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Original Research

Role of birthplace in chronic disease in adults and very old individuals: national cohorts in the UK and USA, 2009–2010

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ABSTRACT

Objectives: To understand the role of birthplace in chronic disease in adults and very old individuals.

Study design: Two national and population-based studies (UK Longitudinal Household Survey and US National Health and Nutrition Examination Surveys) in 2009–2010 were included.

Method: Information on demographics, lifestyle factors and self-reported chronic diseases was obtained by household interview. Analyses included Chi-squared test, *t*-test and logistic regression modelling.

Results: In the UK, there were more cases of heart failure and myocardial infarction in adults (aged 20–79 years) born in Scotland, and more cases of coronary heart disease in adults born in Northern Ireland. There were fewer cases of asthma, depression and hypothyroidism in adults born in Northern Ireland and not born in the UK, and fewer cases of cancer, chronic bronchitis and epilepsy in adults not born in the UK. In USA, there were fewer cases of asthma, cancer, chronic bronchitis, heart failure and heart attack, but more cases of liver disease in adults born in Mexico. Similarly, there were fewer cases of asthma, cancer and chronic bronchitis in adults born in other Spanish or non-Spanish countries, although there were more cases of liver disease in other Spanish-born adults and more cases of diabetes in other non-Spanish-born adults. In very old (≥80 years) individuals, there were more cases of chronic bronchitis in those born in Wales, more cases of myocardial infarction in those born in Northern Ireland, and more cases of diabetes and liver disease in those not born in the UK. Overall, diabetes was more common in foreign-born adults, and respiratory illness and cancer were more common in native-born adults.

Conclusions: It is suggested that future health policy and public health programmes should consider birthplace.

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Introduction

In 2008, the World Health Organization Commission on Social Determinants of Health issued a report describing the important role of social and environmental factors in shaping health inequity worldwide.[1] It is well known that genetics, external and social environment, socio-economic status, education and literacy, cultural norms and personal behaviour all contribute to an individual's health.[2] These greatly influence health disparities and therefore health outcomes across different populations. Environmental factors experienced during foetal life could cause non-modifiable changes in the structure and function of an individual's organs, metabolism and genotype, and have inter-relationships with socio-economic factors.[3] Previous animal, placental, singleton and twin studies seem to support the developmental origins of health and disease hypothesis,[4,5] and suggest the need for modern public health interventions starting in-utero or in early life for common chronic disease prevention as this could have a positive lifelong or even multigenerational impact.[6,7] In this context, physiological changes have been proposed to be positive adaptations because they could help to optimize foetal survival.[8]

In epidemiological observations at population level, it is important to understand how birthplace could play a role in chronic disease in adulthood and old age as literature in this field is still limited, and if and how this 'foetal programming'[6] should be included in future public health programmes and national health policy. Hence, this study aimed to examine the relationship between birthplace and chronic disease for adults (20–79 years) and very old (≥80 years) individuals in two national and population-based settings in the UK and USA, and to provide evidence on the variance in disease prevalence by birthplace.

Methods

Study sample: UK

Data from the 2009–2010 UK Longitudinal Household Survey (now 'Understanding Society', http://www.understandingsociety.org.uk/) were extracted and analysed. This is a national, population-based, multiyear study among people aged ≥16 years residing in the UK (England, Scotland, Wales and Northern Ireland). Written informed consent was obtained from all subjects. The study design and sampling method have been published in detail elsewhere.[9] Information on demographics (including birthplace), living and work conditions, and self-reported chronic disease (Has a doctor or health professional ever told you that you have any of the conditions listed? What age were you when you were first told you had any of the conditions listed?) was obtained by household interview.

Covariates controlled in the analysis included age, sex, education (high school as the threshold),[10,11] marital status, salary (proxy of occupation), body mass index, high blood pressure and willingness to stay in the current neighbourhood (proxy of neighbourhood satisfaction). A Likert scale was used [dichotomized into 'agree' ('strongly agree' and 'agree') and 'disagree' ('neutral', 'disagree' and 'strongly disagree')] for the assessment of neighbourhood satisfaction.

Study sample: USA

As described in detail elsewhere,[12] the US National Health and Nutrition Examination Survey is a national, population-based, multiyear, cross-sectional study (http://www.cdc.gov/nchs/nhanes/nhanes2009-2010/nhanes09_10.htm). Information on demographics, lifestyle factors and self-report health conditions in the 2009–2010 study cohort was obtained by household interview using questionnaires. Written informed consent was obtained for all subjects. Original ethical approval was granted with Protocol Number 'Continuation of Protocol #2005–06' (http://www.cdc.gov/nchs/nhanes/irba98.htm).

Covariates controlled in the analysis included age, sex, education (high school as the threshold),[10,11] marital status, family poverty income index (an index for the ratio of family income to poverty, http://www.cdc.gov/nchs/nhanes/nhanes2009-2010/DEMO_F.htm), body mass index and high blood pressure. In the second adjusted model, further adjustment was made for serum cotinine level. Models were also weighted for survey design.

Statistical analysis

In this study, adults aged 20–79 years were included in the UK and USA study cohorts. In the UK study cohort, adults aged ≥80 years were also included for a separate assessment. Analyses involved Chi-squared test, *t*-test and logistic regression modelling. As the study outcomes were binary (yes or no), effects were estimated using odds ratios (OR) and 95% confidence intervals (CI), with $P < 0.05$ considered to indicate statistical significance. STATA Version 13.0 (STATA, College Station, TX, USA) was used to perform all the analyses. As this study was a secondary data analysis, no further ethics approval was required.

Results

Role of birthplace in chronic disease in the UK

Table 1 shows the characteristics of all eligible participants in the UK study cohort. Large differences were found across birthplace groups. Tables 2 and 3 show the associations between birthplace and chronic diseases in adults aged 20–79 years and those aged ≥80 years in the UK, respectively. Among adults aged 20–79 years, there were more cases of heart failure (OR 3.21, 95% CI 1.00–10.31, $P = 0.050$) and myocardial infarction (OR 1.73, 95% CI 1.00–3.00, $P = 0.052$) in those born in Scotland, and more cases of coronary heart disease (OR 2.46, 95% CI 1.04–5.82, $P = 0.041$) in those born in Northern Ireland. There were fewer cases of asthma (OR 0.57, 95% CI 0.44–0.75, $P < 0.001$ and OR 0.43, 95% CI 0.37–0.49, $P < 0.001$, respectively), depression (OR 0.58, 95% CI 0.39–0.86, $P = 0.007$ and OR 0.30, 95% CI 0.23–0.40, $P < 0.001$, respectively) and hypothyroidism (OR 0.37, 95% CI 0.16–0.83, $P = 0.016$ and OR 0.57, 95% CI 0.39–0.81, $P = 0.002$, respectively) in those born in Northern Ireland and not born in the UK. In addition, there were also fewer cases of cancer (OR 0.43, 95% CI 0.29–0.65, $P < 0.001$), chronic bronchitis (OR 0.47,