Age, the desire to have a child and cumulative pregnancy rate

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The relationship between women’s age and fertility, and the factors that influence the age at which couples desire to have their first child, were analysed in a national sample of women aged 25–49 years. A random sample of 8050 households in the Netherlands was approached. In these households, 3295 women between the ages of 25 and 49 years answered a short questionnaire about planning their first pregnancy and about fertility. Furthermore, socio-demographic data were gathered. There appeared to be almost no variation in cumulative pregnancy rate between age 20 and 28: between 65 and 70% at 6 months, just below 90% at 12 months and ~93% at 24 months. After the age of 33 years, the cumulative pregnancy rate at 6 months decreased. From the age of 28 years the cumulative pregnancy rate at 12 months and at 24 months decreased gradually, reaching 75 and 80% respectively, by the age of 35 years. The year of birth of the woman (the ‘time’ factor) was the most important factor influencing the age at which couples desired to have their first child. In addition, demographic factors, particularly a high level of education, a high professional level and a high level of family income, were associated with the desire to have the first child at a relatively late age.

Key words: age/desire to have a child/effect of infertility treatment/fertility/pregnancy rate

Introduction

As a medical and social problem, infertility has received a great deal of attention lately. In particular, the age of the woman at her first delivery is often discussed. In the Netherlands, the last 20 years have witnessed a clear change regarding the age at which women have their first child. In 1970, the mean age of women at first birth was 24.3 years; in 1990 the mean age was 27.6 years (De Graaf, 1992; Vermunt, 1993). In other European countries (for instance: Germany, United Kingdom, France, Sweden, Denmark, Belgium) the same tendencies are visible. It is assumed that the increasingly late age at which women desire to have their first child has negative consequences for their fertility. This effect may raise the age at which the first child is born even further. The public debate has brought forward the fact that the social changes that lead to delay in women’s active desire to have a child subsequently produce medical problems.

This article presents the results of a national study of behaviour regarding infertility in the Netherlands. It takes into account fertility rates at later ages, and factors that influence the age at which couples desire to have their first child.

Previous studies

The relationship between fertility and age has been the subject of many studies. However, most studies have been directed at special populations such as infertility patients and exceptional religious groups. The existing literature contains data on: patients of obstetric clinics (Hull et al., 1985; Scott et al., 1995), women who had been submitted to artificial insemination by donor (Schwartz and Mayaux, 1982; Van Noord-Zaadstra et al., 1991), women who had been submitted to hormonal treatments and/or intrauterine insemination (Pearlstone et al., 1992), women who had been submitted to in-vitro fertilization (Padilla and Garcia, 1989; Piette et al., 1990; Tan et al., 1992; Dor et al., 1996), women who had received donated oocytes (Levran et al., 1991), women who had stopped using contraception (Tietze, 1968; Howe et al., 1985), women who had never used contraceptives (Harlap and Baras, 1984), early 19th century populations in Europe (Henry, 1972; Bongaarts, 1982), and special religious groups that do not use birth control, like the Hutterites, an anabaptist sect in North America (Eaton and Mayer, 1953; Tietze, 1957). Some studies show a rather confined picture as they use only one dichotomy: ‘older’ versus ‘younger’ women (Tietze, 1968; Wajntraub, 1970; Levran et al., 1991; Pearlstone et al., 1992). All studies indicate a decreasing fertility in women at later ages. Some researchers established a gradual decrease in the cumulative pregnancy rate. However, the starting point of this decrease was established at different ages: 20 years (Henry, 1972), 27 years (Toner et al., 1991), 28 years (Howe et al., 1985), and 30 years (Bongaarts, 1982; Schwartz and Mayaux, 1982; Tan et al., 1992; Scott et al., 1995). Other researchers established a distinct turning point regarding chances of fertility. Their investigations showed that, after a certain critical point, the cumulative pregnancy rate decreases strongly, while before that critical age chances of fertility show little variability. Here also, different critical points were indicated: 31 years (Van Noord-Zaadstra et al., 1991), 35 years (Pearlstone et al., 1992), 37 years (Padilla and Garcia, 1989; Piette et al., 1990), and 40 years (Dor et al., 1996). The study carried out by Eaton and Mayer (1953) among Hutterites indicated a variable pattern: decrease of the cumulative pregnancy rate between
the ages of 18 and 23, followed by a stabilization until the age of 33, a slight decrease, and a strong decrease starting at the age of 38 years.

It can be concluded that the results differ with respect to the age indicated as a starting point and the abruptness of the decrease. These divergent results can partly be explained by the fact that the data were gathered in different and often specific populations, and partly because different age limits or age categories were used.

The growing tendency of women to become mothers at a later age and the different results of the above-mentioned studies were reasons to investigate the (in)fertility in a national (Dutch) sample and to analyse the factors that may influence the timing of childbearing. In this study also the effect of using medical assistance was included. Because most developed Western countries show the same tendencies regarding family planning and infertility, it is plausible that the results are also relevant to this wider area.

Materials and methods

In the autumn of 1992, a national survey was carried out among women aged 25–49 years. The fieldwork was performed by the Dutch Institute for Public Opinion Polls by means of an omnibus survey (a survey in which various issues are included). A random list of addresses was used: 8050 households were approached. Out of these households, 3295 contained women aged between 25 and 49 years, who answered four questions about planning of the first pregnancy and fertility. Furthermore, sociodemographic data were gathered.

The sample represented a cross section of the female population (aged 25–49 years) in The Netherlands. This means, on the one hand, that the group was composed of different cohorts (women born in the same year), who had potentially experienced fertility problems in the period 1960–1992. This enabled longitudinal analyses. On the other hand, there was a wide variance concerning the age at which women desired to have their first child. Women who were 25 years and those who were >40 years were included. Therefore, the study had also a transversal character. The developments regarding the active desire to have a child were charted for successive cohorts of women. The analysis of the relationship between age and active desire to have a child was carried out among women aged 35 and older. This included almost all women who had wanted to have a child, because only <1% of the women in the sample desired to have a first child at ≥35 years.

Cumulative pregnancy is defined here as the chance of achieving a pregnancy that leads to the birth of a first child within a certain period (abortions were excluded). The cumulative pregnancy rate was measured at 6 months, 12 months and at 24 months by dividing the number of pregnancies (resulting in births) by the number of women trying to get pregnant. The factors influencing the timing of childbearing were grouped into two categories: sociodemographic and cultural. Changes in sociodemographic factors (such as constantly increasing percentages of highly educated women, higher living standards, the declining importance of religion) may delay the timing of childbearing. Also, cultural changes that do not depend on changes in the composition of the population may have an important influence. These cultural changes over time (the ‘time’ factor) can influence women’s attitude towards the active desire to have a child. The factors that influence the age at which a woman desires her first child were analysed over the period 1974–1986. This was in order to include sufficient successive generations of women at ages at which a pregnancy is desired (19–31 years).

Bivariate analyses were first carried out to answer the question as to which factors determine changes in the age at which Dutch women desire to have their first child. Several variables were analysed: level of family income, religion, educational level, level of urbanization, region and number of incomes per family. The time factor was operationalized by determining the time elapsed since the beginning of the women’s active desire to have a child. Subsequently, the significance of different variables was investigated by means of linear regression analyses.

The representativeness of the sample was tested on four aspects: age, educational level, religious denomination and percentage of women with and without children for each age category. Comparisons were made with population data provided by the Central Bureau of Statistics: age (Centraal Bureau voor de Statistiek, 1993), educational level (Centraal Bureau voor de Statistiek, 1993) and mothers (De Jong, 1993), and from a study of religious convictions (Bureau Inter/View, 1989).

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Sample (n = 3295)</th>
<th>The Netherlands*</th>
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</thead>
<tbody>
<tr>
<td>25–29</td>
<td>19</td>
<td>22</td>
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<tr>
<td>30–34</td>
<td>23</td>
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<td>35–39</td>
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<td>45–49</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
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<td>12</td>
</tr>
<tr>
<td>Calvinist</td>
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<td>8</td>
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<tr>
<td>Other</td>
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<td>3</td>
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<tr>
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<tr>
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<td>22</td>
</tr>
<tr>
<td>Senior secondary (3)</td>
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<tr>
<td>University (4)</td>
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<tr>
<td>Mean level (1–4)</td>
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<td>2.8</td>
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<td>Families with child(ren) (years)</td>
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<td>45–49</td>
<td>91</td>
<td>89</td>
</tr>
</tbody>
</table>

*Data on the Dutch population are derived from the Central Bureau of Statistics: age (Centraal Bureau voor de Statistiek, 1993), educational level (Centraal Bureau voor de Statistiek, 1993) and mothers (De Jong, 1993), and from a study of religious convictions (Bureau Inter/View, 1989).
who do not have children). As ‘having children’ constituted an important aspect in this study and this bias would result in an overestimation of the cumulative pregnancy rate and an underestimation of the incidence of infertility, the data were weighted on the presence/absence of children in the household. The size of the childless group was increased by means of CBS data; the size of the group with children was reduced proportionally. The effect of this weighing was that also for this aspect the sample was representative of the Dutch population.

Results

Age and cumulative pregnancy rate

More than two-thirds of the women in the sample (68.6%) succeeded in becoming pregnant at 6 months; 17.5% succeeded in the second half of the first year (7–12 months) and 5.5% succeeded in the second year (13–24 months), while 8.4% of the women did not succeed in becoming pregnant in a period of 2 years.

The cumulative pregnancy rate for the three measurement moments is illustrated in Figure 1. Between the 17th and the 20th year of their life, women’s chance of pregnancy was the highest at each of the three measurement moments. Around the 18th year of their life, 80% of the women became pregnant before the 7th month, and subsequently the cumulative pregnancy rate decreased. Between the 22nd and 33rd year, the pregnancy chance at 6 months was 65–70%. From the 33rd year onwards, the pregnancy chance decreased to ~50% at 34 and 35 years. The cumulative pregnancy rate at 6 months was significantly lower for women >33 years than for those <33 years ($\chi^2$-test: $P < 0.026$).

The cumulative pregnancy rate at 12 months was slightly lower than 90% between the 20th and 28th year. Subsequently, the pregnancy rate decreased to 75% around the 35th year. The size of the group that did not succeed in becoming pregnant within 2 years was rather stable between the 19th and the 28th year (~7%), but it increased rather rapidly to >20% around the 35th year. Those who succeeded in becoming pregnant during the second year were asked whether they had called upon the general practitioner and/or a specialist for medical assistance regarding their infertility problems. It appeared that 43% of these women had received medical advice and/or had undergone treatment.

Factors that influence the age at which a child is desired

As mentioned before, the relationship between age and active desire to have a child was analysed over the period 1974–1986. A significant relationship existed between the years elapsed and age of the women ($r = 0.21; P < 0.001$): the more recent the desire for a child, the older were the women. The mean age of the group in which the first active desire to have a child occurred in the period 1974–1986 was 25.4 years at that time. The mean age of the group in which the first active desire to have a child occurred in the period 1974–1976 was 23.6 years: a statistically significant difference of 1.8 years ($t = 6.93; P < 0.001$).

The age at which the first active desire to have a child occurs is also related to some of the sociodemographic variables analysed in this study: gross family income ($r = 0.22, P < 0.001$), professional and especially educational level reached by the principal wage earner in the household ($r = 0.29, P < 0.001$; $r = 0.21, P < 0.001$ respectively). The higher the level of family income, professional status and educational level in the households, the later in life occurred the first active desire to have a child. However, there appeared to be no significant correlations between the age at which the first active desire to have a child occurred and religious denomination, region, level of urbanization, and number of incomes per family. Because family income, professional level and educational level appeared connected, a multiple regression equation was used to calculate the weight of these separate variables (Table II).

Discussion

The aims of this study were to gain more insight into the relationship between age, active desire to have a child and fertility, and to analyse the factors that determine the age at which active desire to have a child occurs. The time factor (number of years elapsed since 1974) was the most important factor in relation to the age at which Dutch women desire to have their first child. Demographic factors also played a role. In particular, high educational level and, apart from that, high professional level and high family income were related to women’s active desire to have a child at later ages. The consequence of the constant increase in average educational and professional levels and family income during the study was that the age of active desire to have a child also increased.
As regards the cumulative pregnancy rate, there appeared little variation between the 20th and the 28th year. From 65 to 70% of the women became pregnant within the first 6 months, slightly less than 90% in the first 12 months and approximately 93% within 24 months. The cumulative pregnancy rate at 6 months remained close to 70% until the 33rd year, decreasing strongly after that age. The study indicated a distinct turning point around the 33rd year. Several previous studies also indicated a definite turning point; however, this varied between the 31st and the 40th year (Padilla and Garcia, 1989; Piette et al., 1990; Pearlstone et al., 1992; Van Noord-Zaadstra et al., 1991; Dor et al., 1996); in our study the turning point was also established within that period. It appears that somewhere in the mid-thirties the chance of pregnancy decreases rather abruptly.

The cumulative pregnancy rate at 12 months and at 24 months decreased gradually after the 28th year. By the age of 35 years, the chance of pregnancy at 12 months was 75% and a little less than 80% at 24 months. The results of this study are more detailed than those of several other studies, because previous studies used just one dichotomy: ‘older women’ versus ‘younger’ women (Tietze, 1968; Wajntraub, 1970; Levran et al., 1991; Pearlstone et al., 1992) or because women aged up to 25 were not included in the analysis (Padilla and Garcia, 1989; Toner et al., 1991; Dor et al., 1996). If a comparison is made with other samples that showed more or less the same age distribution, the graphs of the cumulative pregnancy rate in our study match mostly those from the study dealing with the Hutterite population (Eaton and Mayer, 1953). There is also a resemblance with an analysis based on studies conducted in the USA and on historical populations carried out by McFalls Jr (1990).

It is generally assumed that fertility data from the youngest age category (17–20 years) are biased by an inadequate use of contraceptives. Though there are many studies about teenage pregnancies, there are only a few studies regarding the fertility rate among this youngest age group. A very high pregnancy rate under the age of 20 was established in the Hutterite study (Eaton and Mayer, 1953). McFalls Jr (1990) also concluded that the highest cumulative pregnancy rate lies under the age of 20 years. Also in our study it was established that the chance of pregnancy between the 17th and the 20th year is very high. However, it is possible that a relatively large number of unplanned pregnancies occur in this age category, and that the pregnancy is not always preceded by a deliberate desire to have a child.

Out of the group that did not succeed in becoming pregnant after the first year (13.9% of the total sample), 40% (namely 5.5% from the total group) became pregnant during the second year. The majority (57%) of these pregnancies occurred without medical assistance. Furthermore, the pregnancies (43%) that occurred after medical advice and treatment were not always the consequence of these interventions.

The results of this study confirm that infertility problems increase with the age of the woman, and that reaching the age of 33 years leads to an essentially diminishing chance of achieving a first ongoing pregnancy. Because in many Western developed countries ever more women are desiring to have their first child in their middle thirties, infertility problems will arise. On the other hand, it appears that a large proportion of those who do not become pregnant within a year achieve this state in the second year. Therefore, one should be reluctant regarding the application of invasive medical treatment during this period.

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