Regional Differences in Standard of Living in the Netherlands, 1800-1875. A Study Based on Anthropometric Data

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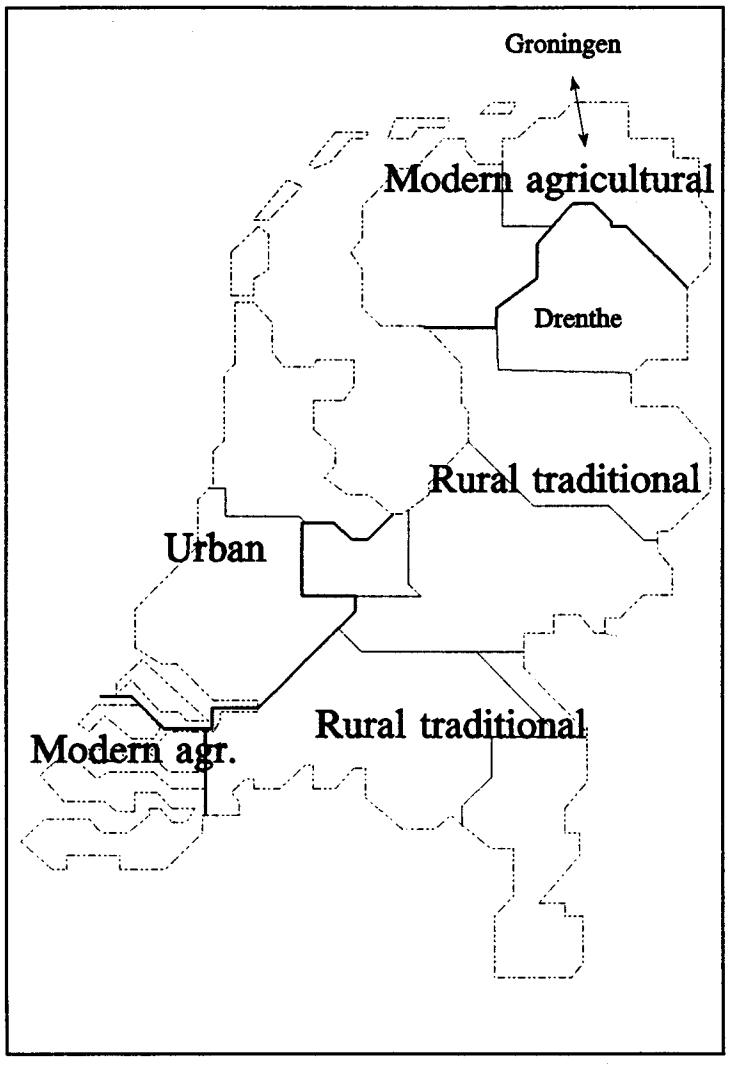

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Introduction

This research covers a study on height, birth and death of men. The purpose is to analyze the standard of living in the Netherlands and in particular regions by combining these indicators. The use of birth and death rates as indicator for standard of living will presumably not raise many doubts, but this may be different for height. In human biology, average sex- and age-specific height of a population is considered an accurate indicator of the nutritional status of that population[1]. Tanner, for instance, who wrote about the effect of nutrition on heights, concluded that good nutrition and health resulted not only in a higher average height, but also in a menarche at an earlier age[2].

In recent decades it has become apparent that historical studies on standard of living have two obstacles. Firstly, there is the problem of differentiating between material, psychological and biological aspects. Although some authors tried to combine these factors, it seemed generally impossible to obtain good weights to relate these standards. Secondly, it appeared very difficult to construct a representative index of real income[3]. For these reasons many researchers started to use anthropometric methods. It is generally accepted that a change in average height, resulting from a change in the nutritional status, is an important variable for economic and social research.

The first economic historians who shared this opinion were Fogel and Engerman[4]. They gathered a group of researchers around them to collect height data in several countries, including the United States, the United Kingdom, Japan, France, Sweden and the Habsburg Empire. I will focus on two studies, namely those by Komlos and Floud. The most interesting methodological aspect of these studies is the introduction of 'Biological standard of living'. In his later work it seems that Komlos accepts the division between material and biological standard of living, and tries to combine these factors in a single index[5]. Komlos concentrated on the material effects of industrialisation for the working class, within the framework of the standard of living debate, focusing on the question: did the standard of living for the working class increase or decrease during the first phase of industrialisation. The final conclusion of his work *'Nutrition and economic development in the Eighteenth-century Habsburg Monarchy'*, was that although average height decreased during this period, industrialisation had a positive effect on the standard of living. Industrialisation made it possible to escape from the Malthusian trap. It made demographic growth possible without the inevitable subsistence crisis.

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[1] R.Floud and B.Harris, *British industrialisation and changing stature* (Congress paper London/Southampton 1995) 3.

[2] J.M. Tanner 'The potential of auxological data for monitoring Economic and Social well-being' in: *Social Science History (SSH)* 6 (Fall 1982) 571-580, **578.**

[3] J.Komlos, 'On the significance of Anthropometric history' in : J. Komlos (ed.) *Stature, living standards, and economic development. Essays in anthropometric history* (Chicago 1994) 210-220, there 211.

[4] R. Floud, K.Wachter & A. Gregory, *Height, health and history. Nutritional status in the United Kingdom, 1750-1980* (Cambridge 1990) xviii.

[5] Komlos, 'Significance of anthropometric history' *Stature, living standards* 213.

Floud and his associates intervened in the 'longest running single discussion in British economic history'; according to them the impact of industrialisation on the British working class is an issue of paramount importance at the moment[6]. They described the development of standard of living in the United Kingdom in the period 1750-1980. They were less cautious than Komlos. In their opinion, height is the same as standard of living. They reject the division between standard of living and biological standard of living. Their results did not fit those of Crafts and Feinstein that the real income per capita increased after the 'hungry forties' of the nineteenth century. Floud and his associates found out that the average height, and thus standard of living, actually decreased during this period. The study of Nicholas and Johnson dealing with the health and welfare of criminals (especially women), also supports this conclusion[7].

Even more exciting were the findings of Floud and associates on regional differences in standard of living. They calculated that, based on average heights, Ireland and Scotland, though classified as rural traditional regions, apparently had the highest standard of living during the eighteenth century and the first part of the nineteenth century. The lowest standard of living was found in modern urban areas, such as London and Manchester. In between these two areas were the rural modern and urban traditional regions. During the time of industrialisation the rural modern areas had the highest standard of living of these two regions. For Ireland some specific studies were undertaken to see whether this pattern was corroborated. These studies suggested that the key factor was to be found in the small holdings of the Irish labourers. On these plots they cultivated some subsistence products and kept some cattle. This gave them a better nutritional intake in comparison with city dwellers. Other research suggested, the same pattern was found in other countries such as the United States, Japan, Sweden, France and the Habsburg Empire. Komlos stated it at as follows: 'an individual who purchases food at higher market prices might consume less of it than a self-sufficient peasant isolated from the market by high transport costs'[8]. The situation changed after the period of industrial take-off. Komlos gives as explanation for this paradoxical situation the increase of labour productivity, market integration of the former isolated regions, and the substitution of meat for food with less protein.

In this paper I concentrate on the differences between rural traditional and rural modern provinces in the Netherlands in the nineteenth century. The province of Drenthe will serve as an example of a rural traditional region, and the province of Groningen as the example of a rural modern region. Both provinces are located in the north of the Netherlands. In the literature Drenthe is labelled as a depressed area of 'peat, gin and suspicion'. On the other hand other scholars take the view that the standard of living in Drenthe was sober, but with a higher social security for the population[9]. Groningen is known as a rich modern agricultural area. The focus below will not only be on different

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[6] Floud cs. *British industrialisation* 4.

[7] P. Johnson and S. Nicholas, *Health and welfare of women in the United Kingdom 1785-1920* (Congress paper Cambridge M.A.) 36-40.

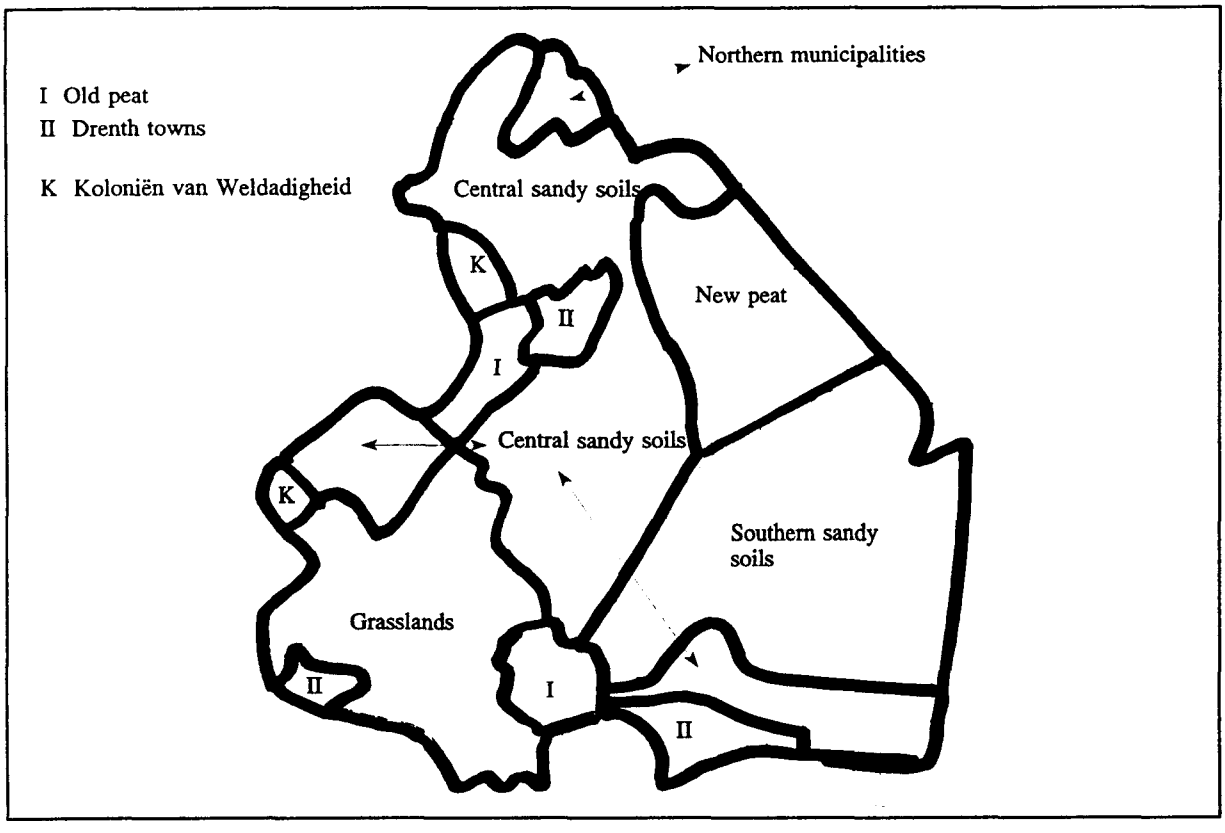
[8] Komlos, 'Significance of anthropometric history' *Stature, living standards* 214.

[9] J.A. Verduin *Bestaanswijze en huwelijks- en voortplantingspatroon in het negentiende eeuwse Drentse zandgebied* (Assen 1972) 40.

patterns, but also on the differences in development, and an explanation of the differences in these areas.

Developments in a rural traditional area: 'backward' Drenthe

Figure 1 Regions in Drenthe



The province of Drenthe was in the nineteenth century a rural traditional area. On what basis can Drenthe be characterized as a rural traditional area? Urbanisation in Drenthe (containing only three relatively small towns) was largely absent but it was not a completely self-supporting agrarian community. Some cattle and agricultural output was exported from Drenthe to Amsterdam, Groningen, Friesland and Prussia. Bieleman, following Von Thünen, characterizes the Drenth agrarians as 'profit-maximizers'[10]. Normally Drenth farmers produced both for the market and for their own needs. In bad times they retained their harvests. Thanks to this strategy they could stay in agriculture, and that was their main economic motive. The geography of the province of Drenthe, can be typified as a sandy area with a border of peat[11]. There was a high percentage of cottagers (*keuters*), which had steadily grown from at least the seventeenth until the

[10] J. Bieleman, 'Boeren op het Drentse zand 1600-1910. Een nieuwe visie op de 'oude' landbouw' *A.A.G. Bijdragen (AAG)* 29 (Wageningen 1987) 49.

[11] With the exception of the peat area in the neighbourhood of Smilde all these places were located in the southern and eastern part of the province.

nineteenth century. The main agricultural product in the first half of the nineteenth century was rye. Apart from rye, only buckwheat on the moor, and potatoes were of some importance[12].

Table I Agricultural classification of Drenthe and Groningen in percentages (benchmark years 1810 and 1850)

Live stock	Drenthe	Groningen	Arable products	Drenthe	Groningen
Cattle	27	48	Wheat	0	11
Horses	5	13	Rye	64	18
Sheep	62	32	Barley	2	18
Pigs	6	8	Buckwheat	19	5
			Oats	5	32
			Legumes	1	10
			Potatoes	10	7

Source: J.L. v. Zanden, 'De economische ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800-1914' A.A.G. Bijdragen 25 (Wageningen 1985) 91 and 100.

The adjacent province of Groningen is distinctly the opposite of Drenthe. The major part of the soil is clay. Only in the southeast and southwest part of Groningen were some peat bogs and sandy areas. The agricultural sector in this province, especially in the clay area, was primarily orientated towards export already in the eighteenth century. This becomes obvious from the main focus in arable farming being on oats, barley, wheat, rye and legumes, and (as was the case in Drenthe) in stock breeding[13]. The Groningen agrarians, however, specialized primarily in cattle, whereas their Drenth counterparts specialized in sheep breeding. The products of sheep (wool, milk and meat) were mainly for private consumption[14]. Therefore Drenthe is regarded as a typical rural traditional area, and Groningen as a rural modern society.

[12] P.W. Alstorphius Grevelink, *Statistiek van de provincie Drenthe, voornamelijk uit het oogpunt van Nijverheid en Volkswelvaart; met opgave der hoofd-middelen ter opbeuring van dat gewest* (Assen 1840) 140.

[13] The percentages of live stock are based on averages of guesstimations of the total amount of the animals in 1810 and 1850. The percentages of areas cultivated with the seven most important agricultural products are based on percentages of the years 1812-1813, and 1851-1860.

[14] C.H. Edelman, *De geschriften van Harm Tiesing over den landbouw en het volksleven van Oostelijk Drenthe* (Assen 1943) 201.

Height data in Drenthe

From 1817 onwards the Netherlands knew a general conscription for the national army. All men who reached the age of nineteen, were called for military service. Some 95% of these summoned showed up at the examination[15]. Heys van Zouteveen's *Statistiek van Drenthe* confirms that absenteeism was low[16]. Some researchers suggest that especially boys from the higher and middle social classes were absent from the medical examination in the nineteenth century. This view can be easily rejected. The major part of the absentees belonged to lower classes. The absentees came mainly from the little Drenth towns and places of peat exploitation. The most common occupations of the absentees were shipmen, soldiers, farm-hands, students and labourers. Mandemakers and van Zanden have suggested that the average height was influenced negatively by the Dutch replacement system (*remplaçantenstelsel*)[17]. For that reason, the conscripts from the higher classes would have been under represented, according to Mandemakers and van Zanden[18]. Howev, sons of the nobility, mayors, judges, doctors, ministers and even the son of the provincial governor were present at the examination days[19]. Of all absentees no more than ten percent belonged to the higher social classes. This group constituted only 0.42% in comparison with all registered boys, so this group cannot have a big influence at all[20]. The conclusion can therefore be drawn that the measured conscripts are to a high degree of accuracy representative for all nineteen year old men in Drenthe.

Recent research has focused attention on conscript registers (*lotelingenregisters*). These registers listed all the conscripts within a province in one year. The books are classified by year of examination, and municipality in which the conscripts were registered in that year.[21] These data have a high quality. Military authorities noted the name of the conscripts, the names of the parents, birth date of the conscript, the municipality of birth, of living, and of registration, his occupation, the occupation of at least one parent, his height and special circumstances that could exempt him from military service. After gathering of the data, I grouped the conscripts in different files. These categories are

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[15] Statistics of the nineteenth century make clear that in the years 1835-1861 the military doctors measured 94,23% of the registered conscripts in Drenthe. A comparative study for 1821-1825 showed that 94.79% of all registered conscripts attended on those days

[16] H.H. Heys van Zouteveen, *Bijdragen tot de statistiek van Drente* (Delft 1864) 58-59.

[17] Which means that you could hire someone to take your place in the army.

[18] C. Mandemakers and J.L. v Zanden, 'Lengte van lotelingen en het nationaal inkomen. Schijnrelaties en misvattingen' in: *Economisch en sociaal-historisch jaarboek* 53 (1990) 1-23.

[19] Militieregisters *Rijks Archief Drenthe* Archief van de Commissaris der Koningin, inv nr. 0040 f 450010-450055.

[20] Militieregisters, *Rijks Archief Drenthe* Archief van de Commissaris der Koningin, inv. nr. f 450010-450014.

[21] For the province of Drenthe individual data are present for the years 1817-1850, and 1884-1940. The data are now being systematically explored. Aggregated data of 18,512 young men are gathered in files.

based on region, occupational group and year of examination or birth.

In the first place it is interesting to compare the yearly average heights of conscripts in Drenthe with the estimated average national heights. Calculation of the correlation coefficient revealed that the national trend is different from the trend in Drenthe. The R^2 of 0.31 makes this obvious. Except the years 1826 and 1847, the average height in Drenthe is higher than the average height of the Netherlands (see graph 3). For the most of the period the difference in height was 1 cm (0.39 inch) or more. In the years 1823-1825, 1830, 1842-1848 the difference was relatively small. With some caution can be spoken of a downward trend for the period covering the mid twenties to 1850 on both a national, and provincial scale. The explanation for the reduction at the end of the period, lies in a decrease in nutrition intake caused by the failure of the potato harvest from 1845. What is remarkable is the sharp recovery of the average height in Drenthe thereafter. After the nadir of 1847, the average height immediately recovered in following years, while the average height in the whole country (that had initially declined more sharply) continued its stagnation. The gap in average height, henceforth of the standard of living, between Drenthe and the urban areas became wider the whole period of 1825-1850. I will come back to this later in the paper.

The regional pattern of standard of living in the Drenth regions

Until recently, researchers considered Drenthe as an economically backward province. The first results of anthropometric studies of this provinces showed that during the first half of the nineteenth century the biological standard of living did not correspond with this view of economic backwardness. The standard of living in Drenthe seemed better than in any other Dutch province. This pattern changed after 1860. Large-scale peat digging which started in the first half of the nineteenth century could possibly explain this development. However, an investigation of standard of living in a new peat digging area rather showed the opposite[22]. This circumstances made another study of the standard of living and a regional diversification necessary.

Based on the indicators average height, medium height and percentage of undersized people, the Drenth municipalities can be divided into three clusters. The area with the highest average height, and lowest percentage of undersized conscripts was the Grassland area in the southwest of Drenthe around the town Meppel. From a socio-economic perspective this town had an important function for this area. The dairy products of the Grassland area could be sold at the market of Meppel, and transported from this town to Holland and other regions. The emphasis was on stock breeding, especially on cows. This becomes clear from the following figures. In the whole province only 24% of the cattle were cows. In the Grassland zone it was 37%[23]. The acreage sewed with rye was almost ten points lower than the provincial average, but was still more than 50%.

The main part of the labour force worked in the agrarian sector. Almost 85% of the conscripts were occupied in this sector, and about ten percent were primarily occupied as

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[22] P.G. Tassenaar, 'Welvaartsontwikkeling in het Oostermoer' in *Nieuwe Drentse volksalmanak (NDVA)* 111 (1994) 1-20.

[23] Alstorphius Grevelink, *Statistiek van de Provincie Drenthe* 140.

Table II Economic en social classification of the Drenth regions in the first part of the nineteenth century

	Average height of conscripts	Leading economic sector	Focus in agrarian sector	Important arable products	Main type of stock
Grassland area	165.84	Agrarian sector	Stock breeding	Rye & Buckwheat (sand)	Cattle
Drenth towns	164.04	Industry & service sector			
Central sandy soils	164.03	Agrarian sector	Arable farming	Rye	Sheep
Old peat area	163.66	Peat digging	Arable farming	Rye, potato & Buckwheat (peat)	Sheep
The northern municipalities	162.83	Agrarian sector	Stock breeding	Rye & Fodder	Cattle
New peat area	162.73	Agrarian sector & peat digging	Arable farming	Rye	Sheep
Southern sandy soils	162.50	Agrarian sector	Arable farming	Rye & Buckwheat (Peat)	Sheep
Drenthe	163.86	Agrarian sector	Arable farming	Rye	Sheep

Sources:
Height data: Based on military registers Rijks Archief Drenthe Archief van de Commissaris der Koningin inv nr. 0040 f 450010-450055.
Economic indicators: P.W. Alstorphius Grevelink Statistiek van de provincie Drenthe, voornamelijk uit het oogpunt van Nijverheid en Volkswelvaart; met opgave der hoofd-middelen ter opbeuring van dat gewest (Assen 1840) 140-

craftsmen. Of the conscripts in the primary sector almost half (45%) were farmers. They lived and worked on the farm or cottage of their father, or they had taken over the business from their father after his death. The proportion of farm-hands was as big as the farmers. They lived at the farm where they were employed. The farm workers were a much smaller group. Their share was less than ten percent. They worked on a farm, but

lived independently.

The second cluster enclosed most municipalities. These municipalities can be divided into three categories in social and economic terms: the Central sandy soils, the Drenth towns and the Old peat area. The biggest zone is the Central Sand area. Mainly in this area were sand drifts and heath. In contrast with the Grassland zone all the municipalities of the Central sand soils had one or more of the so-called 'marks'. This were agrarian organisations that collectively administered some marginal common land. These common lands played an important role in the production of dung. Droppings of sheep were collected on the common grounds, and were vital for fertility of the relatively poor sandy grounds. Rye cultivation and sheep breeding dominated the agrarian sector.

Roughly speaking the structure of the labour force was similar to that of the Grassland area. About 80% were employed in the agrarian sector. Almost 15% worked as craftsmen, and the rest were employed in services or did not have a job at all. There was no peat digging in this area before 1850. The distribution of employees in the agrarian sector were different from the Grassland area. Only one in three conscripts was cultivator. More than half of those in agriculture were farm hands. The percentage of farm workers was about the same as in the Grassland area.

Looking at their height data, the Drenth towns, Meppel, Coevorden and Assen belong to the second cluster. The biggest of these three towns (Meppel) had about 6,500 inhabitants[24]. Some of these towns included surrounding farmlands. There were no large scale industrial firms, except some shipyards and textile factories in Meppel. Usually, these undertakings each employed over ten persons[25]. These three towns were very different from each other: Meppel was a town with a lot of small scale industry and shipping because of the trade with Holland. Coevorden was a fortress, and Assen was the political centre of Drenthe. Agriculture around the towns was diverse. The countryside of Assen and Coevorden looked a lot like the Central sand areas. The most important product was rye and the livestock mainly existed of sheep, although Coevorden had a relatively large amount of cows too. Around Meppel farmers grew potatoes. There were no sheep, and three quarters of the cattle were cows. The largest group of the conscripts from the cities were craftsmen (45%). Almost 20% were employed in services. About 15% worked in the agrarian sector, and 10% of the labour force were unemployed or labourers.

The third category of the second cluster, the Older peat, comprises municipalities that had been centres for peat digging since the seventeenth century. Peat production grew very fast from the first decade of the nineteenth century until 1860[26]. Therefore, peat digging remained the most important economic sector in this period. As a consequence of this economic activity shipping was important too. The agrarian sector was mainly organised on a small scale basis, and orientated towards potato growing and sheep breeding. In 1807 Hoogeveen (the largest place of the old peat) mostly had sheep and

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[24] *Uitkomsten der derde tienjarig volkstelling in het Koninkrijk der Nederlanden op den negentienden November 1849* (7e deel 's-Gravenhage 1852-1853).

[25] I.J. Brugmans, *Statistieken van de Nederlandse Nijverheid uit de eerste helft der 19e eeuw* "Tweede stuk" ('s-Gravenhage 1956) 620, 628 en 634.

[26] M.A.W. Gerding, 'Vier eeuwen turfwinning. De verveningen in Groningen, Friesland, Drenthe en Overijssel tussen 1550 en 1950' *A.A.G. Bijdragen* 35 (Wageningen 1995) 212 en 239.

cows, owned by shipmasters and labourers. Together these groups owned more land than the farmers[27]. The occupation of 45% of the conscripts was peat cutting[28]. Nearly a quarter were shipmasters and therefore involved in peat digging as well. About 15% of the conscripts were craftsmen, and 10% were agrarians.

The first cluster, i.e. areas with the shortest conscripts, can be divided into three categories. The first category consists of two northern councils. There was a small group of large farmers, who delivered their total production to the market. This area also contained many stately homes inhabited by people living on private incomes[29]. About 50% of agricultural output was rye, which was exceptionally low for Drenthe. Potatoes were also grown on a larger scale, unlike in the peat area where potato cultivation was on a small scale. No more than a quarter of the animal stock were sheep. Based on arable products and stock this area looked much more similar like the Grassland area. This difference can be seen in the structure of occupations. Especially the structure of the agrarian workforce shows some contrasts. The total amount of farmers was lower. Only 23% of the conscripts working in the agrarian sector were farmers, and roughly 55% were farm-hands. The proportion of farm workers was equal with that of the farmers. The percentage of farm-hands in this area was twice as high as in the Grassland.

The second category, the New peat was partly a Sand area like the Central sand soil. Peat digging occurred in part of the area, named the Bourtanger Moor. The acre that was dug, was still unusable for agriculture. The sandy bottom layer was an infertile soil. Only after the manuring with huge amounts of town refuge it could be used for arable farming. As a result was the structure of the agrarian sector identical to the Central sand soils, with almost 60% of stock being sheep, and rye being the main product. The percentage of the areas grown with potatoes was only a little higher. This is the only factor that makes the peat culture apparent. Peat cutting caused some variation in the occupational structure. Fifteen percent of the conscripts were chiefly peat diggers[30]. The percentage that worked in the agrarian sector was therefore ten percent points lower. There were no visible differences for the other sectors. Equally represented were the farmers and farm-hands. At the end of the period 1821-1850, these two groups together were six times as large as the farm workers.

The third category was the Southeast sand area. This territory included the hill-crest, the 'Hondsrug'. A huge peat area was in the Eastern part of this area, which was the

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[27] W. Tijms, 'De agrarische en ambachtelijke sector' in F. Keverling Buisman (ed.) *Hoogeveen, oorsprong en ontwikkeling 1625 - 1813* (Hoogeveen 1983) 143-174, there 155/6.

[28] In the conscript registers peat- and landlabourers are not separated. Therefore we assume that all labourers were peat-cutters in the Old Peat.

[29] J. Bos (ed.), *Huizen van stand: geschiedenis van de Drentse havezaten en andere herenhuizen en hun bewoners* (Meppel 1989)

[30] Based on place of living is for one of the municipalities in this area calculated which percentage of the conscripts called labourer, worked as peat-cutter. This percentage is extrapolated and corrected for the other municipalities.

southern part of the Bourtanger Moor. The exploitation of that peat started after 1850[31]. The type of livestock was the same as in the Central sand soils. There were some differences in arable farming. Peasants cultivated buckwheat on the waste lands of the Bourtanger Moor: in total buckwheat covered a third of all the arable lands. The rough occupational structure of the conscripts looked like those of most other predominantly rural areas. More than 85% belonged to the agrarian sector, almost ten percent were craftsmen and relatively few conscripts worked in other sectors. However, there were some differences in the agrarian sector itself. Nowhere else so few farm-hands existed in comparison with farmers. Apparently most farmers could not afford farm-hands. They did not compensate this shortage with farm workers. Together farm-hands and farm labourers comprised only 45% of the conscripts that worked in the agrarian sector. Evidently, most farmers could be described as peasants.

The structure of standard of living for occupational groups

Methods are available to examine the standard of living by occupational group or occupational sector. For Drenthe comparisons are made of average heights by level of occupation and sector. For the different regions, comparisons can only be made for sectors and for the three most important occupations: farmers, farm-hands, and farm workers. The tallest conscripts in Drenthe were students. Their average height was 1.70 metre (66.9 inch). Next, in order of average height, followed a group which consisted of workers from the tertiary sector (teachers and clerks), the building industry (carpenters, black smiths), the food industry (bakers), and farmers. A middle group was constituted of shipmasters, painters, and a group of conscripts with unknown profession. Persons from light industry (shoemaker, tailor, and weaver), wage dependents in the agrarian sector (farm-hands, farm workers, and shepherds) and salesmen (mostly pedlars from Jewish origin) came at the bottom of the list.

These divisions of groups hardly differs from the divisions, based on wages and prices, constructed by Paping for the province of Groningen. Only material standard of living (measured through 'real' income) of the light industry in Groningen was relatively better than the biological standard of living in Drenthe[32]. Their 'real' income in Groningen was higher than labourers, but they did not have a higher average height than the labourers in Drenthe. We can convert these finer divisions, based on occupational groups, into occupational sectors. Five sectors have been created for this purpose. These sectors are agriculture, crafts (or industry), economic and social services, peat digging, and unknown occupations. Craftsmen had the highest average height of conscripts from Drenthe. This sector was closely followed by agriculture. The other sectors had equal average heights.

It might be interesting to look at differences between some areas. For statistical representativeness, attention will be concentrated on agriculture and as well crafts. Only in the towns was the average height of conscripts from the agrarian sector higher than

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[31] M.G. Buist, 'Van oude vrijheid naar nieuwe eenheid, 1748-1850' in J.Heringa (ed.), *Geschiedenis van Drenthe* (Meppel 1985) 475-546, there 534.

[32] R.F.J. Paping, *Voor een handvol stuivers* (Groningen 1995) 151.

average height of craftsmen. This was due to the wealthy stock breeders in Meppel and the bigger proportion of conscripts in light industry. In the Central sand soils and the Grassland area the difference was smaller than in other regions. For services it is striking that average height is better in the regions where shipping created much employment. These regions were the Drenth towns and the New peat. In the Old peat area, shipping was also important, but this did not result in a positive effect on the average height of conscripts that worked in the service sector. The Grassland did not have high average heights in the service sector either. The explanation for the low average height of this region is possibly the relative big share of poor Jewish pedlars[33].

Except for the Drenth towns and the Old peat area, farmers, farm-hands, and farm workers were the most common occupations. The average height of farmers in Drenthe was high. Especially in the Northern municipalities they were relatively tall. Nowhere else was the difference in average height between farmers on the one hand, and farm-hands and farm workers, on the other hand, as big as in this area. The relatively low standard of living can be explained by inequality in prosperity. It is striking that the differences in average heights between these two groups are small in the rich Grassland and the poor Southern sandy soils. This means that the least inequality in prosperity existed in a wealthy region and in a less prosperous region. The level of prosperity in the Grassland area was so high that even those dependent on a wage could benefit from this wealth. The average farm-hand or farm worker in the Grassland area was taller than the average farmer in the Southern sand soils.

Agrarians on the Southern sand soils and in the New peat area, were not capable to increase their standard of living. Most of them were cottagers, and were restricted by the 'mark' organisation in the area. Probably this organisation stabilized these relative poor agrarian communities because it protected cottagers from total misery. These areas focused on arable farming. The average number of horses pro farm was the highest of Drenthe in the Southern sand soils[34]. Probably the necessary food input for horses could not be compensated for the increased food output. This diminished the nutrition intake of the population, and decreased the possibilities of cattle breeding. The standard of living of agrarians on the Southern sand soils becomes clear from their relative low average height. Not only all conscripts in the agrarian sector, but also the agrarians (cottagers and some farmers) had a lower average height than the craftsmen. This did not occur in any other region. There is a striking difference with the two northern municipalities, where the average height of farmers was almost the same as the average height of the Grassland farmers. No mark organisations existed in this Northern area[35]. The wage dependents were the shortest of Drenthe, and therefore the most badly nourished people in whole of the province.

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[33] Intermixing of the Jewish people in the foregoing ages with native population and the small influence of so-called racial components exclude a genetical explanation.

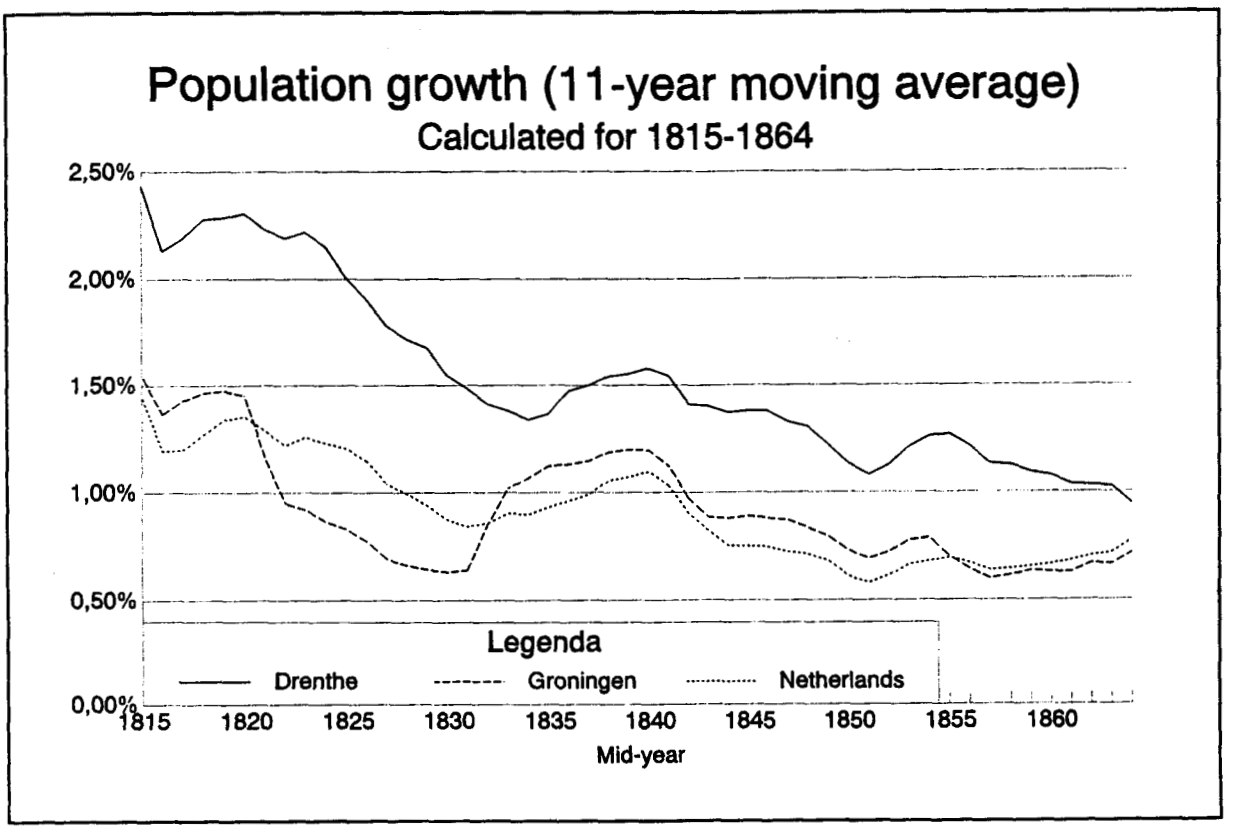
[34] Bieleman, 'Boeren op het oude zand' *AAG* 289-290.

[35] Alstorphius Grevelink, *Statistiek van de provincie Drenthe* 153.

Trends in height and population growth

What is the significance of the declining average height in the period 1821-1850. The pattern matched with the declining average height in other European countries[36]. The order of height in different sort of areas also fits into the western pattern. Rural traditional areas had a higher standard of living than modern agricultural and urban areas. The people in rural traditional areas suffered less from a subsistence crisis in a pre-industrial society, and recovered faster. The danger for rural traditional regions was long-term population growth. In periods of strong population growth increased the amount of agricultural small holders. Those small holders had a marginal agricultural business , but also hired themselves farm workers. Bieleman suggests that in Drenthe the system of these semi-autonomous small holders collapsed after the potato blight of 1846-47. They had become to much dependent on the results of the potato crop. In his opinion this development is a result of the population growth[37]. There can be some doubt about this statement. This question will be raised again later in the paper.

Graph 1



There was a strong population growth in Drenthe in the first part of the nineteenth

[36] D. Weir, 'Economic welfare and physical well-being in France: 1750-1990' *Conference paper 1995* (Cambridge ma. 1995) 39.

[37] Bieleman, 'Boeren op het platteland' *AAG* 684.

century (see Graph 1). In 1814 a census took place, which is the base year. In the period 1814-1849 the Drenth population grew from 45,000 to 85,000. The yearly average growth rate was 1.7%, which made Drenthe the fastest growing province of the Netherlands. There is a twofold explanation for this exponential growth. On the one hand, Drenthe was confronted with a migration surplus. This was the result of the exploitation of the territory, Oostermoer, and the inflow of impoverished people into 'de Koloniën van Weldadigheid'[38].

De Koloniën van Weldadigheid were a private initiative of some prominent persons in Dutch society. The government supported the project, although it was a private initiative. The purpose of this pauper colony was to set up a new life for beggars, orphans, and paupers. These people coming from Dutch cities belonged to the lower social classes of society. In colony settlements, mainly located in the Central sand soils, these outcasts would be transformed into farmers and craftsmen[39]. In 1849 the colonies had 10,000 inhabitants. Consequently, a quarter of the population growth can be explained by this development of plantations. Another important factor was the net birth surplus in Drenthe. Over the whole period 1815-1850, the Drenth birth surplus was amongst the highest in the country. The low death rates were of greatest importance[40]. Birth rates were also at a relatively low level, but high enough to show a net surplus of births.

What were the effects of the strong population growth on occupational structure? Bieleman found that between 1798 and 1849 the agrarian sector in the Drenth countryside retained an equal share of the working population. The percentage of labourers increased by ten percent points, while the percentage of farmers and farm-hands decreased proportionally[41]. The same development is revealed in the occupations of conscripts. Between 1821 and 1850 the percentage of labourers in the total working population increased by more then ten percent points. In contrary to the figures of Bieleman, this percentage includes peat-diggers. The growth of the percentage of labourers is not only caused by the exploitation of the peat district of Oostermoer (the New peat area), and the intensification of peat digging in the Old peat colonies, but is also an outcome of the increase in the proletariat. The increase in labourers in the some areas was more than twenty percent points (see graph 2). In the other areas it increased with ten percent points.

Despite this increase of the proletariat, the standard of living did not decline in most areas before the potato blight. It is necessary to make two remarks about this proletarianism. In the first place the difference between cottagers and labourers was not so big: most labourers had some plots of land, and some sheep or pigs for dairy products and meat. Secondly the increase in cultivation of potatoes stabilised the standard of living. In the Oostermoer, where peat digging had started, was the standard of living in the period 1830-1844 higher than in the other periods. Although the percentage of labourers increased, average height stayed on the same level until the devastations of the potato

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[38] The Oostermoer was a part of the Bourtanger Moor and located in the East of Drenthe.

[39] C.A. Kloosterhuis, *De bevolking van de vrije koloniën der Maatschappij van Weldadigheid* (Zutphen 1981) 14.

[40] E.W. Hofstee, *De demografische ontwikkeling van Nederland in de eerste helft van de negentiende eeuw. Een historisch-demografische en sociologische studie* (1978) 190-215.

[41] Bieleman, 'Boeren op het Drentse zand' *AAG* 119.

Table III Percentage increase of labourers in total labour force between 1821-1825 and 1847-1850

Region	1821-1825	1847 - 1850	Difference in percentage points
Grasslands	4.7%	11.2%	6.5%
Old Peat	43.1%	50.9%	7.8%
Northern municipalities	16.0%	24.7%	8.7%
Drenth Towns	4.6%	13.6%	9.0%
Central sand	5.0%	16.0%	11.0%
Southern sand	8.0%	20.1%	12.1%
New Peat	7.1%	40.2%	33.1%
Drenthe	10.0%	22.6%	12.6%

Source: Based on military registers Rijks Archief Drenthe Archief van de Commissaris der Koningin inv nr. 0040 f 450010-450014 and 450048-450055.

blight, when average height decreased to a very low level[42].

Trends in standard of living: a comparison between Drenthe and Groningen

The development of the Groningen population followed the national trend (see graph 1). The differences in population growth between Drenthe, Groningen and the entire Netherlands declined over the period. Especially during the period 1814-1829 the population in the Netherlands and these provinces expanded very rapidly. From 1819 to 1825 Drenthe had extraordinary low death rates[43]. In 1819 the 'Koloniën van Weldadigheid' started to educate the impoverished city dwellers, and particulary in the first year the inflow of paupers was substantial.

The key question here is how this demographic growth is reflected in the average height figures. The figures that can be compared most easily are the percentages of undersized conscripts[44]. They are available for most of the period for Groningen (1836-

[42] Tassenaar, 'Welvaartsontwikkeling' *NDVA* 18.

[43] Hofstee, *De demografische ontwikkeling van Nederland* 198.

[44] Not all the years are midyears for 11 year periods (1815 = 3 years, 1816 = 5 years, 1817 = 7 years, 1818 = 9 years)

Table IV Average annual growth of population by period

	Drenthe	Groningen	Netherlands
1814-1819	2.16%	1.40%	1.20%
1819-1829	2.14%	0.80%	1.23%
1829-1839	1.34%	1.11%	0.91%
1839-1849	1.39%	0.84%	0.72%
1849-1859	1.28%	0.79%	0.72%
1859-1869	0.89%	0.79%	0.83%
1814-1869	1.47%	0.91%	0.91%

Source: Based on the results from E.W. Hofstee, De demografische ontwikkeling in Nederland in de eerste helft van de negentiende eeuw

1875), and Drenthe (1821-1875)[45]. For the Netherlands these figures are only available after 1851[46]. Median and average heights for the Netherlands are complete, but these are less well documented for most provinces. These figures are only for some years available for Groningen (1836-1861) and Drenthe (1821-1850). The year 1863 is a significant year. From then on the conscripts were measured at the age of twenty instead of nineteen year. At the same time the government reduced the minimum height requirement for military services from 1.57 metre (61.8 inch) to 1.55 metre (61.0 inch). This is the reason that the development of undersized conscripts is given as a ratio between both provinces Drenthe and Groningen.

In most years during the period before 1863 the percentage of undersized was lower in Drenthe compared to Groningen. The Crimean War (1853-1856) caused an upswing of prices of arable products. It is striking that impact of this war on the nutrition intake was stronger and lasted for longer than the effects of the potato blight. This is contrary to the assumption of Bieleman that the system of marginal small holdings collapsed after this subsistence crisis. During the Crimean War, prices of cereals rose and meat consumption declined. The Crimean War changed the relative biological standard of living between Drenthe and Groningen. During the mid-fifties the percentage of undersized conscripts rose sharply, but only the figures for Groningen recovered afterwards.

Which developments accounted for the stagnation of Drenthe, and the economic upswing of its neighbour Groningen? Firstly Drenthe was confronted with strong

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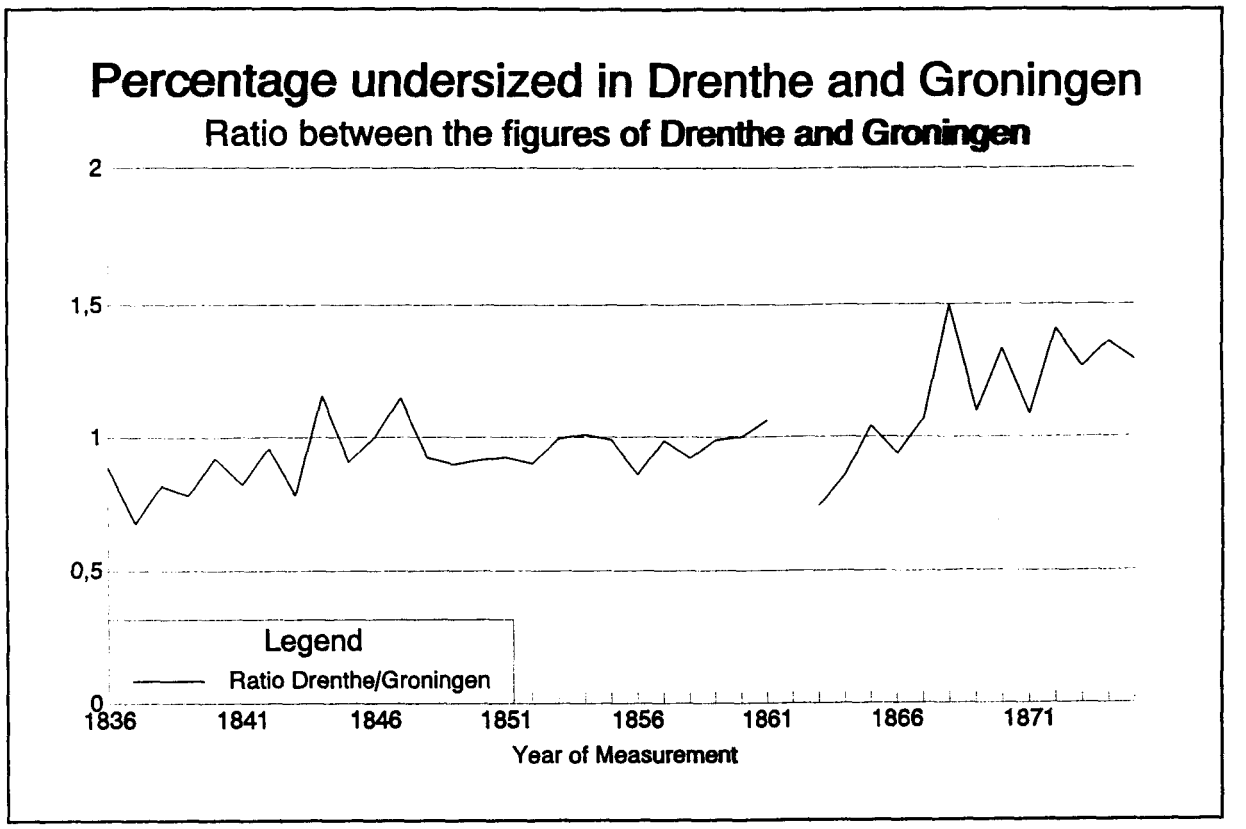
[45] J. Zeeman, 'Rapport voor de commissie voor statistiek over de lotelingen van de provincie Groningen van 1836-1861' in: *Nederlandsch Tijdschrift voor de Geneeskunde (NTvG* (1861) 691-723.
Statistische bescheiden voor het Koninkrijk der Nederlanden ('s Gravenhage 1867-1883).

[46] J.C. v. Wieringen, *Seculaire groeiverschuiving* 'Lengte en gewicht surveys 1964-1966 in Nederland in historisch perspectief. Samenvatting in het Engels. Tabellen en figuren.' (Leiden 1872) 87.

Graph 2



population growth. As has been argued this growth was associated with some kind of proletarisation, so wage dependence grew. However, it is unlikely that the Drenth farming sector could absorb all these people. Peat digging was an alternative way of employment, but it was seasonal work for only three months in a year. Bieleman discovered that the number of cottagers increased substantially after 1840[47]. In summary, one must take account of the following factors. The number of cottagers and wage-dependent labourers increased, partly as a result of population growth. However, cottage industry could not unlimitedly absorb the growing labour force.

Another important development were investments in the infrastructure in Drenthe. Before 1825 there were no paved roads in Drenthe, but 100 kilometres were constructed in 1845. The total amount of paved roads in the province doubled between 1845 and 1860[48]. This road construction was important for the inland connection between the northern part of the Netherlands and the economic and political centre in the western part of the Netherlands. There were also many investments in canal construction between 1825-1860[49]. These investments in paved roads and canals opened up Drenthe. This was especially important for the Eastern and Central part of the provinces. These areas became more integrated with the Grassland and Old Peat areas. The New Peat area, Northern

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[47] Bieleman, 'Boeren op het Drentse zand' *AAG* 143.

[48] J.R. Luurs *De aanleg van verharde wegen in Drenthe, Groningen en Friesland* [unpublished master thesis Rijksuniversiteit Groningen] (Groningen 1994).

[49] P.D. Groote, *Kapitaalvorming in infrastructuur in Nederland 1800-1913* (Capelle ad IJssel 1995) 172/3.

municipalities, the provincial capital Assen, and the northern part of the Central sand became better connected with the province of Groningen. This had consequences for different economic sectors. Light industry had to compete with the growing steam powered textile industry from North Brabant and Overijssel. For some farmers new economic opportunities flourished. Probably they could export more dairy products and livestock. The deliverance of cattle and butter to the different Drenth markets increased very strong after 1855[50]. Furthermore, this development could have changed the social coherence of the so called peasant society, and strengthened the market oriented elements of the agrarian sector.

After the potato blight, the standard of living came under pressure, and collapsed with the high prices during the next decades. An example of the decline in of standard of living is the growth of the total amount of livestock. Between 1814 and 1869 the cattle population grew with a percentage of 40%, and sheep by 20%[51] However, the population also doubled in this period. The total number of sheep increased between 1843 and 1851, and after 1860. The number of cottagers increased at the same time. These cottagers were dependent on sheep for dung, milk and the inflow of cash from wool.

Groningen shows a better development, especially for these indicators. The cattle population increased by 34%, and the sheep population by 50%, but the amount of inhabitants increased by only 86%[52]. The years 1850-1878 ('Champagne jaren') were extremely good for the agrarian sector. Agricultural prices were at a high level, also on international standards. This was extremely good for an area which was primarily oriented towards the export of arable products, livestock and dairy products. At first only the farmers benefited from this upswing. The reasons for this development were the expansion of the European population together with a insufficient rise in agrarian output. The farm workers of Groningen, a group without property, remained in deprived conditions[53]. Many migrated to the United States in these years. On the long run the labour class benefited in these golden years, as wages rose and unemployment declined after some years. Family income increased sharply after 1856, although Paping suggests that this improvement was not a long-term structural change. After 1860, agricultural prices generally stabilized, while in particular the prices of livestock and dairy products continued to rise[54]. After 1864 the percentage of undersized conscripts decreased rapidly, (see graph 3). The height data correspond with the cycles of the Groningen agricultural sector and the standard of living estimates.

There was a change in the pattern of standard of living by region after the middle of the nineteenth century. The explanations can be found in a combination of trends in

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[50] Bieleman, 'Boeren op het Drentse zand' *AAG* 427.

[51] Bieleman, 'Boeren op het Drentse zand' *AAG* 719 en 730.

[52] P. Priester, 'De economische ontwikkeling van de landbouw in Groningen 1800-1910. Een kwantitatieve en kwalitatieve analyse' *A.A.G. Bijdragen* 31 (Wageningen 1991) 552.

[53] Conditions were somewhat different in the Oldambt, an area in East Groningen. There the conditions looked more the same like Drenthe, and had the labourers some property like houses, live-stock and plots of land. In this areas were the percentages of undersized very low.

[54] Paping, *Voor een handvol stuivers* 206, 211, 298 en 402.

demographic change, commercialization of trade in agrarian products, and wage dependence of the labour force. This period was only the first stage in the transformation of the economic and social structure of the northern part of the Netherlands. An example may be used to support this statement. In 1906 Groningen was the second province, following Friesland (another modern agricultural province), in which more than 50% of the conscripts had a height of 1.70 metre (66.9 inch) or more. Drenthe only surpassed this line in 1919, as one of the last Dutch provinces[55].

Standard of living in Drenthe in the Dutch context

The change in standard of living relation between Drenthe and Groningen is also visible in a comparison of Drenthe and the Netherlands as a whole. Data are available for six provinces (Drenthe, Groningen, North Brabant, North Holland, Utrecht, and Zeeland), which give a representative view of the Netherlands. The percentages of undersized conscripts for the Netherlands was reconstructed with these data (See statistical annex 4). They are weighted on basis of the population of the provinces in the birth years of the conscripts. The difference in percentage of undersized conscripts between Drenthe and the Netherlands hardly changed during the first part of the nineteenth century. Except for the years 1826 and 1847, the percentage of undersized was lower in Drenthe. During most years, the difference was five per cent. After 1847, Drenthe recovered quickly until 1850, but it appears that there was a downward trend of the standard of living in Drenthe after 1840.

The pattern is different when Drenthe is compared to the most urbanized province North Holland, or with two Dutch cities (see graph 4 & 5). The gap between Drenthe and North Holland increased after 1832. In all the years a difference of more than five percent existed except for the year 1847. The height data in graph 4 are weighted averages for the two South Holland cities Leiden and Rotterdam[56]. These two cities had different characteristics. Leiden was a old textile centre. The main economic activity was based on the Dutch staple market system of the golden age. During the first part of the nineteenth century Rotterdam developed into the centre of engineering industry in the Netherlands[57].

Regression shows that the average heights for these Dutch cities are representative of all Dutch cities in the period of 1863-1897. Over the whole period 1821-1850 the average height of Drenthe is much higher, and the gap widened especially after 1838. During the first part of the nineteenth century the standard of living developed in favour of the rural traditional province of Drenthe. This improvement in standard of living corresponds with the growth in land productivity and labour productivity in the agricultural sector. These growth factors for Drenthe were estimated by van Zanden. His results show that gross-production increased more than the input factors during the period 1810-1850. He

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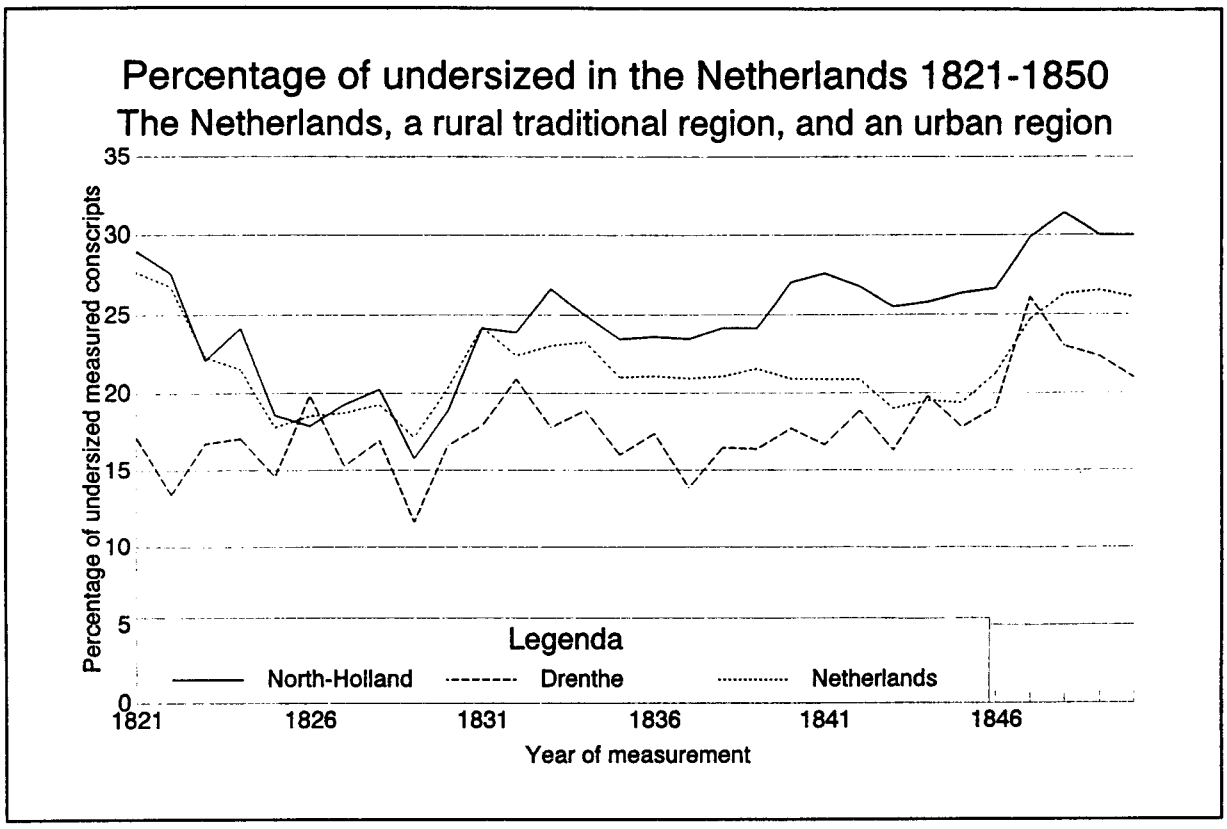
[55] J.C.G.M. Jansen en W.J.M.J. Rutten, *Geschiedenis van de landbouw in Limburg in de twintigste eeuw* (Leeuwarden/Mechelen 1992) 88.

[56] V. M. Oppers, *Analyse van de acceleratie van de menselijke lengtegroei door bepaling van het tijdstip van de groeifasen* (1963) 55-67.

[57] R.T. Griffiths, *Industrial retardation in the Netherlands 1830-1850* (Den Haag 1979) 121.

Graph 3



estimated a yearly growth of gross production of 1.8%, which was higher than the yearly increase of the production factors (acreage under production, labour force)[58]. Thus van Zanden estimated the yearly productivity growth at 0.8%. The yearly growth of gross agricultural production exceeded the yearly population growth of 1.7%. Of course, it is not certain if the growth of production directly benefitted the population. The constant average height data suggest that gross consumption developed in the same direction as gross production (with the exception of period of the potato blight). Net consumption per capita did not change much in Drenthe between 1810 and 1850.

Bieleman found that only farming land was extended, and therefore the gross production rose slightly. He objected to the relatively high increase in productivity as calculated by van Zanden. Bieleman's data of rye and potato output do not show any increase in productivity[59]. There has been some criticism on the methods used by both authors. There are some doubts about the reliability of the yield rates of the beginning of the nineteenth century. However, the rise in agrarian productivity as put forward by van Zanden is more plausible than the stagnation found by Bieleman. Suppose that Bieleman is right, and the production in hectolitre per hectare remained stable during the first part of the century. In that case the increased exploitation of farming land should have been insufficient to balance the growth in population.

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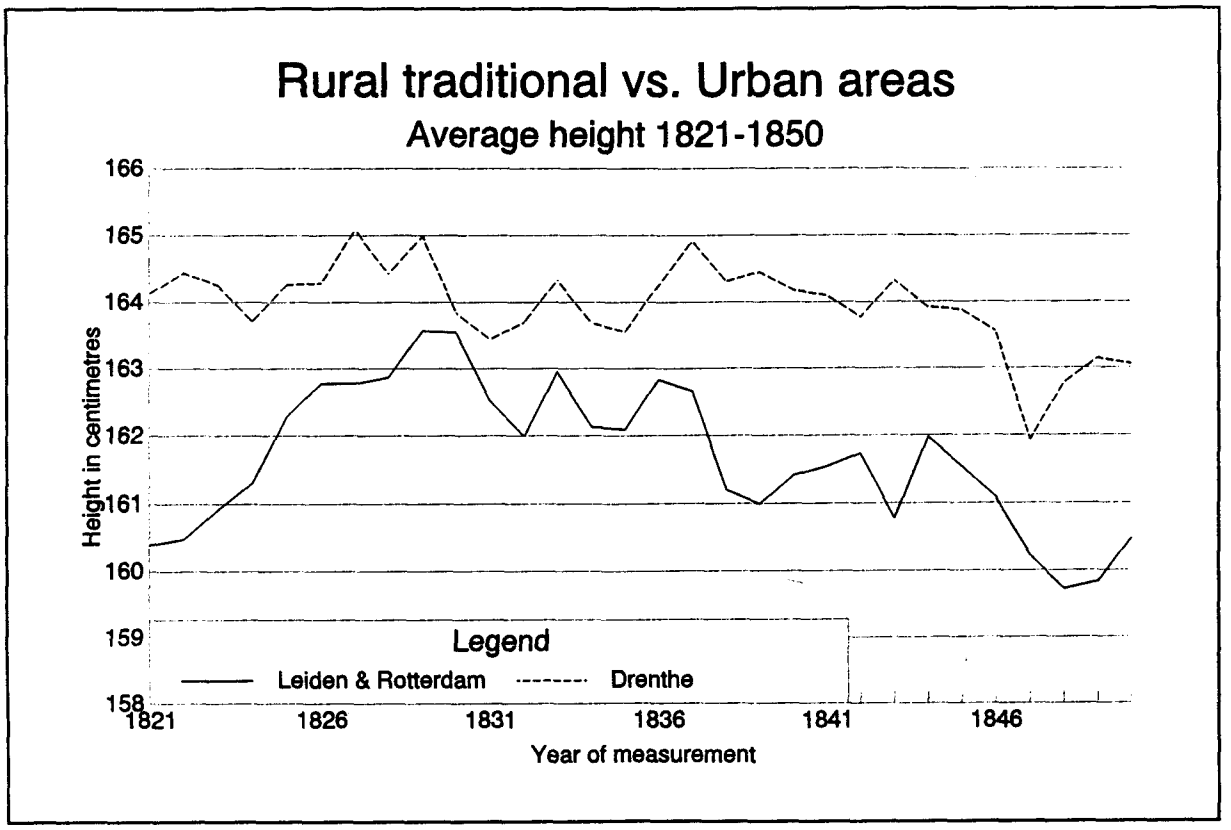
[58] J.L. van Zanden, 'De economische ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800-1914' *AAG bijdragen* 25 (Wageningen 1985) 166.

[59] Bieleman, 'Boeren op het Drentse zand' *AAG* 645-653.

It is very unlikely that Drenthe imported agrarian products on a large scale. In this period the population grew by 81%, and farming land increased in scale by 54%[60]. The majority of this new agricultural land was used for peat buckwheat, a product with a unstable and relatively low yield[61]. Another part of the increase in farming land was due to the Maatschappij of Weldadigheid. The poor in these colonies were physically and mentally not capable of agrarian work. The average yields in these plantations were only 60% of the average yield in the rest of Drenthe[62]. These developments could not be sufficient to account for the population growth. Bearing this in mind, the conclusion has to be that Drenthe could only keep the same standard of living with a rise in agrarian productivity.

Graph 4



According to van Zanden gross-production for the Netherlands as a whole rose by 0.6% and the agrarian production by 0.1%[63]. Was this small growth enough to feed the population surplus? The median height of the conscripts in Dutch cities shows that the

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[60] J.Bieleman, 'De landbouw in de periode 1600-1850' in: J.Heringa e.a. (ed.), *Geschiedenis van Drenthe* (Meppel 1985) 327-372, there 372.

[61] Bieleman, 'Boeren op het Drentse zand' *AAG* 644.

[62] J.D. Dorgelo, *De koloniën van de Maatschappij van weldadigheid (1818-1859)* (Assen 1964) 182.

[63] Van Zanden, 'De economische ontwikkeling' *AAG* 166.

standard of living decreased. After 1840 it shows a declining trend. Yearly population growth was 0.99% between 1814 and 1850, which is much higher than the growth of agrarian gross production. It is also unlikely that exports declined during this period. During the period 1833-1850 the export of dairy products, such as cheese and butter, doubled and tripled respectively[64]. The prices of the most important foodstuffs rose after 1835. Especially the city dwellers suffered from this insufficient growth. A few years after prices went up, the drop in heights started. The average height of conscripts in North Holland, the most urbanized province, and the average height of Leiden and Rotterdam show the same decline in nutrition intake (see graph 4 & 5). The conclusion can be drawn that the nutrition intake in the western part of the Netherlands, and especially in the cities, went down in the second quarter of the nineteenth century.

Agricultural prices and productivity, demographic data and height data seem closely related in both Drenthe and the Netherlands. In Drenthe there was a relatively strong growth of gross agricultural production, which exceeded the strong demographic growth. The rural traditional areas experienced a large population surplus without suffering a decline in their standard of living. How did they succeed? The most plausible explanation is the intensification in agriculture. Weed killing became necessary, especially to extend potato cultivation. The practice of leaving livestock in longer stables, made an increase in manure production possible[65]. However, the evidence for this increase is small. In any case the intensification of agriculture protected a segment of the rural labour force from becoming unemployed. In 1850, Drenthe had the smallest percentage dependent on charity relief. This figure was also low in two other rural traditional provinces: Gelderland and Overijssel[66].

The use of figures of infant mortality is a more established way to study standard of living, but it does not show a different picture. During the period 1826-1849 infant mortality in the Dutch capital, Amsterdam, was much higher than infant mortality in Drenthe. Subsistence crises are much clearer from the figures of Amsterdam. Normally an infant in Amsterdam had twice as much probability to die in his first year than an infant in Drenthe. This picture fits the international pattern. Both percentages of undersized conscripts and infant mortality ratios were much lower in the rural traditional Drenthe than in the big cities of the country.

An attempt to explain the development of the Drenth standard of living

The experience of different regions in Drenthe provided the opportunity to focus in detail on occupational structure and average height. Changes in average height and occupational structure in the regions could perhaps explain the decline in the standard of living after the potato crisis. There is some relation between the extent of proletarisation and the impact of the failure of the potato harvests. In the Grasslands area there was no decrease in standard of living. Average height declined by 0.5 cm (0.20 inch) between

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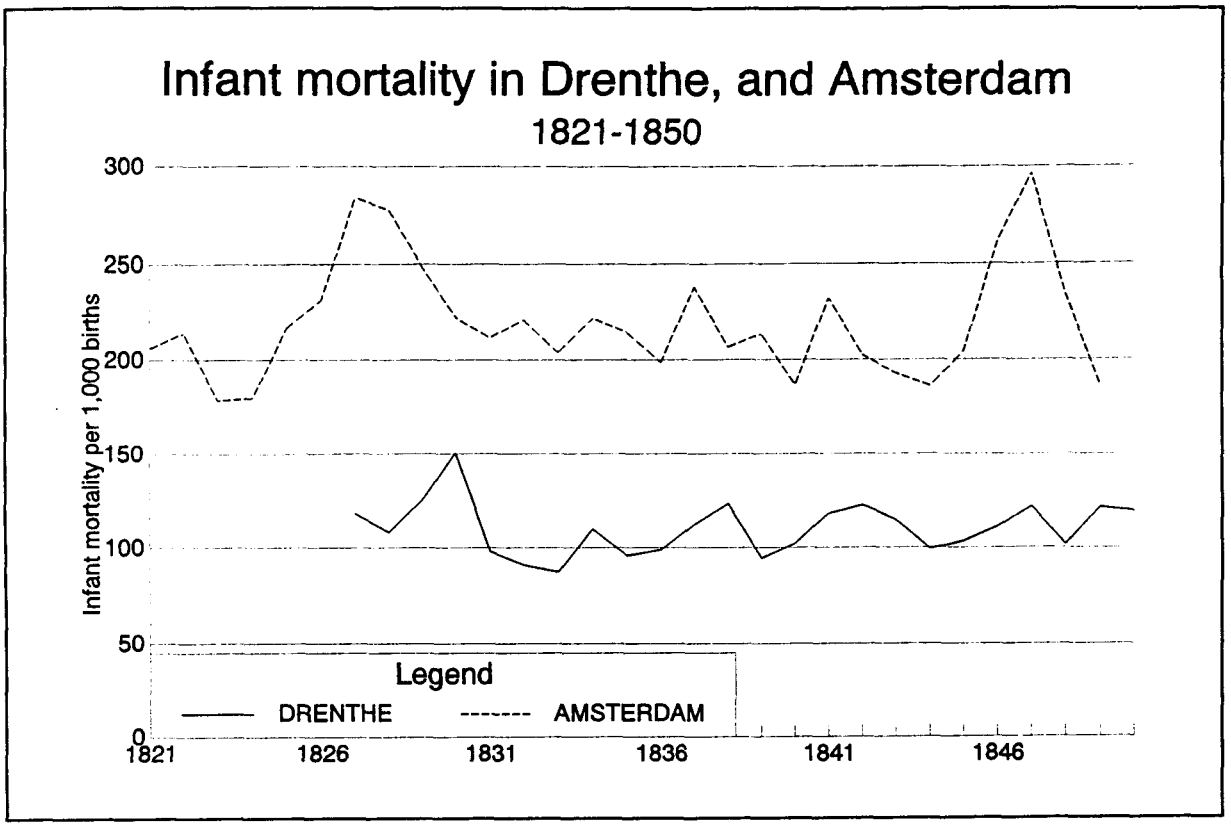
[64] Griffiths, *Industrial retardation* 27.

[65] Van Zanden, 'De economische ontwikkeling' *AAG* 179.

[66] J.L. van Zanden, 'Den zedelijken en materiëlen toestand der arbeidende bevolking ten platten lande. Een reeks rapporten uit 1851' *Historia Agriculturea* 21 (Groningen 1991) 36.

Graph 5



1841-1845 and 1846-1850. The percentage undersized conscripts, the indicator for lower classes, did not change at all. Table I showed that this area had the lowest amount of proletarisation. In areas such as the Drenth towns and the Central sand soils, the standard of living did not drop very much either. In these areas the proletarisation amongst younger men was greater than in the Grasslands, but less than in the Southern sand soils and the New peat districts. The decrease in average height was the greatest in the latter two districts. In the Drenth towns the average height dropped sharply, but only for a short period. In the country food supplies were easily available, so it took some time before the effects of the crises became visible.

A comparison between the percentages of undersized conscripts for the period 1846-1850 and the period 1855-1861 shows that the decline in living standards was more severe during the latter period than the notorious potato blight. The percentage of undersized conscripts increased between these two periods. This increase can be located in three regions: the Grasslands, the Drenth towns and the Southern sand soils. There was a downward turn in the development in standard of living after 1863. This tendency is confirmed by the figures of undersized for Drenthe and for whole of the Netherlands. However, it is important to keep in mind that in 1863 the minimum height and age of conscription changed.

Van Zanden suggested that the downward turn in Drenth prosperity is caused by the increase of peat labourers[67]. The percentage undersized data from the *Bijdragen tot de*

[67] Van Zanden, 'Den zedelijken en materiëlen toestand; *Historia Agriculturea* 23.

statistiek van Drenthe from Heys van Zouteveen can be used to challenge this hypothesis[68]. A comparison of the increase in the percentage of undersized conscripts between the periods 1835-1844 and 1855-1861 shows that the smallest increase took place in the peat digging regions. This did not only happen in the New Peat and Old Peat districts, but also in the Southern sand area were the peat moors were exploited after 1850[69]. These developments provide further evidence against the traditional view that the peat areas were characterized by poverty and a low standard of living. The proportions of undersized conscripts rose in most municipalities. The only exception was the municipality of Odoorn, as this community faced a large inflow of peat diggers. Around 1850 peat exploration started in this municipality. Four out of five municipalities with the smallest rise of undersized conscripts can be characterized as peat communities.

The highest increase in undersized conscripts was in the northern municipalities of Drenthe, and to a lesser degree in the towns, Central sand and Grasslands areas. These regions were connected to the national infrastructure network. The municipalities where a greater share of the arable land was reserved for potato cultivation were all situated in these regions. Exactly in these regions, cattle accounted for a higher share of total livestock than in the other three regions. Especially cattle grew not as rapidly as the population. It is not strange to expect that the export of meat and dairy products from Drenthe further expanded as a consequence of the increase in population in the Western and Northern part of the country, the growing market for meat and dairy products outside the Netherlands, the market integration of this part of Drenthe, and the higher food prices. It can be concluded that the people in these regions lost their better nutrition intake (except the Northern municipalities) in comparison with the south and eastern part of the province.

The main conclusion of this overview supports the picture that has been shaped by Komlos. Thus it can be used for Drenthe. In the period of isolation the nutrition intake of the areas with a bi-polar traditional agricultural sector was higher than in the modern agricultural and urban regions of the country. Market integration destroyed the local handicraft industries and affected the pattern of agriculture.

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[68] Heys van Zouteveen *Bijdragen* 58-59.

[69] Gerding, 'Vier eeuwen turfwinning' *AAG* 101 and 219.

Statistical annex belonging to Figure 2

Annually population growth (11-year moving average)

Mid year	Drenthe	Groningen	Netherlands
1815	2.43%	1.55%	1.45%
1816	2.13%	1.37%	1.19%
1817	2.19%	1.43%	1.20%
1818	2.28%	1.47%	1.27%
1819	2.29%	1.47%	1.34%
1820	2.31%	1.45%	1.35%
1821	2.23%	1.16%	1.29%
1822	2.19%	0.95%	1.22%
1823	2.22%	0.92%	1.26%
1824	2.15%	0.87%	1.23%
1825	2.01%	0.83%	1.20%
1826	1.90%	0.78%	1.15%
1827	1.78%	0.69%	1.04%
1828	1.72%	0.66%	1.00%
1829	1.68%	0.64%	0.94%
1830	1.55%	0.63%	0.88%
1831	1.48%	0.64%	0.84%
1832	1.41%	0.86%	0.86%
1833	1.38%	1.02%	0.90%
1834	1.34%	1.07%	0.90%
1835	1.37%	1.12%	0.93%
1836	1.47%	1.13%	0.96%
1837	1.50%	1.15%	0.99%
1838	1.54%	1.19%	1.06%
1839	1.55%	1.20%	1.07%

1840	1.58%	1.19%	1.10%
1841	1.54%	1.12%	1.03%
1842	1.41%	0.97%	0.90%
1843	1.40%	0.89%	0.83%
1844	1.37%	0.88%	0.75%
1845	1.38%	0.89%	0.75%
1846	1.38%	0.88%	0.75%
1847	1.33%	0.87%	0.73%
1848	1.30%	0.84%	0.71%
1849	1.22%	0.80%	0.68%
1850	1.13%	0.73%	0.61%
1851	1.08%	0.69%	0.58%
1852	1.12%	0.72%	0.61%
1853	1.21%	0.78%	0.67%
1854	1.26%	0.79%	0.68%
1855	1.27%	0.70%	0.70%
1856	1.21%	0.64%	0.67%
1857	1.13%	0.60%	0.64%
1858	1.12%	0.61%	0.64%
1859	1.09%	0.64%	0.66%
1860	1.07%	0.63%	0.67%
1861	1.04%	0.63%	0.69%
1862	1.03%	0.67%	0.70%
1863	1.03%	0.67%	0.72%
1864	0.95%	0.72%	0.78%

Source:

These figures are derived from the population figures of E.W. Hofstee *De demografische ontwikkeling van Nederland in de eerste helft van de negentiende eeuw. Een historisch-demiografische en sociologische studie* (See **table 1a**) (page 190-191, column 2 & 4). Except for the first period are the figures growth rates of 10 year periods.

Statistical annex belonging to Figure 3

Percentage undersized in Drenthe and Groningen

Year	Drenthe	Groningen	Ratio
1836	17.39	19.64	0.89
1837	13.83	20.44	0.68
1838	16.49	20.15	0.82
1839	16.40	20.93	0.78
1840	17.71	19.22	0.92
1841	16.67	20.27	0.82
1842	18.87	19.7	0.96
1843	16.33	20.87	0.78
1844	19.81	17.12	1.16
1845	17.83	19.69	0.91
1846	19.06	19.03	1.00
1847	26.13	22.76	1.15
1848	22.98	24.89	0.92
1849	22.30	24.87	0.90
1850	20.95	22.94	0.91
1851	20.60	22.30	0.92
1852	21.40	23.80	0.90
1853	20.50	20.60	1.00
1854	20.90	20.70	1.01
1855	26.90	27.20	0.99
1856	23.00	26.80	0.86
1857	28.60	29.00	0.99
1858	24.20	26.30	0.92
1859	24.20	24.50	0.99

1860	25.10	25.10	1.00
1861	27.40	25.80	1.06
1862			
1863	10.02	13.49	0.74
1864	12.94	15.11	0.86
1865	11.08	10.63	1.04
1866	11.65	12.45	0.94
1867	10.98	10.30	1.07
1868	12.82	8.57	1.50
1869	12.00	10.96	1.09
1870	12.87	9.68	1.33
1871	12.30	11.34	1.08
1872	13.41	9.54	1.41
1873	13.20	10.45	1.26
1874	12.66	9.33	1.36
1875	11.11	8.63	1.29

Sources:

Column 2 Groningen

The figures for the period of 1836-1861 are percentages undersized conscripts at the age of nineteen. The figures for the period 1863-1875 are from *Statistische bescheiden voor het Koningrijk der Nederlanden*. These are percentages of undersized conscripts at the age of twenty.

Column 3 Drenthe

The figures for Drenthe are based on the research of P.G. Tassenaar on height of conscripts in Drenthe in the period 1821-1850. The source of this investigation is the "Archive of the Governor of the King", which can be found in the *Provincial Archive of Drenthe* (inv. nr 0040 : f 450015-45005) in Assen.

The figures for the period 1851-1861 are from J.C. v. Wieringen, *Seculaire groeiverschuiving. Lengte en gewicht surveys 1964-1966 in Nederland in historisch perspectief. Samenvatting in het Engels. Tabellen en figuren.* (page 87, column 4). These are percentages undersized conscripts at the age of nineteen. The figures for the period 1863-1875 are from *Statistische bescheiden voor het Koningrijk der Nederlanden*. These are percentages undersized conscripts at the age of twenty.