

LS WORKING PAPER 78

Teenage fertility in England and Wales: trends
in socioeconomic circumstances between the
1971 and 1981 Censuses

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Contents	Page
Abstract	3
Acknowledgements	4
1. Introduction	5
1.1 Recent trends in the fertility of Great Britain	5
1.2 Teenage pregnancy	7
2. Methods	10
2.1 The ONS Longitudinal Study	10
2.2 Scope of the LS	10
2.3 The sample	11
2.4 Definition of the cohort	11
2.5 Data preparation	13
2.6 A note on the data	14
2.6.1 Social class	14
2.6.2 Education	15
2.7 Statistical analysis	15
3. Results	16
3.1 Study sample	16
3.2 Socioeconomic indicators	17
3.2.1 Patterns in the rates	17
3.2.2 Univariate survival analysis	18
3.3 Family structure	20
3.3.1 Patterns and trends	20
3.4 Multivariate analysis	24
3.4.1 The 1971 cohort	25
3.4.2 The 1981 cohort	27
3.4.3 Trends in the multivariate analysis between the censuses	28
3.5 Social mobility	29
3.5.1 Mobility: by access to cars	30
3.5.2 Mobility: by housing tenure	31
Discussion and conclusions	32
Appendix 1: Description of key variables used in the analysis	34
Bibliography	36

Abstract

Using data from the ONS Longitudinal Study, this report explores trends in teenage fertility between the two periods after the 1971 and 1981 censuses. The role of social mobility in the generation of these trends is also examined. Gradients associated with housing tenure became steeper between the two periods of interest, dominated by increased relative risks associated with Local Authority tenancy. Analysis of mobility based on housing tenure suggests that those classed as downwardly mobile at the 1981 census contribute more heavily to this steepening gradient than might be expected. Indicators of family structure (the age of the LS teenager's mother and the number of siblings) continue to show significant independent associations with the risk of teenage pregnancy.

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Chapter 1: Introduction

1.1 Recent trends in the fertility of Great Britain

Recent fertility in Great Britain has more or less followed general trends seen over the whole of the developed world. Against a background of period fertility rates in which the long term trend is decline, the age at which women have children is increasing^{1,2}. Period rates for British women in their twenties (where the main burden of reproduction has historically taken place) have declined while those for the over thirties have increased. Historically, in 1964 total period fertility rates (TPFR¹) peaked at 2.93, declined to a low of 1.66 in 1977, and thereafter have fluctuated between 1.7 and 1.9. The most recent figures for the TPFR are at 1.75 (1994) and 1.72 for 1995. Shaw²³, using the year 1977 as a pivotal point between declining and increasing rates, shows the period from the mid 1960's to 1977 to be one of consistent decline for all but those in the fifteen to nineteen age group. After 1977 age specific rates (indexed against the 1977 figures) rose consistently across age groups until the early 1980's whereupon age specific patterns diverged, with the fertility of those in the thirty plus age groups increasing more rapidly than those of the twenty to twenty-nine year age groups. While the period of analysis ended in 1988 the pattern in age specific rates has maintained to the present day, as suggested by the most recent figures. These currently show that fertility at older ages is still increasing: for thirty-five to thirty-nine year olds by five percent between 1993 and 1994, and by a further one percent between 1994 and 1995. The percentage increases are even larger for those over forty: three percent between 1993 and 1994, and six percent between 1994 and 1995 (although absolute numbers are very low for this group). For those between twenty and thirty the rates are declining: a four percent and two percent decline for the age groups twenty to twenty-four and twenty-five to twenty-nine respectively between 1993 and 1994, and a two percent decline for twenty to twenty-nine year olds between 1994 and 1995^{3,4}.

The gradual progress of legislation enabling individuals more control over their private lives has led to profound societal changes. For those who desire it, life's defining categories have become more fluid: marriage is not now the complete defining state it once was. More and more people now cohabit before marriage, establish enduring unions outside marriage or end their marriage by divorce^{9, 13}, all without social disapprobation. More and more children are

¹ The total period fertility rate (TPFR) measures overall fertility at a particular point in time (usually a calendar year). It relates to the number of children a woman would have in her lifetime, if she had the average fertility rates of all women in a population at a given time.

now born outside marriage either to women defined as single parents, or to unmarried couples (as instanced by joint registration of births)¹⁴, and since implementation of legalised abortion in 1968 it has become in most cases a normal means of fertility control (rates of legal abortion have increased by approximately three fold from 6.4 per cent of conceptions in 1969 to 19.6 per cent in 1988)¹⁸.

While these changes are historically unprecedented at least some of the underlying forces are clear. Women can now exercise genuine control, made possible by education, access to more desirable parts of the job market, and use of effective contraception. This control is tempered by the economics of everyday life: it is also necessary that women maintain a place in the labour market. This is reflected in the general trend of women having their first child at older ages when their personal and economic situation is more settled. For a sizable but growing minority of women having children is now but one of the possibilities that life offers and, with constantly rising opportunity costs of children and curtailment of personal life chances that a dependent family entails, it is one that not everyone is prepared to choose.

Given the force of this scenario the fertility of those in their teenage years can be seen, at least initially, as an anomaly. In the late 1960's and early 1970's the fertility rates of this group ranged around the high 40's per 1000 women (aged fifteen to nineteen), peaking in 1971 at 50.6 per 1000. Thereafter they quickly declined and since 1976 have maintained a steady position oscillating at around thirty per 1000 females aged fifteen to nineteen, with the most recent figures being 28.8 and 28.3 for 1994 and 1995 respectively^{10, 11, 12}. While this registers as a slight decline in fertility for this group the rates remain relatively and persistently high especially when compared with the rest of western Europe where trends in teenage fertility show a steeper and more or less homogeneous decline over the last twenty or so years. In the developed world only the United States has higher rates of teenage fertility.

It is therefore a problem on two counts. Firstly, for demography: why are the secular trends affecting general reproductive behaviour in developed societies not seen to be substantially influencing the fertility of British teenagers. More importantly, perhaps, is that in this country, it is currently seen as a 'high profile' social problem with potentially serious policy implications.

1.2 Teenage pregnancy

While it is incorrect to assume that all teenage pregnancy is problematic, research shows that the majority of pregnancies to those under twenty years of age are unplanned and estimates suggest that in the United Kingdom between fifty percent and ninety percent of these pregnancies are unwanted. Fifty one percent of all pregnancies to those under sixteen years of age lead to abortion⁵, and that for those females under twenty the proportion of pregnancies terminated by legal abortion has remained at a level of about forty percent of conceptions from 1975 to 1987⁹.

Much of the research examined here is from either the United States of America or Great Britain, where it appears two different intellectual traditions are at work. In Great Britain research seems to concentrate on the relationship between socioeconomic components and family structure. In the United States, however, research seems less concerned with the allocation of underlying causal mechanisms than with problems relating to the costs and consequences of teenage pregnancy: for the children born to teenage mothers, for the mother themselves, and for society in general.

One early British study (1981) using longitudinal data from the National Survey of Health and Development's (NHDS) 1946 cohort¹⁹ concluded that the role of the family of origin of the young mother is crucial. Parental education levels, family social class, 'intactness' of the family of origin ('Children who had experienced a broken home were more likely to start childbearing sooner than those whose families had remained intact'), and the fact that 'men and women whose parents...had children early were more likely to become parents relatively early'.

More recently, a study based in the Tayside area of Scotland²⁰ used the Carstairs index of deprivation to examine teenage conception and abortion rates. The author reports clear gradients associated with the deprivation categories: while rates of teenage conception increased with movement from the more affluent to deprived areas the rates of teenage abortion increased with movement from the more deprived areas to more affluent parts of the region.

The potential of 'intergenerational transmission' from mother to daughter of a tendency to teenage pregnancy has received much attention in the literature. One recent study used the British National Child Development Study (NCDS) to examine different mechanisms by

which it could occur²¹. The paper lists a number of hypotheses, including the biological (age at menarche), the imitative (young mothers follow a pattern established by their own mother), and the socioeconomic (a common familial disadvantage, and poor educational environment). While the Manlove paper concludes that the effect of the biological mechanism (age at menarche) is negligible in this context, it does report an association with age of the mother. Daughters of teenage mothers have an elevated risk of becoming teenage mothers themselves when compared to daughters of older women (twenty percent of the daughters of younger mothers themselves became teenage mothers against eight percent of the daughters of older mothers). It also reports that family structure is important (living with both biological parents at age eleven is associated with a reduced likelihood of becoming a teenage mother (0.69); that socioeconomic disadvantage, as measured by the fact of living in subsidised housing, is associated with a twenty-three percent increase in risk of teenage motherhood; and that educational underachievement remained important in all the models generated. The phenomenon was also addressed by Di Salvo²³ in a study using the ONS Longitudinal Study (LS). This shows odds ratios (when compared against mothers twenty plus) of 1.96 and 1.63 for teenage motherhood in those females whose own mothers were respectively mid-teen or late-teenage mothers themselves. That these results are adjusted for number of siblings, housing tenure and family type indicates the strong independent effect associated with this indicator. With this we have identified the main strands of the British research effort: the effects of family structure and lack of educational opportunity, the independent effect of intergenerational transmission (and its attendant intuitively pleasing idea of the effect for one generation becoming a cause for the next), socioeconomic circumstance (especially as defined by housing tenure) and the location of 'gradients' in the rates more normally associated with social class.

In contrast, the American model seems to assume a necessary relationship between teenage motherhood, low socioeconomic status and poverty (which is itself defined at least partly by dependence on welfare). Without the implication of poverty there is no problem. While it is, therefore, a problem for the poor it is their continuing dependence on state welfare systems that is a problem for society at large. Much of the research effort is about how to quantify and alleviate this problem. The strategies see 'self-sufficiency' (defined as reliance on sources other than welfare, and includes shared households and reliance of free child care) as the desired outcome, and all see completion of formal education programs as crucial to this effort. However, because 'formal education cannot compete with the time, energy and monetary outlays of young children' teenage mothers are less likely to finish their education. It is this loss of educational opportunity that prevents them moving from dependence into the

self-sufficiency of the normal adult world^{6,17}. For the under-educated, finding both flexible work which can pay enough to lift them out of poverty, or provide adequate training prospects, is very difficult. The emphasis of the United States research stressed a negative feedback loop in the relationship between teenage motherhood and reduced educational prospects for the offspring. Research suggests that higher school drop-out rates, poorer school achievement, and lower intelligence levels in the offspring are all associated with teenage motherhood as both cause and effect.

The reported health consequences of teenage motherhood are far reaching. It has been linked with perinatal mortality. One Australian study¹⁵ reports relative risks of 1.28 (confidence intervals=0.99 to 1.65) for perinatal mortality to infants born to teenage mothers. In a study¹⁶ based in England and Wales examining the relationship between social class and low birth weight Babb and Bethune note consistently higher rates of low birth-weight births for those mothers less than twenty. It is also associated with increased risks of toxemia¹⁷ for the mother, increased levels of premature birth²⁵ and increased stress for the mother.

Chapter 2: Methods

2.1 The ONS Longitudinal Study

The Office for National Statistics (ONS) Longitudinal Study (LS) is described in detail elsewhere^{7, 8, 24}. Briefly, it is an extended exercise in record linkage which began with the inclusion of the census returns of an approximate one percent sample of the population of England and Wales drawn initially from the 1971 census. This also included the information related to those sharing the household of the selected individual. Selection was based on having a birthday on one of four days in the year. The process was repeated for the 1981 and 1991 censuses and will soon incorporate the planned 2001 census. A continuing surveillance of sample members is carried out at the National Health Service Central Register (NHSCR) based in Southport and all routine vital life events posted through the NHS are included. These events include deaths, cancer registrations, any exits out of and re-entries into the NHS system (if it receives the information) and, most importantly for the analysis, live and still births to female sample members. Additionally, between census points, those meeting the selection criteria who either enter the country as immigrants and join the NHS system or who are newly born are included. The 'live' or active sample therefore always remains at roughly the one percent level, though the numbers included always grow. The LS is essentially then a series of discrete sets of data, each relating to a different aspect of an individual life history, linkable via a single key identifier and able to combine in various ways to form individual life histories.

2.2 Scope of the LS

The LS is therefore ideally suited to an examination of structural components such as family characteristics or socioeconomic circumstance. Its advantages are that it is a relatively large sample, generally accepted as representative, with a follow up period for births to sample mothers which is both complete enough and currently long enough to allow substantive analysis of at least the cohorts of interest to us. It has limitations, however, which affects its scope in this study. It is based on the census of England and Wales only, and any results based on it can formally apply to England and Wales only. Its constituency, however, is about ninety percent of the population of Great Britain. Because it links only routine data it cannot directly address the problems of motivation in these young women. It cannot link information on abortions and therefore cannot be used in the analysis of conceptions, itself possibly a more normal outcome in research in this field. In the context of the current study it deals with

a highly selected group: those fifteen to nineteen year olds who become pregnant, continue with the pregnancy and who have a live or still birth.

2.3 The sample

The study focuses on two specific areas. Firstly, on the trends in fertility of those females who pass through their middle and late teens in the years after both the 1971 and 1981 censuses, and secondly, in the effect of patterns of family mobility on these young women. This establishes three separate strands on which to base the analysis. The first of these includes those enumerated at the 1971 census while the second includes those enumerated at the 1981 census. From comparing results gained from these we can examine detail behind the trends in fertility over time. Finally, taking those enumerated at both the 1971 and 1981 census points we can examine the effects of the passage of time on an individual. This is because (by definition) we have individual level data on the same young women at both the 1971 and 1981 census points and access to the full follow up period of risk (of teenage motherhood) after the 1981 census.

2.4 Definition of the cohort

We are interested in the risk of having a first birth to females aged between fifteen and nineteen completed years of age in the period after the relevant census. The initial selection criterion therefore includes women ten to fifteen years old at the census. This ensures that those included can be entered into risk and followed through for the full five-year period immediately after their fifteenth birthday. These individuals enter and completely traverse the period from fifteen years to nineteen completed years of age at some point during the follow-up period. For example, those aged fifteen at the 1971 census are at risk for up to five years to some point in 1975, while those ten years old at the census enter risk at some time around 1975 (when they become fifteen) and remain at risk to some time around 1980. For the analysis this group is treated as a single cohort of those aged ten to fifteen at the census. The same principle is applied to the selection of both the cohort of those ten to fifteen years old at the 1981 census, and also those are enumerated at both census points. Those present at both the census points are a subset of those present at the 1981 census.

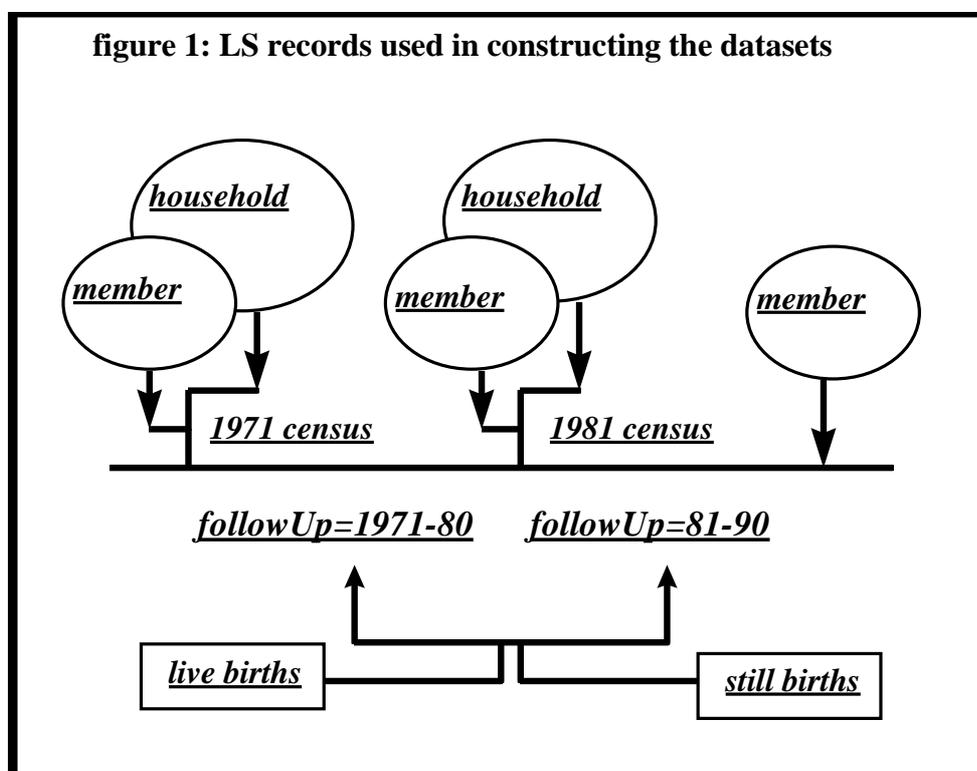
The outcome variables were computed as follows: the age of teenage mothers at the birth was computed and those with a birth before the age of fifteen were excluded from the analysis. This ensured that those included in the cohorts were nulliparous at the point of entry to risk.

Those who had a birth after their twentieth birthday in the designated follow up period were allowed to contribute the full period of follow up (the birth event was not included in the study).

2.5 Data preparation

The logistics of generating data sets for the analysis is quite complicated. The LS resides on an IBM 9672 'enterprise server' computer where it is held as a case structured hierarchical data base in a MODEL 204 environment. It is routinely accessed using in-house software which allows the user to draw off variables for analysis purposes. This 'raw' data extracted for the study was pre-processed using a set of SAS programs (SAS 6.11) before being analysed. Although details are not described, they are available on request. The data was analysed using Stata 5.0 where, prior to the analysis it was further manipulated and finally restructured for use by the regression functions of Stata. Again, this is not described in detail but is available on request. A description of the main variables used in the analysis is given as appendix one.

For the 1971 cohort the linkage procedure combined data from the 1971 LS members file (the young women), variables from the 1971 household file (the parents and those siblings normally resident in the household), and finally information on any live or still births that may have been flagged at NHSCR. This was repeated for the 1981 cohort. The linkage is represented schematically in figure one below.



2.6 A note on the data

2.6.1 Social class

Traditionally, analysis of the effect of the social class organisation of British society plays a major role in almost all social research in this country. The LS, an integral part of this tradition, uses a number of measures to determine socioeconomic circumstance. The most direct of these is social class as derived from the Registrar General's classification of occupations. Goldblatt⁷, gives a detailed critique of the use of the classification. While it suffices for most purposes it has certain limitations. It is updated at regular intervals. As new occupations are created and others disappear the content and meaning of the classification changes. This especially effects the interpretation of trends in social class over time. For example, the current classification dates from 1980 and was used in the coding of social class at the 1981 census. The social categorisation is therefore not completely compatible across the two censuses. There are other problems specific to this study. Social class is allocated to the individual on the based of their own occupation. Women who do not have paid employment outside the home are allocated a general category regardless of their actual socioeconomic circumstance. If the individual is too young to work (less than fifteen at the 1971 census or less then sixteen at the 1981 census), or a student, they do not get allocated a social class. If both the mother and father in a household both have an allocated social class then there is the possibility of within family variation (where they have different social classes).

To overcome these limitations a single value for family social class was determined based on the given social classes for both the father and the mother. If both parents had a social class in the range of categories I-V then the higher one of the two was attached as the social class of the family. If only one of the parents had a given social class then that was used, and if both were unclassified then the family was assigned to the unclassified category.

To complement social class analysis LS research also uses other variables which more directly reflect lifestyle and family circumstances: housing tenure and the extent of access to private cars. These are determined directly from the census information, and are assumed to be free of the biases affecting occupational social class.

2.6.2 Education

In the review of the current research the level of education was a very important indicator of risk. In the LS for the census of 1971 it is known not to be a very good discriminator.

Educational attainment at the 1971 census was focused on higher education, discrimination at lower levels was non-existent. For this reason it was not included in the analysis.

2.7 Statistical analysis

The descriptive analysis comprises an examination of incident birth rates for each of the risk indicators of interest. The formal analysis, both univariate and multivariate, fitted proportional hazards models to measure the relative risk of the various socioeconomic and family structure indicators and assess their contribution to the trends in teenage fertility. Confidence intervals are given at the 95 percent level.

Chapter 3: Results

3.1 Study sample

The 1971 cohort comprises 23657 teenagers. Of these 3032, (12.8 percent), had at least one live or still born child before the age of twenty. The overall birth rate for the cohort was 26.6 per 1000 person years of risk. The comparable 1981 cohort comprises 24844 individuals of whom 2827, (11.6 percent), had a birth in similar circumstances. The birth rate for this cohort was 23.6 per 1000 person years of risk.

table 1: age distribution of births to the cohort members by age of LS member at the birth

age at birth	percentages		number of births	
	1971	1981	1971	1981
15	2.8	2.5	85	70
16	9.6	10.3	290	291
17	22.1	20.8	669	588
18	30.4	28.4	921	852
19	35.2	36.3	1067	1027

For the purposes of the analysis itself the various indicators split quite naturally into two types: those in some way defining socioeconomic circumstance and those describing family structure. There are a number of reasons for this dichotomy. The socioeconomic indicators (social class, access to cars and housing tenure) are assumed to be related, measuring different aspects of the individuals position within a social structure. The indicators of family structure are assumed in some way to be mediated by this social structure. The analysis firstly looks at these two sets of indicators separately, then in a multivariate analysis they are combined to look at the relative importance of each. Finally, based on the socioeconomic indicators between the censuses we look at mobility to attempt to determine what effects any effects it may have on the gradients.

3.2 Socioeconomic indicators

Table 2a shows the number of births and birth rates for the individual categories of the socioeconomic indicators for both the 1971 and 1981 cohorts.

table 2a: numbers of births and birth rates to LS members 15 to 19 years of age for indicators of socioeconomic circumstance				
indicators of risk	1971 cohort		1981 cohort	
	births	rate*	births	rate*
social class of family				
I	36	5.8	32	4.8
II	311	13.1	355	11.3
IIIIn	307	16.9	348	17.1
IIIIm	1132	32.0	938	30.1
IV	624	38.8	495	33.2
V	227	47.2	172	46.0
other	395	43.4	103	38.5
housing tenure				
owner occupier	859	15.2	1011	13.3
private renting	423	31.5	151	21.7
LA tenant	1698	40.4	1635	45.6
car access				
cars=2+	141	10.2	301	10.9
car=1	1167	20.1	1310	20.6
cars=0	1675	41.7	186	43.2

note: *=rates given per 1000 person years of risk

3.2.1 Patterns in the rates

Social class of the family at the 1971 census shows a stepwise increase in the incident rates of teenage pregnancy for the categories I to V. Similar patterns are apparent with both housing tenure and access to cars, the two additional and more indirect measures of social circumstance. These 'classic' gradients are maintained in the 1981 cohort. With two exceptions, the rates are seen to fall in all categories between the censuses. For the tenants of local authority housing the rates have increased from 40.4 to 45.6 births per thousand person years of risk. This is possibly evidence of an increasing social polarisation between the censuses. The other exception is that of the very slight increase in the rates for social class IIIIn (from 16.9 to 17.1 per 1000 person years of risk).

3.2.2 Univariate survival analysis

Tables 3a and 3b below show the corresponding hazard ratios for each of these socio-economic indicators taken separately at both the census points. These results reflect the steepening of the gradient associated with housing tenure. Compared to teenagers in owner occupied accommodation those in local authority housing at the 1981 census show an elevated risk of 3.54, while for the 1971 cohort the comparable risk was smaller, at 2.72.

In addition, social class itself also shows a widening of the gradient between the top and bottom social classes (8.43 for those in the 1971 cohort rising to 9.96 with the 1981 cohort).

Finally, family access to cars maintains its gradient across the two cohorts: its average effect barely changes with the relative risk of the univariate main effects models being 2.09 in 1971 and 2.06 in 1981.

table 3a: risk of teenage motherhood by indicators of socioeconomic status as determined at the 1971 census

indicators of risk	hazard ratio	confidence intervals	pValue
family social class	1.30+	(1.28 - 1.34)	p=0.000
I	1.00		
II	2.26	(1.60 - 3.18)	p=0.000
IIIIn	2.93	(2.07 - 4.14)	p=0.000
IIIIm	5.63	(4.04 - 7.84)	p=0.000
IV	6.87	(4.91 - 9.16)	p=0.000
V	8.43	(5.93 - 11.99)	p=0.000
other	7.75	(5.50 - 10.90)	p=0.000
housing tenure	1.63+	(1.57 - 1.70)	p=0.000
own occ	1.00		
rent:pr	2.09	(1.87 - 2.36)	p=0.000
rent:la	2.72	(2.51 - 2.95)	p=0.000
access to cars	2.09+	(1.97 - 2.23)	p=0.000
2+ cars	1.00		
1 car	1.99	(1.68 - 2.38)	p=0.000
0 cars	4.23	(3.56 - 5.03)	p=0.000

note: + result shows results for the main effects model

table 4a: risk of teenage motherhood by indicators of socioeconomic status as determined at the 1981 census

indicators of risk	hazard ratio	confidence intervals	pValue
family social class	1.32+	(1.29 - 1.35)	p=0.000
I	1.00		
II	2.36	(1.64 - 3.39)	p=0.000
IIIIn	3.59	(2.51 - 5.17)	p=0.000
IIIIm	6.41	(4.51 - 9.12)	p=0.000
IV	7.10	(4.96 -10.15)	p=0.000
V	9.96	(6.83 -14.53)	p=0.000
other	9.16	(6.41 -13.11)	p=0.000
housing tenure	1.88+	(1.81 - 1.96)	p=0.000
own occ	1.00		
rent:pr	1.64	(1.38 - 1.94)	p=0.000
rent:la	3.54	(3.27 - 3.82)	p=0.000
access to cars	2.06+	(1.95 - 2.19)	p=0.000
2+ cars	1.00		
1 car	1.90	(1.68 - 2.16)	p=0.000
0 cars	4.10	(3.61 - 4.65)	p=0.000

note: + result shows results for the main effects model

3.3 Family structure

Numbers of births and birth rates relating to family structure are presented in table 2b.

Corresponding hazard ratios are presented in tables 3b (for the 1971 census) and 4b (the 1981 census).

table 2b: numbers of births and birth rates to LS members
15 to 19 years of age for risk indicators relating to
family structure

indicators of risk	1971 cohort		1981 cohort	
	births	rate*	births	rate*
presence of father of LS teenager in household				
present	2629	25.4	2253	21.6
absent	403	40.8	574	37.5
age of LS teenager's mother at birth of eldest child in household				
20 plus	2405	24.0	1852	19.2
to 19	461	48.8	710	43.3
number of siblings ever born normally resident in household				
none (lone child)	338	23.9	321	22.3
sib=1	656	17.8	801	15.7
sibs=2	712	24.3	838	25.7
sibs=3 or more	1326	39.9	867	39.8
number of siblings				
to 1 sibling	994	19.5	1122	17.2
sib=2 plus	2038	32.6	1705	31.4

note: *=rates given per 1000 person years of risk

3.3.1 Patterns and trends

Generally, the incident rates for each of the categories decline from the 1971 Census to the 1981 Census. Because these are mostly dichotomous variables it is difficult to see any variation in trends, so it probably better to go straight to the examination of hazard ratios.

When compared to family situations where the father is normally resident the risk of having a teenage birth where the father is absent is sixty percent higher at the 1971 census and seventy-seven percent higher at the 1981 census.

The hazard ratios associated with the number of siblings normally resident in the household show a positive association with the risk of becoming a teenage mother. Overall, the average elevated risks per individual child in the family are of thirty three percent for the cohort in 1971 and thirty-nine percent for the 1981 cohort. For both the cohorts, however, the distribution of this risk through the individual categories is slightly complicated. Using only children as the baseline reference category for the 1971 cohort the stratified results show the hazard ratios for one sibling, two siblings and three or more. Having a single sibling resident in the same household at the census confers an approximate twenty five percent protection (hazard ratio=0.74, $p=0.000$) while the positive association between number of siblings and risk of teenage motherhood only appears with three or more siblings (hazard ratio=1.69, $p=0.000$).

For the cohort of 1981 we again find the same overall pattern of risk when we examine the stratified results. The protective effect of a single sibling is again evident, though in this cohort it is slightly less muted (hazard ratio=0.69, $p=0.000$). The subsequent gradient (associated with one and two siblings) is, however, more pronounced than with the 1971 cohort with significant hazard ratios of 1.15 and 1.81 respectively.

For those LS teenagers whose mothers were aged less than twenty at the birth of the eldest resident sibling in the household the risk of themselves becoming teenage mothers is more than double that of those whose mothers were aged twenty or more. With the 1971 cohort the hazard ratio was 2.06 while with the 1981 cohort it has risen to 2.31 in 1981.

Increasing age of the cohort member's mother (in this case measured as the age at the birth of the LS member herself) also has a protective effect. With the 1971 cohort increasing age of the LS members mother at the birth confers an average protection of 0.9 ($p=0.000$), a ten percent reduction in risk with each age group as the LS teenager's mother gets older. Using as a base line the births to those less than twenty the stratified results show this decreasing risk flattening out for those whose mothers who were thirty-five to thirty-nine at the census, and increasing for those forty or more, to 0.71 ($p=0.000$).

This pattern is repeated with the 1981 cohort although the magnitude of the risks change somewhat. The protective effect is enhanced (to an average relative risk of 0.81), and the stratified results show this is consistent across all strata. The enhanced risk noted for those whose mothers were aged forty or more in the 1971 cohort is almost non-existent.

table 3b. risk of teenage motherhood by indicators of family structure as determined at the 1971 census

indicators of risk	hazard ratio	confidence intervals	pValue
presence of father of LS teenager in household			
present v absent	1.60	(1.44 - 1.78)	p=0.000
number of siblings			
none (lone child)	1.33+	(1.28 - 1.38)	p=0.000
one sibling	1.00	(.65 - .84)	p=0.000
two siblings	.74	(.89 - 1.16)	p=0.783
three or more	1.01	(1.50 - 1.91)	p=0.000
age of LS teenager's mother at birth of eldest sibling in household			
20+ v to19	2.08	(1.89 - 2.30)	p=0.000
mother's age at birth of the LS teenager			
to 19	.90+	(.87 - .93)	p=0.000
20-24	1.00	(.56 - .76)	p=0.000
25-29	.65	(.40 - .54)	p=0.000
30-34	.47	(.40 - .56)	p=0.000
35-39	.48	(.39 - .55)	p=0.000
40 plus	.46	(.57 - .87)	p=0.000

note: + result shows results for the main effects model

table 4b: risk of teenage motherhood by indicators of family structure as determined at the 1981 census

indicators of risk	hazard ratio	confidence intervals	pValue
presence of father of LS teenager in household			
present v absent	1.77	(1.61 - 1.94)	p=0.000
number of siblings			
none (lone child)	1.39+	(1.34 - 2.45)	p=0.000
one	1.00	(.61 - .79)	p=0.000
two	.69	(1.01 - 1.31)	p=0.000
three or more	1.15	(1.59 - 2.06)	p=0.000
age of LS teenager's mother at birth of eldest sibling in household			
20+ v to19	1.81	(2.12 - 2.52)	p=0.000
mother's age at birth of the LS teenager			
to 19	.82+	(.79 - .85)	p=0.000
20-24	1.00	(.48 - .61)	p=0.000
25-29	.55	(.33 - .43)	p=0.000
30-34	.38	(.30 - .41)	p=0.000
35-39	.35	(.37 - .53)	p=0.000
40 plus	.45	(.38 - .63)	p=0.000

note: + result shows results for the main effects model

3.4 Multivariate analysis

The selection of indicators for inclusion in the multivariate analysis is based on a number of criteria: the results of the univariate analysis is the more important of these, but the current research agenda and, lastly, intuition also have a role to play.

Because of the high degree of collinearity between the socioeconomic indicators, and in deference to previous research (where it has no real history), access to cars was not included in the multivariate analysis. The basic model defining socioeconomic circumstance is then housing tenure and social class at the census.

For the univariate analysis two indicators had been derived for the age of LS teenager's mother: her age at the relevant census, and her age at the birth of the eldest child in the household. While both of these gave highly significant results in the univariate analysis only the indicator giving the mothers age at the birth of the eldest sibling was used in the multivariate analysis. It was thought that this better reflected the idea of family structure.

Each of the indicators of family structure is added separately to this basic model to test their effect. Finally, a fully saturated model is given to attempt to examine the relationships between all the indicators.

3.4.1 The 1971 cohort

Table 5a below gives the results of the multivariate analysis for the 1971 cohort.

table 5a (1971 cohort): hazard ratios for selected indicators of socioeconomic circumstances by family circumstances

indicators	models=a	b	c	d	e
housing tenure	1.45+	1.42+	1.40+	1.45+	1.39+
owner occupier	1.00	1.00	1.00	1.00	1.00
private renting	1.71	1.67	1.68	1.71	1.65
LA tenant	2.00	1.94	1.87	2.00	1.82
family					
social class	1.24+	1.24+	1.23+	1.25+	1.22+
I	1.00	1.00	1.00	1.00	1.00
II	2.03	2.02	2.04	2.02	2.03
IIIa	2.36	2.37	2.45	2.34	2.41
IIIb	3.96	3.86	3.84	3.79	3.76
IV	4.62	4.52	4.40	4.50	4.25
V	5.32	5.09	4.87	5.26	4.64
unclassified	5.43	5.29	5.08	4.96	4.31
age of LS teenager's mother at birth of eldest sibling in household					
twenty plus		1.66+			1.53+
to nineteen		1.00			1.00
		1.65			1.51
number of siblings					
none (lone child)			1.22+		1.19+
one sibling			1.00		1.00
two siblings			.88		.89*
three or more			1.10		1.08*
			1.49		1.44
presence of father of LS teenager in household					
present				.94**	1.04**
absent				1.00	1.00
				1.16*	1.27*

note: + result shows results for the main effects model
 * shows non-significant result

The main effects model for the combination of social class and housing tenure show reduced relative risks for both indicators when compared against the respective univariate analyses (the hazard ratios dropping from 1.63 to 1.45 for housing tenure and from 1.32 to 1.24 for social class). These remain both stable and significant for the remainder of the analysis showing a strong independent effect. The relative risks from the stratified analysis of this

combination show some mutual attenuation of the gradients especially at the lower ends of the scale, suggesting some interaction between these indicators.

Adding mother's age does not reduce these substantially and the indicator itself shows a strong independent effect. Its initial power on addition is reduced from 2.08 to 1.55 but thereafter it is not affected much by inclusion of the other family structure indicators, remaining both a strong and significant indicator.

Adding the indicator for number of siblings to the basic model has a similar effect: its independent effect is reduced (from 1.33 in the univariate analysis to 1.22), with no change in the main effect of social class, and a reduction in the effect of housing tenure (the relative risk slips from 1.45 to 1.40). Again the stratified results show that the gradients of both the socioeconomic indicators is attenuated somewhat with the introduction of this indicator with the largest reductions being felt at the lower ends of the scales.

The presence/absence of the LS teenager's father in the household becomes non-significant when added to the model.

3.4.2 The 1981 cohort

Table 5b below gives the results of the multivariate analysis for the 1981 cohort.

table 5b: elected indicators of socioeconomic circumstances by family circumstances as measured at the 1981 census					
indicatore	models=a	b	c	d	e
housing tenure	1.67+	1.64+	1.61+	1.67+	1.59+
owner occupier	1.00	1.00	1.00	1.00	1.00
private renting	1.48	1.43	1.48	1.48	1.44
LA tenant	2.65	2.57	2.47	2.64	2.40
family					
social class	1.19+	1.18+	1.19+	1.21+	1.17+
I	1.00	1.00	1.00	1.00	1.00
II	2.15	2.16	2.16	2.14	2.18
IIIa	2.83	2.79	2.96	2.81	2.91
IIIb	4.22	3.96	4.07	4.23	3.87
IV	4.24	4.09	4.05	4.21	3.88
V	5.13	4.85	4.72	5.08	4.39
unclassified	5.27	4.82	5.09	5.00	4.16
age of mother of LS teenager					
twenty plus		1.66+			1.55+
to nineteen		1.00			1.00
		1.63			1.52
number of siblings					
none (lone child)			1.25+		1.26+
one sibling			1.00		1.00
two siblings			.87*		.94*
three or more			1.22		1.30
			2 57		1.67
presence of father of LS teenager					
present				.90*	.98+*
absent				1.00	1.00
				1.08*	1.16*

note: + result shows results for the main effects model
* shows non-significant result

Broadly speaking the overall effects of this analysis are similar to those described in the analysis of the 1971 cohort. Housing tenure and social class both maintain their significant effect over the whole analysis. Of the indicators of family structure the age of the (LS teenager's) mother remains important, as does the number of siblings in the household.

Again, the indicator for presence/absence of the LS teenager's father becomes non-significant when added to the model.

The stratified analysis also yields similar overall effects. The attenuation of the gradients associated with both of the indicators of socioeconomic circumstances is explained by the age of the mother of the LS teenager.

3.4.3 Trends in the multivariate analysis between the censuses

With the exception of housing tenure the main effects models recorded for each of the indicators in the sequence of models presented for each cohort remains very stable. Housing tenure becomes relatively more important to the 1981 cohort analysis. This stability is also reflected in the stratified analysis, again with the exception of housing tenure where the relative risk for LA tenants increases markedly between the censuses, (from 1.82 when based on the 1971 characteristics to 2.40 in 1981). The age of the LS teenager's mother maintains its important position over both censuses although it's relative power is weakened in the 1981 model.

3.5 Social mobility

In the context of the present study the analysis of mobility concerns the net effect of changes in socioeconomic circumstances over time. That subset of the 1981 cohort who were enumerated at the 1971 census provides data from both census points that can be used to form a mobility matrix to chart these changes. While the acknowledged problems with the 1980 classification changes for the direct measure of social class make it unsuitable for examining the social mobility of the present cohorts the two indirect measures (access to cars and housing tenure), however, can be used as markers of socioeconomic change.

At the aggregate level the problem addressed by analysis of mobility can be stated as follows: of the risk associated with a particular stratum of a given indicator how much is accounted for by those entering, those leaving and those stable in relation to the indicator. For example, in the case of housing tenure (for whatever outcome) how much of the risk associated with being a local authority tenant remains with those who move (upwardly) into owner occupation from rented accommodation, or downward into rented accommodation. In relation to teenage pregnancy this can translate to a question about the strength or persistence of the specific cultural or sub-cultural mores which act on the individual because of their socioeconomic circumstance.

The analysis reports firstly on mobility in terms of the indicator of car access. It then reports on the indicator of housing tenure. The ordering is deliberate: the configuration of risk in the models for car access lends itself to a more straightforward interpretation than the similarly structured modeling in relation to housing tenure.

The sample comprising that subset of the 1981 cohort enumerated at the 1971 census consisted of 22255 teenagers, of whom 2462 (11.6 percent) had a birth. The overall birth rate for this cohort was 22.93 per 1000 person years of risk.

3.5.1 Mobility: by access to cars

In terms of the risk of teenage pregnancy the first of the models (on the left of table 6a below) shows that those classed as upwardly mobile (at the 1981 census) exhibit a protective effect when compared against the base line category of the socially stable between censuses after adjustment for car access at the 1971 census (hazard ratio=0.70, p=0.000). The downwardly mobile in the same model, however, show an excess risk (hazard ratio=2.56, p=0.000).

The second model of table 6a (on the right) again shows the risk associated with mobility, but this time adjusted for car access at the 1981 census (the destination). Here the pattern is reversed, with the upwardly mobile showing higher risk of teenage pregnancy (hazard ratio=2.12, p=0.000) than the downwardly mobile (hazard ratio=0.84, p=0.014).

table 6a: effect of mobility on the risk of teenage motherhood as defined by access to cars at both the 1971 and 1981 censuses

	<u>model one</u>			<u>model two</u>		
	car access in 1971 (origin)			car access in 1981 (destination)		
adjustment:	hazard ratio	confidence Intervals		hazard ratio	confidence intervals	
car access	2.96	(2.73 - 3.20)	p=0.000	2.88	(2.66 - 3.11)	p=0.000
stable	1.00			1.00		
up	.70	(.64 - .76)	p=0.000	2.12	(1.90 - 2.37)	p=0.000
down	2.56	(2.19 - 2.98)	p=0.000	.84	(.73 - .96)	p=0.014

The standard interpretation of these results is that the upwardly mobile (in terms of access to cars) show lower risk than the class they left behind but higher risk than the class they enter: the relative risk associated with upward mobility adjusted for point of origin=0.70, while upward mobility associated with the point of destination=2.12. In contrast the downwardly mobile show higher risk than the class they left behind but lower risk than the class they enter: in this case the relative risk associated with downward mobility adjusted for point of origin=2.56, while downward mobility associated with the point of destination=0.84. This suggests that social selection is playing a part in the mobility.

3.5.2 Mobility: by housing tenure

In terms of the straightforward interpretation of the results the symmetry associated with the model is important. Turning now to housing tenure as an indicator of mobility it is apparent that the symmetry is not complete.

table 6b: effect of mobility on the risk of teenage motherhood as defined by housing tenure at both the 1971 and 1981 censuses

adjustment:	<u>model one</u>			<u>model two</u>		
	tenure in 1971 (origin)			tenure in 1981 (destination)		
	hazard ratio	confidence intervals		hazard ratio	confidence intervals	
tenure	1.88	(1.79 - 1.96)	p=0.000	1.86	(1.78 - 1.94)	p=0.000
stable	1.00			1.00		
up	.88	(.80 - .97)	p=0.012	1.28	(1.16 - 1.41)	p=0.000
down	2.20	(1.92 - 2.53)	p=0.000	1.16	(1.00 - 1.35)	p=0.046

The first of the models (on the left above) shows that when adjusted for housing tenure of origin the upwardly mobile show a protective effect (hazard ratio=0.88, p=0.012) while the downwardly mobile show an excess risk (hazard ratio=2.20, p=0.000). The second model of table 6b (on the right) shows the risk associated with mobility adjusted for the housing tenure at the 1981 census (the destination). Here the pattern is reversed, with the upwardly mobile showing higher risk of teenage pregnancy (hazard ratio=1.28, p=0.000) than either the stable or the downwardly mobile (hazard ratio=1.16, p=0.046). The asymmetry lies in the risk associated with this downward mobility. It is greater than one, therefore implying a higher relative risk than the housing tenure of destination. This in turn implies that the process of downward mobility (as defined in terms of housing tenure) is itself contributing to the steepening of the gradient associated with housing tenure observed earlier.

Discussion and conclusions

Teenage pregnancy has now become a serious social policy issue. Government is now interested in intervention and the media will make sure that, at least for the present, the issue will not go away.

What this report does is chart the pre-conditions or changing social setting in which these young people are making the pertinent 'decisions' regarding their fertility: both engaging in unprotected sex, and subsequently continuing with a normally undesired pregnancy. While analysis of the LS cohorts cannot directly deal with the purely personal motivations behind these issues, it is accepted that a strong social structural component is involved. What does not seem to be quantified in any systematic way is how much this social structural component affects differential access to both information and health services. While the idea of 'intergenerational transmission' was already established as an important mechanism the report corroborates that its relative effect has not diminished with time and that it can act independently of social structure. Social structure itself remains important: each of the markers of social circumstance shows strong 'classic' gradients linking increasing deprivation with teenage motherhood. In combination, both social class and housing tenure maintain their separate importance. What is noteworthy is the changing relative importance of the risk attached to housing tenure over the two cohorts. In the analysis of the 1981 cohort housing tenure has the strongest independent effect of all the indicators. The analysis of mobility (based on housing tenure) shows that, contrary to expectation, those downwardly mobile show higher risks than the tenure group they are moving into. This is probably dominated by movement into Local Authority tenancy and seems to suggest that this tenancy category is beginning to act as a 'sink' (drawing individuals of a certain type into it and concentrating the problem somewhat in this group). The period of follow up of the 1981 cohort partly coincides with the Thatcherite 'restructuring' of British society which is now accepted as having had the effect of increasing levels of both absolute poverty and creating wide disparities between income groups. The results shown may be a manifestation of these wider societal changes.

In terms of the way forward: now that we 'formally' recognise that a problem exists, it might be time to apply more of the research techniques from the United States research community to try to develop a better understanding of the psycho-social motivations behind teenage pregnancy. Thus far research at this micro level this seems to be missing from the British

research agenda. It is probably not appropriate to import this research directly. The researchers from the United States seem to have a different agenda from what would be considered appropriate in this society. For them getting individuals out of the poverty trap is the goal, while here reducing social inequality is still part of the agenda. That being said, the problem of teenage pregnancy is one that would seem to be amenable to a systematic and sensitively targeted intervention. This would seem to be a good point to end, with the traditional call for more research.

Appendix 1: Description of key variables used in the analysis

The following set of independent variables were generated for each of the 1971 and 1981 cohorts. These can be categorised as follows: those relating to the household structure or family composition, and those relating to socioeconomic circumstances

FPRx

Indication of the presence or absence of the LS teenager's father at the census
(1=present, 2=absent)

FAGx

The age of LS teenager's father at the census
(1=15-19, 2=20-24, 3=25-29, 4=30-34, 5=35-39, 6=40 plus)

FSCx

The social class of the LS teenager's father at the census as defined according to the Registrar General's classification of occupations.
(0=I, 1=II, 2=IIIa, 3=IIIb, 4=IV, 5=V, 7=armed forces, 8=inadequately described, 9=other unclassified)

MPRx

Indication of the presence or absence of the LS teenager's mother at the census
(1=present, 2=absent)

MAGx

The age of the LS teenager's mother at the census
(five year age groups 1=15-19, 2=20-24, 3=25-29, 4=30-34, 5=35-39, 6=40 plus)

AGSx

The age of the LS teenager's mother at the birth of the eldest child resident in the household at the census.
(1=to 19 years of age at birth 2=20 plus years at the birth)

MSCx

The social class of the LS teenager's mother at census (See the note relating to FSC7 above)

NSBx

The number of siblings for the LS teenager normally resident in the household at the census
(0 siblings, 1, 2, 3 or more)

CSCx

A composite variable deriving a social class value for the family based on the highest of either the mother or fathers social class. For values see the note on social class above

CxG1

The number of cars to which the household has access at the census
(1=two or more, 2=one, 3=none)

TxG2

The housing tenure of the family at the census.
(1=owner occupier, 2=private rental, 3=LA tenant)

Two Variables relating to the outcome were generated. These were included in all three datasets.

OUTC

Indicates that a first child was born to the LS member during the five year follow up period occurring in the period immediately following the census and during which the individual ages from 15 years of age to 19 completed years of age.
(1=a birth event occurs, 0=no birth event occurs to the individual before their twentieth birthday).

RSK1

the amount of risk in days accumulated by the LS member from their fifteenth birthday to the point of their exit from the risk of having a first born child before the age of twenty. This is either the date of birth of the child or the end of inclusion in the study (triggered by their twentieth birthday), whichever is the soonest

Finally, two additional variables were derived, charting the patterns of mobility between the censuses. These are

TMB

social mobility based on housing tenure. This can take the following values

1=no change in the status of housing tenure between the censuses

2=upward mobility. Indicates a move from renting to owner occupation, or from LA accommodation to privately renting.

3=downward mobility. Indicates a move from owner occupation to renting, or from private renting to LA accommodation.

CMB

social mobility based on car access. This can take the following values

1=no change in the number of cars the family has access to.

2=access to more cars. Indicates a move from access to no cars to access to one or more, or from one to two or more

3=access to less cars. Indicates a move from two cars to one or none , or from one to zero.

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WORKING PAPERS USING THE ONS LONGITUDINAL STUDY

*We do not supply copies of papers which have been subsequently published, or for various other reasons have been discontinued. Working paper numbers not shown have been withdrawn.

- *1 Dawkins, D. (1982) Migration and Health of the Elderly.
- *2 Leon, D. (1983) Housing tenure: an example of using record linkage to study differentials in cancer incidence, survival and mortality.
- *3 E. Hoinville (1983) A review of the literature on migration in England and Wales.
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