

Influence of moving to the UK on maternal health behaviours: prospective cohort study

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ABSTRACT

Objective To compare health behaviours during pregnancy (smoking and alcohol consumption) and after birth (initiation and duration of breast feeding) between British/Irish white mothers and mothers from ethnic minority groups; and, in mothers from ethnic minority groups, to examine whether indicators of acculturation (generational status, language spoken at home, length of residency in the United Kingdom) were associated with these health behaviours.

Design Prospective nationally representative cohort study.

Setting England.

Participants 6478 British/Irish white mothers and 2110 mothers from ethnic minority groups.

Main outcome measures Any smoking during pregnancy; any alcohol consumption during pregnancy; initiation of breast feeding; breast feeding for at least four months.

Results Compared with British/Irish white mothers, mothers from ethnic minority groups were less likely to smoke (15% v 37%) or consume alcohol (14% v 37%) during pregnancy but more likely to initiate breast feeding (86% v 69%) and breast feed for at least four months (40% v 27%). Among mothers from ethnic minority groups, first and second generation mothers were more likely to smoke during pregnancy (odds ratio 3.85, 95% confidence interval 2.50 to 5.93, and 4.70, 2.49 to 8.90, respectively), less likely to initiate breast feeding (0.92, 0.88 to 0.97, and 0.86, 0.75 to 0.99), and less likely to breast feed for at least four months (0.72, 0.62 to 0.83, and 0.52, 0.30 to 0.89) than immigrants, after adjustment for sociodemographic characteristics. There were no consistent differences in alcohol consumption. Among immigrants, for every additional five years spent in the UK the likelihood of mothers smoking during pregnancy increased by 31% (4% to 66%) and they were 5% (0% to 10%) less likely to breast feed for at least four months.

Conclusions After immigration, maternal health behaviours worsen with length of residency in the UK. Health professionals should not underestimate women's likelihood of engaging in risky health behaviours because of their ethnicity.

INTRODUCTION

Acculturation is the adoption of health behaviours from the new dominant culture and loss of health

behaviours from the original culture.¹ In the US, indicators of acculturation have been associated with an increase in smoking²⁻⁵ and alcohol consumption²⁻⁴ during pregnancy as well as a reduction in initiation⁶⁻¹¹ and duration⁶⁻¹¹ of breast feeding.

In 2001-2, 7.6% of the population in the United Kingdom was from an ethnic minority group, an increase of 44% over the previous decade.¹² Women from ethnic minority groups are less likely to smoke or consume alcohol than the general population in England¹³ and more likely to initiate and continue breast feeding than white mothers.¹⁴

We compared health behaviours during pregnancy and after birth between British/Irish white mothers and mothers from ethnic minority groups in a nationally representative, contemporary cohort of mothers in England. We also examined how indicators of acculturation were associated with these health behaviours.

METHODS

Participants

The millennium cohort study is a prospective study of British children born in the new century. We used a stratified clustered sampling framework to over-represent children from ethnic minority groups. Families were invited to participate if they were eligible for child benefit and resident in the UK when their child was aged 9 months. The original cohort comprised 18 819 children born between September 2000 and January 2002 (72% response).¹⁵ About 80% (14 630) participated in the second contact, in September 2003 to January 2005, when the children were aged 3 years.¹⁶ At both contacts, information was collected through interviews of main respondents in the home. Translators were available.

Among the 11 695 mothers with singleton children who were living in England at the first contact, 79% (9184) participated in the second. Of the 9184 mothers with singleton children at both contacts, we included 8588 in the analyses. To facilitate analysis we collapsed ethnic groups into British/Irish white, Pakistani or Bangladeshi, black, Indian, other white, other, or mixed. Sociodemographic characteristics, including maternal socioeconomic circumstances, maternal education, and single motherhood status, were based on maternal self report at the first contact.

Outcome measures

Measures were based on maternal self report at the first contact except where indicated. Mothers were classified as having smoked if they reported smoking any number of cigarettes during pregnancy or having consumed alcohol if they reported consuming any amount of alcohol during pregnancy. Initiation of breast feeding was defined as the baby having received any breast milk. Duration was categorised as being either fully or partially breast fed for at least four calendar months or less than four months.

Indicators of acculturation

At the second contact, main respondents reported their country of birth. Mothers were classified as immigrants

(neither they nor either parent were born in the UK or Republic of Ireland), first generation (they were born in the UK or Republic of Ireland, but at least one parent was born outside the UK or Republic of Ireland), or second generation (both they and their parents were born in the UK or Republic of Ireland). At the first contact, main respondents reported the language usually spoken at home. At the second contact, main respondents who were not born in the UK or Republic of Ireland were asked the year they arrived in the UK.

Statistical analyses

We derived weighted percentages and conducted analyses using survey and non-response weights to allow for the clustered sampling and attrition

Unadjusted and adjusted risk ratios (95% CI) for health behaviours among mothers from ethnic minority groups, according to indicators of acculturation

	% of participants who engaged in behaviour*	Risk ratio† (95% CI)	
		Unadjusted	Adjusted‡
Smoking during pregnancy			
Generational status:			
Immigrant	9	1	1
1st generation	23	2.92 (2.07 to 4.13)	3.85 (2.50 to 5.93)
2nd generation	54	11.47 (6.24 to 21.09)	4.70 (2.49 to 8.90)
Language spoken at home:			
Other language only	7	1	1
English and other language	8	1.19 (0.67 to 2.14)	1.69 (0.80 to 3.56)
English only	31	5.81 (3.32 to 10.16)	4.19 (1.94 to 9.09)
Alcohol consumption during pregnancy			
Generational status:			
Immigrant	11	1	1
1st generation	16	1.50 (1.04 to 2.16)	1.43 (0.88 to 2.33)
2nd generation	35	4.28 (2.05 to 8.94)	1.96 (0.88 to 4.37)
Language spoken at home:			
Other language only	4	1	1
English and other language	9	2.36 (1.20 to 4.64)	1.39 (0.68 to 2.86)
English only	27	9.49 (4.05 to 22.23)	2.55 (1.05 to 6.21)
Breast feeding initiation			
Generational status:			
Immigrant	87	1	1
1st generation	85	0.99 (0.94 to 1.03)	0.92 (0.88 to 0.97)
2nd generation	83	0.96 (0.83 to 1.10)	0.86 (0.75 to 0.99)
Language spoken at home:			
Other language only	84	1	1
English and other language	85	1.01 (0.94 to 1.08)	0.96 (0.91 to 1.02)
English only	89	1.06 (0.99 to 1.14)	0.88 (0.83 to 0.95)
Breast feeding for at least 4 months			
Generational status:			
Immigrant	44	1	1
1st generation	35	0.79 (0.69 to 0.90)	0.72 (0.62 to 0.83)
2nd generation	26	0.59 (0.36 to 0.98)	0.52 (0.30 to 0.89)
Language spoken at home:			
Other language only	38	1	1
English and other language	39	1.02 (0.87 to 1.20)	0.87 (0.74 to 1.03)
English only	44	1.14 (0.93 to 1.40)	0.76 (0.63 to 0.93)

*Weighted percentage.

†Odds ratios for smoking and alcohol consumption during pregnancy; rate ratios for initiation of breast feeding and breast feeding for at least 4 months.

‡Adjusted for ethnic group, socioeconomic circumstances, family income, highest academic qualification, single motherhood, age at cohort birth, parity.

WHAT IS ALREADY KNOWN ON THIS TOPIC

The United Kingdom has experienced an increase in immigration over the past 50 years

Compared with British/Irish white women, women from ethnic minority groups are more likely to breast feed, but there is no information on their use of alcohol or tobacco during pregnancy or whether their health behaviours change with acculturation

WHAT THIS STUDY ADDS

Mothers from ethnic minority groups are less likely to use tobacco and alcohol during pregnancy than British/Irish white mothers

Maternal health behaviours worsen (smoking during pregnancy and lack of breast feeding) with length of residency in the UK, an indicator of acculturation

Health professionals should not underestimate women's likelihood of engaging in risky health behaviours because of their ethnicity

between contacts. Health behaviours during pregnancy and after birth were compared by maternal ethnic group.

Adjusted regression analyses were conducted to examine the relations between mothers' ethnicity and health behaviours during pregnancy and after birth. We adjusted analyses for socioeconomic circumstances, family income, highest academic qualification, single motherhood, age at cohort birth, and parity. Subsequent analyses focused on mothers from ethnic minority groups, who were combined, as our hypothesis was related to acculturation in general regardless of country of origin. We conducted univariable regression analyses to examine the relations between indicators of acculturation (measured by mothers' generational status, language spoken at home) and health behaviours during pregnancy and after birth. We calculated odds ratios for smoking and alcohol consumption during pregnancy and rate ratios for initiation and duration of breast feeding, by both indicators of acculturation. We then adjusted analyses for sociodemographic characteristics and maternal ethnic group. Analyses were repeated for immigrants only to examine the relation between length of residency in the UK and health behaviours during pregnancy and after birth (see bmj.com for further details).

RESULTS

Indicators of acculturation and health behaviours varied by maternal ethnic group. Compared with British/Irish white mothers, mothers from ethnic minority groups were less likely to smoke or drink alcohol during pregnancy but more likely to start breast feeding or breast feed for at least four months (all $P < 0.001$). These differences persisted after adjustment for sociodemographic characteristics (see bmj.com for further details). Mothers from ethnic minority groups

were less likely to smoke (odds ratio (baseline British/Irish white mothers) 0.27, 95% confidence interval 0.21 to 0.35) or drink alcohol (0.34, 0.28 to 0.42) during pregnancy but more likely to start breast feeding (rate ratio 1.35, 1.30 to 1.40) or breast feed for at least four months (1.71, 1.54 to 1.88).

In general, British/Irish white mothers and first and second generation mothers had more advantaged sociodemographic profiles than immigrants. Family income levels, however, were similar between immigrants and first and second generation mothers, while British/Irish white mothers had higher income levels. We examined relations between the indicators of acculturation and maternal health behaviours among mothers from ethnic minority groups (table). First and second generation mothers were more likely to smoke during pregnancy than immigrants, and there was a gradient by generation. Mothers who spoke only English at home were more likely to smoke during pregnancy than mothers who spoke only another language. Both relations were maintained after adjustment for sociodemographic characteristics. In unadjusted analyses, first and second generation mothers were more likely to drink alcohol during pregnancy than immigrants. Mothers who spoke English and another language at home and only English at home were more likely to drink alcohol than mothers who spoke only another language. After adjustment, risk of alcohol consumption during pregnancy was still significantly increased for mothers who spoke only English at home but was attenuated considerably.

In unadjusted analyses there were no differences in initiation or duration of breast feeding by the indicators of acculturation, except that first and second generation mothers were less likely to breast feed for at least four months than immigrants. After adjustment for sociodemographic factors, however, first and second generation mothers were less likely to start breast feeding than immigrants and the relation between generational status and duration of breast feeding strengthened. Gradients were evident by generational status. Mothers who spoke only English at home were less likely to start or continue breast feeding than mothers who spoke only another language.

Immigrants had lived in the UK for a median of nine years (interquartile range 4-15). Among immigrants, maternal health behaviours varied by length of residency in the UK. After adjustment for sociodemographic factors, for every additional five years in the UK mothers were 31% (4% to 66%) more likely to smoke during pregnancy and 5% (0% to 10%) less likely to breast feed for at least four months. There was no association between length of residency and alcohol consumption or initiation of breast feeding.

DISCUSSION

Compared with British/Irish white mothers, mothers from ethnic minority groups were less likely to smoke

or drink alcohol during pregnancy and more likely to initiate breast feeding and breast feed for at least four months. Among mothers from ethnic minority groups, first and second generation mothers were more likely to smoke during pregnancy than immigrants, but less likely to start breast feeding or breast feed for at least four months. First and second generation mothers were also more likely to consume alcohol during pregnancy, but associations were apparent only in unadjusted analyses. Immigrants who had lived in the UK for longer were more likely to smoke during pregnancy and less likely to breast feed for at least four months than those who had arrived more recently.

Strengths and limitations

Because of small numbers we had to combine some ethnic minority groups when making statistical adjustment. These combined groups might be heterogeneous with respect to maternal characteristics related to acculturation or health behaviours and so our findings might not be generalisable to mothers from all ethnic minority groups in England.

Although self reported information on breast feeding has been found to be reliable and valid,¹⁷ smoking and alcohol consumption during pregnancy might be under-reported.^{18,19} If under-reporting occurred, we have probably underestimated the size of the relations between the indicators of acculturation and alcohol use and smoking during pregnancy. The cohort study was not designed to assess acculturation, so we used generational status, language spoken at home, and length of residency as indicators.

Comparison with literature

Our findings agree with those of previous studies in the US, which have reported that mothers with greater acculturation are more likely to smoke²⁻⁵ and drink alcohol²⁻⁴ during pregnancy and less likely to start⁶⁻¹¹ or continue^{6,10,11} breast feeding. Some of these relations have been examined in a cohort of Pacific Island infants in New Zealand. Mothers were more likely to smoke during pregnancy²⁰ and less likely to breast feed exclusively²¹ with a longer residency in New Zealand. Research on acculturation has public health implications for other countries with large immigrant populations. It will be important to determine whether our results and the US findings can be replicated in other countries.

Implications for practice and policy

Health professionals should not underestimate the likelihood of women engaging in risky health behaviours because of their ethnicity. As families settle in the UK, it will be important to support the maintenance of healthy behaviours among ethnic minority women, their daughters, and future generations. National policies should ensure that all mothers can achieve recommendations to foster their own and their children's health.

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- 1 Abraido-Lanza AF, Armbrister AN, Florez KR, Aguirre AH. Toward a theory-driven model of acculturation in public health research. *Am J Public Health* 2006;96:1342-6.
- 2 Madan A, Palaniappan L, Urizar G, Wang Y, Fortmann S, Gould JB. Sociocultural factors that affect pregnancy outcomes in two dissimilar immigrant groups in the United States. *J Pediatr* 2006;148:341-6.
- 3 Perreira KM, Cortes KE. Race/ethnicity and nativity differences in alcohol and tobacco use during pregnancy. *Am J Public Health* 2004;96:1629-36.
- 4 Leslie JC, Diehl SJ, Galvin SL. A comparison of birth outcomes among US-born and non-US-born Hispanic women in North Carolina. *Matern Child Health J* 2006;10:33-8.
- 5 Harley K, Eskenazi B. Time in the United States, social support and health behaviors during pregnancy among women of Mexican descent. *Soc Sci Med* 2006;62:3048-61.
- 6 Singh GK, Kogan MD, Dee DL. Nativity/immigrant status, race/ethnicity, and socioeconomic determinants of breastfeeding initiation and duration in the United States, 2003. *Pediatrics* 2007;119(suppl 1):S38-46.
- 7 Celi AC, Rich-Edwards JW, Richardson MK, Kleinman KP, Gillman MW. Immigration, race/ethnicity, and social and economic factors as predictors of breastfeeding initiation. *Arch Pediatr Adolesc Med* 2005;159:255-60.
- 8 Gibson MV, Diaz VA, Mainous AG, Geesey ME. Prevalence of breastfeeding and acculturation in Hispanics: results from NHANES 1999-2000 study. *Birth* 2005;32:93-8.
- 9 Merewood A, Brooks D, Bauchner H, MacAuley L, Mehta SD. Maternal birthplace and breastfeeding initiation among term and preterm infants: a statewide assessment for Massachusetts. *Pediatrics* 2006;118:e1048-54.
- 10 Gibson-Davis CM, Brooks-Gunn J. Couples' immigration status and ethnicity as determinants of breastfeeding. *Am J Public Health* 2006;96:641-6.
- 11 Harley K, Stamm NL, Eskenazi B. The effect of time in the U.S. on the duration of breastfeeding in women of Mexican descent. *Matern Child Health J* 2007;11:119-25.
- 12 White A. *Social focus in brief: ethnicity 2002*. London: Office for National Statistics, 2002.
- 13 Erens B, Primatesta P, Prior G. *Health survey for England 1999: the health of minority ethnic groups*. London: Department of Health, 2007.
- 14 Bolling K, Grant C, Hamlyn B, Thornton A. *Infant feeding survey 2005*. London: Information Centre for Health and Social Care, 2007.
- 15 Plewis I. *Millennium cohort study: technical report on sampling*. London: Institute of Education, University of London, 2004.
- 16 Plewis I, Ketende S. *Millennium cohort study: technical report on response*. 1st ed. London: Institute of Education, University of London, 2006.
- 17 Li R, Scanlon KS, Serdula MK. The validity and reliability of maternal recall of breastfeeding practice. *Nutr Rev* 2005;63:103-10.
- 18 Ford RPK, Tappin DM, Schluter PJ, Wild CJ. Smoking during pregnancy: how reliable are maternal self reports in New Zealand? *J Epidemiol Community Health* 1997;51:246-51.
- 19 Stoler JM, Huntington KS, Peterson CM, Peterson KP, Daniel P, Aboagye KK, et al. The prenatal detection of significant alcohol exposure with maternal blood markers. *J Pediatr* 1998;133:346-52.
- 20 Butler S, Williams M, Paterson J, Tukuitonga C. Smoking among mothers of a Pacific Island birth cohort in New Zealand: associated factors. *N Z Med J* 2004;117:1171.
- 21 Butler S, Williams M, Tukuitonga C, Paterson J. Factors associated with not breastfeeding exclusively among mothers of a cohort of Pacific infants in New Zealand. *N Z Med J* 2004;117:908.

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