

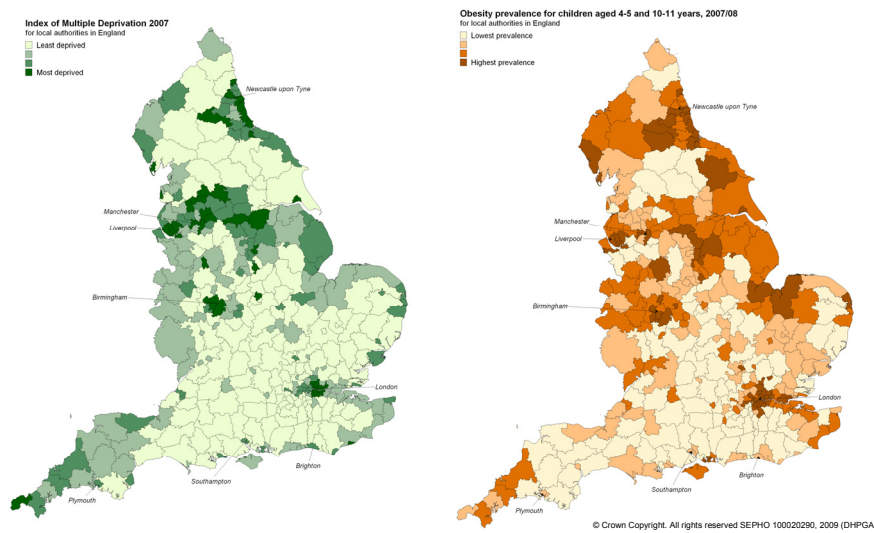
Introduction

The National Child Measurement Programme (NCMP) measures the height and weight of children in Reception (aged 4-5 years) and Year 6 (aged 10-11 years) in state maintained primary schools in England. The NCMP was established in 2005, and now measures nearly one million children each year. It allows the monitoring of child weight status in England, and provides data for detailed analyses of the determinants of obesity in children.

The wider literature on obesity and its determinants, including the National Obesity Observatory (NOO) 2006/07 NCMP report¹, describes a strong relationship between obesity prevalence and deprivation. Areas of high deprivation in England have the highest prevalence of obesity (Figure 1).

A significant association between the likelihood of being obese, and both the ethnicity of the child and the urban environment of their school, was documented in the NOO 2006/07 NCMP report. This significant association for urban environment of school was lost after controlling for both ethnicity and deprivation, but was not lost when controlling for ethnicity alone. Improvements in the 2007/08 data allowed the urban environment of the child's place of residence to be used in the analysis for this paper, incorporating all individual cases from the 2007/08 NCMP.

Figure 1. Maps showing deprivation quartile and child obesity prevalence quartile (NCMP) for local authorities in England



Methods

The following variables were used within the analysis:

- 'Classified as obese' by UK90 growth reference charts.
- Urban environment of child's residence through Lower Super Output Area (LSOA)² of reported postcode, values derived from Office for National Statistics (ONS) classifications³.
- Ethnicity of child as reported in health and education records.
- Index of Multiple Deprivation (IMD), a numerical measure of deprivation using 38 indicators based in seven domains including: Income, Employment, Health and Education⁴.

Logistic regression analysis was performed using three models, all adjusted for sex and age, using 'classified as obese' as the dependent variable (Table 1):

Model 1 Independent variable: Urban environment of child's residence.

Model 2 Independent variables: Urban environment of child's residence and ethnicity of child.

Model 3 Independent variables: Urban environment of child's residence, ethnicity of child and measure of deprivation of child's residence.

Age and sex adjusted models were also calculated to investigate the association between deprivation and both urban environment and ethnicity. Odds ratios in respect to IMD quartiles are displayed (Table 2).

Results

The majority of children (83%) lived in urban environments and over half of children (56%) were White British or Irish. These values were chosen as reference categories in the calculation of odds ratios in regression models. Findings for selected ethnic groups are displayed in tables.

In Model 1 a significant association was found between urban environment of child's residence and obesity prevalence: the greater the urbanisation the greater the odds of the child being classified as obese (Table 1).

Model 2 found a significant association between obesity prevalence and both urban environment and ethnicity of child. Black African and Black Caribbean children had the highest odds of being classified as obese (Table 1).

In Model 3 significant associations between urban environment, ethnicity and obesity prevalence remained after controlling for deprivation (Table 1).

A decrease in the difference of odds of as much as 20% occurred for each urban-rural category after controlling for ethnicity and then deprivation (Chart 1).

A decrease in the difference of odds of as much as 17% occurred for all ethnic groups except Chinese when controlling for deprivation (Chart 2).

Significant associations were found between IMD score and both urban environment and ethnicity of children (Table 2).

Table 1. Odds ratios with 95% CIs for urban-rural category, ethnicity and LSOA IMD score for logistic regression models against 'classified as obese'

	Model 1	Model 2	Model 3
N of pupils	914,712	828,683	828,586
Urban-rural category	p<0.01**	p<0.01**	p<0.01**
Urban	1	1	1
Town & Fringe	0.82 (0.80,0.84)	0.86 (0.84,0.88)	0.96 (0.94,0.98)
Village, Hamlet, Isolated Dwelling	0.74 (0.73,0.77)	0.80 (0.78,0.82)	0.89 (0.87,0.92)
Ethnicity	p<0.01**	p<0.01**	p<0.01**
White British & Irish	1	1	1
Black African	1.76 (1.70,1.82)	1.55 (1.50,1.60)	1.55 (1.50,1.60)
Black Caribbean	1.63 (1.56,1.07)	1.46 (1.39,1.53)	1.46 (1.39,1.53)
Chinese	0.71 (0.62,0.82)	0.71 (0.62,0.82)	0.71 (0.62,0.82)
Indian	1.07 (1.02,1.12)	1.03 (0.98,1.07)	1.03 (0.98,1.07)
Pakistani	1.35 (1.30,1.39)	1.16 (1.12,1.21)	1.16 (1.12,1.21)
Bangladeshi	1.44 (1.37,1.51)	1.20 (1.15,1.26)	1.20 (1.15,1.26)
Deprivation			p<0.01**
IMD			1.01 (1.01,1.01)
R²	0.033	0.037	0.041

** = significant at the 1% level

Chart 1. Odds of being 'classified as obese' for urban-rural category with urban as a reference category, from Models 1 to 3

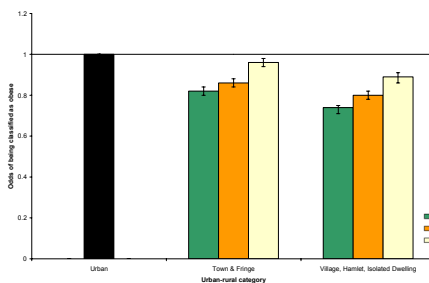
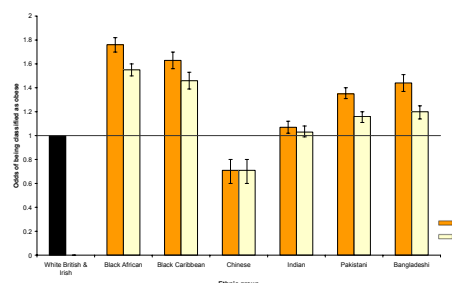


Table 2. Odds ratios with 95% CIs for urban-rural category and ethnicity against IMD score quartiles

	IMD
Urban-rural category	p<0.01**
Urban	1
Town & Fringe	0.43 (0.43, 0.43)
Village, Hamlet, Isolated Dwelling	0.46 (0.45,0.46)
N of pupils	927,099
R²	0.153
Ethnicity	p<0.01**
White British & Irish	1
Black African	2.55 (2.51,2.60)
Black Caribbean	2.35 (2.30,2.40)
Chinese	1.06 (1.02,1.10)
Indian	1.40 (1.40,1.40)
Pakistani	2.51 (2.47,2.55)
Bangladeshi	3.49 (3.40,3.60)
N of pupils	840,207
R²	0.09

** = significant at the 1% level

Chart 2. Odds of being 'classified as obese' by ethnic group with White British & Irish as a reference category, from Models 2 & 3



Caveats

The confounding nature of variables is very difficult to prove. This analysis provides some investigation into the confounding nature of these specific variables but does not consider confounding for other factors.

Measuring deprivation is challenging, IMD involves measures of many indicators.

The ethnic group of a child may represent many cultural, social and physiological differences. Controlling for height suggests that the greater odds of being classified as obese found for Black African and Black Caribbean children may be due to differences in growth and body composition⁵.

The complex nature of obesity determination and the data collection methods of the NCMP suggest a multilevel analysis should be conducted; this is planned for future research by NOO.

Conclusions

This analysis provides some evidence that, in England, deprivation is a confounding factor for both urban environment and ethnicity in their association with the likelihood of being classified as obese. Significant associations were not lost, however, when controlling for Index of Multiple Deprivation scores.

References

- 1 Dinedale, H and Rutter, H. (2008) National Child Measurement Programme: Detailed Analysis of the 2006/07 National Dataset, NOO.
- 2 LSOA is an ONS statistical geography (<http://www.statistics.gov.uk/geography/>)
- 3 ONS Rural and Urban Classification (<http://www.statistics.gov.uk/geography/ruidsp.asp>)
- 4 Department for Communities and Local Government (<http://www.communities.gov.uk>)
- 5 Ridler, C, Townsend, N et al. (2009) National Child Measurement Programme: Detailed Analysis of the 2007/08 National Dataset, NOO.