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Summary

- This report summarises the key findings from the Government’s National Child Measurement Programme (NCMP) for England, 2008/09 school year. The report provides high-level analysis of the prevalence of ‘underweight’, ‘healthy weight’, ‘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 2008/09. The report contains comparisons with 2007/08 and where appropriate comparisons have also been made with 2006/07 results.

- This report presents the headline findings for the 2008/09 NCMP. The National Obesity Observatory (NOO) will produce additional analysis in 2010 (expected publication date 30 April 2010), and the anonymised national dataset will be made available to Public Health Observatories (PHOs) to allow regional and local analysis of the data. 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 the NCMP data and will be available on the following link: http://www.noo.org.uk/maps/eatlas

- Information for 2008/09 is presented in Table B of Annex 1 by the new Local Authority areas (introduced in April 2009). Information is presented by the pre-2009 LA boundaries also.

- To counter the effect of natural year to year variation, confidence intervals are included around the figures 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 likely error around the estimate calculated. As the sample sizes for NCMP are large (80% in 2006/07, 88% in 2007/08, and 90% in 2008/09) the 95% confidence intervals (see Annex 3) for prevalence estimates are very narrow (indicating a small margin of potential error).

- When examining prevalence rates it is also important to consider how the participation rate might affect the calculated prevalence figures. Analyses performed in 2007/08 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 is 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 being measured than other children. Year 6 obesity confidence intervals have been extended to address this potential underestimation.

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

- ‘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;

Note ‘overweight’ means ‘overweight but not obese’.
When interpreting the prevalence figures contained in this report, it is important to consider the confidence intervals to determine the degree of accuracy within figures to determine whether any change in prevalence is real or might be affected by the participation rate. Where 95% confidence limits for two subgroups do not overlap, the difference can be said to be statistically significant.

Key Findings

- In total, 1,003,849 valid measurements were received for children, in England, in Reception and Year 6 – approximately 90% of those eligible\(^2\). This represents an increased participation rate from 2007/08, when the corresponding rate was 88%, and 2006/07 when the rate was 80%.

- The prevalence of underweight, overweight and obese children by year and sex in England for 2008/09 is summarised in Table i.

### Table i: Prevalence of underweight, healthy weight, overweight and obese children by year and sex, England, 2008/09

<table>
<thead>
<tr>
<th></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><strong>Boys</strong></td>
<td>1.2% (3,160)</td>
<td>74.8% (193,624)</td>
<td>13.8% (35,679)</td>
<td>10.2% (26,545)</td>
<td>24.0% (62,224)</td>
<td>259,008</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td>0.8% (1,945)</td>
<td>77.7% (192,121)</td>
<td>12.6% (31,065)</td>
<td>8.9% (22,030)</td>
<td>21.5% (53,095)</td>
<td>247,161</td>
</tr>
<tr>
<td><strong>Both</strong></td>
<td>1.0% (5,105)</td>
<td>76.2% (385,745)</td>
<td>13.2% (66,744)</td>
<td>9.6% (48,575)</td>
<td>22.8% (115,319)</td>
<td>506,169</td>
</tr>
<tr>
<td><strong>Boys</strong></td>
<td>1.1% (2,709)</td>
<td>64.5% (165,297)</td>
<td>14.4% (36,962)</td>
<td>20.0% (51,370)</td>
<td>34.5% (88,332)</td>
<td>256,338</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td>1.6% (3,758)</td>
<td>67.7% (163,508)</td>
<td>14.2% (34,235)</td>
<td>16.5% (39,841)</td>
<td>30.7% (74,076)</td>
<td>241,342</td>
</tr>
<tr>
<td><strong>Both</strong></td>
<td>1.3% (6,467)</td>
<td>66.1% (328,805)</td>
<td>14.3% (71,197)</td>
<td>18.3% (91,211)</td>
<td>32.6% (162,408)</td>
<td>497,680</td>
</tr>
</tbody>
</table>

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Cross-Government Obesity Unit NCMP Dataset

In summary, the key findings for 2008/09 are that:

- In Reception, more than one in five (22.8%) of the children measured were either overweight or obese. In Year 6, this rate was nearly one in three (32.6%);
- The percentage of obese children in Year 6 (18.3%) is nearly double than that in Reception (9.6%);
- The percentage of overweight children is higher in Year 6 (14.3%) than in Reception (13.2%);
- The overall prevalence of underweight children is similar for both age groups (approx 1%). There were no significant differences in underweight prevalence between boys and girls in either age group.

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\(^2\) See The National Child Measurement Programme Guidance for PCTs: 2008–09 school year (www.dh.gov.uk/healthyliving) for further information on which children were eligible for inclusion
The prevalence of underweight, overweight and obese children by NCMP year for 2006/07 to 2008/09 are shown in Figure i.

Figure i: Prevalence of underweight, overweight and obese children by NCMP year, 2006/07 to 2008/09

- The main findings when results from 2007/08 to 2008/09 are compared are:
  - In Reception, the proportions of underweight (1.0%), overweight (13.2%) and obese children (9.6%) in 2008/09 were similar to those in 2007/08 where the corresponding proportions were (1.3%, 13.0%, and 9.6%). None of the changes were significant;
  - In Year 6, the proportions of overweight (14.3%) and obese (18.3%) children were the same in 2007/08 and 2008/09. The percentage of underweight children was similar in 2008/09 (1.3%) and 2007/08 (1.4%);
  - Between 2007/08 and 2008/09 there were no significant changes in the prevalence rates for underweight, overweight, or obese children for both age groups. There were also no significant changes when comparing 2006/07 and 2008/09; all or some of the apparent difference of 0.8 percentage points in the proportion of obese children between 2006/07 and 2008/09 is estimated to be due to the higher participation rate for Year 6 in the later year’s programme (as indicated by the expanded confidence interval).

- Obesity prevalence is significantly higher than the national average in the London, North East, and West Midlands SHAs for both age groups and in the North West SHA for Year 6 children.

- Obesity prevalence is significantly lower than the national average in the East of England, South East Coast, South Central, and South West SHAs for children in both age groups, and in the East Midlands SHA for Reception children.
- The 2008/09 SHA obesity patterns are similar to those for 2007/08.
- Obesity prevalence is significantly higher in urban areas than in rural areas, as was the case in NCMP 2007/08.
- As in the 2007/08 NCMP, a strong positive relationship exists between deprivation and obesity prevalence for children in Reception and Year 6.
1. Introduction

1.1. This publication was previously formally announced in the UK Statistics Authority (UKSA) publication hub release calendar and the NHS Information Centre release calendar as the ‘National Child Measurement Programme – Statistics on child obesity 2008-09’. In response to comments received from the UKSA during the assessment of the publication for National Statistic status, the publication has been renamed to its current name ‘National Child Measurement Programme: England, 2008/09 school year’. Following this assessment, this publication from this year is classified as a National Statistic.

1.2. Established in 2005, the National Child Measurement Programme (NCMP) for England\(^3\) weighs and measures children in Reception (typically aged 4–5 years) and Year 6 (aged 10–11 years). The findings are used to inform local planning and delivery of services for children and gather population-level surveillance data to allow analysis of trends in weight. The programme also engages with parents about the importance of healthy weight in children, since their children’s results are shared with them.

1.3. The NCMP is part of the Government’s Healthy Weight, Healthy Lives: a Cross-Government Strategy for England, published in January 2008\(^4\) following the announcement in September 2007, of an ambition: to reverse the rising tide of obesity and overweight in the population, by ensuring that all individuals are able to maintain a healthy weight. The Government’s initial focus is on children, and by 2020 they aim: to have reduced the proportion of overweight and obese children to 2000 levels.

1.4. The Government’s strategy is implemented by the Cross-Government Obesity Unit (CGOU), with the Department of Health (DH) responsible for overall policy on obesity and jointly responsible with the Department for Children, Schools and Families (DCSF) for policy on child obesity. Although the ambition covers a period of 12 years, progress from 2008-11 is being monitored through the inclusion of child obesity as one of the indicators in the child health Public Service Agreement (PSA).

1.5. Central collation and analysis of the NCMP data has been coordinated by the NHS Information Centre for health and social care (the NHS IC) since 2006/07. Data are supplied locally by Primary Care Trusts (PCTs) with the support and cooperation of schools, in line with guidance\(^3\) from the Cross-Government Obesity Unit.

1.6. This report presents the headline findings for the 2008/09 NCMP. The National Obesity Observatory (NOO) will produce additional analysis in 2010 (expected publication date 30 April 2010), and the anonymised national dataset will be made available to NOO and Public Health Observatories.

\(^3\) See www.dh.gov.uk/healthyliving for more information about the National Child Measurement Programme, including guidance and resources for undertaking the exercise.

\(^4\) http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_063565
(PHOs) to allow regional and local analysis of the data. 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: http://www.noo.org.uk/maps/eatlas

1.7. The NHS Information Centre for health and social care may also present further analysis of the data, including mean height and mean weight, and analysis by gender via a range of web based products to a restricted audience. This analysis will be available on request from early 2010.

1.8. The NCMP programme includes all state schools in England (unless the school declined to participate). Independent and special schools (those categorised as 'Community Special', 'Foundation Special', 'Independent School Approved for SEN Pupils', 'Non-Maintained Special', 'Other Independent', 'Other Independent Special School' or 'Pupil Referral Unit') are not formally required to participate although their participation is encouraged. Independent and special schools are excluded from the analysis in this report, but are included in the datasets provided to NOO and to PHOs for further analysis.

1.9. The NHS Information Centre are always looking for ways to improve our publications. Feedback can be provided via www.ic.nhs.uk/ncmp.
2. Methodology

Data collection and validation

2.1. 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. PCT staff entered these data into specially designed spreadsheets: the NCMP Upload Tool. Measurements could be taken at any time during the 2008/09 academic year. Consequently, some children were almost two years older than others in the same school year at the point of measurement; however, Body Mass Index (BMI) centile results are adjusted for age.

2.2. The data that PCTs uploaded to the NCMP database underwent a series of data quality checks before being included in the national dataset. Full details of these checks can be found in: National Child Measurement Programme: NHS Information Centre validation process for NCMP data (see Annex 7). This document was provided as guidance for PCTs. The validation process is summarised below.

2.3. Checks were done at each stage of the data submission:

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 NHS IC carried out further validation through, for example, comparing data across PCTs and over time. The NHS IC contacted a number of PCTs to query unexpected findings and, where necessary, requested that data be corrected.

2.4. PCTs’ participation rates were assessed (see Annex 5). As discussed above, low participation rates may bias prevalence if the ‘missing’ data are atypical (Section 3).
Definitions of underweight, healthy weight, overweight and obese

2.5. Prevalence rates were calculated by deriving every child’s Body Mass Index (BMI)\(^5\) and referencing the age and sex-specific UK National BMI centiles classification to count the number of children defined as underweight, healthy weight, overweight or obese.

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

- **Underweight** is defined as a BMI less 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).

Participation

2.7. Pupils eligible for inclusion in the NCMP were all children in Reception and Year 6 attending non-specialist maintained state schools in England\(^6\).

2.8. Numbers of pupils at each school were provided by DCSF, but PCTs could edit these figures if necessary. The PCT could 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 DCSF pupil numbers and schools were validated by the NHS IC to ensure accuracy.

2.9. The participation rate is the proportion of eligible pupils who were measured (see Annex 5). Participation rates are estimates and should be treated with caution, particularly at smaller geographical levels, because of the difficulty in calculation of the number of pupils eligible for measurement. For example, in Reception, pupils might join the school throughout the year.

2.10. 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 Local Authority (LA), are based on the location of the child’s school rather than their home address, as home postcode was not provided for all child records.

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\(^5\) Body-mass index (BMI) is an indicator of body fat based on height and weight. BMI=weight(kg)/height(m)\(^2\)

\(^6\) 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’ and ‘Pupil Referral Unit’. 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.
2.11. Collection of a child’s home postcode became a formal requirement from the 2007/08 NCMP and 98% of uploaded records in 2008/09 included a valid child postcode. This is an increase from 2007/08 data when 97% included a valid child postcode. These data were mapped to lower super output area (LSOA) to anonymise the data on upload and will be a valuable asset for local-level analyses by PHOs and PCTs.
3. Results

**Participation**

3.1. Participation rate is the percentage of eligible pupils who were measured. For NCMP 2008/09, PCTs were set a participation rate goal, for each age group, of 85%. Nationally, the participation rates for 2008/09 across all PCTs were:

- 91% for Reception (506,169 children measured): a two percentage point increase from 2007/08;
- 89% for Year 6 (497,680 children): a three percentage point increase from 2007/08;
- 90% for Reception and Year 6 combined (1,003,849 children): a two percentage point increase from 2007/08.

3.2. All 152 PCTs provided data for NCMP 2008/09. Participation rates varied by PCT:

- 93% of PCTs (142 PCTs) exceeded the 85% goal for Reception;
- 89% of PCTs (135 PCTs) exceeded the 85% goal for Year 6;
- Only four PCTs did not achieve a participation rate of at least 80% for Reception, and the lowest was 76%. This is an improvement on 2007/08, when the Reception year participation rate was lower than 80% in 13 PCTs and the lowest was 74%;
- The picture is similar for Year 6, where only 7 PCTs did not achieve a participation rate of at least 80%, and the lowest was 74%. This is an improvement on 2007/08, when the Year 6 participation rate was lower than 80% in 15 PCTs and the lowest was 63%;
- Annex 2 shows overall participation rates for all 152 PCTs.

3.3. Of the pupils measured, boys accounted for 51% in Reception and 52% in Year 6. It is not possible to calculate the participation rates by gender since the numbers of eligible pupils are not collected by gender.

3.4. Figure 1 shows the participation rates by PCT for Reception; Figure 2 shows the rates for Year 6:
Figure 1: Participation rate for Reception 2008/09, by PCT

Data Source: ONS Boundary Files 2006
National Child Measurement Programme Data
© Crown copyright. All rights reserved (100044408) (2009)
© The Health and Social Care Information Centre
Figure 2: Participation rate for Year 6 2008/09, by PCT
The effect of participation rates on prevalence

3.5. For NCMP 2006/07, 80% of eligible pupils in Reception and Year 6 combined were measured. This figure increased to 88% in 2007/08 and to 90% in 2008/09.

3.6. In all three years, a proportion of eligible pupils were not measured. This section investigates whether results could have been biased through not including measurements from these ‘missing’ pupils, and looks at the possible effect of participation rate on the recorded prevalence of overweight and obese children.

3.7. Regression analysis of the 2007/08 data showed that, for Year 6, PCTs with lower participation rate also had lower levels obesity prevalence than those with a higher rate. It also showed PCTs whose participation rate increased the most from 2006/07 tended to have greater increases in recorded prevalence. This relationship suggests that obese children were more likely to opt out of being measured than were other children and that a lower participation rate tends to lead to an underestimation of prevalence of obese children for Year 6. However, participation rate was shown to have little or no effect on prevalence for Reception children. Findings from similar analysis performed in 2008/09 were consistent with these.

3.8. These analyses suggest that Year 6 obesity prevalence estimates are underestimated by around 1.3 percentage points in 2006/07, around 0.8 percentage points in 2007/08, and around 0.7 percentage points in 2008/09.

3.9. The possible effect of other factors, such as deprivation, on participation and prevalence has not been examined.

3.10. Annex 6 contains further information on the effect of participation rate on prevalence.
Prevalence of underweight, healthy weight, overweight and obese children: national findings

3.11. Prevalence rates have been calculated by first deriving every child’s BMI and referencing the age and sex-specific UK National BMI centiles classification to count the number of children defined as underweight, healthy weight, overweight or obese according to the population monitoring criteria\(^1\).

3.12. Since the NCMP sample size is large, the confidence intervals (Annex 3) of the prevalence estimates are very narrow. Where 95% confidence intervals for prevalence estimates do not overlap, it can be deduced that differences are statistically significant.

3.13. Tables A-B in Annex 1 show underweight, overweight, and obese prevalence, with associated 95% confidence intervals, by school year, at PCT, SHA and LA level.

3.14. Figures 3 and 4 show the prevalence of underweight, overweight and obese children, with associated 95% confidence intervals, by sex, in England, 2008/09.

Figure 3: Prevalence of underweight, overweight and obese children in Reception, by sex, England, 2008/09

![Figure 3: Prevalence of underweight, overweight and obese children in Reception, by sex, England, 2008/09](image-url)
3.15. Figure 5 shows the 2008/09 prevalence breakdowns including healthy weight.
3.16. Key findings for 2008/09:

- In Reception more than one in five (22.8%) children were classified as either overweight or obese: in Year 6 this rate was nearly one in three (32.6%);

- The prevalence of obesity is significantly higher in boys than in girls in both age groups;

- The prevalence of obesity is significantly higher in Year 6 (18.3%) than in Reception (9.6%);

- The overall prevalence of underweight children is similar for both age groups (approx 1%). There were no significant differences in underweight prevalence between boys and girls in either age group;

- The percentage of children who are overweight is higher in Year 6 (14.3%) than in Reception (13.2%);

- The percentage of children who are overweight is similar for boys (14.4%) and girls (14.2%) in Year 6: in Reception, this rate is higher for boys (13.8%) than for girls (12.6%);

- In Reception the prevalence of overweight children (13.2%) is greater than the prevalence of obese children (9.6%). In Year 6, the opposite is true with prevalence of overweight children (14.3%) being lower than that for obese children (18.3%).
Comparisons of 2007/08 and 2008/09 Headline Findings

3.17. 2008/09 is the third year for which reliable data (with an overall response rate of 80% or higher) have been collected, therefore assessment of year-on-year changes in child obesity prevalence is possible.

3.18. Before making year-on-year comparisons, it is important to note the effect of participation rates on the Year 6 obesity prevalence estimates discussed in 3.5 – 3.10 (note: none of the other prevalence estimates are shown to be affected by participation rates). Analysis performed in 2007/08 contained detailed statistical analysis that estimated that for each 10 percentage point increase in the Year 6 participation rate, the true Year 6 obesity prevalence estimates will increase by 0.6 percentage points on average.

3.19. Figure 6 shows the prevalence of underweight, overweight, and obese children from 2006/07 to 2008/09.

Figure 6: Prevalence of underweight, overweight and obese children by NCMP year, 2006/07 to 2008/09
3.20. Figure 7 compares the 2006/07 to 2008/09 prevalence breakdowns for each BMI category.

Figure 7: Prevalence of underweight, healthy weight, overweight and obese children by NCMP year, 2006/07 to 2008/09

3.21. The key findings are as follows:

- In Reception, the proportions of underweight (1.0%), overweight (13.2%) and obese children (9.6%) in 2008/09 were similar to those in 2007/08 where the corresponding proportions were 1.3%, 13.0%, and 9.6%. None of the changes were significant;

- In Year 6, the proportions of overweight (14.3%) and obese (18.3%) children were the same in 2007/08 and 2008/09. The percentage of underweight children were similar in 2008/09 (1.3%) and 2007/08 (1.4%);

- Between 2007/08 and 2008/09 there were no significant changes in the prevalence rates for underweight, overweight, or obese children for both age groups. There were also no significant changes when comparing 2006/07 and 2008/09; all or some of the apparent difference of 0.8 percentage points in the proportion of obese children between 2006/07 and 2008/09 is estimated to be due to the higher participation rate for Year 6 in the later year’s programme (as indicated by the expanded confidence interval).
Prevalence by Strategic Health Authority (SHA)

3.22. Prevalence of underweight, overweight and obese children, with associated 95% confidence intervals, by the SHA of the PCT which measured the child in 2008/09 are shown in Figure 8 for Reception and Figure 9 for Year 6. The bars are ordered by obesity prevalence. Detailed tables are in Annex 1 showing underweight, overweight, and obese prevalence, with associated 95% confidence intervals, by school year, at PCT, SHA and LA level.

3.23. NCMP data for 2008/09 in Table B of Annex 1 is presented by the new Local Authority areas (introduced in April 2009). The data is also presented by the pre-2009 LA areas as these are still recognised geographical areas. Information presented in an e-Atlas (hosted by NOO and available on http://www.noo.org.uk/maps/eatlas) also contains NCMP data for 2006/07 and 2007/08 recalculated to the 2009 LA areas to allow comparison over time.

3.24. The Office for National Statistics (ONS) is also expected to present prevalence information calculated from NCMP data via Neighbourhood Statistics. This might be provided at a smaller geographical area than those included in this report. This is expected to be published by the end of March 2010 and should be available on the following link: http://www.neighbourhood.statistics.gov.uk

Figure 8: Prevalence of underweight, overweight and obese children in Reception, by SHA, England, 2008/09

[Graph showing prevalence by SHA]
Figure 9: Prevalence of underweight, overweight and obese children in Year 6, by SHA, England, 2008/09

3.25. Figure 10 compares the prevalence of children who are overweight or obese ('overweight and obese combined'), with associated 95% confidence intervals, in Reception and Year 6, by SHA, in 2008/09. The bars have been ranked by prevalence in Year 6.

Figure 10: Prevalence of ‘overweight and obese combined’ children, by year and SHA, England, 2008/09
3.26. Key findings:

- Obesity prevalence is significantly higher than the national average in the London, North East, and West Midlands SHAs for both age groups and in the North West SHA for Year 6 children;

- Obesity prevalence is significantly lower than the national average in the East of England, South East Coast, South Central, and South West SHAs for children in both age groups, and in the East Midlands SHA for Reception children;

- The 2008/09 SHA obesity prevalence patterns are similar to those observed in 2007/08;

- Areas with high obesity prevalence in one year group tend to also have high obesity prevalence in the other year group. The order of SHAs, ranked by obesity prevalence, is similar for both school years, with the top three SHAs occupying the same rank order for children in both years;

- Analysis of 2006/07 and 2007/08 NCMP data showed that child obesity prevalence is 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 a separate publication based on NCMP data and this report will contain further analysis on the links between obesity and other factors. This is expected to be published on 30 April 2010 and will be available from the following link: [http://www.noo.org.uk/NOO_pub](http://www.noo.org.uk/NOO_pub)
Prevalence by PCT

3.27. Figures 11 and 12 show Reception and Year 6 obesity prevalence by PCT. PCT prevalence estimates have been calculated on the basis of the PCT that measured the children. Annex 1 provides more detailed tables.

Figure 11: Prevalence of obese children in Reception, by PCT, England 2008/09
Figure 12: Prevalence of obese children in Year 6, by PCT, England 2008/09

Data Source: ONS Boundary Files 2006, National Child Measurement Programme Data
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**Prevalence by area deprivation**

3.28. Figures 13 and 14 investigate the relationship between deprivation as measured by the 2007 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 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 most deprived) has then been calculated:

Figure 13: Prevalence of underweight, overweight and obese children in Reception against school area 2007 IMD group, England, 2008/09
3.29. Key findings:

- A link exists between deprivation (as measured by the 2007 IMD score) and obesity prevalence in children in both years;

- For both school years, the four most deprived groups have obesity prevalence that is significantly higher than the national average;

- For both school years, the five least deprived groups have obesity prevalence that is significantly lower than the national average;

- The two most deprived groups have a prevalence of underweight children that is very slightly higher than the national average for both school years;

- Overweight prevalence shows no obvious link to deprivation, although the least derived groups have a significantly lower prevalence figure than the national average for both school years.
**Prevalence by ethnicity**

3.30. In the 2008/09 NCMP, collection of the ethnicity of participating children was a formal requirement. PCTs were able to supply ethnic codes using either the NHS or DCSF classification. These codes were grouped into seven categories for national analysis.

3.31. Of the 1,003,849 children for whom valid measurements were submitted, 77% of records included valid ethnic codes (for the purpose of this report, ‘not stated’ is considered invalid). This is an improvement on 2007/08 when only 67% of records had valid ethnic codes.

3.32. In order to assess the quality of the 2008/09 ethnicity data, Figure 15 compares the ethnicity breakdowns for the children in the NCMP dataset with the mid-2007 national ethnicity profiles for the population of 4-5 and 10-11 year-olds for the 5 main specified ethnic groups.

**Figure 15: Comparison of 2008/09 NCMP ethnicity profiles and national population breakdowns for 4-5 and 10-11 year-olds**

3.33. Whilst the population figures and NCMP figures relate to different time periods (mid-2007 and 2008/09 academic year respectively), and they relate

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7 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

8 Excludes ‘not provided’, ‘not stated’ and ‘any other ethnic group’. Source: ONS mid-year population estimates
to different population groups (all children aged 4-5 and 10-11 compared to children in Reception and Year 6) they do at least give an indicative comparison of the national and NCMP participant ethnicity profiles.

3.34. ‘Asian or Asian British’ and ‘Black or Black British’ groups accounted for higher proportions in the NCMP measured population than the population as a whole, whilst the ‘White’ ethnicity group accounts for a lower proportion in the NCMP data when compared to the whole population. It is important to note that nearly a quarter of NCMP measurements had missing or ‘not stated’ ethnic codes. It is possible that these records included a disproportionate number of measurements for children from particular ethnic groups. It must also be considered that the population figures are based on estimates.

3.35. Figures 16 and 17 show, for Reception and Year 6 respectively, the prevalence of underweight, overweight and obese children, with associated 95% confidence intervals, by ethnic category, in England, 2008/09. The bars have been ranked by obesity prevalence.

Figure 16: Prevalence of underweight, overweight and obese children in Reception, by ethnic category, England, 2008/09
3.36. Key findings:

- Obesity prevalence is significantly higher than the national average for children in both years in the ethnic groups: ‘Asian or Asian British’, ‘Any Other Ethnic Group’ and ‘Black or Black British’.

- Obesity prevalence is significantly lower than the national average for children in both years in the ethnic groups: ‘Chinese’ and ‘White’.

- The prevalence of overweight Year 6 children is not significantly different to the national average for any ethnic group except ‘Black or Black British’. The prevalence of overweight Reception children varies considerably more by ethnic group.

3.37. There are known associations between ethnicity and area deprivation. However, 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 exist confounding factors which affect the obesity prevalence by ethnicity.

Prevalence by rural/urban classification

3.38. Collection of the home postcode of participating children was a formal requirement for the 2008/09 NCMP. Of the 1,003,849 children for whom valid measurements were uploaded to the NCMP Database, 98% of records included a home postcode.

3.39. To anonymise the data, postcodes were aggregated to the larger areas of LSOA when PCTs uploaded their data to the NCMP database. This meant that the NHS IC did not hold home postcode of any child.

3.40. Each record was assigned a rural/urban classification\(^{10}\) according to the settlement form of the LSOA of the child.

3.41. Figures 18 and 19 show, for Reception and Year 6 respectively, the prevalence of underweight, overweight and obese children, by rural/urban classification, in England, 2008/09.

Figure 18: Prevalence of underweight, overweight and obese children in Reception, by rural/urban classification, England, 2008/09

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\(^{10}\) 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: [http://www.statistics.gov.uk/geography/nrudp.asp](http://www.statistics.gov.uk/geography/nrudp.asp)
Figure 19: Prevalence of underweight, overweight and obese children in Year 6, by rural/urban classification, England, 2008/09

3.42. Key findings for 2008/09:

- Obesity prevalence is significantly higher in urban areas than in non-urban areas for both age groups;

- The prevalence of underweight children is similar in urban areas and non-urban areas for both age groups;

- Overweight prevalence is similar between urban areas and non-urban areas for both age groups.

3.43. The National Obesity Observatory’s 2006/07\(^\text{11}\) and 2007/08\(^\text{12}\) 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.

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Comparison of results from the Health Survey for England

3.44. It is useful to compare the NCMP findings with the child obesity data from the Health Survey for England (HSE)\(^\text{13}\). The HSE is a series of sample-based surveys focusing on a range of health indicators including obesity in children.

3.45. The findings of the 2006/07 NCMP were compared to the 2006 HSE. It was shown that, apart from obese boys in Reception, the prevalence rates in the two studies are not statistically significantly different. The obesity prevalence estimate for boys in Reception was shown to be significantly higher in the HSE and warrants further investigation.

3.46. At the time of publication of this report, the results of the 2008 HSE had not been published and so comparison with the 2008/09 NCMP has not been possible.


<table>
<thead>
<tr>
<th>SHA/PCT Name</th>
<th>SHA/PCT Code</th>
<th>Prevalence</th>
<th>95% confidence interval (+)</th>
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</thead>
<tbody>
<tr>
<td>Warwickshire PCT</td>
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<td>0.7%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Wakefield District PCT</td>
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<td>0.3%</td>
</tr>
<tr>
<td>South Staffordshire PCT</td>
<td>5PK</td>
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<td>0.2%</td>
</tr>
<tr>
<td>Heart of Birmingham Teaching PCT</td>
<td>5MX</td>
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</tr>
<tr>
<td>Dudley PCT</td>
<td>5PE</td>
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<td>0.4%</td>
</tr>
<tr>
<td>Leicestershire County &amp; Rutland PCT</td>
<td>5PA</td>
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<td>0.2%</td>
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<tr>
<td>Derby City PCT</td>
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<td>Bassetlaw PCT</td>
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</tr>
<tr>
<td>Salford PCT</td>
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<td>0.4%</td>
</tr>
<tr>
<td>Oldham PCT</td>
<td>5J5</td>
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<td>0.4%</td>
</tr>
<tr>
<td>Central Lancashire PCT</td>
<td>5NG</td>
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<td>0.3%</td>
</tr>
<tr>
<td>Central &amp; Eastern Cheshire PCT</td>
<td>5NP</td>
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<td>0.2%</td>
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</tr>
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<td>5QR</td>
<td>2.1%</td>
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<tr>
<td>Newcastle PCT</td>
<td>5D7</td>
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</table>

Table A: Prevalence of underweight, overweight and obese children, with associated 95% confidence intervals, by PCT and SHA, England, 2008/09

Annex 1: Detailed tables
<table>
<thead>
<tr>
<th></th>
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<tbody>
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<td>0.1%</td>
<td>1.2%</td>
<td>0.1%</td>
<td>1.3%</td>
<td>0.1%</td>
<td>1.4%</td>
<td>0.2%</td>
<td>1.5%</td>
<td>0.2%</td>
</tr>
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<td>0.2%</td>
<td>1.4%</td>
<td>0.3%</td>
<td>1.3%</td>
<td>0.2%</td>
<td>1.4%</td>
<td>0.3%</td>
<td>1.3%</td>
<td>0.2%</td>
</tr>
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<td>0.3%</td>
<td>1.1%</td>
<td>0.4%</td>
<td>1.3%</td>
<td>0.4%</td>
<td>1.3%</td>
<td>0.4%</td>
<td>1.3%</td>
<td>0.4%</td>
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<td>0.1%</td>
<td>1.4%</td>
<td>0.1%</td>
<td>1.3%</td>
<td>0.1%</td>
<td>1.4%</td>
<td>0.1%</td>
<td>1.3%</td>
<td>0.1%</td>
</tr>
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<td>0.4%</td>
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<tr>
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<td>0.4%</td>
<td>1.3%</td>
<td>0.5%</td>
<td>1.3%</td>
<td>0.5%</td>
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<td>0.5%</td>
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<td>South East Essex PCT</td>
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<td>0.3%</td>
<td>1.3%</td>
<td>0.4%</td>
<td>1.6%</td>
<td>0.4%</td>
<td>1.6%</td>
<td>0.4%</td>
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<tr>
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<td>1.3%</td>
<td>0.4%</td>
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<td>West Hertfordshire PCT</td>
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<td>0.3%</td>
<td>1.3%</td>
<td>0.3%</td>
<td>1.3%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

1. Due to an error during the upload of data it has not been possible to validate the participation rate for this PCT.

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Cross-Government Obesity Unit NCMF Dataset
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<table>
<thead>
<tr>
<th>Area Code</th>
<th>Authority and Local Authority District/Former District, England, 2008/09</th>
</tr>
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<tbody>
<tr>
<td>N 35UE 2</td>
<td>former districts of: Barnes, Fulham, Hammersmith &amp; Fulham, Hounslow and West Ealing</td>
</tr>
<tr>
<td>N 00CL 2</td>
<td>former districts of: Barnsley, Dearne Valley, Doncaster, Rotherham and Sheffield</td>
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<tr>
<td>N 36UG x x</td>
<td>former districts of: Barrow-in-Furness, Sellafield, South Lakeland and Westmorland</td>
</tr>
<tr>
<td>N 36UG x x</td>
<td>former districts of: Barrow-in-Furness, Sellafield, South Lakeland and Westmorland</td>
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<td>former districts of: Barrow-in-Furness, Sellafield, South Lakeland and Westmorland</td>
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<tr>
<td>N 36UG x x</td>
<td>former districts of: Barrow-in-Furness, Sellafield, South Lakeland and Westmorland</td>
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</tbody>
</table>

**Table B: Prevalence of underweight, overweight and obese children, with associated 95% confidence intervals, by Government Office Region, Local Authority County/Unitary Authority and Local Authority District/Former District, England, 2008/09**

<table>
<thead>
<tr>
<th>Area Code</th>
<th>Prevalence</th>
<th>95% confidence interval [a]</th>
<th>Prevalence</th>
<th>95% confidence interval [a]</th>
<th>Prevalence</th>
<th>95% confidence interval [a]</th>
</tr>
</thead>
<tbody>
<tr>
<td>N 00CL 2</td>
<td>15.4% 2.7%</td>
<td>15.9% 2.5%</td>
<td>10.5% 2.1%</td>
<td>20.0% 2.7%</td>
<td>11.6% 4.2%</td>
<td>13.7% 4.3%</td>
</tr>
<tr>
<td>N 36UG x x</td>
<td>former districts of: Barrow-in-Furness, Sellafield, South Lakeland and Westmorland</td>
<td>15.4% 2.7% 15.9% 2.5% 10.5% 2.1% 20.0% 2.7%</td>
<td>11.6% 4.2% 13.7% 4.3% 7.6% 3.5% 21.0% 5.1%</td>
<td>11.6% 4.2% 13.7% 4.3% 7.6% 3.5% 21.0% 5.1%</td>
<td></td>
<td></td>
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<tr>
<td>N 36UG x x</td>
<td>former districts of: Barrow-in-Furness, Sellafield, South Lakeland and Westmorland</td>
<td>15.4% 2.7% 15.9% 2.5% 10.5% 2.1% 20.0% 2.7%</td>
<td>11.6% 4.2% 13.7% 4.3% 7.6% 3.5% 21.0% 5.1%</td>
<td>11.6% 4.2% 13.7% 4.3% 7.6% 3.5% 21.0% 5.1%</td>
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<tr>
<td>N 36UG x x</td>
<td>former districts of: Barrow-in-Furness, Sellafield, South Lakeland and Westmorland</td>
<td>15.4% 2.7% 15.9% 2.5% 10.5% 2.1% 20.0% 2.7%</td>
<td>11.6% 4.2% 13.7% 4.3% 7.6% 3.5% 21.0% 5.1%</td>
<td>11.6% 4.2% 13.7% 4.3% 7.6% 3.5% 21.0% 5.1%</td>
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<tr>
<td>N 36UG x x</td>
<td>former districts of: Barrow-in-Furness, Sellafield, South Lakeland and Westmorland</td>
<td>15.4% 2.7% 15.9% 2.5% 10.5% 2.1% 20.0% 2.7%</td>
<td>11.6% 4.2% 13.7% 4.3% 7.6% 3.5% 21.0% 5.1%</td>
<td>11.6% 4.2% 13.7% 4.3% 7.6% 3.5% 21.0% 5.1%</td>
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</tr>
</tbody>
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[a] Confidence intervals: for underweight 95%, overweight 95%, and obese 95%.
<table>
<thead>
<tr>
<th>Area</th>
<th>Code</th>
<th>Underweight Prevalence</th>
<th>95% confidence interval</th>
<th>Overweight Prevalence</th>
<th>95% confidence interval</th>
<th>Obese Prevalence</th>
<th>95% confidence interval</th>
<th>Year 1</th>
<th>Prevalence</th>
<th>95% confidence interval</th>
<th>Year 2</th>
<th>Prevalence</th>
<th>95% confidence interval</th>
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<th>Year 4</th>
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<tr>
<td>East Midlands</td>
<td>35</td>
<td>0.4%</td>
<td>1.7% - 0.7%</td>
<td>5.4%</td>
<td>1.3% - 9.5%</td>
<td>12.2%</td>
<td>7.2% - 18.2%</td>
<td>2007</td>
<td>0.5%</td>
<td>1.7% - 1.1%</td>
<td>2008</td>
<td>1.1%</td>
<td>1.2% - 4.0%</td>
<td>2009</td>
<td>1.5%</td>
<td>1.2% - 2.8%</td>
<td>2010</td>
<td>2.1%</td>
<td>1.2% - 3.1%</td>
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<tr>
<td>Yorkshire and the Humber</td>
<td>36</td>
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<td>1.5% - 0.1%</td>
<td>1.9%</td>
<td>0.4% - 4.2%</td>
<td>2.9%</td>
<td>0.4% - 5.2%</td>
<td>2007</td>
<td>0.9%</td>
<td>1.2% - 0.6%</td>
<td>2008</td>
<td>1.1%</td>
<td>0.9% - 2.4%</td>
<td>2009</td>
<td>1.3%</td>
<td>1.0% - 2.1%</td>
<td>2010</td>
<td>1.5%</td>
<td>1.1% - 2.1%</td>
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<td>0.3%</td>
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<td>1.9%</td>
<td>0.2% - 3.9%</td>
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<td>0.5%</td>
<td>1.3% - 0.3%</td>
<td>2008</td>
<td>0.6%</td>
<td>0.6% - 2.2%</td>
<td>2009</td>
<td>0.7%</td>
<td>0.7% - 2.0%</td>
<td>2010</td>
<td>0.8%</td>
<td>0.8% - 2.0%</td>
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<td>0.4%</td>
<td>3.3% - 0.1%</td>
<td>1.9%</td>
<td>1.0% - 3.6%</td>
<td>2.9%</td>
<td>0.4% - 5.0%</td>
<td>2007</td>
<td>0.5%</td>
<td>1.9% - 0.3%</td>
<td>2008</td>
<td>0.6%</td>
<td>0.6% - 2.3%</td>
<td>2009</td>
<td>0.7%</td>
<td>0.7% - 2.1%</td>
<td>2010</td>
<td>0.8%</td>
<td>0.8% - 2.0%</td>
</tr>
<tr>
<td>West Midlands (Met County)</td>
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<td>1.2%</td>
<td>1.3% - 0.0%</td>
<td>1.9%</td>
<td>0.2% - 3.9%</td>
<td>2.9%</td>
<td>0.2% - 5.4%</td>
<td>2007</td>
<td>1.4%</td>
<td>2.0% - 0.2%</td>
<td>2008</td>
<td>1.5%</td>
<td>1.0% - 3.3%</td>
<td>2009</td>
<td>1.7%</td>
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<td>2010</td>
<td>1.9%</td>
<td>1.2% - 3.2%</td>
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<tr>
<td>West Midlands (City of)</td>
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<td>0.4%</td>
<td>0.4% - 1.4%</td>
<td>1.9%</td>
<td>1.0% - 3.6%</td>
<td>2.9%</td>
<td>0.2% - 5.0%</td>
<td>2007</td>
<td>0.5%</td>
<td>0.6% - 2.0%</td>
<td>2008</td>
<td>0.6%</td>
<td>0.6% - 2.3%</td>
<td>2009</td>
<td>0.7%</td>
<td>0.7% - 2.1%</td>
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<td>0.8% - 2.0%</td>
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<td>2.9%</td>
<td>0.2% - 5.4%</td>
<td>2007</td>
<td>1.7%</td>
<td>1.0% - 3.4%</td>
<td>2008</td>
<td>1.8%</td>
<td>1.2% - 3.4%</td>
<td>2009</td>
<td>2.0%</td>
<td>1.2% - 3.4%</td>
<td>2010</td>
<td>2.1%</td>
<td>1.2% - 3.3%</td>
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<tr>
<td>Area</td>
<td>Code</td>
<td>Prevalence</td>
<td>95% confidence interval</td>
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<td>Obesity</td>
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</tbody>
</table>

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<table>
<thead>
<tr>
<th>Area Code</th>
<th>Reception Prevalence</th>
<th>95% confidence interval</th>
<th>Underweight Prevalence</th>
<th>95% confidence interval</th>
<th>Overweight Prevalence</th>
<th>95% confidence interval</th>
<th>Obese Prevalence</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bristol, City of U</td>
<td>0.9%</td>
<td>0.5%</td>
<td>0.3%</td>
<td>12.3%</td>
<td>1.3%</td>
<td>14.8%</td>
<td>1.9%</td>
<td>7.6%</td>
</tr>
<tr>
<td>North Somerset U</td>
<td>1.5%</td>
<td>0.9%</td>
<td>0.6%</td>
<td>13.3%</td>
<td>1.7%</td>
<td>15.9%</td>
<td>2.1%</td>
<td>6.8%</td>
</tr>
<tr>
<td>Somerset U</td>
<td>1.1%</td>
<td>0.7%</td>
<td>0.4%</td>
<td>14.6%</td>
<td>1.6%</td>
<td>16.7%</td>
<td>2.0%</td>
<td>8.7%</td>
</tr>
</tbody>
</table>

Notes:

- Underweight prevalence estimates based on small numbers (1-5 individuals) have been suppressed and are denoted by \( x \). Corresponding healthy weight prevalence estimates have also been suppressed to maintain suppression.

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Cross-Government Obesity Unit NCMP Dataset

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Annex 2: Data Quality report

Table C shows a number of PCT data quality measures for the 2008/09 NCMP. As discussed at the beginning of Section 3, there have been considerable improvements in the overall NCMP data quality since 2006/07.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Green</th>
<th>Amber</th>
<th>Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure 1 - Overall participation rate</td>
<td>≥85%</td>
<td>≥80% and &lt;85%</td>
<td>&lt;80%</td>
</tr>
<tr>
<td>Measure 2 - % of records with heights rounded to the nearest whole number</td>
<td>&lt;25%</td>
<td>≥25% and ≤50%</td>
<td>&gt;50%</td>
</tr>
<tr>
<td>Measure 3 - % of records with weights rounded to the nearest whole number</td>
<td>&lt;25%</td>
<td>≥25% and ≤50%</td>
<td>&gt;50%</td>
</tr>
<tr>
<td>Measure 4 - % of records with complete home postcodes</td>
<td>&gt;95%</td>
<td>≥75% and ≤95%</td>
<td>&lt;75%</td>
</tr>
<tr>
<td>Measure 5 - % of records with complete ethnicity codes</td>
<td>&gt;90%</td>
<td>≥50% and ≤90%</td>
<td>&lt;50%</td>
</tr>
</tbody>
</table>

### Table C: PCT data quality report for NCMP 2008/09

<table>
<thead>
<tr>
<th>Measure</th>
<th>National average</th>
<th>95%</th>
<th>90%</th>
<th>85%</th>
<th>80%</th>
<th>75%</th>
<th>70%</th>
<th>65%</th>
<th>60%</th>
<th>55%</th>
<th>50%</th>
<th>45%</th>
<th>40%</th>
<th>35%</th>
<th>30%</th>
<th>25%</th>
<th>20%</th>
<th>15%</th>
<th>10%</th>
<th>5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure 1 - Overall participation rate</td>
<td>90%</td>
<td>85%</td>
<td>80%</td>
<td>75%</td>
<td>70%</td>
<td>65%</td>
<td>60%</td>
<td>55%</td>
<td>50%</td>
<td>45%</td>
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<td>15%</td>
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<td>5%</td>
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</tr>
<tr>
<td>Measure 2 - % of records with heights rounded to the nearest whole number</td>
<td>21%</td>
<td>15%</td>
<td>10%</td>
<td>5%</td>
<td>3%</td>
<td>1%</td>
<td>0%</td>
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<tr>
<td>Measure 3 - % of records with weights rounded to the nearest whole number</td>
<td>10%</td>
<td>5%</td>
<td>2%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>Measure 4 - % of records with complete home postcodes</td>
<td>23%</td>
<td>15%</td>
<td>10%</td>
<td>5%</td>
<td>3%</td>
<td>1%</td>
<td>0%</td>
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</tr>
<tr>
<td>Measure 5 - % of records with complete ethnicity codes</td>
<td>23%</td>
<td>15%</td>
<td>10%</td>
<td>5%</td>
<td>3%</td>
<td>1%</td>
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</tbody>
</table>

**Key:**
- Green indicates excellent performance.
- Amber indicates good performance.
- Red indicates areas for improvement.
The rows in Table C are sorted by the main data quality indicator: 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 rounded to 1 decimal place, and so it would be expected that approximately 10% of measurements would be rounded to the nearest 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 3 – 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.

Note that:
- Confidence limits have not been adjusted using the finite population correction factor; and
- 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.

Where applicable in this report, confidence limits are included in graphs. These confidence limits give an indication of whether any observed differences in prevalence (e.g. between school years) are likely to be real, or whether they are likely to be due to chance and the small numbers involved. **Where 95% confidence limits for two subgroups do not overlap, the difference can be said to be statistically significant.**

Year 6 obesity prevalence figures have the upper confidence limits expanded wherever possible in this report to represent the uncertainties in the estimates due to response bias. Analysis has shown that in Year 6, the children who opt out are more likely to be obese than those who are measured (see Annex 6). Given that the final Year 6 participation rates for the 2006/07, 2007/08, and 2008/09 NCMP were different (78%, 87%, and 89% respectively), this is an important consideration when assessing whether there has been a genuine change in obesity prevalence between the years.
Annex 4 - 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 score: $BMI = \frac{10,000}{h(cm)^2} \times w(kg)$

2. calculate the BMI z-score:
   a. look up child age (rounded to the nearest whole month) and sex on the UK National 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 >=0.85 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 5 – 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 measured 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 (further information on the validation process can be found in Annex 7);

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 DCSF 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.

---

14 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 6 - Effect of participation rate on prevalence

Since the participation rates for the NCMP were not 100%, the datasets used to estimate prevalence are based on samples. 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 undertaken in 2007/08 investigated whether there is a relationship between participation rate and obesity prevalence by plotting each PCT’s percentage point change in participation rate against their recorded change in prevalence.

It was deduced that there was no substantial association between participation rate and obesity prevalence for Reception children. However, it was suggested that there is a significant link between participation rates and obesity prevalence for Year 6 children. This suggests that a slightly disproportionate number of “obese” children in Year 6 could have missed measurement and, therefore, prevalence in Year 6 may be a slight underestimate.

The analysis showed that a 10 percentage point increase in Year 6 participation rate will, on average, lead to an increase in the Year 6 obesity prevalence estimate of approximately 0.6 percentage points. Around this estimate, there is a confidence interval of +/- 0.3 percentage points. The findings from similar analysis undertaken in 2008/09 was consistent with the 2007/08 findings.

Given that the Year 6 participation rate was 77.9% in 2006/07, it is likely that the true obesity prevalence in this year was underestimated by \(((100-77.9)/10)*0.6 = 1.3\) percentage points +/- 0.3.

Given that the Year 6 participation rate was 86.6% in 2007/08, it is likely that the true obesity prevalence in this year was underestimated by \(((100-86.6)/10)*0.6 = 0.8\) percentage points +/- 0.3.

Given that the Year 6 participation rate was 89.1% in 2008/09, it is likely that the true obesity prevalence in this year was underestimated by \(((100-89.1)/10)*0.6 = 0.7\) percentage points +/- 0.3.

The headline Year 6 obesity prevalence estimates presented throughout this report have not been adjusted to take into account this element of underestimation, but the
upper confidence limits for Year 6 in figure 5 (year-on-year comparisons) have been adjusted.

There may be other confounding factors which also have an impact on the prevalence figures, and these are not investigated in this report.

In conclusion, participation rate is shown to have a slight but significant positive association with the estimated prevalence of obese Year 6 children in the NCMP data. For Reception there is no significant association between participation rate and prevalence.
Annex 7 – Data cleaning

The data that PCTs uploaded to the NCMP database underwent a series of data quality checks before being included in the national dataset. A guidance document was provided to PCTs and gives full details of the data quality checks that NCMP 2008/09 data underwent. It is available on the following link:

www.ic.nhs.uk/ncmp/validation