Have Sociodemographic Differentials in Fertility Status Changed Over Time? Results from a Norwegian Population-Based Study (HUNT)

Berit Rostad*
Department of Public Health and General Practice, Faculty of Medicine, Norwegian University of Science and Technology, Norway

Abstract

Objective: The impact of sociodemographic factors on trends in fertility status is a relatively unexplored area of research. The study relates changes in fertility status to changes in sociodemographic factors in two samples of women, aged 50 to 59 years, and born 10 years apart.

Design: Population-based descriptive comparative study on women (born 1937-1946) participating in the HUNT health survey in 1995-97 and women (born 1947-1956) are participating in the HUNT health survey in 2006-08, respectively 4468 and 4951 women. Sociodemographic and reproductive data were collected by questionnaires and public registers. Fertility status, including fertility, subfertility, involuntary and voluntary childlessness, was assessed and compared between the two samples, and possible associations to sociodemographic factors examined.

Results: Fertility declined and subfertility increased significantly across the two surveys (p<0.001). The proportion of women remaining childless (involuntarily and voluntarily childless women) increased over time (p=0.086), mainly explained by increasing voluntary childlessness (p=0.004). Levels of education increased and employment positions improved over time, and these changes were associated with fertility status. The women in least favourable educational and occupational positions were more often fertile; however, the importance of education and employment seemed to level over time. An increasing proportion of the professionally employed women were voluntarily childless across surveys. Family formation patterns changed and non-marital motherhood became more common; the majority of the never married women in the first survey were childless, whereas the opposite was true of the never married women in the last survey.

Conclusion: Changes in fertility status were associated with changes in sociodemographic factors.

Keywords: Fertility status, Sociodemographic factors, Population-based

Introduction

There is a perception that women’s fertility status are changing; e.g. fertility is declining, subfertility is on the rise, and childlessness is becoming more prevalent. However, studies have shown conflicting results, some determine a decline in fertility and some show an upward trend [1-3]. There are discrepant research findings as to subfertility; some studies indicate no changes in subfertility, other research documents decreasing subfertility over time whereas other studies support the notion that subfertility is increasing, the latter finding is supported by an increasing demand for reproductive treatment and the increasing proportion of medically assisted births [2-6]. These varied findings may arise from population differences, but are more likely due to differences in defining and measuring fertility and subfertility. Fertility is conventionally defined as ability to conceive and bear children, and subfertility is generally described as any form of reproductive impairment with prolonged time of unwanted non-conception [7]. However, definitions applied in fertility and subfertility studies vary and so do inclusion criteria of subjects studied, bringing in turn discrepancy in fertility and subfertility assessment. Pregnancy - or clinic-based samples are extensively used in fertility research, but the studies may be biased due to the exclusion of women who fail to conceive and of women experiencing fertility problems but not seeking treatment. Population-based data evaluating time trends in fertility are generally scarce, and population-based data on subfertility are in general not available [4]. A growing proportion of women in Europe remain childless, but it is uncertain whether childlessness is involuntary or intentional [8].
Studies have documented that fertility status differentials in women are associated with marital status, education, and employment [2,3,9,10]. There have been substantial changes in women’s circumstances, conventions and experiences over the latter half of the 20th century, in particularly in family formation and timing of motherhood and in educational and professional opportunities [11]. To my knowledge are analyses rarely done on changes in fertility status associated with changes in sociodemographic factors.

The study on two samples of women aged 50-59 years born at 10-years’ intervals, aimed to describe changes in fertility status over time and to relate any changes to changes in selected sociodemographic factors.

Material and Methods

The study was based on two cross-sectional population-based health surveys conducted in 1995-97 and in 2006-08, inviting all inhabitants aged ≥20 years in a county (considered as nationally representative) in Norway, to the North-Trøndelag Health Study (HUNT). Women aged 50.0-59.9 years at entry to participation in either of the respective surveys, constituted the two samples. Some 5733 women participated in the 1995-97 survey (6653 women invited) and 6009 women in the latter (8439 women invited). However, due to incomplete reproductive data, were 1265 women in the 1995-97 survey and 1995-97 survey the women ticked of an appropriate category on sociodemographic and reproductive information. In the comprehensive, structured and self-administered questionnaires the two samples. Some 5733 women participated in the 1995-97 survey and 1058 women in the 2006-08 survey excluded. Hence 4468 women (67.2% of all invited in the 1995-97 survey) and 4951 women (58.7% of all invited in the 2006-08 survey) were eligible for analyses, having their complete reproductive histories, collected when having their complete reproductive histories, collected when ever having tried for more than a year to conceive and had given birth. Women were defined as involuntarily childless if they had ever tried for more than a year to conceive and had never delivered a child. Women reporting never having tried for more than a year to conceive and had never given birth to a child were classified as voluntarily childless.

To analyse the association between fertility status and sociodemographic characteristics I applied information on marital status divided into never married (including cohabitants) and ever married categories (currently or previously married, there were no available data on marital status at time of trying to conceive). Educational qualification was classified by years of schooling: <10 years, 10-12 years, and >12 years. Occupation was categorised into the three items, manual (semi-or unskilled occupations such as shop assistants, cleaners, farmers), managerial (skilled professions and lower grade administrators such as teachers, nurses, technicians), and professional (academic and superior management occupations such as medical doctors, lawyers, dentists).

Descriptive statistics of the study participants are presented in total and relative numbers. The chi-squared test was used to test the overall significance of differences between the two samples. Statistical significance was set at p< 0.05. All analyses were performed using SPSS statistics (version 19, SPSS INC., Chicago, IL).

Results

Table 1 presents descriptive information on the two samples of women stratified by fertility status. There was a decline in fertility across the two surveys and with declining age in both

<table>
<thead>
<tr>
<th>Description</th>
<th>Survey 1995-97 n=4468</th>
<th>Survey 2006-08 n=4951</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AGE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-54</td>
<td>2325 (67.2 %)</td>
<td>2325 (68.6 %)</td>
<td></td>
</tr>
<tr>
<td>55-59</td>
<td>1957 (88.6 %)</td>
<td>1957 (86.6 %)</td>
<td></td>
</tr>
<tr>
<td><strong>MARRIAGE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>102 (2.3 %)</td>
<td>102 (2.3 %)</td>
<td></td>
</tr>
<tr>
<td>Ever</td>
<td>4365 (74.7 %)</td>
<td>4365 (74.7 %)</td>
<td></td>
</tr>
<tr>
<td><strong>EDUCATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 years</td>
<td>136 (6.2 %)</td>
<td>136 (6.2 %)</td>
<td></td>
</tr>
<tr>
<td>10-12 years</td>
<td>25 (1.8 %)</td>
<td>25 (1.8 %)</td>
<td></td>
</tr>
<tr>
<td>&gt;12 years</td>
<td>21 (2.6 %)</td>
<td>21 (2.6 %)</td>
<td></td>
</tr>
<tr>
<td><strong>OCCUPATION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>104 (7.0 %)</td>
<td>104 (7.0 %)</td>
<td></td>
</tr>
<tr>
<td>Managerial</td>
<td>172 (8.3 %)</td>
<td>172 (8.3 %)</td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>21 (12.0 %)</td>
<td>21 (12.0 %)</td>
<td></td>
</tr>
</tbody>
</table>

* Differences between samples.

Table 1: Fertility status and sociodemographic characteristics of women 50-59 years.
samples (p < 0.001). Sub-analyses showed that fertility rate declined from 2.76 to 2.4 across surveys (not shown in table). Prevalence of subfertility increased over the two successive surveys, and with declining age within samples (p<0.001). Sub-analyses showed that 77.2% of the subfertile in survey 1995-97 conceived and delivered a child, compared with 83.4% of the subfertile in the last survey (not shown in table). The prevalence of childlessness (involuntarily and voluntarily childless women combined) increased from 4.4% to 5.2% across surveys (p=0.086, p-values of sub-analyses are not shown in Table 1). Although there was little variation in proportions of childless women in the two samples, there were varied reasons for childlessness: voluntary childlessness increased significantly (P=0.004) over time, while involuntary childlessness decreased, though the latter difference in prevalence was negligible.

Marital differences were obvious in fertility status (Table 1). Viewed from a time perspective there were substantial differences in the proportions of never-married women in the samples 2.2% in the 1995-97 survey and 19.7% in the 2006-08 survey. The majority of unmarried women reported to be childless in the 1995-97 survey while the unmarried women were represented in all fertility status categories in the 2006-08 survey (Table 1). Sub-analyses showed that there were significant differences in fertility status among the unmarried women compared with their ever married counterparts in the 1995-97 survey, but not in the 2006-08 survey.

The variability of fertility was linked to educational level in both samples. Educational achievement was higher in the 2006-08 survey, and in both samples was fertility lower among the higher educated, and conversely higher among the low educated. The educational difference of 6.8% between lowest and highest educated fertile women, seen in the 1995-97 survey, was smaller in the 2006-08 survey (1.6%). Subfertility bore a relation to education; the lowest educated were less likely to be subfertile than the highest educated in both samples. Subfertility among the highest educated women declined across surveys. Education differentials (between lowest and highest educated) in subfertility levelled over time. There were educational disparities in childlessness (involuntarily and childless women), slightly more prevalent among the highest educated in both samples, but the educational differences levelled in the survey 2006-08, and further a slightly decreasing proportion of better educated women among the involuntarily childless in the 2006-08 survey compared to the highest educated women in the earlier survey, however, the difference was insignificant.

The pattern of occupation changed over time, resulting in more women in better occupational positions (Table 1). Women in higher occupational positions reported less frequently fertility and more frequently subfertility than manually employed women in both surveys. However, the proportion of women in professional occupations classified as subfertile and involuntarily childless women decreased over time. The occupational differences in fertility, subfertility, and involuntary childlessness between women in manual and professional positions became less substantial over time, whereas the discrepancy in voluntary childlessness between manually and professionally employed women increased in the last survey. A professional career increased the likelihood of voluntary childlessness.

**Discussion**

The present study on representative samples of women 50 to 59 years, born at 10 years' interval and studied some ten years apart, showed that fertility declined and subfertility increased significantly over time. The changes in marital status, education and occupation were associated with changes in fertility status, but the impact of education and occupation became less substantial over time. Subfertile women seemed to have better prospects as to fulfilling a childwish over time. The proportion of women remaining childless increased across surveys, but fewer women were involuntarily childless.

The finding of decreased fertility over the 10 years’ time span agrees with research findings on declining 12 months fertility among women [12]. Women’s reproductive behaviour has changed during the last decades demonstrating a consistent increase in the proportion of women delaying childbearing [13]. An advancing maternal age effects fertility as the probability of conception decreases with age due to the age-related decrease in reproductive capacity [14]. The average maternal age at first birth has continuously risen since the mid-1970s in Norway [13]. The possible age-delayed attempts to conceive may account for the finding of declining fertility. This age shift towards childbearing at older maternal ages may account for the subsequent increase in subfertility seen in the last survey. The estimated prevalence of subfertility in women in the 2006-08 survey corresponds to subfertility prevalence found in Finnish women participating in a cross-sectional survey [14,15]. Very few studies have examined time trends in subfertility. A Swedish study based on birth registry data concluded that subfertility decreased over succeeding birth cohorts (from 1950) [4]. The true change in fertility and subfertility over time is difficult to demonstrate because population-data on fertility status trends are in general not available, and to uncertainties involved in definitions, measurements and sampling criteria [4,16].

Education is a determinant of reproductive behaviour in terms of timing of motherhood [2,9]. Delayed childbearing is more prevalent among higher educated women [17]. Higher educated women report more fertility problems than low educated women [18]. The education determinant may partly account for the declining fertility. Educational differences (between lowest and highest educated) in fertility and subfertility diminished across succeeding surveys, may be explained by less importance of education as more women pursue longer education, as seen in the study. The diminishing educational differentials in fertility over time, is a result that to my knowledge is not presented in other research. The increasing number of subfertile women over time was not consistently associated with higher educational attainment, indicating that a joint effect of age-related attempts of conceiving and attainment of higher educational goals may account for the finding.

The occupation related changes in fertility status showed an inconsistent pattern. Contrary to assumptions, the professional women were less often subfertile over time. Education is linked to occupational position, but occupation is a determinant in its own right, and the inverse relationship between employment and women’s fertility is well known [10]. This association however, depends mostly on analyses on employed versus non-employed women or studies limited to fertility impairments due
to occupational hazards; less is known about a possible impact on fertility position in the occupational hierarchy. The results indicate that a professional career is associated with reduced fertility compared with manually employed women, but not consistently to subfertility, as seen in the last survey.

The corresponding proportions of childless women were quite equal between the samples, with a slight increase in childlessness over time. There have been fairly stable rates of childlessness in Norway (8%-9% in cohorts born before 1950, measured at age 40), though there is a trend towards slightly increasing proportions of childlessness among women born since 1950 [19,20]. This trend corresponds with European studies showing that an increasing proportion of women remain childless [8]. The rates of childlessness among women in the two surveys were lower than national rates. However, the estimates of involuntary and voluntary childlessness were similar to previous research findings of about 3% involuntary childlessness and 2.8% voluntary childlessness in other countries [21,22]. I have not found any corresponding research on kind of childlessness in Norway. Postponement of motherhood carries an increased risk of involuntary childlessness due to age-related reduced fecundity. The present results do not support that assumption. In spite of a decline in fertility and increased subfertility, the proportion of involuntarily childless women declined over time, in particular in professionally employed women. Overall, the results do not support the notion that a professional career and motherhood are incompatible, but a professional career seemed to increase the likelihood of voluntary childlessness. Demographic surveys have documented that childlessness increases with higher educational level and higher occupational position, the results add support to these findings [17,23]. Demographic studies however, do not discriminate between involuntary and voluntary childlessness. The present results indicate that fewer highly educated and professionally employed women remained involuntarily childless over time, and noteworthy was that professional women increasingly refrained from motherhood, a finding to my knowledge, not shown in earlier research. Conclusions are made with caution as the numbers are very small.

The marital difference in fertility status was an apparent time effect. The women in the two surveys were born just ten years apart; however, women participating in the 2006-08 survey entered their adult lives at a time when expectations about marriage and motherhood were publicly challenged. They faced radical changes in family formation patterns as co-habitation and non-marital motherhood become common, the latter supported by public benefits, and further in expectations to and opportunities in pursuing higher education and making a career [17]. The women in the 1995-97 survey were young women at a time when family formation entailed marriage and children should be born in wedlock, and women were not encouraged to make a career. Thus the historical specificity of the women’s lived experiences differed greatly in the two samples.

The strengths of this study included two population-based surveys within the same geographical locale, nationally representative samples of women, good participation rates, and comprehensive and consistent datasets on multiple sociodemographic and reproductive characteristics. In addition, the surveys offered a unique opportunity and good facilities to study changes over time. The study design was retrospective, an advantage was that the participants’ complete reproductive histories were available; a disadvantage might be recall bias. However, reproduction is in general important to women and it is unlikely that reproductive information was remembered inaccurately. Studies have maintained that retrospectively self-reported information on reproduction is validated to be a measure with high reliability [24,25]. There are limitations. Non-participation may have resulted in distorted samples. A study on non-participation in the surveys concluded that there were no major differences between participants and non-participants, or any reason to be concerned about non-respondents among the participants [26,27]. Data on reproductive treatment were not available. Reproductive treatment induced pregnancies may be a positive contribution to overall fertility as more couples will not remain childless. Medically assisted reproduction may only concern women in the 2006-08 survey, though most of the women were too old to benefit from the more recent advances in reproductive medicine. I presumed and hence classified women as voluntarily childless if they had not tried for a year to get pregnant and had never given birth. It might be that some of the women had tried for less than a year to become pregnant, or got pregnant within a year but suffered miscarriages, thus not fitting the classification. However, it is reasonable to believe that most women having a childwish would be quite persistent in trying to conceive. Data on education and occupation were collected at the time of participation, and not at the time the women planned or not planned motherhood. It is unlikely that educational level and occupational position changed substantially over time for the majority of women.

In conclusion, this study based on two population-based samples of women, showed changes in fertility status, measured at 10 years’ interval. The results confirm a continuous time fall in fertility, increased subfertility and childlessness, but fewer women remained involuntarily childless. The changes in fertility status over time were associated with changed social circumstances for women, including higher educational levels and occupational positions. Population-based surveys may provide valuable data in examining changing social disparities in fertility status. This study has gone some way to demonstrate the strength of using reproductive data from health surveys to describe fertility issues in women’s health.

Acknowledgments

The Nord-Trøndelag Health Study is collaboration between HUNT Research Center, Faculty of Medicine, Norwegian University of Science and Technology; Nord-Trøndelag County Council and The Norwegian Institute of Public Health. The study is part of the North-Trøndelag Health Study (HUNT) and was approved by the Regional Committees for Medical and Health Research Ethics, Central Norway (approval no 2009/853-2).

Conflict of interest

None to report.

References
