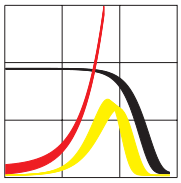


Max-Planck-Institut für demografische Forschung
Max Planck Institute for Demographic Research
Konrad-Zuse-Strasse 1 · D-18057 Rostock · GERMANY
Tel +49 (0) 3 81 20 81 - 0; Fax +49 (0) 3 81 20 81 - 202;
http://www.demogr.mpg.de

MPIDR WORKING PAPER WP 2006-024
AUGUST 2006

Settlement size and fertility in the Nordic countries

Hill Kulu (kulu@demogr.mpg.de)
Andres Vikat (Andres.Vikat@unece.org)
Gunnar Andersson (andersson@demogr.mpg.de)

This working paper has been approved for release by: Gerda Ruth Neyer (neyer@demogr.mpg.de)
Deputy Head of the Laboratory of Contemporary European Fertility and Family Dynamics.

Abstract

There is a growing body of literature that looks at the causes of below-replacement fertility in developed countries. While the variation in childbearing patterns across countries and between socio-economic groups within a country has been studied in detail, little is known about the differences in fertility patterns across settlements within a country. A few recent studies suggest that there are persistent differentials between high- and low-fertility settlements in contemporary Europe. This study examines fertility variation across settlements in four Nordic countries: Denmark, Finland, Norway and Sweden. We base our study on aggregate and individual-level register data. We first examine annual total and parity-specific fertility across settlement type from the mid-1970s to the early twenty-first century. We proceed to study the relative contribution of the socio-economic characteristics of the local populations and the characteristics of the settlements to this variation, using hazard regression models.

Keywords: fertility, urbanisation, event-history analysis, Nordic countries

Classical theory of demographic transition states that in the course of history human societies experience transition from high mortality and fertility to low mortality and fertility with only minor variation (if any) existing in the demographic patterns between countries, regions and social groups (Notestein 1945; Vishnevsky 1991). While it is true that differences across countries, regions and social groups that emerged (or were reinforced) in the course of transition have grown smaller over time, there is still evidence of significant variation in 'post-transitional' demographic behaviour. In a study on demographic patterns in the industrialised world, Coleman (2002) indicated that differences in fertility levels across countries decreased until the 1970s and have been remaining stable ever since. Billari and Kohler (2004), in turn, show that despite some convergence in European fertility levels, significant variations in fertility-related behaviour (such as leaving the parental home, marriage and female labour force participation) continue to exist in present-day Europe. Several other recent studies provide evidence in support of this conclusion (Kiernan 1996; Prskawetz et al. 2003).

When looking at sub-populations who reproduce themselves in the context of below-replacement fertility, most recent research focuses on fertility variation across countries (Frejka and Calot 2001a; Frejka and Calot 2001b; Coleman 2002; Kohler et al. 2002; Caldwell and Schindlmayr 2003; Morgan 2003; Billari and Kohler 2004) or between socio-economic groups within a country (Rønsen 2004a; 2004b; Vikat 2004; Hoem 2005; Andersson et al. 2006; Hoem et al. 2006a; 2006b). Differences across regions and various settlements within a country, however, have received little attention in the recent demographic literature. On the one hand, there seems to be the (self-evident) assumption that childbearing patterns in 'post-transitional' societies only vary negligibly across regions and settlements. Even more importantly, higher fertility in some places (e.g., remote regions or small villages) does not receive detailed attention since high-fertility (i.e., traditional) areas sooner or later are believed to "catch up" with low-fertility (modern) areas. On the other hand, the few recent studies on the topic show significant variation in childbearing or fertility-related behaviour across various settlements, which suggests that these differences may be more persistent than usually thought (Glusker et al. 2000; Hank 2001; Kulu 2005; 2006; cf. Lesthaeghe and Neels 2002). Whatever the story so far, there is no doubt that fertility differentials across regions and settlements deserve attention in our endeavour to understand

the causes of below-replacement fertility in 'post-transitional' societies as well as to look for factors that may be related to elevated fertility.

In this article, we study fertility patterns across settlement hierarchy in four Northern European countries: Denmark, Finland, Norway and Sweden. The objectives are, first, to outline fertility trends across various types of settlement from the mid-1970s to the present day; second, to study the extent to which possible variations in fertility levels result from differences in the socio-economic composition of populations of various settlements the extent to which other factors play a role. The reasons for having chosen four Nordic countries are as follows. The population registers of these countries provide the data that allow us to study the variation in fertility across settlements in detail and to follow fertility trends over an extended period of time. Further, the Nordic countries belong to the group of 'post-transitional' countries with relatively high (or 'highest-low') fertility, and they are thus of particular interest to many fertility and family researchers.[1]

The rest of our article is structured as follows. First, we provide an overview of previous research on childbearing across settlements in Europe and North America. We then describe the study context and state hypotheses to be tested by our study. Third, we introduce the data and methods. Fourth, we present the results of our analysis, followed by a discussion on the causes of fertility variation across settlements.

Previous research on fertility across settlements

Previous studies on the topic can be divided into research looking at fertility variation across settlements during the (first) demographic transition in Europe and works focussing on the 'post-transitional' period. While research on the effect of urbanisation on childbearing has a long history (Jaffe 1942; Goldberg 1959; Duncan 1965; Carlsson 1966), the most comprehensive treatment of historical trends in fertility across settlements comes from studies associated with the Princeton European Fertility Project (see Coale and Watkins 1986). In his path-breaking study, Knodel (1974) considered fertility transition in

[1] Some demographers see the Nordic countries as 'forerunners' of demographic development. In our opinion, this view is too laden with the historicism and determinism of classical demographic theory to be relevant to research on contemporary family dynamics.

Germany and found, first, that, urban fertility (both marital and overall fertility) was generally lower than rural fertility, and this already prior to the transition, and second, that urban regions showed earlier fertility decline than rural areas and that the largest cities experienced the earliest decline of all. The study also revealed that while fertility in Germany had become relatively low by the 1930s in urban as well as in rural areas, rural-urban differences were still clearly evident (Knodel 1974, 97, 102). Livi-Bacci's (1977) research on fertility dynamics in Italy showed similar patterns. More specifically, in the early and mid-19th century, fertility levels in the urban areas of central and northern Italy were consistently lower than in the surrounding rural areas. In the larger urban areas, they also declined earlier and more rapidly during the subsequent demographic transition. Research by Lesthaeghe (1977) on Belgium and by Coale et al. (1979) on European Russia supports previous findings on lower marital fertility in urban regions during the transition and revealed that urban-rural fertility differences also varied across regions.

Drawing from previous studies and his analysis of fertility transition in a number of European countries, Sharlin (1986) summarised the major findings of the European Fertility Project on urban-rural fertility variation. First, urban marital fertility was lower than the rural variant prior to the general decline in fertility; second, marital fertility began to decline earlier in urban areas than it did in rural areas; third, urban fertility declined faster, thus increasing the rural-urban gap; and fourth, in the 'post-transitional' period, marital fertility in rural areas was only slightly higher than in urban regions. He looked at the patterns of the three Nordic countries, Finland, Norway and Sweden, and his findings were in accordance with the general patterns, although clear urban-rural differences in marital fertility emerged in Norway only in the first decades of the 20th century (Sharlin 1986, 245–248). Subsequent research by Lutz (1987) on fertility dynamics in Finland supports the patterns previously observed, showing that reductions in parity-specific fertility began in the urban areas of the country in the last decades of the 19th century, whereas this behaviour spread to rural areas only later, i.e., in the first decades of the 20th century.

While most aforementioned studies describe the patterns of urban-rural fertility differences during the demographic transition, they do not discuss in detail the causes of fertility variation across the settlements. Sharlin (1986) concluded his study writing that urban places are more receptive to initiating limitations on family size (for whatever reason), and that the occupational

composition accounts for some but not all of the differences between urban and rural fertility. Later, Livi-Bacci and Breschi (1990) added that the costs of children are different in the urban and the rural context, and that the impact of religious and social norms on individual behaviour varies across the size of settlement. Recently, Galloway et al. (1998) analysed the causes of fertility differences in demographic transition Prussia according to the level of urbanisation. The authors showed that in the early 20th century urban fertility was far lower than rural fertility because the major socio-economic characteristics of the population changed more rapidly in the cities – this applies in particular to female labour-force participation (in non-traditional occupations) – and because the effect of these characteristics on fertility was also stronger there.

Turning now to research on fertility variation across settlements in the 'post-transitional' period, we first summarise the major findings of selected studies on North America and then on Europe. Kiser et al. (1968) looked at variations in the fertility levels of the post-war U.S. Their analysis of the 1960 U.S. census showed that women living in urban areas had fewer children than their rural counterparts, and that urban and rural women living in metropolitan areas had smaller families than those living in non-metropolitan areas. The authors conclude that fertility levels tended to vary inversely with the size of settlement and that rural populations tended to be less fertile when located at the vicinity of a large city (Kiser et al. 1968, 130). Research by Rindfuss and Sweet (1977) support the existence of significant urban-rural differences in U.S. fertility. Fertility trends across settlements from the mid-1940s to the 1970s revealed systematically lower fertility in urban areas than in rural ones but changes that took place there were similar in nature: an increase in fertility levels during the 1950s and a subsequent decline in the 1960s.

Trovato and Grindstaff (1980) took a step further by investigating the causes of urban-rural fertility differentials. Their analysis of the 1971 Canadian census showed that differences in the socio-economic characteristics of populations explain some urban-rural variations in childbearing patterns, but not all of them. The authors attributed most variation in fertility across settlements to cultural differences between urban and rural areas, and in conclusion suggested not to overemphasise the role of socio-economic characteristics when explaining higher fertility in North American rural populations. Recent research by Glusker et al. (2000) supports the existence of

fertility variation across settlements in the North American context. They studied fertility patterns in the state of Washington in the early 1980s and early 1990s and showed that women living in the metropolitan areas had lower fertility than those living in non-metropolitan counties. The differences, however, decreased during the 1980s, possibly as a result of the increasing share of immigrants with high fertility in the cities (Glusker et al. 2000, 66).

Several important contributions have also been made in the European context. Brunetta and Rotondi (1991) studied fertility trends in Italy from the 1960s to the 1980s and found that there existed a reversed relationship between fertility and urbanisation, although urban-rural differences in fertility were smaller in the South and changed over time. Fagnani (1991), in turn, studied the childbearing patterns of French women born in the 1930s, using the 1982 census data. First, as expected, the average number of children declined as the size of settlement increased. Second, and more importantly, further analyses revealed that urban women in all educational and occupational groups exhibited lower fertility levels than their rural counterparts. The reversed relationship between fertility and settlement size persisted even after the partner's occupation was included into the analysis (Fagnani 1991, 170). Research by Courgeau and Pumain (1993) confirmed the existence of significant variations in childbearing patterns across settlement size in France from the late 1960s to the early 1980s. However, their analysis also revealed decreasing fertility variations across settlements over time. Coleman (1996) reached a similar conclusion when looking at regional fertility differentials in several European countries. His study showed that regional and urban-rural variation in fertility levels declined and demographic convergence increased within countries in the 1970s and early 1980s.

While most previous research has demonstrated that urban-rural fertility differences in post-war European countries have been narrowing gradually, recent studies have revealed that significant variations in childbearing patterns across settlements continue to persist in several countries. Hank (2001) studied regional fertility variation in West Germany in the mid-1990s and found that fertility levels in German cites were 15% lower than the levels witnessed in the rural areas of the country. A further analysis showed that differences in fertility levels between various districts remained even after having controlled for the socio-economic characteristics of the populations (Hank 2001, 253). Kulu (2005; 2006) studied the childbearing patterns of Estonian, Austrian and Polish

women born between the early 1940s and the mid-1970s and discovered that women in urban areas in general and in large cities in particular displayed lower fertility compared to their counterparts living in rural settlements. The significant variations across settlements continued to persist when the socio-economic characteristics of the populations were included into the analysis. Several recent studies on Central and Eastern European countries have shown the existence of persisting urban-rural fertility differences even after the steep declines in period fertility of the 1990s (Zakharov and Ivanova 1996; Burcin and Kučera 2000; Steshenko 2000; Vojtěchovská 2000).

To sum up, previous research has discovered the following. First, in most European countries, urban fertility (both marital and overall) was lower than rural fertility prior to the (first) demographic transition, and during the transition it decreased earlier and more rapidly. Second, a significant urban-rural variation in fertility levels has been characteristic of fertility in 'post-transitional' North American and European societies, although the differences across settlements seem to have decreased over time. Third, some studies have found that socio-economic factors account for most of the variations in fertility across settlements, whereas other authors have shown that cultural factors play a larger role.

Although existing studies have contributed to outlining and sometimes also explaining differences in childbearing patterns across settlements, the need for further research on this matter continues to persist. First, most researchers on fertility variation across settlements in 'post-transitional' societies have contented themselves to use the cross-sectional data just from three to four points in time when demonstrating changes over time. We believe that annual information on fertility over longer periods of time is needed to detect developments with better precision. Second, most existing research has focused on country-specific studies. Comparative research with a common methodology applied to various countries would advance substantially our knowledge on the effect of residence on fertility. Third, most studies use aggregate fertility measures (period or cohort-based) whereas disaggregating them would allow us to gain much deeper insight into fertility dynamics across settlements. Finally, the issue whether or not the socio-economic characteristics of populations account for most fertility variation across settlements is in need of re-examination. Before we present the hypotheses for our study, we will briefly describe the context of our research.

Long-term fertility trends in the four Nordic countries

The Nordic transition to the 'modern fertility regime' can be traced back to the 1880s and 1890s, when fertility levels in Sweden began to decrease, closely followed by Denmark and Norway, and later, in the 1910s, also by Finland (Lutz 1987, 34–35; Chesnais 1992, 133, 226–230). As early as in the 1930s, period fertility in the Scandinavian countries reached below replacement level, while in Finland it stayed above this level (Chesnais 1992, 123). After World War II, the Nordic countries witnessed a 'baby-boom' (Coleman 1996, 13), as did many other European nations on the western side of the Iron Curtain. Among the Nordic countries, the highest fertility levels were reached in Finland, where the TFR peaked at 3.5 children per woman right after the war. In Denmark, the post-war TFR climbed to a level of 3.0, this compares to 2.8 for Norway and 2.6 for Sweden (Chesnais 1992, 547–548). In the late 1940s, fertility decreased in all four countries, and trends varied across the countries in the 1950–1960s. Finland saw a continual decline in the TFR from relatively high levels, and the TFR remained relatively stable in Denmark and Sweden, but climbed significantly in Norway to reach a high point of 3.0 in the mid-1960s (Chesnais 1992, 548).

Over the past forty years, fertility trends have been similar in the four Nordic countries, although some variation across countries is evident. In the late 1960s and early 1970s, fertility declined in all four countries (Figure 1) owing to the postponement of childbearing and decreasing second and (especially) third birth intensities (Hoem 1993b, 21–23; Andersson 1999, 7–10; Andersson 2004b, 161–164). Thereafter, period fertility levelled off and remained stable until the mid-1980s (except in Denmark, where the gradual decrease continued) only to rise again. The TFR climbed for some years and has been staying stable at a level of 1.7–1.8 children per woman since the1990s (except in Sweden, as this country witnessed 'roller-coaster' fertility, Hoem and Hoem 1996). Rising fertility in the late 1980s can be attributed to the recuperation of first births at higher ages and to increasing second and third birth intensities, arguably as a response to new family policies (Hoem 1990, 740–745; Hoem 1993b, 24–28; Vikat 2002, 169–173; Andersson 2004b, 160–

166)[2]. Cohort fertility shows similar completed fertility levels for the birth cohorts born between the 1940s and the 1960s (Frejka and Calot 2001a, 143–186; Hoem 2005, 562; Björklund 2006). The post-war cohorts in the Nordic countries have thus (so far) been "successful" in compensating at older ages their low fertility at younger ages (Frejka and Calot 2001a, 137).

Recent research on fertility differentials in the Nordic countries has focused on variations across socio-economic groups in general and by educational level in particular. Studies on cohort fertility have shown that childbearing patterns in the Nordic countries vary across educational groups, but that the variation in completed fertility is smaller than in other 'post-transitional' societies (Rønsen 2004a, 277; Hoem 2005, 565; cf. Frejka 2004, 91). Research has also revealed some fertility variation across regions and highlighted the effect of local labour market conditions on childbearing patterns (Hoem 2000; Kravdal 2002; Thygesen et al. 2005). However, the recent international demographic literature has not addressed the possible differences in fertility across settlement hierarchy. Studies on historical fertility patterns have shown that significant urban-rural variations continued to exist in the 1950s and 1960s (Carlsson 1966, 153; Sharlin 1986, 247–248; Lutz 1987, 43). Data published by the United Nations (1999) support this conclusion. In 1969, the TFR in Denmark was 1.8 and 2.2 in urban and rural areas, respectively. The corresponding figures for Finland are 1.7 and 2.0, and for Norway they are 2.4 and 2.9. For later periods, only the figures for Finland show that fertility in urban areas has constantly been 10–20% lower than in rural areas (UN 1999).

Hypotheses on fertility across settlement size

Our hypotheses are derived from the previous two sections, and are as follows. First, we assume that fertility varies across settlement hierarchy in all four Nordic countries. More specifically, fertility levels are expected to decrease as the size of settlement increases (UN 1999; Hank 2001; Kulu 2005; 2006). There is also reason to assume that the timing of childbearing varies across settlements: fertility in urban areas may be significantly lower at younger ages,

[2] Hoem (1990; 1993b) has shown that the rising second- and third-birth rates in Sweden resulted from shortened birth intervals, and that this change in childbearing behaviour was a direct response to new family policies (a 'speed premium' was introduced to the Swedish parental-leave system).

while the differences are expected to disappear at older ages (Rindfuss and Sweet 1977, 170). We believe that parity-specific fertility rates will provide further insight into childbearing differentials across settlements. Second, we assume that differences in fertility levels across settlements have decreased over time (Coleman 1996), although the data from Finland (UN 1999) suggest that the convergence may not be as large as one might assume, drawing from classical demographic transition theory, evidence from some other European countries, or the equalizing influence of the Nordic welfare state.

Next, we believe that the findings will not be very different between countries with a similar history and institutional background. Some differences certainly exist, but their nature is difficult to predict. Research has shown on the one hand that fertility variation across educational groups is the smallest in Sweden (Rønsen 2004a, 277; Hoem 2005, 565). Differences across settlements may thus be smaller in Sweden, too. On the other, variation may turn out to be the smallest in Denmark, as the population size is small and population density is high, although some other factors, such as the existence of isolated islands, may have the opposite effect (Thygesen et al. 2005). Finally, we assume that differences in the socio-economic characteristics (educational enrolment and attainment, labour-force participation and earnings, etc.) of population subgroups account for some, but not all variations in fertility levels and dynamics across the settlement hierarchy (Trovato and Grindstaff 1980; Fagnani 1991; Kulu 2005; 2006).

Data, methods and definitions

Our data come from the population registers of the four Nordic countries. For each country, we have access to the annual number of births by age of mother across municipalities (by single-year age groups for Denmark, Norway as well as Sweden, and by five-year age groups for Finland) and to the female populations by age at the beginning of each year over the 1975–2003 period (for Finland since 1976). The data enable us to calculate annual age-specific fertility rates and total fertility (TFR) for various types of municipalities for each country over about a quarter of a century. We have access to anonymous individual childbearing records from Swedish population registers on all women born in 1945 and later. The data allow us to take our analysis a step further, i.e. to calculate parity-specific fertility rates (so-called occurrence-

exposure rates) across various municipalities with and without controlling for a number of socio-economic variables. First, we have computed the annual parity-specific fertility rates standardised for age of woman (all birth orders) and age of youngest child (for second and higher-order births). Thereafter, we have standardised the fertility rates for a set of the socio-economic characteristics of the women concerned (educational enrolment as well as the educational level and earnings) to see the extent to which the variation in the socio-economic composition accounts for possible differences in fertility levels across settlements. When calculating parity-specific fertility rates, we followed the methodology developed and implemented by Jan Hoem (1987; 1990; 1993a; 1993b).

Our major explanatory variable of interest is the size of settlement. We have gone beyond the traditional urban-rural dichotomy and distinguished six types of settlement according to the size of the municipality of residence (by its 1999–2001 population size)[3]: 1) the capital city (Copenhagen, Helsinki, Oslo, and Stockholm, with 500,000 and more inhabitants; for Sweden, the category also includes the second largest city, Gothenburg); 2) other cities, with a population of 100,000–500,000; 3) towns with 50,000–100,000 inhabitants; 4) towns with 10,000–50,000 inhabitants; 5) small towns (5,000–10,000); and 6) rural municipalities, with less than 5,000 inhabitants. We have considered that all cities and many towns extend beyond their administrative borders and have therefore defined suburban municipalities to cities and towns with more than 50,000 people as part of the urban region. We have used commuting data from the 1998–2000 period to assign the municipalities to urban regions if at least 20% of its employed population commute to work in the neighbouring city or town. Using commuting data to define urban or labour-market regions is standard in migration and urbanisation research, although the threshold used varies across studies (see Champion 2001; Hugo et al. 2003). We have chosen the 20-percent threshold as it is consistent with several studies on internal migration in the Nordic countries (Kupiszewski et al. 2001a; 2001b).

Table 1 shows the distribution of the female population aged 15–49 across settlement groups for the four countries. The data from the most recent period show that about 25% to 30% of women in reproductive ages live in the

[3] Our data contain information on municipalities of women's residence. A municipality in the Nordic countries usually consists of a city or town with its nearest hinterland or of several economically and culturally closely linked smaller rural settlements.

major cities or adjacent suburbs. Another large group is composed of women living in towns of 10,000 to 50,000 people (medium-sized towns). The relative size of the female population in the smallest municipalities varies across countries. In Finland and Norway, about one-fifth of women aged 15–49 live in municipalities with less than 10,000 residents (small towns and rural areas). This share is remarkably smaller in Denmark and negligible in Sweden, primarily indicating that municipality structure varies across the Nordic countries. Concerning changes over time, we see that the relative distribution of women across settlement group has been relatively stable. Still, the share of women living in small towns and rural areas seems to have decreased slightly over time in all four countries, while the proportion of women in cities has increased in Finland and Sweden.

Fertility across settlements in the four Nordic countries

Figures 2a to 2d present total fertility (TFR) across settlement group for the four countries over a period stretching from the mid-1970s to 2003. We see that the TFR significantly varied across settlements in all four Nordic countries. Moreover, we observe a relationship between fertility levels and the size of settlement that is more or less systematically inverse – the larger the settlement, the lower the fertility, and fertility variation persisted over time. We note that in the past decade the TFR in rural settlements and small towns stayed close to replacement level in all countries except Sweden, while the TFR in the capital city regions remained at levels between 1.5 and 1.7 children per woman.

Figure 3 provides further information on fertility variation and change over time. In the late 1970s and early 1980s, fertility levels were significantly lower in the large cities than they were in the rural municipalities and small towns: by 30% in Denmark and by 20–25% in Finland, Norway and Sweden. In the late 1980s and early 1990s, however, the fertility variation between the largest and smallest settlements decreased in all four countries. Since the mid-1990s, the differences have been remaining stable in the three Scandinavian countries, but they have been increasing in Finland. The most recent figures show that women in Norwegian and Swedish major cities have a fertility that is lower by 10–15% than it is in the small towns and rural areas, while in Denmark and Finland this difference is 20–25%. Our analysis thus shows that the fertility variation across settlements decreased in the Nordic countries

during the last quarter of the past century, but significant variations still remain in all four countries.

Figures 4a to 4h present the age-specific fertility rates (ASFR) for various settlement sizes in order to gain further information on fertility patterns and changes across settlement over time. In order to eliminate the effect of random annual fluctuations, we have calculated the average ASFR for various settlement groups for two three-year periods: one ASFR for the second half of the 1970s (1975/6–77/8) and another for the early 21st century (2001–03). We see that in the mid- to late 1970s, the timing of childbearing was relatively similar in various settlements of the Nordic countries (perhaps with some exception for Norway), but that fertility levels tended to decrease as the size of settlement increased. The patterns of the early 2000s reveal that interesting changes have taken place: as expected, the fertility levels of women in the large cities are still lower than they are in smaller municipalities, but fertility now peaks at relatively late ages. Thus, while the postponement of childbearing has been a common trend in all settlements, it has been much more pronounced in the cities, particularly in the capital city regions.

Next, we extend our analysis by looking at parity-specific fertility behaviour across settlement group, using data from Sweden over the 1981–99 period. Figures 5a to 5d present the annual parity-specific fertility rates for five settlement groups (municipalities with less than 10,000 people have been combined into one category), standardised for age of woman and time since previous birth. First birth rates have been calculated separately for childless women in the age group 15–29 and for childless women at ages 30–45. All rates are given relative to the rate in the largest cities in 1981 (see also Andersson 1999; 2004a; 2004b). We see that for younger women, first birth rates increased as the size of settlement declined, and significant differences persisted over the two decades as first-birth rates first rose during the 1980s and then dropped during the 1990s. The patterns for older women are the opposite: first-birth rates were the highest in the major cities, and the lowest in rural areas and small towns, altogether reflecting the selectivity of older childless populations in different settlements. Still, fertility for older women in the cities was not high enough to compensate the relatively low fertility of these women at younger ages.

The patterns of second and third births are also interesting. Again, the fertility levels were highest for women in rural areas and small towns and

smallest for women in large cities. However, the variation decreased in the 1990s when fertility in Sweden declined. All in all, while the fertility variation across settlements decreased in Sweden over time, differences remain, especially in first birth rates and between the smallest and the largest settlements. Our final step now is to study whether or not, and if so, the extent to which socio-economic characteristics account for fertility variations across settlements.

We have computed parity-specific fertility rates standardised for a set of socio-economic characteristics of women: educational enrolment, educational attainment, and earnings. In order to get a better overview of possible changes across models, we have collapsed the annual data and calculated parity-specific fertility rates (with and without socio-economic controls) for the 1980s and the 1990s separately. This procedure has allowed us to better summarize changing fertility patterns over time. The results are presented in Table 2. As shown in Figures 5a-b, we see that first birth rates for younger women decreased as the settlement size increased, and they climbed for older women. Interestingly, for younger women the relative differences between the cities on the one hand, and rural areas and small towns on the other increased over time, which is something that is not immediately evident in Figure 5. Controlling for the socio-economic characteristics does not change much the childbearing patterns by settlement size for younger women, but it removes the fertility differences across settlements for older women. Further analyses show that higher fertility for older women in the large cities mostly result from the larger share of highly-educated women there, many of whom gave first birth in their thirties.

The results for second- and third-birth rates repeat the patterns observed in Figures 5c-d – fertility levels were highest in rural areas and small towns, and lowest in the large cities, and the variation slightly decreased over time. Controlling for the socio-economic characteristics of women does not change the patterns much: women in rural areas and small towns still exhibited 15–30% higher second and third birth rates than their counterparts in the major cities. Thus, our analysis of the Swedish data shows that, first, all three parity-specific fertility rates vary across settlements in Sweden; second, the differences in second and third birth rates decrease over time while variations in first-birth rates increase; third, the socio-economic characteristics of women account for only a negligible, if any, part of the fertility variation across settlements.

Summary and discussion

In this study, we have examined fertility variation across settlement type in four Nordic countries: Denmark, Finland, Norway and Sweden. We used register data of the four countries and this allowed us to study variation in childbearing patterns in detail across settlements and to follow trends over an extended period of time. First, we observed significant fertility variation across settlement size in all four Nordic countries – the larger the settlement, the lower the fertility. Second, the variation in fertility decreases over time, although significant differences between settlement type persist. Third, the timing of childbearing also varies across settlements – the larger the settlement, the later the peak of fertility. This is a relatively recent development, however, indicating that postponement of childbearing is more pronounced in larger settlements. Fourth, the overall fertility patterns are relatively similar in all four countries. Fifth, our further analysis of Swedish data has shown that parity-specific fertility varies across settlements. The variation in second and third-birth levels decreases over time, while the differences in first-birth rates increases. Sixth, the socio-economic characteristics of women account only for a small portion of fertility variation across settlements.

Overall, our analysis supports the hypotheses espoused in previous research, but our focus on fertility variation over a long period of time and a close look at parity-specific fertility has enabled us to gain deeper insight into childbearing dynamics across settlements. Two issues are particularly interesting, and would need further consideration: the cause of fertility variation across settlements and the reason behind the differences in fertility timing, a recent phenomenon. Why do fertility levels decrease as the settlement size increases even after controlling for the socio-economic characteristics of populations? We believe that at least four (partly competing, partly complementary) explanations can be offered. First, the cost of child-raising varies across settlements, being highest in the large cities and lowest in rural areas (Livi-Bacci and Breschi 1990). Opportunity costs also differ: in urban areas, especially in large cities, wider work- or leisure-related opportunities open up (Michielin 2004). Having children sometimes means that the possibility of taking these opportunities is relatively small. Second, in large cities, working mothers face the problem of reconciling work with family, also

because of time-space constraints. Long journeys to and fro work can make it hard for women with small children to manage a family (Fagnani 1991).

Third, most people in rural areas and small towns live in single family houses, while in the cities flats in multi-storey dwellings are the dominant type of housing. Living space is usually larger for people living in family houses (Kulu 2003). Differences in housing type and size may also account for varying fertility levels across settlements (Courgeau 1989). Fourth, the role of varying norms and values across settlements should be considered, too. Research has shown that considerable uniformity remains in rural settlements and small towns with regard to traditional attitudes and lifestyles, a value orientation towards large families, and preferences for extended families (Trovato and Grindstaff 1980; Heaton et al. 1989). A rural and small-town population can be considered a 'family-oriented' sub-culture within a country, clearly distinct from city sub-cultures, with the latter displaying higher heterogeneity as to childbearing (cf. Lesthaeghe and Neels 2002).

What are, then, the factors responsible for the fact that women in urban areas, and particularly in the major cities, start childbearing much later than their counterparts living in small towns and rural settlements? At first, this may be because most women who continue with studies after secondary school stay in or move to larger cities. We controlled for educational enrolment but the results did not change much except for university towns and cities (where students are over-represented). Furthermore, the structural-economic factors mentioned above cannot explain the emergence of variation in fertility timing either, as the mentioned differences in costs, housing and time-space constraints across settlements have existed for a long time and have not obviously changed during the past quarter of the century. Therefore, the only explanation we can offer is a life-style related one, suggesting that late fertility in cities, particularly in the largest ones, mostly reflects changing values and norms in these settlements. However, a competing (or complementary) structural-economic explanation can still be offered: labour markets have become more competitive over the past two decades, and nowadays it takes much longer to become established in the labour market, particularly in the large cities as competition there is highest.

All in all, our analysis has shown that, on the one hand, the variation in fertility levels across settlements has decreased slightly over time, and on the other, the differences in fertility timing have increased, indicating growing

heterogeneity across settlements as to how people structure their family lives. These results are consistent with recent studies that show significant variation in fertility-related behaviour in present-day Europe (Kiernan 1996; Prskawetz et al. 2003; Billari and Kohler 2004). It would be interesting to see if current differences in fertility timing across settlements in the Nordic countries will remain or if trends in fertility postponement will resemble developments in overall fertility during the demographic transition: initial urban-rural differences emerge when new behavioural patterns are adopted in the cities; these differences subsequently decrease when the new behaviour spreads to the rural population.

Another interesting issue is that despite strong postponement of childbearing, overall fertility in the Nordic cities did not decrease, but remained stable or even increased over the past decades. This allows us to conclude that at least in the Nordic context late childbearing does not necessarily mean fewer children. Instead, we observe a significant restructuring of the individual life course and family-related behaviour.

Acknowledgements

We are grateful to Magdalena Muszynska and the members of the research team on "Interdependencies in the Life Course" at the Max Planck Institute for Demographic Research for comments and discussions on earlier versions of this paper. We thank Susann Backer for editing the English of the manuscript, and Susann Trabert for drawing the maps of the Nordic countries.

References

Andersson, G. 1999. Childbearing trends in Sweden 1961–1997, *European Journal of Population* 15: 1–24.

Andersson, G. 2004a. Demographic trends in Sweden: an update of childbearing and nuptiality up to 2002, *Demographic Research* 11: 95–110.

Andersson, G. 2004b. Childbearing developments in Denmark, Norway, and Sweden from the 1970s to the 1990s: a comparison, *Demographic Research* S3: 155–176.

Andersson, G., A.-Z. Duvander, and J. M. Hoem. 2006. Social differentials in speed-premium effects in childbearing in Sweden, *Demographic Research* 14: 51–70.

Billari, F. C., and H.-P. Kohler. 2004. Patterns of low and lowest-low fertility in Europe, *Population Studies* 58(2): 161–176.

Björklund, A. 2006. Does family policy affect fertility? Lessons from Sweden, *Journal of Population Economics* 19: 3–24.

Brunetta, G., and G. Rotondi. 1991. Urban and rural fertility in Italy: regional and temporal changes, in J. Bähr and P. Gans (eds.), *The Geographical Approach to Fertility*. Kieler Geographische Schriften 78. Kiel: Geographisches Institut der Universität Kiel, pp. 203–217.

Burcin, B., and T. Kučera. 2000. Changes in fertility and mortality in the Czech Republic: an attempt of regional demographic analysis, in T. Kučera, O. Kučerová, O. Opara and E. Schaich (eds.), *New Demographic Faces of Europe*. Berlin: Springer, pp. 371–417.

Caldwell, J. C., and T. Schindlmayr. 2003. Explanations of the fertility crisis in modern societies: a search for commonalities, *Population Studies* 57(3): 241–263.

Carlsson, G. 1966. The decline of fertility: innovation of adjustment process, *Population Studies* 20(2): 149–174.

Champion, A. G. 2001. Urbanization, sub-urbanization, counterurbanization, and reurbanization, in R. Paddison (ed.), *Handbook of Urban Studies*. London: Sage, pp. 143–161.

Chesnais, J.-C. 1992. *The Demographic Transition: Stages, Patterns, and Economic Implications*. Oxford: Clarendon Press.

Coale, A. J., B. Anderson, and E. Harm. 1979. *Human Fertility in Russia since the 19th Century*. Princeton: Princeton University Press.

Coale, A. J., and S. C. Watkins. 1986. (Eds.) *The Decline of Fertility in Europe*. Princeton: Princeton University Press.

Coleman, D. 1996. New patterns and trends in European fertility: international and sub-national comparisons, in D. Coleman (ed.), *Europe's Population in the 1990s*. Oxford: Oxford University Press, pp. 1–61.

Coleman, D. 2002. Populations of the industrial world – a convergent demographic community?, *International Journal of Population Geography* 8(5): 319–344.

Courgeau, D. 1989. Family formation and urbanization, *Population: An English Selection* 44(1): 123–146.

Courgeau, D., and D. Pumain. 1993. Sustained low fertility and spatial population distribution in France, in N. van Nimegen, J.-C. Chesnais and P. Dykstra (eds.), *Coping with Sustained low Fertility in France and the Netherlands*. Amsterdam: Swetz & Zeitlinger, pp. 131–153.

Duncan, O. D. 1965. Farm background and differential fertility, *Demography* 2: 240–249.

Fagnani, J. 1991. Fertility in France: the influence of urbanization, in J. Bähr and P. Gans (eds.), *The Geographical Approach to Fertility*. Kieler Geographische Schriften 78. Kiel: Geographisches Institut der Universität Kiel, pp. 165–173.

Frejka, T. 2004. The 'curiously high' fertility of the USA, *Population Studies* 58(1): 88–92.

Frejka, T., and G. Calot. 2001a. Cohort reproductive patterns in the Nordic countries, *Demographic Research* 5: 125–186.

Frejka, T., and G. Calot. 2001b. Cohort reproductive patterns in low-fertility countries, *Population and Development Review* 27(1): 103–132.

Galloway, P. R., R. D. Lee, and E. A. Hammel. 1998. Urban vs. rural: fertility decline in the cities and rural districts of Prussia, 1875 to 1910, *European Journal of Population* 14: 209–264.

Glusker, A. I., S. A. Dobie, D. Madigan, R. A. Rosenblatt, and E. H. Larson. 2000. Differences in fertility patterns between urban and rural women in Washington State, 1983–1984 to 1993–1994, *Women & Health* 31(1): 55–70.

Goldberg, D. 1959. The fertility of two-generation urbanites, *Population Studies* 12(3): 214–222.

Hank, K. 2001. Regional fertility differences in Western Germany: an overview of the literature and recent descriptive findings, *International Journal of Population Geography* 7: 243–257.

Heaton, T. B., D. T. Lichter, and A. Amoateng. 1989. The timing of family formation: rural-urban differentials in first intercourse, childbirth, and marriage, *Rural Sociology* 54(1): 1–16.

Hoem, B. 2000. Entry into motherhood in Sweden: the influence of economic factors on the rise and fall in fertility, 1968–1997, *Demographic Research* 2.

Hoem, B., J. M. Hoem. 1996. Sweden's family policies and roller-coaster fertility, *Journal of Population Problems* 52(3): 1–22.

Hoem, J. M. 1987. Statistical analysis of a multiplicative model and its application to the standardization of vital rates: a review, *International Statistical Review* 55(2): 119–152.

Hoem, J. M. 1990. Social policy and recent fertility change in Sweden, *Population and Development Review* 16(4): 735–748.

Hoem, J. M. 1993a. Classical demographic models of analysis and modern event-history techniques, Stockholm Research Reports in Demography 75. Stockholm: Stockholm University, Demography Unit.

Hoem, J. M. 1993b. Public policy as the fuel of fertility: effects of a policy reform on the pace of childbearing in Sweden in the 1980s, *Acta Sociologica* 36: 19–31.

Hoem, J. M. 2005. Why does Sweden have such high fertility?, *Demographic Research* 13: 559–572.

Hoem, J. M., G. R. Neyer, and G. Andersson. 2006a. Education and childlessness: the relationship between educational field, educational level, and childlessness among Swedish women born in 1955–59, *Demographic Research* 14: 331–380.

Hoem, J. M., G. R. Neyer, and G. Andersson. 2006b. Education attainment and ultimate fertility among Swedish women born in 1955–59, *Demographic Research* 14: 381–404.

Hugo, G., A. Champion, and A. Lattes. 2003. Toward a new conceptualization of settlements for demography, *Population and Development Review* 29(2): 277–297.

Jaffe, A. J. 1942. Urbanization and fertility, *The American Journal of Sociology* 48(1): 48–60.

Kiernan, K. E. 1996. Partnership behaviour in Europe: recent trends and issues, in D. Coleman (ed.), *Europe's Population in the 1990s.* Oxford: Oxford University Press, pp. 62–91.

Kiernan, K. E. 1999. Cohabitation in Western Europe, *Population Trends* 96: 25–32.

Kiser, C. V., W. H. Grabill, and A. A. Campbell. 1968. *Trends and Variations in Fertility in the United States.* Cambridge: Harvard University Press.

Knodel, J. E. 1974. *The Decline of Fertility in Germany, 1871–1939*. Princeton, Princeton University Press.

Kohler, H.-P., F. C. Billari, and J. A. Ortega. 2002. The emergence of lowest-low fertility in Europe during the 1990s, *Population and Development Review* 28(4): 641–680.

Kravdal, Ø. 2002. The impact of individual and aggregate unemployment on fertility in Norway, *Demographic Research* 6: 263–294.

Kulu, H. 2003. Housing differences in the late Soviet city: the case of Tartu, Estonia, *International Journal of Urban and Regional Research* 27(4): 897–911.

Kulu, H. 2005. Migration and fertility: competing hypotheses re-examined, *European Journal of Population* 21(1): 51–87.

Kulu, H. 2006. Fertility of internal migrants: comparison between Austria and Poland, *Population, Space and Place* 12(3): 147–170.

Kupiszewski, M., S. Illeris, H. Durham, and P. Rees. 2001a. Internal migration and regional population dynamics in Europe: Denmark case study, Working Paper 01/02. Leeds: The University of Leeds, School of Geography.

Kupiszewski, M., L.-E. Borgegard, U. Fransson, J. Hakansson, H. Durham, and P. Rees. 2001b. Internal migration and regional population dynamics in Europe: Sweden case study, Working Paper 01/01. Leeds: The University of Leeds, School of Geography.

Lesthaeghe, R. 1977. *The Decline of Belgian Fertility, 1800–1970*. Princeton: Princeton University Press.

Lesthaeghe, R., and K. Neels. 2002. From the first to the second demographic transition: an interpretation of the spatial continuity of demographic innovation in France, Belgium and Switzerland, *European Journal of Population* 18(4): 325–360.

Livi-Bacci, M. L. 1977. *A History of Italian Fertility during the Last Two Centuries*. Princeton: Princeton University Press.

Livi-Bacci, M. L., and M. Breschi. 1990. Italian fertility: an historical account, *Journal of Family History* 15(4): 385–408.

Lutz, W. 1987. *Finnish Fertility since 1722: Lessons from an Extended Decline.* Publications

of the Population Research Institute D 18. Helsinki: The Population Research Institute.

Michielin F. 2004. Lowest low fertility in an urban context: the role of migration in Turin, Italy, *Population, Space and Place* 10(4): 331–347.

Morgan, S. P. 2003. Is low fertility a twenty-first-century demographic crisis?, *Demography* 40(4): 589–603.

Notestein, F. W. 1945. Population – the long view, in T. W. Schultz (ed.), *Food for the World.* Chicago: University of Chicago Press, pp. 36–57.

Prskawetz, A., A. Vikat, D. Philipov, and H. Engeldhardt. 2003. Pathways to stepfamily in Europe: results from the FFS, *Demographic Research* 8: 107–149.

Rindfuss, R. R., and J. A. Sweet. 1977. *Postwar Fertility Trends and Differentials in the United States*. New York: Academic Press.

Rønsen, M. 2004a. Fertility and family policy in Norway – a reflection on trends and possible connections, *Demographic Research* 10: 265–286.

Rønsen, M. 2004b. Fertility and public policies – evidence from Norway and Finland, *Demographic Research* 10: 143–170.

Sharlin, A. 1986. Urban-rural differences in fertility in Europe during the demographic transition, in A. J. Coale and S. C. Watkins (eds.), *The Decline of Fertility in Europe.* Princeton: Princeton University Press, pp. 234–260.

Steshenko, V. 2000. Demographic situation in Ukraine in the transition period, in T. Kučera, O. Kučerová, O. Opara and E. Schaich (eds.), *New Demographic Faces of Europe.* Berlin: Springer, pp. 347–369.

Thygesen, L. C., L. B. Knudsen, and N. Keiding. 2005. Modelling regional variation of first-time births in Denmark 1980–1994 by an age-period-cohort model, *Demographic Research* 13: 573–596.

Trovato, F., and C. F. Grindstaff. 1980. Decomposing the urban-rural fertility differential: Canada, 1971, *Rural Sociology* 45(3): 448–468.

UN (United Nations). 1999. *The Demographic Yearbook Historical Supplement 1948–1997 CD-ROM (DYB-CD)*. United Nations: New York.

Vikat, A. 2002. Fertility in the 1980s and 1990s: analysis of fertility trend by age and parity, *Yearbook of Population Research in Finland* 38: 159–178.

Vikat, A. 2004. Women's labor force attachment and childbearing in Finland, *Demographic Research* S3: 177–212.

Vishnevsky, A. 1991. Demographic revolution and the future of fertility: a systems approach, in W. Lutz (ed.), *Future Demographic Trends in Europe and North America.* London: Academic Press, pp. 257–270.

Vojtěchovská, P. 2000. Population development in Poland, in T. Kučera, O. Kučerová, O. Opara and E. Schaich (eds.), *New Demographic Faces of Europe.* Berlin: Springer, pp. 247–266.

Zakharov, S. V., and E. I. Ivanova. 1996. Regional fertility differentiation in Russia: 1959–1994, *Studies on Russian Economic Development* 7(4): 354–368.

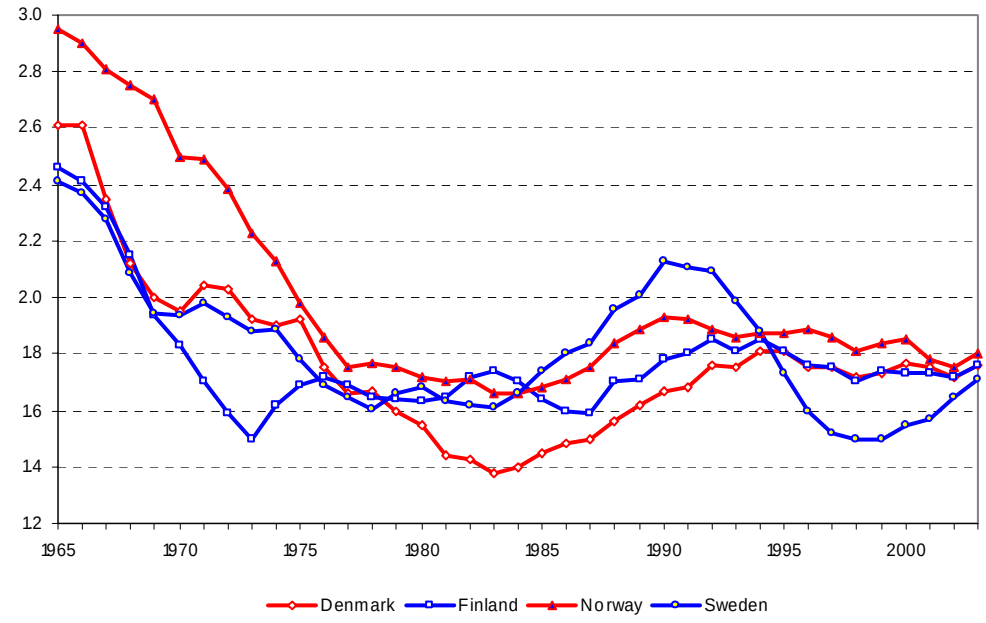


Figure 1. Total fertility (TFR) in the Nordic countries, 1965–2003.

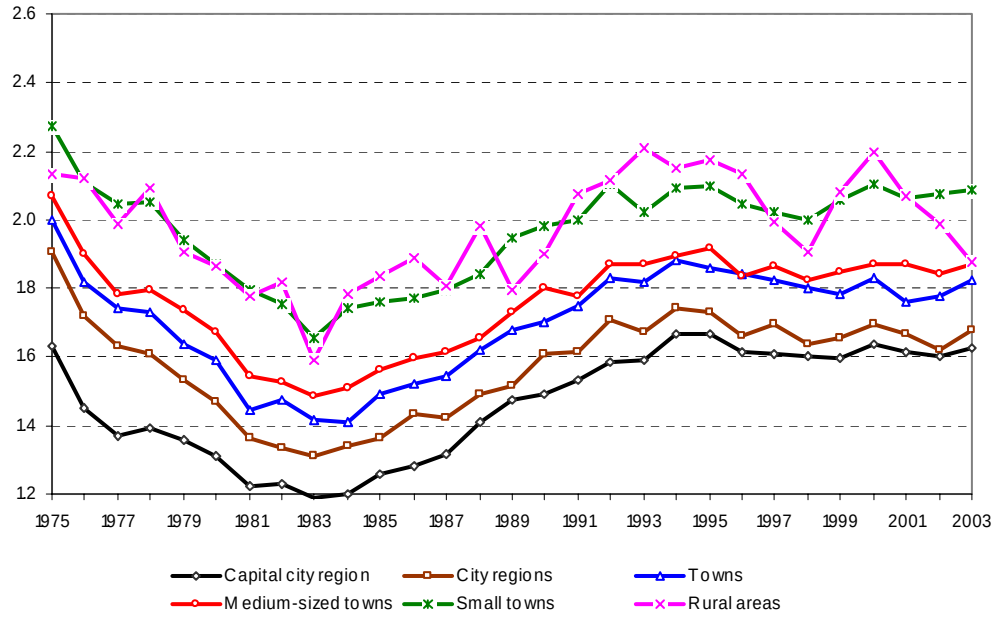


Figure 2a. Total fertility (TFR) by settlement size in Denmark, 1975–2003.

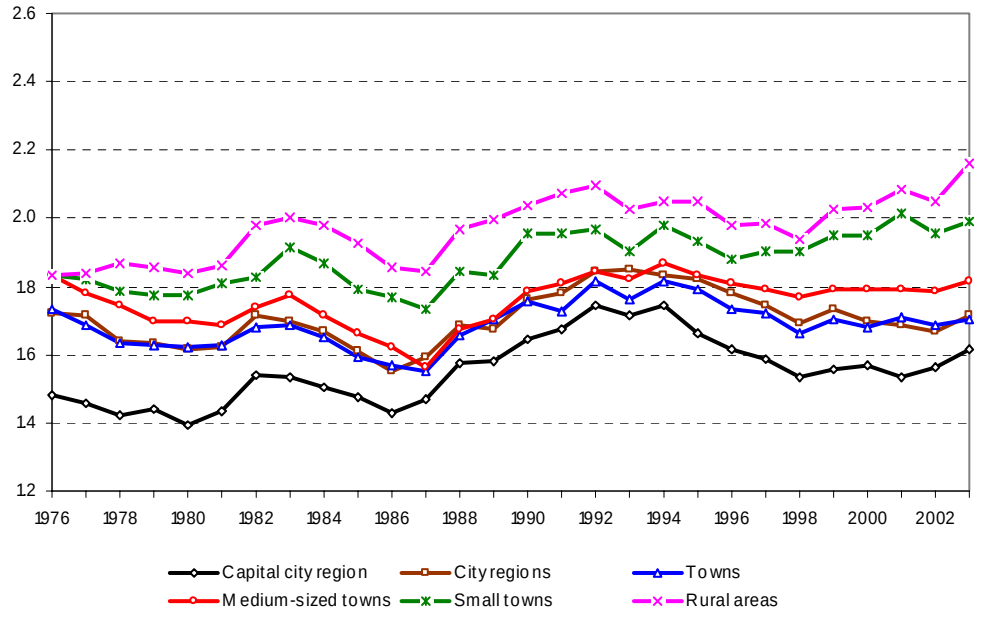


Figure 2b. Total fertility (TFR) by settlement size in Finland, 1976–2003.

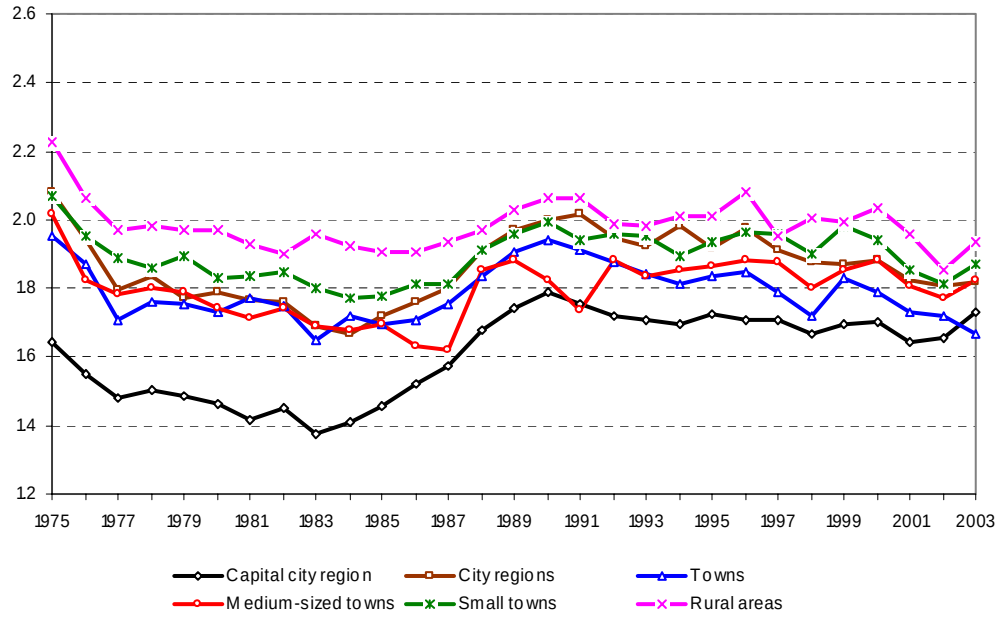


Figure 2c. Total fertility (TFR) by settlement size in Norway, 1975–2003.

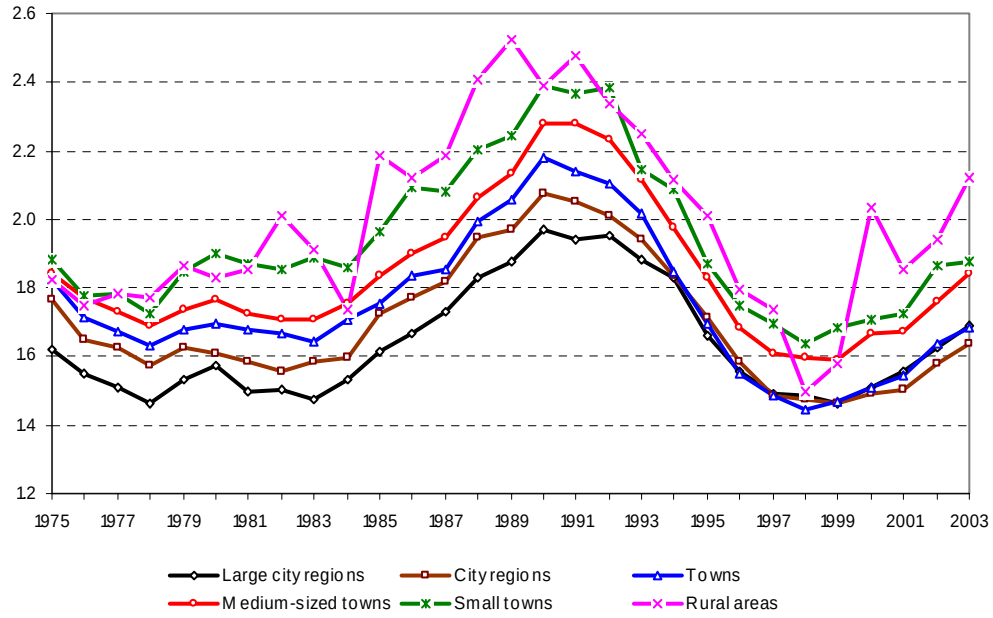


Figure 2d. Total fertility (TFR) by settlement size in Sweden, 1975–2003.

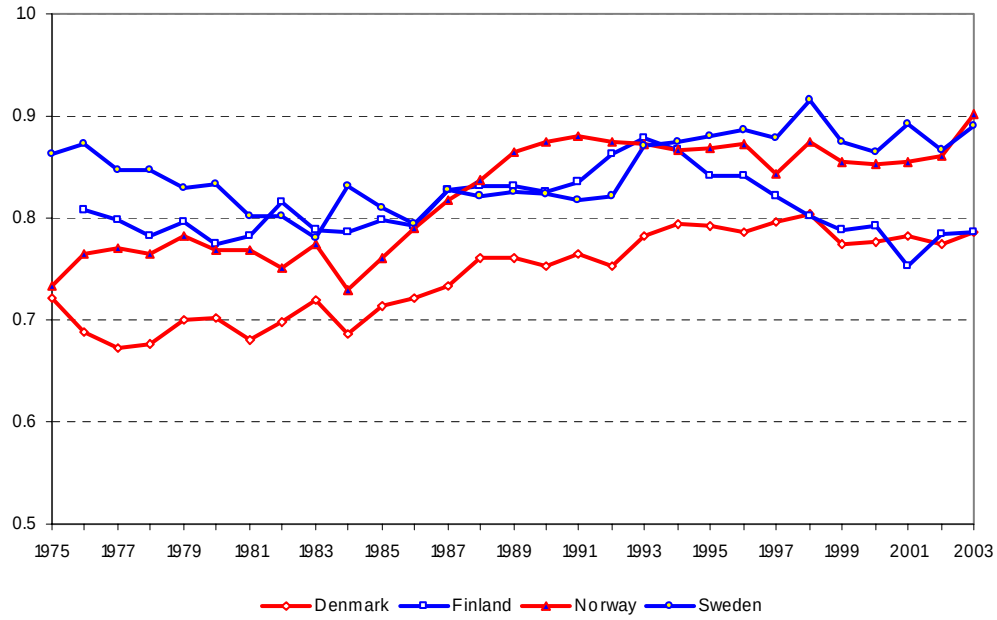


Figure 3. Total fertility (TFR) in large city regions relative to the TFR in small towns and rural areas, 1975–2003.

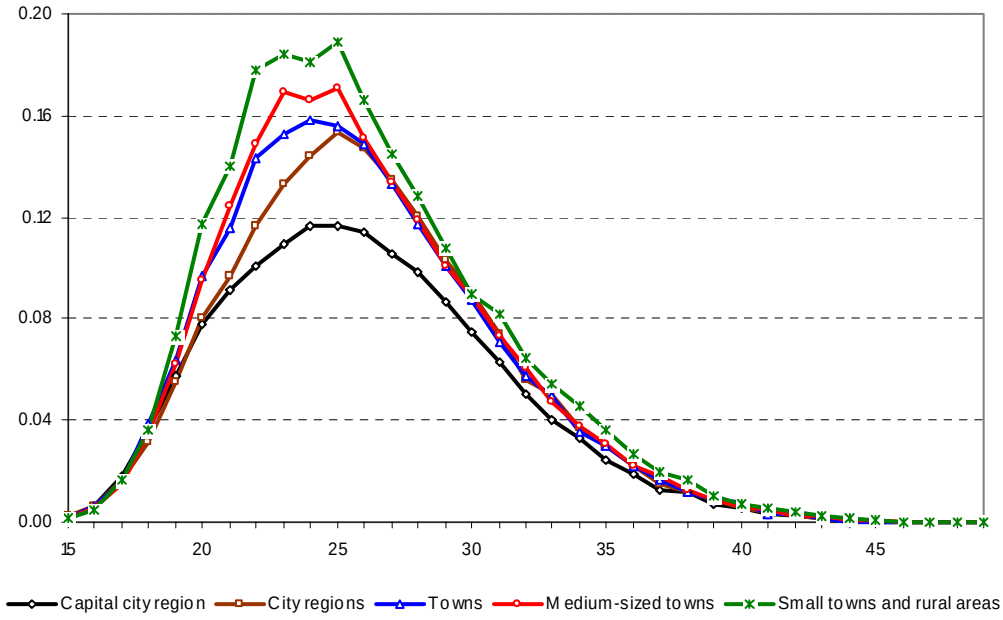


Figure 4a. Age-specific fertility rates by settlement size in Denmark, 1975–77.

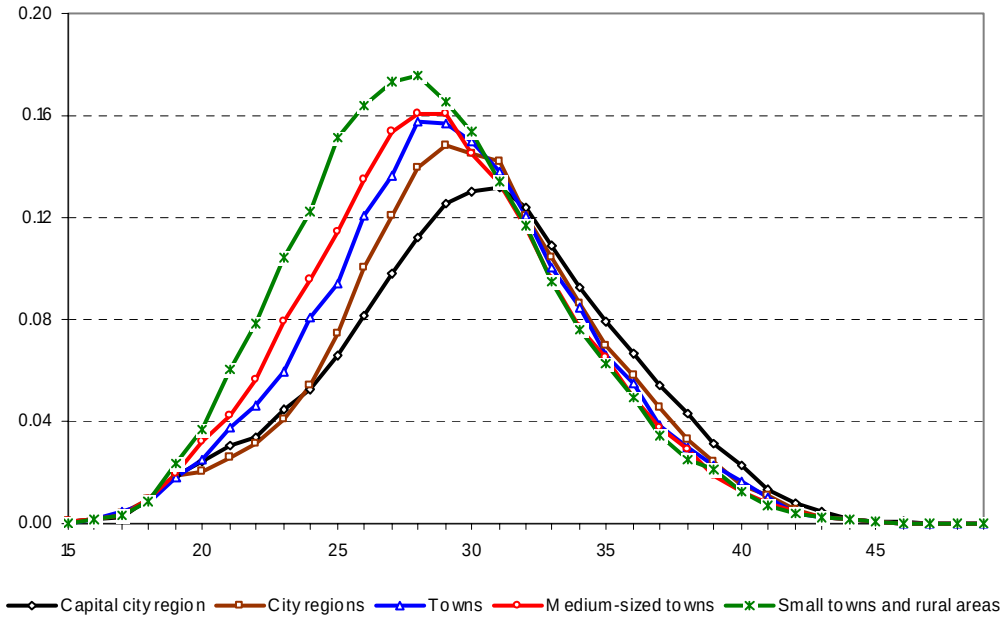


Figure 4b. Age-specific fertility rates by settlement size in Denmark, 2001–03.

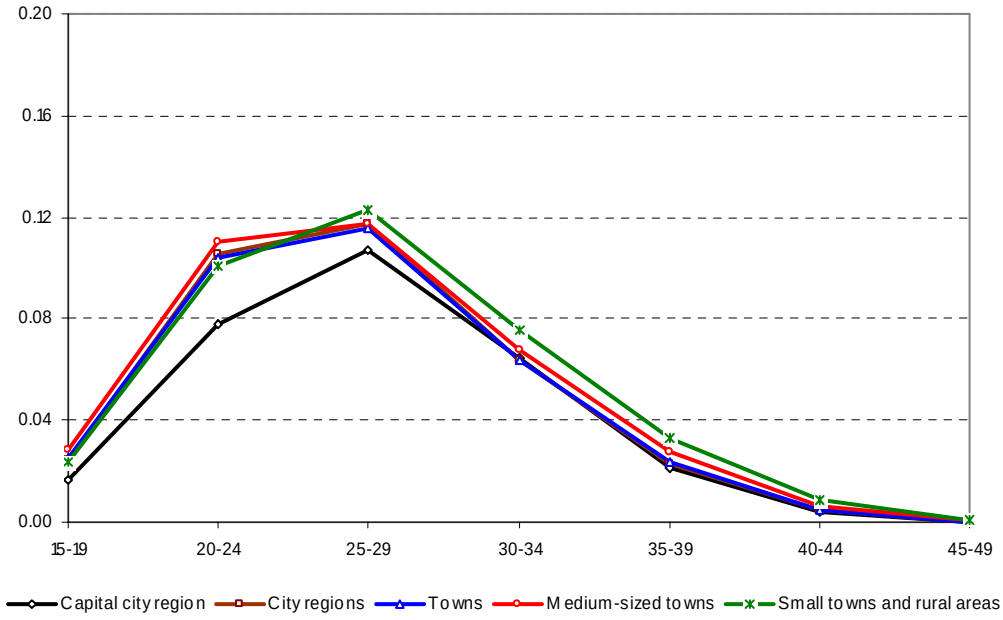


Figure 4c. Age-specific fertility rates by settlement size in Finland, 1976–78.

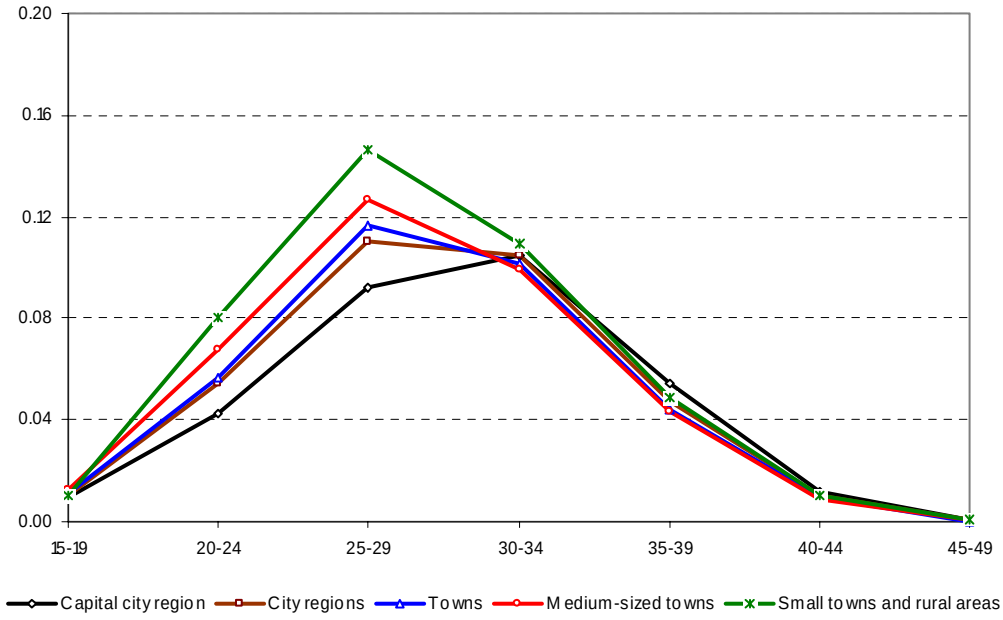


Figure 4d. Age-specific fertility rates by settlement size in Finland, 2001–03.

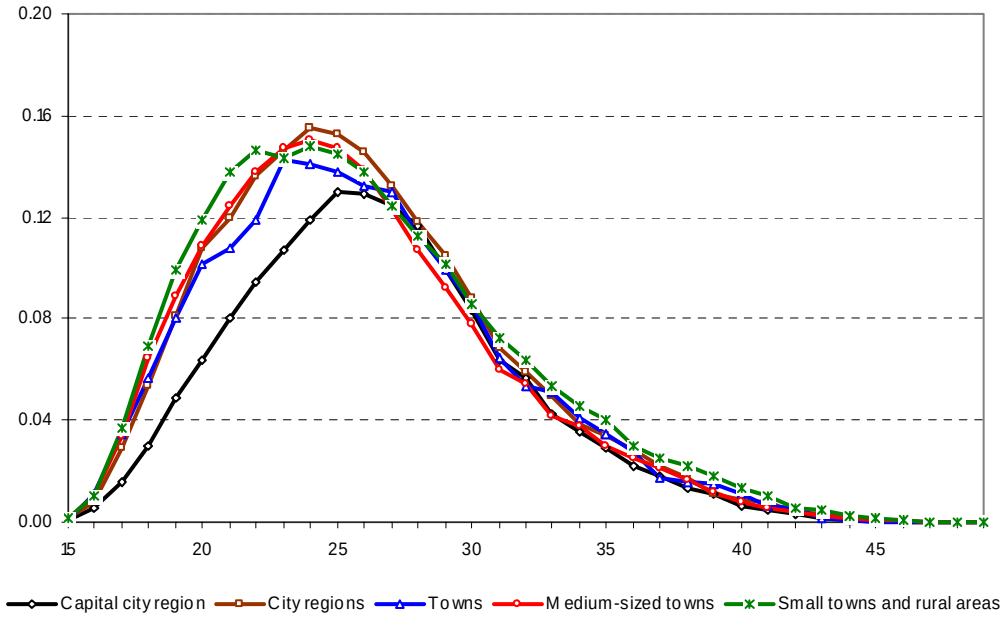


Figure 4e. Age-specific fertility rates by settlement size in Norway, 1975–77.

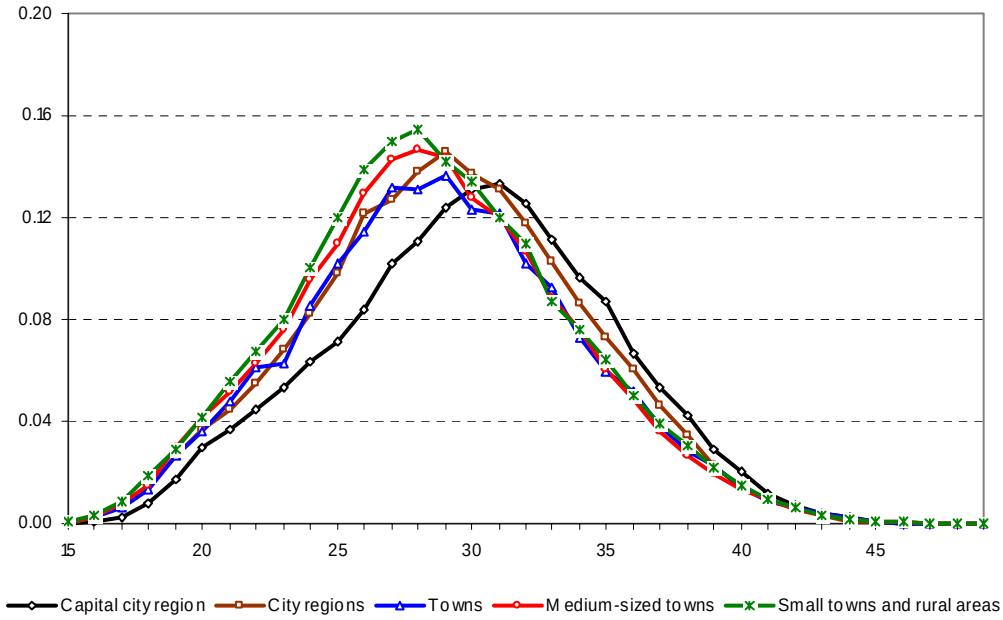


Figure 4f. Age-specific fertility rates by settlement size in Norway, 2001–03.

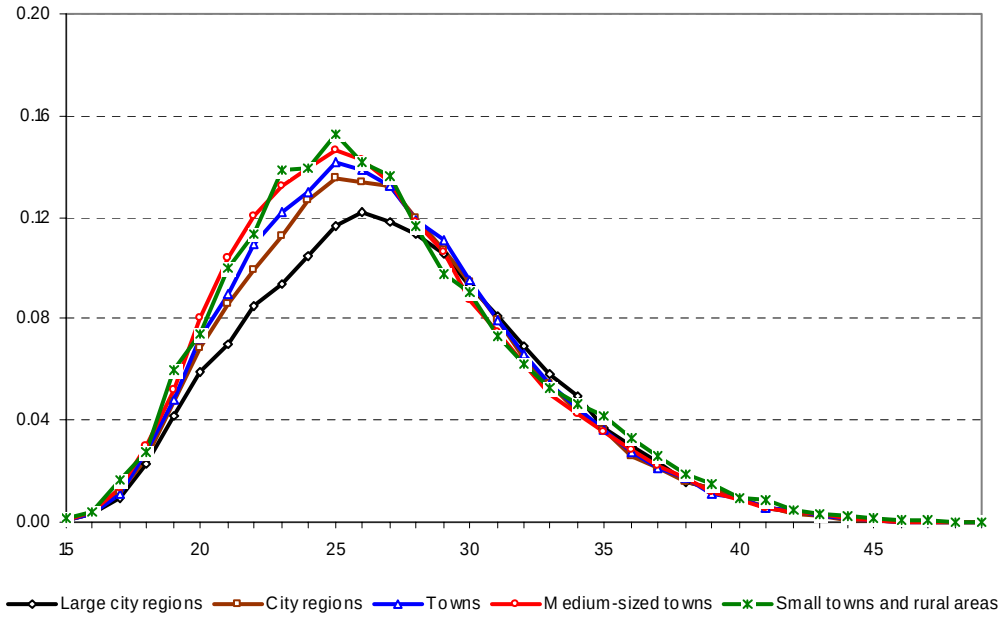


Figure 4g. Age-specific fertility rates by settlement size in Sweden, 1975–77.

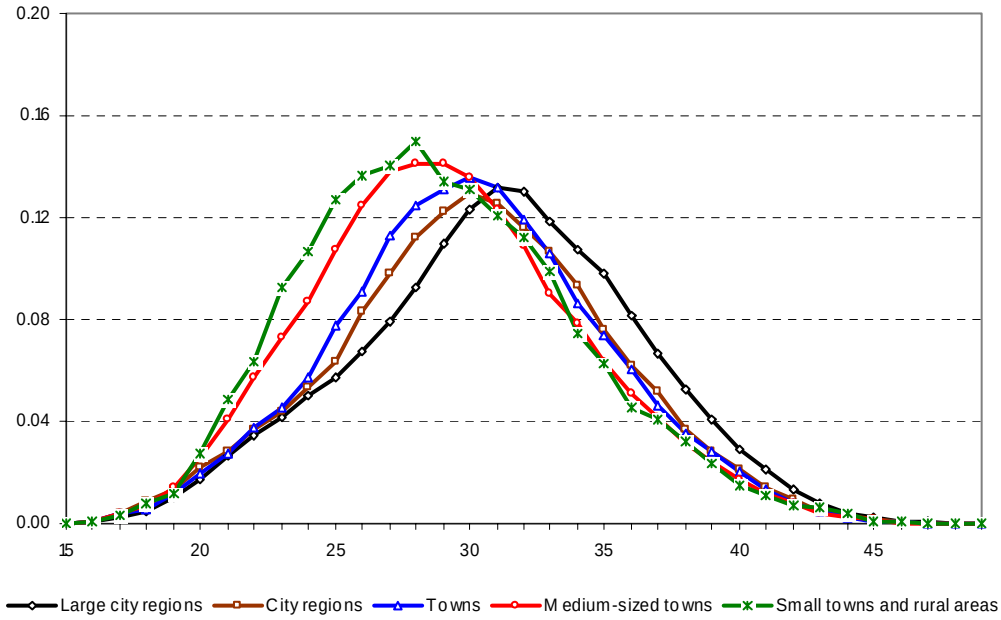


Figure 4h. Age-specific fertility rates by settlement size in Sweden, 2001–03.

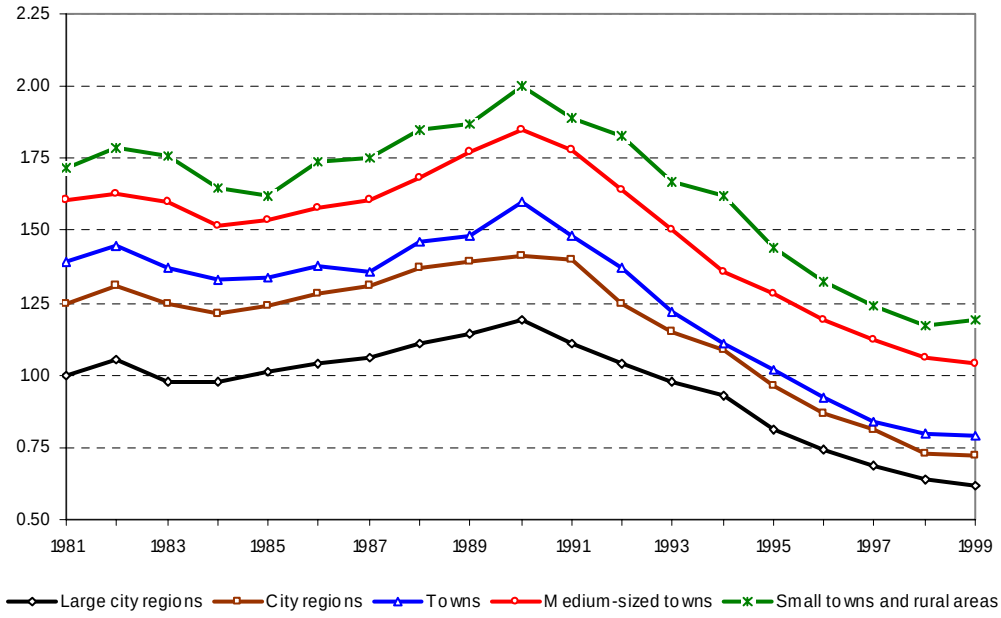


Figure 5a. Relative rates of first births at ages 15–29 by settlement size in Sweden (large city regions in 1981=1).

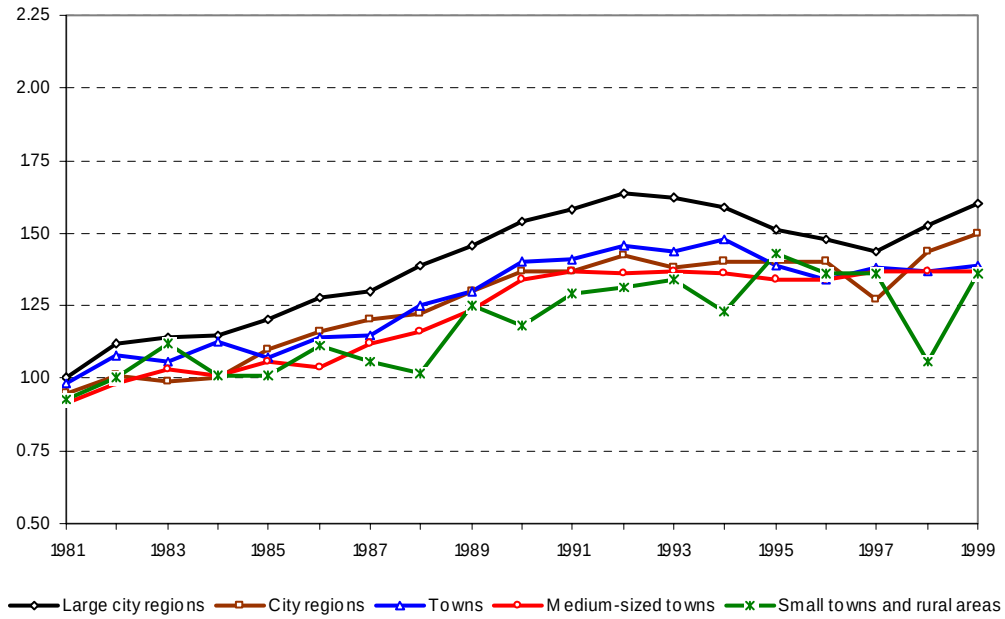


Figure 5b. Relative rates of first births at ages 30–45 by settlement size in Sweden (large city regions in 1981=1).

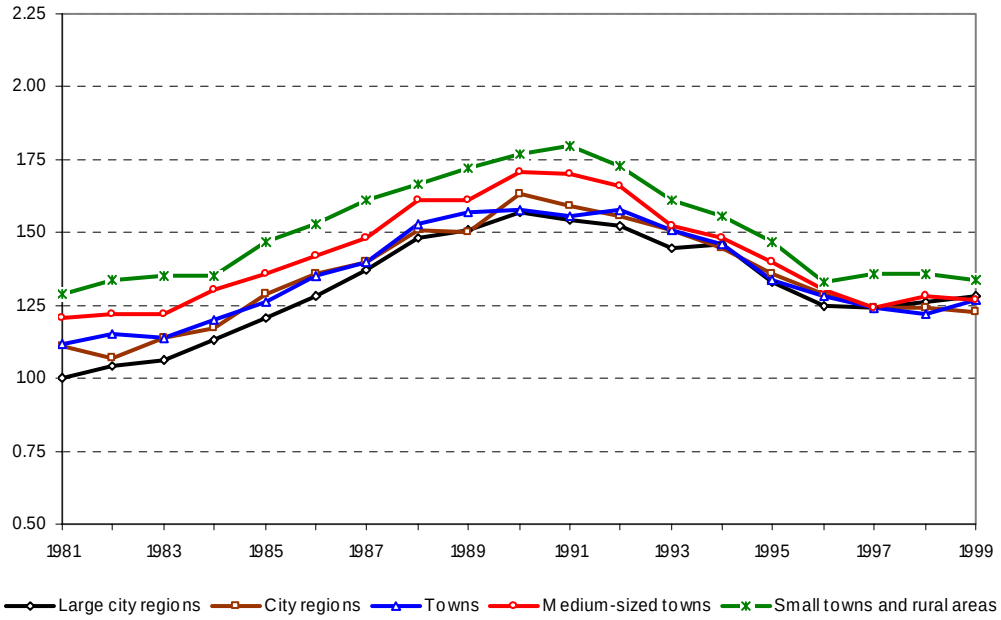


Figure 5c. Relative rates of second births by settlement size in Sweden (large city regions in 1981=1).

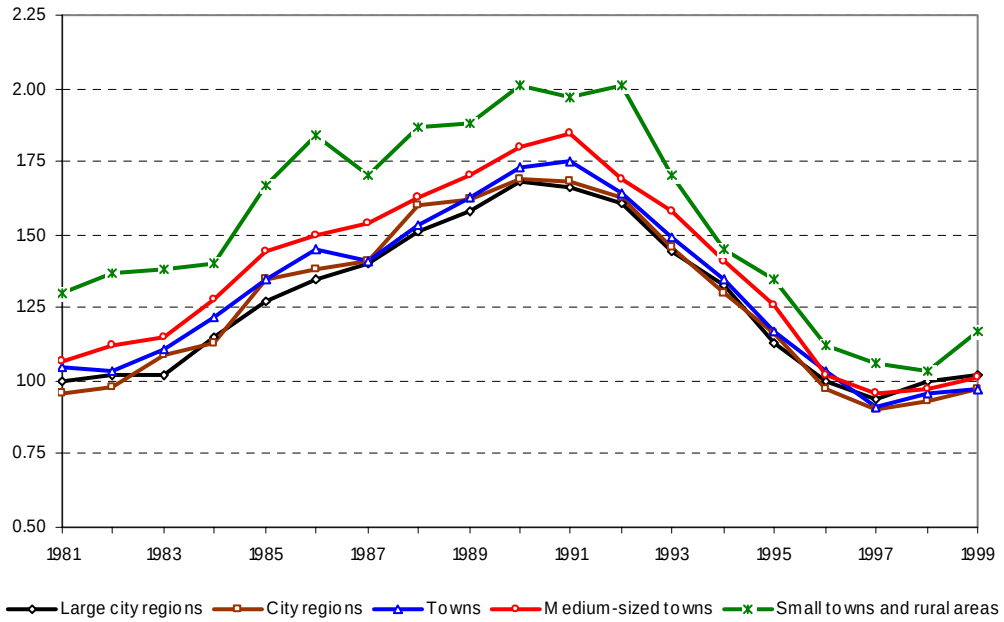


Figure 5d. Relative rates of third births by settlement size in Sweden (large city regions in 1981=1).

Table 1. Female population at reproductive ages by settlement size in the Nordic countries, 1975, 1985, 1995 and 2003.

	1975	1985	1995	2003
Denmark				
Capital city region	29	27	27	28
City regions	17	17	18	18
Towns	13	14	14	14
Medium-sized towns	29	29	29	28
Small towns	11	12	12	11
Rural areas	1	1	1	1
Total	100	100	100	100
Finland				
Capital city region	21	22	24	26
City regions	14	14	15	17
Towns	16	16	16	16
Medium-sized towns	25	25	24	23
Small towns	13	13	12	11
Rural areas	10	9	9	8
Total	100	100	100	100
Norway				
Capital city region	24	24	23	24
City regions	17	16	16	17
Towns	6	6	7	8
Medium-sized towns	26	27	30	29
Small towns	12	13	12	11
Rural areas	14	14	12	11
Total	100	100	100	100
Sweden				
Large city regions	26	27	28	30
City regions	18	18	19	20
Towns	20	20	20	19
Medium-sized towns	31	31	29	27
Small towns	4	4	3	3
Rural areas	1	1	0	0
Total	100	100	100	100

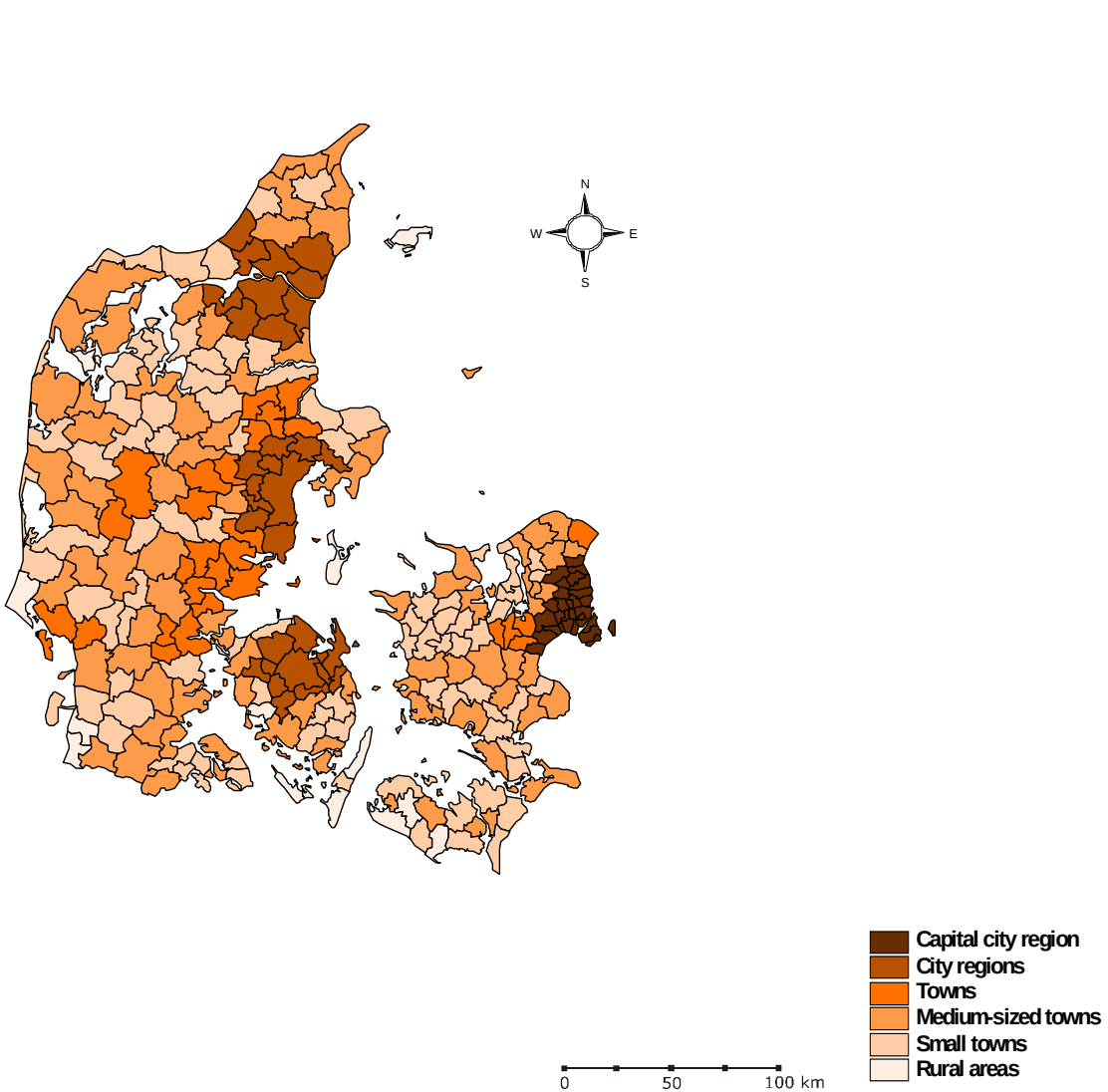
Table 2. Relative birth rates by settlement size in Sweden.

	Model 1		Model 2	
	1981–9	1990–9	1981–9	1990–9
First births at ages 15–29				
Large city regions	1	1	1	1
City regions	1.22	1.20	1.25	1.26
Towns	1.32	1.29	1.35	1.32
Medium-sized towns	1.52	1.62	1.54	1.56
Small towns and rural areas	1.65	1.82	1.68	1.75
First births at ages 30–45				
Large city regions	1	1	1	1
City regions	0.90	0.90	0.94	0.95
Towns	0.92	0.90	0.98	0.97
Medium-sized towns	0.87	0.87	1.00	1.00
Small towns and rural areas	0.85	0.84	1.03	0.99
Second births				
Large city regions	1	1	1	1
City regions	1.04	1.02	1.04	1.02
Towns	1.05	1.02	1.05	1.02
Medium-sized towns	1.11	1.05	1.13	1.07
Small towns and rural areas	1.18	1.12	1.21	1.14
Third births				
Large city regions	1	1	1	1
City regions	1.01	1.00	1.02	1.00
Towns	1.03	1.02	1.05	1.03
Medium-sized towns	1.08	1.07	1.12	1.10
Small towns and rural areas	1.25	1.18	1.29	1.21

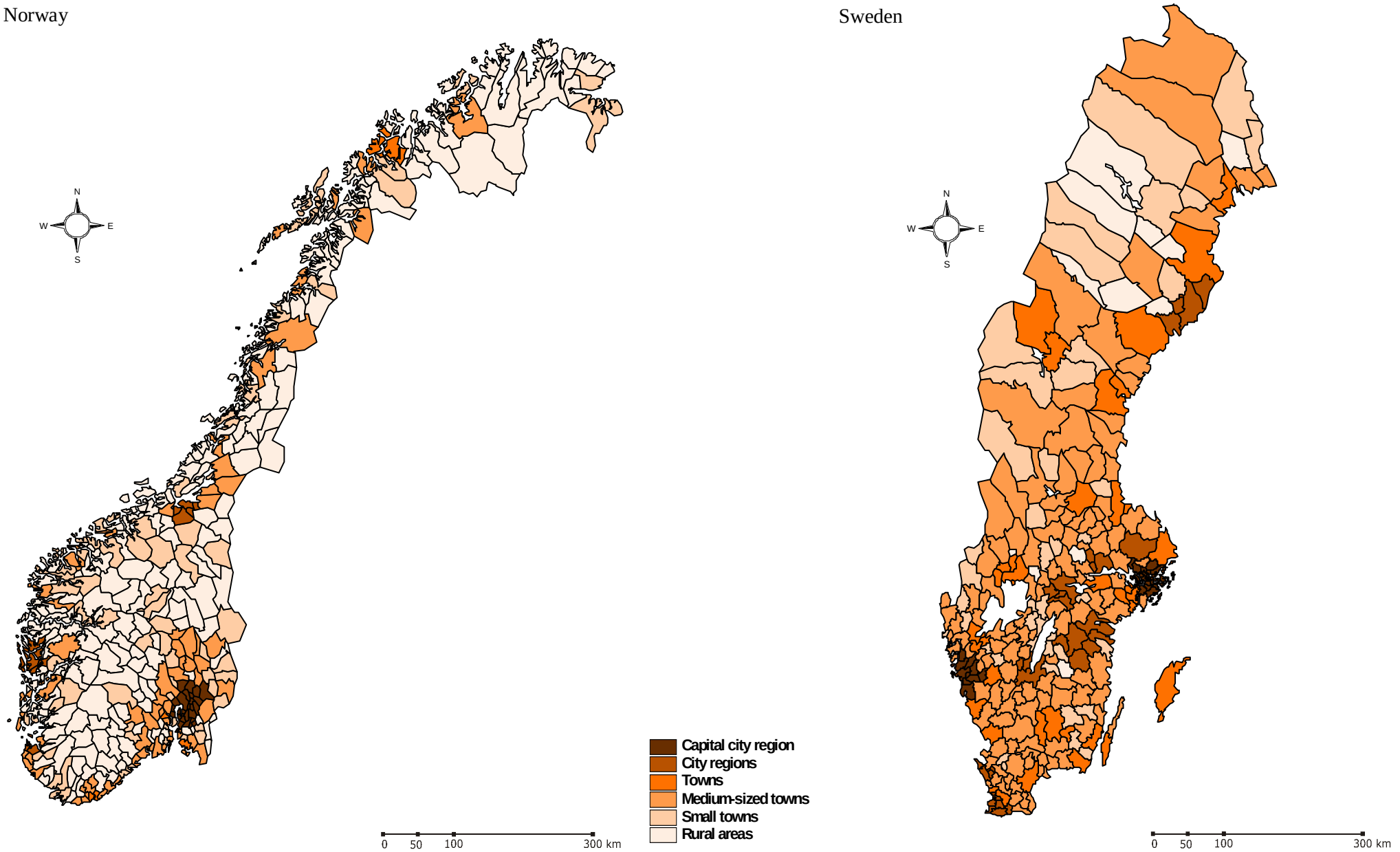
Model 1: Birth rates are standardised for age of woman and any youngest child.
Model 2: First-birth rates are additionally standardised for educational enrolment and level, and earnings; second- and third-birth rates are standardised for educational level.

Denmark

Finland



Appendix 1a. Municipalities of Denmark and Finland by type.



Appendix 1b. Municipalities of Norway and Sweden by type.