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Short report

Cross-sectional study of ethnic differences in the utility of area deprivation measures to target socioeconomically deprived individuals

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ABSTRACT

Area deprivation measures provide a pragmatic tool for targeting public health interventions at socioeconomically deprived individuals. Ethnic minority groups in the UK experience higher levels of socioeconomic deprivation and certain associated diseases than the White population. The aim of this study was to explore ethnic differences in the utility of area deprivation measures as a tool for targeting socioeconomically deprived individuals. We carried out a cross-sectional study using the Health Survey for England 2004. 7208 participants aged 16–64 years from the four largest ethnic groups in England (White, Indian, Pakistani and Black Caribbean) were included. The main outcome measures were percentage agreement, sensitivity and positive predictive value (PPV) of area deprivation, measured using Index of Multiple Deprivation 2004, in relation to individual socioeconomic position (measured by education, occupation, income, housing tenure and car access). We found that levels of both area and individual deprivation were higher in the Pakistani and Black Caribbean groups compared to the White group. Across all measures, agreement was lower in the Pakistani (50.9–63.4%) and Black Caribbean (61.0–70.1%) groups than the White (67.2–82.4%) group. However, sensitivity was higher in the Pakistani (0.56–0.64) and Black Caribbean (0.59–0.66) groups compared to the White group (0.24–0.38) and PPV was at least as high. The results for the Indian group were intermediate. We conclude that, in spite of lower agreement, area deprivation is better at identifying individual deprivation in ethnic minority groups. There was no evidence that area based targeting of public health interventions will disadvantage ethnic minority groups.

Introduction

Socioeconomic status is a well established and an important determinant of health and health inequalities. Lower individual socioeconomic status, measured by factors such as education, income, occupation, housing and car ownership, has been shown to be associated with poorer health (Macintyre, Ellaway, Der, Ford, & Hunt, 1998; Marmot, 2005; Marmot et al., 1991). Therefore, targeting public health interventions at socioeconomically deprived individuals has the potential to reduce health inequalities, as well as improve overall health. In practice, measuring and recording socioeconomic position for every individual in the general population is resource intensive and impractical, so alternative approaches are often used. A commonly used approach is to target individuals who live in socioeconomically deprived geographical areas using accessible area based measures, which incorporate multiple aspects of deprivation (Demissie, Hanley, Menzies, Joseph, & Ernst, 2000; Galobardes, Shaw, Lawlor, Lynch, & Davey Smith, 2006; Tunstall & Lupton, 2003). These measures classify small areas using aggregated data about the characteristics of residents (Noble et al., 2004). However, the use of area deprivation measures to classify the socioeconomic position of residents is subject to the "ecological fallacy"; aggregated information relating to a group of individuals may not reflect the characteristics of all individuals in that group (Macintyre, Ellaway, & Cummins, 2002). An effective tool should accurately capture the target population, whilst minimising the number of people who are targeted in error. Using area deprivation as a proxy for individual deprivation in a targeting process may, nonetheless, be justified if a sufficiently high proportion of deprived individuals live in deprived areas and the number of non-deprived individuals targeted inappropriately is sufficiently small.

Ethnic minority groups in the UK experience higher levels of socioeconomic deprivation (Barnard & Turner, 2011; Nazroo, 1998; Smaje, 1995), and a higher risk of associated diseases than the White population (Bhopal et al., 2002; Davey Smith, Chaturvedi, Harding, Nazroo, & Williams, 2000; Nazroo, 2003). Area measures

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of deprivation currently in use are driven by a majority White population and may not therefore be equally applicable across other ethnic groups (Davey Smith, 2000). It is unclear whether the pragmatic use of area measures of deprivation as a tool for targeting prevention at deprived individuals works equally well in non-white populations.

This study therefore asked three questions. First, are there ethnic differences in the extent to which area deprivation measures agree with individual socioeconomic measures? Second, are there ethnic differences in the proportion of socioeconomically deprived individuals that are identified by area deprivation measures? Third, are there ethnic differences in the extent to which people without individual socioeconomic deprivation are inappropriately included using area deprivation measures? The findings are discussed in relation to the practical implications for public health programmes.

Method

Data

The Health Survey for England (HSE) is a large, annual, cross-sectional survey that contains self-reported information on health and individual circumstances. The HSE 2004 contained a boosted sample of the ethnic minority population in England (Sproston & Mindell, 2004). Multi-stage stratified probability sampling was used to recruit representative samples of the general and ethnic minority population living in private households (Sproston & Mindell, 2006). Postal addresses were used to select households, and therefore individuals, to take part in the survey. In the general population sample the postal addresses were selected from randomly identified small geographical areas. The ethnic minority boost sample was recruited separately with postal addresses selected from areas stratified according to the proportion of relevant ethnic minority populations estimated to live there. Focused enumeration was used in areas with the lowest proportions of residents from Black and Asian backgrounds. Weighting variables, which correct for individual non-response and different probabilities of being selected for the survey, were applied in these analyses. Adult participants aged 16–64 years, from the four largest ethnic groups in England – White, Black Caribbean, Indian and Pakistani, were included.

Variables

Ethnicity was self-reported from questions on family and cultural background, using the same categories as the 2001 Census. Area deprivation was measured using Index of Multiple Deprivation (IMD) 2004. IMD is a composite measure of multiple aspects of deprivation widely used in England to identify, and target, deprived areas (Noble et al., 2004). Individual level data on seven domains of deprivation (income; employment; health deprivation and disability; education, skills and training; barriers to housing and services; crime; and living environment) are aggregated for small areas (with approximately 1500 residents) (Noble et al., 2004). These areas are ranked by increasing area deprivation and grouped into quintiles of the general population. Each household in the HSE 2004 was assigned to an IMD 2004 quintile based on its postcode. The IMD 2004 quintiles were divided into two groups – most deprived (quintile 5) and less deprived (quintiles 1–4).

Individual socio-economic position was measured using self-reported information on income, education, occupation, housing tenure, and car access. Income quintiles were derived from equivalised annual income (a measure of total household income which accounts for the number of people living in the household) based on the whole sample (Sproston & Mindell, 2006). This was divided into a binary variable of lowest income (quintile 5) and higher incomes (quintiles 1–4). Variables with multiple categories – education, occupation, and housing tenure – were dichotomised. Educational level, measured as highest qualification achieved, was divided into higher qualifications (degree level, National Vocational Qualification (NVQ) 2 and 3) and lower or no qualifications (NVQ 1, other and no qualifications). Occupation, categorised using the UK's National Statistics Socio-economic Classification (NSSEC) for the household reference person (the householder with the highest income, or the oldest householder in the case of equal incomes), was divided into higher occupations (managerial, professional, and intermediate) and lower or no occupation (routine, manual, and none, including those who have never worked and the long-term unemployed). Housing tenure category was converted into owner-occupier (own it outright, buying it with a mortgage, pay part rent and part mortgage) and rented or rent free (rent it, live there rent free).

Analyses

Differences between ethnic groups in demographic and socioeconomic characteristics were investigated. Each ethnic minority group was compared with the White group using an independent-samples *t*-test for age and chi-squared tests for sex, area deprivation, and individual socioeconomic position.

Ethnic differences in the association between area deprivation and individual socioeconomic position were investigated by comparing percentage agreement. The proportion of socioeconomically deprived individuals identified by the area deprivation measure was then investigated by calculating sensitivity; the number of individuals in the most deprived area that also had poorer individual socioeconomic position divided by the total number of those with poorer individual socioeconomic position. Finally, the extent to which the area deprivation measure inappropriately included people without individual socioeconomic deprivation was investigated using positive predictive value (PPV), calculated as the number of individuals in the most deprived area who also had poorer individual socioeconomic position divided by the total number in the most deprived area.

Further analyses determined the effect of different approaches to dichotomising individual socioeconomic position, and therefore the robustness of the conclusions from the main analysis. Narrower and broader definitions of lower individual socioeconomic position were tested. SPSS 19.0 and Microsoft Excel were used for the analyses.

Results

The overall unweighted sample comprised 7208 participants, of whom 4377 (60.7%) were White, 1070 (14.8%) Indian, 874 (12.2%) Pakistani and 887 (12.3%) Black Caribbean (Table 1). Each ethnic minority group had a significantly lower mean age than the White group with the lowest mean age in the Pakistani group. There were significantly fewer males in each ethnic minority group compared to the White group, with the lowest proportion in the Black Caribbean group. In comparison to the White group, the prevalence of area deprivation was higher in all ethnic minority groups (Table 1). The Pakistani group had a higher prevalence of all individual level measures of deprivation. Higher prevalence of individual level deprivation was also observed in the Indian and Black Caribbean groups, with the exception of education where levels did not differ significantly compared to the White group, and housing tenure where the Indian group was not significantly different to the White group.