



National Child Measurement Programme: England, 2011/12 school year

December 2012



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Summary

This report summarises the key findings from the government's National Child Measurement Programme (NCMP) for England, 2011/12 school year. The report provides high-level analyses of the prevalence of 'underweight', 'healthy weight', 'overweight', 'obese' and 'combined overweight and obese'¹ children, in Reception (aged 4–5 years) and Year 6 (aged 10–11 years), measured in state schools in England in the school year 2011/12. The report contains comparisons with 2010/11 and, where appropriate, comparisons have also been made with the results from earlier years.

There are now six years of reliable NCMP data from 2006/07 to 2011/12. The data to be received during the 2012/13 school year is likely to contain a large cohort of children who were previously measured in reception during 2006/07.

Additional analyses will be produced by the National Obesity Observatory (NOO) (expected to be published early 2013) and the anonymised national dataset will be made available to Public Health Observatories (PHOs) to allow regional and local analyses of the data.

In recognition of the effect of natural year to year variation, confidence intervals are included around the percentages in the tables and charts in this report where possible and should be considered when interpreting results. A confidence interval gives an indication of the sampling error around the estimate calculated and takes into consideration the sample sizes and the degree of variation in the data.

As the sample sizes and participation rates for NCMP are large (1,056,780 children and 93% participation in 2011/12) the 95% confidence intervals for prevalence estimates at national level are very narrow (indicating a small margin of potential error). The comparisons that feature in this report have all been tested at a 95% significance level. Both comparisons of prevalence figures relating to groups within the 2011/12 dataset, and comparisons with prevalence figures of earlier years, have only been highlighted where the difference was determined to be statistically significant. Where there was no significant difference between two proportions, the term 'similar' has been used. Further details are provided in [Annex 2](#).

¹ Prevalence rates calculated using the age and sex-specific UK National Body Mass Index (BMI) centile classification. A large representative sample of 37,700 children was constructed by combining data from 17 separate surveys. The sample was rebased to 1990 levels and the data were then used to express BMI as a centile based on the BMI distribution, adjusted for skewness, age and sex using Cole's LMS method - *Growth monitoring with the British 1990 growth reference*. *Cole Arch Dis Child*.1997; 76: 47-49.

- 'underweight' is defined as less than or equal to the 2nd centile;
- 'overweight' is defined as greater than or equal to the 85th centile but less than the 95th centile;
- 'obese' is defined as greater than or equal to the 95th centile;
- 'overweight and obese combined' is defined as greater than or equal to the 85th centile.

When examining prevalence rates it is also important to consider how the participation rate might affect the calculated prevalence figures. Analyses performed in earlier years concluded that a lower participation rate may lead to an underestimation of prevalence for obese children for Year 6, but had little or no effect on prevalence for Reception children. It is estimated that Year 6 obesity prevalence may be underestimated by around 1.3 percentage points for 2006/07, around 0.8 percentage points for 2007/08, and around 0.7 percentage points for 2008/09. This appears to be due to obese children being less likely to participate in the NCMP than other children. The upper confidence intervals associated with Year 6 prevalence estimates were extended to indicate the potential underestimation in each of these years. Similar analysis carried out on the 2009/10 and 2010/11 datasets showed that it was no longer necessary to extend the confidence intervals around Year 6 obesity prevalence figures. As the participation rate remained high in 2011/12 it was considered unnecessary to carry out the analysis again for this report. We will continue to monitor this each year. Further details are provided in [Annex 5](#).

Improvements in data quality over time can also affect prevalence figures. Although no analysis has yet been carried out to quantify any impact on 2011/12 data², this should also be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant.

Key findings for 2011/12

- In total, 1,056,780 valid measurements were received for children in England, in Reception and Year 6 – approximately 93% of those eligible.³ Participation rates have increased each year from 2006/07 when it was 80%.
- The prevalence of underweight, healthy weight, overweight and obese children by year and sex in England for 2011/12 is summarised in [Table i](#). The prevalence of overweight and obese combined is also presented.

² The following reports each contain information on the impact of data quality on prevalence rates in respect of previous years' NCMP datasets

'NCMP: Detailed Analysis of the 2006/07 National Dataset'
www.noo.org.uk/uploads/doc168_2_NOO_NCMP_report230608.pdf

'NCMP: Detailed Analysis of the 2007/08 National Dataset'
www.noo.org.uk/uploads/doc168_2_noo_NCMPPreport1_110509.pdf

'Variations in data collection can influence outcome measures of BMI measuring programmes'
www.ncbi.nlm.nih.gov/pubmed/21834603

³ See 'National Child Measurement Programme Operational Guidance for the 2011/12 school year' (www.dh.gov.uk/en/PublicHealth/Obesity/DH_100123) for further information on which children were eligible for inclusion.

Table i: Prevalence of underweight, healthy weight, overweight, obese and combined overweight and obese children by year and sex, England, 2011/12

		Underweight		Healthy Weight		Overweight		Obese		Overweight and obese combined		Number measured
Reception	Boys	3,260	1.1%	218,005	75.4%	39,299	13.6%	28,738	9.9%	68,037	23.5%	289,302
	Girls	1,892	0.7%	214,899	77.8%	34,638	12.5%	24,931	9.0%	59,569	21.6%	276,360
	All Children	5,152	0.9%	432,904	76.5%	73,937	13.1%	53,669	9.5%	127,606	22.6%	565,662
Year 6	Boys	2,646	1.1%	159,778	63.6%	36,898	14.7%	51,952	20.7%	88,850	35.4%	251,274
	Girls	3,505	1.5%	158,732	66.2%	35,252	14.7%	42,355	17.7%	77,607	32.4%	239,844
	All Children	6,151	1.3%	318,510	64.9%	72,150	14.7%	94,307	19.2%	166,457	33.9%	491,118

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health
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- In Reception, over a fifth (22.6%) of the children measured were either overweight or obese. In Year 6, this proportion was one in three (33.9%).
- The percentage of obese children in Year 6 (19.2%) was over double that of Reception year children (9.5%).
- Among Reception year children, the prevalence of overweight pupils (13.1%) was greater than the prevalence of obese pupils (9.5%). In Year 6, the opposite was true with prevalence of overweight children (14.7%) being lower than that of obese children (19.2%).
- The prevalence of children with a healthy weight was higher in Reception (76.5%) than Year 6 (64.9%). In both years a higher percentage of girls were of a healthy weight than boys. In Reception 77.8% of girls and 75.4% of boys were a healthy weight and in Year 6 this was 66.2% and 63.6% respectively.
- The overall prevalence of underweight children was higher in Year 6 (1.3%) than in Reception (0.9%). In Reception, a higher percentage of boys were underweight than girls (1.1% and 0.7% respectively); whereas in Year 6, a higher percentage of girls were underweight than boys (1.5% and 1.1% respectively).
- Obesity prevalence varied by Strategic Health Authority (SHA). South East Coast SHA had the lowest obesity prevalence for Reception (8.1%) and South Central SHA was lowest for Year 6 (16.3%). London SHA reported the highest obesity prevalence for both (11.1% and 22.5% for each age group respectively).
- SHAs with high obesity prevalence in Reception tended to also have high prevalence in Year 6.
- As in previous years, a strong positive relationship existed between deprivation and obesity prevalence for children in each age group. The obesity prevalence among Reception year children attending schools in areas in the least deprived decile was 6.8% compared with 12.3% among those attending schools in areas in the most deprived decile. Similarly, obesity prevalence among Year 6 children attending schools in areas in the least deprived decile was 13.7% compared with 24.3% among those attending schools in areas in the most deprived decile.

- Obesity prevalence was significantly higher than the national average for children in both school years in the ethnic groups 'Black or Black British', 'Asian or Asian British', 'Any Other Ethnic Group' and 'Mixed'. Fifteen per cent of children were unclassified.
- Obesity prevalence was significantly higher in urban areas than rural areas for each age group, as was the case in previous years. The obesity prevalence among Reception year children living in urban areas was 9.8% compared with 8.1% and 7.8% living in town areas and village areas respectively. Similarly, obesity prevalence among Year 6 children living in urban areas was 19.9% compared with 16.3% and 15.6% living in town areas and village areas respectively.
- Office for National Statistics Area Classification (ONS-AC) categorises geographic areas based on a wide variety of common characteristics to provide a simple approach which can be used at local level to target interventions or resources. The results indicated that for both school years obesity prevalence was highest in areas classed as Multicultural City Life, followed by areas classed as being Disadvantaged Urban Communities. Urban Fringe areas had the lowest obesity prevalence.

Key findings comparing 2011/12 NCMP findings with earlier years

There are now six years of reliable NCMP data and [Figure i](#) presents the prevalence of underweight, overweight, obese and combined overweight and obese children by school year from 2006/07 to 2011/12.

The comparisons that feature in this report have all been tested at a 95% significance level. Both comparisons of prevalence figures relating to groups within the 2011/12 dataset, and comparisons with prevalence figures of earlier years, have only been highlighted where the difference was determined to be statistically significant. Where there was no significant difference between two proportions, the term 'similar' has been used. Further details are provided in [Annex 2](#).

When comparing with years 2006/07 to 2008/09 it is important to note the extended confidence intervals for obese and combined overweight and obese children in Year 6.

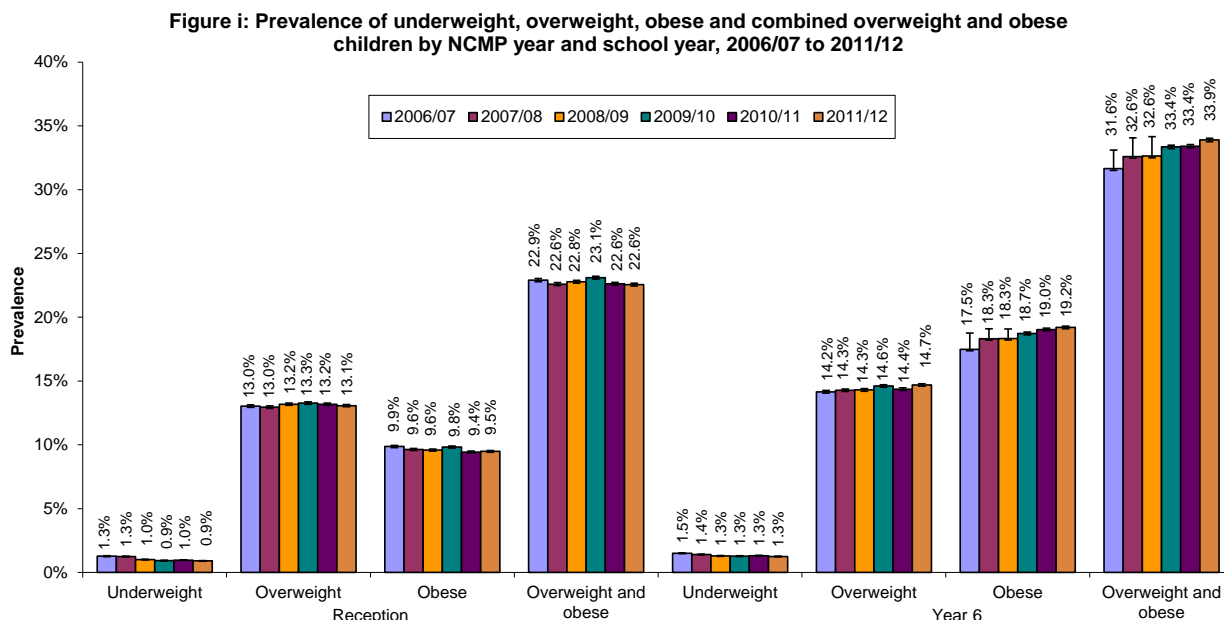
As mentioned earlier, improvements in data quality over time can also affect prevalence figures. Although no analysis has yet been carried out to quantify any impact on 2011/12 data, this should also be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant.

2011/12 compared with 2010/11:

- In Reception, the proportion of obese children (9.5%) was similar in 2010/11 (9.4%). The proportion of overweight and obese children combined (22.6%) was also similar in 2010/11 (22.6%). The proportion of underweight children was lower in 2011/12 (0.9%) than in 2010/11 (1.0%).
- In Year 6, the proportion of obese children (19.2%) was higher than in 2010/11 (19.0%). The proportion of overweight and obese children combined (33.9%) was also higher than in 2010/11 (33.4%). The proportion of underweight children was lower than in 2010/11 (although rounded to one decimal place both are 1.3%).

2011/12 compared with 2006/07:

- In Reception, the proportion of obese children (9.5%) was lower than in 2006/07 (9.9%). The proportion of overweight and obese children combined (22.6%) was also lower than in 2006/07 (22.9%). The proportion of underweight children (0.9%) was again lower than in 2006/07 (1.3%).
- In Year 6, the proportion of obese children (19.2%) was higher than in 2006/07 (17.5%). The proportion of overweight and obese children combined (33.9%) was also higher than in 2006/07 (31.6%). The proportion of underweight children (1.3%) was lower than in 2006/07 (1.5%).



Notes:
 1. All percentages are rounded to one decimal place.
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1 Introduction

Established in 2005/06, the National Child Measurement Programme (NCMP) for England⁴ records height and weight measurements of children in Reception (typically aged 4–5 years) and Year 6 (aged 10–11 years) and enables detailed analysis of prevalence and trends in child overweight and obesity levels. The programme now holds six years of reliable data (2006/07 is the first year that the data are considered to be of an acceptable quality) and the national report holds UK National Statistics status. The data are key to improving understanding of overweight and obesity in children. They are used at a national level to inform policy and locally to inform the planning and commissioning of services. The NCMP also provides local areas with an opportunity to raise public awareness of child obesity and to assist families to make healthy lifestyle changes through provision of a child's result to their parents.

Central collation and analysis of the NCMP data has been coordinated by the Health and Social Care Information Centre (HSCIC) since 2006/07. Data are supplied locally by Primary Care Trusts (PCTs) with the support and cooperation of schools, in line with guidance⁴ from the Department of Health Obesity and food policy branch.

Through the reforms to the NHS and public health system brought about by the Health and Social Care Act 2012, from 1st April 2013, Local Authorities will take on new public health responsibilities funded by the public health grant, and Primary Care Trusts (PCTs) (along with Strategic Health Authorities (SHAs)) will be abolished. Local authorities will take on responsibility for local delivery of the National Child Measurement Programme from April 2013.

This report presents the headline findings for the 2011/12 NCMP. The National Obesity Observatory (NOO) will produce additional analyses in 2013 (expected to be published early 2013), and the anonymised national dataset will be made available to NOO and Public Health Observatories (PHOs) to allow regional and local analyses of the data. NCMP datasets relating to 2006/07 to 2010/11 have already been deposited in the UK Data Archive⁵ and a reduced version of this year's dataset will be made available early 2013.

In addition, NOO will also be presenting NCMP data in an e-Atlas – an interactive mapping tool that enables the user to compare a range of indicators and examine correlations and allows regional and national comparisons. The e-Atlas tool is expected to be available shortly after publication of this report and will be available on the following link: www.noo.org.uk/visualisation/eatlas

The NCMP includes all state schools in England (unless the school declined to participate or if the PCT did not manage to get into that school for other reasons).

⁴ See www.dh.gov.uk/en/Publichealth/Obesity/DH_100123 for more information about the National Child Measurement Programme, including guidance and resources for undertaking the exercise

⁵ UK Data Archive www.data-archive.ac.uk

Independent and special schools⁶ are not formally required to participate although their participation is encouraged.

Independent and special schools are excluded from the analysis in this report⁷, but are included in the dataset provided to NOO and to PHOs for further analyses.

Information for 2011/12 is presented by PCT and SHA ([Online Table 2](#)) as well as by the current upper and lower tier LA areas (introduced in April 2009) on the basis of both the LA in which the school is located ([Online Table 3A](#)) and the LA of the child's residence ([Online Table 3B](#)). Although in general these two sets of figures are quite similar, there is a notable impact on prevalence figures in areas where high concentrations of pupils attend a school located in an LA different to their home LA, such as LAs in inner London.

⁶ Those schools categorised as 'Community Special', 'Foundation Special', 'Independent School Approved for SEN Pupils', 'Non-Maintained Special', 'Other Independent', 'Other Independent Special School', 'Pupil Referral Unit', 'Early Years Setting' or 'LA Nursery' are not formally required to participate in the NCMP programme.

⁷ 100 out of approximately 3,400 independent or special schools in England chose to take part in 2011/12. Across all PCTs, there were a total of 812 Reception year and 1,139 Year 6 records relating to pupils in these schools. In total this represents only 0.18% of the total number of records across all state and independent / special schools. Records from independent / special schools are excluded from analysis in this report due to concerns around how representative they are due to the low proportion of such schools that participate.

2 Methodology

2.1 Data collection and validation

The measurement of children's heights and weights, without shoes and coats and in normal, light, indoor clothing, was overseen by healthcare professionals and undertaken in school by trained staff. Measurements could be taken at any time during the 2011/12 academic year. Consequently, some children were almost two years older than others in the same school year at the point of measurement⁸, however, body mass index (BMI) centile results are adjusted for age.

The data that PCTs submitted underwent a series of data quality checks. The validation process is summarised below:

- i. *As the PCT entered data:* the Upload Tool checked that each variable met certain required conditions. For example, the height and weight were checked for extreme values;
- ii. *Before the PCT uploaded data to the NCMP database:* the tool provided a data quality report to highlight if there were any possible areas of concern for the PCT to check and correct. For example, the percentage of duplicate records was calculated;
- iii. *After the PCT uploaded data:* PCTs were given access to a secure website providing data quality information about their uploaded data. For example, PCTs were provided with a list of schools, within their boundary, for which no data had been returned. PCTs were able to review this information and correct their data or, if they were satisfied with data quality, they could confirm this and 'finalise' their data;
- iv. *After the PCT had 'finalised' their data:* the HSCIC carried out further validation through, for example, comparing data across PCTs and over time. The HSCIC contacted a number of PCTs to query unexpected findings and, where necessary, requested that data be corrected.

PCTs' participation rates were calculated based on validated data. Headcounts were adjusted where necessary and where the pupils in a school were reported to be ineligible due to closure, this was verified using Edubase (www.edubase.gov.uk).

⁸ At the time of measurement in 2011/12, 87% of Year R pupils were aged between 4.5 years and 5.5 years whilst 81% of Year 6 pupils were aged between 10.5 years and 11.5 years. These percentages have mainly remained unchanged since 2008/09. The impact on the prevalence figures as a result of inclusion of pupils outside these age ranges is negligible.

2.2 Definitions of underweight, healthy weight, overweight and obese

Prevalence rates were calculated by deriving every child's BMI⁹ and referencing the age and sex specific centiles calculated using the British 1990 growth reference (UK90) to determine the number of children defined as underweight, healthy weight, overweight or obese as a proportion of the number measured.

The age and sex-specific UK90 growth reference centiles were based on UK growth data: a large representative sample of 37,700 children was constructed by combining data from 17 separate surveys. The sample was rebased to 1990 levels and the data were then used to express BMI as a centile based on the BMI distribution, adjusted for skewness, age and sex using Cole's LMS method.¹⁰

The following thresholds for defining underweight, healthy weight, overweight and obese children were then used:

- **Underweight** is defined as a BMI less than or equal to the 2nd centile;
- **Healthy weight** is defined as a BMI greater than the 2nd centile but less than the 85th centile;
- **Overweight** is defined as a BMI greater than or equal to the 85th centile but less than the 95th centile (i.e. overweight *but not* obese);
- **Obese** is defined as a BMI greater than or equal to the 95th centile.

These thresholds are those conventionally used for population monitoring and are not the same as those used in a clinical setting (where overweight is defined as a BMI greater than or equal to the 91st but below the 98th centile and obese is defined as a BMI greater than or equal to the 98th centile). Prevalence figures which are based on the thresholds used in a clinical setting are available on the NOO website via the eAtlas.

2.3 Analyses

2.3.1 Participation

Pupils eligible for inclusion in the NCMP were all children in Reception and Year 6 attending state-maintained schools in England (except special schools).¹¹

The numbers of pupils at each school were provided by the Department for Education (DfE), but PCTs could edit these figures if necessary. The PCT could also add or remove

⁹ Body mass index (BMI) is an indicator of body fat based on height and weight. $BMI = \text{weight}(\text{kg}) / \text{height}^2 (\text{m}^2)$

¹⁰ 'Growth monitoring with the British 1990 growth reference'. Cole *Arch Dis Child*.1997; 76: 47-49.

¹¹ The following institutions were excluded from the prevalence and participation rate calculations: 'Community Special', 'Foundation Special', 'Independent School Approved for SEN Pupils', 'Non-Maintained Special', 'Other Independent', 'Other Independent Special School', 'Pupil Referral Unit', 'Early Years Setting' and 'LA Nursery'. PCTs were encouraged, but not obliged, to include independent schools and special schools in their NCMP measurements. Numbers of independent school pupils were not, however, included in participation rates used for performance management purposes.

schools from their geographically assigned list if, despite being within their PCT boundary, another PCT had undertaken measurement in that school. PCT changes to DfE pupil numbers and schools were validated by the HSCIC to ensure accuracy.

The participation rate is the proportion of eligible pupils for whom valid measurements were recorded (see [Annex 4](#)). Participation rates are estimates and should be treated with caution, particularly at smaller geographical levels, because of the difficulty in calculating the number of pupils eligible for measurement. For example, pupils might join the school throughout the year.

Records were assigned to a PCT, and thereby Strategic Health Authority (SHA), based on the PCT that returned the data. Geographical analyses, showing results by upper and lower tier Local Authority (LA) location are based on the location of the child's school, as well as the child's residence.

The collection of the child's home postcode became a formal requirement in 2007/08. The percentage of records which included a valid child postcode increased from 95.1%¹² in 2007/08 to 99.5% in 2011/12. The child postcode is mapped to Lower Super Output Area (LSOA) to anonymise the data on upload, and is a useful field for analyses by PHOs and PCTs.

The National Obesity Observatory (NOO) published guidance¹³ to assist users wishing to undertake analysis of NCMP data at small area level in June 2011.

2.3.2 Confidence Intervals

A confidence interval gives an indication of the likely error around an estimate that has been calculated from measurements based on a sample of the population. It indicates the range within which the true value for the population as a whole can be expected to lie, taking natural random variation into account.

Throughout this report, 95% confidence intervals are used. These are known as such because if it were possible to repeat the same programme under the same conditions a number of times, we would expect 95% of the confidence intervals calculated in this way to contain the true population value for that estimate.

Larger sample sizes lead to narrower confidence intervals, since there is less natural random variation in the results when more individuals are measured. The NCMP has relatively narrow confidence limits because of the large size of the sample.

Further details on calculating confidence intervals are provided in [Annex 2](#).

¹² This percentage has been amended from 97% previously published following an exercise to further cleanse historic NCMP datasets and re-circulate to PHOs.

¹³ 'NCMP Guidance for small area analysis'
www.noo.org.uk/uploads/doc/vid_11853_NCMP_Guidanceforsmallarea%20analysisFINAL.pdf

2.3.3 Significance Testing

When interpreting the prevalence figures contained in this report, it is important to consider the associated confidence intervals. This is to determine whether any differences in prevalence figures are real or might be a result of chance due to sampling variation. Where 95% confidence limits for two sub-groups do not overlap, the difference is said to be statistically significant. As this is a conservative method of testing for significance which can be used to identify some, but not all, significant changes, the method described in [Annex 2](#) is applied in this report. This method involves calculating 95% confidence intervals around the absolute difference between two proportions p_1 and p_2 . A significant difference exists between p_1 and p_2 if and only if zero is not included in the range covered by the 95% confidence intervals around the absolute difference.

2.3.4 Regression Analysis

When examining prevalence rates it is important to consider how the participation rate might affect the calculated prevalence figures.

In 2006/07, 80% of eligible pupils in Reception and Year 6 combined were measured. This percentage has increased steadily since then and is 93% for 2011/12. Regression analysis was performed in previous years to investigate the possible effect participation rate had on the recorded prevalence of overweight and/or obese children.

Analyses performed in 2007/08 and repeated subsequently, concluded that a lower participation rate may lead to an underestimation of prevalence for obese children for Year 6, but had little or no effect on prevalence for Reception children. It is estimated that Year 6 obesity prevalence was underestimated by around 1.3 percentage points for 2006/07, around 0.8 percentage points for 2007/08, and around 0.7 percentage points for 2008/09 due to obese children being more likely to opt out of being measured than other children. Year 6 obesity confidence intervals were extended to highlight this potential underestimation in each of these years.

Similar analyses carried out on the 2009/10 and 2010/11 NCMP dataset showed that it was no longer appropriate to extend the upper confidence intervals around Year 6 obesity prevalence figures. This year participation rates were again high (92.4% for Reception and 94.2% for Year 6) with low standard deviation in these rates (3.7% for Reception and 4.2% for Year 6). It was therefore considered unnecessary to repeat the analysis. Based on previous years' analysis the assumption was made that no adjustment should be made. Further details on this are available in [Annex 5](#). We will continue to monitor this annually.

The possible effects of other factors, such as deprivation, on participation and prevalence have not been examined in this report.

3 Results

3.1 Participation

The participation rate is the percentage of pupils eligible in state schools in each year group for whom valid measurements were recorded. PCTs were aiming to achieve at least an 85% participation rate in each year group.

The overall participation rates achieved nationally in 2011/12 were:

- 94% for Reception (565,662 pupils measured); a 0.8 percentage point increase from 2010/11
- 92% for Year 6 (491,118 children); a 0.6 percentage point increase from 2010/11
- 93% for Reception and Year 6 combined (1,056,780 children); a 0.7 percentage point increase from 2010/11.

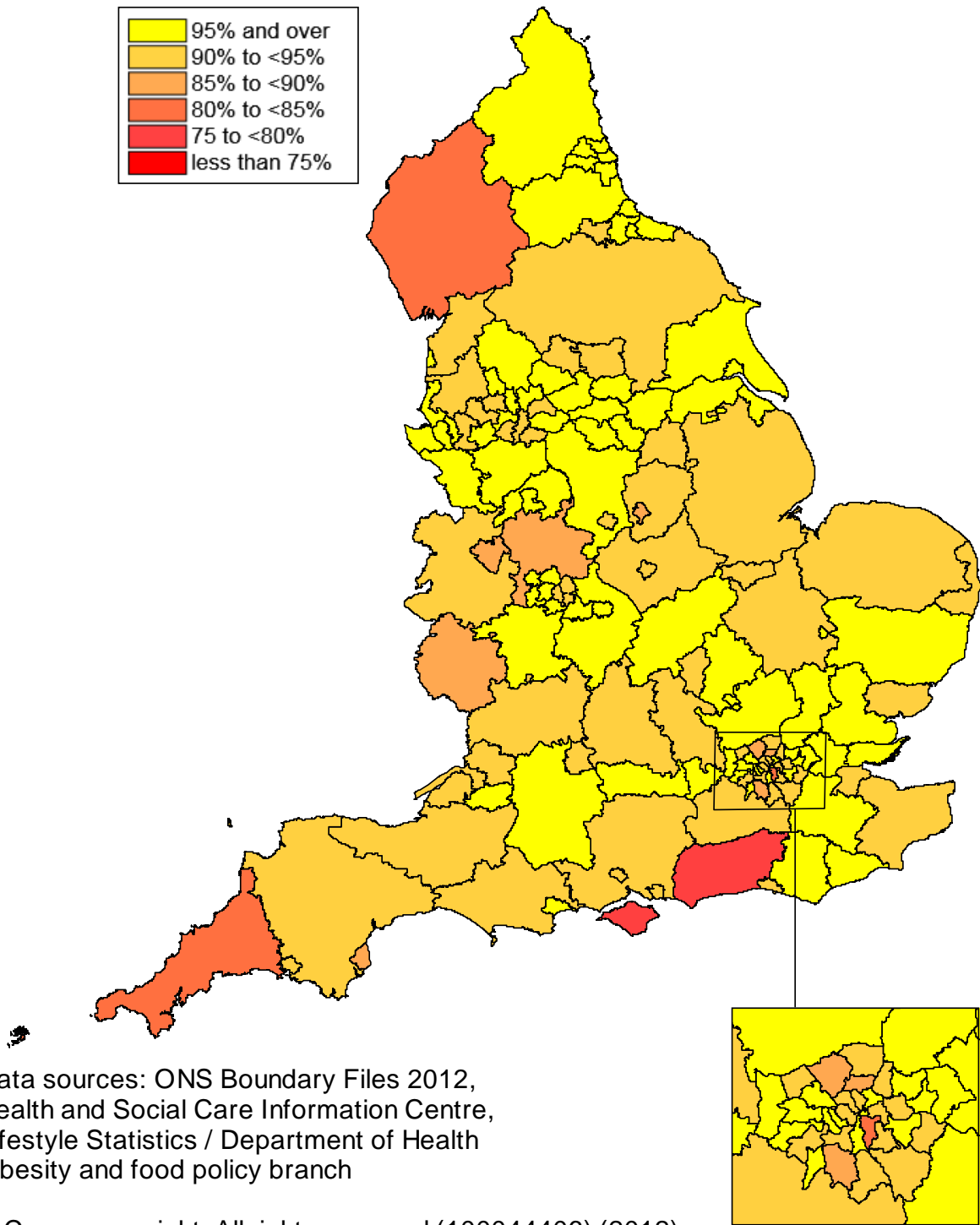
All 151 PCTs provided data for Reception and Year 6 children in 2011/12.

- 97% of PCTs (146 of 151) met or exceeded 85% participation rate for Reception, compared with 96% (145 of 152) in 2010/11.
- 95% of PCTs (144 of 151) met or exceeded 85% participation rate for Year 6, compared with, 94% (144 of 152) in 2010/11.
- [Annex 1](#) and [online Table 2](#) shows overall participation rates for all 151 PCTs.

Of the pupils measured, boys accounted for 51% in Reception and in Year 6. It is not possible to calculate the participation rates by sex since the numbers of eligible pupils are not collected by sex.

[Figure 1](#) shows the participation rates by PCT for Reception; [Figure 2](#) shows the rates for Year 6:

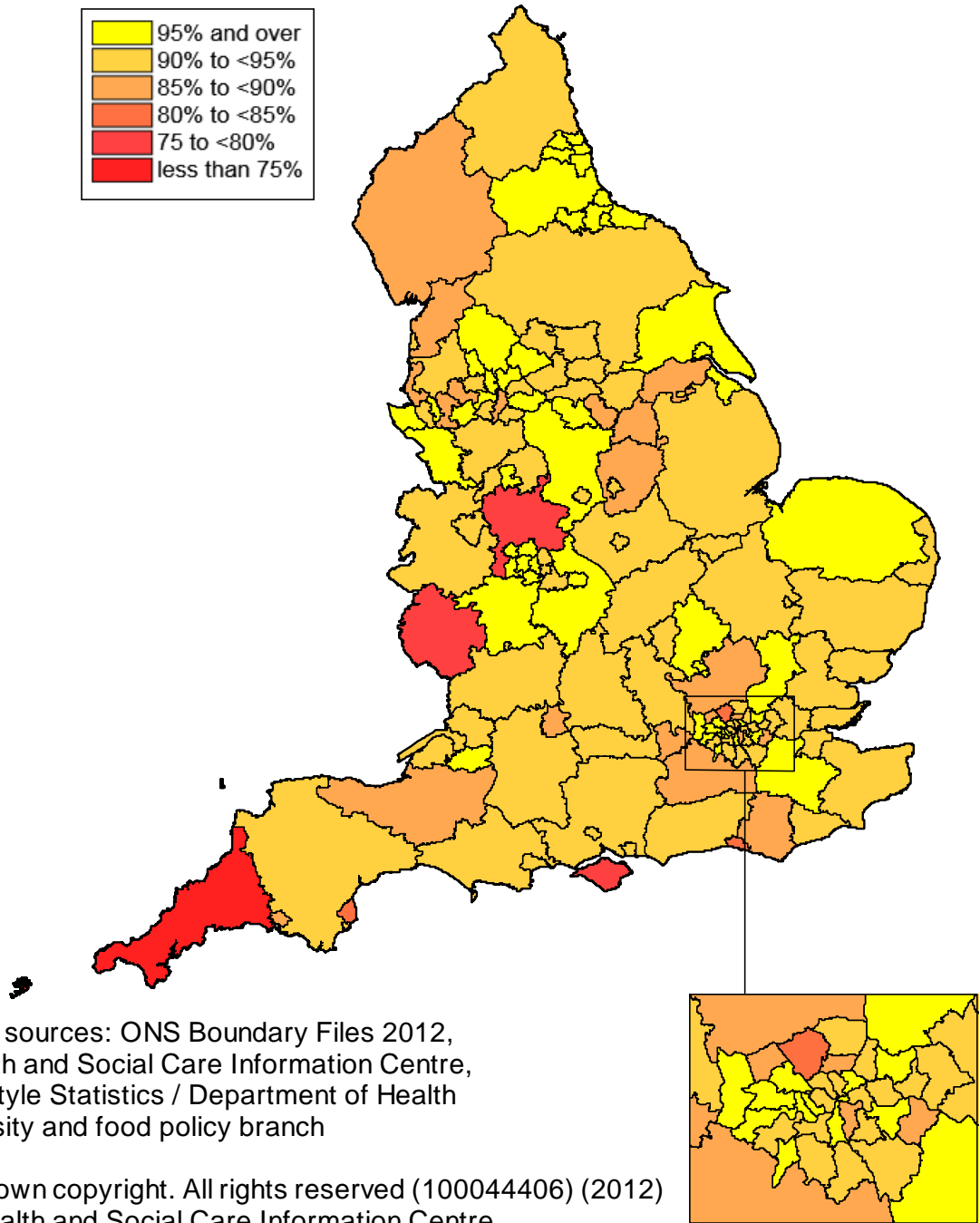
Figure 1: NCMP participation rates for Reception, 2011/12, by Primary Care Trust



Data sources: ONS Boundary Files 2012, Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity and food policy branch

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Figure 2: NCMP participation rates for Year 6, 2011/12, by Primary Care Trust



3.2 Prevalence

3.2.1 Prevalence of underweight, healthy weight, overweight, obese and combined overweight and obese children: national findings

Prevalence rates have been calculated by first deriving every child's BMI and referencing the age and sex specific UK90 classification to calculate the proportion of children defined as underweight, healthy weight, overweight or obese according to the population monitoring criteria.¹⁴

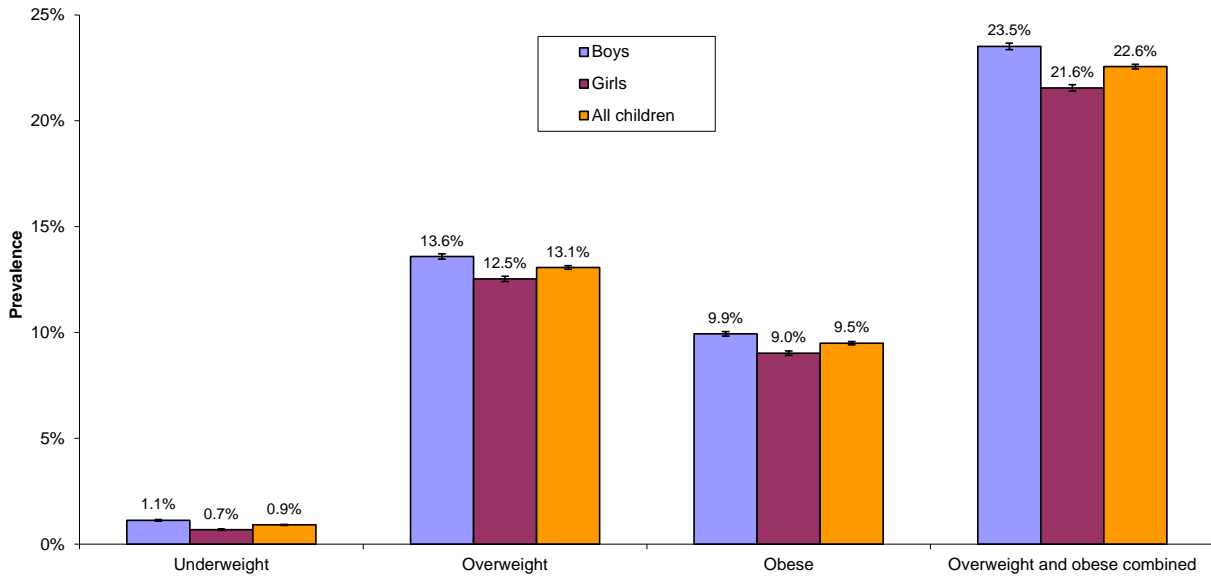
Online Table 2 shows the prevalence of underweight, healthy weight, overweight, obese and combined overweight and obese prevalence, with associated 95% confidence intervals, by school year, Primary Care Trust (PCT) and Strategic Health Authority (SHA).

Figures 3 and 4 below show the prevalence of underweight, overweight, obese and combined overweight and obese children, with associated 95% confidence intervals, by sex, in England, 2011/12.

¹⁴ Prevalence rates calculated using the age and sex-specific UK National Body Mass Index (BMI) centile classification. A large representative sample of 37,700 children was constructed by combining data from 17 separate surveys. The sample was rebased to 1990 levels and the data were then used to express BMI as a centile based on the BMI distribution, adjusted for skewness, age and sex using Cole's LMS method - *Growth monitoring with the British 1990 growth reference*. Cole *Arch Dis Child*.1997; 76: 47-49.

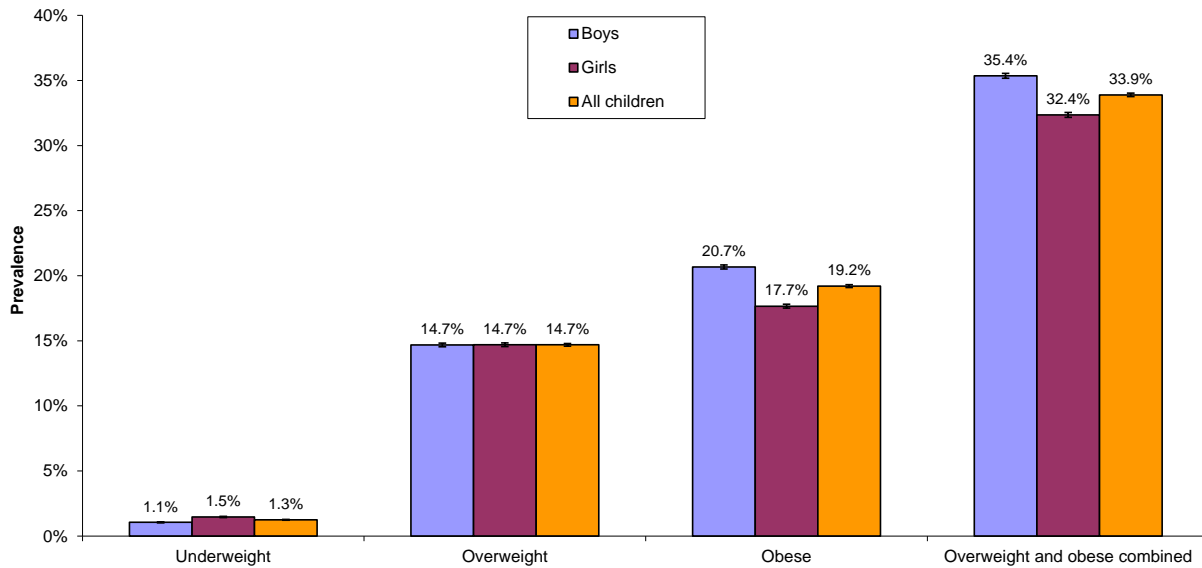
- 'underweight' is defined as less than or equal to the 2nd centile;
- 'overweight' is defined as greater than or equal to the 85th centile but less than the 95th centile;
- 'obese' is defined as greater than or equal to the 95th centile;
- 'overweight and obese combined' is defined as greater than or equal to the 85th centile.

Figure 3: Prevalence of underweight, overweight and obese children in Reception, by sex, England, 2011/12



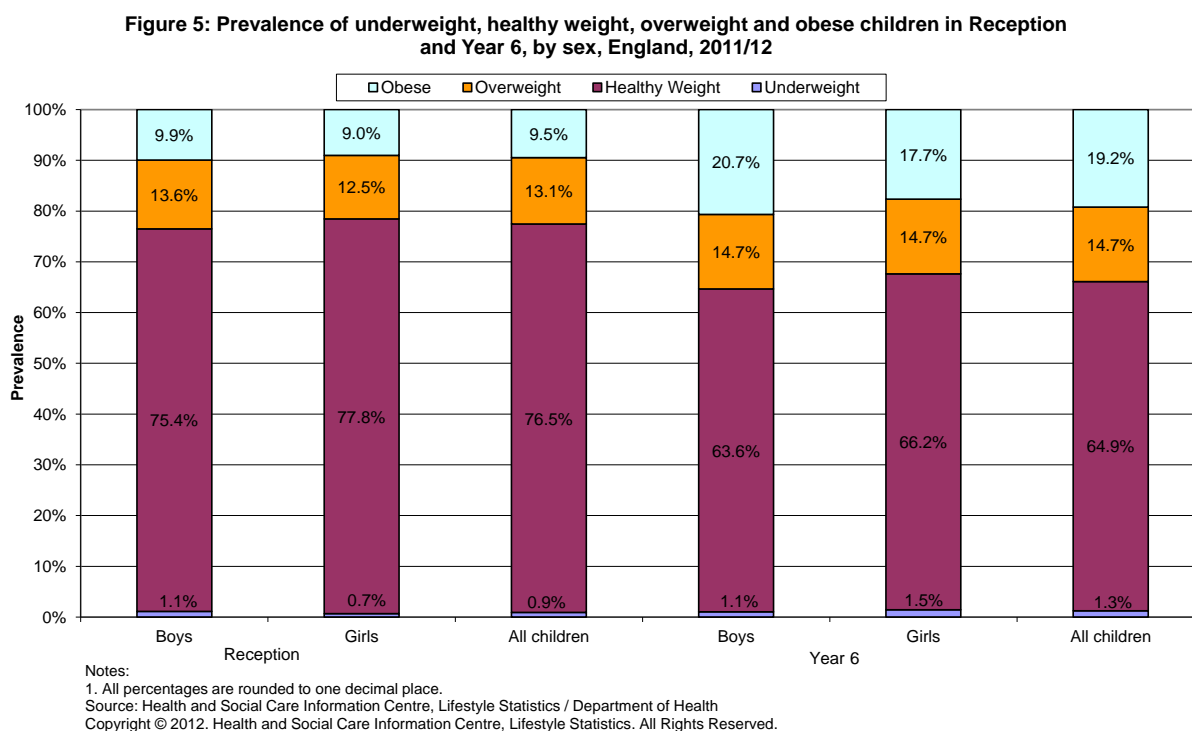
Notes:
 1. All percentages are rounded to one decimal place.
 Source: Health and Social Care Information Centre, Lifestyle Statistics / Department of Health
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Figure 4: Prevalence of underweight, overweight and obese children in Year 6, by sex, England, 2011/12



Notes:
 1. All percentages are rounded to one decimal place.
 Source: Health and Social Care Information Centre, Lifestyle Statistics / Department of Health
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Figure 5 shows the 2011/12 prevalence breakdowns including healthy weight.



Key Findings:

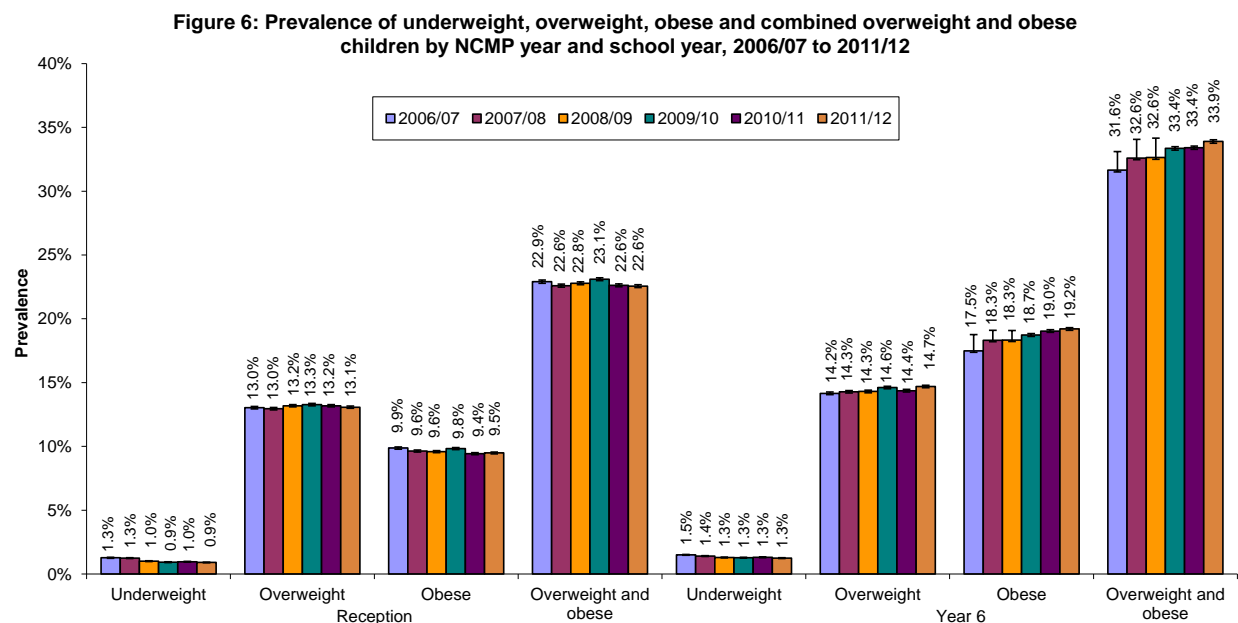
- In Reception over a fifth (22.6%) of children were classified as either overweight or obese; in Year 6 this proportion was one in three (33.9%);
- The prevalence of obese children in Year 6 (19.2%) was double that in Reception (9.5%);
- Prevalence of obesity was found to be higher among boys than girls in both school years. In Reception, 9.9% boys and 9.0% girls were classified as obese. In Year 6 the percentages were 20.7% and 17.7% respectively;
- The overall prevalence of underweight children was higher in Year 6 (1.3%) than in Reception (0.9%). In Reception, a higher percentage of boys were underweight than girls (1.1% and 0.7% respectively); whereas in Year 6, a higher percentage of girls were underweight than boys (1.5% and 1.1% respectively);
- Among Reception children, the prevalence of overweight pupils (13.1%) was greater than the prevalence of those who were classified as obese (9.5%). In Year 6, the opposite was true with prevalence of overweight children (14.7%) being lower than that of obese children (19.2%).
- The prevalence of children with a healthy weight was higher in Reception (76.5%) than Year 6 (64.9%). In both years a higher percentage of girls were of a healthy weight than boys. In Reception 77.8% of girls and 75.4% of boys were a healthy weight and in Year 6 this was 66.2% and 63.6% respectively.

3.2.2 Comparisons between the 2011/12 headline findings and those of previous years

When comparing with years 2006/07 to 2008/09 it is important to note the extended confidence intervals for obese and combined overweight and obese children in Year 6.

As mentioned earlier, improvements in data quality over time can also affect prevalence figures. Although no analysis has been carried out to quantify any impact, this should also be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant. For further details see [Annex 5](#) of the report.

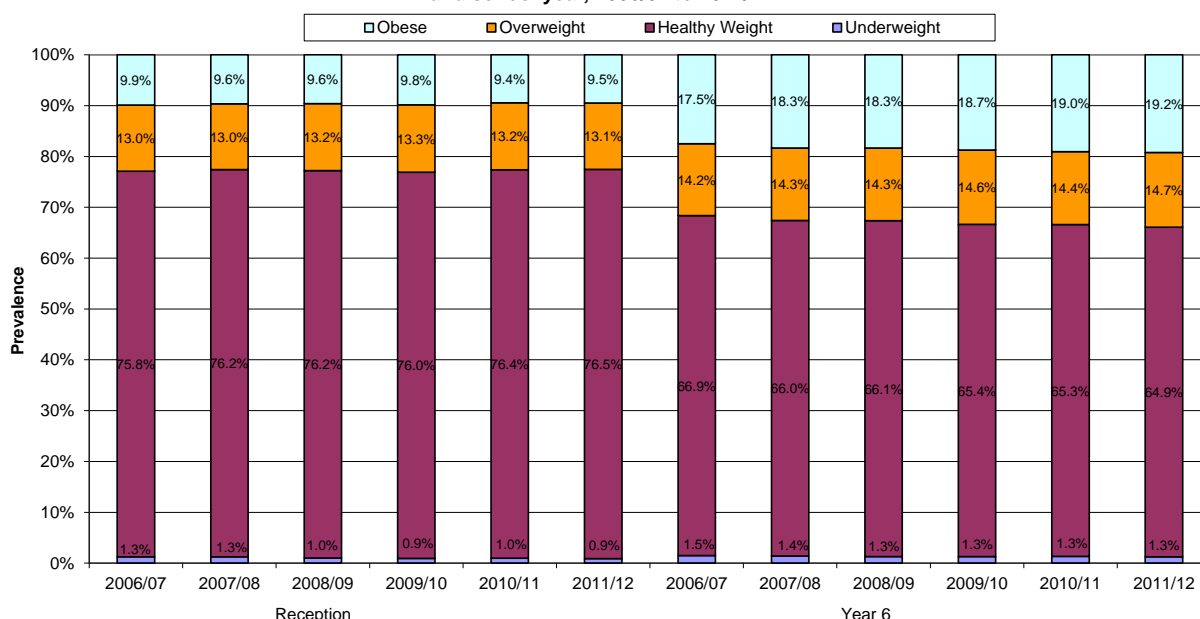
Figure 6 shows the prevalence of underweight, overweight, obese and combined overweight and obese children between 2006/07 and 2011/12.



Notes:
 1. All percentages are rounded to one decimal place.
 Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health
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Figure 7 shows prevalence breakdowns for each BMI category from 2006/07 to 2011/12

Figure 7: Prevalence of underweight, healthy weight, overweight and obese children by NCMP year and school year, 2006/07 to 2011/12



Notes:
 1. All percentages are rounded to one decimal place.
 Source: Health and Social Care Information Centre, Lifestyle Statistics /Department of Health
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The key findings when the results from 2011/12 are compared to 2010/11 are as follows:

- In Reception, the proportion of obese children (9.5%) was similar to 2010/11 (9.4%). The proportion of overweight and obese children combined was similar in both years (22.6%) and the proportion of underweight children was lower in 2011/12 (0.9%) than in 2010/11 (1.0%).
- In Year 6, the proportion of obese children (19.2%) was higher than in 2010/11 (19.0%). The proportion of overweight and obese children combined (33.9%) was also higher than in 2010/11 (33.4%). The proportion of underweight children was lower in 2011/12 than in 2010/11 (although rounded to one decimal place both are 1.3%).

The key findings when the results from 2011/12 are compared to 2006/07 are as follows:

- In Reception, the proportion of obese children (9.5%) was lower than in 2006/07 (9.9%). The proportion of overweight and obese children combined (22.6%) was also lower than in 2006/07 (22.9%). The proportion of underweight children (0.9%) was again lower than in 2006/07 (1.3%).
- In Year 6, the proportion of obese children (19.2%) was higher than in 2006/07 (17.5%). The proportion of overweight and obese children combined (33.9%) was also higher than in 2006/07 (31.6%). The proportion of underweight children (1.3%) was lower than in 2006/07 (1.5%).

3.2.3 Prevalence by Strategic Health Authority (SHA)

Prevalence of underweight, overweight and obese children, with associated 95% confidence intervals, by the Strategic Health Authority (SHA) of the Primary Care Trust (PCT) which measured the child in 2011/12, are shown in [Figure 8](#) for Reception and [Figure 9](#) for Year 6. Detailed tables are available in [Online Table 2](#) showing underweight, healthy weight, overweight, and obese prevalence, with associated 95% confidence intervals, by school year, by PCT and SHA.

NCMP data for 2011/12 is also presented by the current upper and lower tier Local Authority (LA) areas (introduced in April 2009) on the basis of both the LA in which the school is located and the LA of the child's residence ([Online Tables 3A and 3B](#)).

Information presented in an e-Atlas (hosted by NOO and available at www.noo.org.uk/visualisation/eatlas) also contains NCMP data for 2006/07 and 2007/08 recalculated to the current LA areas (introduced in April 2009) to allow comparison over time.

Figure 8: Prevalence of underweight, overweight, and obese children in Reception, by SHA, England, 2011/12

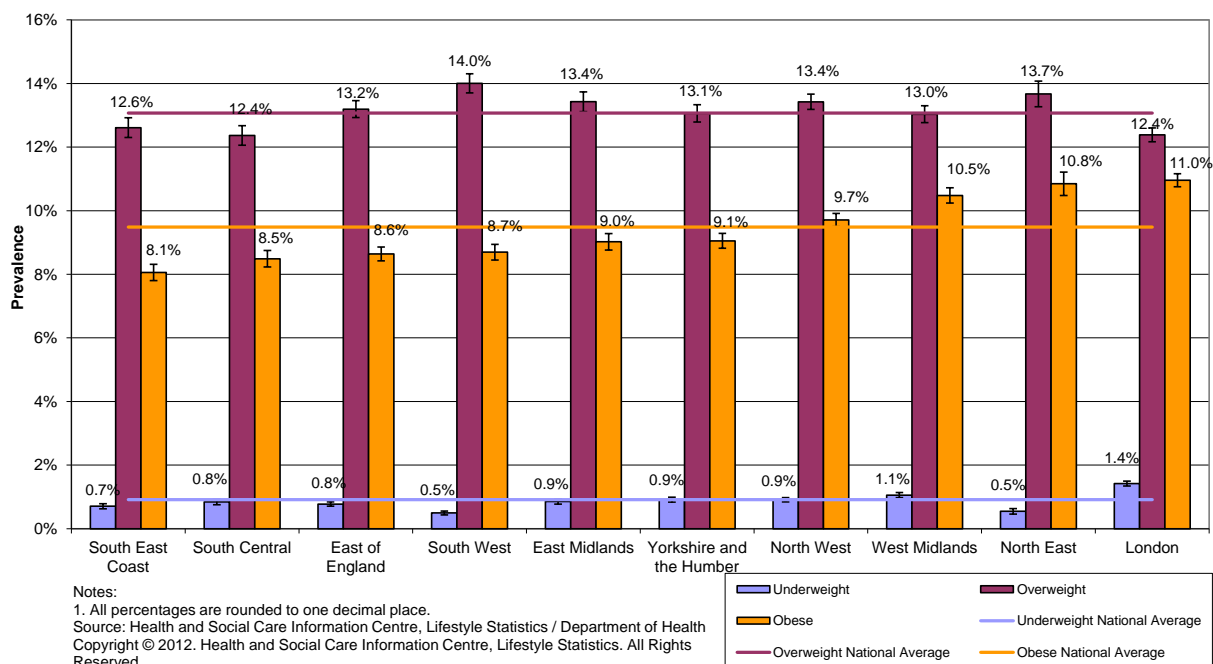


Figure 9: Prevalence of underweight, overweight, and obese children in Year 6, by SHA, England, 2011/12

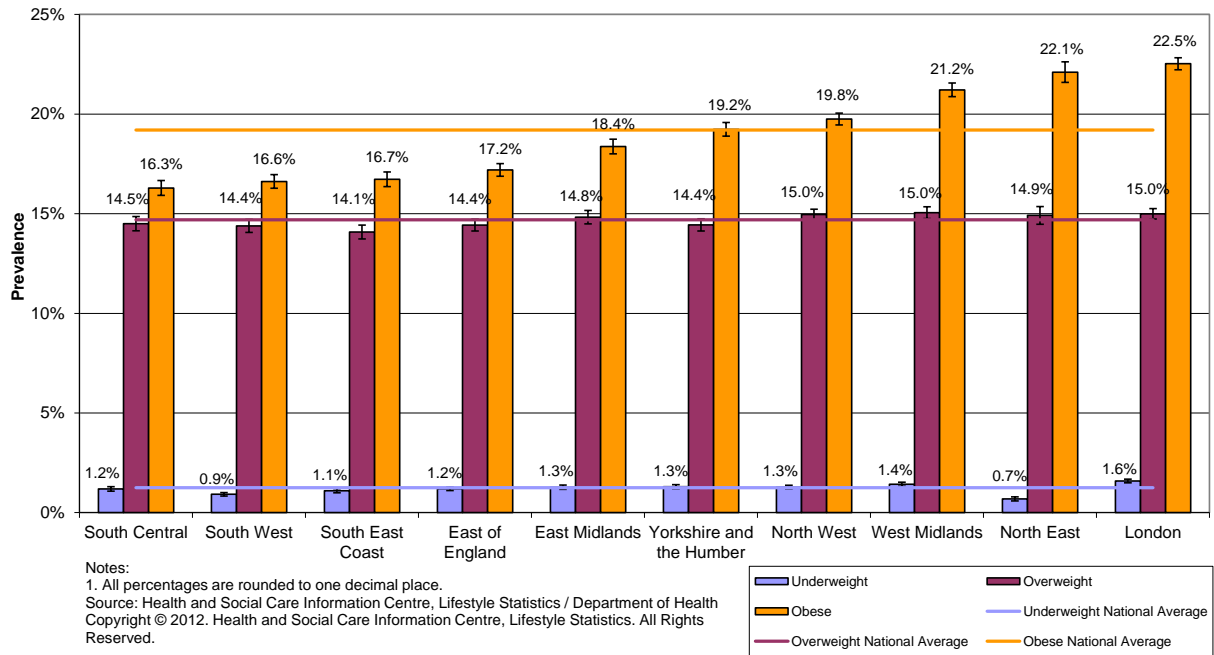
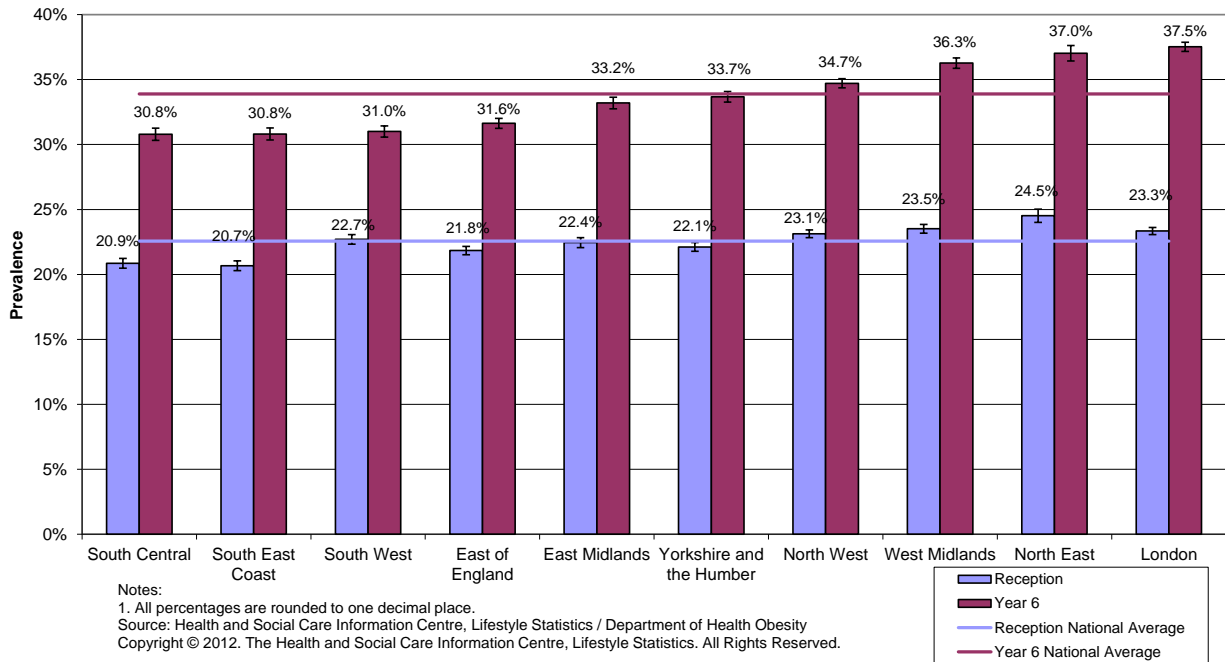


Figure 10 compares the prevalence of children who are overweight or obese ('combined overweight and obese'), with associated 95% confidence intervals, in Reception and Year 6, by SHA, in 2011/12.

Figure 10: Prevalence of combined overweight and obese children, by school year and SHA, England, 2011/12



Key findings:

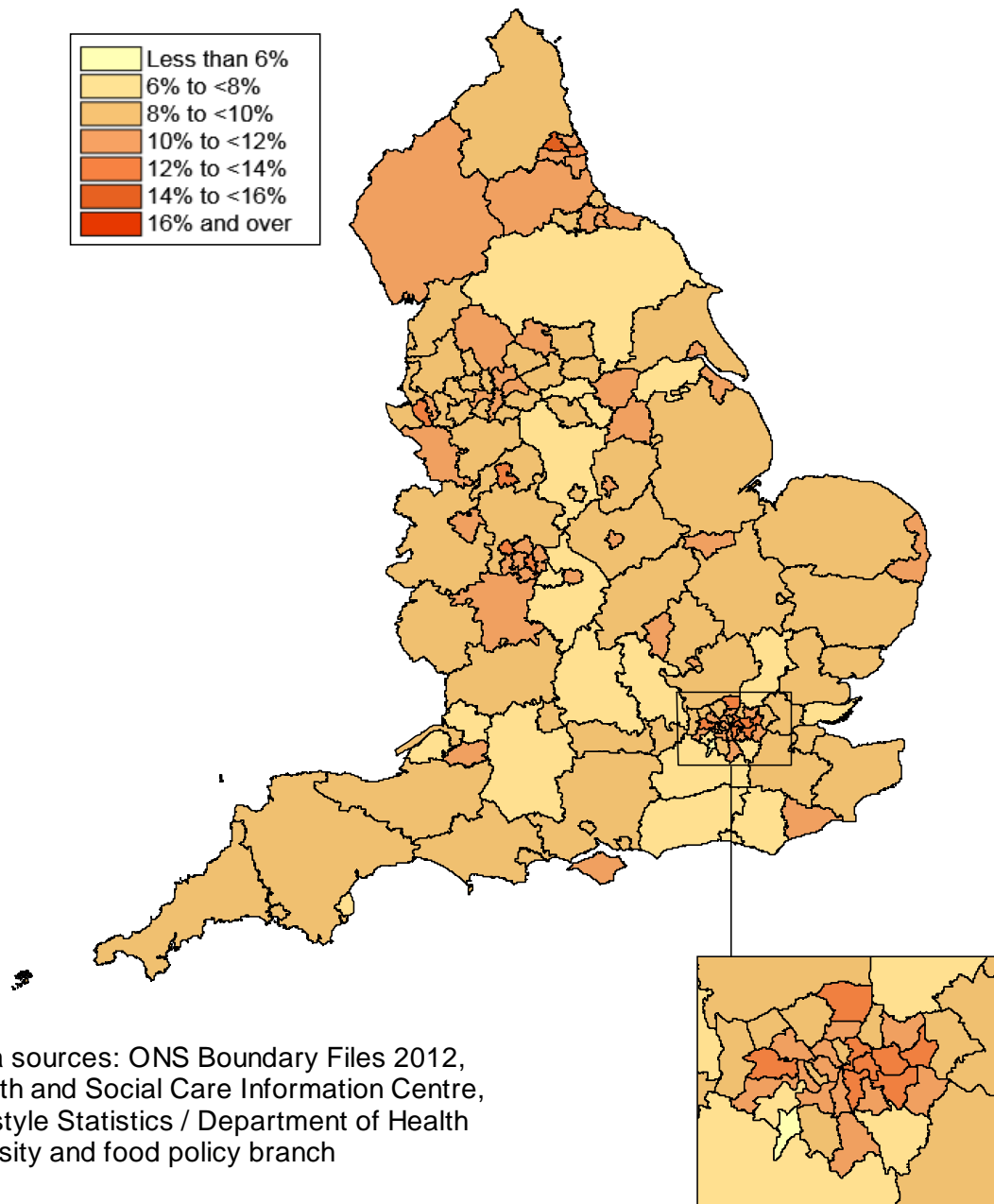
- Obesity prevalence varied by Strategic Health Authority (SHA). South East Coast SHA had the lowest obesity prevalence for Reception (8.1%) and South Central SHA the lowest obesity prevalence for Year 6 (16.3% respectively). London SHA reported the highest obesity prevalence for both school years (11.0% and 22.5% respectively).
- SHAs with high obesity prevalence in Reception tended to also have high prevalence in Year 6.
- Analysis of 2006/07 and 2007/08 NCMP data showed that child obesity prevalence was correlated with area deprivation factors and child ethnicity. Areas with higher concentrations of deprived areas and particular ethnic profiles, such as London, would therefore be expected to have higher rates of child obesity.
- The National Obesity Observatory will be producing further analysis of the 2011/12 NCMP data. This is expected to be published early 2013 and will be available from the following link:
www.noo.org.uk/NOO_pub

3.2.4 Prevalence by Primary Care Trust

Obesity prevalence varied by Primary Care Trust (PCT). For Reception this ranged from 5.9% in Kingston PCT to 14.5% in Newcastle and in Year 6 the range was from 12.9% in Richmond and Twickenham PCT to 28.3% in Southwark PCT.

Figures 11 and 12 show Reception and Year 6 obesity prevalence by PCT, where the PCT recorded is the one that took responsibility for the school the child attended. Online Table 2 provides more detailed tables.

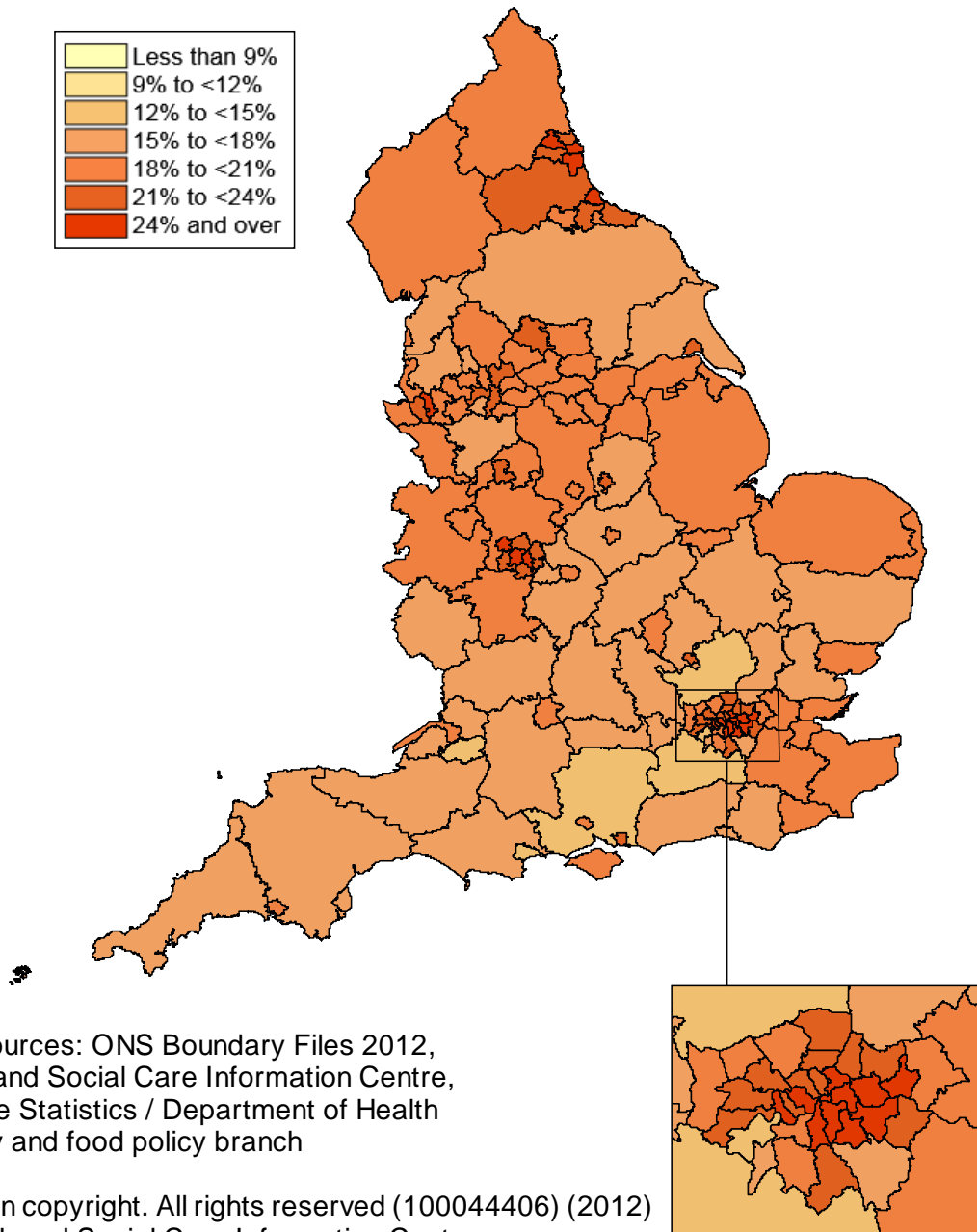
Figure 11: Prevalence of obese children in Reception, by Primary Care Trust, England, 2011/12



Data sources: ONS Boundary Files 2012, Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity and food policy branch

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Figure 12: Prevalence of obese children in Year 6, by Primary Care Trust, England, 2011/12



3.2.5 Prevalence by area deprivation

Figures 13 and 14 investigate the relationship between deprivation as measured by the 2010 Index of Multiple Deprivation (IMD) and the prevalence of underweight, overweight and obese Reception and Year 6 children. Records have been placed into one of ten equal sized groups (deciles) based on the IMD score of the child's school location. The prevalence of underweight, overweight and obese children within each group (where 1 is the least deprived and 10 is the most deprived) have then been calculated.

The prevalence figures by IMD decile have been derived on the basis of the school postcode in order to make the results comparable with those of previous years.

Figure 13: Prevalence of underweight, overweight and obese children in Reception by school area 2010 IMD decile, England, 2011/12

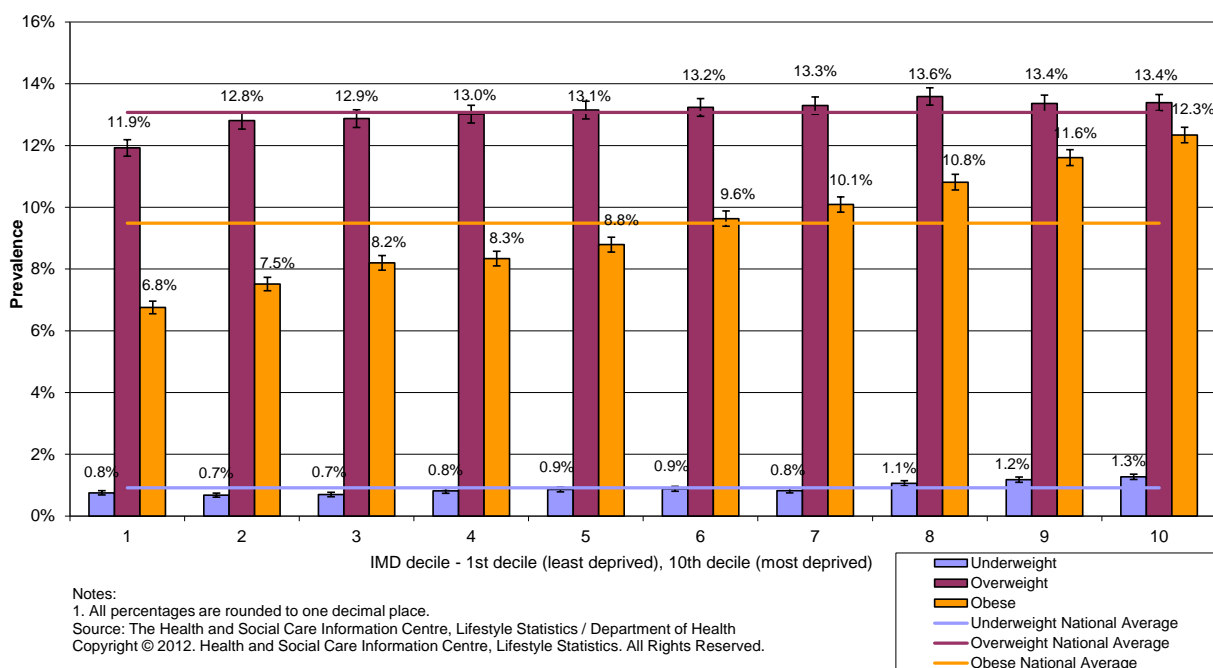


Figure 14: Prevalence of underweight, overweight and obese children in Year 6 by school area 2010 IMD decile, England, 2011/12

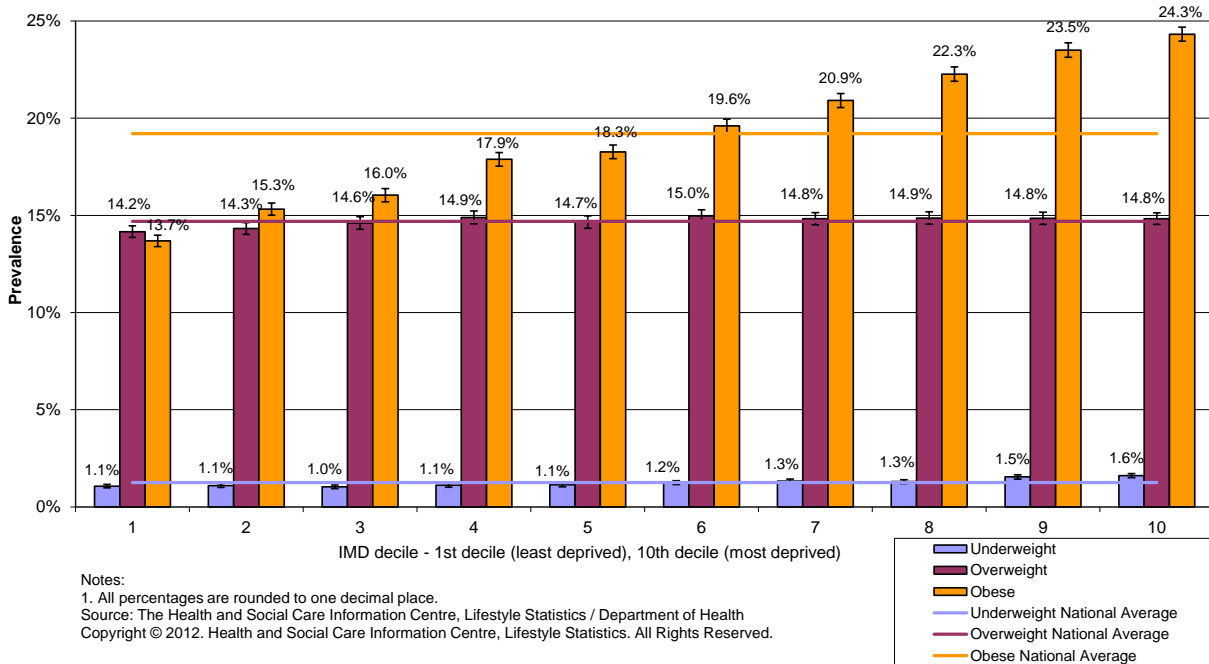
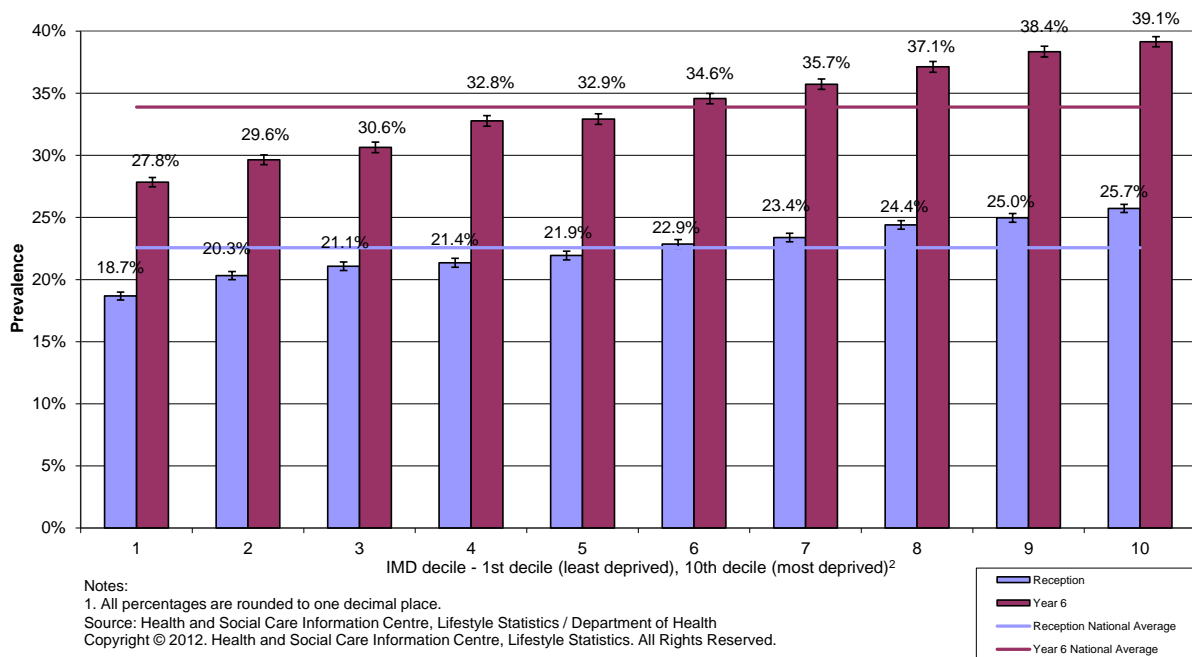


Figure 15 compares the prevalence of children who are overweight or obese ('combined overweight and obese'), with associated 95% confidence intervals, in Reception and Year 6, by IMD decile, in 2011/12.

Figure 15: Prevalence of combined overweight and obese children, by school area 2010 IMD decile, England, 2011/12



Key findings:

- As in previous years, a strong positive relationship existed between deprivation (as measured by the 2010 IMD score) and obesity prevalence for children in each age group. The obesity prevalence among Reception children attending schools in areas in the least deprived decile was 6.8% compared with 12.3% among those attending schools in the most deprived decile. Similarly, obesity prevalence among Year 6 children attending schools in the least deprived decile was 13.7% compared with 24.3% among those attending school in the most deprived decile;
- In Reception the four most deprived deciles had obesity prevalence that was significantly higher than the national average. In Year 6 the five most deprived deciles were significantly higher than the national average;
- For both school years, the four least deprived deciles had obesity prevalence that was significantly lower than the national average;
- In Reception the three most deprived groups had a prevalence of underweight children that was higher than the national average. In Year 6 the two most deprived groups were significantly higher than the national average.

3.2.6 Prevalence by ethnicity

Since 2007/08, collection of the ethnicity of participating children has been a mandatory requirement. PCTs were able to supply ethnicity codes using either the NHS or the Department for Education (DfE) classification codes or those used within the Rio and System One child health systems. These codes were grouped into seven categories for national analysis.¹⁵

Of the 1,056,780 children for whom valid measurements were submitted, 85% of records included a valid ethnic code (for the purpose of this report, 'not stated' and 'unknown' are considered invalid). This is an improvement on all previous years.

Figures 16 and 17 show the prevalence of underweight, overweight and obese children by ethnic category, for Reception and Year 6 respectively. The associated 95% confidence intervals are also presented.

¹⁵ The seven ethnic categories used for analysis have been derived by combining the following NHS ethnic categories:

- **White:** White British, White Irish, White Any other White background;
- **Mixed:** Mixed White and Black Caribbean, Mixed White and Black African, Mixed White and Asian, Mixed Any other mixed background;
- **Asian or Asian British:** Asian and Asian British Indian, Asian and Asian British Pakistani, Asian and Asian British Bangladeshi, Asian and Asian British Any other Asian background;
- **Black or Black British:** Black or Black British Caribbean, Black or Black British African, Black or Black British Any other Black background;
- **Chinese:** Chinese;
- **Any other ethnic group:** Any other ethnic group;
- **Unknown:** Not Stated or data not returned by PCT

Figure 16: Prevalence of underweight, overweight and obese children in Reception, by ethnic category, England, 2011/12

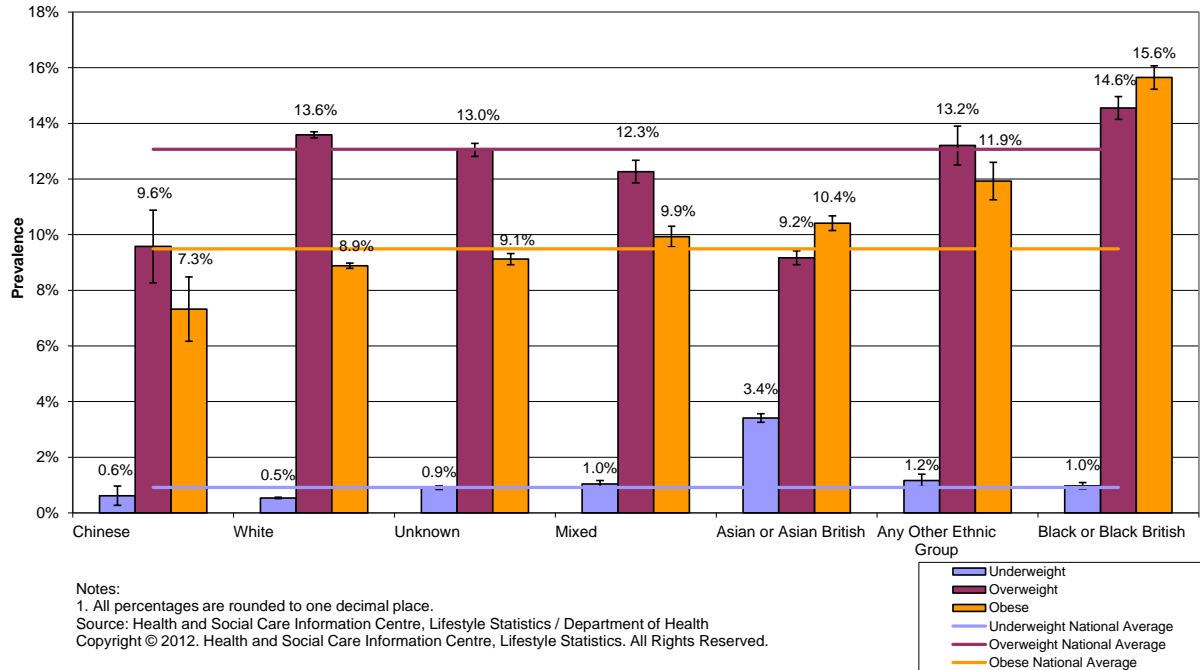


Figure 17: Prevalence of underweight, overweight and obese children in Year 6, by ethnic category, England, 2011/12

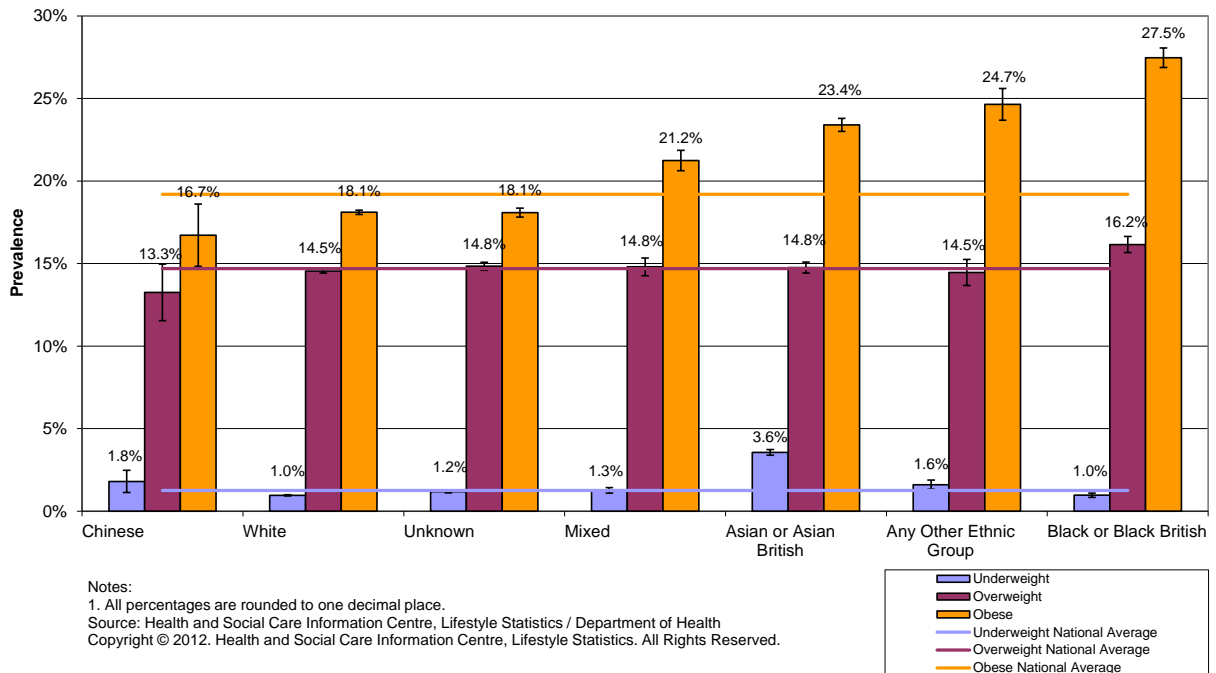
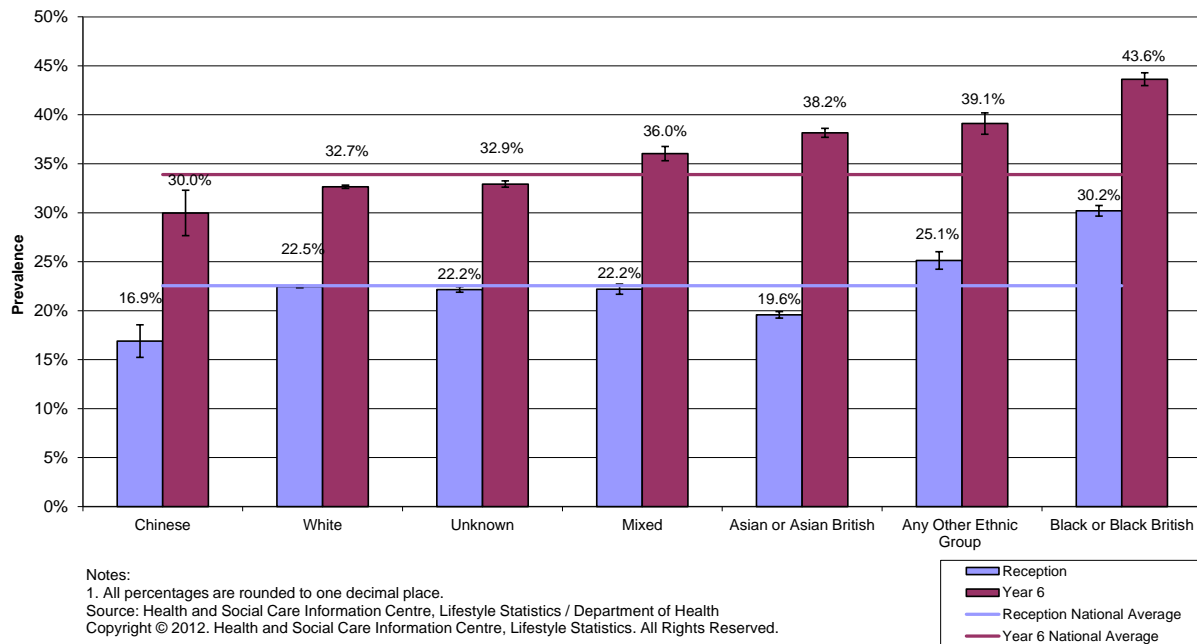


Figure 18 compares the prevalence of children who are overweight or obese ('combined overweight and obese'), with associated 95% confidence intervals, in Reception and Year 6, by ethnic category, in 2011/12.

Figure 18: Prevalence of combined overweight and obese children, by ethnic category and school year, England, 2011/12



Key findings:

- Obesity prevalence was significantly higher than the national average for children in both school years in the ethnic groups ‘Asian or Asian British’, ‘Any Other Ethnic Group’, ‘Black or Black British’ and for the ethnic group ‘Mixed’;
- Obesity prevalence was significantly lower than the national average for children in both years in the ‘White’ ethnic group; and for ‘Chinese’ in Reception;

There are known associations between ethnicity and area deprivation.¹⁶ Deprived urban areas in England tend to also have a higher proportion of individuals from non-White ethnic groups, so it is likely that there are confounding factors which affect obesity prevalence by ethnic group.

¹⁶ ‘National Child Measurement Programme; Detailed Analysis of the 2006/07 National Dataset’ www.noo.org.uk/uploads/doc168_2_NOO_NCMP_report230608.pdf

3.2.7 Prevalence by rural/urban classification

Collection of the home postcode of participating children has been a formal requirement since 2008/09. Of the 1,056,780 children for whom valid measurements were uploaded to the NCMP Database in 2011/12, 99.5% of records included a valid home postcode.

To anonymise the data, postcodes were aggregated to the larger areas of Lower Super Output Area (LSOA) when PCTs uploaded their data to the NCMP database as postcodes are not held centrally.

Each record was assigned a rural/urban classification¹⁷ according to the settlement form of the LSOA of the child.

Figures 19 and 20 show, for Reception and Year 6 respectively, the prevalence of underweight, overweight and obese children, by rural/urban classification, in England.

¹⁷ The Office for National Statistics (ONS) produced the Rural and Urban Classification in consultation with the Department for Environment, Food and Rural Affairs, the Department for Communities and Local Government and the Countryside Agency. Areas are defined through two measures:

- settlement form: dispersed dwellings, hamlet, village, small town, urban fringe and urban (>10,000 population);
- sparsity - each hectare grid square is assigned a sparsity score based on the number of households in surrounding hectare squares up to a distance of 30 km.

The analyses in this report have combined 'sparse' with 'less sparse' and classifications are purely based on settlement form.

Further details are available at: www.ons.gov.uk/ons/guide-method/geography/products/area-classifications/rural-urban-definition-and-la/rural-and-urban-statistics-guidance-notes.pdf

Figure 19: Prevalence of underweight, overweight and obese children in Reception, by rural/urban classification, England, 2011/12

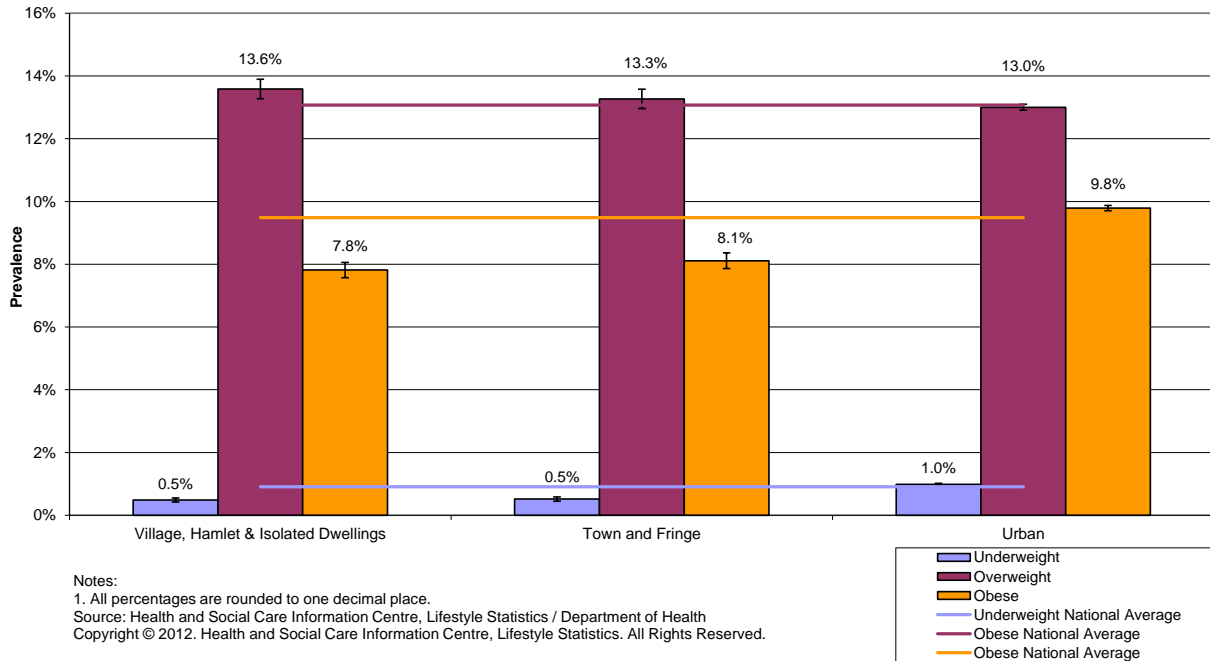


Figure 20: Prevalence of underweight, overweight and obese children in Year 6, by rural/urban classification, England, 2011/12

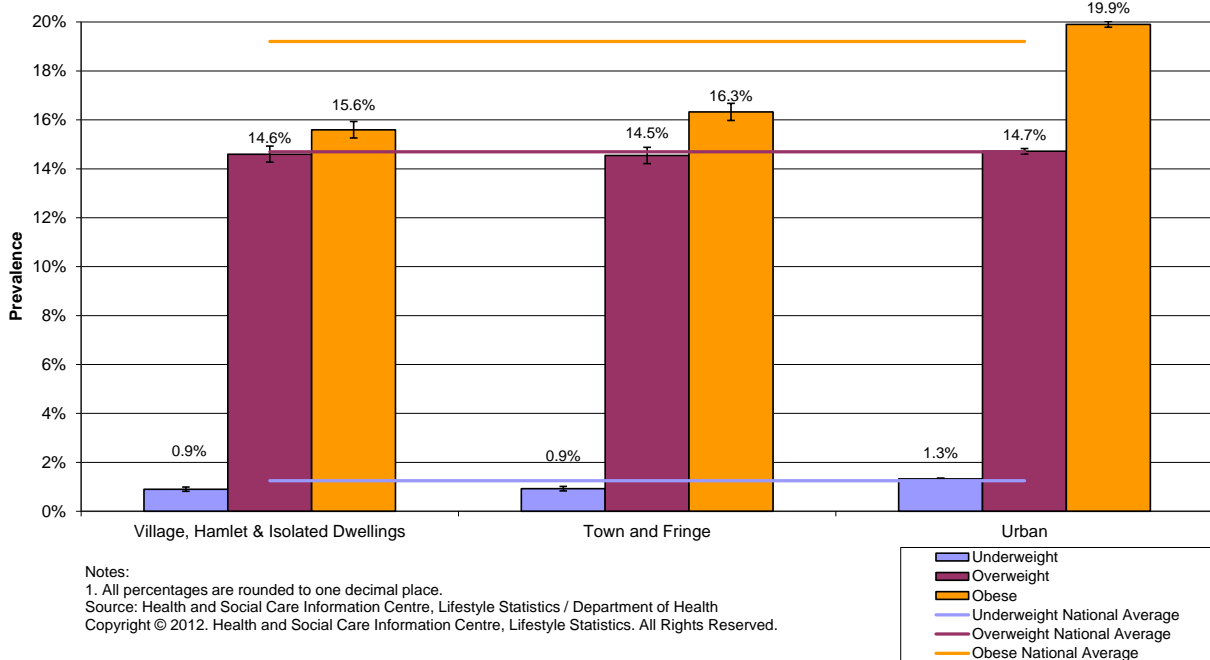
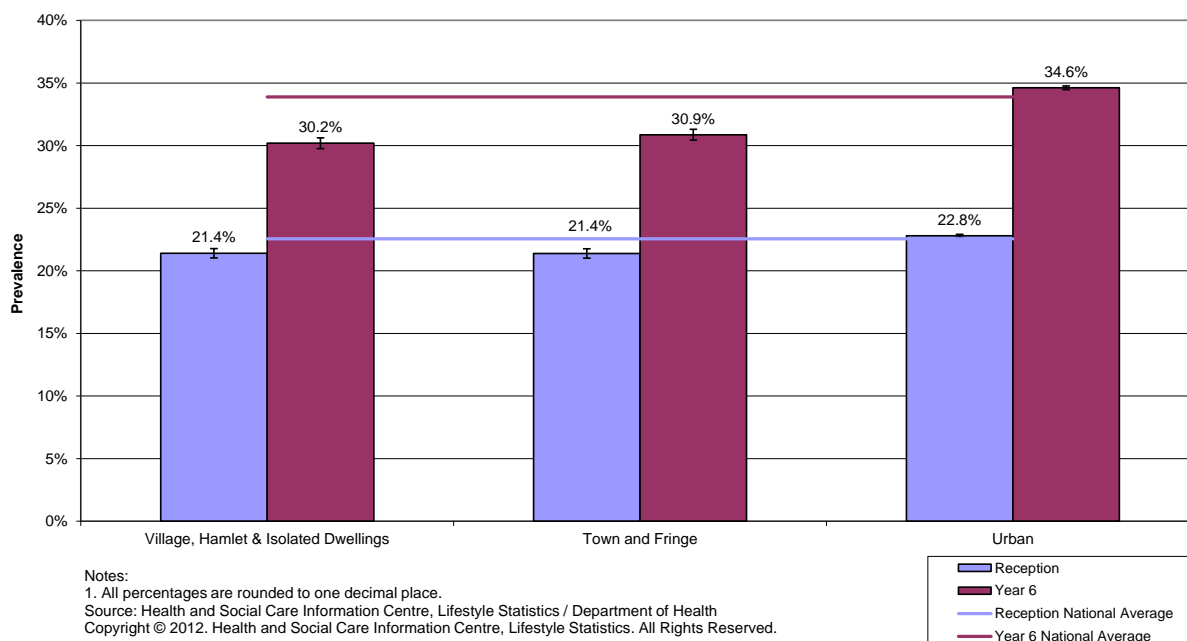


Figure 21 compares the prevalence of children who are overweight or obese ('combined overweight and obese'), with associated 95% confidence intervals, in Reception and Year 6, by rural/urban classification, in 2011/12.

Figure 21: Prevalence of combined overweight and obese children, by rural/urban classification and school year, England, 2011/12



Key findings:

- As in previous years, obesity prevalence was significantly higher in urban areas than in rural areas for each age group. The obesity prevalence among Reception children living in urban areas was 9.8% compared with 8.1% and 7.8% living in town areas and village areas respectively. Similarly, obesity prevalence among Year 6 children living in urban areas was 19.9% compared with 16.3% and 15.6% living in town areas and village areas respectively.
- The prevalence of underweight children was significantly higher in urban areas than in rural areas for both age groups. In Reception, 1.0% of children in urban areas were underweight compared to 0.5% in both town and village areas. In Year 6 these percentages were 1.3%, 0.9% and 0.9% respectively;

The National Obesity Observatory’s 2006/07¹⁸ and 2007/08¹⁹ reports showed that confounding factors exist, and that variation in child obesity prevalence between urban and rural areas can possibly be explained by differences in the degree of deprivation and the ethnic mix in such areas.

¹⁸ ‘National Child Measurement Programme: Detailed Analysis of the 2006/07 National Dataset’: www.noo.org.uk/uploads/doc168_2_NOO_NCMP_report230608.pdf

¹⁹ ‘National Child Measurement Programme: Detailed Analysis of the 2007/08 National Dataset’ available at: www.noo.org.uk/uploads/doc168_2_noo_NCMPreport1_110509.pdf

3.2.8 Prevalence by Office for National Statistics Area Classification (ONS-AC)

NCMP data have been analysed using the Office for National Statistics Area Classification (ONS-AC). The ONS-AC categorises geographic areas based on a wide variety of common characteristics and provides a simple approach that can be used at local level to target interventions or resources.

The analysis within this report has demonstrated how obesity prevalence varies across socioeconomic and ethnic groups, and between urban and rural areas. However it has also been noted that there are close links between these variables; the most deprived communities are often found within urban areas and frequently have a high proportion of residents from non-White British ethnic groups.

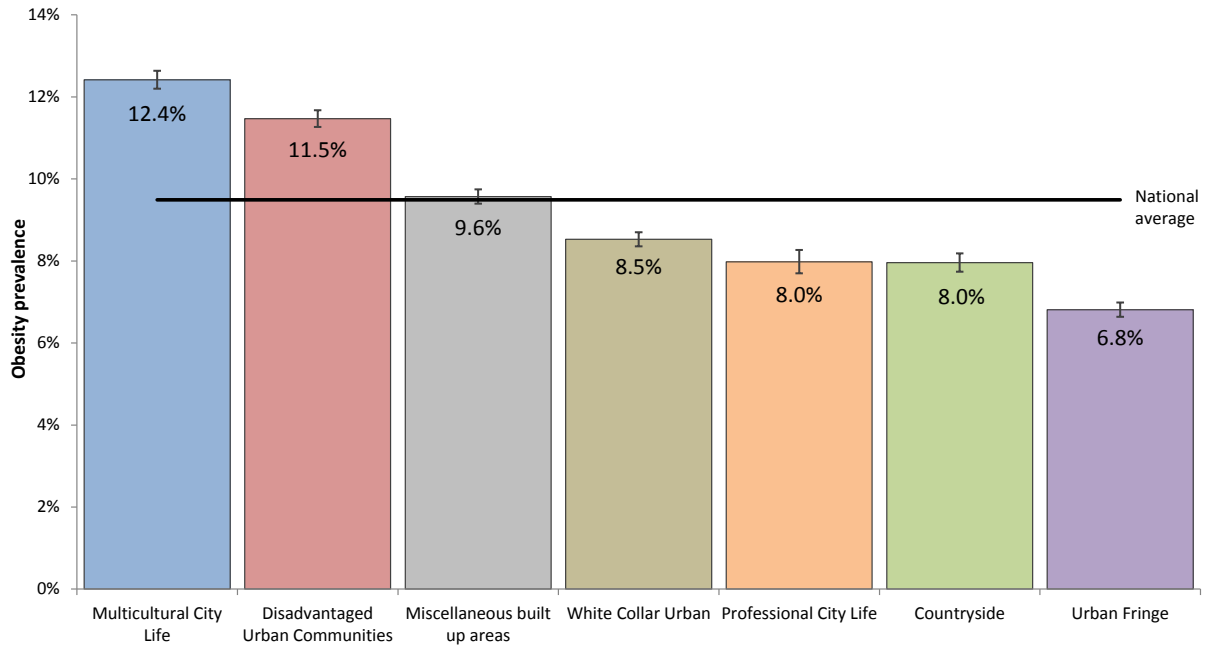
The ONS-AC is a system of population stratification that categorises local areas based on a range of sociodemographic characteristics, including deprivation, ethnicity and urban/rural environment.²⁰ The categories are named in a way that describes the type of population predominant in those areas, for example 'Disadvantaged Urban Communities' or 'Professional City Life'.

It is possible to calculate obesity prevalence for ONS-AC categories using NCMP data. This approach identifies those populations or communities with the highest risk of obesity prevalence and highlights the combined impact of deprivation, ethnicity and urban/rural environment.

Figures 22 and 23 show obesity prevalence for the ONS-AC categories in the 2011/12 NCMP. This analysis uses the seven 'supergroups' provided within the ONS-AC at LSOA level. Categories have been assigned to individual children based on the LSOA of residence.

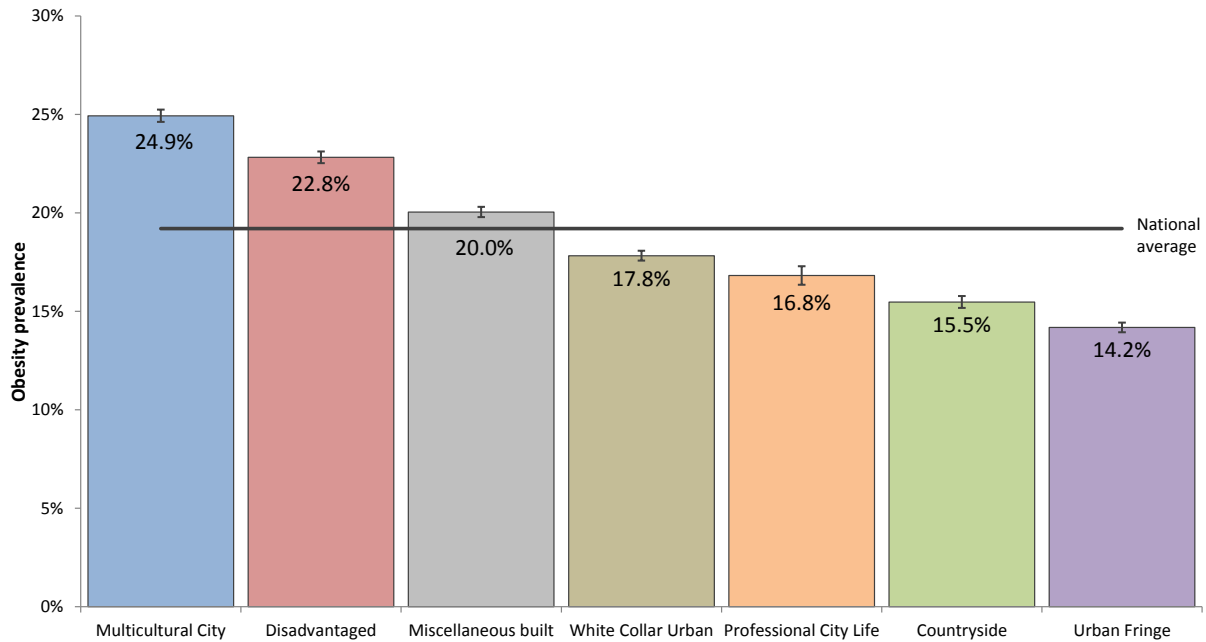
²⁰ National Statistics 2011 Area Classification available at: www.neighbourhood.statistics.gov.uk/dissemination/Info.do?page=nessgeography/areaclassification/area-classification.htm

Figure 22: Prevalence of obese children in Reception, by ONS-AC supergroup, England 2011/12



Notes:
 1. All percentages are rounded to one decimal place.
 Source: Health and Social Care Information Centre, Lifestyle Statistics / Department of Health
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Figure 23: Prevalence of obese children in Year 6, by ONS-AC supergroup, England 2011/12



Notes:
 1. All percentages are rounded to one decimal place.
 Source: Health and Social Care Information Centre, Lifestyle Statistics / Department of Health
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Key findings:

- The pattern of obesity prevalence by ONS-AC supergroup was consistent across both school years.
- Obesity prevalence was highest in areas classed as Multicultural City Life, followed by areas classed as being Disadvantaged Urban Communities.
- Urban Fringe areas had the lowest obesity prevalence.

Previous analysis²¹ has shown that the differences in obesity prevalence between ONS-AC groups are similar for boys and girls and across the nine Government Office Regions (GORs). The relative differences between ONS-AC categories have also remained constant over time.

The ONS-AC categories can be mapped to LSOAs, and this information can be used by local areas to assist in the targeting of resources to tackle child obesity. There is also potential to use the ONS-AC at local level to detect differences in the trend in child obesity prevalence over time within PCTs or LAs.

The National Obesity Observatory have produced a report 'NCMP: Analysis using the ONS Area Classification' which provides more information on this approach.²¹

3.3 Comparison of results with the Health Survey for England

The Health Survey for England (HSE)²² is a series of sample-based surveys focusing on a range of health indicators including obesity in children. Analysis to consider where meaningful comparisons could be made between NCMP data and the child obesity data contained within HSE was carried out in previous years. This resulted in comparisons between 2007/08 NCMP and HSE 2007 data, and between 2008/09 NCMP and HSE 2008 data being made. The findings from this can be found in Chapter 13 of the HSE 2008.²³ Due to the smaller sample sizes associated with HSE 2009, comparisons were not attempted between 2009/10 NCMP and HSE 2009 data. This may be revisited in the future.

²¹ 'NCMP: Analysis using ONS Area Classification' (www.noo.org.uk/gsf.php5?f=11678&fv=12524)

²² Health Survey for England (www.ic.nhs.uk/hse)

²³ 'Health Survey for England 2008: Physical activity and fitness' (www.ic.nhs.uk/pubs/hse08physicalactivity)

4 Further sources of information

This chapter provides links to other sources of data on obesity in children that may be of interest to users of the NCMP report and data. A very brief description of the data available is presented here along with a link to the data source.

Health Survey for England

The Health Survey for England (HSE) is an annual report that presents information on child BMI and obesity for children in England aged 2 to 15. Information is presented at England level and in some years by Strategic Health Authority. The HSE 2011 is expected to be published by the Health and Social Care Information Centre on 20th December 2012.

Health Survey for England trend tables

The HSE trend tables are published alongside the HSE main report and provide time series data on child height, weight, Body Mass Index (BMI) and obesity for children aged 2 to 15. Information is available for 1995 to 2010, with trend tables updated for 2011 expected to be published alongside the main report on 20th December 2012.

The HSE publications can be accessed from the following link:

www.ic.nhs.uk/hse

National Obesity Observatory (NOO)

The National Obesity Observatory (NOO) provide a number of resources relating to the NCMP and child obesity in general. NCMP resources include the child e-Atlas (a data examination tool containing NCMP data at local authority and Middle Super Output Area level for all years of the NCMP), NCMP data at Electoral Ward level, guidance for analysis of NCMP data, and a variety of reports providing detailed analysis of NCMP data. Resources relating to child obesity in general include a slide set which presents key data and information on child obesity and a simple guide to classifying body mass index in children.

All NOO resources can be accessed via the NOO website:

www.noo.org.uk

Statistics on Obesity, Physical Activity and Diet: England 2012

This compendium report brings together a wide range of information on child obesity, diet and physical activity, along with information on obesity in adults and health outcomes associated with obesity.

www.ic.nhs.uk/pubs/opad12

Annex 1 – Data quality report

Table A shows a number of PCT data quality measures for the 2011/12 NCMP. As discussed at the beginning of Section 3, there have been considerable improvements in the overall participation rate since 2006/07.

Table A: PCT data quality report for NCMP 2011/12

Key:

	Green	Amber	Red
Measure 1 - Overall participation rate	≥90%	≥85% or <90%	<85%
Measure 2 - % of records with heights rounded to the nearest whole number	>5% and <25%	≥25% or ≤50%	<5% or >50%
Measure 3 - % of records with weights rounded to the nearest whole number	>5% and <25%	≥25% or ≤50%	<5% or >50%
Measure 4 - % of records with missing home postcodes	<25%	≥25% or ≤50%	>50%
Measure 5 - % of records with missing ethnicity codes	<25%	≥25% or ≤50%	>50%

	PCT name	Overall participation rate	Percentage of records with heights rounded to the nearest whole number	Percentage of records with weights rounded to the nearest whole number	Percentage of records with missing home postcodes	Percentage of records with missing ethnicity codes
ENGLAND	National average	93%	17%	10%	0.5%	15%
5HG	Ashton, Leigh and Wigan PCT	90%	21%	11%	0.0%	78%
5C2	Barking and Dagenham PCT	95%	22%	10%	0.4%	0%
5A9	Barnet PCT	86%	20%	10%	0.9%	2%
5JE	Barnsley PCT	94%	13%	10%	0.0%	1%
5ET	Bassetlaw PCT	90%	17%	12%	0.0%	6%
5FL	Bath and North East Somerset PCT	98%	14%	10%	0.0%	4%
5P2	Bedfordshire PCT	95%	15%	7%	0.4%	3%
5QG	Berkshire East PCT	95%	16%	9%	0.0%	15%
5QF	Berkshire West PCT	96%	19%	12%	0.1%	54%
TAK	Bexley Care Trust	92%	18%	10%	0.0%	41%
5PG	Birmingham East and North PCT	92%	17%	10%	0.6%	7%
TAP	Blackburn with Darwen Teaching Care Trust Plus	97%	15%	9%	0.0%	12%
5HP	Blackpool PCT	96%	16%	10%	0.0%	1%
5HQ	Bolton PCT	92%	13%	9%	52.7%	10%
5QN	Bournemouth and Poole Teaching PCT	94%	16%	10%	0.0%	2%
5NY	Bradford and Airedale Teaching PCT	91%	21%	10%	0.1%	15%
5K5	Brent Teaching PCT	98%	14%	10%	0.0%	7%
5LQ	Brighton and Hove City PCT	88%	20%	7%	0.1%	3%
5QJ	Bristol PCT	92%	16%	9%	0.5%	22%
5A7	Bromley PCT	93%	16%	6%	0.0%	4%
5QD	Buckinghamshire PCT	93%	24%	11%	0.4%	6%
5JX	Bury PCT	96%	21%	18%	1.2%	1%
5J6	Calderdale PCT	96%	14%	12%	0.0%	2%
5FP	Cambridgeshire PCT	93%	9%	9%	0.0%	4%
5K7	Camden PCT	93%	24%	10%	0.0%	1%
5NP	Central and Eastern Cheshire PCT	95%	12%	11%	0.0%	38%
5NG	Central Lancashire PCT	93%	17%	10%	0.2%	57%
5C3	City and Hackney Teaching PCT	98%	22%	20%	0.4%	1%
5QP	Cornwall and Isles of Scilly PCT	77%	14%	12%	0.1%	4%
5ND	County Durham PCT	99%	14%	10%	0.0%	14%
5MD	Coventry Teaching PCT	98%	12%	10%	0.0%	5%
5K9	Croydon PCT	92%	14%	9%	0.0%	1%
5NE	Cumbria Teaching PCT	86%	17%	15%	0.2%	51%
5J9	Darlington PCT	95%	18%	10%	0.1%	3%
5N7	Derby City PCT	93%	16%	11%	0.5%	2%
5N6	Derbyshire County PCT	96%	18%	10%	0.1%	12%
5QQ	Devon PCT	94%	20%	11%	0.1%	4%
5N5	Doncaster PCT	95%	12%	11%	0.1%	1%
5QM	Dorset PCT	93%	18%	10%	0.0%	1%
5PE	Dudley PCT	99%	20%	11%	0.0%	0%
5HX	Ealing PCT	97%	20%	12%	0.0%	11%
5NH	East Lancashire Teaching PCT	97%	17%	10%	0.0%	21%
5NW	East Riding of Yorkshire PCT	97%	19%	8%	0.0%	8%
5P7	East Sussex Downs and Weald PCT	92%	16%	11%	0.1%	7%
5QA	Eastern and Coastal Kent PCT	93%	16%	11%	0.1%	3%
5C1	Enfield PCT	92%	27%	10%	0.3%	3%
5KF	Gateshead PCT	97%	14%	11%	0.4%	50%
5QH	Gloucestershire PCT	94%	21%	7%	0.0%	2%

	PCT name	Overall participation rate	Percentage of records with heights rounded to the nearest whole number	Percentage of records with weights rounded to the nearest whole number	Percentage of records with missing home postcodes	Percentage of records with missing ethnicity codes
5PR	Great Yarmouth and Waveney PCT	93%	10%	10%	0.4%	1%
5A8	Greenwich Teaching PCT	96%	14%	9%	0.1%	2%
5NM	Halton and St Helens PCT	92%	15%	10%	0.3%	71%
5H1	Hammersmith and Fulham PCT	98%	18%	6%	0.1%	17%
5QC	Hampshire PCT	92%	16%	10%	0.0%	67%
5C9	Haringey Teaching PCT	89%	16%	10%	1.0%	1%
5K6	Harrow PCT	88%	21%	10%	0.0%	1%
5D9	Hartlepool PCT	99%	12%	11%	0.0%	13%
5P8	Hastings and Rother PCT	95%	19%	12%	0.2%	15%
5A4	Havering PCT	95%	26%	11%	0.3%	2%
5MX	Heart of Birmingham Teaching PCT	94%	13%	9%	0.8%	4%
5CN	Herefordshire PCT	83%	18%	18%	0.0%	2%
5QV	Hertfordshire PCT	92%	26%	13%	0.3%	2%
5NQ	Heywood, Middleton and Rochdale PCT	96%	22%	11%	0.0%	14%
5AT	Hillingdon PCT	96%	21%	10%	0.2%	1%
5HY	Hounslow PCT	99%	19%	8%	0.6%	2%
5NX	Hull Teaching PCT	97%	17%	10%	0.0%	1%
5QT	Isle of Wight NHS PCT	79%	10%	9%	0.0%	48%
5K8	Islington PCT	92%	18%	10%	0.6%	3%
5LA	Kensington and Chelsea PCT	97%	14%	6%	0.1%	1%
5A5	Kingston PCT	99%	12%	8%	0.0%	0%
5N2	Kirklees PCT	96%	19%	11%	0.2%	3%
5J4	Knowsley PCT	97%	20%	10%	0.5%	10%
5LD	Lambeth PCT	97%	16%	10%	0.0%	9%
5N1	Leeds PCT	93%	20%	10%	0.0%	4%
5PC	Leicester City PCT	92%	17%	11%	0.0%	2%
5PA	Leicestershire County and Rutland PCT	93%	15%	11%	1.6%	10%
5LF	Lewisham PCT	93%	14%	10%	0.2%	3%
5N9	Lincolnshire Teaching PCT	93%	17%	10%	0.1%	17%
5NL	Liverpool PCT	95%	28%	30%	1.2%	3%
5GC	Luton PCT	99%	10%	9%	0.3%	19%
5NT	Manchester PCT	89%	23%	10%	1.4%	31%
5L3	Medway PCT	92%	15%	11%	0.2%	7%
5PX	Mid Essex PCT	95%	26%	29%	0.1%	10%
5KM	Middlesbrough PCT	99%	6%	10%	0.0%	0%
5CQ	Milton Keynes PCT	94%	14%	10%	0.0%	3%
5D7	Newcastle PCT	97%	18%	10%	0.0%	3%
5C5	Newham PCT	93%	19%	10%	0.5%	1%
5PO	Norfolk PCT	95%	14%	10%	0.0%	44%
5PW	North East Essex PCT	94%	23%	15%	0.0%	67%
TAN	North East Lincolnshire Care Trust Plus	99%	13%	11%	0.0%	32%
5NF	North Lancashire Teaching PCT	89%	16%	10%	0.0%	5%
5EF	North Lincolnshire PCT	92%	21%	10%	0.2%	10%
5M8	North Somerset PCT	90%	15%	7%	0.1%	2%
5PH	North Staffordshire PCT	95%	22%	14%	0.0%	16%
5D8	North Tyneside PCT	97%	17%	16%	0.0%	1%
5NV	North Yorkshire and York PCT	93%	19%	9%	0.0%	5%
5PD	Northamptonshire Teaching PCT	95%	27%	10%	0.0%	48%
TAC	Northumberland Care Trust	96%	9%	9%	0.2%	2%
5EM	Nottingham City PCT	91%	25%	11%	0.0%	2%
5N8	Nottinghamshire County Teaching PCT	90%	23%	11%	0.0%	2%
5J5	Oldham PCT	92%	21%	10%	0.1%	25%
5QE	Oxfordshire PCT	92%	11%	8%	0.0%	32%
5PN	Peterborough PCT	91%	18%	9%	0.1%	29%
5F1	Plymouth Teaching PCT	91%	13%	10%	0.2%	2%
5FE	Portsmouth City Teaching PCT	92%	12%	6%	0.0%	88%
5NA	Redbridge PCT	98%	15%	7%	0.4%	3%
5QR	Redcar and Cleveland PCT	98%	7%	10%	0.0%	0%
5M6	Richmond and Twickenham PCT	93%	18%	9%	1.2%	4%
5H8	Rotherham PCT	91%	14%	10%	0.1%	8%
5F5	Salford PCT	97%	18%	11%	0.1%	7%
5PF	Sandwell PCT	99%	18%	10%	0.1%	1%
5NJ	Sefton PCT	93%	19%	11%	0.4%	50%
5N4	Sheffield PCT	96%	14%	6%	0.1%	2%
5M2	Shropshire County PCT	92%	18%	9%	0.0%	15%
5QW	Solihull PCT	94%	15%	10%	0.1%	22%
5QL	Somerset PCT	90%	20%	10%	0.1%	33%
5M1	South Birmingham PCT	97%	17%	10%	0.7%	3%
5P1	South East Essex PCT	93%	10%	8%	0.4%	3%
5A3	South Gloucestershire PCT	91%	11%	9%	0.1%	6%
5PK	South Staffordshire PCT	82%	18%	11%	1.5%	3%
5KG	South Tyneside PCT	97%	15%	11%	0.7%	46%
5PY	South West Essex PCT	93%	7%	10%	0.5%	5%
5L1	Southampton City PCT	92%	16%	11%	0.1%	19%
5LE	Southwark PCT	84%	26%	10%	0.3%	24%
5F7	Stockport PCT	93%	17%	16%	0.0%	9%
5E1	Stockton-On-Tees Teaching PCT	98%	18%	10%	0.0%	0%
5PJ	Stoke on Trent PCT	98%	18%	8%	0.0%	13%
5PT	Suffolk PCT	96%	22%	10%	0.1%	20%
5KL	Sunderland Teaching PCT	96%	15%	10%	0.1%	3%
5P5	Surrey PCT	91%	18%	10%	0.6%	8%
5M7	Sutton and Merton PCT	90%	9%	8%	0.0%	2%
5K3	Swindon PCT	90%	23%	13%	0.0%	32%
5LH	Tameside and Glossop PCT	97%	14%	10%	0.1%	76%
5MK	Telford and Wrekin PCT	88%	14%	11%	0.1%	17%
TAL	Torbay Care Trust	85%	17%	10%	0.3%	3%
5C4	Tower Hamlets PCT	91%	15%	10%	0.8%	15%
5NR	Trafford PCT	94%	15%	10%	0.2%	4%
5N3	Wakfield District PCT	95%	21%	11%	0.1%	5%
5M3	Walsall Teaching PCT	98%	12%	9%	0.0%	1%
5NC	Waltham Forest PCT	92%	25%	7%	0.3%	1%
5LG	Wandsworth PCT	93%	20%	7%	0.4%	1%
5J2	Warrington PCT	96%	16%	10%	0.0%	1%
5PM	Warwickshire PCT	98%	13%	10%	0.2%	1%
5PV	West Essex PCT	97%	21%	11%	0.1%	47%
5P9	West Kent PCT	96%	14%	10%	0.0%	1%
5P6	West Sussex PCT	85%	15%	10%	0.1%	100%
5NN	Western Cheshire PCT	97%	16%	10%	0.0%	9%
5LC	Westminster PCT	92%	15%	9%	0.3%	20%
5QK	Wiltshire PCT	95%	11%	10%	0.0%	3%
5NK	Wirral PCT	98%	13%	10%	1.4%	0%
5MV	Wolverhampton City PCT	96%	15%	11%	0.1%	6%
5PL	Worcestershire PCT	97%	16%	10%	0.0%	22%

The main data quality indicator is measure 1, the overall participation rate (the percentage of eligible Reception and Year 6 children for which valid measurements were received).

Four other data quality measures are also presented:

- Measures 2 and 3: percentage of records with rounded heights / weights. Heights and weights in the NCMP should be recorded to 1 decimal place, and so it would be expected that approximately 10% of measurements would be a whole number. Percentages that are considerably different to this may have been inappropriately rounded. Analysis by the National Obesity Observatory has shown that systematic rounding to the nearest whole number can have a small overall biasing effect on height and weight measurements.
- Measures 4 and 5: percentages of records with complete home postcodes and ethnicity codes. The 2007/08 NCMP was the first year for which collection of these data fields was mandatory.

Annex 2 – Confidence intervals and significance testing

A confidence interval gives an indication of the likely error around an estimate that has been calculated from measurements based on a sample of the population. It indicates the range within which the true value for the population as a whole can be expected to lie, taking natural random variation into account.

Throughout this report, 95% confidence intervals are used. These are known as such because if it were possible to repeat the same programme under the same conditions a number of times, we would expect 95% of the confidence intervals calculated in this way to contain the true population value for that estimate.

Larger sample sizes lead to narrower confidence intervals, since there is less natural random variation in the results when more individuals are measured. The NCMP has relatively narrow confidence limits because of the large size of the sample and high participation rates.

There is an adjustment known as the 'Finite Population Correction' (FPC) which can be applied to confidence intervals when the survey size exceeds 5% of the population. This ensures that the greater the proportion of the population sampled, the smaller the confidence intervals around the estimates produced. If the survey covers 100% of the population, the confidence interval is reduced to zero by the FPC.

The NCMP samples a very large proportion of the child populations in Reception and Year 6. Nevertheless, the FPC is not applied to the confidence intervals presented. This is because, in practice, the NCMP results are used much more broadly than simply to draw conclusions of the form 'x% of children of Reception age measured for the NCMP were obese'. The statistics are assumed to apply to the current population of children in Reception/Year 6 and are used to make comparisons between NCMP results across different years and to make comparisons between different sub-populations (e.g. geographical areas). As a result, the confidence intervals are not adjusted by the FPC so that they are not reduced on the basis of coverage.

This approach is consistent with that used throughout the public health community. For example, census, mortality and hospital admission data represent a 100% sample, yet the associated confidence intervals are routinely calculated without the FPC adjustment.

Please also note that raw confidence limits do not reflect error due to issues such as data quality and low response rates and, therefore, may give a misleading impression of the degree of precision.

The significance of the difference between two rates or proportions has been carried out throughout this report using the approach outlined below. This is an improvement on the statistical significance testing methodology carried out in NCMP reports prior to

2009/10 and makes this analysis consistent with that used and advised by the Association of Public Health Observatories (APHO) and the National Obesity Observatory (NOO).

- Calculate 95% confidence intervals using the method described by Wilson²⁴ and Newcombe²⁵
- Calculated the estimated proportions of children with and without the feature of interest (e.g. percentage of obese Reception year children):

observed number of obese Reception year children in each area = r

sample size = n

proportion with feature of interest = p = r/n

proportion without feature of interest = q = (1 – p)

- Calculate three values (A, B and C) as follows:

$$A = 2r + z^2; \quad B = z\sqrt{z^2 + 4rq}; \quad \text{and} \quad C = 2(n+z^2)$$

where z is the appropriate value, $z_{1-\alpha/2}$, from the standard Normal distribution.

- Then the confidence interval for the population proportion is given by

$$(A-B)/C \quad \text{to} \quad (A+B)/C$$

This method is superior to other approaches because it can be used for any data. When there are no observed events, then r and hence p are both zero, and the recommended confidence interval simplifies to 0 to $z^2/(n+z^2)$. When r = n so that p = 1, the interval becomes $n/(n+z^2)$ to 1.

In order to test for statistical significance, the use of the approach outlined by Altman et al. in *Statistics with Confidence* (edition 2)²⁶ should then be followed

- Calculate the absolute difference between the two proportions, $\hat{D} = \hat{p}_2 - \hat{p}_1$

²⁴ Wilson EB (1927) Probable inference, the law of succession, and statistical inference. *J Am Stat Assoc*; **22**:209-212

²⁵ Newcombe RG (1998) Two-sided confidence intervals for the single proportion: comparison of seven methods. *Stat Med*; **17**:857-72

²⁶ Altman DG, Machin D, Bryant TN and Gardner MJ (2000) *Statistics with Confidence*, 2nd edn. London; BMJ books; 49

Then calculate the confidence limits around \hat{D} as:

$$\hat{D} - \sqrt{(\hat{p}_2 - l_2)^2 + (u_1 - \hat{p}_1)^2} \quad \text{to} \quad \hat{D} + \sqrt{(\hat{p}_1 - l_1)^2 + (u_2 - \hat{p}_2)^2}$$

where \hat{p}_i is the estimated prevalence for year i , and l_i and u_i are the lower and upper confidence intervals for \hat{p}_i respectively.

- A significance difference exists between proportions \hat{p}_1 and \hat{p}_2 if and only if zero is not included in the range covered by the confidence limits around the difference \hat{D} .

This improved methodology has not been applied to previous years. However, users would be able to do so using the methodology above.

Annex 3 – Calculation of prevalence

Prevalence = number of overweight or obese ÷ number of valid records uploaded

The data collection tool calculates the number of overweight/obese children using the following steps for each record:

1. calculate the BMI: $BMI = \frac{10,000}{h^2(cm^2)} \times w(kg)$
2. calculate the BMI z-score:
 - a. look up child age (rounded to the nearest whole month) and sex on the UK90 BMI centiles classification;
 - b. retrieve the corresponding L, M, and S values for use in the following formula (where y is the BMI score):

$$z = \frac{\left(\frac{y}{M}\right)^L - 1}{LS}$$

3. calculate the BMI p-score by converting the above z-score using the standardised normal distribution
4. children with a BMI p-score of ≤ 0.02 are flagged as 'underweight', those with a p-score > 0.02 and < 0.85 are flagged as 'healthy', those with a p-score ≥ 0.85 and < 0.95 are flagged as 'overweight' and those with a p-score ≥ 0.95 are flagged as 'obese'.

Prevalence rates are then calculated by dividing the numbers of children flagged by the number of eligible records uploaded for each school year.

Annex 4 – Calculation of participation rates

Calculating participation rates:

The participation rate is the proportion of eligible children who were measured by the PCT. The participation rate is calculated by dividing ***the number of pupils for whom valid measurements were recorded*** by ***the number of pupils who were eligible for measurement***.

From 2007/08 PCTs were given access to a secure NCMP website where they were able to view, following their data upload, their participation rate and the basis upon which it had been calculated. PCTs were able to review their data, make corrections, and re-upload data to the NCMP database, as many times as necessary.

The **number of pupils measured** is the total number of records uploaded by a PCT to the NCMP database *excluding*:

- i. Invalid records;
- ii. Records from independent and special schools.

Note: after a PCT had uploaded data they were provided with information on the secure NCMP website detailing the records that would be removed due to being invalid. PCTs were given the opportunity to correct these records and thereby increase their participation rate.

The **number of pupils eligible for measurement** for each school year is the number of pupils in state-maintained schools, with primary school aged children, excluding pupils with special educational needs:

- i. Estimates of the total number of pupils that were eligible for measurement, based on DfE data, were initially supplied to PCTs. PCTs were then able to update these figures if they deemed them inaccurate.
- ii. These 'eligible' figures were automatically validated, on upload, through comparison to other PCT supplied data: (i) the school-level headcounts and (ii) the number of pupils with special educational needs.
- iii. Based on this comparison, the PCT supplied 'eligible' figure was either accepted or rejected by the database.²⁷
- iv. PCTs had the opportunity to review and correct their data, if necessary.

²⁷ The report compared **(A)** to **(B) – (C)** for each year, where:

(A) is the number of eligible pupils

(B) is the state-maintained schools headcount sum

(C) is the number of pupils with special educational needs

Since the number of eligible pupils should be the number of pupils in state-maintained schools, excluding pupils with special educational needs, it would be expected that

(A) = (B) – (C).

The database carried out the following calculation:

- Where **(A) / ((B) – (C))** is in the range 0.95 to 1.05, **(A)** was **accepted**.
- Where **(A) / ((B) – (C))** is outside the range 0.95 to 1.05, **(A)** was **rejected** and **(B) – (C)** was used instead.

Annex 5 – Effect of participation rate on prevalence

Although there have been year-on-year increases in the participation rates for the NCMP since 2006/07 in each age group, the dataset used to estimate prevalence is nevertheless based on a sample. The prevalence rates for the sample are assumed to apply to the entire population.

To avoid biased results, a sample must be representative of the entire population from which it was drawn. In the case of the NCMP this means that every child must have an equal chance of being included in the dataset.

If the children who do not get included in the dataset share certain characteristics, such as being more likely to be overweight, then the sample would be biased. Such selective non-participation of overweight or obese children could potentially bias the results.

We do not have a good measure of the degree of selective opt out, but participation may provide a reasonable proxy of this factor. The higher the participation rate, the less chance there is for selective opt out, though this measure is far from perfect.

Analysis was undertaken in previous years to assess the strength of the relationship. The association between participation rate and obesity prevalence for Year 6 pupils in 2006/07 to 2008/09 was found to be sufficient to warrant an extension to the confidence intervals on obesity and combined obesity and overweight prevalence figures. For other weight groups the relationship was found to be negligible. In 2009/10 and 2010/11 the national participation rate continued to increase. Analysis showed that no extension to the confidence intervals was necessary in either year. As the participation rate has increased again in 2011/12, and the regional variation has decreased, it was considered unnecessary to repeat the analysis this year. We will continue to monitor this in the future.

There may be other confounding factors which have a greater impact on the prevalence figures, and these have not been investigated.

Details of the analysis from previous years can be found in the earlier reports.

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