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Executive Summary

This report summarises the key findings from the government’s National Child Measurement Programme (NCMP) for England, 2012/13 school year.

In total, 1,076,824 valid measurements were received for children in England, in Reception and Year 6 – approximately 93% of those eligible.¹

In Reception, over a fifth (22.2%) of the children measured were either overweight or obese. In Year 6, this proportion was one in three (33.3%).

The percentage of obese children in Year 6 (18.9%) was over double that of Reception year children (9.3%).

In Reception:
- The proportion of obese children (9.3%) was lower than in 2011/12 (9.5%) and also lower than in 2006/07 (9.9%).
- The proportion of overweight and obese children combined (22.2%) was lower than in 2011/12 (22.6%) and also lower than in 2006/07 (22.9%).

In Year 6:
- The proportion of obese children (18.9%) was lower than in 2011/12 (19.2%) but higher than in 2006/07 (17.5%).
- The proportion of overweight and obese children combined (33.3%) was also lower than in 2011/12 (33.9%) but higher than in 2006/07 (31.6%).

This is the first time since the NCMP collection began in 2006/07 that the prevalence of overweight including obese has reduced for Year 6 children. Further years’ data will be required to see if this is the start of a decline.

As in previous years, a strong positive relationship existed between deprivation and obesity prevalence for children in each school year with obesity prevalence being significantly higher in deprived areas.

Obesity prevalence was significantly higher in urban areas than rural areas for each age group, as was the case in previous years.

Obesity prevalence varied by Strategic Health Authority (SHA). South East Coast SHA, South Central SHA and East of England SHA had the lowest obesity prevalence in Reception and South East Coast SHA, South Central SHA and South West SHA had the

lowest obesity prevalence in Year 6. London SHA reported the highest obesity prevalence for both years.

It is important to note that improvements in data quality over time can affect prevalence figures. This should be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant.
Overview

This report summarises the key findings from the government's National Child Measurement Programme (NCMP) for England, 2012/13 school year. The report provides high-level analyses of the prevalence of 'underweight', 'healthy weight', 'overweight', 'obese' and 'combined overweight and obese' children, in Reception (aged 4–5 years) and Year 6 (aged 10–11 years), measured in state schools in England in the school year 2012/13.

The report contains comparisons with 2011/12 and, where appropriate, comparisons have also been made with the results from earlier years.

From 1st April 2013 responsibility for local delivery of the NCMP transferred to Local Authorities (LAs). As Primary Care Trusts (PCTs) were in place at the beginning of the school year, the data were collected and are presented by these structures (data by LA are also provided) and are referred to when describing the process for measuring and submitting.

There are now seven years of reliable NCMP data from 2006/07 to 2012/13. The data collected during the 2012/13 school year is likely to contain a large cohort of children who were previously measured in Reception during 2006/07. However, as identifiable data are not held centrally, at national level there is limited potential to make detailed comparisons between the measurements from these two years for this cohort. The HSCIC and Public Health England (PHE) will be investigating what analyses are possible using these child measurements, and will work with local areas to determine whether more detailed analyses can be undertaken.

Additional analyses of the 2012/13 NCMP data will be produced by Public Health England’s Obesity Knowledge and Intelligence team (PHE Obesity K&I) (expected to be published early 2014) and the anonymised national dataset will be made available to PHE Knowledge and Intelligence Teams 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

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2 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 or equal to the 95th centile;
- ‘overweight and obese combined’ is defined as greater than or equal to the 85th centile.
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 (1,076,824 children and 93% participation in 2012/13) 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 2012/13 dataset, and comparisons with prevalence figures of earlier years, are described as being different where the difference was determined to be statistically significant at a 95% significance level. Where there was no significant difference between two proportions, the term ‘similar’ has been used. Further details are provided in Annex 2.

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 may 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 suggests that it was no longer necessary to extend the confidence intervals around Year 6 obesity prevalence figures. As the participation rate remained high in 2012/13 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 2012/13 data, this should also be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant. Please see the accompanying Data Quality Statement for information on the 2012/13 data.

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

\[\text{NCMP: Detailed Analysis of the 2006/07 National Dataset}\]

\[\text{NCMP: Detailed Analysis of the 2007/08 National Dataset}\]

\[\text{Variations in data collection can influence outcome measures of BMI measuring programmes}\]
www.ncbi.nlm.nih.gov/m/pubmed/21834603
Key findings for 2012/13

In total, 1,076,824 valid measurements were received for children in England, in Reception and Year 6 – approximately 93% of those eligible. Participation rates have increased from 2006/07 when it was 80% to 2011/12 when it was 93%. Participation rates in 2012/13 were similar to those in 2011/12.

The prevalence of underweight, healthy weight, overweight and obese children by year and sex in England for 2012/13 is summarised in Table i. The prevalence of overweight and obese combined is also presented.

Table i: Prevalence of underweight, healthy weight, overweight, obese and combined overweight and obese children by year and sex, England, 2012/13

<table>
<thead>
<tr>
<th>Year</th>
<th>Underweight</th>
<th>Healthy Weight</th>
<th>Overweight</th>
<th>Obese</th>
<th>Overweight and obese combined</th>
<th>Number measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reception</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>3,280</td>
<td>227,394</td>
<td>40,414</td>
<td>29,249</td>
<td>69,663</td>
<td>300,337</td>
</tr>
<tr>
<td>Girls</td>
<td>1,874</td>
<td>224,482</td>
<td>35,777</td>
<td>25,206</td>
<td>60,985</td>
<td>287,341</td>
</tr>
<tr>
<td>All Children</td>
<td>5,154</td>
<td>451,876</td>
<td>76,191</td>
<td>54,457</td>
<td>130,648</td>
<td>587,678</td>
</tr>
<tr>
<td>Year 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>2,847</td>
<td>160,727</td>
<td>36,050</td>
<td>51,101</td>
<td>87,151</td>
<td>250,725</td>
</tr>
<tr>
<td>Girls</td>
<td>3,648</td>
<td>158,937</td>
<td>34,399</td>
<td>41,437</td>
<td>75,836</td>
<td>238,421</td>
</tr>
<tr>
<td>All Children</td>
<td>6,495</td>
<td>319,664</td>
<td>70,449</td>
<td>92,538</td>
<td>162,987</td>
<td>489,146</td>
</tr>
</tbody>
</table>

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Public Health England
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In Reception, over a fifth (22.2%) of the children measured were either overweight or obese. In Year 6, this proportion was one in three (33.3%).

The percentage of obese children in Year 6 (18.9%) was over double that of Reception year children (9.3%).

The prevalence of children with a healthy weight was higher in Reception (76.9%) than Year 6 (65.4%). In both years a higher percentage of girls were of a healthy weight than boys. In Reception 78.1% of girls and 75.7% of boys were a healthy weight and in Year 6 this was 66.7% and 64.1% 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, South Central SHA and East of England SHA had the lowest obesity prevalence in Reception (7.9%, 8.0% and 8.1% respectively) and South East Coast SHA, South Central SHA and South West SHA had the lowest obesity prevalence in Year 6 (15.8%, 16.1% and

16.6% respectively). London SHA reported the highest obesity prevalence for both years (10.8% for Reception and 22.4% for Year 6).

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 6.4% compared with 12.1% 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 13.0% compared with 24.2% 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’. 14% of records were returned without an ethnicity classification.

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 9.6% compared with 8.1% and 7.5% living in town areas and village areas respectively. Similarly, obesity prevalence among Year 6 children living in urban areas was 19.6% compared with 16.0% and 15.4% 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 2012/13 NCMP findings with earlier years

There are now seven 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 2012/13.

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 2012/13 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 2012/13 data, this should also be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant.

2012/13 compared with 2011/12:

In Reception, the proportion of obese children (9.3%) was lower than in 2011/12 (9.5%). The proportion of overweight and obese children combined (22.2%) was also lower than in 2011/12 (22.6%). The proportion of underweight children was similar in both years (0.9%).

In Year 6, the proportion of obese children (18.9%) was lower than in 2011/12 (19.2%). The proportion of overweight and obese children combined (33.3%) was also lower than in 2011/12 (33.9%). This is the first time since the NCMP collection began in 2006/07 that these figures have reduced. Further years’ data will be required to see if this is the start of a decline. The proportion of underweight children was higher than in 2011/12 (although rounded to one decimal place both are 1.3%).

2012/13 compared with 2006/07:

In Reception, the proportion of obese children (9.3%) was lower than in 2006/07 (9.9%). The proportion of overweight and obese children combined (22.2%) 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 (18.9%) was higher than in 2006/07 (17.5%). The proportion of overweight and obese children combined (33.3%) was also higher than in 2006/07 (31.6%). The proportion of underweight children (1.3%) was lower than in 2006/07 (1.5%).

A large number of Year 6 children measured in 2012/13 are highly likely to have been also measured in 2006/07, when they were in Reception. It is not possible for the HSCIC to link records between the two years because person identifiable data are not held as part of the NCMP collection. These data were collected locally but automatically removed when data were uploaded to the HSCIC – so only anonymised data are held for collection years up to and including 2012/13. From 2013/14, the HSCIC will securely hold person identifiable data, in a way that children cannot be identified, for data linkage purposes and this will enable longitudinal analyses to be carried out in future. The PHE Obesity K&I team will work with the HSCIC to investigate what analyses can be conducted to compare 2012/13 and 2006/07 data in early 2014.

In 2012-13 a third of Year 6 children (33.3 per cent) were either overweight or very overweight. In 2006-07, under a quarter of Reception Year children (22.9 per cent) were overweight or very overweight.

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5 Data linkage will be carried out by the HSCIC’s Data Linkage and Extract Service who will hold the data in a secure environment. Robust Information Governance standards will be in place to protect and control how data are managed.
Figure i: Prevalence of underweight, overweight, obese and combined overweight and obese children by NCMP year and school year, 2006/07 to 2012/13

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

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Public Health England
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Chapter 1 Introduction

Established in 2005/06, the National Child Measurement Programme (NCMP) for England records height and weight measurements of children in Reception (typically aged 4–5 years) and Year 6 (typically aged 10–11 years) and enables detailed analysis of prevalence and trends in child overweight and obesity levels. The programme now holds seven 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. Up to April 2013 data were supplied locally by Primary Care Trusts (PCTs) with the support and cooperation of schools, in line with guidance from the Department of Health Obesity and Food Policy branch. From April 2013 Local Authorities took on responsibility for local delivery of the National Child Measurement Programme and Public Health England (PHE) took on responsibility for national oversight of the programme from the Department of Health (DH). At the same time Primary Care Trusts (PCTs) and Strategic Health Authorities (SHAs) were abolished. These changes were brought about by the reforms to the NHS and public health system included in the Health and Social Care Act 2012 in which Local Authorities were given new public health responsibilities funded by the public health grant.

As PCTs were in place at the beginning of the school year, the data were collected and are presented by these structures (data by LA are also provided) and we refer to PCTs when describing the process for measuring and submitting.

This report presents the headline findings for the 2012/13 NCMP. PHE Obesity K&I will conduct additional analyses (expected to be published early 2014), and the anonymised national dataset will be made available to PHE Obesity K&I to allow regional and local analyses of the data. NCMP datasets relating to 2006/07 to 2011/12 have already been deposited in the UK Data Archive and a non-identifiable version of this year’s dataset will be made available early 2014.

In addition, PHE Obesity K&I also present NCMP data in an online data tool that enables the user to examine patterns and trends at local authority level. This interactive data tool will be updated with the 2012/13 NCMP data in early January 2014 and will be available on the following link: www.noo.org.uk/visualisation.

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7 UK Data Archive [www.data-archive.ac.uk](http://www.data-archive.ac.uk)
The NCMP includes all state schools in England (unless the school declined to participate or if the responsible organisation did not measure in that school for other reasons). Independent and special schools\(^8\) are not formally required to participate although their participation is encouraged.

Independent and special schools are excluded from the analysis in this report\(^9\), but are included in the dataset provided to PHE for further analyses.

Information for 2012/13 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.

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\(^8\) 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.

\(^9\) 84 out of approximately 3,400 independent or special schools in England chose to take part in 2012/13. Across all PCTs, there were a total of 1,731 records relating to pupils in these schools. In total this represents only 0.16% 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.
Chapter 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 2012/13 academic year. Consequently, some children were almost two years older than others in the same school year at the point of measurement\footnote{At the time of measurement in 2012/13, 87\% of Year R pupils were aged between 4.5 years and 5.5 years whilst 80\% 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.}, 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).
2.2 Definitions of underweight, healthy weight, overweight and obese

Prevalence rates were calculated by deriving every child’s BMI\(^{11}\) 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.\(^{12}\)

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 2\(^{nd}\) centile;
- **Healthy weight** is defined as a BMI greater than the 2\(^{nd}\) centile but less than the 85\(^{th}\) centile;
- **Overweight** is defined as a BMI greater than or equal to the 85\(^{th}\) centile but less than the 95\(^{th}\) centile (i.e. overweight *but not* obese);
- **Obese** is defined as a BMI greater than or equal to the 95\(^{th}\) 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 91\(^{st}\) but below the 98\(^{th}\) centile and obese is defined as a BMI greater than or equal to the 98\(^{th}\) centile).

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).\(^{13}\)

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

\(^{11}\) Body mass index (BMI) is an indicator of body fat based on height and weight. BMI=weight(kg)/height\(^2\) (m\(^2\))


\(^{13}\) 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.
also add or remove 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 exact 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% in 2007/08 to 99.8% in 2012/13. 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 PHE and LAs.

PHE Obesity K&I published guidance\(^\text{14}\) 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.

\(^{14}\) ‘NCMP Guidance for small area analysis’
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 until 2011/12 when it was 93%. Overall participation in the NCMP remained at this level in 2012/13. 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 necessary to extend the upper confidence intervals around Year 6 obesity prevalence figures. This year participation rates were again high (94.0% for Reception and 92.7% for Year 6). It was therefore considered unnecessary to repeat the analysis. Based on previous years' analyses 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.
Chapter 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 2012/13 were very similar to those achieved in 2011/12:

- 93% for Reception and Year 6 combined (1,076,824 children).
- 94% for Reception (587,678 pupils measured).
- 93% for Year 6 (489,146 children).

All 151 PCTs provided data for Reception and Year 6 children in 2012/13.

- 96% of PCTs (145 of 151) met or exceeded 85% participation rate for Reception, compared with 97% (146 of 151) in 2011/12.
- 97% of PCTs (146 of 151) met or exceeded 85% participation rate for Year 6, compared with 95% (144 of 151) in 2011/12.

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, 2012/13, by Primary Care Trust

Data Sources: ONS Boundary Files 2013, Health and Social Care Information Centre, Lifestyle Statistics / Public Health England

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Figure 2: NCMP participation rates for Year 6, 2012/13, by Primary Care Trust

Data Sources: ONS Boundary Files 2013, Health and Social Care Information Centre, Lifestyle Statistics / Public Health England

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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.\(^{15}\)

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, 2012/13.

---

**Figure 3: Prevalence of underweight, overweight and obese children in Reception, by sex, England, 2012/13**

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
<th>All children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>1.1%</td>
<td>0.7%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Overweight</td>
<td>13.5%</td>
<td>12.5%</td>
<td>13.0%</td>
</tr>
<tr>
<td>Obese</td>
<td>9.7%</td>
<td>8.8%</td>
<td>9.3%</td>
</tr>
<tr>
<td>Overweight and obese combined</td>
<td>23.2%</td>
<td>21.2%</td>
<td>22.2%</td>
</tr>
</tbody>
</table>

Notes:
1. All percentages are rounded to one decimal place.
Source: Health and Social Care Information Centre, Lifestyle Statistics / Public Health England
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---

\(^{15}\) 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 2\(^{nd}\) centile;
- ‘overweight’ is defined as greater than or equal to the 85\(^{st}\) centile but less than the 95th centile;
- ‘obese’ is defined as greater or equal to the 95th centile;
- ‘overweight and obese combined’ is defined as greater than or equal to the 85\(^{th}\) centile.
### Figure 4: Prevalence of underweight, overweight and obese children in Year 6, by sex, England, 2012/13

<table>
<thead>
<tr>
<th>Condition</th>
<th>Boys</th>
<th>Girls</th>
<th>All children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>1.1%</td>
<td>1.5%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Overweight</td>
<td>14.4%</td>
<td>14.4%</td>
<td>14.4%</td>
</tr>
<tr>
<td>Obese</td>
<td>20.4%</td>
<td>17.4%</td>
<td>18.9%</td>
</tr>
<tr>
<td>Overweight and obese combined</td>
<td>34.8%</td>
<td>31.8%</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

**Notes:**
1. All percentages are rounded to one decimal place.
2. Source: Health and Social Care Information Centre, Lifestyle Statistics / Public Health England
Figure 5 shows the 2012/13 prevalence breakdowns including healthy weight.

**Key Findings:**

- In Reception over a fifth (22.2%) of children were classified as either overweight or obese; in Year 6 this proportion was one in three (33.3%);

- The prevalence of obese children in Year 6 (18.9%) was double that in Reception (9.3%);

- Prevalence of obesity was found to be higher among boys than girls in both school years. In Reception, 9.7% boys and 8.8% girls were classified as obese. In Year 6 the percentages were 20.4% and 17.4% 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);

- The prevalence of children with a healthy weight was higher in Reception (76.9%) than Year 6 (65.4%). In both years a higher percentage of girls were of a healthy weight than boys. In Reception 78.1% of girls and 75.7% of boys were a healthy weight and in Year 6 this was 66.7% and 64.1% respectively.
3.2.2 Comparisons between the 2012/13 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 2012/13.

![Figure 6](image-url)
Figure 7 shows prevalence breakdowns for each BMI category from 2006/07 to 2012/13.

Figure 7: Prevalence of underweight, healthy weight, overweight and obese children by NCMP year and school year, 2006/07 to 2012/13

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

Source: Health and Social Care Information Centre, Lifestyle Statistics / Public Health England

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The key findings when the results from 2012/13 are compared to 2011/12 are as follows:

- In Reception, the proportion of obese children (9.3%) was lower than in 2011/12 (9.5%). The proportion of overweight and obese children combined (22.2%) was also lower than in 2011/12 (22.6%). The proportion of underweight children was similar in both years (0.9%).

- In Year 6, the proportion of obese children (18.9%) was lower than in 2011/12 (19.2%). The proportion of overweight and obese children combined (33.3%) was also lower than in 2011/12 (33.9%). This is the first time since the NCMP collection began in 2006/07 that these figures have reduced. Further years’ data will be required to see if this is the start of a decline. The proportion of underweight children was higher than in 2011/12 (although rounded to one decimal place both are 1.3%).

The key findings when the results from 2012/13 are compared to 2006/07 are as follows:

- In Reception, the proportion of obese children (9.3%) was lower than in 2006/07 (9.9%). The proportion of overweight and obese children combined (22.2%) 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 (18.9%) was higher than in 2006/07 (17.5%). The proportion of overweight and obese children combined (33.3%) 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 2012/13, 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 2012/13 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).

The online tool produced by PHE Obesity K&I also contains NCMP data for previous years 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, 2012/13

Figure 9: Prevalence of underweight, overweight, and obese children in Year 6, by SHA, England, 2012/13
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 2012/13.

Key findings:

- Obesity prevalence varied by Strategic Health Authority (SHA). South East Coast SHA, South Central SHA and East of England SHA had the lowest obesity prevalence in Reception (7.9%, 8.0% and 8.1% respectively) and South East Coast SHA, South Central SHA and South West SHA had the lowest obesity prevalence in Year 6 (15.8%, 16.1% and 16.6% respectively). London SHA reported the highest obesity prevalence for both years (10.8% for Reception and 22.4% for Year 6).

- SHAs with high obesity prevalence in Reception tended to also have high prevalence in Year 6.

3.2.4 Prevalence by Primary Care Trust

Obesity prevalence varied by Primary Care Trust (PCT). For Reception this ranged from 5.8% in Surrey PCT to 14.6% in Redcar and Cleveland\(^\text{16}\). In Year 6 the range was from 12.7%, also in Surrey PCT, to 27.3% in Newham PCT.

\(^{16}\) Data for Redcar and Cleveland showed a greater than expected increase in obesity prevalence for Reception. Whilst analysis of the data could not determine for certain any inaccuracies within the data, it did highlight a potential issue regarding height measurements in some schools. Caution should be exercised when interpreting these results. Please see the accompanying Data Quality Statement for further information relating to 2012/13 data.
Improvements in data quality over time can affect prevalence figures. Although no analysis has yet been carried out to quantify any impact on 2012/13 data, this should also be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant.

Figures 11 and 12 show Reception and Year 6 obesity prevalence by PCT, where the PCT recorded is the one that took responsibility for collecting measurements in the school that the child attended. Online Table 2 provides more detailed tables.
Figure 11: Prevalence of obese children in Reception, by Primary Care Trust, England, 2012/13

Data Sources: ONS Boundary Files 2013, Health and Social Care Information Centre, Lifestyle Statistics / Public Health England

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Figure 12: Prevalence of obese children in Year 6, by Primary Care Trust, England, 2012/13

Data Sources: ONS Boundary Files 2013, Health and Social Care Information Centre, Lifestyle Statistics / Public Health England

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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

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

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Public Health England
Copyright © 2013. Health and Social Care Information Centre, Lifestyle Statistics. All Rights Reserved.
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 2012/13.

**Figure 14: Prevalence of underweight, overweight and obese children in Year 6 by school area 2010 IMD decile, England, 2012/13**

Notes:
1. All percentages are rounded to one decimal place.
Source: The Health and Social Care Information Centre, Lifestyle Statistics / Public Health England
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**Figure 15: Prevalence of combined overweight and obese children, by school area 2010 IMD decile, England, 2012/13**

Notes:
1. All percentages are rounded to one decimal place.
Source: Health and Social Care Information Centre, Lifestyle Statistics / Public Health England
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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 6.4% compared with 12.1% among those attending schools in the most deprived decile. Similarly, obesity prevalence among Year 6 children attending schools in the least deprived decile was 13.0% compared with 24.2% among those attending schools 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 five 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.17

Of the 1,076,824 children for whom valid measurements were submitted, 86% (923,585) 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.

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 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 2012/13.
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. 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.

18 ‘National Child Measurement Programme; Detailed Analysis of the 2006/07 National Dataset’
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 1,076,824 children for whom valid measurements were uploaded to the NCMP Database in 2012/13, 99.8% (1,074,149) 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 classification according to the settlement form of the postcode 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.

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19 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.

Figure 19: Prevalence of underweight, overweight and obese children in Reception, by rural/urban classification, England, 2012/13

Figure 20: Prevalence of underweight, overweight and obese children in Year 6, by rural/urban classification, England, 2012/13

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

Source: Health and Social Care Information Centre, Lifestyle Statistics / Public Health England

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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 2012/13.
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 9.6% compared with 8.1% and 7.5% living in town areas and village areas respectively. Similarly, obesity prevalence among Year 6 children living in urban areas was 19.6% compared with 16.0% and 15.4% 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 1.4%, 1.1% and 0.9% respectively;

The PHE Obesity K&I’s 2006/07\(^\text{20}\) and 2007/08\(^\text{21}\) 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.


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. 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 2012/13 NCMP. This analysis uses the seven ‘supergroups’ provided within the ONS-AC at LSOA level. Categories have been assigned to individual children based on their postcode of residence.

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22 National Statistics 2011 Area Classification available at:
Figure 22: Prevalence of obese children in Reception by ONS-AC supergroup, England 2012/13

Figure 23: Prevalence of obese children in Year 6 by ONS-AC supergroup, England 2012/13
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.

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.

PHE Obesity K&I have produced a report ‘NCMP: Analysis using the ONS Area Classification’ which provides more information on this approach.  

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23 ‘NCMP: Analysis using ONS Area Classification’
(www.noo.org.uk/uploads/doc/vid_12524_NCMP_Analysis%20using%20the%20ONS%20Area%20Classification.pdf)
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 2012 is expected to be published by the Health and Social Care Information Centre on 18th December 2013.

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 2011, with trend tables updated for 2012 expected to be published alongside the main report on 18th December 2012.

The HSE publications can be accessed from the following link:
www.hscic.gov.uk/article/3659/Health-Survey-for-England

Public Health England Obesity Knowledge and Intelligence (PHE Obesity K&I)

The Public Health England Obesity Knowledge and Intelligence team provide a number of resources relating to the NCMP and child obesity in general. NCMP resources include an online Local Authority NCMP data profile tool, NCMP data at Electoral Ward and Middle Super Output Area level, guidance for data sharing and 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 PHE Obesity K&I resources can be accessed via this website:
www.noo.org.uk/

Statistics on Obesity, Physical Activity and Diet: England 2013

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.hscic.gov.uk/searchcatalogue?productid=11194&q=Statistics+on+Obesity%2c+Physical+Activity+and+Diet%3a+England+&topics=0%2fPublic+health&sort=Most+recent&size=10&page=1#top
# Annex 1 – Data quality report

Table A shows a number of PCT data quality measures for the 2012/13 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 2012/13

**Key:**

<table>
<thead>
<tr>
<th>Measure 1 - Overall participation rate</th>
<th>Green</th>
<th>Amber</th>
<th>Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥90%</td>
<td></td>
<td>≥85% or &lt;90%</td>
<td>&lt;85%</td>
</tr>
</tbody>
</table>

| 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% |

<table>
<thead>
<tr>
<th>PCT name</th>
<th>Overall participation rate</th>
<th>Percentage of records with heights rounded to the nearest whole number</th>
<th>Percentage of records with weights rounded to the nearest whole number</th>
<th>Percentage of records with missing home postcodes</th>
<th>Percentage of records with missing ethnicity codes</th>
</tr>
</thead>
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<td>PCT name</td>
<td>Overall participation rate</td>
<td>Percentage of records with heights rounded to the nearest whole number</td>
<td>Percentage of records with weights rounded to the nearest whole number</td>
<td>Percentage of records with missing home postcode</td>
<td>Percentage of records with missing ethnicity code</td>
</tr>
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<td>----------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>National average</td>
<td>99%</td>
<td>17%</td>
<td>10%</td>
<td>9.2%</td>
<td>14%</td>
</tr>
<tr>
<td>LB Aylesbury</td>
<td>99%</td>
<td>17%</td>
<td>10%</td>
<td>9.2%</td>
<td>14%</td>
</tr>
<tr>
<td>LB Buckingham</td>
<td>99%</td>
<td>17%</td>
<td>10%</td>
<td>9.2%</td>
<td>14%</td>
</tr>
<tr>
<td>LB Brent</td>
<td>99%</td>
<td>17%</td>
<td>10%</td>
<td>9.2%</td>
<td>14%</td>
</tr>
<tr>
<td>LB Harrow</td>
<td>99%</td>
<td>17%</td>
<td>10%</td>
<td>9.2%</td>
<td>14%</td>
</tr>
<tr>
<td>LB Hounslow</td>
<td>99%</td>
<td>17%</td>
<td>10%</td>
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<td>14%</td>
</tr>
<tr>
<td>LB Milton</td>
<td>99%</td>
<td>17%</td>
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<tr>
<td>LB Richmond</td>
<td>99%</td>
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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 Public Health England Knowledge and Intelligence Teams.

- Calculate 95% confidence intervals using the method described by Wilson\(^{24}\) and Newcombe\(^{25}\)

- 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

\[
\frac{(A-B)}{C} \quad \text{to} \quad \frac{(A+B)}{C}
\]

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, $\hat{D} = \hat{p}_2 - \hat{p}_1$

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

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

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.

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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):
   \[ z = \left( \frac{y}{M} \right)^L - 1 \]

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.  

iv. PCTs had the opportunity to review and correct their data, if necessary.

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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 between 2006/07 and 2011/12 in each age group (in 2012/13 the rates were similar to 2011/12), 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 increased again in 2011/12 and remains similar in 2012/13, 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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