

# **Comparison of Cohort Abortion among Those Aged 20 and over in Finland**

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*As prepared for the Population Association of America annual conference 1-3 May 2014*

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## **Acknowledgements**

Many thanks to Professor Mike Murphy, Dr Tiziana Leone and Professor Mikko Myrskylä for their helpful comments, and Professor Mika Gissler and Dr Markus Jokela for their expertise help with obtaining the data set.

This work was supported by the Economic and Social Research Council [grant number ES/J00070/1]. I am grateful to Statistics Finland and the National Institute of Health and Welfare for the permissions (TK53-162-11 and THL/173/5.05.00/2011 respectively) to use these data.

## **Abstract**

UN (1994) called upon reducing abortions by providing universal access to family planning, but it remains unclear whether universal access alone reduces socioeconomic differences in abortion behaviour. Low socioeconomic status (SES), low education and high opportunity costs are associated with higher risk of abortion, but studies often suffer from underreporting of abortions, and lack longitudinal data. This study explores whether the association between socioeconomic characteristics and abortion changed across cohorts using a unique longitudinal set of Finnish register data of women aged 20+ born in 1955-59, 1965-69 and 1975-79. No studies have applied cohort perspective in this context before. Discrete-time event-history analysis showed that education was the driving force of socioeconomic differences in abortion behaviour in Finland. The association between low education and higher risk persisted across cohorts despite universal access to family planning, indicating that targeted policies are needed.

## **Introduction**

Induced abortion is a major personal decision and an important part of fertility behaviour. Analysis of abortion is crucial for understanding the dynamics of reproductive behaviour, because abortions are used to postpone, space and stop childbearing (Bankole et al. 1998). Abortions are not rare – it is estimated that 20% of all pregnancies worldwide ended in induced abortion in the 1990s and 2000s (Sedgh, Singh, et al. 2012). Understanding abortion behaviour is important so that appropriate policies can be developed. In the Cairo Consensus in 1994 UN called upon the right to control one's fertility and asked "all national Governments to reduce the need for abortion by providing universal access to family planning information and services (Population Information Network 1994)". Easy access to family planning also reduces health care costs (Cleland et al. 2011; Frost et al. 2008).

Women in less advantaged socioeconomic groups have more abortions than other women (Hansen et al. 2009; Jones et al. 2002; Rasch et al. 2007; Regushevskaya et al. 2009), but it remains unclear whether availability of family planning services alone is enough to reduce the socioeconomic differences in abortion. This study examines these differences in Finland, where comprehensive family planning policies and sex education have taken place since 1970.

The aim of this study is to explore how socioeconomic characteristics, especially educational level, are associated with the likelihood of abortion at different stages of the life course and whether the association has changed across birth cohorts in Finland. I analyse a reliable, unique and nationally representative longitudinal dataset based on administrative registers, which overcome the common problems of underreporting of abortions in surveys (Jones &

Kost 2007). Although there are limitations in using register data, such as no information on attitudes or religiosity, and confidentiality restrictions on linking all the available socioeconomic and household-level data to the study sample, the reliability, very low non-response and drop-out, as well as longitudinal nature and the possibility to distinguish between abortions due to social and medical indication in these data provide considerable advantages.

To the best of my knowledge a cohort perspective exploring association between socioeconomic characteristics and abortion has not been applied in Finland or in other countries with comprehensive and reliable data. Previous studies in Finland were either based on surveys (Regushevskaya et al. 2009), have only studied women who have had at least one abortion thus ignoring women who never experience one (Heikinheimo et al. 2008, 2009; Niinimäki et al. 2009; Väisänen & Jokela 2010) or have not focused on the socioeconomic characteristics of the women (Hemminki et al. 2008; Sydsjö et al. 2009; Vikat et al. 2002).

Finland has provided easy access to family planning services alongside with generous financial and other help to families with children for decades (Vikat 2004). Furthermore, the socio-democratic ethos of equality, relatively high social mobility (see e.g. Sirniö et al. 2013) and a high-quality education system, which is free of charge from primary school to higher education and thus offers a possibility to obtain high education for everyone regardless of their family background, offers an interesting setting to study whether socioeconomic differences in abortion disappear if universal family planning is available over a long period of time. Abortion patterns in Finland are indeed different compared to, for instance, US and UK: abortion rate is considerably lower in all age groups in Finland (Sedgh, Bankole, et al. 2012). Abortion legislation or attitudes do not explain these differences, as these are liberal in both Finland and UK, whereas following recent legislative restrictions more than half of women in US now live in states where access to abortion is restricted (Nash et al. 2014).

This paper cannot explore causal relations between abortion behaviour and education. Based on register data alone it is not possible to infer whether obtaining education itself changes the women's likelihood of abortion or whether there are other unmeasured characteristics which make certain individuals both more likely to obtain high education and less likely to have abortions. Moreover, the effect of education is mediated through sexual activity, contraceptive use and willingness to terminate an unintended pregnancy, which were not measured in this study. However, exploring the associations between education and the

likelihood of abortion with a representative dataset, which does not suffer from underreporting or dropout and allows for cohort comparisons, will give new information regarding the association between socioeconomic characteristics and abortion behaviour, which may also be of interest to researchers in the field and others such as policy makers who wish to reduce the socioeconomic inequalities in abortion.

## **Background**

Previous studies in US and Europe (including Finland) have shown that low socioeconomic status (SES) (Rasch et al. 2007; Väisänen & Jokela 2010), low education and income (Jones et al. 2002; Regushevskaya et al. 2009), young age (Jones et al. 2002; Knudsen et al. 2003; Niinimäki et al. 2009; Rasch et al. 2007), being single, having relationship problems and previous births (Hansen et al. 2009; Jones et al. 2002; Rasch et al. 2007; Regushevskaya et al. 2009) or abortions (Hansen et al. 2009; Niinimäki et al. 2009) increase the likelihood of having an abortion.

Socioeconomic characteristics may affect the likelihood of unintended pregnancy and thus likelihood of abortion through three mechanisms: sexual activity, effective contraceptive use and likelihood of having an abortion due to an unwanted pregnancy (Bongaarts 1978).

Unintended pregnancies may be unwanted (not wanted at all) or mistimed (wanted later) (Santelli et al. 2009; Trussell et al. 1999). In this study, pregnancies ending in abortion due to social indication are assumed to be unwanted.

Women who are more sexually active are at a higher risk of experiencing an unintended pregnancy and therefore an abortion, especially if contraception is not used consistently and efficiently (Wellings et al. 2013). Sexual activity is associated with relationship status, as people in unions tend to be more active than single people (Dunn et al. 2000; Waite 1995). In this study, relationship status is controlled for, which may help to control for the association between higher sexual activity and higher risk of pregnancy.

Low education and/or income have been associated with a higher likelihood of unintended pregnancies for instance in the US (Finer & Zolna 2011), UK (Wellings et al. 2013) and Spain (Font-Ribera et al. 2007), but not in the Netherlands, where highly educated women were overall less likely to become pregnant, but there was no association between education and unintended pregnancy (Levels et al. 2010).

Response to an unwanted pregnancy varies with the stage of the life course. Young highly educated women are more likely to terminate such a pregnancy than women with lower education, whereas the opposite is true later in life (Font-Ribera et al. 2007; Levels et al. 2010; Sihvo 2003). Highly educated women at early career stage usually have higher opportunity costs of childbearing than less educated women due to interruptions in work after childbearing and possibly due to having lower income and position in the workplace after returning to work (Becker 1991; Kreyenfeld 2010; Oppenheimer 1994; Werding 2014). Therefore they often postpone births until having established their socioeconomic position and thus become mothers on average several years later than women with medium or low education (Andersson et al. 2009; Ní Bhrolcháin & Beaujouan 2012).

Contraceptive failure or lack of contraceptive use when there is no intention to become pregnant, may lead to an unintended pregnancy. Studies have found that higher socioeconomic position is associated with more effective contraceptive use and a higher satisfaction with family planning services (in US: Frost et al. 2007; Kost et al. 2008; Ranjit et al. 2001; in Finland: Hemminki et al. 1997; Kosunen et al. 2004). More effective contraceptive use and higher likelihood of aborting an unintended pregnancy are often associated with a high motivation to avoid childbearing (Frost et al. 2007; Miller et al. 2013), which is often linked to higher opportunity and direct costs of childbearing.

Reducing the costs of childrearing by supporting families with welfare policies may affect the level of abortion in a society. In Finland, the duration of parental leave and allowance were increased in the late 1980s, which together with universal right to day-care of children in cheap and high quality nurseries may have resulted in birth rates not decreasing despite a severe depression in the early 1990s contrary to what usually happens during economic hardship (Sobotka et al. 2011; Vikat 2004).

Policies directly aiming to reduce unwanted pregnancies and the number of abortions, such as sex education, family planning services and easy and cheap access to contraception (Keski-Petäjä 2012; Kontula 2010; Ritamies 1993; Sydsjö et al. 2009) have been implemented in Finland ever since abortion legislation became liberal in 1970<sup>1</sup>. Sex education was introduced

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<sup>1</sup> Since 1970, abortion has been permitted, if at least one of the following is fulfilled: “(1) considerable strain caused by living or other condition (so-called social reason), (2) age <17 years, (3) age >40 years (4), women has given birth to at least four children, (5) medical reasons of the woman (pregnancy is a risk for her life or health, her sickness, physical defect or infirmity or she is not able to take care of the child), (6) medical reason of the father (he is not able to take care of the child), (7) medical reason of the fetus (mental deficiency, severe

in schools in 1970 and apart from the recession years in the 1990s it has been a compulsory part of the curriculum ever since (Kontula 2010). It is believed that it has reduced teen pregnancies in Finland (ibid.), and it is also likely contribute to knowledge about sexuality and pregnancy prevention later in life.

In the 1990s, contraceptives requiring a prescription or meeting with a medical doctor (i.e. hormonal contraceptives, and copper and hormonal intra-uterine devices (IUDs)) were available at every municipality health centre and GP, in addition to private clinics and university- and school-health centres. However, access to care was better in private clinics due to long waiting times in the public health care system. Private clinics more often provided appointments with a gynaecologist compared to GP or nurse in the public sector, and more often provided IUDs to nulliparous women. Private clinics are expensive and more often used by high-SES women (Hemminki et al. 1997). Contraceptives are not costless in Finland: hormonal contraceptives are the most expensive method (€60-150 per year). Copper-IUD is the cheapest method if used for five years (approximately €80 in five years), whereas hormonal-IUD costs approximately €150 for five years (Koistinen 2008; University Pharmacy 2014; Väestöliitto - Family Federation of Finland 2012).

However, money is not the only issue when women choose their contraceptive method: previous experiences, attitudes, pregnancy intentions, socioeconomic and partnership characteristics also matter (Frost et al. 2007). In Finland, young women commonly use oral contraceptives, whereas older women use IUDs or sterilisation (Heino et al. 2013; Hemminki et al. 1997; Kosunen et al. 2004) In 2000, women with higher education used oral contraceptives more often than other women, whereas use of IUDs did not depend on education (Kosunen et al. 2004).

These policies seem to have reduced the overall level of abortion, since the total number of abortion decreased from 21,547 in 1975 to 13,787 in 1985 and further to 9,872 in 1995. Since 2000 there have been around 11,000 abortions per year (Heino et al. 2011). The abortion rate per 1000 fertile age women, which was 18 in the mid-1970s, has decreased steadily being, for instance, 12 in 1980, 10 in 1990 and finally 9 since 2000 up to the present (Fig. 1; Gissler & Heino 2011; Heino et al. 2011). The number of abortions per 1000 women was highest for women aged 20-24 for almost the entire period from 1975 to 2010, followed by teenagers

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illness or handicap), and (8) ethical reasons including rape, incest and other reasons mentioned in the penal code” (Knudsen et al. 2003, 260-261).

(aged 15-19) and women aged 25-29. Since the mid-1980s, women aged 30 or more have had quite stable abortion rates, whereas there has been more variability among younger women, especially in the 1990s when family planning services and sex education were reduced due to the recession (Fig. 1; Kontula 2010).

*{Insert Fig. 1 about here}*

The total period abortion rate (TAR), which is the expected number of abortions a woman would have if the age-specific abortion rates observed in a given year continued throughout her entire fertile period, was 0.41 in 1980 but decreased steadily to 0.29 in the mid-1990s after which it has fluctuated between 0.30 and 0.33 until 2010<sup>2</sup>. It is one of the lowest TARs in Europe and North America. For instance, in the 1990s and 2000s England and Wales had TAR around 0.5 and the US around 0.6, whereas some Eastern European countries such as Russia and Estonia have had TARs higher than one (Sedgh, Bankole, et al. 2012). Lower TARs than in Finland in the 1990s and 2000s were observed, for example in the Netherlands, Belgium and Germany (all between 0.19-0.27 depending on the year) (Sedgh, Bankole, et al. 2012).

In this study, I focus on the association of the likelihood of the first abortion with education and other socioeconomic characteristics (occupational SES and income). The majority of abortions in Finland are first abortions (63% to 73% of abortions between 1987 and 2010 (Heino et al. 2011)). I study situations in which women choose to have an abortion on social grounds, meaning terminating a pregnancy because childbearing is not desired at that time due to, for instance, economic hardship, lack of partner, or no intention to have a child in the near future rather than due to medical problems of the foetus or one of the parents (i.e. medical indication). Abortions due to social indications (indications 1-4 and 8, see footnote 1) accounted for more than 90% of all abortions in the mid-1970s and more than 95% since the 1980s (Heino et al. 2011).

I study women aged 20 or more, because the dynamics of abortion behaviour are likely to be different for adult women compared to teens, who have not yet completed their education, formed long-lasting partnerships or acquired resources and thus face more severe direct and

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<sup>2</sup> TAR was calculated based on the number of abortions in 5-year age groups (Heino et al. 2011) and the number of women in each age group (Official Statistics of Finland 2013a). The number of abortions for women younger than 20 or older than 45 is only available as a single number (i.e. an open-ended interval rather than a 5-year age group), but the total number of women was estimated to be the number of women age 15-19 and 45-49, since typically there are only few abortions before age 15 or after age 49.

opportunity costs of childbearing (Becker 1991; Hansen et al. 2009; Kreyenfeld 2010; Oppenheimer 1994; Väisänen & Murphy (Forthcoming)). Also, as the interest in this study is in the association between abortion and socioeconomic characteristics, education in particular, it is important that the women in the sample have had time to acquire a status that will retain for a long time. Although many women younger than 25 have not yet finished their education especially if they wish to acquire a university degree, differences between basic and upper secondary education will still be meaningful, as upper secondary education is typically completed before age 20 (three years of schooling after lower secondary school, which is usually completed at age 15). Women aged 25 or more are likely to have achieved their ultimate highest level of education and thus more clear-cut analyses are possible. In the analyses, I control for other factors which are known to be associated with the likelihood of abortion such as place of residence, relationship status, parity, time since last childbirth (zero for nulliparous women) and immigration status (Hansen et al. 2009; Jones et al. 2002; Rasch et al. 2007; Regushevskaya et al. 2009; Vikat et al. 2002).

Based on previous studies, I expect low SES (Rasch et al. 2007), low education and low income (Jones et al. 2002; Regushevskaya et al. 2009) to increase the likelihood of abortion. The policies introduced since 1970 providing better availability of family planning services and sex education could either decrease or increase socioeconomic differences in the likelihood of abortion. As more women have more information on contraceptive use and access to family planning services, one would expect socioeconomic differences in abortion to decrease, but this could be offset by the fact that because of easier access to these services, women who have abortions have become a selected group and therefore the differences increase. The latter claim is supported by the notion that typically people with higher socioeconomic position are the first ones to take advantage of new policies, and thus more educated women may have disproportionately benefited from more effective family planning services (Hemminki et al. 1997; Saurina et al. 2012).

## **Data**

Nationally representative data on three female birth cohorts (1955-1959, 1965-1969 and 1975-1979) were obtained from the Registry of Induced Abortions, the Medical Birth Registry and the Population Registry of Finland (see Gissler et al. 2004 p. 423 for a comprehensive description of the registers). Statistics Finland linked these registers using a unique identification number each permanent resident in Finland holds. These data were



provided to me after being anonymised. Evaluation studies have found registers to be reliable sources of information (Gissler & Shelley 2002; Gissler et al. 1996).

These data were collected using two-stage sampling: a study sample of women who have had at least one abortion and a comparison group of women who have never had one. Sampling was conducted in two phases in order to make sure that there are enough women in the data set, who have had abortions to be able to conduct the analysis. First, an 80% random sample of all the women of the above mentioned cohorts, who had had at least one abortion within the fertile period of their life (assumed to be ages 15-50) were collected (N=91,636). As some of the women had not reached age 50 yet, they were included in the sampling frame if they had had an abortion after age 15 and before the end of year 2010, the end of the study period. All women who had ever had an abortion were not included in the data, because ethics regulations in Statistics Finland do not allow for using complete (sub-) populations for research purposes: 80% sample is the maximum. Second, a comparison group, twice the size of the study group, of women from the same cohorts who had not had an abortion, were selected using random sampling (N=183,272). The sample was taken from the group of women who had lived in Finland for at least a year within any of the following periods: 1970-75, 1980-85 or 1987-2010 and had not had abortions during their stay in Finland. These periods were chosen, because these were the years when detailed census information on the Finnish population was available. The 1950s cohort's study group represents 17% of all the cohort's women, and the comparison group 35%. For the 1960s cohort the study group is 18% and the comparison group 36%, and for 1970s 12 and 24%, respectively. Overall the unweighted sample includes approximately 47% of women of those three cohorts. In the statistical analysis weights were used to control for this design.

This study focuses on the adult life of the women, so those women in the original sample who died (N=621) or emigrated<sup>3</sup> (N=5,233) before age 20 were not included. Most women enter the study when they reach age 20, but the 13,308 women immigrating when they were 21 or older enter the sample on the first year of arrival in Finland. Thus, overall 269,054 women are included in the study, but the number of women in the sample changes over time due to mortality and migration. There were 91,636 first abortions in the data, 65,384 of which took place in adulthood (age 20 or later). 62 of these abortions were recorded to have taken place

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<sup>3</sup> It is assumed that someone has emigrated if there is information in the registers about her, but after a certain point in time information is missing, i.e. there are no more updates on all of the following: socioeconomic characteristics, relationship status, place of residence, births or abortions, but the woman has not died or reached age 50 (or the end of year 2010 when applicable). Such women are included until assumed date of emigration.

before woman's recorded year of immigration and were thus excluded from the analyses. Of the remaining abortions 58,183 were conducted due to social indication, 6,018 due to medical indication, and 1,121 had no indication recorded in the registers.

The dataset includes information on education (basic, upper secondary, further, undergraduate or postgraduate<sup>4</sup>), relative individual income (from poorest to richest quartile within one's age group and cohort within the sample, calculated based on annual taxable income of the women), occupational SES (manual worker; upper- or lower level non-manual employee; farmer, self-employed; student; other<sup>5</sup>), place of residence (level of urbanity: urban, semi-urban or rural and province: South, West, East, North, Lapland and Western Archipelago), immigration status (whether born in Finland and whether her native language is one of the official languages i.e. Finnish or Swedish), relationship status (single, cohabiting, married<sup>6</sup>, divorced or widowed), and pregnancy history (induced abortions and live births).

Year and month of abortions and live births were recorded; changes in marital status were updated once a year; cohabitation is included on annual basis since 1987, but not at all before that; place of residence, SES, level of education, and income were measured at ages 20, 25 and 30 or the nearest year possible, as information on education, income, and place of residence were recorded in the Population register every five years (census years 1970, 1975 etc.) until year 1987, and until 2004 for SES after which the variables have been recorded annually<sup>7</sup>. In this paper the first measurement refers to the value around age 20, the second around age 25 and the third around age 30.

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<sup>4</sup> It is assumed that someone has at most basic education if there was no educational level recorded, because Statistics Finland does not give detailed information for research purposes about people with less than upper secondary education due to ethical reasons and codes those cases as missing. "Further education" means some schooling after upper secondary education, which has not led to an under- or postgraduate degree.

<sup>5</sup> Upper-level employees are in managerial, professional and related occupations, whereas lower-level employees have administrative and clerical occupations. Manual workers typically work in manufacturing or distribution of goods and services. "Other" category includes pensioners, unemployed, those outside workforce and those, who do not belong to any of the other categories (Official Statistics of Finland 2013b).

<sup>6</sup> Including separated women.

<sup>7</sup> Thus, values at ages 19, 24 and 29 (if born in 1956, 1966 or 1976), 18, 23 and 28 (if born in 1957, 1967 or 1977), 21, 26 and 31 (if born in 1959, 1969 or 1979) or 22, 27 and 32 (if born in 1958, 1968 or 1978) were included in the data. When socioeconomic data are used in the analysis, the latest information is used until new value is available. For instance, the first measurement of SES is used starting at age 20 (if born in 1955, 1965 or 1975) and updated at age 25 etc.

## Methods and analytical strategy

The analysis proceeded as follows. After creating a table describing the distribution of socioeconomic characteristics of the women, overall first abortion rates by indication of abortion (social or medical) per 1000 women by age and cohort were calculated to see whether these rates differ across ages and cohorts. Then first abortion rates<sup>8</sup> per 1000 women by age, cohort and socioeconomic group were calculated to see how abortion rates differ by these characteristics across cohorts. The denominators include women who have already had an abortion, although they are no longer at risk of having their first abortion, since these rates are conventionally based on the whole population.

In order to assess whether the level of educational inequality in the likelihood of having an abortion has changed over time, concentration curves of education and the incidence of abortion were calculated using aggregate data. Weighted cumulative percentages of abortion were plotted against cumulative level of education beginning from the lowest level (see e.g. Chen & Roy 2009; Erreygers & Van Ourti 2011; Konings et al. 2009). The concentration curve shows inequality in distribution of abortion by education: if abortion was equally distributed among educational groups, the concentration curve would coincide with the 45° equality line. The further the concentration curve is above the equality line, the more common abortion is among the less than more educated women (Chen & Roy 2009; Erreygers & Van Ourti 2011). Since level of education is an ordinal variable with five categories unequally distributed within the population, we have to assume that the distribution of abortion is constant within educational groups (Konings et al. 2009), although these groups may be heterogeneous. The concentration curve is used here to show the population-level changes in abortion by educational group over time. Since the data include 80% of abortions conducted in Finland for these cohorts, the estimate is very precise and confidence intervals are not provided.

In order to provide additional insight on how the level of educational inequality in the likelihood of having an abortion has changed and to explore whether changes in the abortion rates across cohorts were attributable to the changing educational pattern in society, standardised cohort abortion rates by age group (20-24, 25-29, 30-34) and cohort were calculated using the educational distribution of the 1950s cohort as standard. This gives the expected cohort abortion rate for the 1960s and 1970s cohorts had the educational

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<sup>8</sup> Including only abortions due to social indication.

distribution been the same as for the 1950s cohort (see e.g. Hinde 1998). Comparing the standardised rates to observed ones tells us whether abortion levels would have been different had the educational composition of the population not changed all else being equal. Weighted frequencies controlling for the sampling design were used here.

Discrete-time event history analyses, essentially logistic regression with age included as a dummy-variable, were conducted to determine, whether the socioeconomic patterns hold after controlling for other factors known to be associated with abortion behaviour, such as parity, birth interval (months since last live birth), place of residence, relationship status and immigration status (Hansen et al. 2009; Jones et al. 2002; Rasch et al. 2007; Regushevskaya et al. 2009; Vikat et al. 2002). Discrete-time approach was used, because it reduced computing time and including time varying covariates in these models is straightforward (Steele et al. 2004). The implicit assumption that the hazard function and covariate values are constant within each one-year age interval leads to minimal loss of information compared to continuous time models such as Cox regression (Steele et al. 2005). The analyses were run separately for the three cohorts and 5-year age-groups (20-24, 25-29, 30-34, 35+) in order to allow for differences by age and cohort (Steele et al. 2004). The women were followed from age 20 (or from the year they first entered Finland if they immigrated after age 20) until their first abortion due to social indication or censored at the first of reaching end of year 2010, age at emigration, death, reaching age 50 or of experiencing an abortion due to medical indication or an abortion without a recorded indication.

The results of the event history analyses were illustrated by calculating the probability of abortion by age-group and level of education. The probabilities were calculated using average marginal effects at representative values, in other words by taking each individual in the data, treating her as she had the level of education of interest, say basic education, leave all other variable values as observed, and calculate the probability of abortion. Then, the same calculation was conducted for the same individual using the other four levels of education keeping everything else constant. The procedure was then repeated for all individuals. The average of these marginal effects is the probability of having an abortion in each educational and age-group (Williams 2012). The results are presented as the predicted number of abortions per 1000 women with 95% confidence intervals.

All analyses were conducted using Stata 13 except the concentration curves, which were calculated using R 2.15.

## Results

Most women acquired at least upper secondary education by age 30, 76 to 89% depending on cohort (Table 1). The level of education was higher for the later cohorts. In particular, the proportion of women with at least an undergraduate degree by age 30 was higher for the 1970s cohort (42%) than in the other cohorts (10% and 15% in 1950s and 1960s cohorts, respectively). The SES composition of the population also changed somewhat during the study period. For instance, although 3% of the women in the sample were farmers at age 30 in the 1950s cohort, they represented less than 1% of the sample in the 1970s cohort. On the other hand, the proportion of upper-level employees grew from 13% in the 1950s cohort to 20% in the latest cohort at age 30. Among the youngest women (age 20) students were the largest SES group (around 40% for the two earliest cohorts and 52% for the latest). Within the same age group and cohort, the total sample size is usually different for SES compared to education, because these were measured in slightly different years (see Data-section and footnote 7).

*{Insert Table 1 about here}*

There were 26,014 first abortions after age 20 in the 1950s cohort, (21,088 due to social indication), 24,400 first abortions in 1960s cohort (22,866 due to social indication) and 14,908 first abortions on 1970s cohort (14,229 due to social indication). The overall first abortion rate was the highest for the 1960s cohorts across almost all ages. The rate was higher for the 1970s cohort between ages 24 and 30 compared to the 1950s cohort, but lower for women younger than 24 or older than 30. There were more abortions due to medical indications in the 1950s cohort among young women (younger than age 27) compared to the other two cohorts (Fig. 2) perhaps because the liberal abortion law only came into force in June 1970 (see footnote 1) permitting abortion due to social indication for the first time in Finland – it may have taken somewhat longer before the practices in registering the indication of abortion caught up.

*{Insert Fig. 2 about here}*

Figure 3 shows that the first abortion rate for abortions due to social indication varies across different socioeconomic groups in any cohort. Overall, differentials were largest for young women but decreased at later ages. Women with basic education had the highest abortion rate in all cohorts, but the differences were more pronounced in later cohorts: for instance 20-

year-olds with basic education had first abortion rates per 1000 women of 14 women in the 1950s<sup>9</sup>, 28 in the 1960s and 26 in the 1970s cohorts compared to 12, 15 and 10 for 20-year-olds with upper secondary education in the respective cohorts. Women with at least undergraduate degree had low abortion rates across all age groups and cohorts: approximately 7 per 1000 or fewer first abortions due to social indication across all ages and cohorts.

Abortion rates by SES were calculated for the five largest SES groups (upper and lower-level employees, manual workers, students and others), because farmer and self-employed groups had so few women in each one-year age category that the figures were not informative. Other and manual worker groups had higher rates than upper- and lower-level employees across cohorts, but the differences were more pronounced for the two latest cohorts than the 1950s cohort. Income had almost no association with abortion apart from the 1960s cohort, where it seems that younger women with higher level of income have slightly higher abortion rates than other women.

*{Insert Fig. 3 about here}*

The abortion rates shown in Fig. 3 suggest that the inequality in the likelihood of abortion by education has increased for later cohorts. Fig. 4 confirms that even when we account for the changing educational composition of the population, the level of inequality has changed somewhat across cohorts, especially for women with low education. For instance, 20% of women in the low end of education distribution had approximately 28% of abortions in the 1950s cohort, 31% of abortions in the 1960s cohort and 35% of abortions in the 1970s cohort, whereas 40% of women in the low end of education distribution had approximately 53% of abortions in the 1950s cohort, 51% of abortions in the 1960s cohort and 55% of abortions in the 1970s cohort. As the 1970s cohort's curve is further away from the equality line than the others, inequality for that cohort is higher than for the other two.

*{Insert Fig. 4 about here}*

The cohort abortion rate standardised for educational level shows that part of the decline in the abortion rate may be attributable to the changing educational distribution, because had the education distribution been the same for the 1960s and 1970s cohorts as for the 1950s cohorts, we would have observed higher abortion rates, all else being equal. The observed

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<sup>9</sup> The estimate may be biased downwards due to high number of abortions due to medical indication for this group – see previous paragraph and Fig. 2.

rates per 1000 women for the 1950s cohort were 9.6 for 20-24-year-olds, 6.2 for 25-29-year-olds and 5.5 for 30-34-year-olds. Had the education distribution been the same for the 1960s cohort as for the 1950s cohort, the abortion rate per 1000 women in the 20-24 age group would have been 16.9 instead of the observed 13.8. For 1970s cohort the standardised rate was 15.8 per 1000 women instead of the observed 11.2. The same pattern holds for other age groups: for 25-29-year-olds in the 1960s cohort the standardised rate per 1000 women was 7.9 (observed 7.1) whereas for 30-34-year-olds the standardised rate was 6.4 (observed 6.0). In the 1970s cohort the standardised rate per 1000 women was 9.5 (observed 7.4) for 25-29-year-olds and 5.2 (observed 4.3) for 30-34-year-olds.

Finally, discrete time event-history analyses of the likelihood of abortion by age-group and cohort including age, socioeconomic characteristics, birth interval and its quadratic term, parity, relationship status, place of residence and immigration status were conducted (Table 2). The overall pattern in the adjusted models was similar to that observed in Fig. 2: the higher the education, the lower the likelihood of abortion and the association was stronger for the later cohorts compared to the earlier ones as well as for younger women compared to women in their 30s.

*{Insert Table 2 about here}*

Upper- and lower-level employees had lower risk of abortion than manual workers in the adjusted models. The group “other” became non-significantly different from manual workers’ group in the adjusted models although in Fig. 3 these women seemed the highest risk of abortion. Like for education, the associations were stronger for younger women compared to women in their 30s. Higher income was associated with higher likelihood of abortion for the 1960s cohort, less so for the other two.

Average marginal effects by education and age in Fig. 5 illustrate the educational differences in the probability of abortion found in the event-history models. Women with basic education had the highest probability for abortion in all age groups and cohorts and the gap grew larger for later cohorts compared to the earlier ones especially among young women.

*{Insert Fig. 5 about here}*

## Discussion

Education is the driving force of socioeconomic differences in abortion in Finland. The pattern persisted across cohorts despite universal access to family planning and changing educational composition of the population. In particular women with only basic education had a higher likelihood of abortion compared to other women and the inequalities in abortion by education were largely driven by this group. One explanation for this pattern is selection into education: although it was still fairly common to have only completed basic education in the 1955-1959 cohort, in the later cohorts it became increasingly unusual not to have at least upper secondary education and women who only have basic education probably are different from other women in many characteristics. This explanation is supported by the fact that changes in the other two socioeconomic indicators (occupational SES and relative income) were less dramatic across cohorts. Selection does not change for relative income at all and is changing to a smaller extent to occupational SES compared to education.

Low education has been associated with higher likelihood of abortion in previous studies (Jones et al. 2002; Regushevskaya et al. 2009), but this study is the first one to analyse this topic using a large, representative and reliable dataset which allowed for cohort comparisons. In addition, it was possible to identify and study abortions due to social indication, which follow different kind of decision-making process compared to abortions due to medical indication; the former more likely resulting from an unwanted pregnancy and the latter a wanted pregnancy which was terminated due to medical problems of the foetus or one of the parents.

The proximate reasons for the observed differences in abortion behaviour by socioeconomic position are related to differences in sexual activity, contraceptive use and the likelihood of having an abortion due to an unwanted pregnancy (Bongaarts 1978). Since being in a union (marriage or cohabiting), which is a proxy for higher sexual activity (Dunn et al. 2000; Waite 1995), was controlled for in the event history models and the socioeconomic differences pertained nevertheless, the other two may be better in explaining the differences. However, unintended pregnancies when there is no partner may be terminated more often than unintended pregnancies within long-term relationships, which could not be studied here.

If the differences in the likelihood of abortion were due to differences in contraceptive use, women with high education may use contraceptives more effectively. In the US a study found



that poorer women felt they had less choice over the contraceptive method they use, because some methods were too expensive (Cleland et al. 2011). Perhaps women with low education use less effective methods in Finland due to similar reasons although differences are likely to be smaller than in the US due to better financial support from the state. Since contraceptives are readily available throughout the country (Hemminki et al. 1997), it is unlikely that any of the observed differences are due to contraceptives not being available in some regions of the country. Because academic research on contraceptive use patterns in Finland by socioeconomic characteristics is outdated (Hemminki et al. 1997; Kosunen et al. 2004), surveys on current patterns of contraceptive use and pregnancy intentions should be conducted.

If contraceptive use patterns are the main reason for socioeconomic differences in abortion, use of long lasting reversible contraceptive methods such as IUDs and contraceptive implants should be advocated in order to minimise the number of unwanted pregnancies due to contraceptive failure because of user error (Frost et al. 2007; Kost et al. 2008; Madden et al. 2011). Discontinuation rates of these methods are low and they are also suitable for young women who have never been pregnant (e.g. Grunloh et al. 2013).

There were limitations in this study. The prevalence of abortions due to medical indication was higher among young women in the 1950s cohort than among other women. It is unlikely that this is due to higher prevalence of foetal abnormalities or medical problems of the parents. Instead, it may be due to slow changes in the classification of indication of abortion after the change in legislation in 1970. However, this did not cause much bias, since as analyses were run using all abortions as outcome for the 1950s cohort, the estimates of the model changed very little and the interpretation of the model was essentially the same (results available on request).

Although the results obtained by concentration curves (Fig. 4) suggest that the level of inequality increased somewhat for later cohorts, the results only hold if we assume that the distribution of abortion is constant within each educational group (Konings et al. 2009), which may not be plausible. For instance, women who have completed years of university education, but have not (yet) graduated, are included in the upper secondary group together with women who never even intended to pursue higher education. In addition, although abortion rates standardised for education suggest that some of the decrease in abortion is attributable to rise in the educational level of the women, it only holds all else being equal,

which may not be plausible. Had the educational level not changed in the population, the society would probably be different in many other aspects as well. However, these results provide important descriptive information on how the association between abortion and education has changed over time. Further studies should investigate the pathways in more detail.

Other limitations of the study include lack of information not included in registers and lack of detail due to ethics regulations. For instance, the level of detail cannot be too specific, since no individual in the data set should be identifiable. In addition, some relevant information is not included, such as personal motivations to choose abortion, partner's role in the decision, pregnancy intentions, contraceptive use, and attitudes or religious background of the women are not known, although these affect the likelihood of having an abortion (Bankole et al. 1998). Due to these limitations in data, it is not possible to establish causal pathways to abortion.

Despite the limitations, the results are reliable due to strengths of register data and provide new information regarding associations between socioeconomic characteristics and having abortions due to social indication across cohorts in a population, where access to family planning and education are relatively equal. Given the availability of family planning services as well as financial and other assistance given to families by the state, the socioeconomic differences in countries with different institutional structures are likely to be even more pronounced than in Finland.

## **Conclusions**

The results of this study show that providing easy and cheap access to family planning services together with comprehensive sex education in schools does not eliminate the socioeconomic differences in abortion behaviour. Women with higher education seem to have benefited more from the family planning services introduced in Finland since 1970 than women with lower education. Also, policies designed to reduce the costs of childbearing such as relatively long paid parental leave and cheap and high quality nurseries may have reduced the overall number of abortions especially among women who suffer from higher opportunity costs – typically women with higher education (Becker 1991; Kreyenfeld 2010; Oppenheimer 1994). However, women with higher education are likely to have lower abortion rates also due to other reasons, such as better knowledge of pregnancy prevention through social

networks (Kohler 1997). In the future, policy interventions should be targeted to young women with lower education in addition to continuing to provide cheap and easy access to contraceptives and sex education to everyone.

## References

- Andersson, G., Rønsen, M., Knudsen, L. B., Lappegård, T., Neyer, G., Skrede, K., ... Vikat, A. (2009). Cohort Fertility Patterns in the Nordic Countries. *Demographic Research*, 20, 313–352. doi:10.4054/DemRes.2009.20.14
- Bankole, A., Singh, S., & Haas, T. (1998). Reasons Why Women Have Induced Abortions: Evidence from 27 Countries. *International Family Planning Perspectives*, 24(3), 117–152. doi:10.2307/3038208
- Becker, G. S. (1991). *A treatise on the family* (Enlarged ed.). Cambridge, Mass, London: Harvard University Press.
- Bongaarts, J. (1978). Framework for Analyzing Proximate Determinants of Fertility. *Population and Development Review*, 4(1), 105–132. doi:10.2307/1972149
- Chen, Z., & Roy, K. (2009). Calculating concentration index with repetitive values of indicators of economic welfare. *Journal of Health Economics*, 28(1), 169–175. doi:10.1016/j.jhealeco.2008.09.004
- Cleland, K., Peipert, J. F., Westhoff, C., Spear, S., & Trussell, J. (2011). Family Planning as a Cost-Saving Preventive Health Service. *New England Journal of Medicine*, 364(18), e37. doi:10.1056/NEJMp1104373
- Dunn, K. M., Croft, P. R., & Hackett, G. I. (2000). Satisfaction in the Sex Life of a General Population Sample. *Journal of Sex & Marital Therapy*, 26(2), 141–151. doi:10.1080/009262300278542
- Erreygers, G., & Van Ourti, T. (2011). Measuring socioeconomic inequality in health, health care and health financing by means of rank-dependent indices: A recipe for good practice. *Journal of Health Economics*, 30(4), 685–694. doi:10.1016/j.jhealeco.2011.04.004
- Finer, L. B., & Zolna, M. R. (2011). Unintended pregnancy in the United States: incidence and disparities, 2006. *Contraception*, 84(5), 478–485. doi:10.1016/j.contraception.2011.07.013
- Font-Ribera, L., Pérez, G., Salvador, J., & Borrell, C. (2007). Socioeconomic Inequalities in Unintended Pregnancy and Abortion Decision. *Journal of Urban Health*, 85(1), 125–135. doi:10.1007/s11524-007-9233-z
- Frost, J. J., Finer, L. B., & Tapales, A. (2008). The Impact of Publicly Funded Family Planning Clinic Services on Unintended Pregnancies and Government Cost Savings. *Journal of Health Care for the Poor and Underserved*, 19(3), 778–796. doi:10.1353/hpu.0.0060
- Frost, J. J., Singh, S., & Finer, L. B. (2007). Factors Associated with Contraceptive Use and Nonuse, United States, 2004. *Perspectives on Sexual and Reproductive Health*, 39(2), 90–99. doi:10.1363/3909007
- Gissler, M., Berg, C., Bouvier-Colle, M. H., & Buekens, P. (2004). Pregnancy-associated mortality after birth, spontaneous abortion, or induced abortion in Finland, 1987-2000. *American Journal of Obstetrics and Gynecology*, 190(2), 422–427. doi:10.1016/j.ajog.2003.08.044
- Gissler, M., & Heino, A. (2011). Induced abortions in the Nordic countries 2009. National Institute for Health and Welfare: Official Statistics of Finland. Retrieved from [http://www.thl.fi/tilastoliite/tilastoraportit/2011/Tr09\\_11.pdf](http://www.thl.fi/tilastoliite/tilastoraportit/2011/Tr09_11.pdf)
- Gissler, M., & Shelley, J. (2002). Quality of data on subsequent events in a routine Medical Birth Register. *Medical informatics and the Internet in medicine*, 27(1), 33–38. doi:10.1080/14639230110119234
- Gissler, M., Ulander, V.-M., Hemminki, E., & Rasimus, A. (1996). Declining Induced Abortion Rate in Finland: Data Quality of the Finnish Abortion Register. *International Journal of Epidemiology*, 25(2), 376–380. doi:10.1093/ije/25.2.376

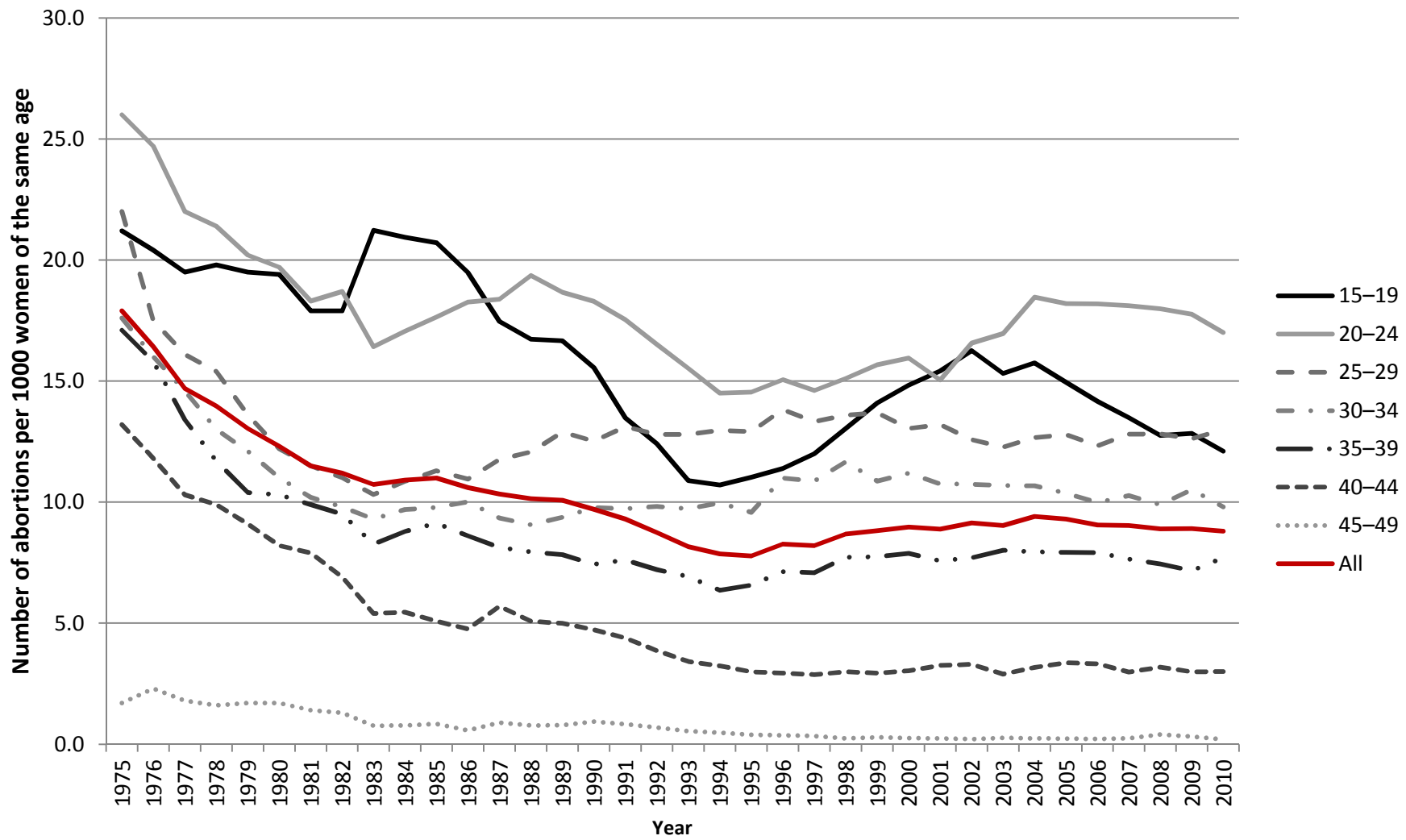
- Grunloh, D. S., Casner, T., Secura, G. M., Peipert, J. F., & Madden, T. (2013). Characteristics associated with discontinuation of long-acting reversible contraception within the first 6 months of use. *Obstetrics and gynecology*, *122*(6). doi:10.1097/01.AOG.0000435452.86108.59
- Hansen, M.-L. H., Mølgaard-Nielsen, D., Knudsen, L. B., & Keiding, N. (2009). Rates of induced abortion in Denmark according to age, previous births and previous abortions. *Demographic Research*, *21*, 647–680. doi:10.4054/DemRes.2009.21.22
- Heikinheimo, O., Gissler, M., & Suhonen, S. (2008). Age, parity, history of abortion and contraceptive choices affect the risk of repeat abortion. *Contraception*, *78*(2), 149–154. doi:10.1016/j.contraception.2008.03.013
- Heikinheimo, O., Gissler, M., & Suhonen, S. (2009). Can the outcome of the next pregnancy be predicted at the time of induced abortion? *Human Reproduction*, *24*(4), 820–826. doi:10.1093/humrep/den465
- Heino, A., Gissler, M., & Soimula, A. (2011). Induced abortions 2010. National Institute for Health and Welfare: Official Statistics of Finland. Retrieved from [http://www.thl.fi/fi\\_FI/web/fi/tilastot/aiheittain/seliterveys/raskaudenkeskeytykset/raskaudenkeskeytykset](http://www.thl.fi/fi_FI/web/fi/tilastot/aiheittain/seliterveys/raskaudenkeskeytykset/raskaudenkeskeytykset)
- Heino, A., Gissler, M., & Soimula, A. (2013). *Sterilisations 2012* (Statistical Report). Helsinki: THL. Retrieved from <http://www.julkari.fi/handle/10024/110585>
- Hemminki, E., Klemetti, R., Sevón, T., & Gissler, M. (2008). Induced abortions previous to IVF: an epidemiologic register-based study from Finland. *Human Reproduction*, *23*(6), 1320–1323. doi:10.1093/humrep/den101
- Hemminki, E., Sihvo, S., Koponen, P., & Kosunen, E. (1997). Quality of contraceptive services in Finland. *Quality and Safety in Health Care*, *6*(2), 62–68. doi:10.1136/qshc.6.2.62
- Hinde, A. (1998). *Demographic methods*. London; New York: Arnold.
- Jones, R. K., Darroch, J. E., & Henshaw, S. K. (2002). Patterns in the Socioeconomic Characteristics of Women Obtaining Abortions in 2000–2001. *Perspectives on Sexual and Reproductive Health*, *34*(5), 226–235. doi:10.2307/3097821
- Jones, R. K., & Kost, K. (2007). Underreporting of Induced and Spontaneous Abortion in the United States: An Analysis of the 2002 National Survey of Family Growth. *Studies in Family Planning*, *38*(3), 187–197. doi:10.1111/j.1728-4465.2007.00130.x
- Keski-Petäjä, M. (2012). Abortion Wishes and Abortion Prevention – Women Seeking Legal Termination of Pregnancy During the 1950s and 1960s in Finland. *Finnish Yearbook of Population Research*, *XLVII*, 113–135.
- Knudsen, L. B., Gissler, M., Bender, S. S., Hedberg, C., Ollendorff, U., Sundstrom, K., ... Vilhjalmsdottir, S. (2003). Induced abortion in the Nordic countries: special emphasis on young women. *Acta Obstetrica et Gynecologica Scandinavica*, *82*(3), 257–268. doi:10.1034/j.1600-0412.2003.00006.x
- Kohler, H.-P. (1997). Learning in Social Networks and Contraceptive Choice. *Demography*, *34*(3), 369. doi:10.2307/3038290
- Koistinen, M. (2008, January 23). The Price of Contraceptives Varies from Dozens to Hundreds of Euros per Year. [Ehkäisyn hinta vaihtelee kympeistä satasiin vuodessa]. *Helsingin Sanomat*. Retrieved from <http://www.hs.fi/artikkeli/Ehk%C3%A4isyn+hinta+vaihtelee+kympeist%C3%A4+satasiin+vuodessa/1135233486837>
- Konings, P., Harper, S., Lynch, J., Hosseinpoor, A. R., Berkvens, D., Lorant, V., ... Speybroeck, N. (2009). Analysis of socioeconomic health inequalities using the concentration index. *International Journal of Public Health*, *55*(1), 71–74. doi:10.1007/s00038-009-0078-y

- Kontula, O. (2010). The evolution of sex education and students' sexual knowledge in Finland in the 2000s. *Sex Education, 10*(4), 373–386.
- Kost, K., Singh, S., Vaughan, B., Trussell, J., & Bankole, A. (2008). Estimates of contraceptive failure from the 2002 National Survey of Family Growth. *Contraception, 77*(1), 10–21. doi:10.1016/j.contraception.2007.09.013
- Kosunen, E., Sihvo, S., Nikula, M., & Hemminki, E. (2004). Birth control [Raskauden ehkaisy]. In P. Koponen & R. Luoto (Eds.), *Reproductive health in Finland. The Health 2000 survey. [Lisääntymisterveys Suomessa. Terveys 2000 -tutkimus]* (pp. 54–61). Helsinki: National Public Health Institute.
- Kreyenfeld, M. (2010). Uncertainties in Female Employment Careers and the Postponement of Parenthood in Germany. *European Sociological Review, 26*(3), 351–366. doi:10.1093/esr/jcp026
- Levels, M., Need, A., Nieuwenhuis, R., Sluiter, R., & Ultee, W. (2010). Unintended Pregnancy and Induced Abortion in the Netherlands 1954-2002. *European Sociological Review, 28*(3), 301–318. doi:10.1093/esr/jcq065
- Madden, T., Secura, G. M., Allsworth, J. E., & Peipert, J. F. (2011). Comparison of contraceptive method chosen by women with and without a recent history of induced abortion. *Contraception, 84*(6), 571–577. doi:10.1016/j.contraception.2011.03.018
- Miller, W. B., Barber, J. S., & Gatny, H. H. (2013). The effects of ambivalent fertility desires on pregnancy risk in young women in the USA. *Population Studies, 67*(1), 25–38. doi:10.1080/00324728.2012.738823
- Nash, E., Benson Gold, R., Rowand, A., Rathbun, G., & Vierboom, Y. (2014). Laws Affecting Reproductive Health and Rights: 2013 State Policy Review. *State Trends for 2013 on Abortion, Family Planning, Sex Education, STIs and Pregnancy*. Retrieved January 24, 2014, from <http://www.guttmacher.org/statecenter/updates/2013/statetrends42013.html>
- Ní Bhrolcháin, M., & Beaujouan, É. (2012). Fertility postponement is largely due to rising educational enrolment. *Population Studies, 66*(3), 311–327. doi:10.1080/00324728.2012.697569
- Niinimäki, M., Pouta, A., Bloigu, A., Gissler, M., Hemminki, E., Suhonen, S., & Heikinheimo, O. (2009). Frequency and risk factors for repeat abortions after surgical compared with medical termination of pregnancy. *Obstetrics and gynecology, 113*(4), 845–852. doi:10.1097/AOG.0b013e31819cae06
- Official Statistics of Finland. (2013a). *Population structure [e-publication]*. Helsinki: Statistics Finland. Retrieved from [http://stat.fi/til/vaerak/tau\\_en.html](http://stat.fi/til/vaerak/tau_en.html)
- Official Statistics of Finland. (2013b). Classification of Socio-economic Groups 1989. Retrieved December 2, 2013, from [http://www.stat.fi/meta/luokitukset/sosioekon\\_asema/001-1989/kuvaus\\_en.html](http://www.stat.fi/meta/luokitukset/sosioekon_asema/001-1989/kuvaus_en.html)
- Openheimer, V. K. (1994). Women's Rising Employment and the Future of the Family in Industrial Societies. *Population and Development Review, 20*(2), 293–342. doi:10.2307/2137521
- Population Information Network. (1994). 94-09-04: Cairo Declaration on Population & Development, ICPPD. Retrieved January 23, 2014, from <http://www.un.org/popin/icpd/conference/bkg/egypt.html>
- Ranjit, N., Bankole, A., Darroch, J. E., & Singh, S. (2001). Contraceptive Failure in the First Two Years of Use: Differences across Socioeconomic Subgroups. *Family Planning Perspectives, 33*(1), 19–27. doi:10.2307/2673738
- Rasch, V., Gammeltoft, T., Knudsen, L. B., Tobiassen, C., Ginzel, A., & Kempf, L. (2007). Induced abortion in Denmark: effect of socio-economic situation and country of birth. *The European Journal of Public Health, 18*(2), 144–149. doi:10.1093/eurpub/ckm112

- Regushevskaya, E., Dubikaytis, T., Laanpere, M., Nikula, M., Kuznetsova, O., Haavio-Mannila, E., ... Hemminki, E. (2009). Risk factors for induced abortions in St Petersburg, Estonia and Finland. Results from surveys among women of reproductive age. *The European journal of contraception & reproductive health care: the official journal of the European Society of Contraception*, 14(3), 176–186. doi:10.1080/13625180902916038
- Ritamies, M. (1993). Have the Aims of the Finnish Abortion Law Been Reached? *Yearbook of Population Research in Finland*, 31, 62–71.
- Santelli, J. S., Lindberg, L. D., Orr, M. G., Finer, L. B., & Speizer, I. (2009). Toward a multidimensional measure of pregnancy intentions: evidence from the United States. *Studies in family planning*, 40(2), 87–100.
- Saurina, C., Vall-Iloera, L., & Saez, M. (2012). Factors determining family planning in Catalonia. Sources of inequity. *International Journal for Equity in Health*, 11, 35. doi:10.1186/1475-9276-11-35
- Sedgh, G., Bankole, A., Singh, S., & Eilers, M. (2012). Legal Abortion Levels and Trends By Woman's Age at Termination. *International Perspectives on Sexual and Reproductive Health*, 38(03), 143–153. doi:10.1363/3814312
- Sedgh, G., Singh, S., Shah, I. H., Åhman, E., Henshaw, S. K., & Bankole, A. (2012). Induced abortion: incidence and trends worldwide from 1995 to 2008. *The Lancet*, 379(9816), 625–632. doi:10.1016/S0140-6736(11)61786-8
- Sihvo, S. (2003). Women's life cycle and abortion decision in unintended pregnancies. *Journal of Epidemiology & Community Health*, 57(8), 601–605. doi:10.1136/jech.57.8.601
- Sirniö, O., Martikainen, P., & Kauppinen, T. M. (2013). Intergenerational Determinants of Income Level in Finland. *Social Forces*, sot098. doi:10.1093/sf/sot098
- Sobotka, T., Skirbekk, V., & Philipov, D. (2011). Economic Recession and Fertility in the Developed World. *Population and Development Review*, 37(2), 267–306. doi:10.1111/j.1728-4457.2011.00411.x
- Steele, F., Goldstein, H., & Browne, W. (2004). A general multilevel multistate competing risks model for event history data, with an application to a study of contraceptive use dynamics. *Statistical Modelling*, 4(2), 145–159. doi:10.1191/1471082X04st069oa
- Steele, F., Kallis, C., Goldstein, H., & Joshi, H. (2005). The Relationship between Childbearing and Transitions from Marriage and Cohabitation in Britain. *Demography*, 42(4), 647–673. doi:10.2307/4147333
- Sydsjö, A., Josefsson, A., & Sydsjö, G. (2009). Trends in induced abortions between 1975 and 2000 in a cohort of women born in 1960–64 in four Scandinavian countries. *The European journal of contraception & reproductive health care: the official journal of the European Society of Contraception*, 14(5), 334–339. doi:10.3109/13625180903039160
- Trussell, J., Vaughan, B., & Stanford, J. (1999). Are All Contraceptive Failures Unintended Pregnancies? Evidence from the 1995 National Survey of Family Growth. *Family Planning Perspectives*, 31(5), 246–260. doi:10.2307/2991573
- University Pharmacy. (2014). Online Pharmacy [Verkkoapteekki - Yliopiston Apteekki]. Retrieved January 29, 2014, from <http://www.yliopistonapteekki.fi/fi/apteekkipalvelut/Pages/Default.aspx>
- Väestöliitto - Family Federation of Finland. (2012, May 8). IUD [Kierukka]. Retrieved January 29, 2014, from [http://www.vaestoliitto.fi/seksuaalisuus/tietoa-seksuaalisuudesta/aikuiset/seksuaalisuuden\\_suloja\\_ja\\_seksin/raskauden\\_ehkaisy/kierukka/](http://www.vaestoliitto.fi/seksuaalisuus/tietoa-seksuaalisuudesta/aikuiset/seksuaalisuuden_suloja_ja_seksin/raskauden_ehkaisy/kierukka/)
- Väisänen, H., & Jokela, M. (2010). Fertility after Induced Abortion: a Register-Based Study in Finland 2000–2008. *Finnish Yearbook of Population Research*, XLV, 25–44.

- Väisänen, H., & Murphy, M. (Forthcoming). Social Inequalities of Teenage Fertility Outcomes: Childbearing and Abortion Trends of Three Birth Cohorts in Finland. *Perspectives on Sexual and Reproductive Health*.
- Vikat, A. (2004). Women's Labor Force Attachment and Childbearing in Finland. *Demographic Research, Special 3*, 177–212. doi:10.4054/DemRes.2004.S3.8
- Vikat, A., Kosunen, E., & Rimpela, M. (2002). Risk of postpartum induced abortion in Finland: A register-based study. *Perspectives on Sexual and Reproductive Health*, 34(2), 84–90. doi:10.2307/3030211
- Waite, L. J. (1995). Does marriage matter? *Demography*, 32(4), 483–507. doi:10.2307/2061670
- Wellings, K., Jones, K. G., Mercer, C. H., Tanton, C., Clifton, S., Datta, J., ... Johnson, A. M. (2013). The prevalence of unplanned pregnancy and associated factors in Britain: findings from the third National Survey of Sexual Attitudes and Lifestyles (Natsal-3). *The Lancet*, 382(9907), 1807–1816. doi:10.1016/S0140-6736(13)62071-1
- Werding, M. (2014). Children are costly, but raising them may pay: The economic approach to fertility. *Demographic Research*, 30, 253–276. doi:10.4054/DemRes.2014.30.8
- Williams, R. (2012). Using the margins command to estimate and interpret adjusted predictions and marginal effects. *The Stata Journal*, 12(2), 308–331.





**Fig. 1** Number of abortions per 1000 women by age in Finland in 1975-2010. (Source: Heino et al. 2011)

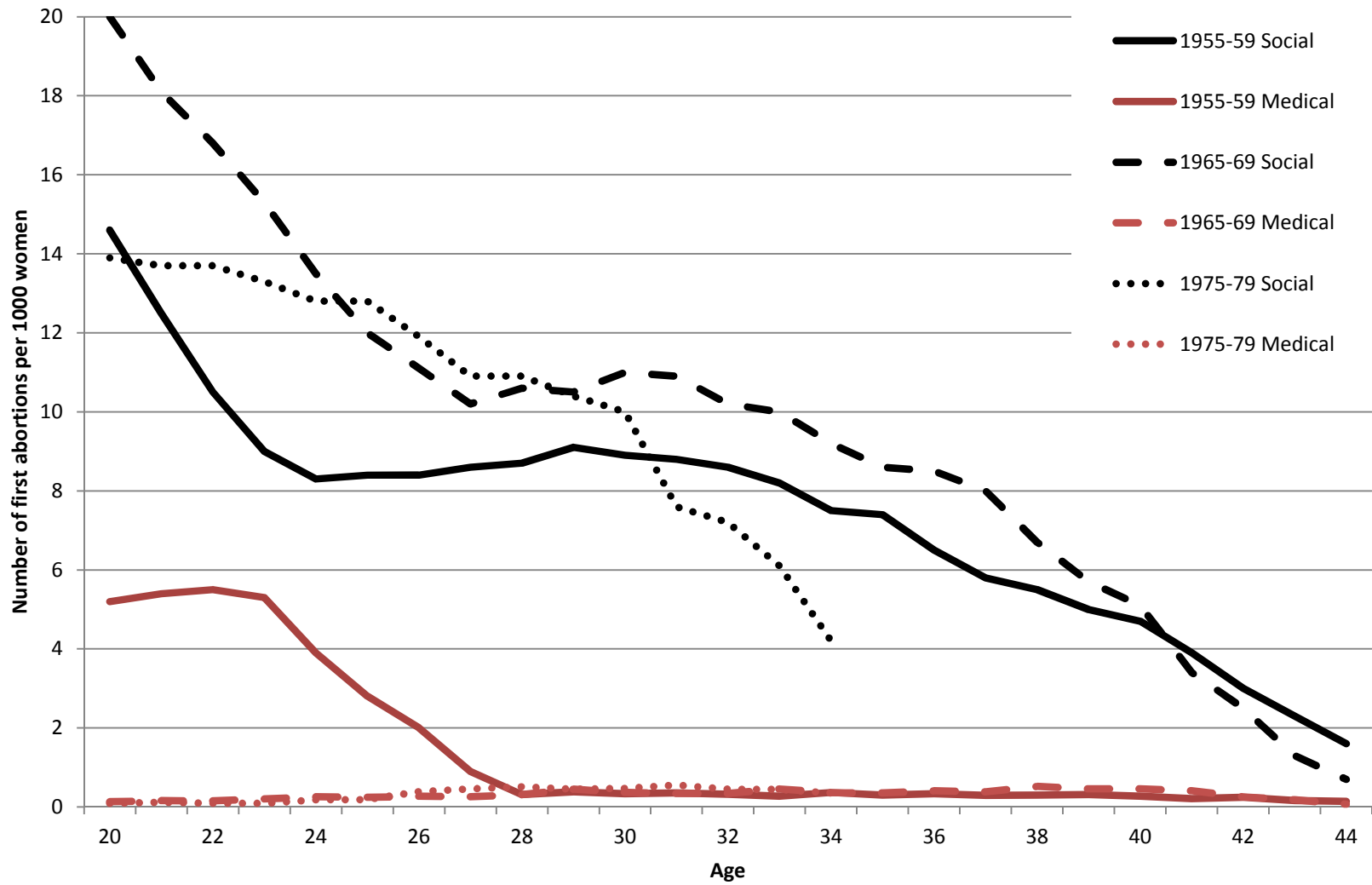
**Table 1** Weighted % of education and SES<sup>a</sup> across age groups and cohorts, un-weighted N

Variable	Category	1955-1959			1965-1969			1975-1979		
		20 <sup>b</sup>	25 <sup>c</sup>	30 <sup>c</sup>	20 <sup>c</sup>	25 <sup>c</sup>	30 <sup>c</sup>	20 <sup>c</sup>	25 <sup>c</sup>	30
EDUCATION	Basic	47.9	27.7	24.1	23.2	16.8	15.2	18.2	12.5	11.2
	Upper secondary	47.3	47.7	39.1	75.2	69.7	48.8	54.1	53.7	38.7
	Further	4.8	17.1	26.5	1.6	7.5	20.7	27.7	10.4	8.5
	Undergraduate	0.0	5.4	4.6	0.0	2.6	4.3	0.0	17.6	24.8
	Postgraduate	0.0	2.1	5.7	0.0	3.3	11.0	0.0	5.9	16.8
<b>Total = 100%</b>										
<b>(N)</b>		(102,014)	(101,090)	(100,442)	(95,540)	(96,102)	(96,439)	(58,173)	(58,746)	(59,149)
SES	Manual worker	22.6	24.8	21.2	19.1	19.7	17.4	15.1	20.4	15.8
	Lower-level employee	25.3	41.8	44.6	24.8	36.2	34.6	13.5	31.9	39.5
	Upper-level employee	0.8	6.6	13.2	1.6	8.0	14.4	1.3	9.5	20.4
	Student	39.1	12.1	3.8	41.1	16.8	7.4	50.9	19.1	6.2
	Other	7.9	8.8	9.2	11.2	14.6	19.7	17.5	15.8	13.2
	Self-employed	0.6	1.6	3.5	0.6	2.3	3.8	0.6	1.7	3.4
	Farmer	1.6	1.5	2.9	0.5	1.3	1.6	0.1	0.5	0.8
	Missing	2.1	2.8	1.6	1.1	1.1	1.1	0.9	1.1	0.8
<b>Total = 100%</b>										
<b>(N)</b>		(102,014)	(101,090)	(100,554)	(95,592)	(95,944)	(96,462)	(58,227)	(58,706)	(59,149)

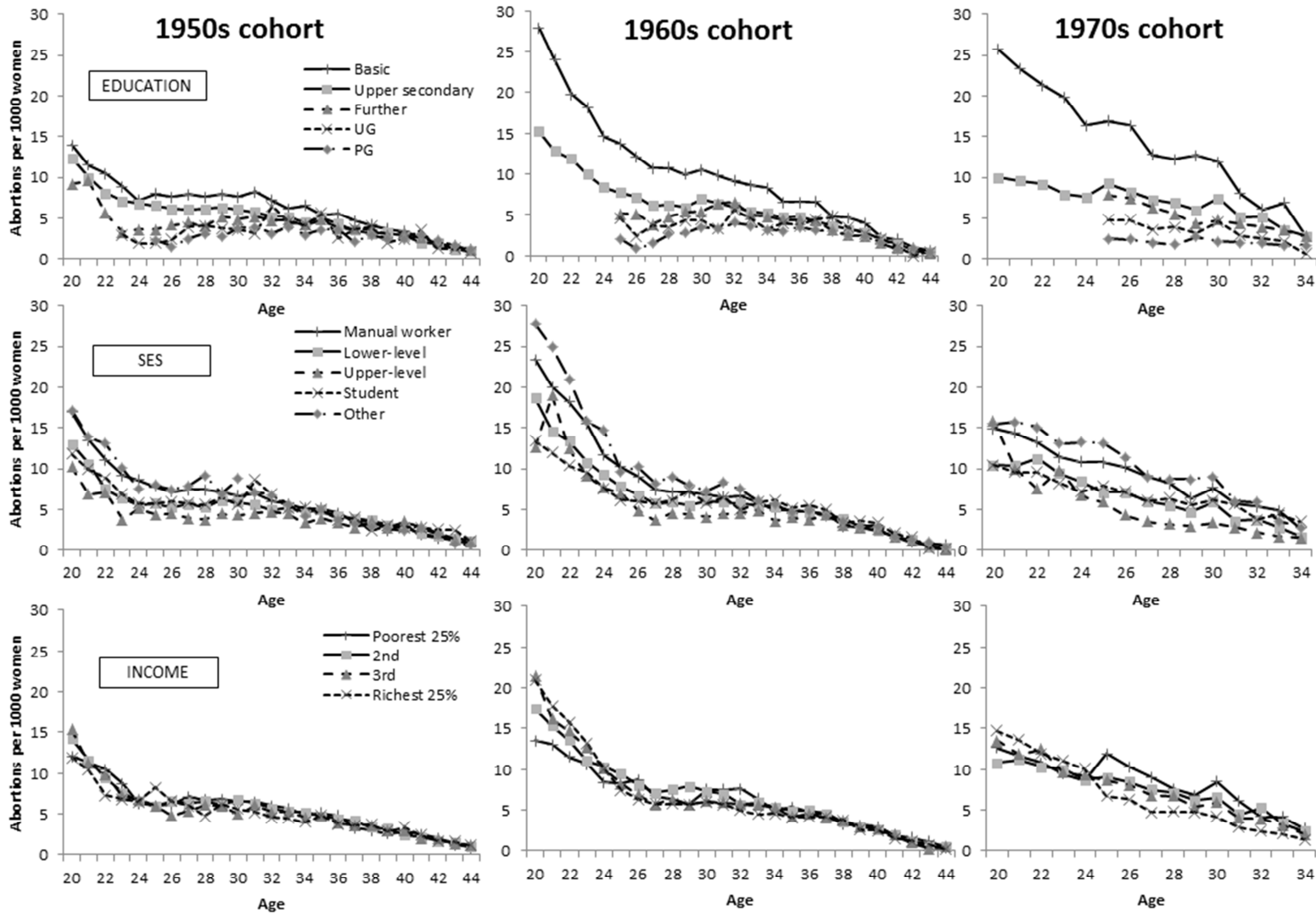
Source: Register data from Statistics Finland and the National Institute for Health and Welfare, author's calculations.

<sup>a</sup> Income not included because all four groups are 25% by definition (see text).

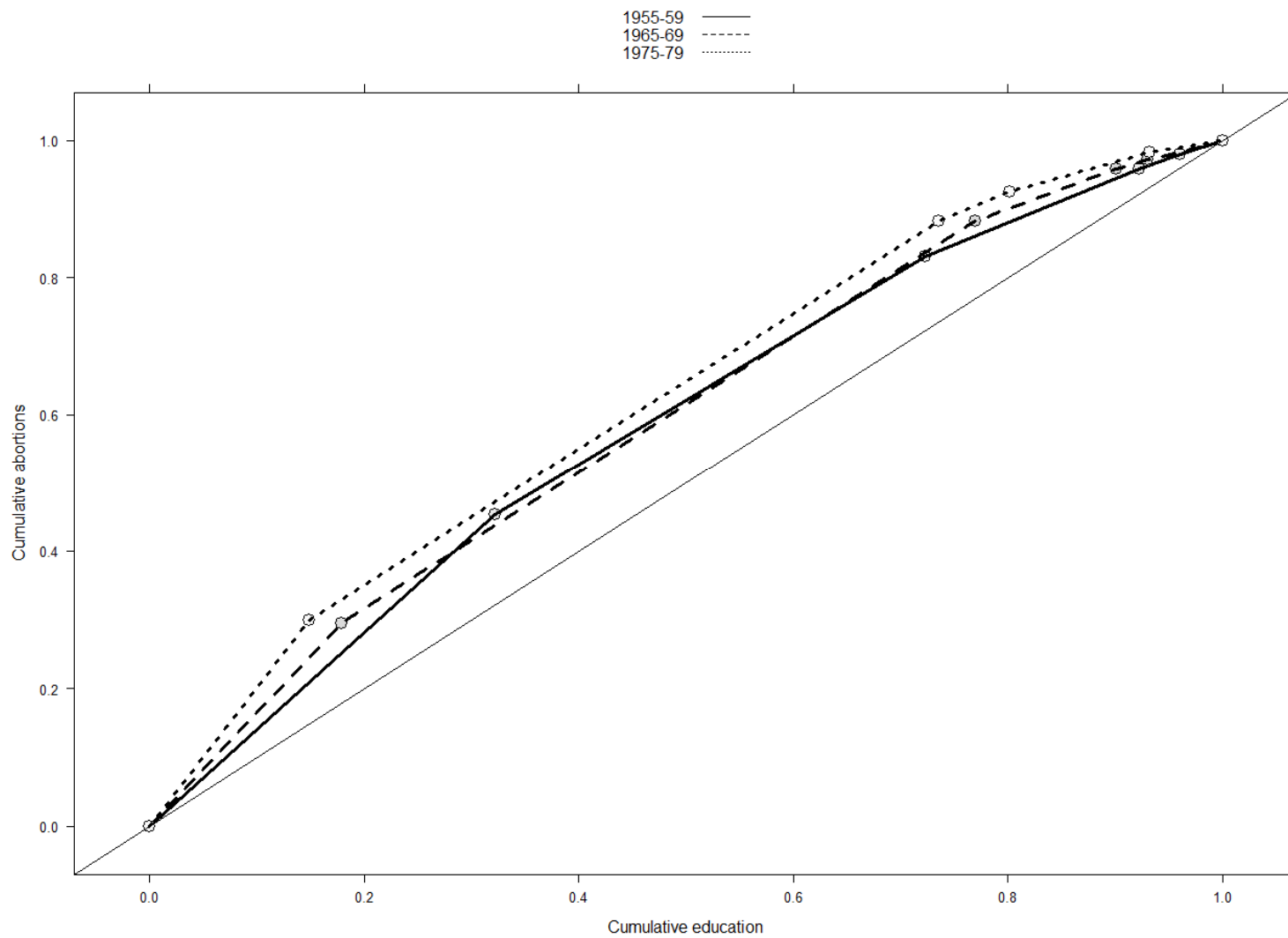
<sup>b</sup> Measured at age 20/25/30 or the nearest year possible (see text). Because of that Total Ns for SES are different from the other Total Ns (sometimes measured in different years).



**Fig. 2** Number of first abortions per 1000 women of the same age by indication of abortion (social/medical) and cohort. *Source:* As for Table 1



**Fig. 3** The number of first abortions due to social indication per 1000 women of the same age and education, SES or income. *Source:* As for Table 1



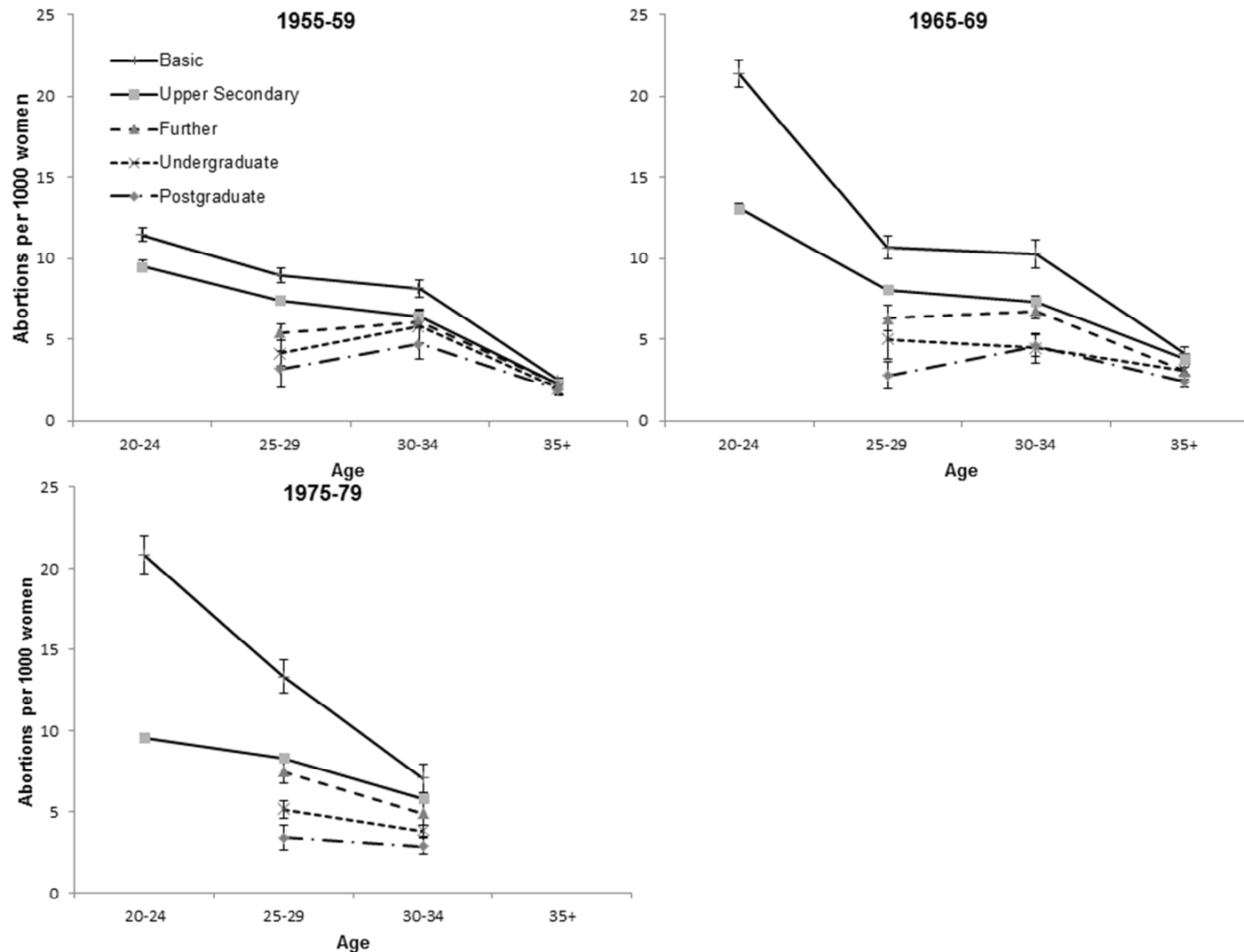
**Fig. 4** Concentration curves of the incidence of first abortion due to social indication against cumulative level of education by cohort. *Source:* As for Table 1

Table 2. Discrete-time event history models by age group and cohort. Hazard-odds ratios with 95% confidence intervals

Age	20-24		25-29		30-34		35+	
	Haz-OR	CI 95%	Haz-OR	CI 95%	Haz-OR	CI 95%	Haz-OR	CI 95%
<b>Cohort</b>	<b>1955-59</b>							
EDUCATION								
Basic (ref.)	1.00		1.00		1.00		1.00	
Upper Secondary	0.83	(0.79-0.88)	0.82	(0.77-0.88)	0.78	(0.72-0.85)	0.92	(0.84-1.00)
Further	0.56	(0.48-0.66)	0.60	(0.54-0.67)	0.75	(0.67-0.83)	0.91	(0.82-1.00)
UG	0.34	(0.18-0.63)	0.46	(0.37-0.56)	0.71	(0.58-0.87)	0.80	(0.66-0.97)
PG			0.35	(0.25-0.51)	0.58	(0.47-0.72)	0.76	(0.63-0.92)
SES								
Manual worker (ref.)	1.00		1.00		1.00		1.00	
Lower-level employee	0.62	(0.43-0.89)	0.88	(0.81-0.95)	0.95	(0.87-1.04)	1.07	(0.98-1.18)
Upper-level employee	0.57	(0.45-0.71)	0.88	(0.75-1.04)	0.88	(0.75-1.02)	1.05	(0.91-1.21)
Student	0.71	(0.52-0.96)	0.97	(0.86-1.08)	1.14	(0.95-1.36)	1.13	(0.94-1.36)
Other	0.78	(0.72-0.84)	1.04	(0.93-1.16)	0.97	(0.85-1.11)	0.94	(0.81-1.09)
Self-employed	0.69	(0.64-0.75)	0.93	(0.74-1.18)	1.13	(0.94-1.37)	1.19	(0.99-1.43)
Farmer	0.96	(0.87-1.05)	0.63	(0.47-0.85)	0.71	(0.55-0.92)	0.97	(0.78-1.21)
INCOME								
Poorest 25% (ref.)	1.00		1.00		1.00		1.00	
2nd	1.10	(1.02-1.18)	1.08	(0.99-1.17)	1.08	(0.98-1.19)	1.06	(0.96-1.17)
3rd	1.07	(0.98-1.16)	1.03	(0.93-1.13)	1.04	(0.93-1.15)	1.00	(0.90-1.11)
Richest 25%	0.96	(0.87-1.05)	1.23	(1.12-1.35)	1.04	(0.93-1.17)	1.04	(0.93-1.16)
<b>Cohort</b>	<b>1965-69</b>							
EDUCATION								
Basic (ref.)	1.00		1.00		1.00		1.00	
Upper Secondary	0.60	(0.54-0.64)	0.75	(0.69-0.81)	0.71	(0.64-0.78)	0.92	(0.82-1.04)
Further			0.58	(0.50-0.68)	0.65	(0.58-0.74)	0.74	(0.64-0.86)
UG			0.46	(0.36-0.60)	0.43	(0.34-0.54)	0.75	(0.60-0.93)
PG			0.26	(0.19-0.35)	0.44	(0.37-0.53)	0.59	(0.48-0.71)
SES								
Manual worker (ref.)	1.00		1.00		1.00		1.00	
Lower-level employee	0.78	(0.73-0.83)	0.90	(0.83-0.97)	1.00	(0.90-1.11)	1.07	(0.96-1.20)
Upper-level employee	0.76	(0.63-0.91)	0.90	(0.78-1.05)	0.99	(0.85-1.16)	1.09	(0.93-1.27)
Student	0.67	(0.62-0.71)	0.86	(0.77-0.95)	1.04	(0.89-1.21)	1.26	(1.07-1.49)
Other	1.07	(0.99-1.15)	0.97	(0.88-1.06)	1.07	(0.95-1.19)	1.12	(0.99-1.28)
Self-employed	0.96	(0.74-1.24)	1.12	(0.92-1.35)	1.12	(0.93-1.36)	1.21	(0.99-1.49)
Farmer	0.72	(0.51-1.01)	0.57	(0.40-0.81)	0.52	(0.35-0.78)	0.66	(0.46-0.96)
INCOME								
Poorest 25% (ref.)	1.00		1.00		1.00		1.00	
2nd	1.11	(1.04-1.18)	1.15	(1.06-1.26)	1.12	(1.02-1.24)	1.09	(0.98-1.21)
3rd	1.22	(1.14-1.30)	1.10	(1.00-1.20)	1.16	(1.04-1.29)	1.09	(0.97-1.23)
Richest 25%	1.24	(1.16-1.34)	1.16	(1.06-1.28)	1.18	(1.05-1.33)	1.11	(0.98-1.26)
<b>Cohort</b>	<b>1975-79</b>							
EDUCATION								
Basic (ref.)	1.00		1.00		1.00			
Upper Secondary	0.45	(0.42-0.48)	0.62	(0.57-0.68)	0.82	(0.71-0.95)		
Further			0.56	(0.49-0.64)	0.69	(0.57-0.85)		
UG			0.38	(0.33-0.44)	0.54	(0.45-0.65)		
PG			0.25	(0.19-0.32)	0.40	(0.31-0.51)		
SES								
Manual worker (ref.)	1.00		1.00		1.00			
Lower-level employee	0.86	(0.78-0.96)	0.88	(0.80-0.96)	0.87	(0.76-0.99)		
Upper-level employee	0.83	(0.62-1.10)	0.71	(0.61-0.83)	0.80	(0.67-0.97)		
Student	0.77	(0.71-0.84)	0.86	(0.77-0.95)	0.94	(0.77-1.16)		
Other	0.99	(0.90-1.09)	0.99	(0.90-1.09)	0.95	(0.81-1.11)		
Self-employed	0.82	(0.54-1.22)	1.03	(0.81-1.31)	1.06	(0.83-1.36)		
Farmer	0.22	(0.05-0.89)	0.52	(0.30-0.92)	0.45	(0.22-0.93)		
INCOME								
Poorest 25% (ref.)	1.00		1.00		1.00			
2nd	0.92	(0.85-1.01)	0.99	(0.90-1.08)	1.14	(1.00-1.30)		
3rd	0.94	(0.86-1.02)	1.11	(1.01-1.23)	1.16	(1.01-1.34)		
Richest 25%	1.08	(0.99-1.18)	1.03	(0.92-1.15)	1.06	(0.91-1.25)		

Notes: All models were conducted separately by cohort and age group and include age, education, SES, income, birth interval (months), birth interval<sup>2</sup>, parity, relationship status, place of residence, and immigration status.

Source: As for Table 1



**Fig. 5** Marginal effects at representative values: the probability of abortion by level of education and age with 95% confidence intervals. Adjusted for age, SES, income, birth interval (months), birth interval<sup>2</sup>, parity, relationship status, place of residence, and immigration status. *Source:* As for Table 1