Food, Population and Health – global Patterns and Challenges

Proceedings of an Interdisciplinary Symposium on the Dynamics from Prehistory to Present

Edited by Lars Jørgensen, Niels Lynnerup, Anne Løkke and Henrik Balslev

Scientia Danica. Series H, Humanistica, 4 · vol. 7

DET KONGELIGE DANSKE VIDENSKABERNES SELSKAB

Printed in Denmark by Specialtrykkeriet Viborg a-s
ISSN 1904-5506 · ISBN 978-87-7304-399-8

Submitted to the Academy January 2016
Published August 2016

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Agriculture, economy and population size in Sweden in the early modern period

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Abstract

Using tax lists which enumerate households and average household size, the author previously estimated the population in Sweden in c. 1570 and c. 1630. These estimates have been considered too low by some scholars. Higher estimates have been suggested. To check the probability of the original figures, the author has considered some totally independent, but historically contemporary, sources.

First, vital records, stretching back to the 1630s, have made it possible to compare estimated births and marriages with alternative population assessments. The population for 1630 suggested by the author gives a plausible birth rate of about 34 per thousand, a rate found in most local studies from the period in Sweden and Western Europe. Higher population estimates give unrealistically low rates.

Second, comparisons were made between the estimated possible consumption of cereals (home-grown and imported) and livestock production that would follow from alternative population figures; Sweden has very good source material on agricultural production in the 17th century. Using the author's population estimate, in about 1630, an adult Swede could consume at least 2 500 calories a day. The higher population estimates would have brought famine.

The rapid growth of the Swedish population in the early modern period indicates that it was part of a more general expansion which was found throughout Northwestern Europe at that time.

SCI. DAN. H. 4 · 7 · FOOD, POPULATION AND HEALTH – GLOBAL PATTERNS AND CHALLENGES
THE ROYAL DANISH ACADEMY OF SCIENCES AND LETTERS · 2016

There has been a long debate among scholars about population sizes in Sweden before the introduction of scientific population statistics in 1749 (tabellverket).

Population estimates from households

In the 1880s Hans Forssell calculated the population within the frontiers of Sweden in 1571 to be between 427,400 and 531,400 people living in 83,900 households.[1] He used as his source material the records from a property tax levied on households, Älvsborgs lösen 1571 – the "First Älvsborg´s ransom", which was introduced following the war with Denmark-Norway from 1563 to 1570 as his source material. Forssell multiplied the households by what he thought was the average household size (AHS) at the time, around 5 people. He also had to make conjectures on tax free households including c. 1,050 rectories, 400 mansions and 70 royal castles and farms.[2]

1. Forssell 1872-1883, p. 348.

2. Sweden proper at the time had c. 1,665 parishes, the Danish provinces later annexed 605, the Norwegian 120, in total c.

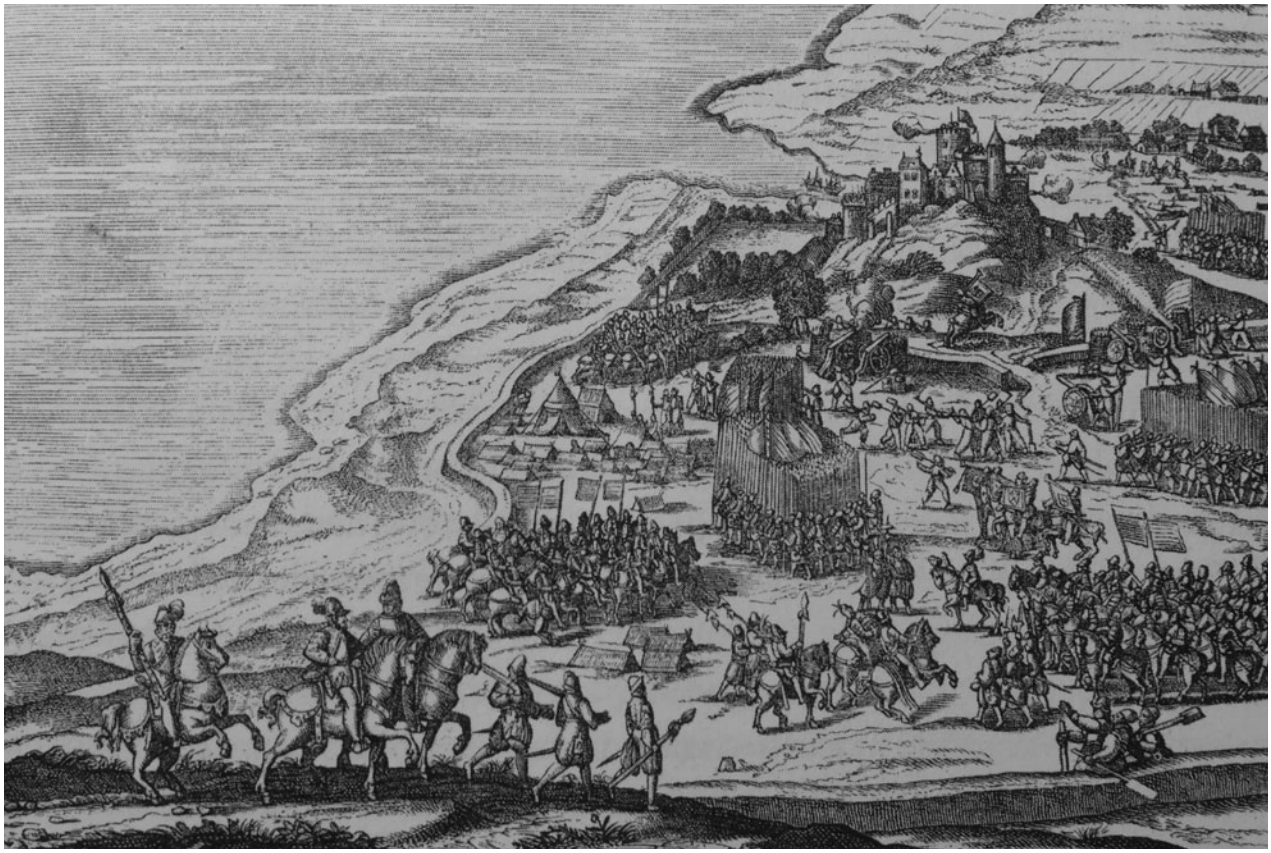


Fig. 1. The Danes taking Älvsborg castle 1563 (after Oskar Alin: Sveriges historia III).

In the 1930s Eli F. Heckscher was critical of Forssell´s figures as he found them to be too low.[3] He based his criticism on an assumption that there was very weak population growth during the period between 1570 and 1749 due to a high mortality rate from wars and plagues. Heckscher's assumption was, as he admitted, pure guesswork however. But he was supported by calculations from Sigurd Sundquist for 1630 on the basis of poll tax lists (mantalslängder, cf. Danish ekstraskattemandtaler).[4] Sundquist assumed in his calculations that there were the same proportions of children, domestics, widows etc. per household in 1630 as there were in the official statistics from the 1760s; the AHS, from the 1760s, was calculated from a number of households that excluded soldier's and poor people's, generally very small, households.

In a project funded by the Swedish Research Council (Vetenskapsrådet), I recounted the population for c. 1620 using poll tax lists. Unsurprisingly I found about the same number of households as Sundquist. Contrary to him, however, I multiplied it by AHSs taken from contemporary sources among which there were lists from the 1620s that included all members of the households, even small children, especially the audit records for the "Second Älvsborg's ransom" (1613-1618). Such lists exist for most of Södermanland province, many *herreds* in Uppland, some in Småland and Västergötland, and throughout the whole province of Dalsland. Together they cover large swaths of Sweden. It became evident that house-

2,390. The rectories include other farms allotted to the priests.
3. Heckscher I.1, 1935, p. 30.
4. Sundquist 1938, p. 274.

Table 1. Population estimates for Sweden c. 1570 – c. 1720

	Sweden within boundaries of 1570		Sweden within borders of today	
Period	My recount	Heckscher et.al.	My recount	Heckscher et.al.
c. 1570	440,000	800,000	640,200	1,022,000
c. 1630	646,000	900,000	905,800	1,150,000
c. 1700			1,300,000	

Note: Figures here somewhat rounded. My figures have been extrapolated somewhat for the time gap 1620-1630.
Sources: Palm 2001, p. 133; Palm 2000, p. 49.

holds in c. 1620 were smaller than those used by Sundquist from the 1760s. The recount accordingly implied a much lower population for 1620 than Sundquist's calculations for 1630 which had determined there to be between 800,000 and 900,000 people; the recount stopped at some 620,500 1620.

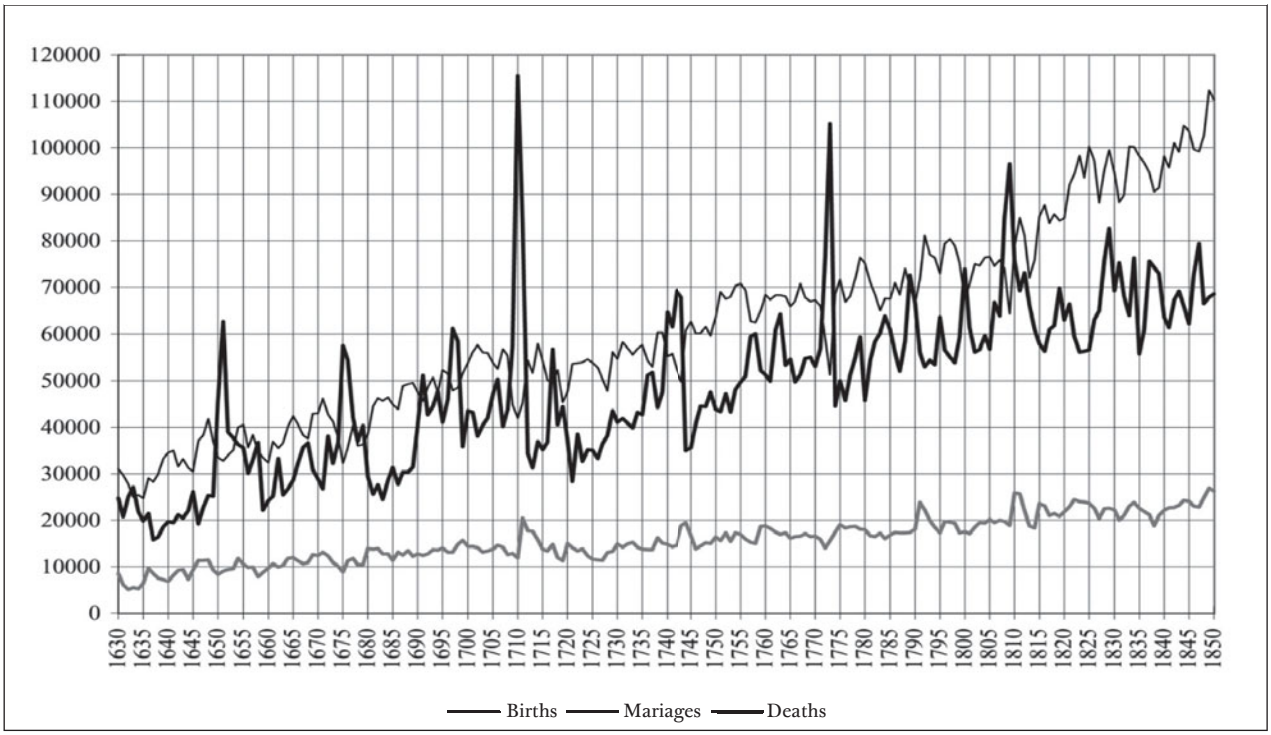
Swedish historians are fairly unanimous about the population c. 1700: c. 1,300,000 (± 100,000) persons lived in Sweden´s frontiers of today. The recounts for 1570, 1620 and the figure for 1700 taken together, point to a relatively fast growth on average during the period 1570-1700.

Can my interpretation be corroborated by other sources?

Population estimates from vital records

To evaluate the realism of one or the other rate of growth, another path was followed which used vital data from church records to aid estimates. Inspiration

Fig. 2. Estimated births, marriages, deaths 1630-1850



Source: Palm 2001, p. 70.

came from Wrigley & Schofield´s well known population history of England from 1541-1871[5]. Such records were compulsory for all parishes in Sweden by 1686 thanks to a new church law, but bishops had introduced church books earlier in parts of the country. From c. 1630 the number of preserved church books grows continuously. Population can then be estimated from a year where population size is known by going backwards successively adding deaths and subtracting births found in the vital records. Factors like migration, under-registration etc. may create important flaws to the calculations however. The number of births can largely be trusted (i.e. stillbirths must be taken into account), recorded deaths, however, tend to be too low (soldiers who died abroad were excluded, crisis mortality insufficiently recorded etc.). When inflated for the probably lacking dead (i.a. adjustments for dead soldiers according to elaborate calculations by professor Jan Lindegren), the diagram above for Sweden within today's borders could be constructed. I expand the studied period here to 1850.

The trends clearly suggest that in the early modern period population growth in Sweden was much faster than Heckscher and others thought.

A comparison between births and deaths and my recounted population estimates above gave the following vital rates:

Table 2. Estimated vital rates for Sweden within today´s borders 1630-1850 (per 1,000 inhabitants)

Period	Births	Marriages	Deaths
1630-1720	34.4	9.4	29.2
1721-1750	32.9	8.6	25.8
1751-1800	33.6	8.5	27.4
1801-1850	33.2	7.3	23.9

Sources: Palm 2001, p. 73; Hofsten & Lundström 1976, p. 16.

The rates for births and marriages are the most reliable. If we concentrate on the birth rate it seems to be fairly stable over time. For the early modern period it is slightly higher than for the following periods, but still very much compatible with calculations for many other European localities or countries for the same period. This suggests the recount from households is realistic.

If we consider net migration other than military negligible, the rates of growth can be estimated from the births and deaths in the previous table as follows:[6]

Table 3. Estimated growth rates in Sweden within today´s borders for periods 1630-1850

Period	Growth ‰
1630-1720	5.2
1721-1750	6.2
1751-1800	6.6
1801-1850	9.3

How do they stand in comparison with estimates of growth for other countries? Here we can only compare the average for a longer period, 1500-1820.

Table 4. Growth rates in some Western European countries 1500-1820

Country	Growth ‰
United Kingdom	5.3
Sweden	4.8
Finland	4.3
Norway	3.7
Portugal	3.7
Switzerland	3.2
Belgium	2.8
The Netherlands	2.8
France	2.3
Germany	2.3
Denmark	2.0
Italy	2.0
Spain	1.8
Austria	1.6
Average for Western Europe	3.1

Source: Maddison 2007, p. 242. Johansen 2002, *passim*.

5. Wrigley & Schofield 1989

6. Palm 2000 p. 105 gives c. 6 ‰ 1571-1699.

Judging from the table the suggested fast growth in Sweden seems to have parallels. With the exception of Portugal it is not farfetched to suggest differences in economic settings between the dynamic and stagnant countries, where Sweden seems to be part of a vigorous north-western Europe. Most important however, the figures do not make fast growth in Sweden during the early period implausible.

Too many people, too little food?

Alleged low agrarian production levels have been used as an argument against relatively fast population growth in 17th century Sweden. Rodney Edvinsson studied grain prices, subjective harvest assessments and tithes in order to reconstruct an annual volume series of GDP and GDP per capita for Sweden within its present borders from 1620 to 1800.[7] As it was mainly based on tithe trends he found that, at least per capita, cereal production displayed a stagnating tendency.

Swedish statistics for agrarian production started to be reliable from as late as the beginning of the 20th century, despite agrarian statistics having been introduced in 1802. There are plenty of other earlier sources that could be used for statistics however. The number of cattle can be estimated from cattle tax registers 1571, c. 1630, from the thousands of land surveyor protocols c. 1570 and c. 1690, and peasant inventories from 1735 onwards. Tithe records, preserved in the Swedish archives in an immense series from the 1540s onwards, picture a certain share of the harvest volumes.

For a long time many scholars have been critical of much of the evidence from fiscal records. Such records are known for under-registration due to tax evasion etc. However due to some aspects of the tax system as a whole – especially the cadastral system – much of the under-registration can generally be adjusted for. From the 1540s onwards, Sweden developed a cadastral system that included nearly all types of settlements (cadastral units, cadastral farms, "byar", "jordeboksgårdar" etc.) except rectories and a few very old mansions. As tithes and other taxes were successively registered according to the cadaster units, "virtual" tithe totals, and hence harvests, can be estimated by inflating tithes in proportion to the total number of units in the cadasters and the number of decimants ("tiondegivare"). For example: A parish consisted of 50 cadastral units and registered 40 decimants giving 20 barrels of tithe. An adjustment can be made as 50/40*20, which gives 25 barrels. The calculated resources of the unregistered rectory and mansions must be added to this if there are any. The resources for these can be estimated from, inter alia, their equivalents in cadastral units as they were finally registered in the cadasters during the 17th or early 18th century. There are many small details which are not in the scope of this paper. When the harvest dependant tithe system was finally abandoned, peasant inventories starting from c. 1736 including seed corn and yields per seed corn, indicated in a variety of sources from all over the country, can be used instead. A similar reasoning can, *mutatis mutandis*, be applied for estimates of animal production.[8]

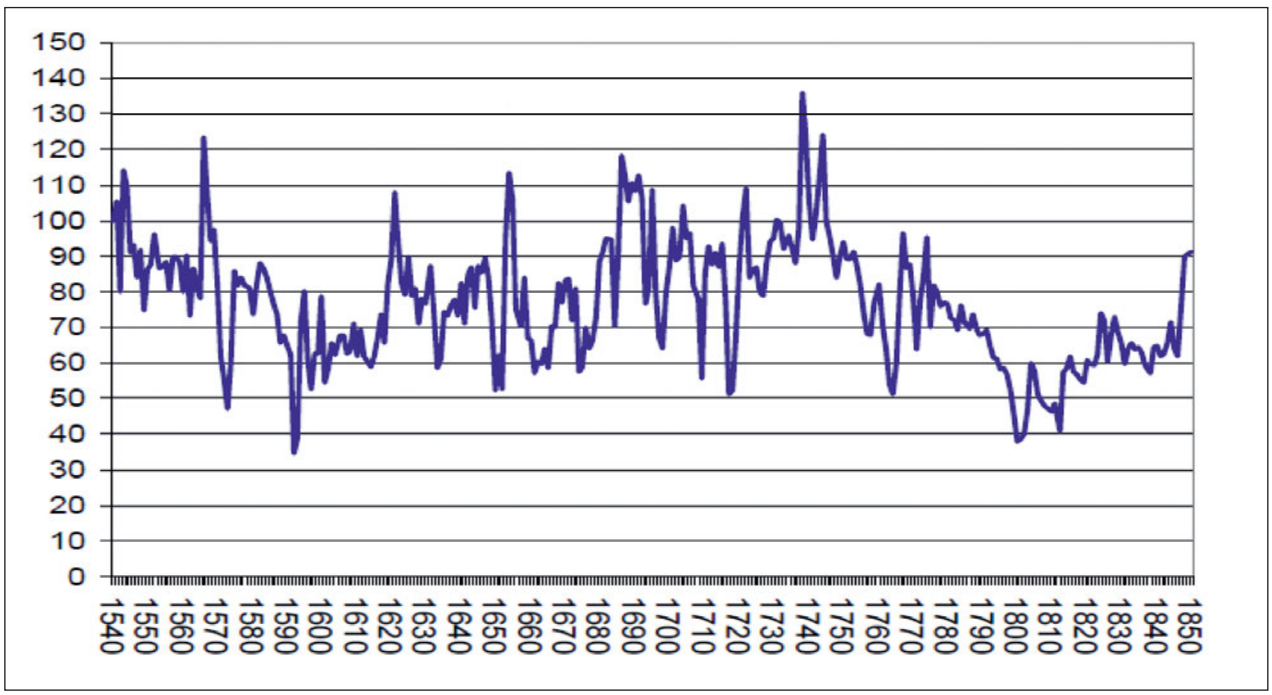
The Swedish Research Council finances research infrastructure projects, especially the production of databases. Martin Linde and I were given the opportunity to build such a database covering agricultural and population development from 1570 to 1810. Our idea was to make calculations for every sixtieth year. In our reports we also made calculations of the levels of nutrition in the five periods. It´s not possible here to go into detail about how the calculations were made. The interested reader can find elaborated discussions on method etc. in our reports published on the Internet.[9]

7. Edvinsson 2008.

8. In the northern parts of Sweden – with relatively low cereal production – tithes could be registered per peasant household. Adjustments can also be made for rectories etc.

9. The sources and methods used for our calculations are found on the Internet in the following publications (in Swedish): Linde 2012; Linde & Palm 2014; Palm 2012a, 2012b, 2013. For the areas taken from Denmark and Norway, mostly after the Roskilde peace treaty of 1658, the sources for the period before c. 1690 are scarcer. Tithe records have survived from e.g. Scania

Fig. 3. Real wage index for daily labour in Stockholm 1540-1850. 1540 = 100.



Source: The Riksbank project *Historical monetary statistics for Sweden 1668-2008*. Wage is presented by Johan Söderberg, and the CPI by Johan Söderberg and Rodney Edvinsson.

In the following table (page 15) the possible consumption from cereals and cattle is shown based on my population recounts and estimates by earlier scholars. The estimated dietary requirements for an adult manual labourer in the 18th century has been calculated to be around 3,000 Kcal:

It should be noted that, contrary to studies based only on tithe records, the possible cereal consumption levels in the table below include net cereal imports. Net imports, which were commenced around 1650, soon reached very high levels, especially during late 17th century – For some years import figures have been preserved in the archives: 1686 – 206,000, 1695 – 11,000 (!), 1696 – 800,000, 1697 – 600,000 barrels.[10]

The population estimates of Heckscher & Co. give, especially that for 1630, per capita consumption levels clearly below subsistence needs.

The calculations can be compared to the real wage index above for manual workers in Stockholm:

Trends in the wage diagram correspond fairly well with the calculated consumption levels for Sweden in the table on page 15. The dip in the curve around 1810, however, shows that the absolute levels in the diagram cannot be directly translated into nutritional levels for all of Sweden over time.

(Skåne) c. 1570 ("Lunds stifts landebok") however, and cattle units can be estimated from revenue sums paid to the central Danish tax authority from several cattle taxes around 1570. Sources from c. 1630 still remain weak for Scania. After the 1680s the source material for these areas has the same quality as for the rest of Sweden. The Swedish surveys from c. 1690 are similar to the Danish "Matrikel" of 1688.

10. Net exports of cereals started in the 1830s.

Table 5. Calories for "normal consumer" (=0.8*pop) 1560-1810.

	My pop. estimate	Kcal	Alternative pop. estimate	Kcal
1560	703,100	3,240		
1570	640,200	3,562	1,000,000	2,278
1630	905,745	2,500	1,150,000	1,957
1690	1,362,000	2,515		
1700	1,300,000	2,634	1,300,000	2,634
1750	1,780,700	3,219	1,780,700	3,219
1810	2,396,400	3,500	2,396,400	3,500

Note: Figures somewhat rounded. The 1690 Kcal figure includes an estimated average yearly net import of 500,000 barrels. The 1560 figure is an estimate for the pre-wartime 1563-1570, 10 % higher than 1570.

Conclusion

I suggest that the discussion above creates a strong argument for a rapidly growing population in Sweden during the 16th and 17th centuries, although a more precise margin of error of course is hard to set. Three independent studies however – of households, church records and consumption levels – all point in the same direction.

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