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Version: 1

Date of Publication: 14th December 2011
We are grateful to all those who have contributed to this publication. First we would like to thank all those children who took part in the National Child Measurement Programme (NCMP); the schools for co-operating with the programme and the health teams around England who worked so hard to collect the data. We would also like to thank everyone at the Primary Care Trusts who managed the collection and submission of the data.

We would like to thank all those who have contributed to the production of this report including:

- Caroline Ridler and Hywell Dinsdale from the National Obesity Observatory for all their help and expertise during the production of the report.
- Rosie Taylor, Katherine Thompson and Ailsa McGinty from the Department of Health for all their help and support in managing the NCMP and to Chris Gibbins and Peter Dick for quality assuring this publication.
- The Department for Education for continued support and for providing information on the schools and number of pupils attending each school in England.
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Summary

This report summarises the key findings from the government’s National Child Measurement Programme (NCMP) for England, 2010/11 school year. The report provides high-level analysis 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 2010/11. The report contains comparisons with 2009/10 and where appropriate, comparisons have also been made with the results from earlier years.

Additional analysis will be produced by the National Obesity Observatory (NOO) (expected to be published in Spring 2012) and the anonymised national dataset will be made available to Public Health Observatories (PHOs) to allow regional and local analysis of the data.

In recognition of the effect of natural year to year variation, confidence intervals are included around the percentages in the tables and charts in this report where possible and should be considered when interpreting results. A confidence interval gives an indication of the sampling error around the estimate calculated and takes into consideration the sample sizes and the degree of variation in the data. They are used to determine whether any differences in prevalence figures are likely to be real or due to sampling variation.

As the sample sizes for NCMP are large (876,416 in 2006/07, 973,073 in 2007/08, 1,003,849 in 2008/09, 1,026,366 in 2009/10 and 1,036,608 in 2010/11) 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 2010/11 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 2 proportions, the term ‘similar’ has been used. Further details are provided in Annex 3.

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

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

- ‘underweight’ is defined as less than or equal to the 2nd centile;
- ‘overweight’ is defined as greater than or equal to the 85th centile but less than the 95th centile;
- ‘obese’ is defined as greater or equal to the 95th centile;
- ‘overweight and obese combined’ is defined as greater than or equal to the 85th centile.
in earlier years concluded that a lower participation rate may lead to an underestimation of prevalence for obese children for Year 6, but had little or no effect on prevalence for Reception children. It is estimated that Year 6 obesity prevalence may be underestimated by around 1.3 percentage points for 2006/07, around 0.8 percentage points for 2007/08, and around 0.7 percentage points for 2008/09. This appears to be due to obese children being less likely to participate in the NCMP than other children. The upper confidence intervals associated with Year 6 prevalence estimates were extended to indicate the potential underestimation in each of these years. Similar analysis carried out on the 2009/10 dataset showed that it was no longer appropriate to extend the confidence intervals around Year 6 obesity prevalence figures. This was again monitored in 2010/11 and although a slight effect was found, it was considered negligible, requiring no adjustment to either prevalence estimates or the associated confidence intervals. Further details are available in Annex 6.

Improvements in data quality over time can also affect prevalence figures. Although no analysis has yet been carried out to quantify any impact on 2010/11 data\(^2\), this should also be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant.

**Key findings for 2010/11\(^3\)**

- In total, 1,036,608 valid measurements were received for children in England, in Reception and Year 6 – approximately 93% of those eligible\(^4\). This represents an increase in participation rate since 2009/10 when 91% participated; the corresponding rates were 90% in 2008/09, 88% in 2007/08, and 80% in 2006/07.

- The prevalence of underweight, healthy weight, overweight and obese children by year and sex in England for 2010/11 is summarised in Table i. The prevalence of overweight and obese combined is also presented.

\(^2\) The following reports each contain information on the impact of data quality on prevalence rates in respect of previous year’s NCMP datasets

‘NCMP: Detailed Analysis of the 2006/07 National Dataset’

‘NCMP: Detailed Analysis of the 2007/08 National Dataset’

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

\(^3\) An improved methodology to test the statistical significance of the difference between two rates or proportions was introduced in 2009/10. Details are provided in Annex 3.

\(^4\) See ‘National Child Measurement Programme Operational Guidance for the 2011/12 school year’ (www.dh.gov.uk/en/Publichealth/Obesity/DH_100123) for further information on which children were eligible for inclusion.
• In Reception, over a fifth (22.6%) of the children measured were either overweight or obese. In Year 6, this proportion was one in three (33.4%).

• The percentage of obese children in Year 6 (19.0%) was over double that of Reception year children (9.4%).

• Among Reception year children, the prevalence of overweight pupils (13.2%) was greater than the prevalence of obese pupils (9.4%). In Year 6, the opposite was true with prevalence of overweight children (14.4%) being lower than that of obese children (19.0%).

• The prevalence of children with a healthy weight was higher in Reception year (76.4%) than Year 6 (65.3%). In both years a higher percentage of girls were at a healthy weight than boys. In Reception year 77.9% of girls and 75.0% of boys were a healthy weight and in Year 6 this was 66.6% and 64.0% respectively.

• The overall prevalence of underweight children is higher in Year 6 (1.3%) than in Reception (1.0%). In Reception, a higher percentage of boys were underweight than girls (1.2% and 0.8% 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 Central SHA had the lowest obesity prevalence for both Reception and Year 6 (8.1% and 16.5% respectively) whilst London SHA showed the highest obesity prevalence (11.1% and 21.9% for each age group respectively).

• SHAs with high obesity prevalence in Reception year 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 6.9% compared with 12.1% among those living in areas in the most deprived decile. Similarly, obesity prevalence among Year 6 children living in...
areas in the least deprived decile was 13.8% compared with 23.7% among those living in areas in the most deprived decile

- Obesity prevalence is significantly higher than the national average for children in both school years in the ethnic groups ‘Asian or Asian British’, ‘Any Other Ethnic Group’, and ‘Black or Black British’ and for the ethnic group ‘Mixed’ in Year 6.

- Obesity prevalence was significantly higher in urban 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 9.7% compared with 8.1% and 7.8% living in town and village areas respectively. Similarly, obesity prevalence among Year 6 children living in urban areas was 19.6% compared with 16.7% and 15.9% living in town and village areas respectively.

- 2010/11 NCMP data has been analysed using the Office for National Statistics Area Classification (ONS-AC) and is presented in this report for the first time. 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 results indicated that 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 2010/11 NCMP findings with earlier years

There are now five years of reliable NCMP data and Figure i presents the prevalence of underweight, overweight, obese and combined overweight and obese children by school year for 2006/07 to 2010/11.

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 2010/11 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 2 proportions, the term ‘similar’ has been used. Further details are provided in Annex 3.

It is important to note that all or some of the apparent difference of 0.8 percentage points in the proportion of obese children in Year 6 between 2006/07 and 2007/08 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).

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 2010/11 data, this should also be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant.
2010/11 compared with 2009/10:

- In Reception, the proportion of obese children (9.4%) was lower than in 2009/10 (9.8%). The proportion of overweight and obese children combined (22.6%) was also lower than in 2009/10 (23.1%). The proportion of underweight children was higher in 2010/11 (1.0%) than in 2009/10 (0.9%).

- In Year 6, the proportion of obese children (19.0%) was higher than in 2009/10 (18.7%). However the proportion of overweight and obese children combined was similar (33.4% in both years). The proportion of underweight children was also similar (1.3% in both years).

2010/11 compared with 2006/07:

- In Reception, the proportion of obese children (9.4%) was lower than in 2006/07 (9.9%). The proportion of overweight and obese children combined (22.6%) was also lower than in 2006/07 (22.9%). The proportion of underweight children (1.0%) was again lower than in 2006/07 (1.3%).

- In Year 6, the proportion of obese children (19.0%) was higher than in 2006/07 (17.5%). The proportion of overweight and obese children combined (33.4%) was also higher than in 2006/07 (31.6%). The proportion of underweight children (1.3%) was lower than in 2006/07 (1.5%).

Figure 1: Prevalence of underweight, overweight, obese and combined overweight and obese children by NCMP year and school year, 2006/07 to 2010/11

Notes:
1. All percentages are rounded to one decimal place.
Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset
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1 Introduction

Established in 2005/06, the National Child Measurement Programme (NCMP) for England\(^5\) records height and weight measurements of children in Reception (typically aged 4–5 years) and Year 6 (aged 10–11 years) and enables detailed analysis of prevalence and trends in child overweight and obesity levels. The program now holds five years of reliable data and the national report holds UK National Statistics status (see Annex 8). 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 NHS Information Centre for health and social care (NHS IC) since 2006/07. Data are supplied locally by PCTs with the support and cooperation of schools, in line with guidance\(^4\) from the Government Obesity Team.

This report presents the headline findings for the 2010/11 NCMP. The National Obesity Observatory (NOO) will produce additional analysis in 2012 (expected to be published in Spring 2012), and the anonymised national dataset will be made available to NOO and Public Health Observatories (PHOs) to allow regional and local analysis of the data. NCMP datasets relating to 2006/07 to 2009/10 have already been deposited in the UK Data Archive\(^6\) and a reduced version of this year’s dataset will be made available in early in 2012.

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

The NCMP includes all state schools in England (unless the school declined to participate or if the PCT did not manage to get into that school for other reasons). Independent and special schools\(^7\) are not formally required to participate although their participation is encouraged. Independent and special schools are excluded from the analysis in this report\(^8\), but are included in the dataset provided to NOO and to PHOs for further analysis.

\(^5\) See [www.dh.gov.uk/en/Publichealth/Obesity/DH_100123](http://www.dh.gov.uk/en/Publichealth/Obesity/DH_100123) for more information about the National Child Measurement Programme, including guidance and resources for undertaking the exercise.

\(^6\) UK Data Archive [www.data-archive.ac.uk](http://www.data-archive.ac.uk)

\(^7\) 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.

\(^8\) 106 out of approximately 2,300 independent or special schools in England chose to take part in 2010/11. Across all PCTs, there were a total of 789 Reception year and 1,210 Year 6 records relating to pupils in these schools. In total this represents only 0.19% 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.
Information for 2010/11 is presented by the current Local Authority (LA) areas (introduced in April 2009). This is available in the accompanying excel file only. Information is also presented by the pre-2009 LA boundaries. In addition, for the first time this year, LA prevalence data is available 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). In previous years, LA level data has only been available on the basis of the LA in which the school is located. Although in general the 2 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 LA different to their home LA, such as LAs in inner London. The National Obesity Observatory (NOO) intend to publish guidance in early 2012 to assist users further interpret these figures.

Information is also available by the PCT cluster structures introduced in June 2011. (Online Table 6).

The NHS Information Centre continues to look for ways to improve this publication. Feedback can be provided via www.ic.nhs.uk/ncmp.
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. PCT staff entered these data into specially designed Excel spreadsheets: the NCMP Upload Tool. Measurements could be taken at any time during the 2010/11 academic year. Consequently, some children were almost two years older than others in the same school year at the point of measurement⁹, however, body mass index (BMI) centile results are adjusted for age.

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 and checks were done at each stage of process. 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 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.

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).

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⁹ At the time of measurement in 2010/11, 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 are unchanged since 2008/09. The impact on the prevalence figures as a result of inclusion of pupils outside these age ranges is negligible.
2.2 Definitions of underweight, healthy weight, overweight and obese

Prevalence rates were calculated by deriving every child's BMI\(^{10}\) and referencing the age and sex-specific centiles calculated using the British 1990 growth reference (UK90) to count 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\(^{11}\).

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). Prevalence figures which are based on the thresholds used in a clinical setting are available on the NOO website via eAtlas.

2.3 Analyses

2.3.1 Participation

Pupils eligible for inclusion in the NCMP were all children in Reception and Year 6 attending non-specialist maintained state schools in England\(^{12}\).

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\(^{10}\) Body mass index (BMI) is an indicator of body fat based on height and weight. BMI = weight (kg)/height\(^2\) (m\(^2\))


\(^{12}\) 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.
The numbers of pupils at each school were provided by the Department for Education (DfE), but PCTs could edit these figures if necessary. The PCT could also add or remove 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 NHS IC to ensure accuracy.

The participation rate is the proportion of eligible pupils for whom valid measurements were recorded (see Annex 5). Participation rates are estimates and should be treated with caution, particularly at smaller geographical levels, because of the difficulty in calculating the number of pupils eligible for measurement. For example, in Reception, 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 Local Authority (LA) location, are based on the location of the child’s school, as well as, for the first time this year, the child’s residence. This has been possible due to improvements in child postcode coverage.

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%\(^{13}\) in 2007/08 to 99.7% in 2010/11. The child postcode is mapped to Lower Super Output Area (LSOA) to anonymise the data on upload, and is a useful field for analyses by PHOs and PCTs.

The National Obesity Observatory (NOO) published analysis guidance\(^ {14}\) to assist users wish 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 3.

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\(^{13}\) This percentage has been amended from 97% previously published following an exercise to further cleanse historic NCMP datasets and re-circulate to PHOs.

\(^{14}\) ‘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 3 is also applied in this report where appropriate. 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 increased to 88% in 2007/08, to 90% in 2008/09, to 91% in 2009/10 and to 93% in 2010/11. Regression analysis was performed 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 NCMP dataset showed that it was no longer appropriate to extend the upper confidence intervals around Year 6 obesity prevalence figures. This was again monitored in 2010/11. A significant association between participation rate and obesity prevalence was identified for both Reception year ($r = 0.24$) and Year 6 ($r = 0.36$). However, given the high overall participation rate (93.4% for Reception year and 91.8% for Year 6) and low standard deviation in these rates (4.2% for Reception year and 4.7% for Year 6), the impact of differential opt-out among obese children was much smaller than in previous years and considered negligible and therefore no adjustment was made. We will continue to monitor this relationship in subsequent NCMP reports, although if high participation rates are maintained it is unlikely any adjustment will be considered necessary. Further details on this are available in Annex 6.

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

3.1 Participation

The participation rate is the percentage of pupils eligible in state schools in each year group for whom valid measurements were recorded. In 2010/11, PCTs were working towards a goal of achieving at least an 85% participation rate in each year group.

The overall participation rates achieved nationally in 2010/11 were:

- 93% for Reception year (541,255 pupils measured); a 0.6 percentage point increase from 2009/10
- 92% for Year 6 (495,353 children); a 1.9 percentage point increase from 2009/10
- 93% for Reception and Year 6 combined (1,036,608 children); a 1.2 percentage point increase from 2009/10.

All 151 PCTs provided data for Reception year and Year 6 children in 2010/11.

- 96% of PCTs (145 of 151) met or exceeded the 85% participation rate goal for Reception year, compared with 97% (148 of 152) in 2009/10.
- 95% of PCTs (144 of 151) met or exceeded the 85% participation rate goal for Year 6, compared with 94% (143 of 152) in 2009/10.
- Annex 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:

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15 On 01/04/2010 Blackburn with Darwen PCT (5CC) was renamed to Blackburn with Darwen Teaching Care Trust Plus (TAP). West Hertfordshire PCT (5P4) and East and North Hertfordshire PCT (5P3) merged to become Hertfordshire PCT (5QV). As a result, there are now 151 PCTs post April 2010 compared with 152 pre April 2010. As a result of a statutory instrument which took effect on 15th April 2011, the designation of Solihull Care Trust (TAM) has been revoked and organisation is now known as Solihull PCT (5QW).
Figure 1: NCMP participation rates for Reception year, 2010/11, by Primary Care Trust


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Figure 2: NCMP participation rates for Year 6 2010/11, by Primary Care Trust


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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.16

Since the NCMP sample size is large, the confidence intervals of the prevalence estimates are very narrow at national level. Where 95% confidence intervals for prevalence estimates do not overlap, it can be deduced that differences are statistically significant. As this is a conservative method of testing for significance, the method described in Annex 3 is also applied in this report where appropriate.

Table A in Annex 1 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, 2010/11.

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16 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.
Figure 3: Prevalence of underweight, overweight, obese and combined overweight and obese children in Reception, by sex, England, 2010/11

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>1.2%</td>
<td>0.8%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Overweight</td>
<td>13.8%</td>
<td>12.6%</td>
<td>13.2%</td>
</tr>
<tr>
<td>Obese</td>
<td>10.1%</td>
<td>9.4%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Overweight and obese combined</td>
<td>23.9%</td>
<td>21.3%</td>
<td>22.6%</td>
</tr>
</tbody>
</table>

Notes:  
1. All percentages are rounded to one decimal place.  
Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset  
Copyright © 2011. The Health and Social Care Information Centre, Lifestyle Statistics. All Rights Reserved.

Figure 4: Prevalence of underweight, overweight, obese and combined overweight and obese children in Year 6, by sex, England, 2010/11

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
<th>Both</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>14.3%</td>
<td>14.4%</td>
<td>14.4%</td>
</tr>
<tr>
<td>Obese</td>
<td>20.6%</td>
<td>19.0%</td>
<td>19.3%</td>
</tr>
<tr>
<td>Overweight and obese combined</td>
<td>34.9%</td>
<td>31.8%</td>
<td>33.4%</td>
</tr>
</tbody>
</table>

Notes:  
1. All percentages are rounded to one decimal place.  
Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset  
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Figure 5 shows the 2010/11 prevalence breakdowns including healthy weight.

Key findings for 2010/11:

- In Reception over a fifth (22.6%) of children were classified as either overweight or obese; in Year 6 this proportion was one in three (33.4%);

- The prevalence of obese children in Year 6 (19.0%) is over double that in Reception (9.4%);

- Prevalence of obesity was found to be higher among boys than girls in both school years. In Reception, 10.1% boys and 8.8% girls were classified as obese. In Year 6 the percentages were 20.6% and 17.4% respectively;

- The overall prevalence of underweight children is higher in Year 6 (1.3%) than in Reception (1.0%). In Reception, a higher percentage of boys were underweight than girls (1.2% and 0.8% respectively); whereas in Year 6, a higher percentage of girls were underweight than boys (1.5% and 1.1% respectively);

- Among Reception year children, the prevalence of overweight pupils (13.2%) was greater than the prevalence of those who were classified as obese (9.4%). In Year 6, the opposite was true with prevalence of overweight children (14.4%) being lower than that of obese children (19.0%).

- The prevalence of children with a healthy weight was higher in Reception year (76.4%) than Year 6 (65.3%). In both years a higher percentage of girls were at a healthy weight than boys. In Reception year 77.9% of girls and 75.0% of boys were a healthy weight and in Year 6 this was 66.6% and 64.0% respectively.
3.2.2 Comparisons between the 2010/11 headline findings and those of previous years

It is important to note that all or some of the apparent difference of 0.8 percentage points in the proportion of obese children in Year 6 between 2006/07 and 2007/08 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).

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 6 of the report.

Figure 6 shows the prevalence of underweight, overweight, obese and combined overweight and obese children between 2006/07 to 2010/11.

![Figure 6: Prevalence of underweight, overweight, obese and combined overweight and obese children by NCMP year and school year, 2006/07 to 2010/11](image)
The key findings when the results from 2010/11 are compared to 2009/10 are as follows:

- In Reception, the proportion of obese children (9.4%) was lower than in 2009/10 (9.8%). The proportion of overweight and obese children combined (22.6%) was also lower than in 2009/10 (23.1%). The proportion of underweight children was higher in 2010/11 (1.0%) than in 2009/10 (0.9%).

- In Year 6, the proportion of obese children (19.0%) was higher than in 2009/10 (18.7%). However the proportion of overweight and obese children combined was similar (33.4% in both years). The proportion of underweight children was also similar (1.3% in both years).

The key findings when the results from 2010/11 are compared to 2006/07 are as follows:

- In Reception, the proportion of obese children (9.4%) was lower than in 2006/07 (9.9%). The proportion of overweight and obese children combined (22.6%) was also lower than in 2006/07 (22.9%). The proportion of underweight children (1.0%) was again lower than in 2006/07 (1.3%).

- In Year 6, the proportion of obese children (19.0%) was higher than in 2006/07 (17.5%). The proportion of overweight and obese children combined (33.4%) 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 2010/11 are shown in Figure 8 for Reception and Figure 9 for Year 6. Detailed tables are available in Annex 1 showing underweight, healthy weight, overweight, and obese prevalence, with associated 95% confidence intervals, by school year, at PCT and SHA.

NCMP data for 2010/11 is presented by the new LA areas (introduced in April 2009). Information also presented by the pre-2009 LA areas as these are still recognised geographical areas. In addition, for the first time this year LA prevalence data is available on the basis of both the LA in which the school is located and the LA of the child’s residence (Online Tables 3 and 3A).

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

Figure 8: Prevalence of underweight, overweight, and obese children in Reception, by SHA, England, 2010/11

Notes:
1. All percentages are rounded to one decimal place.
Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset
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Figure 9: Prevalence of underweight, overweight, and obese children in Year 6, by SHA, England, 2010/11

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

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset
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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 2010/11.

Figure 10: Prevalence of “combined overweight and obese” children, by school year and SHA, England, 2010/11

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

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset
Copyright © 2011. The Health and Social Care Information Centre, Lifestyle Statistics. All Rights Reserved.
Key findings:

- Obesity prevalence varied by Strategic Health Authority (SHA). South Central SHA had the lowest obesity prevalence for both Reception and Year 6 (8.1% and 16.5% respectively) whilst London SHA showed the highest obesity prevalence (11.1% and 21.9% for each age group respectively).

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

- 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 further analysis of the 2010/11 NCMP data, and this will provide further analysis on the links between obesity and other factors. This is expected to be published from Spring 2012 and will be available from the following link: www.noo.org.uk/NOO_pub

3.3.4 Prevalence by Primary Care Trust

Obesity prevalence varied by Primary Care Trust (PCT). For Reception Year this ranged from 6.4% in Richmond and Twickenham PCT to 14.6% in City and Hackney PCT and in Year 6 the range was from 10.7% in Richmond and Twickenham PCT to 26.4% in Southwark PCT.

Figures 11 and 12 show Reception and Year 6 obesity prevalence by PCT, where the PCT recorded is the one that took responsibility for the school the child attended. Annex 1 provides more detailed tables.
Figure 11: Prevalence of obese children in Reception, by Primary Care Trust, England, 20010/11


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Figure 12: Prevalence of obese children in Year 6, by Primary Care Trust, England, 2010/11


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3.3.5 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. Currently, there are an insufficient number of years in the NCMP time series where child postcode completion rates are high enough to allow comparisons of IMD data over time on the basis of child postcode. This will be reviewed in subsequent publications and the basis may change if the high child postcode completion rate seen in recent years is maintained. NOO intend to publish guidance in early 2012 to assist users to further interpret the differences that arise between prevalence figures which are derived on the two different bases.

Figure 13: Prevalence of underweight, overweight and obese children in Reception by school area 2010 IMD deciles, England, 2010/11

Notes:
1. All percentages are rounded to one decimal place.
2. IMD decile - 1st decile (least deprived), 10th decile (most deprived). This is a change from previous years when IMD decile ‘1’ used to correspond to the most deprived and ‘10’ to the least deprived deciles. This change has been carried out to introduce consistency in the labelling convention used in NCMP reports produced by the NHS IC and the National Obesity Observatory (NOO) which present IMD data.

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset

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Figure 14: Prevalence of underweight, overweight and obese children in Year 6 by school area 2010
IMD decile, England, 2010/11

Notes:
1. All percentages are rounded to one decimal place.
2. IMD decile - 1st decile (least deprived), 10th decile (most deprived). This is a change from previous years when IMD decile '1' used to correspond to the most deprived and '10' to the least deprived deciles. This change has been carried out to introduce consistency in the labelling convention used in NCMP reports produced by the NHS IC and the National Obesity Observatory (NOO) which present IMD data.

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset
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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 2010/11.

Figure 15: Prevalence of "combined overweight and obese" children, by school area 2010 IMD decile, England, 2010/11

Notes:
1. All percentages are rounded to one decimal place.
2. IMD decile - 1st decile (least deprived), 10th decile (most deprived). This is a change from previous years when IMD decile '1' used to correspond to the most deprived and '10' to the least deprived deciles. This change has been carried out to introduce consistency in the labelling convention used in NCMP reports produced by the NHS IC and the National Obesity Observatory (NOO) which present IMD data.

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset
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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 year children attending schools in areas in the least deprived decile was 6.9% 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 13.8% compared with 23.7% among those attending school in the most deprived decile.

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

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

- The three most deprived groups have a prevalence of underweight children that is higher than the national average for both school years;
3.3.6 Prevalence by ethnicity

Since 2007/08, collection of the ethnicity of participating children was a mandatory requirement. PCTs were able to supply ethnic code 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.\textsuperscript{17}

Of the 1,036,608 children for whom valid measurements were submitted, 83% 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 2007/08 and 2008/09 when 67% and 77% of records respectively had a valid ethnic code and the same percentage as seen in 2009/10.

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.

\textsuperscript{17} The seven ethnic categories used for analysis have been derived by combining the following NHS ethnic categories:

- **White**: White British, White Irish, White Any other White background;
- **Mixed**: Mixed White and Black Caribbean, Mixed White and Black African, Mixed White and Asian, Mixed Any other mixed background;
- **Asian or Asian British**: Asian and Asian British Indian, Asian and Asian British Pakistani, Asian and Asian British Bangladeshi, Asian and Asian British Any other Asian background;
- **Black or Black British**: Black or Black British Caribbean, Black or Black British African, Black or Black British Any other Black background;
- **Chinese**: Chinese;
- **Any other ethnic group**: Any other ethnic group;
- **Unknown**: Not Stated or data not returned by PCT
Figure 16: Prevalence of underweight, overweight and obese children in Reception, by ethnic category, England, 2010/11

Figure 17: Prevalence of underweight, overweight and obese children in Year 6, by ethnic category, England, 2010/11

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 2010/11.
Figure 18: Prevalence of "combined overweight and obese" children, by ethnic category, England, 2010/11

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

- Obesity prevalence is significantly higher than the national average for children in both school years in the ethnic groups ‘Asian or Asian British’, ‘Any Other Ethnic Group’, and ‘Black or Black British’ and for the ethnic group ‘Mixed’ in Year 6

- Obesity prevalence is 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’
3.3.7 Prevalence by rural/urban classification

Collection of the home postcode of participating children has been a formal requirement since 2008/09. In 2010/11 of the 1,036,608 children for whom valid measurements were uploaded to the NCMP Database, 99.7% 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, to ensure that the NHS IC did not hold home postcode for any child.

Each record was assigned a rural/urban classification\(^\text{19}\) according to the settlement form of the LSOA of the child.

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

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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 20: Prevalence of underweight, overweight and obese children in Year 6, by rural/urban classification, England, 2010/11

<table>
<thead>
<tr>
<th></th>
<th>Village, Hamlet &amp; Isolated Dwellings</th>
<th>Town and Fringe</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>0.9%</td>
<td>1.1%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Overweight</td>
<td>14.0%</td>
<td>14.2%</td>
<td>14.4%</td>
</tr>
<tr>
<td>Obese</td>
<td>15.9%</td>
<td>16.7%</td>
<td>19.6%</td>
</tr>
</tbody>
</table>

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

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset
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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 2010/11.

Figure 21: Prevalence of "combined overweight and obese" children, by rural/urban classification, England, 2010/11

<table>
<thead>
<tr>
<th></th>
<th>Village, Hamlet &amp; Isolated Dwellings</th>
<th>Town and Fringe</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reception</td>
<td>21.2%</td>
<td>21.7%</td>
<td>22.8%</td>
</tr>
<tr>
<td>Year 6</td>
<td>30.0%</td>
<td>30.9%</td>
<td>34.1%</td>
</tr>
</tbody>
</table>

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

Source: The Health and Social Care Information Centre, Lifestyle Statistics / Department of Health Obesity Team NCMP Dataset
Copyright © 2011. The Health and Social Care Information Centre, Lifestyle Statistics. All Rights Reserved.
Key findings for 2010/11:

- As was the case in previous years, obesity prevalence was significantly higher in urban areas than in rural areas for each age group. The obesity prevalence among Reception year children living in urban areas was 9.7% compared with 8.1% and 7.8% living in town and village areas respectively. Similarly, obesity prevalence among Year 6 children living in urban areas was 19.6% compared with 16.7% and 15.9% living in town and village areas respectively.

- The prevalence of underweight children is significantly higher in urban areas than in rural areas for both age groups. In Reception year, 1.1% of children in urban areas were underweight compared to 0.6% in town and 0.5% in village areas. In Year 6 these percentages were 1.4%, 1.1% and 0.9% respectively;

The National Obesity Observatory’s 2006/07 and 2007/08 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.

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

NCMP data has 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’.

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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 2010/11 NCMP data. This analysis uses the seven ‘supergroups’ provided within the ONS-AC at LSOA level. Categories have been assigned to individual children based on the LSOA of residence.

Figure 22: Prevalence of obese children in Reception, by ONS-AC supergroup, England 2010/11

Figure 23: Prevalence of obese children in Year 6, by ONS-AC supergroup, England 2010/11
Key findings for 2010/11:

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

Previous analysis\(^{23}\) has shown that the differences in obesity prevalence between ONS-AC groups are similar for boys and girls and across the nine Government Office Regions (GORs). The relative differences between ONS-AC categories have also remained constant over time.

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

The National Obesity Observatory have produced a report ‘NCMP: Analysis using the ONS Area Classification’ which provides more information on his approach\(^{23}\).

3.3 Comparison of results with the Health Survey for England

The Health Survey for England (HSE)\(^{24}\) is a series of sample-based surveys focusing on a range of health indicators including obesity in children. Analysis to consider where meaningful comparisons could be made between NCMP data and the child obesity data contained within HSE was carried out in previous years. This resulted in comparisons between 2007/08 NCMP and HSE 2007 data, and between 2008/09 NCMP and HSE 2008 data being made. The findings from this can be found in Chapter 13 of the HSE 2008.\(^{25}\) Due to the smaller sample sizes associated with HSE 2009, comparisons were not attempted between 2009/10 NCMP and HSE 2009 data.

This year, a comparison between 2010/11 NCMP and HSE 2010 data will be undertaken by the National Obesity Observatory (NOO) and included in their report (expected to be published in Spring 2012).

\(^{23}\) ‘NCMP: Analysis using ONS Area Classification’ (www.noo.org.uk/gsf.php5?f=11678&fv=12524)
\(^{24}\) Health Survey for England (www.ic.nhs.uk/hse)
\(^{25}\) ‘Health Survey for England 2008: Physical activity and fitness’ (www.ic.nhs.uk/pubs/hse08physicalactivity)
4 Further sources of information

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

Health Survey for England

The Health Survey for England (HSE) is an annual report that presents information on child BMI and obesity for children in England aged 2 to 15. Information is presented at England level and in some years by Strategic Health Authority. The HSE 2010 is expected to be published by the NHS Information Centre on 15th December 2011.

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 2009, with trend tables updated for 2010 expected to be published alongside the main report on 15th December 2011.

The HSE publications can be accessed from the following link:
www.ic.nhs.uk/hse

National Obesity Observatory (NOO)

The National Obesity Observatory (NOO) provide a number of resources relating to the NCMP and child obesity in general. NCMP resources include the child e-Atlas (a data visualisation tool contain NCMP data at PCT and LA level for all years of the NCMP), guidance for analysis of NCMP data, and a variety of reports providing detailed analysis of NCMP data. Resources relating to child obesity in general include a slide set which presents key data and information on child obesity and a simple guide to classifying body mass index in children.

All NOO resources can be accessed via the NOO website:
www.noo.org.uk

Statistics on Obesity, Physical Activity and Diet: England 2011

This compendium report brings together a wide range of information on child obesity, diet and physical activity, along with information on obesity in adults and health outcomes associated with obesity.
www.ic.nhs.uk/OPAD
Annex 1- Detailed tables

Table A shows the prevalence of underweight, healthy weight, overweight and obese children, by school year, at Primary Care Trust (PCT) and Strategic Health Authority (SHA).

Table A: Prevalence of underweight, healthy weight, overweight and obese children, with associated 95% confidence intervals, by PCT and SHA, England, 2010/11

<table>
<thead>
<tr>
<th>SHA/PCT Name</th>
<th>SHA/PCT Code</th>
<th>SHA/PCT numeric code</th>
<th>Prevalence</th>
<th>95% confidence interval</th>
<th>Prevalence</th>
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<td>England</td>
<td>SHA/PCT Code</td>
<td>SHA/PCT numeric code</td>
<td>Prevalence</td>
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</tbody>
</table>

Copyright © 2011, The Health and Social Care Information Centre. All Rights Reserved.
<table>
<thead>
<tr>
<th>SHA/PCT Name</th>
<th>SHA/PCT Code</th>
<th>SHA Alpha</th>
<th>CRN Code</th>
<th>Prevalence</th>
<th>95% confidence interval</th>
<th>Prevalence</th>
<th>95% confidence interval</th>
<th>Prevalence</th>
<th>95% confidence interval</th>
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<th>95% confidence interval</th>
<th>Prevalence</th>
<th>95% confidence interval</th>
<th>Prevalence</th>
<th>95% confidence interval</th>
<th>Prevalence</th>
<th>Number of children measured</th>
<th>Participation rate</th>
<th>Reception Year 6</th>
<th>Reception Year 6</th>
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</thead>
<tbody>
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<tr>
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<td>84,292</td>
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</table>

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| SHA/PC Name       | SHA/PC Code | DNS Alpha Numeric code | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Prevalence | 95% confidence interval | Source: The Health and Social Care Information Centre, Lifestyle Statistics. Department of Health Obesity Trends NCMDS Dataset. Copyright © 2011. The Health and Social Care Information Centre, Lifestyle Statistics. All Rights Reserved. |
Annex 2 - Data quality report

Table B shows a number of PCT data quality measures for the 2010/11 NCMP. As discussed at the beginning of Section 3, there have been considerable improvements in the overall participation rate since 2006/07.

Table B: PCT data quality report for NCMP 2010/11

<table>
<thead>
<tr>
<th>Measure</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>
<tbody>
<tr>
<td>Measure 1 - Overall participation rate</td>
<td>≥90%</td>
<td>≥85% or &lt;90%</td>
<td>&lt;85%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 2 - % of records with heights rounded to the nearest whole number</td>
<td>&gt;5% and &lt;25%</td>
<td>≥25% or ≤50%</td>
<td>&lt;5% or &gt;50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 3 - % of records with weights rounded to the nearest whole number</td>
<td>&gt;5% and &lt;25%</td>
<td>≥25% or ≤50%</td>
<td>&lt;5% or &gt;50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 4 - % of records with missing home postcodes</td>
<td>&lt;25%</td>
<td>≥25% or ≤50%</td>
<td>&gt;50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 5 - % of records with missing ethnicity codes</td>
<td>&lt;25%</td>
<td>≥25% or ≤50%</td>
<td>&gt;50%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The main data quality indicator is measure 1, the overall participation rate (the percentage of eligible Reception and Year 6 children for which valid measurements were received).

Four other data quality measures are also presented:

- Measures 2 and 3: percentage of records with rounded heights / weights. Heights and weights in the NCMP should be 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 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.

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 where appropriate. This is an improvement on the statistical significance testing methodology carried out in NCMP reports prior to 2009/10 and makes this analysis consistent with that used and
advised by the Association of Public Health Observatories (APHO) and the National Obesity Observatory.

- Calculate 95% confidence intervals using the method described by Wilson\textsuperscript{26} and Newcombe\textsuperscript{27}

- 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 = \( p = \frac{r}{n} \)
  proportion without feature of interest = \( q = (1 - p) \)

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

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

  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

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

  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)\textsuperscript{28} should then be followed

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

\textsuperscript{26} Wilson EB (1927) Probable inference, the law of succession, and statistical inference. J Am Stat Assoc; 22:209-212


\textsuperscript{28} Altman DG, Machin D, Bryant TN and Gardner MJ (2000) Statistics with Confidence, 2\textsuperscript{nd} edn. London; BMJ books; 49
Then calculate the confidence limits around \( \hat{D} \) as:

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

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

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

This improved methodology has not been applied to previous years. However, users would be able to do so using the methodology above.
Annex 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: $BMi = \frac{10,000}{h^2(cm^2)} \times w(kg)$

2. calculate the BMI z-score:
   a. look up child age (rounded to the nearest whole month) and sex on the UK90 BMI centiles classification;
   b. retrieve the corresponding L, M, and S values for use in the following formula (where y is the BMI score):

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

3. calculate the BMI p-score by converting the above z-score using the standardised normal distribution

4. children with a BMI p-score of <=0.02 are flagged as 'underweight', those with a p-score >0.02 and <0.85 are flagged as 'healthy', those with a p-score >=0.85 and <0.95 are flagged as 'overweight' and those with a p-score >=0.95 are flagged as 'obese'.

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

---

29 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

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

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

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

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

As in previous years, the strength of the relationship between participation rate and obesity prevalence has been assessed for 2010/11. The strength of the linear relationship between the two variables was calculated using a numerical measure known as the product moment correlation coefficient ($r$). This measures how close to a straight line the points lie on a graph. If the points lie exactly on a straight line with a positive gradient, $r$ would equal 1. If the points lie exactly on a straight line with negative gradient, $r$ would equal -1. A value of $r = 0$ indicates that the variables are not correlated.

The value of $r$ was calculated to be 0.24 for Reception year and 0.36 for Year 6. The critical value of $r$ above which the association can be determined to be significant under a one tail test (a test to determine whether obese children are more likely to opt out is one tail as bias is thought to be in a particular direction) is 0.134. Thus, the association between participation rate and obesity prevalence was significant for both age groups.

In order to ascertain the necessity of introducing an adjustment to the obesity prevalence estimates, or the confidence intervals associated with them, both the strength of the association between participation and obesity and the impact of differential opt out must be examined. The
overall participation rate was high (93.4% for Reception year and 91.8% for Year 6) and the standard deviation in these rates were low (4.2% for Reception year and 4.7% for Year 6), which raises the possibility that differential opt-out among obese children had a much smaller effect than in previous years when participation rates were lower, in spite of the significant association.

An estimate of the overall impact on the prevalence figures was carried out using the same method as previous years with a refinement\(^\text{30}\). NCMP data relating to both 2010/11 and 2009/10 was used to examine how the change in participation rate affected the change in the obesity prevalence.

The value of r showing the strength of the relationship between change in participation rate and change in obesity was found to be 0.147 for Reception year and 0.176 for Year 6, indicating the association was significant for Year 6 only. The formula for the line of best fit for Year 6 ($y = 0.002232 + 0.03816x$) shows that a 1 percentage point increase in Year 6 participation rate between 2009/10 and 2010/11 will, on average, lead to an increase in the Year 6 obesity prevalence estimate of approximately 0.038 percentage points. Around this estimate, there is a confidence interval of +/- 0.034 percentage points.

Given that the Year 6 participation rate was 91.8% in 2010/11, it is likely that the true obesity prevalence in this year was underestimated by (100-91.8)*0.038 = 0.31 percentage points +/- 0.17 percentage points.

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

In conclusion, although participation rate is shown to have a slight but significant positive association with the estimated prevalence of obese children in both Reception year and Year 6 in the 2010/11 NCMP data, the impact of differential opt-out among obese children was much smaller than in previous years and considered negligible, requiring no adjustment to either prevalence estimates or the associated 95% confidence intervals.

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\(^{30}\) This method was refined slightly; participation rates in both 2009/10 and 2010/11 were recalculated before the linear regression was performed, so that rates related to the participation amongst just those schools that took part in the NCMP in each respective year. This was in order to isolate the effect of differential opt-out among obese children in just those schools that took part.
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 introduced for the 2008/09 NCMP collection and was provided to PCTs. This document gives full details of the data quality checks that the NCMP 2010/11 data underwent. It is available on the following link: www.ic.nhs.uk/ncmp/validation
Annex 8 – United Kingdom Statistics Authority Assessment of the National Child Measurement Programme: England

During 2009, the National Child Measurement Programme: England report published by the NHS Information Centre underwent assessment by the United Kingdom Statistics Authority. Following assessment, the publication was awarded National Statistics status (see below):

The United Kingdom Statistics Authority has designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the Code of Practice for Official Statistics.

Designation can be broadly interpreted to mean that the statistics:

- meet identified user needs;
- are well explained and readily accessible;
- are produced according to sound methods; and
- are managed impartially and objectively in the public interest.

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.


This publication may be requested in large print or other formats.
Responsible Statistician
Paul Eastwood, Lifestyle Statistics Section Head

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