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## The characteristics of mobile families with young children in England and the impact of their moves on neighbourhood inequalities in maternal and child health

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### ABSTRACT

This study compares the health and socio-demographic characteristics of residentially mobile families with young children in England to families that do not move and assesses the impact of their moves upon inequalities in health between neighbourhoods. The analysis uses data from the first two waves of the Millennium Cohort Study describing 9022 cohort members, born in 2000–2002, and their families. A third of the families moved between the waves of the survey when the children were aged nine months and three years. Mobile families moved disproportionately toward less deprived areas but had disadvantaged socio-economic characteristics and poor outcomes for infant's birth weight and accidents and mother's self-rated health, limiting longstanding illness and mental health. Health outcomes were worst among the minority moving to more deprived neighbourhoods. Families' moves moderately increased health inequalities between neighbourhoods with high and low deprivation.

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### 1. Introduction

There are marked inequalities in health between areas of Britain that have persisted over long time periods (Dorling et al., 2000; Gregory, 2009) and grown in recent years (Davey Smith et al., 2002; Thomas et al., 2010). The persistence of these socio-spatial inequalities has focussed attention on the processes underlying their reproduction, including migration. A number of studies completed in developed countries have considered the impact of migration within countries on inequalities in health between areas (Boyle, 2004). However, little research has considered one of the most mobile groups in the population: families with young children. This analysis uses data from the UK Millennium Cohort Study (MCS) to assess the health and socio-demographic characteristics of families that moved within England, when their children were aged between nine months and three years, and the impact of their mobility upon inequalities in health outcomes between neighbourhoods with different levels of deprivation.

#### 1.1. Migration and health across the life course

Residential mobility has long been considered from a life course perspective as analysis suggests that the frequency of residential moves, characteristics of movers, and the nature of their moves change across the life course (Cooke, 2008; Champion, 2005; Duke-Williams, 2009). Data from the UK 2001 census describing moves in the last year demonstrates mobility rates are very high among infants, then decline through childhood, before rising steeply to peak in the late teenage years and early twenties and then declining again through the twenties and thirties to the lower rates of later life (Champion, 2005).

The high rates of mobility among people in early adulthood reflect changes in their education, employment and family relationships, including moves associated with cohabitation, marriage and childbearing (Grundy and Fox, 1985; Champion, 2005; Duke-Williams, 2009; Rabe and Taylor, 2009). Pregnancy and childbirth are important triggers to mobility and result in high rates of moves among families with infants and young children (Grundy and Fox, 1985; Grundy, 1986; Clark and Huang, 2003; Kulu, 2005; Kulu and Milewski, 2007; Duke-Williams, 2009).

Analysis of migration within the UK demonstrates that people that move have better health than those that do not; the 'healthy migrant effect' (Boyle et al., 2002; Champion, 2005). However, the good health found among movers overall reflects the high rates of mobility among young adults and comparisons by age group

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suggests a more complex relationship (Bentham, 1988; Findley, 1988; Verheij et al., 1998; Boyle et al., 2002; Rogerson and Han, 2002; Boyle and Duke-Williams, 2004; Norman et al., 2005; Larson et al., 2004; Martikainen et al., 2008). Among young adults movers have better health outcomes than non-movers but in midlife this association reverses and movers at older ages have relatively poor health.

The limited research that has focussed upon mobility among pregnant women, children and their parents indicates that they are also 'exceptions' to the healthy migrant pattern. Analysis of data from the UK MCS suggests that families that move during pregnancy or infancy have worse health in comparison to non-movers for a range of outcomes including infant low birth weight and accident and injury and mother's self-reported health and depression (Tunstall et al., 2010).

A systematic review of research into mobility in childhood and health concluded that high rates of mobility were associated with behavioural problems among children (Jelleyman and Spencer, 2008). This review primarily identified studies of school age children in the USA and located only three studies of pre-school age children. A study of sudden infant death syndrome in New Zealand found a higher risk of death among infants sleeping away from their usual address (Schluter et al., 1998). Analysis in the USA of children aged 2½–5½ years in the Head Start programme, however, did not find significant differences in behaviour or depression among those in more mobile families (Stoneman et al., 1999). While analysis of children aged 0–5 years admitted to a hospital burns unit in the USA found they had moved more frequently than the population as a whole (Knudson-Cooper and Leuchtig, 1982).

A recent study in the UK has used the MCS to consider moves in the previous year among families with children aged nine months, three years and five years (Tunstall and Pickett, 2009). This analysis found that mobile families, in comparison to families that didn't move, had worse mental and physical health among mothers and children for a range of outcomes, including infant's birth weight and accidents, mother's depression, self-rated health and longstanding illness. The relative health disadvantage of these mobile families was greatest when children were infants and declined at age three and five years.

The causes of differences in health between movers and non-movers also vary across the life course. The relatively better health outcomes found overall among mobile young adults in the UK reflect the large proportion of high socio-economic status movers in this age group, relocating for education and employment opportunities (Champion, 2005). In contrast, the poor health found among older mobile adults may reflect health selection as declining health triggers moves to more supported accommodation (Bentham, 1988; Findley, 1988; Verheij et al., 1998; Norman et al., 2005; Boyle and Duke-Williams, 2004).

Analysis of residential mobility among pregnant women and families of young children in the UK and North America has suggested that families that are more mobile have more young and single mothers and greater socio-economically disadvantage than those that are residential stable (Khoury et al., 1988; Long, 1992; Astone and McLanahan, 1994; Shaw and Malcoe, 1991; Tucker et al., 1998; Fell et al., 2004; Canfield et al., 2006; Plewis, 2007; Ketende and McDonald, 2008; Tunstall and Pickett, 2009; Ketende et al., 2010; Miller et al., 2010; Tunstall et al., 2010). Analysis of pregnant women and mothers with infants and young children in the MCS that moved within the UK demonstrates that their relatively poor health outcomes are to a large extent explained by their disadvantaged socio-economic status (Tunstall and Pickett, 2009; Tunstall et al., 2010). This analysis also suggests that the negative circumstances that precipitate a minority of moves, including relationship breakdown and housing problems, may underlie some mobile families' poor health (Tunstall et al., 2010).

This complex relationship between health, socio-economic status and mobility across the life course has been further complicated in recent decades in the UK by the increasingly 'de-standardised' nature of life trajectories (Kulu and Milewski, 2007; Heath, 2008). Patterns of education, employment and childbearing have become more diverse and stratified by socio-economic status resulting in significant variations in patterns of mobility between socio-economic groups across the life course.

## 1.2. Migration and spatial inequalities in health

Studies assessing the impact of migration within countries on variations in health outcomes between areas, completed in UK, Europe, Australia, New Zealand and the USA, have produced conflicting results (Boyle, 2004). The impact of migration on spatial inequalities in health is not straightforward as it reflects the quantity and characteristics of movers in and out of areas, the distance of moves, the time period and spatial scales of analysis and the health outcomes assessed (Jongeneel-Grimen et al., 2011).

The geography of moves also vary across the life course. Analysis of the 2001 Census suggests that in England and Scotland moves between neighbourhoods among people aged 19–29 years were predominantly towards more deprived areas but moves towards less deprived areas were greater in all other age groups and were most dominant among those aged 0–18 and 30–44 years (Bailey and Livingstone, 2007). Other studies of families with children in UK and Europe have also found their moves are primarily towards more affluent and more rural areas (Champion, 2005; Dobsen and Stillwell, 2000; Kulu, 2005; Smith et al., 2006; Joshi et al., 2008; Ketende et al., 2010).

Most studies that have addressed the impact of migration upon spatial variations in health have focussed upon adults. Many of these studies have addressed how selective migration influences the relationship between area socio-economic status and health. Several have indicated that migration strengthens this relationship (Brimblecombe et al., 2000; Norman et al., 2005; Cox et al., 2007; Pearce and Dorling, 2010) but others that migration has relatively little impact (Boyle et al., 2002; Martikainen et al., 2008; Piro et al., 2007; van Lenthe et al., 2007; Connolly et al., 2011) or that it may reduce this association (Boyle and Duke-Williams, 2004; Jongeneel-Grimen et al., 2011).

Studies that have found migration increases socio-spatial inequalities in health have analysed a range of health outcomes including mortality (Brimblecombe et al., 2000; Norman et al., 2005), Type-2 diabetes (Cox et al., 2007) and smoking (Pearce and Dorling, 2010). Most of these studies looked at mobility over a relatively long time scale of 8–18 years (Cox et al., 2007), 20 years (Norman et al., 2005), 25 years (Pearce and Dorling, 2010) and between birth and death (Brimblecombe et al., 2000). In contrast, some of the studies that did not find a strong relationship between mobility and socio-spatial inequalities in health looked at migration over a relatively short time period, including two years (Jongeneel-Grimen et al., 2011) and just one year (Boyle et al., 2002; Connolly et al., 2011).

The impacts of migration on socio-spatial inequalities in health also vary across the life course. This has been demonstrated by a study considering migration and death rates in England and Wales over ten years 1991 to 2001 which found that migration increased inequalities in death rates between more and less deprived areas among those aged under 75 years but reduced these inequalities among those aged 75 years and older (Connolly et al., 2007).

Few studies have considered the impacts of selective migration upon socio-spatial health inequalities among families with young children. Analysis of moves in England in MCS data when children were aged nine months to three years indicates that

socially selective patterns of migration contribute to the socio-economic advantage of families in rural areas (Joshi et al., 2008). Analysis of MCS data describing moves in the last year when children were aged three years has also suggested that these moves increased inequalities in the proportions of households without work and with mothers with poor self-rated health between the least and most deprived neighbourhoods (Tunstall and Pickett, 2009).

It is unclear from this research whether migration affects socio-spatial inequalities in health among families with children as a result of health or social selection. Two recent studies of selective migration of adults between neighbourhoods in the Netherlands with different levels of deprivation and self-reported health, disability and health-related behaviour have however suggested mobility was directly associated primarily with socio-demographic characteristics not health status (van Lenthe et al., 2007; Jongeneel-Grimen et al., 2011).

In summary, therefore, migration research has identified families with young children as a highly mobile group and found distinctive socio-economic characteristics and a risk of poor health among these movers. Their moves have also been found to have a clear social geography. Relatively little is known however about the impact of their moves upon health inequalities between areas.

## 2. Aims

This study has two aims:

- 1) To compare the socio-demographic and health characteristics of families with infants and young children between movers and non-movers and those moving to more and less deprived neighbourhoods in England.
- 2) To assess the impact of these families' moves on inequalities in health outcomes between neighbourhoods with different levels of deprivation.

## 3. Methodology

This analysis uses English data from the first two waves of the Millennium Cohort Study (MCS) when cohort children were aged approximately nine months and three years respectively. It assesses the socio-demographic and health characteristics of families at Wave 1 and moves between area of residence at Waves 1 and 2. The analysis focuses upon the health of mothers and their children because the MCS contains the most complete socio-demographic and health data for these family members.

### 3.1. Millennium Cohort Study (MCS)

The MCS is the Centre for Longitudinal Study's (CLS) most recent UK cohort study describing the health, social and economic characteristics of approximately 19,000 children born in 2000–2002 and their families (Plewis, 2007). The first two waves of the study were carried out in 2001–2002 and 2003–2005 and the survey has now completed four waves of data collection.

The MCS sample was geographically stratified by ward of residence to support analysis within countries of the UK, disadvantaged families and minority ethnic families in England. 'Disadvantaged' wards, defined as within the upper quartile of the Child Poverty Index based on 1991 census data, and English 'ethnic' wards, defined as wards with a minority ethnic group population greater than 30% in the 1991 census, were oversampled.

Addresses of households within these wards with infants aged seven months were identified and sampled from the Department for Work and Pensions' Child Benefit Register. CLS contacted these families to request an interview when the child was nine months. The main respondent, usually the mother, was interviewed in their home and information was collected regarding them, their partner, the cohort child and other family members.

At Wave 1 the overall response rate, the ratio of productive cases to all eligible cases, was 72% in England (Plewis, 2007). At Wave 2 78% of the issued sample in England was productive (Ketende, 2008). The number of households resident in England that responded to the survey at Wave 1 was 11,532. At Wave 2 9357 of these households responded to the survey again.

Cohort members were only included in this analysis if their families were resident at an address in England when sampled and at Wave 1 and Wave 2 interviews. One household resident in England at Wave 1 interview but sampled outside the country was excluded. There were a further 51 households resident in England at Wave 1 that were excluded as they had moved to an address outside England at Wave 2. There were also 89 households that moved to England between Waves 1 and 2 that were excluded.

In addition, from among the 9305 households sampled and resident at Wave 1 and 2 interview in England there were 127 households where the cohort member was not a singleton, 21 households where the birth mother was not the main respondent at Wave 1 and 149 where the birth mother was not resident in the cohort member's household at the time of the Wave 1 and 2 interviews which were also excluded. In total 9022 households were retained in the analysis.

### 3.2. Movers and stayers

The families were categorised as 'movers', resident at different addresses at Waves 1 and 2, and 'stayers', resident at the same address at each wave. The data used to define these categories was from the Wave 2 main respondent interview question regarding whether they were resident at the same address as at Wave 1 interview and from administrative survey data describing the output area (OA) of residence at the time of each interview. Administrative data was used to supplement interview responses because analysis by CLS demonstrated 9% of MCS families that had a different address recorded in administrative data at Wave 1 and 2 did not report a move (Plewis et al., 2008). Families were defined as 'movers' if the main respondent stated that their address was different at Wave 1 and 2 interview or their OA of address at interview had changed between waves.

### 3.3. Neighbourhood deprivation and upward and downward mobility

The neighbourhood areas in this analysis are lower super output areas (LSOA) which contained an average population of 1500 in England in 2001 (Martin, 2004). Neighbourhood deprivation of area of household residence at Wave 1 and 2 was defined using the Index of Multiple Deprivation (IMD) 2004 for England. IMD 2004 includes seven domains of deprivation representing income, employment, health and disability, education, barriers to housing and services, living environment and crime based upon 37 indicators (Noble et al., 2004). The 32,482 LSOAs in England were aggregated into quintiles of deprivation each containing a fifth of the total areas. Movers between Waves 1 and 2 were categorised into three types: those that moved within the same quintile of deprivation, those that moved 'upward' to a less deprived quintile and those that moved 'downward' to a more deprived quintile.

### 3.4. Maternal and infant health variables

Health variables for mothers and infants were selected because they were important measures of health or previous analysis had suggested they were related to mobility. These variables were infant birth weight (under 2500 g/2500 g or more), infant accident or injury since birth (none/one or more), mother's self-rated health (excellent or good/fair or poor), mother has limiting longstanding illness (yes/no), mother ever diagnosed with depression or serious anxiety (yes/no) and mother 'often miserable or depressed (yes/no)'. Two variables measuring maternal health were selected to represent professional diagnosis of mental illness and mother's perception of her mental well-being.

### 3.5. Household socio-demographic variables

Socio-demographic variables that were closely linked to maternal and infant health outcomes or propensity to move were selected. These variables were age of mother at birth in years, number of siblings in households, infant's age in months, mother's relationship with partner, mother's ethnic group, mother's highest academic qualification, workless households, housing tenure and households receiving means-tested benefits (Jobseeker's Allowance, Income Support, Working Families' Tax Credit and or Disabled Person's Tax Credit). More direct measures of income were not used because of their large degree of missing data.

The health and socio-demographic variables were based on responses at Wave 1 and described households at time of interview unless otherwise stated.

### 3.6. Analysis strategy

In the first stage of the analysis the proportions of the socio-demographic and health variables of families in the mover groups stayers, movers within the same quintile, upward movers and downward movers were compared and the differences assessed using Chi-square tests, with *P*-values less than 0.001, 0.01 and 0.05 categorised as significant.

The health outcomes of the mover groups were then compared further in binary logistic regression analysis. In each model the health outcome was the dependent variable and mover status was the independent variable. Models were then adjusted for the socio-demographic variables. Regression analyses report 95% confidence intervals for crude and adjusted odds ratios.

In the next stage of analysis the proportions of health outcomes by quintile of deprivation were compared for all families' areas of residence at Wave 1 and Wave 2. The waves were then compared again in binary logistic regression models in which the health outcomes were the dependent variable and the quintile of deprivation was the independent variable. The least deprived quintile was the reference category in each model. Models were also adjusted for socio-demographic factors. Confidence intervals at 95% were again recorded for crude and adjusted odds ratios.

In the final part of the analysis the health outcomes of families moving in and out of each quintile area of deprivation were assessed. The analysis described the proportion of mothers and infants with poor health outcomes among families that remained in each quintile (stayers and those that moved within the quintile) and the difference in proportions with poor health outcomes among families that moved in and out of the quintile areas.

All analysis was conducted using STATA 11 software (Stata Corporation, TX, USA). Analyses were weighted to account for the survey sample structure at ward level and non-response bias. All reported percentages, means and odds ratios are weighted and all counts are un-weighted.

## 4. Results

### 4.1. Frequency and type of moves

The mean length of time between Waves 1 and 2 interviews was two years and four months. Among the 9022 MCS families 34.2% (3162) had moved address during this time period. The mobile families comprised 15.0% (1469) that moved within the same deprivation quintile, 8.0% (611) that moved to a more deprived quintile and 11.2% (1082) that moved to a less deprived quintile. [Table 1](#) outlining the quintile of deprivation in which families were resident at Waves 1 and 2 demonstrates that the majority of moves between quintiles were to 'adjacent' quintile areas.

[Table 2](#) describes the proportions of families that moved in and out of each quintile of deprivation between Waves 1 and 2 relative to the number of families that remained in the quintiles (stayers and those that moved within the quintile). Quintiles 2–4, with intermediate levels of deprivation, had the greatest proportions of families moving in and out relative to the population that remained in the area. However, the most and least deprived quintiles had larger differences in the proportions of in and out movers. The least deprived quintile had the biggest differences in proportions of in and out movers gaining 23.4% upwardly mobile families moving in and losing 12.7% downwardly mobile families that moved out relative to the number of families that remained in the area. The most deprived quintile lost 19.1% upward movers and gained 14.1% downwardly mobile families relative to those remaining in the quintile.

The net effect of these moves on populations among the most deprived quintiles 1–3 were losses of families, with the greatest decline in the most deprived quintile ([Table 1](#)). The fourth quintile had a similar proportion of families at each wave, while the least deprived population had the greatest change in proportion of families and was the only quintile with a net gain.

### 4.2. Socio-demographic characteristics of mover types

When the socio-demographic characteristics of stayers and total movers were compared ([Table 3](#)) mover families had more young, solo and cohabiting mothers and fewer children. Movers households compared to stayers were more likely to be workless, to receive means-tested benefits and to be privately renting and were less likely to be owner occupiers but had mothers with similar levels of education.

The differences in the socio-demographic characteristics of stayers, movers within the same quintile and upward and downward movers were significant in chi-square tests for all variables at the 0.001 level with the exception of infant's age ([Table 3](#)). The downwardly mobile group had the youngest mothers, the fewest children and were least likely to be married. Upwardly mobile families had more mothers that were aged over 30 years and married compared to downward movers and movers in the same quintile, but more young and unmarried mothers than stayers.

Upwardly mobile mover households had markedly higher socio-economic status than other mover types with more mothers with degrees and lower rates of worklessness and receipt of means-tested benefits. Upward movers compared to stayers had similar or higher socio-economic status for indicators of education, means-tested benefits and worklessness but lower levels of owner occupation. Families that moved within quintiles and those that were downwardly mobile had similar low socio-economic status as indicated by proportions of workless families, housing tenure and receipt of means-tested benefits. Downwardly mobile families compared to those moving within a quintile had fewer mothers with degrees but also with no qualifications.

4.3. Health outcomes of mover types

When the health characteristics of stayers and total movers were compared movers had worse health than stayers for all maternal and infant outcomes with the greatest absolute differences for the maternal mental health variables (Table 4). However, differences between stayers, movers in the same quintile and upward and downward movers were only significant in chi-square test at the 0.01 level for mother has limiting longstanding illness and infant birth weight and mother ever diagnosed with depression or anxiety at the 0.05 level.

Downward movers had worse health outcomes than stayers, upward movers and movers within the same quintile for all infant and maternal health outcomes. Compared to other movers upwardly mobile families had better maternal health outcomes but similar infant health outcomes as those that moved with the same quintile. All mover types had higher rates of poor maternal mental health than stayers. However, upwardly mobile mothers had similar or better outcomes in comparison to stayers for infant birth weight, mother's self-rated health and limiting longstanding illness.

Differences in health outcomes between the mover groups were also compared in binary logistic regression models with stayers as the reference group (Table 5). The odds ratios were most elevated among the mover groups for the maternal mental health variables. For all variables in adjusted and unadjusted data the downwardly mobile group had the most elevated odds ratios indicating poor health.

Unadjusted odds ratios for movers to more deprived quintiles were significant at 95% confidence levels for all variables, with the exception of mother's self-rated health and infant accident and injury. Movers within the same quintile also had significantly elevated crude odds ratios for indicators of poor health for mother's self-rated health and the maternal mental health variables. Odds ratios for poor health outcomes among those that moved to a less deprived quintile were elevated compared to stayers in the unadjusted models for infant accidents and the maternal mental health variables.

After the models were adjusted for socio-demographic variables elevated odds ratios indicating poor health were reduced for most variables among families that moved downwards or within a quintile. Adjusted odds ratios indicating poorer health, however, remained statistically significant among downward movers and movers within a quintile for mother ever diagnosed with depression and among downward movers only for mother often miserable and depressed and maternal limiting longstanding illness.

4.4. Socio-spatial inequalities in health between neighbourhoods

When the proportions of poor health outcomes in each deprivation quintile were compared the expected gradient by quintile was found for most variables at Wave 1 (Figs. 1–6). Following moves between Waves 1 and 2 absolute differences in rates of poor health between the most and least deprived quintiles increased for all health outcomes, although the increase was less than one per cent for infant low birth weight and accidents and mother often low or depressed. Rates of poor health following mobility were greater in the most deprived quintile for four health outcomes and lower in the least deprived quintile for five outcomes, with the most consistent effects for the maternal health variables.

Binary logistic regression models of unadjusted data demonstrate that odds ratios were significantly elevated for most health outcomes in the four most deprived quintiles compared to the least deprived reference category at Waves 1 and 2 and there was a clear gradient across the quintiles (Table 6). For all health

Table 1  
Numbers and percentages of families in IMD 2004 deprivation quintiles of residence at Wave 1 and Wave 2.

IMD 2004 deprivation quintile	Area of residence at Wave 2 % Total, % Wave 1 quintile, % Wave 2 quintile, N					Total																
	1—Most deprived quintile	2	3	4	5—Least deprived quintile																	
<b>Area of residence at Wave 1</b>																						
% Total, % Wave 1 quintile, % Wave 2 quintile, N																						
1—Most deprived quintile	17.4	84.0	87.7	2506	1.7	8.3	9.4	218	0.8	3.9	4.0	102	0.5	2.2	2.4	59	0.3	1.6	1.5	41	20.8	2926
2	1.5	7.8	7.5	157	14.2	74.6	77.1	1475	1.5	8.1	7.5	151	1.0	5.4	5.3	110	0.7	4.1	3.6	74	19.0	1967
3	0.6	2.6	2.8	46	1.3	6.1	7.0	103	16.3	77.7	79.2	1236	1.6	7.4	8.0	116	1.3	6.2	6.0	95	21.0	1596
4	0.2	1.2	1.2	17	0.8	4.1	4.4	55	1.4	7.2	6.8	93	15.3	78.7	78.6	1008	1.7	8.8	7.9	116	19.5	1289
5—Least deprived quintile	0.2	0.9	0.9	11	0.4	2.0	2.1	24	0.5	2.7	2.6	33	1.1	5.7	5.8	72	17.6	88.8	81.0	1104	19.8	1244
Total	19.9	19.9	100.0	2737	18.4	18.4	100.0	1875	20.5	20.5	100.0	1615	19.5	19.5	100.0	1365	21.7	21.7	100.0	1430	100.0	9022

**Table 2**  
Percentages of families moving in and out of IMD 2004 deprivation quintiles of residence between Wave 1 and Wave 2.

IMD 2004 deprivation quintile of residence at Wave 1	Move type between Wave 1 and Wave 2	Numbers of families	Proportion of families moving in and out of quintile relative to number of families remaining in quintile
		N	%
<b>1—Most deprived quintile</b>	Remained in quintile 1 (stayer or moved within quintile)	2506	–
	Moved out to quintile 2–5	420	–19.1
	Moved in from quintile 2–5	231	14.1
	Moved out total	420	–19.1
	Moved in total	231	14.1
<b>2</b>	Remained in quintile 2 (stayer or moved within quintile)	1475	–
	Moved out to quintile 1	157	–10.5
	Moved in from quintile 1	218	12.2
	Moved out to quintile 3–5	335	–23.6
	Moved in from quintile 3–5	182	17.5
	Moved out total	492	–34.1
	Moved in total	400	29.7
<b>3</b>	Remained in quintile 3 (stayer or moved within quintile)	1236	–
	Moved out to quintile 1–2	149	–11.2
	Moved in from quintile 1–2	253	14.4
	Moved out to quintile 4–5	211	–17.6
	Moved in from quintile 4–5	126	11.8
	Moved out total	360	–28.8
	Moved in total	379	26.3
<b>4</b>	Remained in quintile 4 (stayer or moved within quintile)	1008	–
	Moved out to quintile 1–3	165	–15.9
	Moved in from quintile 1–3	285	19.9
	Moved out to quintile 5	116	–11.2
	Moved in from quintile 5	72	7.3
	Moved out total	281	–27.1
	Moved in total	357	27.2
<b>5—Least deprived quintile</b>	Remained in quintile 5 (stayer or moved within quintile)	1104	–
	Moved out to quintile 1–4	140	–12.7
	Moved in from quintile 1–4	326	23.4
	Moved out total	140	–12.7
	Moved in total	326	23.4

outcomes odds ratios indicating poorer health in the most deprived quintile were greater at Wave 2 than 1 in the unadjusted data. The largest increase in odds ratios following mobility in the most deprived quintile in unadjusted data was for mother's limiting longstanding illness, mother often miserable and depressed and infant birth weight. Adjustment of the models for socio-demographic variables substantially reduced odds ratios indicating poorer health in the four most deprived quintiles at Waves 1 and 2 for all health outcomes with the exception of infant accident and injury. In the adjusted data there was no longer a gradient in odds ratios across the quintiles for any health outcome. In the adjusted data for all health outcomes odds ratios indicating poorer health in the most deprived quintile were again greater at Wave 1 than 2 but differences between the waves were smaller in comparison to the crude results. Odds ratios indicating poorer health in the most deprived quintile at Wave 2 were only significantly elevated in the adjusted data for mother often miserable or depressed.

Finally, the analysis compared health outcomes of families that moved in and out of the quintiles to those that remained (Table 7). This demonstrates that for every quintile downward movers had worse health both in comparison to those in the quintile they left and the quintile they joined, for all or most outcomes. The patterns for upward movers were more mixed. Only upward movers leaving quintiles 3 and 4 had better health than those that remained in the quintile for the majority of

outcomes and for all quintiles upward movers had worse health relative to the areas they joined for the majority of outcomes. In the most deprived quintile there were large absolute differences in levels of poor health between those moving in and out for the maternal variables limiting longstanding illness, self-rated health and ever diagnosed with depression or serious anxiety. For these variables downwardly mobile people moving into the most deprived quintile had worse health than those they joined, while those leaving had relatively better or similar health. In the least deprived quintile, there were also large differences in the health of in and out movers. Compared to people that stayed in the least deprived quintile people that moved downwards had much worse for all health outcomes, but those that moved upward into the quintile also had worse outcomes for most variables.

## 5. Discussion

This analysis finds that MCS families with infants and young children in England had high rates of residential mobility, with over a third moving between when the cohort child was aged nine months and three years. These mobile families had distinctive characteristics compared to stayers with more younger and single mothers, fewer children, lower socio-economic status and poorer health for all maternal and infant health outcomes in bivariate analysis.

**Table 3**  
Socio-demographic characteristics by mover type.

Socio-demographic characteristics at Wave 1 <sup>a</sup>	N	Total	Stayers	Movers			
				Total	Moved within quintile	Moved to more deprived quintile	Moved to less deprived quintile
		%	%	%	%	%	%
<b>Age of mother at birth in years</b>							
Under 20	627	6.3	4.1	10.5	11.4	13.4	7.3
20–24	1565	14.8	12.0	20.2	19.6	24.4	18.0
25–29	2550	28.0	27.3	29.3	29.0	28.3	30.4
30–34	2753	32.7	35.6	27.4	26.6	25.0	30.0
35+	1522	18.2	21.1	12.7	13.5	8.9	14.3
P-value				< 0.001 <sup>b</sup>			
<b>Number of siblings in household</b>							
Only child in household	3710	41.6	36.5	51.4	47.1	57.3	52.9
One other sibling in household	3191	37.0	39.4	32.3	33.4	30.0	32.3
Two or more older siblings in households	2121	21.4	24.1	16.3	19.4	12.7	14.7
P-value				< 0.001 <sup>b</sup>			
<b>Infant's age in months</b>							
6–8 months	217	2.3	2.4	2.1	2.6	1.4	1.9
9 months	6978	77.0	76.9	77.2	76.7	78.8	76.7
10 months	1650	18.9	18.7	19.2	19.1	18.7	19.7
11–12 months	177	1.8	2.0	1.5	1.7	1.2	1.6
P-value				N.S. <sup>b,c</sup>			
<b>Mother's relationship with partner</b>							
Married	5800	64.4	69.0	55.6	56.7	47.4	60.0
Cohabiting	2050	24.1	21.7	28.6	25.6	33.9	29.0
Solo separated, divorced or widowed	228	2.1	2.0	2.4	2.6	2.5	2.2
Other solo	944	9.4	7.3	13.4	15.2	16.3	8.8
P-value				< 0.001 <sup>b</sup>			
<b>Mother's ethnic group—six category Census 2001 classification</b>							
White	6998	88.0	87.2	89.6	86.7	90.8	92.4
Mixed	111	0.9	0.9	1.1	1.3	1.0	1.0
Indian	360	2.3	2.6	1.7	1.8	0.9	2.2
Pakistani and Bangladeshi	894	4.6	5.1	2.6	5.9	2.3	1.4
Black or Black British	423	2.7	2.8	2.5	3.0	2.7	1.7
Other Ethnic group (inc. Chinese and Other Asian)	217	1.5	1.5	1.5	1.3	2.2	1.4
P-value				< 0.001 <sup>b</sup>			
<b>Mother's highest academic qualification</b>							
Degree	1513	19.1	19.8	17.7	17.2	13.4	21.5
Diploma in higher education	799	10.1	9.9	10.4	9.4	10.6	11.4
A, AS, S level	767	9.2	9.2	9.2	8.0	9.6	10.6
O level, GCSE grade A to C	2987	35.0	34.8	35.3	32.2	39.0	37.2
GCSE D to G	1044	11.3	10.9	12.1	12.2	14.8	9.9
Other academic qualifications	293	2.1	2.3	1.8	2.3	1.7	1.2
None of these	1606	13.2	13.1	13.4	18.6	10.8	8.2
P-value				< 0.001 <sup>b</sup>			
<b>Workless households</b>							
Neither mother or partner, if mother has partner, in work	1654	14.5	12.4	18.4	22.5	19.3	12.4
Mother and/or partner, if mother has partner, in work	7368	85.5	87.6	81.6	77.5	80.8	87.6
P-value				< 0.001 <sup>b</sup>			
<b>Housing tenure</b>							
Owner occupied	5453	65.9	72.5	53.3	49.3	46.2	63.5
Local authority rented	1532	14.3	13.9	15.1	17.5	14.7	12.1
Housing association rented	701	6.7	6.0	8.1	8.0	7.7	8.4
Private rented	733	7.5	4.1	14.0	14.0	19.9	9.9
Living with parents	392	3.6	1.9	6.9	8.1	8.0	4.4
Other	198	2.0	1.6	2.8	3.2	3.5	1.7
P-value				< 0.001 <sup>b</sup>			
<b>Household receiving means tested benefit</b>							
None	5509	67.0	69.8	61.6	58.2	58.7	68.3
One or more	3504	33.0	30.2	38.4	41.8	41.3	31.7
P-value				< 0.001 <sup>b</sup>			

<sup>a</sup> Missing number of cases for age of mother at birth in years (5), number of siblings in household (0), infant's age in months (0), mother's relationship with partner (0), mother's ethnic group (19), mother's highest academic qualification (13), workless households (0), housing tenure (13) and household receiving means tested benefit (9).

<sup>b</sup> Chi-square test of differences between moved within quintile, moved to more deprived quintile and moved to less deprived quintile.

<sup>c</sup> N.S.: not significant.

Research that has compared the characteristics of movers at different ages has commonly suggested that the young are 'healthy migrants' (Champion, 2005). However, this analysis'

focus upon mobility at one stage of the life course confirms that mothers and young children in England do not conform to this pattern (Tunstall and Pickett, 2009; Tunstall et al., 2010).

**Table 4**  
Maternal and infant health characteristics by mover type.

Maternal and infant health outcomes at Wave 1 <sup>a</sup>	N	Total	Stayers	Movers			
				Total	Moved within quintile	Moved to more deprived quintile	Moved to less deprived quintile
		%	%	%	%	%	%
<b>Infant birth weight</b>							
Under 2500 g	612	5.9	5.8	6.1	5.3	8.3	5.6
2500 g or more	8398	94.1	94.2	93.9	94.7	91.7	94.4
P-value				< 0.05 <sup>b</sup>			
<b>Infant accident and injury since birth</b>							
None	8339	92.0	92.4	91.3	91.7	90.3	91.4
One or more	683	8.0	7.6	8.7	8.3	9.7	8.6
P-value				N.S. <sup>b,c</sup>			
<b>Mother's self-rated health</b>							
Excellent or good	7461	84.1	84.7	82.9	82.3	82.0	84.5
Fair or poor	1559	15.9	15.3	17.1	17.7	18.0	15.5
P-value				N.S. <sup>b,c</sup>			
<b>Mother has limiting longstanding illness</b>							
Yes	850	9.3	9.0	9.9	10.4	12.2	7.5
No	8168	90.7	91.0	90.1	89.6	87.8	90.1
P-value				< 0.01 <sup>b</sup>			
<b>Mother ever diagnosed with depression or serious anxiety</b>							
Yes	2011	23.4	21.6	26.6	26.0	31.2	24.3
No	7010	76.7	78.4	73.4	74.0	68.8	75.8
P-value				< 0.05 <sup>b</sup>			
<b>Mother often miserable or depressed</b>							
Yes	1245	13.3	12.2	15.4	15.2	18.1	13.9
No	7438	86.7	87.8	84.6	84.8	81.9	86.2
P-value				N.S. <sup>b,c</sup>			

<sup>a</sup> Missing number of cases for infant birth weight (12), infant accident and injury since birth (0), mother's self-rated health (2), mother has limiting longstanding illness (4), mother ever diagnosed with depression or serious anxiety (1), mother often miserable or depressed (339).

<sup>b</sup> Chi-square test of differences between moved within quintile, moved to more deprived quintile and moved to less deprived quintile.

<sup>c</sup> N.S.: not significant.

These families' moves were disproportionately towards less deprived neighbourhoods. The minority of families that moved to more deprived areas were however the most distinctive type of movers with the youngest mothers, lowest socio-economic status and poorest health for most indicators compared to other movers. Upwardly mobile families, had higher socio-economic status and better health for most variables than those downwardly mobile or moving between areas with similar levels of deprivation but their health was similar or worse than stayers.

The health variables that were most highly elevated among movers were mother ever diagnosed with depression or serious anxiety and mother often miserable and depressed. Maternal mental health was poorest among downward movers but also elevated among those moving between areas with similar levels of deprivation and to less deprived areas. These results are consistent with previous research that has suggested maternal mental health may be particularly strongly associated with mobility (Hooper and Ineichen, 1979; Tunstall and Pickett, 2009; Tunstall et al., 2010). In addition, maternal mental health problems may have implications for children's well-being (Waylen and Stewart-Brown, 2008).

When health outcomes of movers were adjusted for their socio-demographic characteristics odds ratios indicating poor health were reduced but remained elevated and statistically significant for the mother's mental health and limiting longstanding illness variables and infant birth weight among downwardly mobile families and for the mother's mental health variables among those moving within the same quintile. These results appear to provide some evidence of health selection among mobile families. However, the poorer health of these families may instead reflect the difficult personal circumstances that precipitate some moves,

but are not fully captured by commonly used socio-demographic 'control' variables (Tunstall et al., 2010).

The analysis finds that moves increase differences in rates of poor health between the most and least deprived quintile of neighbourhoods for all maternal and child health outcomes. There was no clear pattern in the types of health outcomes that demonstrated the greatest change in distribution following mobility with the largest increase in differences in unadjusted odds ratios between the most and least deprived quintiles found for mother's limiting longstanding illness, mother often miserable or depressed and infant low birth weight.

The impact of moves upon socio-spatial inequalities reflects the complex interaction of flows in and out of areas. In the most deprived quintile moves affected rates of health primarily because there was markedly worse health among in movers than out movers for some outcomes. In the least deprived quintile there were again significant differences in the health of in and out movers but also larger differences in the numbers of in and out movers.

The effects of mobility upon inequalities in health between areas with different levels of deprivation found in this analysis appeared greater than those found in some previous analysis of mobility over short time periods (Boyle et al., 2002; Connolly et al., 2011; Jongeneel-Grimen et al., 2011). This may reflect the relatively high rates of mobility among families with young children. The impact of migration upon spatial variations in health may also vary by stage of life course and so be distinctive among these families in comparison to other types of households.

The increases in inequalities between areas found in this analysis to result from migration were however relatively modest for most of the health variables compared to pre-existing

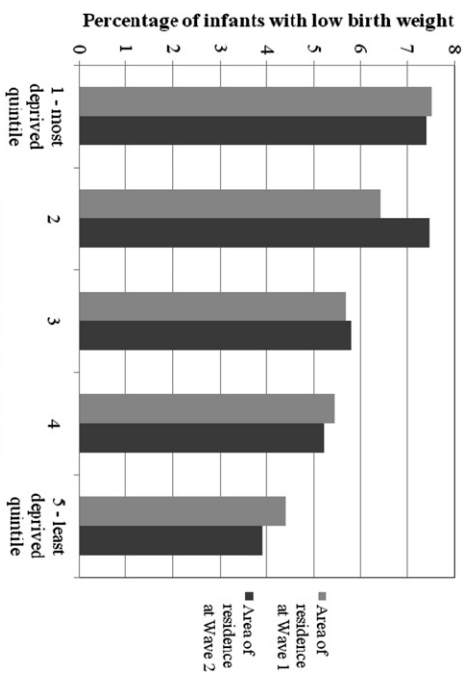


**Table 5**  
Maternal and infant health outcomes by mover type; ORs and 95% CIs.

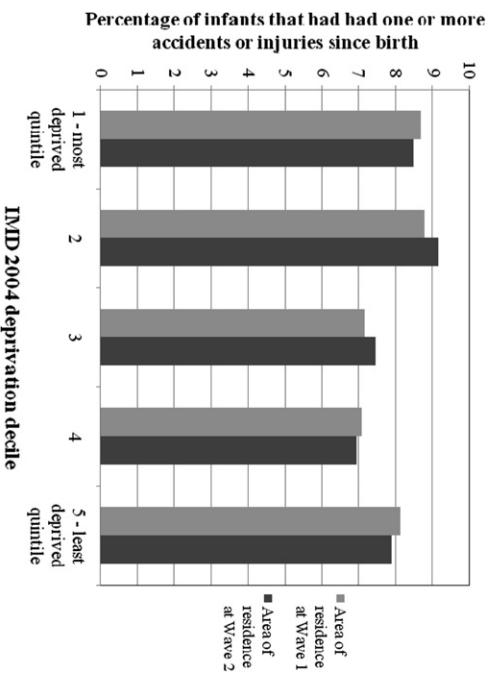
Mover type	Infant birth weight (under 2500 g)		Infant accident and injury since birth (one or more)		Mother's self-rated health (fair or poor)		Mother has limiting longstanding illness (yes)		Mother ever diagnosed with depression or serious anxiety (yes)		Mother often miserable or depressed (yes)	
	Unadjusted OR <sup>a</sup>	Adjusted OR <sup>a,b</sup>	Unadjusted OR <sup>a</sup>	Adjusted OR <sup>a,b</sup>	Unadjusted OR <sup>a</sup>	Adjusted OR <sup>a,b</sup>	Unadjusted OR <sup>a</sup>	Adjusted OR <sup>a,b</sup>	Unadjusted OR <sup>a</sup>	Adjusted OR <sup>a,b</sup>	Unadjusted OR <sup>a</sup>	Adjusted OR <sup>a,b</sup>
<b>Stayer</b>	1	1	1	1	1	1	1	1	1	1	1	1
<b>Mover</b>												
<b>Moved within quintile</b>	0.92 (0.71–1.19)	0.83 (0.63–1.10)	1.10 (0.89–1.37)	1.01 (0.81–1.27)	1.19 (1.04–1.36)	1.06 (0.92–1.23)	1.17 (0.95–1.46)	1.13 (0.90–1.42)	1.27 (1.09–1.48)	1.19 (1.01–1.39)	1.29 (1.08–1.55)	1.13 (0.94–1.37)
<b>Moved to more deprived quintile</b>	1.47 (1.06–2.03)	1.40 (0.99–1.98)	1.31 (0.97–1.78)	1.12 (0.79–1.57)	1.21 (0.96–1.53)	1.16 (0.91–1.49)	1.41 (1.07–1.86)	1.45 (1.09–1.92)	1.64 (1.33–2.02)	1.51 (1.21–1.88)	1.59 (1.24–2.04)	1.46 (1.13–1.89)
<b>Moved to less deprived quintile</b>	0.97 (0.72–1.31)	1.00 (0.74–1.35)	1.15 (0.87–1.52)	1.01 (0.77–1.32)	1.01 (0.82–1.24)	1.07 (0.88–1.31)	0.82 (0.64–1.05)	0.85 (0.66–1.09)	1.16 (0.98–1.37)	1.13 (0.96–1.34)	1.16 (0.93–1.45)	1.21 (0.97–1.51)

<sup>a</sup> Poor health present or absent.

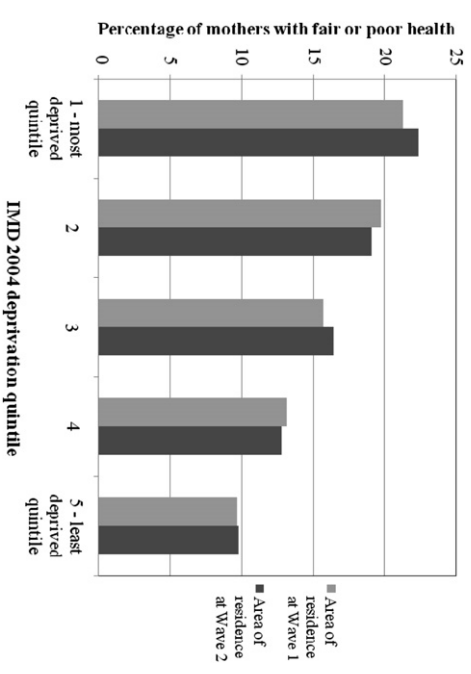
<sup>b</sup> Adjusted for age of mother at birth, number of siblings in household, mother's relationship with partner, mother's ethnic group, mother's highest academic qualification, workless households, housing tenure, household receiving means tested benefit, with the exception of infant accident and injury since birth which was also adjusted for infant's age in months.



**Fig. 1.** Percentage of infants with low birth weight by IMD 2004 deprivation quintile of residence at Wave 1 and Wave 2.



**Fig. 2.** Percentage of infants that had had one or more accidents or injuries since birth by IMD 2004 deprivation quintile of residence at Wave 1 and Wave 2.



**Fig. 3.** Percentage of mothers reporting fair or poor health by IMD 2004 deprivation quintile of residence at Wave 1 and Wave 2.

inequalities. The impact of family mobility on socio-spatial inequalities in health was limited by the contrasting characteristics of movers and their moves. Movers overall had relatively

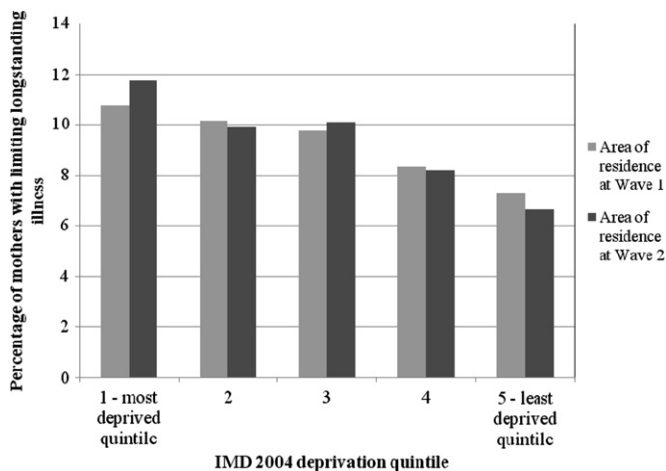


Fig. 4. Percentage of mothers with limiting longstanding illness by IMD 2004 deprivation quintile of residence at Wave 1 and Wave 2.

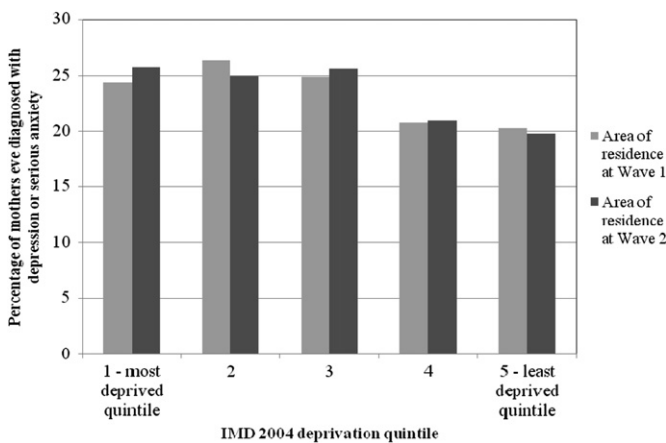


Fig. 5. Percentage of mothers ever diagnosed with depression or serious anxiety by IMD 2004 deprivation quintile of residence at Wave 1 and Wave 2.

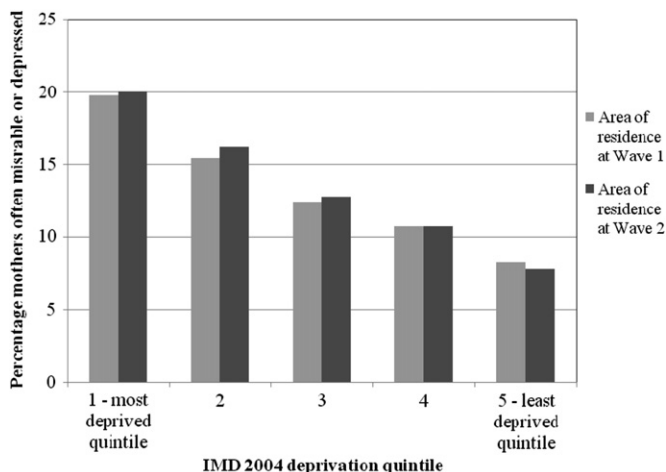


Fig. 6. Percentage of mothers often miserable or depressed by IMD 2004 deprivation quintile of residence at Wave 1 and Wave 2.

poor socio-economic status and health but their moves were disproportionately towards less deprived areas. This study, similarly to some previous analysis, suggests that relatively poor health among movers, including those moving to less deprived areas, may limit the impact of moves on socio-spatial inequalities

between neighbourhoods (Piro et al., 2007). In this analysis the impact of mobility on these inequalities was also constrained by the large proportion of moves between neighbourhoods within the same quintile of deprivation.

Although this study finds that the moves analysed only modestly increased socio-spatial health inequalities, the socially selective patterns of migration identified may have longer term implications for families' life chances. In particular, the analysis indicates how the socio-economic stratification of life course trajectories is interacting with patterns of mobility and may be contributing to the reproduction of inequalities (Kulu and Milewski, 2007; Heath, 2008; Tunstall et al., 2010). More socio-economically disadvantaged mothers in this analysis had given birth at younger ages, when they were likely to have had very limited housing choices, resulting in moves that were disproportionately towards more deprived areas. Socio-economically advantaged mothers had delayed childbearing to older ages when they had greater resources, further increasing the relative superiority of their housing choices and opportunities to move to more affluent areas. The geography of these moves may be particularly important to the subsequent life chances of the children because rates of mobility among families drop rapidly as children grow older and so many children will grow up in the areas they moved to when very young.

It has been suggested that the impact of selective migration in developed countries on health inequalities may have lessened in recent decades because regeneration has increasingly attracted higher income households into deprived urban areas (Jongeneel-Grimen et al., 2011). While this pattern of migration may be important among young adults without children (Bailey and Livingstone, 2007), this analysis emphasises that parents with young children, especially those that are socially advantaged, are still predominantly moving away from deprived urban areas.

The results of this analysis also emphasise the importance of understanding the impacts of migration upon area-based social policies (Lewis, 2003). Evaluations of the effects of the Sure Start Local Programme to support the health and development of children under four years and their families in deprived areas of England produced contradictory evidence (Belsky et al., 2006; Melhuish et al., 2008). The high rates of mobility among families of young children and their selective patterns of migration are a significant challenge to policies of this kind and efforts to assess their impacts.

The MCS is a detailed, high quality dataset that allows in-depth analysis of the health and socio-demographic characteristics of families with children. There are however some significant methodological limitations to the mobility data in this survey. Movers were disproportionately represented among sample members that did not respond at Waves 1 and 2 of the survey (Joshi et al., 2002; Plewis et al., 2008). Movers that did not respond are likely to have different characteristics from movers retained in the study, and may comprise more disadvantaged and frequent movers, groups that are at greater risk of poor health (Cole et al., 2006).

There are also limitations to the approach used to define mobility in this analysis. The use of both interviewee responses and administrative residential data to define movers was intended to identify false negatives in respondent's answers where people incorrectly stated that they did not move, but did not account for false positives. In addition, this analysis only considers moves within England. International migration is very significant to some areas of England and has been found in analysis of New Zealand to have greater impact on health variations between areas than internal migration (Pearce and Dorling, 2010).

There are also limitations to the definition of socio-spatial mobility used in this analysis. The assessment of moves between

**Table 6**  
Maternal and infant health outcomes by IMD 2004 deprivation quintile of residence at Wave 1 and Wave 2; ORs and 95% CIs.

IMD 2004 deprivation quintile	Infant birth weight (under 2500 g)				Infant accident and injury since birth (one or more)				Mother's self-rated health (fair or poor)			
	Unadjusted OR <sup>a</sup>		Adjusted OR <sup>ab</sup>		Unadjusted OR <sup>a</sup>		Adjusted OR <sup>ab</sup>		Unadjusted OR <sup>a</sup>		Adjusted OR <sup>ab</sup>	
	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2
<b>1—Most deprived quintile</b>	1.77 (1.26–2.47)	1.97 (1.40–2.77)	0.92 (0.62–1.38)	1.06 (0.70–1.59)	1.07 (0.81–1.43)	1.09 (0.82–1.44)	1.12 (0.81–1.55)	1.15 (0.83–1.59)	2.52 (2.02–3.15)	2.67 (2.11–3.36)	1.14 (0.88–1.48)	1.21 (0.91–1.61)
<b>2</b>	1.49 (1.07–2.08)	1.99 (1.43–2.77)	1.05 (0.73–1.50)	1.42 (1.00–2.03)	1.09 (0.82–1.43)	1.18 (0.89–1.56)	1.06 (0.80–1.40)	1.13 (0.84–1.52)	2.30 (1.85–2.86)	2.18 (1.71–2.78)	1.50 (1.19–1.89)	1.41 (1.10–1.83)
<b>3</b>	1.31 (0.90–1.90)	1.51 (1.09–2.10)	1.07 (0.73–1.58)	1.26 (0.89–1.76)	0.87 (0.65–1.17)	0.94 (0.69–1.29)	0.87 (0.64–1.19)	0.95 (0.68–1.33)	1.74 (1.36–2.23)	1.81 (1.45–2.27)	1.39 (1.09–1.77)	1.40 (1.11–1.77)
<b>4</b>	1.25 (0.87–1.80)	1.36 (0.95–1.94)	1.16 (0.80–1.68)	1.26 (0.89–1.79)	0.86 (0.63–1.17)	0.87 (0.64–1.20)	0.87 (0.64–1.19)	0.88 (0.64–1.20)	1.42 (1.09–1.84)	1.35 (1.05–1.75)	1.31 (1.02–1.69)	1.24 (0.96–1.60)
<b>5—Least deprived quintile</b>	1	1	1	1	1	1	1	1	1	1	1	1
IMD 2004 deprivation quintile	Mother has limiting longstanding illness (yes)				Mother ever diagnosed with depression or serious anxiety (yes)				Mother often miserable or depressed (yes)			
	Unadjusted OR <sup>a</sup>		Adjusted OR <sup>ab</sup>		Unadjusted OR <sup>a</sup>		Adjusted OR <sup>ab</sup>		Unadjusted OR <sup>a</sup>		Adjusted OR <sup>ab</sup>	
	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2	Wave 1	Wave 2
<b>1—Most deprived quintile</b>	1.53 (1.11–2.11)	1.87 (1.39–2.51)	0.92 (0.64–1.34)	1.21 (0.86–1.72)	1.27 (1.02–1.58)	1.41 (1.13–1.75)	0.85 (0.68–1.06)	0.94 (0.75–1.17)	2.74 (2.17–3.45)	2.95 (2.35–3.72)	1.33 (1.05–1.71)	1.40 (1.10–1.79)
<b>2</b>	1.44 (1.04–1.99)	1.54 (1.15–2.06)	1.07 (0.75–1.53)	1.22 (0.89–1.67)	1.41 (1.14–1.74)	1.35 (1.10–1.64)	1.05 (0.86–1.29)	0.99 (0.82–1.20)	2.03 (1.58–2.60)	2.29 (1.79–2.93)	1.32 (1.02–1.70)	1.48 (1.15–1.90)
<b>3</b>	1.37 (0.98–1.94)	1.58 (1.17–2.12)	1.19 (0.83–1.70)	1.38 (1.02–1.88)	1.31 (1.03–1.66)	1.40 (1.12–1.74)	1.07 (0.86–1.34)	1.13 (0.91–1.40)	1.57 (1.20–2.06)	1.72 (1.34–2.21)	1.26 (0.97–1.63)	1.33 (1.03–1.71)
<b>4</b>	1.16 (0.80–1.67)	1.26 (0.91–1.73)	1.11 (0.77–1.61)	1.21 (0.87–1.68)	1.03 (0.82–1.29)	1.07 (0.86–1.34)	0.99 (0.81–1.22)	1.01 (0.81–1.26)	1.33 (1.02–1.74)	1.42 (1.10–1.83)	1.26 (0.97–1.18)	1.31 (1.02–1.68)
<b>5—Least deprived quintile</b>	1	1	1	1	1	1	1	1	1	1	1	1

<sup>a</sup> Poor health present or absent.

<sup>b</sup> Adjusted for age of mother at birth, number of siblings in household, mother's relationship with partner, mother's ethnic group, mother's highest academic qualification, workless households, housing tenure, household receiving means tested benefit, with the exception of infant accident and injury since birth which was also adjusted for infant's age in months.

**Table 7**  
Differences in maternal and infant health outcomes of families moving in and out of IMD 2004 deprivation quintiles of residence between Wave 1 and Wave 2 compared to those that remained in quintiles.

IMD 2004 deprivation quintile	Health outcome comparison	Mover type	Low birth weight	Infant had one or more accident or injury since birth	Mother's self-rated health fair or poor	Mother has limiting longstanding illness	Mother ever diagnosed with depression or serious anxiety	Mother often miserable or depressed
<b>1—Most deprived</b>	% Health outcome	Remained in quintile 1 (stayer or moved within quintile)	7.5	8.5	22.0	11.3	24.3	20.0
	% Difference in health outcome from remained in quintile 1	Moved out to quintile 2–5	0.4	1.2	–4.7	–3.7	0.6	–1.3
		Moved in from quintile 2–5	–0.3	–0.2	3.0	3.3	12.1	0.2
		Moved out total	0.4	1.2	–4.7	–3.7	0.6	–1.3
		Moved in total	–0.3	–0.2	3.0	3.3	12.1	0.2
<b>2</b>	% Health outcome	Remained in quintile 2 (stayer or moved within quintile)	7.2	9.0	19.0	9.7	24.0	15.0
	% Difference in health outcome from remained in quintile 2	Moved out to quintile 1	–1.0	0.1	7.4	4.7	13.9	5.0
		Moved in from quintile 1	–0.8	2.0	3.6	–1.0	3.0	9.4
		Moved out to quintile 3–5	–3.7	–1.1	0.9	0.4	7.2	0.5
		Moved in from quintile 3–5	2.9	0.0	–1.8	2.0	4.9	3.3
		Moved out total	–2.9	–0.8	2.9	1.7	9.3	1.9
		Moved in total	1.4	0.8	0.4	0.8	4.1	5.8
<b>3</b>	% Health outcome	Remained in quintile 3 (stayer or moved within quintile)	5.5	6.9	16.3	10.4	24.7	11.9
	% Difference in health outcome from remained in quintile 3	Moved out to quintile 1–2	2.8	–0.2	3.3	2.2	10.0	9.7
		Moved in from quintile 1–2	1.1	0.3	1.7	–4.8	4.9	4.1
		Moved out to quintile 4–5	–0.6	2.0	–6.2	–6.3	–4.8	–2.3
		Moved in from quintile 4–5	1.7	5.4	–0.6	2.3	4.0	3.9
		Moved out total	0.8	1.1	–2.5	–3.0	1.0	2.4
		Moved in total	1.4	2.6	0.7	–1.6	4.5	4.0
<b>4</b>	% Health outcome	Remained in quintile 4 (stayer or moved within quintile)	5.0	6.4	12.9	8.0	20.3	10.2
	% Difference in health outcome from remained in quintile 4	Moved out to quintile 1–3	2.7	4.3	2.7	3.1	5.9	5.2
		Moved in from quintile 1–3	0.4	2.0	0.9	1.8	0.6	0.7
		Moved out to quintile 5	1.7	1.1	–0.4	–0.4	–3.6	–1.5
		Moved in from quintile 5	3.6	3.5	–4.3	–0.9	8.6	6.6
		Moved out total	2.3	3.0	1.4	1.6	2.0	2.4
		Moved in total	1.2	2.4	–0.5	1.1	2.7	2.3
<b>5—Least deprived</b>	% Health outcome	Remained in quintile 5 (stayer or moved within quintile)	3.7	7.7	9.1	6.8	19.1	7.2
	% Difference in health outcome from remained in quintile 5	Moved out to quintile 1–4	6.7	3.8	4.7	4.9	10.0	9.7
		Moved in from quintile 1–4	1.4	0.8	3.3	–0.5	3.4	3.4
		Moved out total	6.7	3.8	4.7	4.9	10.0	9.7
		Moved in total	1.4	0.8	3.3	–0.5	3.4	3.4

areas of different levels of deprivation was based upon moves between LSOAs and so excluded some short distance mobility. Analysis of moves in the UK suggests children move shorter distances than other age groups with nearly half of those aged 0–16 years that moved in the year preceding the 2001 Census moving less than 2 km (Champion, 2005). The definition of socio-spatial mobility in this analysis excluded the 4.9% of total moves that were within an OA and 7.1% of moves between OAs within an

LSOA. This may have biased the results as short distance moves are associated with poorer health and socio-economic disadvantage in Britain (Bentham, 1988; Boyle et al., 2002).

A further limitation of this study is the use of cross-sectional data to describe the health and socio-demographic characteristics of movers. The analysis only assessed these variables at Wave 1 and so could not take into account changes in families' characteristics between waves, including the effects of mobility upon health.

## 6. Conclusion

This analysis finds that there are high rates of mobility in England among families with infants and young children and their moves are disproportionately towards less deprived areas. These mobile families however have disadvantaged health and social characteristics, which are particularly marked among the minority moving to more deprived areas. Families' mobility increase inequalities in maternal and child health outcomes between the most and least deprived neighbourhoods.

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