

Statistics Norway
Department of Social Statistics

Trude Lappegård

**Education attainment and
fertility pattern among
Norwegian women**

Trude Lappegård

Education attainment and fertility pattern among Norwegian women

Abstract:

This study examines the connection between fertility trends and women's choice of education. The analyses indicates that field of study has a more decisive influence than educational level on women's fertility. The analysis dealing with the possibility of being childless at age 40, shows that among women who are childless, those educated towards female-dominated occupations are fewer than those educated towards other occupations. The result from the analysis focuses on mean number of children born to women who have children show that women educated towards female-dominated occupations have more children than women educated towards other occupations, but that there is also a high level of fertility among women whose education has a high-career orientation (doctors, dentists). This shows that through choice of occupation and adjustment on the labour market, women combine a high level of fertility with an active career.

Keywords: Fertility, education, labour market.

Acknowledgement:

This research is part of the project "Fertility, education and social changes - more diversity in choice of life-course?", financed by the Norwegian Research Council and Statistics Norway. The paper was presented at the XV World Congress of Sociology, 7-13 July 2002, Brisbane, Australia. A Norwegian version of this paper has been published in Tidsskrift for Samfunnsforskning, Vol. 3, 2001, 409-435. Thanks to Kari Skrede for reading and commenting the present version of the paper.

Address: Division for Social and Demographic Research, Statistics Norway, P.O.Box 8131 Dep, N-0033 Oslo, Norway. E-mail: trude.lappegard@ssb.no

Introduction

During the last decades women's fertility pattern in Norway and other western countries have been through major changes with postponed childbearing and lower fertility rates. This development can be related to more individualistic attitudes, increased equality of status, higher education attainment, and increased income potential and new contraceptives.

Women's role in modern society has changed, and women today have more freedom to choose their life course than earlier. However, in spite of a transition towards a more modern pattern of family formation, not all women have changed. Even though there is a pronounced trend of postponed childbearing, there are still women that become mothers when they are relatively young. At the same time as it varies when women become mothers, there is also a more pronounced variation in how many children they have (Lappegård 1998).

Numerous studies, from both Norway and other western countries, show a clear connection between women's fertility pattern and level of education, where those with higher education have children later than those with less education do. This pattern is most pronounced in younger birth cohorts where women with less education have children at young ages, while women with higher education are postponing childbearing and have fewer children than others (Marini 1984, Rindfuss et. al. 1996, Retherford & Luther 1996, Kalmijn 1996, Blom et. al. 1993). Analyses from Norway in the 1990s show increased differences in the tempo of postponed childbearing, with more marked differences between those with higher education and those with less education (Lappegård 2000). Previous studies have, at the same time, also shown that the level of education does not have the same effect on the number of children a woman has, as when she has her first child. Even though women with less education have the most children, the differences between this group and the one with higher education are small (Noack & Rønsen 1994, Ellingsæter et. al. 1997, Kravdal 1992, Lappegård 2000). Whether or not the field of education also has an effect on women's fertility — has not been analysed as much as the effect of the level of education. However, analyses from Sweden and the Netherlands have shown that women with an education within care, teaching and culture have more children than women with an education within economics and technology (Hoem 1994, Kalmijn 1996).

Accordingly, analyses of women's fertility indicate that both levels of education and fields of education divide women in whether or not they are having children at all, when they are having children and how many. In this paper we are looking at whether or not inequality in women's fertility can be related to their field of education. We have done analyses of three aspects of women's fertility: Who have children and who do not have children, timing of the first childbirth and how many children women who do have children — do they have. We are using register data from Statistics Norway with information about women's fertility and education attainment. Women acquiring higher education have become more common during the last decades, which give us the opportunity to do more detailed analyses of women with higher education than was possible previously. The analyses in this paper concentrate on women who were 40-45 years in 1998, which means women born between 1954 and 1958. This cohort is chosen since we are looking at the number of children born — and therefore have to choose an age where most children are born. The cohort is also interesting to analyse because it concerns the first generation of women growing up with the expectation of a modern role of women.

Theoretical perspectives of fertility

The transition from the traditional to a more modern pattern of family formation, with postponed childbearing and lower fertility rates, has been referred to as the second demographic transition (van de Kaa 1987). Different theories have been used to explain this transition. According to classical economic theory, decreased fertility rates can be seen in connection with changes in women's status. The theory argues that increased level of education and labour market participation among women has reduced the economic value of marriage and parenthood. The indirect cost of the increase in the number of children with increased investment in education, labour market participation and increased income potential, which are connected to the mother's use of time, is again affected by how much human capital (education, work experience) she has (Becker 1981, Butz & Ward 1977, Ermisch 1988, Pollak & Watkins 1993). From such a perspective education is seen as a resource that gives opportunities and yield in the labour market, which competes with family life and childcare over time. Women with higher education are more economically independent than women with less education. Since they are able to support themselves by paid work they are freer in their choice of whether or not they will marry and have children.

Inequality in women's fertility is, from this perspective, a result of rational choices, where women with higher education are more likely to give priority to paid work on the expense of childcare responsibilities. The consequence of this is that women with less education are more family-oriented and have more children at a younger age since they early specialise in home making and childcare. Women with higher education, however, have fewer children and are older when they become mothers since they are more career-oriented and have higher income potential (Becker 1981). The conclusion that postponed childbearing and lower fertility rates only are results of human capital has been criticised. One objection is that not all studies are combinable with having a child during the period of study, either for practical reasons or as a result of normative views that student life is not compatible with family formation. An analysis from Germany shows that participation in a school system in itself postpones childbearing and transition to adulthood, which have more effect on the timing of childbirth than investment in human capital (Blossfeld & Huinink 1991).

According to another perspective, changes in women's fertility can be related to changes in orientation of values and normative views of our social roles. The development during the last decades has been described as an ideological shift towards more post-modernistic values, which reflects more individualistic attitudes. The modern society has been through some fundamental changes, where the opportunity structures around family formation and childcare are more open, and the individual has different options both with own development and when she wants to establish herself with a family (Giddens 1992, Beck 1992, Beck & Beck-Gernsheim 1995). Elements in both perspectives can partially explain postponed childbearing and declining fertility rates, but they do not explain neither why some women choose higher education and some do not, nor the increased variation in women's fertility patterns. To better understand the social processes of changes that have affected new fertility patterns it can be useful to use theories that have been used to explain other processes of inequality.

Choice of life course

Today's young women have more open opportunity structures than their mothers had. Women have different preferences and orientations towards their own life course. These norms will be affected by social background and social and economic structure. Women's life course is embedded in a network of economic, political, social and cultural conditions. During the last

decades there has been a dramatic increase in both women's level of education and labour market participation. The norm of economic independency is strong in our society and can be illustrated by the fact that most women continue in paid work after childbirth. For young mothers today everyday life is to a large extent composed of a combination of childcare and labour market participation. This development can among other things be related to changes in welfare policy during the last decades, which led to a stronger integration of childcare and public policy. Parental leave programmes have strengthened working mothers' and fathers' rights concerning childcare and made it easier to combine work and childcare responsibilities (Leira 1992, 1996).

Women's opportunity structures are in constant change over the life course and are different in different birth cohorts and phases of the life course. When women choose education early in their life course, before they have children, their choices will be affected by their preferences and norms for family and family formation, and for work and labour market participation. However, these preferences are not necessarily the same later in their life course. Differences in preferences concerning labour market participation and childcare are factors that affect the choice of education. Education can be seen as a resource that gives opportunities and status in the labour market, where different types of education give different possibilities. Some types of education are more closely connected to specific occupations than others. In addition to affect your working career, education can also express who you are, which also can be used to explain why some women take higher education and others do not, and why differences in women's life course strategies affect their reproduction behaviour early in their life course (Skrede & Sørensen 1983). This perspective can be related to the "Preference theory", which has been used to explain women's work orientation and is based on the fact that women acquired a genuine choice between career employment and motherhood when modern contraceptives were introduced at the end of the 1960s (Hakim 1991, 1996, 1998, 2000). The theory has a three-fold typology of women's work preferences: Home-centred, work-oriented and adaptive. Children and family are the main priorities throughout life among the home-centred, and in this group we find women who prefer not to work. Work-centred women are committed to work or equivalent activities and childless women are concentrated in this group. Adaptive women are the most complex group, and this group includes all women who want to combine work and family, which means that they want to work, but are not totally committed to work career. The Preference theory has been criticized for arguing that women's

position in the labour market only is a result of different choices where individual and structural conditions are not taken into consideration (Crompton & Harris 1998a, 1998b). However, differences in preferences can be useful as an approach to understand the selection of different types of education, and to understand why some women do not have children at all, that some postpone longer than others before they become mothers, and that some have more children than others.

Sex segregation and childcare

Women's preferences and orientations in regard to their life course can be expressed through their choices of education and adjustments to the labour market. Inequality among women in their preferences for combination of family responsibilities and labour market participation can be used to understand why so many women choose an education that leads to occupations in female-dominated jobs. During the last decades there has been a strong growth in female labour market participation. More than four of five women with children under the age of 16 participate in the labour market. The employment rate among women with the youngest children is also high: 75 per cent of all women with their youngest child between ages 0-2 year were in the labour force in 2000¹. The possibility of working part-time has been important in the Scandinavian countries as a way of combining work and childcare (Ellingsæter & Rønsen 1996). Analyses have shown that education is important for whether or not women work part-time or not, and the number of working hours increases with the level of education. There are also more women working part-time in the public sector than in the private sector (Ellingsæter 1989).

At the same time as the employment rate among young Norwegian mothers is high there is a high level of sex segregation: Statistics show that above half of the women in the work force — work in occupations where half or more are women (Statistics Norway 1998). The high level of sex segregation in Norway has been linked to different aspects of the social benefit systems and the organization of the labour markets in the social democratic welfare state. One argument emphasizes that public sector jobs are especially attractive to women. Mothers choose to take sex-segregated jobs because they fit conveniently into their own domestic

¹ Unpublished figures from Statistics Norway.

commitments, and because they suit the requirements of employers in the service industries (Jacobs 1995). From a classical economic perspective it is argued that women seek "less demanding" jobs and choose occupation where they reduce the cost of employment to mothers by facilitating the combination of the role of worker and mother (Becker 1981, Polachek 1987). That women choose positions where the consequences with job discontinuity are as small as possible – can also explain a sex-segregated labour market (England 1992). For women who are oriented towards family and childcare it will be most rational to choose the type of education where their childcare responsibilities most easily are combinable with work activities (Polachek 1987). Certainty regarding their work situation is important for women who want to establish themselves with a family. Since women usually spend more time on domestic work, the non-economic aspects of the job – such as job certainty, opportunities for shorter working hours and paid or unpaid leave without strong penalties – will probably be more important than for men (Hansen 1995). Most women in today's society want a life where they can combine work and family, and compared with some years ago today's young women have better opportunities to have a double agenda: They may participate full-time in the work force without giving up family life and children (Skrede 1999). Even though family policy programmes have made work career and childcare more compatible than before, women will gain by getting a good foothold in the labour market after having finished their education before they become mothers. In some occupations it may be both time and resource demanding for women to establish themselves in the labour market, while it is easier to get a foothold in the labour market in other occupations. In some occupations continuity is also more important for their career opportunities than it is in other occupations. There is more predictability in the labour market in female-dominated occupations, both in regard to attaining necessary competence in the occupation and building up seniority before having the first child. Female-dominated occupations are described as occupations where it is easier with discontinuity than in other occupations. There is less "punishment" for career development to be away for a period in connection with childbirth in female-dominated jobs, and there are opportunities for more part-time work than in other occupations. In an analysis of Norwegian female graduate engineers it was reported that the consequences of childbirth were a delay of two to three years compared with male graduates (Kvande & Rasmussen 1990).

To different fields of education there are linked different career orientations and characteristics of the labour market situation that might affect women's fertility. However, there are also other factors that may affect women's fertility. Whether or not the women establish themselves in long-term relationships is important for having a child or not. Some women are more work-oriented than others and will have a higher threshold for establishing themselves with a family than others. When women are asked — most of them answer — regardless of education, that they want children (Lyngstad & Noack 2000). That some women remain childless is more likely to be a result of not being able to have children — either for medical reasons — or they are less likely to have children because they are unmarried or not cohabiting with a man. They may also deliberately have chosen not to have children. However, differences between women with different education in how many who do not have children can be related to how much the individual wants to become a mother or to make a career. In this paper we will explore how women's fertility varies between women with different education attainment. Our general assumption is that women's preferences and orientations with regard to family life and labour force can be expressed through their choice of education and later choice of occupation.

Data, methods and classifications

The analyses are based on Norwegian register data, the population statistics system and the educational statistics system from Statistics Norway. The population statistics system is based on information extracted from the Central Population Register in Norway. These biographies cover complete female birth cohorts after 1935. The analyses in this paper are based on women living in Norway 1 January 1999. The educational statistics system is based on information on women's highest attained education 1 October 1997. This means that we do not know the educational attainment at the time of childbirth. We do, however, know the time of the highest educational attainment, which means that we can say whether or not a child was born before or after the women finished her highest educational attainment. As a measure of life course strategies, educational attainment can also be interesting, because plans for future education like finished education may affect women's fertility. Register data give us good opportunities to divide into small groups, which gives us relatively detailed information about fertility among women with different education attainment. However, register data limit the possibility to apply a multivariate model with other covariates such as social background,

information about the father, income, labour force participation etc. This is a weakness in our data and limits our possibilities for clear conclusions. However, the analyses will show how fertility varies between women with different education attainment.

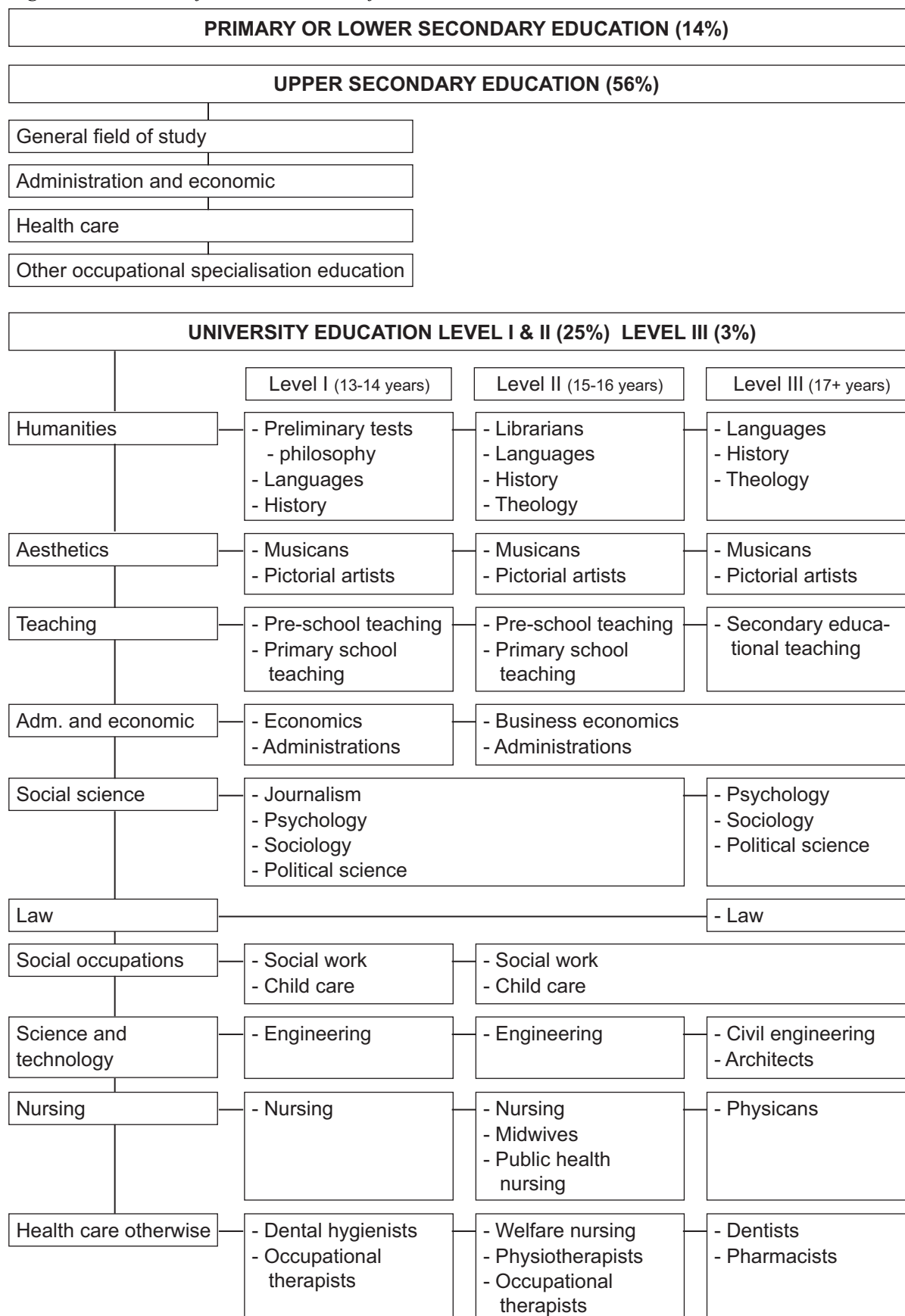
When looking at the number of children we use bivariate regression analyses, which is an adequate tool to test the significance of our estimates. In the analyses of how many have children at the age of 40, we used linear regression (least square method). By using logistic regression we have estimated the probability of being childless at age 40, and the probability of having number three among mothers with two children. The probability from logistic regression can be expressed as

$$P(Y = 1) = \frac{e^{\beta x}}{1 + e^{\beta x}}$$

We have divided educational attainment into 31 different groups, which are measured as dummy variables with primary or lower secondary education as the reference group. Each group is defined by a combination of level of education and field of education, because some fields of education are not found at all levels. Level of education is divided into five: 9, 10-12, 13-14, 15-16 and 17 years and more. For division of field of education we used Norwegian standard classification of education (Statistics Norway 1989). Field of education at upper secondary school is only divided into four groups: *general field of study*, *administration and economic*, *health care* and *other occupational specialisation*. We divided field of education at higher levels into three groups at three levels of university education.

In figure 1 we give an overview of educational classification used in this paper. In the birth cohort that is analysed in this paper (1954-58-cohorts), 14 per cent of the women finished school after primary or lower secondary education and 56 per cent finished after upper secondary school. One fourth of the women have completed education at 4 years above upper secondary education. The group — women with university education at a higher level — is a marginal group of only 3 per cent at the cohort. Women in these cohorts have more education than older birth cohorts, but were still traditional in their choice of education. The largest group of women with university education is found in *teaching* (31 per cent). Here we find both pre-school teaching and primary school teaching among those with lower levels and

Figure 1. Overview of educational classification



secondary educational teaching among those with higher levels. The second largest group is found in health care (27 per cent), where we distinguished between *nursing* and *health care otherwise*. In nursing we find nurses, midwives and public health nurses among those with lower levels, and physicians among those with higher levels. In health care otherwise we find dental hygienists, occupational therapists, welfare nurses and physiotherapists among those with lower levels, and dentists and pharmacists among those with higher levels. The groups of *administration and economics, social sciences, law and social occupations* comprise 23 per cent of the women. In the first group we find economics and business economics. Among social sciences we find journalists and women with lower and higher levels in the fields of psychology, sociology and political sciences. Among social occupations we found social work and childcare work. In the group of *humanities and aesthetics* (12 per cent) we find musicians and pictorial artists. In the latter group and in the first group we find librarians, languages, history and theology. *Science and technology* is a small group (6 per cent) and includes engineers, civil engineers and architects.

Childlessness and family formation

Most women become mothers, but at different times in their life course — and some women remain childless. In this part we are looking at differences between groups of education in regard to how many that are not having children — and the timing of the first childbirth. Table 1 shows the probability of being childless at age 40 by different educational groups. There are three findings that can be pointed out. Firstly, the field of education has a stronger effect for the level of childlessness among women with education at university level than among women with upper secondary school. Secondly, among those with a higher educational level the effect is different in different fields of education. Thirdly, there is more variation between fields of education among those with university education at a lower level than among those with education at a higher level.

The probability of being childless is lowest among those with no education above upper secondary school. The differences among women with different types of upper secondary education are small. Among women with higher education the probability of being childless increases by a higher level of education, with some exceptions. The differences between levels of specialisation depend on the field of education. The level of education seems to have

more influence on how many women that remain childless in some fields than others. There are most variations among those with lower levels, and it seems like the field of education is more influential concerning how many that do not have children among those with lower levels than among those with higher levels.

Table 1. The probability of being childless at age 40 by different groups of education. Women born between 1954 and 1958. Logistic regression

	B	Standard Error	Predicted probability
Intercept	-2,370	0,025	
Primary or lower secondary education			8,5
Upper secondary education			
General field of study	0,234	0,035	10,6
Administration and economic	0,160	0,033	9,9
Health care	0,039*	0,040	8,9
Other occupational specialisation	0,274	0,032	10,9
University education			
Humanities - Level I	0,985	0,052	20,0
Humanities - Level II	1,230	0,096	24,2
Humanities - Level III	1,215	0,104	23,9
Aesthetics - Level I	1,118	0,146	22,2
Aesthetics - Level II	1,548	0,140	30,5
Aesthetics - Level III	1,629	0,194	32,3
Teaching - Level I	-0,054*	0,085	8,1
Teaching - Level I	0,314	0,039	11,3
Teaching - Level I	0,972	0,143	19,8
Adm. and economic - Level I	0,622	0,049	14,8
Adm. and economic - Level II and III	1,120	0,071	22,3
Social science - Level I and II	1,016	0,079	20,5
Social science - Level III	1,042	0,104	20,9
Law - Level III	0,935	0,123	19,2
Social occupations - Level I	1,077	0,142	21,5
Social occupations - Level II and III	0,692	0,085	15,7
Science and technology - Level I	0,507	0,085	13,4
Science and technology - Level II	1,005	0,135	20,3
Science and technology - Level III	0,764	0,097	16,7
Nursing - Level I	0,003*	0,063	8,6
Nursing - Level II	0,259	0,053	10,8
Nursing - Level III	0,548	0,111	13,9
Health care otherwise - Level I	0,283**	0,099	11,0
Health care otherwise - Level II	0,703	0,103	15,9
Health care otherwise - Level III	0,579	0,137	14,3
Likelihood Ratio	1298,68		
DF	29		
Number of women	143584		

* not significant at 0,01-level. ** not significant at 0,001-level

Note: University level: Level I = 13-14 years, Level II = 15-16 years, Level III = 17+ years.

Independent of level of education, the probability of being childless at age 40 is highest among women in the field of aesthetics. Many musicians, dancers, actors and pictorial artists work freelance and are not connected to the labour market in the same way as other occupations. More childless women among these fields of education might indicate that uncertain relationship to the labour market is an obstacle for job discontinuity in connection with childbirth. The probability of being childless is also high among women in the field of humanities. It is not easy to explain why the probability of being childless is higher in this group than in other groups since the employment possibilities are more open in this field than in others. However, it might indicate that women have different preferences and orientations in regard to family life and work life, which may be expressed through choice of education. In some societal groups it may be more legitimate to choose not to have children than in other groups. These attitudes have been seen in connection with the development towards more post-modern values where self-expression is highly valued and traditional values become less important (Inglehart 1990).

That there are more childless women in some groups of education than in others must also be related to whether or not the women live in stable relationships. There might also be more legitimate to live alone in some groups than in others. It is, of course, possible to live in a stable relationship without being married, but unfortunately we do not have information on cohabitation in the population register. The cohort studied here (1954-58-cohorts) is one of the first cohorts where cohabitation started to be more common as an alternative to marriage. However, marital status can be used as an indication of variations on how many that live in stable relationships. Table 2 shows the probability of being unmarried by the age of 40 by different groups of educations. Generally it looks like groups where the probability of being unmarried is high, and the probability of being childless is also high. Accordingly, the highest probability of being childless is among women in the field of aesthetics. The level of education has an effect on the probability of being childless in the fields of teaching and health care, with the highest probability of being childless among those with higher levels. In general — being childless among those with educational attainment of teaching at university level is 11.3 per cent for lower levels and 19.8 per cent among those with higher levels. The probability of being childless among those with an educational attainment of nursing is 10.8 per cent among nurses and 13.9 per cent among physicians. Results show that it is as likely to become a mother among teachers and nurses as among women with no education above upper

secondary education. These results show that higher levels in it self do not decrease the probability of having children, but that also the field of education is an important factor.

Table 2. Probability of being unmarried at age 40 by different groups of education. Women born between 1954 and 1958. Logistic regression

	B	Standard Error	Predicted probability
Intercept	-1,884	0,021	
Primary or lower secondary education			13,2
Upper secondary education			
General field of study	0,009*	0,030	13,3
Administration and economic	0,003*	0,028	13,2
Health care	0,039*	0,033	13,6
Other occupational specialisation	0,181	0,027	15,4
University education			
Humanities - Level I	0,576	0,049	21,3
Humanities - Level II	0,718	0,095	23,7
Humanities - Level III	0,688	0,104	23,2
Aesthetics - Level I	0,973	0,134	28,7
Aesthetics - Level II	1,062	0,139	30,5
Aesthetics - Level III	1,215	0,191	33,9
Teaching - Level I	-0,248	0,075	10,6
Teaching - Level I	0,106**	0,034	14,4
Teaching - Level I	0,619	0,137	22,0
Adm. and economic - Level I	0,200	0,046	15,7
Adm. and economic - Level II and III	0,668	0,069	22,9
Social science - Level I and II	0,774	0,073	24,8
Social science - Level III	0,673	0,100	22,9
Law - Level III	0,464	0,122	19,5
Social occupations - Level I	0,881	0,132	26,8
Social occupations - Level II and III	0,522	0,077	20,4
Science and technology - Level I	0,079*	0,083	14,1
Science and technology - Level II	0,588	0,131	21,5
Science and technology - Level III	0,404	0,092	18,5
Nursing - Level I	-0,285	0,057	10,3
Nursing - Level II	0,131**	0,046	14,8
Nursing - Level III	0,118*	0,108	14,6
Health care otherwise - Level I	0,037*	0,090	13,6
Health care otherwise - Level II	0,623	0,090	22,1
Health care otherwise - Level III	0,181**	0,133	15,4
Likelihood Ratio	787,02		
DF	29		
Number of women	143584		

* not significant at 0,01-level. ** not significant at 0,001-level

Note: University level: Level I = 13-14 years, Level II = 15-16 years, Level III = 17+ years.

Among women in the fields of social sciences, administration and economics, and science and technology, the level of education has less effect on the probability of being childless than in the fields of teaching and health care. Independent of field of education, education at higher

levels is demanding and results in occupations with high career-orientation, which can explain why the field of education has less effect on whether or not women in these groups have children or not. To achieve desirable position and status in the labour market can be both resource and time demanding, and thereby be chosen on the expense of family formation or it may postpone the timing of the first childbirth.

Table 3 shows the mean age at education attainment and the mean age at first childbirth. Women establish themselves with children at different ages. Previous studies have shown that education differentiates increasingly between ages of the first childbirth (Lappegård 2000). We find the same result in this table, which shows that mean age at first childbirth increases with a higher level of education. However, there are also differences between women with university education in timing of the first childbirth, and the effect of the level of education is more pronounced in some field of education than in others. We find most differences among women with education attainment of nursing and health care otherwise — and least differences among those with education attainment of administration and economy and science and technology. For some occupations it may be easier to get established in the labour market than in others, and thereby the timing of the first childbirth might be less related to the timing of education attainment. The table shows no obvious connection between mean age at first childbirth and mean age at education attainment. For some of the fields of education, mean age at the first childbirth is higher than mean age at education attainment, while for others it is reverse, which strengthens the argument that for women in some fields of education the timing of education attainment is closer related to timing of the first childbirth than in other fields of education. One interesting observation is that women with a university education that have the lowest mean age at first childbirth have the highest mean age at education attainment. It is not unusual that women in the cohorts studied here (1954-58-cohorts) started their studies after they had become mothers. This seems to be most pronounced in fields of education within social and health occupations. Unfortunately, we do not have information on how many that become mothers when they are students or how many that started their education after they had become mothers. With more detailed register data, a next step will be to look more closely into the relationship between the completion of education and the entry into motherhood.

Table 3. Mean age at education attainment and mean age at first childbirth. Women born between 1954 and 1958

	Mean age education attainment	Mean age first childbirth
Primary or lower secondary education	17,00	22,1
Upper secondary education		
General field of study	22,25	24,64
Administration and economic	23,33	24,33
Health care	28,02	24,59
Other occupational specialisation	24,23	24,06
University education		
Humanities - Level I	28,46	27,79
Humanities - Level II	27,94	29,41
Humanities - Level III	31,04	30,10
Aesthetics - Level I	26,29	29,83
Aesthetics - Level II	28,52	29,25
Aesthetics - Level III	32,97	29,16
Teaching - Level I	25,06	27,31
Teaching - Level II	32,31	27,24
Teaching - Level III	34,09	29,17
Adm. and economic - Level I	26,93	27,24
Adm. and economic - Level II and III	33,15	28,30
Social science - Level I and II	30,29	28,26
Social science - Level III	31,66	29,90
Law - Level III	29,70	30,04
Social occupations - Level I	26,48	29,65
Social occupations - Level II and III	37,03	26,03
Science and technology - Level I	24,20	28,09
Science and technology - Level II	30,19	28,29
Science and technology - Level III	28,38	29,96
Nursing - Level I	24,21	27,53
Nursing - Level II	33,08	26,61
Nursing - Level III	30,36	29,82
Health care otherwise - Level I	25,16	28,76
Health care otherwise - Level II	36,46	26,09
Health care otherwise - Level III	27,67	29,87

Note: University level: Level I = 13-14 years, Level II = 15-16 years, Level III = 17+ years.

Childcare and career adjustments

We have so far seen that some groups of women with higher education live without children, which can be related to both difficulties in adjusting work career to family formation and differences in orientation towards family life and work life. When women have become mothers, there will be different strategies for combining family life with own work career. Even though women in Norway to a large extent combine labour market participation with childcare, it varies how combinable this is for women. These two aspects can both be related to the possibility for working part-time and flexibility in the work situation. How many children women have, can be one measure of how combinable women feel that childcare is

with own work career. It can also be a measure of how family-oriented they are. To look closer into this, we have estimated expected number of children born among women with at least one child at age 40 (Table 4), and the probability of having a third child among mothers with two children (Table 5).

Table 4. Expected number of children born by women with at least one child at age 40 by different groups of educations. Women born between 1954 and 1958. Linear regression

	B	Standard Error	Expected number of children
Intercept	2,381	0,007	
Primary or lower secondary education			2,38
Upper secondary education			
General field of study	-0,028**	0,010	2,35
Administration and economic	-0,173	0,009	2,21
Health care	-0,052	0,011	2,33
Other occupational specialisation	-0,046	0,009	2,34
University education			
Humanities - Level I	-0,130	0,020	2,25
Humanities - Level II	-0,150	0,042	2,23
Humanities - Level III	-0,192	0,046	2,19
Aesthetics - Level I	-0,262	0,063	2,12
Aesthetics - Level II	-0,224**	0,070	2,16
Aesthetics - Level III	-0,370	0,101	2,01
Teaching - Level I	0,076	0,023	2,46
Teaching - Level I	0,001*	0,012	2,38
Teaching - Level I	-0,207	0,058	2,17
Adm. and economic - Level I	-0,254	0,016	2,13
Adm. and economic - Level II and III	-0,255	0,030	2,13
Social science - Level I and II	-0,172	0,032	2,21
Social science - Level III	-0,246	0,043	2,14
Law - Level III	-0,229	0,049	2,15
Social occupations - Level I	-0,152*	0,060	2,23
Social occupations - Level II and III	-0,215	0,031	2,17
Science and technology - Level I	-0,083**	0,028	2,30
Science and technology - Level II	-0,254	0,055	2,13
Science and technology - Level III	-0,141	0,036	2,24
Nursing - Level I	0,179	0,017	2,56
Nursing - Level II	0,026*	0,016	2,41
Nursing - Level III	0,153	0,038	2,53
Health care otherwise - Level I	0,041*	0,030	2,42
Health care otherwise - Level II	-0,135	0,037	2,25
Health care otherwise - Level III	-0,023*	0,048	2,36
r ²	0,01		
Number of women	128055		

* not significant at 0,01-level. ** not significant at 0,001-level

Note: University level: Level I = 13-14 years, Level II = 15-16 years, Level III = 17+ years.

General trends in the fertility pattern have shown increased variations in how many children Norwegian women have, and there is an increased trend in "two-child" mothers having a third

child among women with higher education (Lappegård 2000). Results show that when women first have had children there are small differences among different education groups in how many children they have. There are more women with less education that have children than women with higher education. Among those with children, it is not those with less education that have the most children. Expected number of children varies more between fields of education than between levels of education.

Table 5. Probability of a two-child mother gets a third child at age 40 by different groups of educations. Women born between 1954 and 1958. Logistic regression

	B	St. feil	Predicted probability
Intercept	-0,181	0,016	
Primary or lower secondary education			45,5
Upper secondary education			
General field of study	-0,077**	0,023	43,6
Administration and economic	-0,368	0,023	36,6
Health care	-0,111	0,026	42,7
Other occupational specialisation	-0,075	0,022	43,6
University education			
Humanities - Level I	-0,236	0,049	39,7
Humanities - Level II	-0,022*	0,104	44,9
Humanities - Level III	-0,360	0,114	36,8
Aesthetics - Level I	-0,386*	0,164	36,2
Aesthetics - Level II	-0,161*	0,179	41,5
Aesthetics - Level III	-0,537*	0,273	32,8
Teaching - Level I	0,114*	0,052	48,3
Teaching - Level I	0,023*	0,027	46,0
Teaching - Level I	-0,308*	0,147	38,0
Adm. and economic - Level I	-0,519	0,041	33,2
Adm. and economic - Level II and III	-0,404	0,075	35,8
Social science - Level I and II	-0,090*	0,079	43,3
Social science - Level III	-0,383	0,110	36,3
Law - Level III	-0,512	0,125	33,3
Social occupations - Level I	-0,199*	0,146	40,6
Social occupations - Level II and III	-0,271	0,076	38,9
Science and technology - Level I	-0,237	0,067	39,7
Science and technology - Level II	-0,637	0,143	30,6
Science and technology - Level III	-0,208*	0,087	40,4
Nursing - Level I	0,296	0,039	52,9
Nursing - Level II	0,129	0,037	48,7
Nursing - Level III	0,325	0,087	53,6
Health care otherwise - Level I	0,115*	0,070	48,3
Health care otherwise - Level II	-0,159*	0,090	41,6
Health care otherwise - Level III	-0,089*	0,112	43,3
Likelihood Ratio	818,30		
DF	29		
Number of women	107609		

* not significant at 0,01-level. ** not significant at 0,001-level

Note: University level: Level I = 13-14 years, Level II = 15-16 years, Level III = 17+ years.

The lowest expected number of children is found in aesthetic and highest in nursing. There are small differences between levels of education in nursing: The expected number of children among nurses and physicians is both at a high level. In these groups we also find women with large families — and where the probability of having a third child among "two-child" mothers is highest. High fertility among women in nursing has also been found in Sweden and the Netherlands (Hoem 1994, Kalmijn 1996). There is more variation in expected number of children in the field of teaching. Those at lower levels have higher expected number of children than those at higher levels, but secondary education teachers have a higher number of children than most of the other groups. Both teaching and nursing are occupations that traditionally have been combinable with childcare. We find most of these occupations in the public sector where there are good opportunities for part-time work and where the consequences for discontinuity are less than in other parts of the labour market.

It is interesting that we also find high fertility among women with demanding education with high career-orientation such as physicians and dentists. This indicates that there are groups among women with higher education that both can be more family-oriented and have high aspirations for many children than other women with the same or less education. Even though they have chosen education with a high career-orientation — it seems like high fertility is not necessarily an obstacle for their choice of number of children. These results might indicate that the number of children has different symbolic value in different social groups. For some groups many children might be related to both economic and social status. To be able to manage demanding responsibilities, both regard to work situation and to family situation, might in some groups give high social status. How income, both the individual's and the households' affect preferences for children — is an interesting topic that we do not have information on yet. The lowest expected number of children is found for women educated in fields of social sciences, aesthetics, economics and laws. Women with these types of education also have the highest probability of having only one child². For some occupations related to these types of education, the labour market will be less combinable with work and family than more traditional female occupations in the public sector. For women who want to combine work and childcare it will, from an economic perspective, be most rational to choose a job where the negative consequences of discontinuity are low. For women with career-

² Figures not reported.

oriented occupations childbirths might have more direct consequences for their career, which can result in fewer children. The expected number of children among women in the field of science and technology is somewhat higher than in the field of social sciences, aesthetics, economics and laws. In this field we find architects, bioengineers, chemical engineers and civil engineers, where the labour market varies from traditional female occupations in the public sector to more male-dominated occupations in the private sector. The conditions for combining childcare with work career might therefore vary considerably. Especially among those with higher levels there will be many women in male-dominated occupations. That the fertility level is relatively high in this group is therefore quite interesting. To sum up, the analyses in this part show that women with education towards typical female-dominated occupations have more children than women with education directed towards other occupations, but that fertility is also high in some groups with career-orientated education. These women have through choice of occupations and adjustments in the labour market made it possible with both high fertility and an active work career.

Conclusion

In this paper we have addressed the question of whether or not inequality in women's fertility can be related to different choices of education. A general assumption in this paper is that women have different preferences and orientations towards their own life course, which affects their choices of education and later choices of occupation. Our subject is based on a female role in change: At the beginning of a new century there are less differences between the sexes compared with some decades ago. The transition towards a more modern family pattern has led to postpone childbearing and less number of children. That the fertility level in Norway is relatively high for Europe has been seen in connection with a strong expansion of parental benefits since the end of the 1980s, combined with good opportunities for part-time work and a general favourable economic climate. This has made labour market participation and childcare more combinable than in other countries. At the same time as there is a modernisation of women's life — there are increased differences in the fertility pattern. The level of education seems to make more differences in when women have their first child, and there are especially more pronounced differences between those who have attained higher education and those who have attained less education. Even though there has been postponed childbearing in all groups of education the tempo has not been the same.

Women analysed in this paper are born between 1954 and 1958 and are among the first modernised birth cohorts with increased education attainment, increased labour market participation and new fertility patterns. We have focused on three aspects of women's fertility: Who have children and who remain childless, the timing of the first childbirth, and how many children do women — who have children — has. Our main conclusion is that both the field of education and the level of education differentiate between women's fertility. The level of education seems to have more effect on whether or not women become mothers or not – and the timing of the first childbirth, than to how many children they have – if they have children at all. This does not support the traditional assumption that women with less education are more family-oriented than women with higher education are. Women will have different preferences towards family life and work life, which can be expressed through the field of education. Even though most women in different ways combine work and childcare, there are some women that remain childless. There will be different explanations for why some women do not have children. Variations between women in different groups of education might indicate that there are different preferences and selection processes towards the choice of education. More women have children among those with no education above upper secondary school than among those with higher education, except nurses and pre-school and primary school teachers. This might indicate that there are more family-oriented women among those with education directed towards female-dominated occupations than education directed towards other occupations. When women attain higher education, they want to get established in the labour market before they have children. For some occupations it can be time and resource demanding to get a foothold in the labour market, both in regard to achieving professional competence in the occupation, and to work up some seniority before they have their first child. However, the analyses show that for women in some fields of education, the timing of education attainment is closer related to the timing of the first childbirth than in other fields of education. Since we at this point do not know the education attainment at the time of birth, further research needs to be done on the relationship between family formation and education attainment.

When women first have children, there are relatively small variations in how many children women have in different education groups. This shows that a combination of work-career and childcare is possible in all parts of the labour market. This is not only the case for women with education directed towards traditional female occupations where the fertility level is

high, but also among women with education directed towards other parts of the labour market. The number of children might also have different symbolic value in different social groups and might give status in some groups. Women will have different strategies for combining family responsibilities with work careers. Generous family benefits were introduced as a result, and a condition for increased labour force participation among women. In addition to good parental leave and day-care programmes, work adjustments and work conditions will also have an effect on how many children women choose to have. The effect different adjustment strategies have for women's fertility will be an interesting subject for further research.

References

- Beck, U. (1992) *Risk Society - Towards a New Modernity*, London, SAGE Publications.
- Beck, U & E. Beck-Gernsheim (1995): *The Normal Chaos of Love*, Malden, Blackwell Publishers Ltd.
- Becker, G. S. (1981) *A treatise on the family*, London - Cambridge: Harvard University Press.
- Blom, S., T. Noack & Lars Østby (1993) *Giftermål og barn - bedre sent enn aldri?*, (*Marriage and children - better late than never?*) Sosiale og økonomiske studier **81**, Oslo: Statistics Norway.
- Blossfeld, H-P. & J. Huinink (1991) "Human capital investments or norms of role transition? How women's schooling and career affect the process of family formation", *American Journal of Sociology*, **97**, 143-68.
- Butz, W. P. & M. P. Ward (1979) "The emergence of counter cyclical U.S. fertility". *American Economic Review*, **69**, 318-328.
- Crompton, R. & F. Harris (1998a) "Explaining women's employment patterns, 'orientations to work' revisited", *British Journal of Sociology*, **49**, 118-136.
- Crompton, R. & F. Harris (1998b) "A reply to Hakim", *British Journal of Sociology*, **49**, 144-149.
- Ellingsæter, A.L., T. Noack & M. (1997) "Sosial ulikhet blant kvinner: Polarisering, utjevning eller status quo?" (Social inequality between women: polarisation, equalization or status quo?). *Tidsskrift for samfunnsforskning*, **1**, 33-69.

- Ellingsæter, A.L. (1989) "Normalisering av deltidsarbeidet. En analyse av endring i kvinners yrkesaktivitet og arbeidstid i 80-årene" (Normalisation of part-time work), *Sosiale og økonomiske studier* **71**, Oslo: Statistics Norway.
- Ellingsæter, A.L. & M. Rønsen (1996) "The Dual Strategy, Motherhood and the Work Contract in Scandinavia", *European Journal of Population*, **12**, 239-260.
- England, P. (1992) *Comparable Worth – Theories and evidence*, New York.
- Ermisch, J. (1988) "Econometric analysis of birth rate dynamics in Britain", *Journal of Human Resources*, **19**, 1-32.
- Giddens, A. (1992) *Intimitetens forandring (The Transformation of Intimicity)*, København, Hans Reitzels Forlag.
- Hakim, C. (1991) "Grateful slaves and self-made women, fact and fantasy in women's work orientation", *European Sociological Review*, **7**, 101-21.
- Hakim, C. (1996) "Labour mobility and employment stability, rhetoric and reality on sex differential in labour-market behaviour", *European Sociological Review*, **12**, 1-31.
- Hakim, C. (1998) "Developing a sociology for the twenty-first century, Preference Theory", *British Journal of Sociology*, **49**, 137-143.
- Hakim, C. (2000) *Work-Lifestyles Choices in the 21st Century: Preference Theory*, Oxford University Press.
- Hansen, M.N. (1995) "Kjønnssegregering i det norske arbeidsmarkedet. Kan forskjeller i lønnsstruktur bidra til at kvinner og menn velger ulike yrker?" (Sex-segregation in the Norwegian labour market), *Tidsskrift for samfunnsforskning*, **2**, 147-177.
- Hoem, B. (1994) "Lärare föder flere barn" (Teachers gets many children), *Välfärdsbulletinen*, **3**, 17-19.
- Inglehart, R. (1990) *Culture Shift in advanced industrial society*, Princeton - New Jersey: Princeton University Press.
- Jacobs, S. C. (1995) "Changing Patterns of Sex Segregated Occupations throughout the Life-Course", *European Sociological Review*, **2**, 157-171.
- Kalmijn, M. (1996) "Effecten van opleidingsniveau, duur en richting op het tijdstip waarop paren hun eerste kind krijgen" (Effects of educational level, school enrollment and type of schooling on the timing of the first birth), *Bevolking en Gezin*, **1**, 41-71.
- Kravdal, Ø. (1992) "The emergence of a positive relation between education and third birth rates in Norway with supportive evidence from the United States", *Population Studies*, **46**, 459-475.

Kvande, E. & B. Rasmussen (1990) *Nye kvinneliv - Kvinner i menns organisasjoner* (Women in men's organisations), Oslo, Ad Notam.

Lappegård, T. (1998) "Større ulikhet i barnetall" (More inequality in number of children), *Samfunnsspeilet*, **5**, 42-48.

Lappegård, T. (2000) "New fertility trends in Norway", *Demographic Research*, Vol2/3 (www.demographic-research.org/Volumes/Vol2/3).

Leira, A. (1992) *Welfare states and working mothers – The Scandinavian experience*, Cambridge, Cambridge University Press.

Leira, A. (1996) "Fra statsfeminisme til statsfamilisme? Om mor og far, stat og marked i 1990-åra" (Mother and fathers, state and marked in the 1990s), in B. Brandth & K. Moxnes, ed., *Familie for tiden - Stabilitet og forandring* (Family of the time - stability and change). Oslo, Tano.

Lyngstad, T.H. & T. Noack (2000) "Norske fruktbarhetsidealer 1977-1999: Idealene består" (Norwegian fertility preferences 1977-1999), *Samfunnsspeilet*, **3**, 30-34.

Marini, M.M. (1984) "Women's educational attainment and the timing of entry into parenthood", *American Sociological review*, **49**, 491-511.

Noack T. & M. Rønsen (1994) "Når er det tid for barn? Livsløp mellom jobb og familie" (When is it time for children? Life-course between job and family), in I. Frønes & A. Hompland ed., *Den nye barne- og familiebooka* (The new child- and family book), Oslo, Universitetsforlaget.

Polachek, S.W. (1987) "Occupational Segregation and the Gender Wage Gap", *Population Research and Policy Review*, **6**, 47-67.

Pollak, R.A. & S.C. Watkins (1993) "Cultural and economic approaches to fertility, Proper marriage or mesalliance?". *Population and Development Review*, **19**, 467-495.

Retherford, R. & N. Luther (1996) "Are fertility differentials by education converging in the United States?", *GENUS*, **3-4**, 13-37.

Rindfuss, R., P. Morgan & K. Offutt (1996) "Education and the changing age patterns of American fertility, 1963-1989", *Demography*, **3**, 277-290.

Skrede, K. & A. Sørensen (1983) "På spor av en ny kvinnerolle – Hvilken betydning har tidligere livsløpstilpasning for kvinners tilknytning til arbeidsmarkedet i ulike livsløpsfaser?" (On track of a new role of women), in K. Skrede & K. Tørnes ed., *Studier i kvinners livsløp* (Studies in women's life-course), Oslo, Universitetsforlaget.

Skrede, K. (1999) "Drømmen, dyden og belønningen" (The dream, the virtue and the reward), in G.E. Birkelund, A.K. Broch-Due & A. Nilsen ed., *Ansvar og protest Kjønn, klasse og utdanning i senmoderniteten* (Sex, class and education in late modernity), Bergen.

Statistics Norway (1989) *Norwegian standard classification of education*.

Statistics Norway (1998) "Labour Market Statistics 1996-1997", *Official Statistics of Norway* C467.

van de Kaa, D. J. (1987) "Europe's second demographic transition", *Population Bulletin*, **42**, 389-432.

Recent publications in the series Documents

- 2001/1 T. Bye, R Choudhury, M. Harlarson and P. Hardarson: The ISM model: A CGE model for the Icelandic Economy
- 2001/2 K.Ø. Sørensen, J.L. Hass, H. Sjølie, P. Tønjum and K. Erlandsen: Norwegian Economic and Environment Accounts (NOREEA) Phase 2
- 2001/3 G. Haakonsen, K. Rypdal, P. Schøning and S.E. Stave: Towards a National Indicator for Noise Exposure and Annoyance: Part I: Building a Model for Traffic Noise Emissions and Exposure
- 2001/4 T. Åvitsland: User Costs of Real Capital
- 2001/5 H.V. Sæbø: Strategic planning and management in Instituto Nacional de Estatística, Mozambique: Short Term Mission Report, November 2 - 9, 2000
- 2001/6 H.V. Sæbø, J. Byfuglien and R. Johannessen: Quality issues in Statistics Norway
- 2001/7 J. Byfuglien: Comparability of income data: Project report
- 2001/8 A.S. Abrahamsen, M.Q. Andersen and R. Ragnarsøn: Project: Quality of Manufacturing Statistics and Evaluation of Methods for Producing Preliminary and Final Figures. Final Report
- 2001/9 T. Skoglund: Employment in the Norwegian National Accounts
- 2001/10 O.C. Moen: Nordic Economic Growth in Light of New Theory: Overoptimism about R&D and Human Capital?
- 2001/11 H.V. Sæbø: Strategic Planning and Management in Instituto Nacional de Estatística, Mozambique: Short Term Mission Report, August 27 - September 6, 2001
- 2001/12 B. Hoem: Environmental Pressure Information System (EPIS) for the household sector in Norway
- 2001/13 H. Brunborg, I. Bowler, A.Y. Choudhury and M. Nasreen: Appraisal of the Birth and Death Registration Project in Bangladesh
- 2001/14 K. Rypdal: CO₂ Emission Estimates for Norway. Methodological Difficulties
- 2001/15 E. Røed Larsen: Bridging the Gap between Micro and Macro: Interdependence, Contagious Beliefs and Consumer Confidence
- 2001/16 L. Rogstad: GIS-projects in Statistics Norway 2000/2001
- 2002/1 B. Hoem, K. Erlandsen og T. Smith: Comparisons between two Calculation Methods: LCA using EPIS-data and Input-Output Analysis using Norway's NAMEA-Air Data
- 2002/2 R. Bjørnstad: The Major Debates in Macroeconomic Thought - a Historical Outline
- 2002/3 J. L. Hass and T. Smith: Methodology Work for Environmental Protection Investment and Current Expenditures in the Manufacturing Industry. Final Report to Eurostat.
- 2002/4 R. Bjørnstad, Å. Cappelen, I. Holm and T. Skjerpen: Past and Future Changes in the Structure of Wages and Skills
- 2002/5 P. Boug, Å. Cappelen and A. Rygh Swensen: Expectations and Regime Robustness in Price Formation: Evidence from VAR Models and Recursive Methods
- 2002/6 B.J. Eriksson, A.B. Dahle, R. Haugan, L. E. Legernes, J. Myklebust and E. Skauen: Price Indices for Capital Goods. Part 2 - A Status Report
- 2002/7 R. Kjeldstad and M. Rønsen: Welfare, Rules, Business Cycles and the Employment of Single Parents
- 2002/8 B.K. Wold, I.T. Olsen and S. Opdahl: Basic Social Policy Data. Basic Data to Monitor Status & Intended Policy Effects with Focus on Social Sectors incorporating Millennium Development Goals and Indicators
- 2002/9 T.A. Bye: Climate Change and Energy Consequences.
- 2002/10 B. Halvorsen: Philosophical Issues Concerning Applied Cost-Benefit Analysis
- 2002/11 E. Røed Larsen: An Introductory Guide to the Economics of Sustainable Tourism
- 2002/12 B. Halvorsen and R. Nesbakken: Distributional Effects of Household Electricity Taxation
- 2002/13 H. Hungnes: Private Investments in Norway and the User Cost of Capital
- 2002/14 H. Hungnes: Causality of Macroeconomics: Identifying Causal Relationships from Policy Instruments to Target Variables
- 2002/15 J.L. Hass, K.Ø. Sørensen and K. Erlandsen: Norwegian Economic and Environment Accounts (NOREEA) Project Report -2001
- 2002/16 E.H. Nymoene: Influence of Migrants on Regional Variations of Cerebrovascular Disease Mortality in Norway. 1991-1994
- 2002/17 H.V. Sæbø, R. Gløsen and D. Sve: Electronic Data Collection in Statistics Norway