



## Teenage motherhood: where you live is also important. A prospective cohort study of 14,000 women



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### ABSTRACT

The United Kingdom has among the highest rates of teenage motherhood (TM) in Western Europe. The relationship to individual social and material disadvantage is well established but the influence of area of residence is unclear. We tested for additional TM risks in deprived areas or in cities. The Northern Ireland Longitudinal Study was used to identify 14,055 nulliparous females (15–18). TM risk was measured using multilevel logistic regression, adjusting for health status, religion, family structure, socio-economic status, rurality and employment-based area deprivation. Most variation in TM was driven by individual, household and socioeconomic factors with the greatest proportion of mothers in low value or social rented accommodation. Living in an area with fewer employment opportunities was associated with elevated TM risk (most vs. least deprived,  $OR_{adj} = 1.98 [1.49, 2.63]$ ), as was urban dwelling (urban vs. intermediate,  $OR_{adj} = 1.42 [1.13, 1.78]$ ). We conclude that area of residence is a significant independent risk factor for TM. Interventions should be targeted towards the most deprived and urban areas and to those in the lowest value housing.

### 1. Introduction

Early child-bearing may have a profound impact on the well-being of adolescents, being associated with reduced educational attainment and curtailed career prospects (Chevalier et al., 2003; Navarro and Walker, 2012). Births to young teens (13–16 years old) have been associated with negative health outcomes for both mothers and children (Reime et al., 2008; Kuo et al., 2010) and children of teenage mothers are at increased risk of emotional and behavioural problems (Moffitt and the E-Risk Study Team, 2002). Social and economic costs associated with supporting these groups may be considerable although there remains debate over whether teenage motherhood should be considered a social problem and whether early reproduction should be discouraged (Duncan, 2007; Bonell, 2004; Lawlor and Shaw, 2002).

The evidence base about individual and household factors associated with teenage motherhood is well established but the influence of area of residence is less clear. At the individual level, low socio-economic status (SES), poor educational attainment and mental health problems have been associated with increased teenage motherhood risk (Kiernan, 1997; Lehti et al., 2012; Horwitz et al., 1991). Women born to young mothers may be more likely to become young mothers themselves (Kahn and Anderson, 1992; Lehti et al., 2012; Horwitz

et al., 1991), as are those not living with both parents (Lehti et al., 2012). There have been fewer studies of teenage fatherhood but similar associations with low SES and educational attainment have been found (Kiernan, 1997). Associations between teenage fatherhood and problems at home and school, drug use and early onset of sexual activity have been reported (Dearden et al., 1995; Thornberry et al., 1997) but for teenagers of both sexes, birth of a child can mark a turning point towards more positive behaviours and maturity (Duncan, 2007; Enderstein and Boonzaier, 2015).

Many risk factors for teenage motherhood are shared with teenage pregnancy (Woodward et al., 2001; Imamura et al., 2007; Gibb et al., 2012), however some factors influence only post-conception reproductive decisions and so the strength of the relationship between teenage pregnancy and motherhood rates can vary considerably among populations (Smith, 1993). For example, variation in pregnancy outcomes among areas in England may be due to varying policies on abortion provision among health authorities (Diamond et al., 1999).

Ecological studies have revealed higher rates of teenage pregnancy in deprived areas (McLeod, 2001; Bradshaw et al., 2005) and risk increasing with distance to family planning clinics in some urban areas (Diamond et al., 1999). Family planning services may influence teenage pregnancy and motherhood rates at the area level; GP practices with

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female or younger doctors have been associated with lower teenage pregnancy rates (Hippisley-Cox et al., 1999). However, ecological studies cannot distinguish whether variation in risk is due to population composition (the characteristics of residents) or to features of the areas themselves. Rare multilevel studies have found residual regional variation in teenage pregnancy risk after adjusting for household SES and family structure (Finland) (Vikat et al., 2002) and elevated risks of teenage motherhood in some urban areas whilst adjusting for area deprivation, individual and household factors (UK) (McCulloch, 2001).

In this study, we develop a detailed picture of the risk factors for teenage motherhood, formally testing whether area level deprivation and urban/rural residence are associated with teenage motherhood risk independent of a wide range of individual and household characteristics. Rather than relying on survey responses from a potentially difficult to reach demographic group, we used a large scale linkage of birth records with Census records to investigate gradients of teenage motherhood risk in Northern Ireland (NI).

The social context surrounding teenage sexual behaviour and fertility differs between Northern Ireland and Great Britain. In Northern Ireland, abortion is illegal unless it can be proven that the life of the mother is at serious risk and so teenagers may travel to Great Britain to obtain an abortion. In 2014, 107 NI resident women under twenty obtained an abortion in England or Wales (Department of Health, 2015). The number of NI residents obtaining an abortion in Scotland is not reported in official statistics as these women are frequently assigned a temporary postcode in Scotland for the purposes of treatment (Information Services Division, 2016).

Although some denominations are in decline, religious affiliation is an important indicator of social identity and churches retain a stronger influence on social norms especially regarding sexual behaviour than would be observed in Great Britain. There are separate school systems corresponding to the two dominant communities, the Catholic system and the state system that is predominantly attended by Protestants. Catholic schools have traditionally placed a low emphasis on contraception in the sex education curriculum (Rolston et al., 2005), consistent with the strong anti-abortion teaching of the Catholic Church. Opposition to abortion from both the Catholic Church and conservative Protestant denominations is largely responsible for the continued ban on abortion in NI.

To account for these features and to gain additional insight into underlying mechanisms we included measures not previously used in studies of teenage motherhood. Current religious affiliation was included as those with no religious affiliation might have lower risk of teenage motherhood due to increased use of contraception and/or use of abortion services compared with those declaring an affiliation. In addition to measures of SES based on parental occupation which reflect current exposure to social environments, we used house value as a measure of accumulated household wealth and indicator of cumulative exposure to these environments. Wealth may indirectly reduce teenage motherhood risk by encouraging teenagers to delay childbearing to pursue education and careers but may also have a direct influence by increasing the ability to travel to Great Britain to obtain an abortion.

Rates of teenage motherhood have decreased in the UK over recent years, a trend that partially reflects an increase in the proportion of pregnancies aborted; in England and Wales the proportion of pregnancies aborted among the under 20s increased from 34.7% in 1994 to 44.6% in 2014 (ONS, 2016). Despite this decreasing trend the UK has some of the highest rates of teenage motherhood in Western Europe. In 2012, there were 19.7 births per 1000 women aged 15–19 (ONS, 2014). In Northern Ireland alone the rate was slightly lower (18.1 births per 1000, NISRA, 2015).

## 2. Methods

### 2.1. Data sources

The study cohort was drawn from the Northern Ireland Longitudinal Study (NILS) which comprises data from the Northern Ireland Health Card registration system linked to Census and vital events data from administrative sources (O'Reilly et al., 2012). The representative sample covers approximately 28% of the population, an unprecedentedly large population fraction for a study of teenage motherhood. A cohort of nulliparous women aged 15–18 at the 2001 Census was identified. The 15–19 age range is widely used for comparisons of teenage motherhood rates over time and between countries (e.g. ONS, 2014; Kiernan, 1997). A focus of this analysis was on the influence of household and family characteristics on teenage motherhood risk and the likelihood of a young woman leaving the family home increases considerably at University entry age. Therefore we excluded those aged 19 at baseline because for women that have left home household characteristics were not available. Also for this reason we excluded 88 women living in communal establishments. The majority (59) were in educational establishments (including halls of residence), 14 were in children's homes and the remaining 15 were in hostels, care homes, prison or psychiatric hospitals. We also excluded 184 cases with incomplete information, leaving a final cohort size of 14,055. The risk period for each woman comprised the period in which she remained under 20, giving a maximum follow up duration of five years. First births were the primary outcome and at this point women were excluded from the risk set so subsequent births did not contribute to our estimates. Contextual information on the cohort members, drawn from 2001 Census returns was anonymised, held in a secure environment by the Northern Ireland Statistics and Research Agency (NISRA) and made available to the research team for this study. The use of the NILS for research was approved by the Office for Research Ethics Committees Northern Ireland (ORECNI).

#### 2.1.1. Individual measures

Cohort attributes were selected based on those factors previously associated with variation in teenage motherhood risk or that might plausibly be so. Two measures of self-reported health status were included; general health (good/fair/not good) and whether the respondent had a long term health condition that limited normal activities of daily living. Current religion (Roman Catholic/Church of Ireland/Methodist/No religion or other religion/Other Christian/Presbyterian) was recorded. Only 30 cohort members reported belonging to 'other' religions and so these were grouped with those reporting no religion. Previous analyses have demonstrated that Other Christians are more conservative and the group has healthier behaviours and outcomes (O'Reilly and Rosato, 2010). Whether the cohort member was living with parents was also recorded. Cohort members were grouped into those living with both parents and those who were not, as an exploratory analysis revealed no statistically significant difference in teenage motherhood risk for those living with just one parent and those living with neither parent.

#### 2.1.2. Household factors

Socio-economic status of the household was captured using four variables. Social class of the head of household was based on the National Statistics Socio-Economic Classification (NS-SEC) (Rose and Pevalin, 2002) and was used along with their economic activity (employed/inactive/unemployed). The head of household was identified using a combination of variables. Lone parents were taken to be head of household. In couple families, the partner with the highest level of economic activity was head. If both had the same activity, the elder was selected or if both were the same age, the first entered on the Census form was selected. If household members were unrelated, or there was more than one family present, the same set of rules was used

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