socioeconomic circumstances remains doubtful. The clustering procedure resulted in two intermediate clusters that cannot be merged into one cluster. Unfortunately, the areas involved in both clusters had different socioeconomic systems, varying from being strongly oriented towards modern agriculture to an important and increasing orientation towards large-scale (agrarian) industries. Specific clay and peat patterns did exist, but were confined to a minority of the municipalities involved.

Appendix A: The clustering model

The ultimate aim was to obtain clusters that showed internal consistency on all demographic variables. In other words, the quest was for a denominator that minimized internal stress without producing mutually penetrating groups for any of the relevant variables. Data on marital fertility, death rates and nuptuality for all 55 municipalities making up the province of Groningen (the city of Groningen and the nearby town of Haren were excluded) were used simultaneously in the model. All data were constructed or reconstructed to represent 5-year averages centred on one census year.

Ward's hierarchical clustering method is an adequate procedure technically, given the nature of the results required. Other procedures produce clusters with either minimal internal or minimal external stress or give prevalence to one variable, while adapting the other(s). Ward's hierarchical clustering is preferred over other forms of clustering because it forms new clusters by dividing previous ones, thus providing a kind of guarantee for the easy reunion of two cognate clusters. A complete series of clustering procedures was performed with the help of SPSS, beginning with individual variables. Such a strategy is required to judge whether full clustering, using all

variables, has indeed brought together discriminating individual patterns in one multidimensional cluster.

The final result will ideally display distinct demographic patterns with small internal variance. The latter can be verified statistically, but to decide whether a pattern is indeed distinct includes a strong personal element. This is also true for the number of groups produced, which can range from 2 to 55. Criteria (or rather decision rules) were introduced in order to obtain a manageable number of distinct groups. Neither the clay nor the peat districts showed variability consistent with a single group only, so a minimum of three groups was assumed. The maximum number of clusters was limited to six in the light of the total number of cases. The optimal number of clusters depended on several factors. The process of adding a new cluster was ended when the addition would have resulted in a group of less than four municipalities. The same applied when the statistical distance (stress) of the added cluster was at least 2.5 times that of the previous cluster. Finally, the procedure ended when a new cluster would have increased the geographical dispersion of at least four previous clusters.