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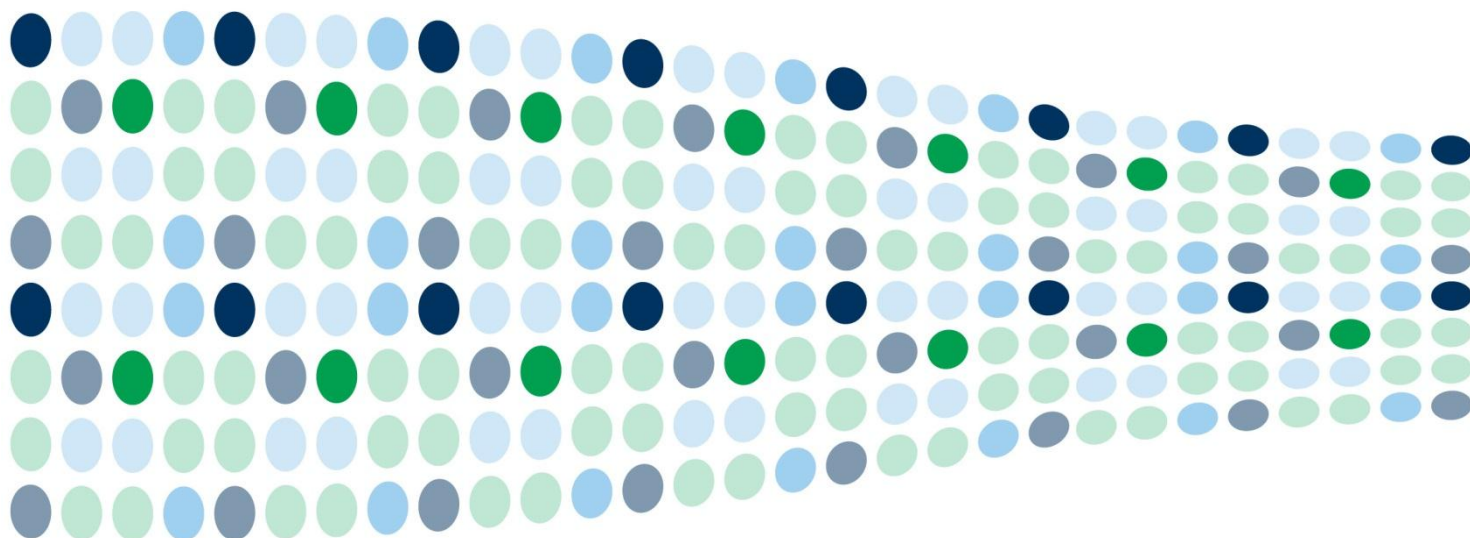


Public Health  
England



# National Child Measurement Programme:

England, 2013/14 school year



Published 3 December 2014

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- Rachel Conner and Peter Dick from the Department of Health 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.

## National Statistics Status

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.

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## Executive Summary

This report summarises the key findings from the government's National Child Measurement Programme (NCMP) for England, 2013/14 school year and makes comparisons with previous years<sup>1</sup>.

The data are used at a national level to inform policy and locally to inform the planning and commissioning of services. Through provision of a child's result to their parents, the NCMP also provides local areas with an opportunity to raise parents' awareness of child obesity as an issue, raise parents' awareness of their own child's weight status and potential health impacts, and provide an opportunity to provide further support to families to make healthy lifestyle changes.

- 1,101,611 valid measurements were received for children in England, in reception and year 6 – approximately 94 per cent of those eligible<sup>2</sup>.
- In reception:
  - Over a fifth (22.5%) of the children measured were either overweight or obese. This was higher than in 2012/13 (22.2%) but lower than in 2006/07 (22.9%)
  - The proportion of obese children (9.5%) was higher than in 2012/13 (9.3%) but lower than in 2006/07 (9.9%).
- In year 6:
  - Around a third (33.5%) of the children measured were either overweight or obese. This was higher than in 2012/13 (33.3%) and also higher than in 2006/07 (31.6%)
  - The proportion of obese children (19.1%) was higher than in 2012/13 (18.9%) and also higher than in 2006/07 (17.5%).
- By geography:
  - Obesity prevalence varied by Local Authority (LA)<sup>3</sup>. For reception this ranged from 5.5 per cent in the Royal Borough of Windsor and Maidenhead<sup>4</sup> and 6.0 per cent in the Royal Borough of Kingston Upon Thames to 14.4 per cent in the London Borough Of Hackney<sup>5</sup>. In year 6 the range was from 11.1 per cent, in the London Borough Of Richmond Upon Thames Council, to 26.7 per cent in London Borough Of Southwark Council.
- By deprivation:
  - The obesity prevalence among reception year children attending schools in areas in the most deprived decile was 12.0 per cent compared with 6.6 per cent among those attending schools in areas in the least deprived decile.

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<sup>1</sup> It is important to note that improvements in data quality over time can affect prevalence figures. For example, prevalence rates for the different BMI categories for an LA should be treated with caution if the participation rate for that LA is low. This is because there is a chance that the children measured may not be representative of all the children in that LA. This should also be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant.

<sup>2</sup> See 'National Child Measurement Programme Operational Guidance for the 2013/14 school year' ([www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/226203/NCMP\\_Guidance\\_2013\\_to\\_2014.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226203/NCMP_Guidance_2013_to_2014.pdf)) for further information on which children were eligible for inclusion

<sup>3</sup> This is based on the upper tier local authority that the school was located within.

<sup>4</sup> It should be noted that the participation rate for Royal Borough of Windsor and Maidenhead was particularly low at 34.2 per cent. This may impact on the obesity prevalence rate if those children measured were not representative of all children in the LA.

<sup>5</sup> Figures for London Borough of Hackney also include City of London.

- Similarly, obesity prevalence among year 6 children attending schools in areas in the most deprived decile was 24.7 per cent compared with 13.1 per cent among those attending schools in areas in the least deprived decile.

# Chapter 1 Introduction

## 1.1 Background

Established in 2005/06, the National Child Measurement Programme (NCMP) for England<sup>6</sup> records height and weight measurements of children in state-maintained schools<sup>7</sup> in reception (aged 4–5 years) and year 6 (aged 10–11 years). The programme now holds eight years of reliable data (2006/07 is the first year that the data were considered an acceptable quality as the prevalence rate was only 48 per cent in 2005/06), and the national report holds UK National Statistics status. The programme provides robust data for the child excess weight indicators in the Public health Outcomes Framework, and is a key element of the Government's approach to tackling child obesity. The data are regarded as a valuable tool for driving action to tackle child obesity both locally and nationally. Through provision of a child's result to their parents, the NCMP also provides local areas with an opportunity to raise parents' awareness of child obesity as an issue, raise parents' awareness of their own child's weight status and potential health impacts, and provide an opportunity to provide further support to families to make healthy lifestyle changes.

Public Health England (PHE) has responsibility for national oversight of the programme, and on its behalf, the central collation and analysis of the NCMP data is coordinated by the Health and Social Care Information Centre (HSCIC). Local Authorities have a statutory responsibility to deliver the National Child Measurement Programme.

## 1.2 Contents of the report

This report presents the findings for the NCMP from the 2013/14 school year. It provides high-level analyses of the prevalence of 'underweight', 'healthy weight', 'overweight', 'obese' and 'combined overweight and obese'<sup>8</sup> children measured in state-maintained schools in England in the school year 2013/14. The report contains comparisons with 2012/13 and, where appropriate, comparisons have also been made with the results from earlier years<sup>9</sup>.

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<sup>6</sup> See [www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/226203/NCMP\\_Guidance\\_2013\\_to\\_2014.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226203/NCMP_Guidance_2013_to_2014.pdf) for more information about the National Child Measurement Programme, including guidance and resources for undertaking the exercise.

<sup>7</sup> The NCMP includes all state schools in England (unless the school declined to participate or if the responsible organisation did not measure in that school for other reasons). Any data collected from independent or special schools is excluded from this analysis. See annex 2 for more details.

<sup>8</sup> Prevalence rates are calculated using the age and sex-specific UK National body mass index (BMI) centile classification.

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

More details are available in annex 4.

<sup>9</sup> A large number of year 6 children measured in 2013/14 are highly likely to have been also measured when they were in reception in 2007/08. However, it is not possible to link these measurements as the HSCIC only began to retain person identifiable data for linkage purposes from 2013/14 so the data held for earlier years is anonymised. In the future, it will be possible to link measurements of children in reception to their future year 6 measurement. The linkage will be carried out in a secure environment with robust Information Governance standards in place to protect and control how data are managed.



Information for 2013/14 is presented by region and local authority (LA). The LA data is presented in three ways:

- By the upper tier LA who submitted the data ([Online Table 2](#)).
- By upper and lower tier LA, based on the LA in which the school is located (using the school postcode of each child) ([Online Table 3A](#)).
- By upper and lower tier LA, based on the LA in which the child lives (using the postcode of residence of each child) ([Online Table 3B](#)).

Users may want to use the different breakdowns for different purposes. For example, users who want to look at the impact of interventions which are targeted through schools, such as healthy school meals or physical activity provision, may want to use the results which are based on where the school is located. Other users who want to look at interventions which are more residence based, such as provision of leisure facilities or parks, may want to use the residence based results.

Users particularly interested in looking at results over time should be aware that provision of the child's residence postcode only became a required field in 2007/08. Therefore, users wanting to compare current results with those in 2006/07 should use the results based on school location ([Online table 3A](#)).

For most local authorities, the three sets of figures will not differ substantially. Some examples where differences may occur are:

- There may be a difference in results between submitting LA ([Online table 2](#)) and those based on the location of the school ([Online table 3A](#)) where an LA has an arrangement with a neighbouring LA to collect measurements in a few schools outside of their own geographical boundary.
- There may be a difference in results between those based on the location of the school ([Online table 3A](#)) and those based on child residence ([Online table 3B](#)) where a relatively high number of pupils attend a school located in an LA different to the one in which they live, which is particularly the case in inner London.

Breakdowns are also given by sex of the child, levels of deprivation, urban/rural classification, ethnicity and an area classification developed by the Office for National Statistics.

Other data sources and reports on obesity in children are provided in chapter 5.

## 1.3 Data collection and validation

The measurement of children's heights and weights, without shoes and coats and in normal, light, indoor clothing, was overseen by healthcare professionals and undertaken in school by trained staff. Measurements could be taken at any time during the 2013/14 academic year. Consequently, some children were almost two

years older than others in the same school year at the point of measurement<sup>10</sup>; however, body-mass index (BMI) centile results are adjusted for age.

A new NCMP collection system was launched by the HSCIC for the 2013/14 collection year. The system incorporates validation at the point of data entry and provides a secure environment according to NHS standards in which pupil identifiable records can be processed and stored.

The system carries out some data quality checks on submission which include looking for invalid data items and outliers. It also provides real time data quality reports for the LA to consider and resolve any issues at an early stage. There is also further data validation carried out by HSCIC after the collection has closed which includes comparing submissions over time, and looking for issues affecting particular schools. More information is given in annex 2.

## 1.4 Participation rates and confidence intervals

Not all children are measured as part of the NCMP although the participation rate is close to 100 per cent. In 2013/14 1,101,611 children were measured which gave a participation rate of 94 per cent.

The high participation rate and large sample size means that the 95 per cent confidence intervals<sup>11</sup> for prevalence estimates at national level are very narrow (indicating a small margin of potential error). Confidence intervals are included around the percentages in the tables and charts in this report where possible and should be considered when interpreting results.

Comparisons of prevalence figures relating to groups within the 2013/14 dataset, and comparisons with prevalence figures of earlier years, are described as being different, (e.g. higher/lower or increase/decrease etc.) where the difference was determined to be statistically significant at a 95 per cent significance level<sup>12</sup>. Where there was no significant difference between two proportions, terms such as 'similar' or 'no change' have been used, or the difference is described as 'not being statistically significant'. 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 in earlier years concluded that a lower participation rate may lead to an underestimation of prevalence for obese children for year 6 and the confidence intervals were extended to allow for this. More information is available in Annex 6.

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<sup>10</sup> Although there can potentially be a 2-year age gap dependent on the pupil's date of birth and when in the school year they were measured, 87% of Year R pupils were aged between 4.5 years and 5.5 years when they were measured and 79% of year 6 pupils were aged between 10.5 years and 11.5 years.

<sup>11</sup> A confidence interval is needed as we do not have the true population value as not all children were measured. A 95% confidence interval gives a range in which we are 95% confident the true value lies.

<sup>12</sup> A 95% level of significance means that we are 95% confident the two values being compared are actually different and the difference is not just due to random variation.

Improvements in data quality over time can also affect prevalence figures. Although no analysis has been carried out to quantify any impact on 2013/14 data<sup>13</sup>, this should also be considered when making comparisons over time as it may partly explain any observed changes; both significant and non-significant. Please see the accompanying Data Quality Statement for information on the 2013/14 data.

## 1.5 Other analyses of 2013/14 data

PHE Obesity Knowledge & Information team (K&I) will conduct additional analyses (expected to be published in mid 2015), and the anonymised national dataset will be made available to PHE Obesity K&I to allow regional and local analyses of the data. Additionally, PHE Obesity K&I also present NCMP data in an online data tool that enables the user to examine patterns and trends at local authority level. This interactive data tool will be updated with the 2013/14 NCMP data in early January 2015 and will be available on the following link:  
<http://fingertips.phe.org.uk/profile/national-child-measurement-programme>.

Non-disclosive versions of the NCMP datasets relating to 2006/07 to 2012/13 have already been deposited in the UK Data Archive<sup>14</sup> and a non-identifiable version of the 2013/14 dataset will be made available in 2015.

PHE Obesity K&I published guidance<sup>15</sup> to assist users wishing to undertake analysis of NCMP data at small area level in June 2011.

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<sup>13</sup> The following reports each contain information on the impact of data quality on prevalence rates in respect of previous years' NCMP datasets

'NCMP: Detailed Analysis of the 2006/07 National Dataset'  
[www.noo.org.uk/uploads/doc168\\_2\\_NOO\\_NCMP\\_report230608.pdf](http://www.noo.org.uk/uploads/doc168_2_NOO_NCMP_report230608.pdf)

'NCMP: Detailed Analysis of the 2007/08 National Dataset'  
[www.noo.org.uk/uploads/doc168\\_2\\_noo\\_NCMPReport1\\_110509.pdf](http://www.noo.org.uk/uploads/doc168_2_noo_NCMPReport1_110509.pdf)

'Variations in data collection can influence outcome measures of BMI measuring programmes'  
[www.ncbi.nlm.nih.gov/m/pubmed/21834603](http://www.ncbi.nlm.nih.gov/m/pubmed/21834603)

<sup>14</sup> UK Data Archive [www.data-archive.ac.uk](http://www.data-archive.ac.uk)

<sup>15</sup> 'NCMP Guidance for small area analysis'  
[www.noo.org.uk/uploads/doc/vid\\_11853\\_NCMP\\_Guidanceforsmallarea%20analysisFINAL.pdf](http://www.noo.org.uk/uploads/doc/vid_11853_NCMP_Guidanceforsmallarea%20analysisFINAL.pdf)

## 2. Key findings for 2013/14

### 2.1 Participation rates

In total, 1,101,611 valid measurements were received for children in England, in reception and year 6 – approximately 94 per cent of those eligible<sup>16</sup>. Over time, participation rates have increased from 2006/07 when it was 80 per cent up to 2012/13 when it was 93 per cent.

### 2.2 Prevalence of BMI categories

The prevalence of underweight, healthy weight, overweight and obese children by year and sex in England for 2013/14 is summarised in [Table 1](#) and [figures 2, 3 and 4](#). The prevalence of overweight and obese combined is also presented in [table 1](#) only.

#### Key Findings:

- **In reception:**
  - Over a fifth (22.5%) of the children measured were either overweight or obese. This was higher than in 2012/13 (22.2%) but lower than in 2006/07 (22.9%)
  - The proportion of obese children (9.5%) was higher than in 2012/13 (9.3%) but lower than in 2006/07 (9.9%).
- **In year 6:**
  - Around a third (33.5%) of the children measured were either overweight or obese. This was higher than in 2012/13 (33.3%) and also higher than in 2006/07 (31.6%)
  - The proportion of obese children (19.1%) was higher than in 2012/13 (18.9%) and also higher than in 2006/07 (17.5%).
- **Comparisons of reception with year 6 measurements:**
  - The percentage of obese children in year 6 (19.1%) was over double that of reception year children (9.5%).
  - The prevalence of children with a healthy weight was higher in reception (76.5%) than year 6 (65.1%).
  - The overall prevalence of underweight children was higher in year 6 (1.4%) than in reception (0.9%).
- **By sex:**
  - Prevalence of obesity was found to be higher among boys than girls in both school years. In reception, 9.9 per cent of boys and 9.0 per cent of girls were classified as obese. In year 6 the percentages were 20.8 per cent and 17.3 per cent respectively.

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<sup>16</sup> See 'National Child Measurement Programme Operational Guidance for the 2013/14 school year' ([www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/226203/NCMP\\_Guidance\\_2013\\_to\\_2014.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226203/NCMP_Guidance_2013_to_2014.pdf)) for further information on which children were eligible for inclusion.

- In both reception and year 6 a higher percentage of girls were of a healthy weight than boys. In reception 77.7 per cent of girls and 75.4 per cent of boys were a healthy weight and in year 6 this was 66.7 per cent and 63.6 per cent respectively.
- In reception, a higher percentage of boys were underweight than girls (1.2% and 0.7% respectively); whereas in year 6, a higher percentage of girls were underweight than boys (1.6% and 1.2% respectively).

**Table 1: Prevalence of underweight, healthy weight, overweight, obese and combined overweight and obese children by year and sex, England, 2013/14**

		Underweight		Healthy Weight		Overweight		Obese		Overweight and obese combined		Number measured
Reception	Boys	3,532	1.2%	225,934	75.4%	40,417	13.5%	29,720	9.9%	70,137	23.4%	299,603
	Girls	2,037	0.7%	223,442	77.7%	36,301	12.6%	25,953	9.0%	62,254	21.6%	287,733
	<b>All Children</b>	<b>5,569</b>	<b>0.9%</b>	<b>449,376</b>	<b>76.5%</b>	<b>76,718</b>	<b>13.1%</b>	<b>55,673</b>	<b>9.5%</b>	<b>132,391</b>	<b>22.5%</b>	<b>587,336</b>
Year 6	Boys	3,074	1.2%	167,506	63.6%	37,962	14.4%	54,774	20.8%	92,736	35.2%	263,316
	Girls	3,928	1.6%	167,362	66.7%	36,253	14.4%	43,416	17.3%	79,669	31.7%	250,959
	<b>All Children</b>	<b>7,002</b>	<b>1.4%</b>	<b>334,868</b>	<b>65.1%</b>	<b>74,215</b>	<b>14.4%</b>	<b>98,190</b>	<b>19.1%</b>	<b>172,405</b>	<b>33.5%</b>	<b>514,275</b>

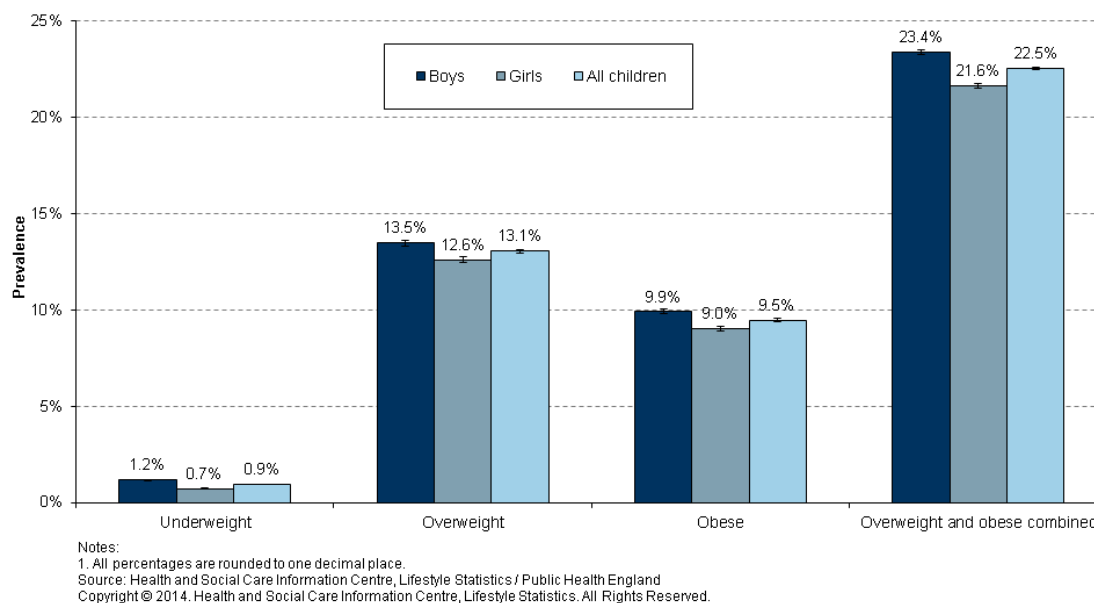
**Source**

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Figures 2 and 3 show the prevalence of underweight, overweight, obese and combined overweight and obese children, with associated 95 per cent confidence intervals, by sex, in England, 2013/14. The prevalence of healthy weight children is not shown as it is much higher than the other categories, which would affect the scale of the chart making it difficult for differences to be seen in the other categories.

**Figure 2: Prevalence of underweight, overweight and obese children in reception, by sex, England, 2013/14**



**Figure 3: Prevalence of underweight, overweight and obese children in year 6, by sex, England, 2013/14**

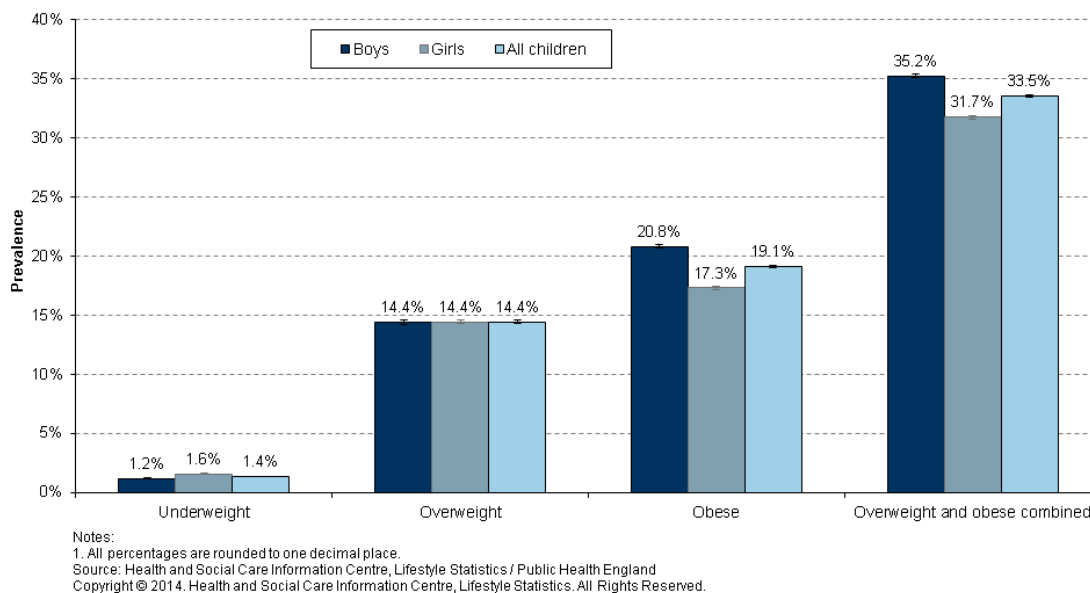
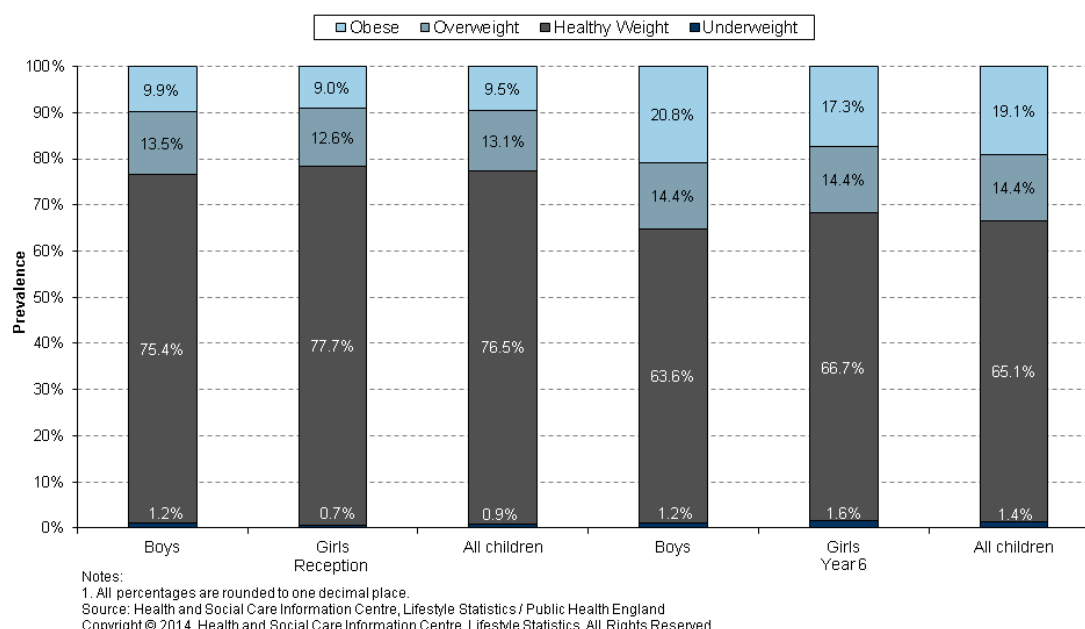


Figure 4 shows the 2013/14 prevalence breakdowns including the proportion with a healthy weight.

**Figure 4: Prevalence of underweight, healthy weight, overweight and obese children in reception and year 6, by sex, England, 2013/14**



## 2.3 Comparisons with earlier years

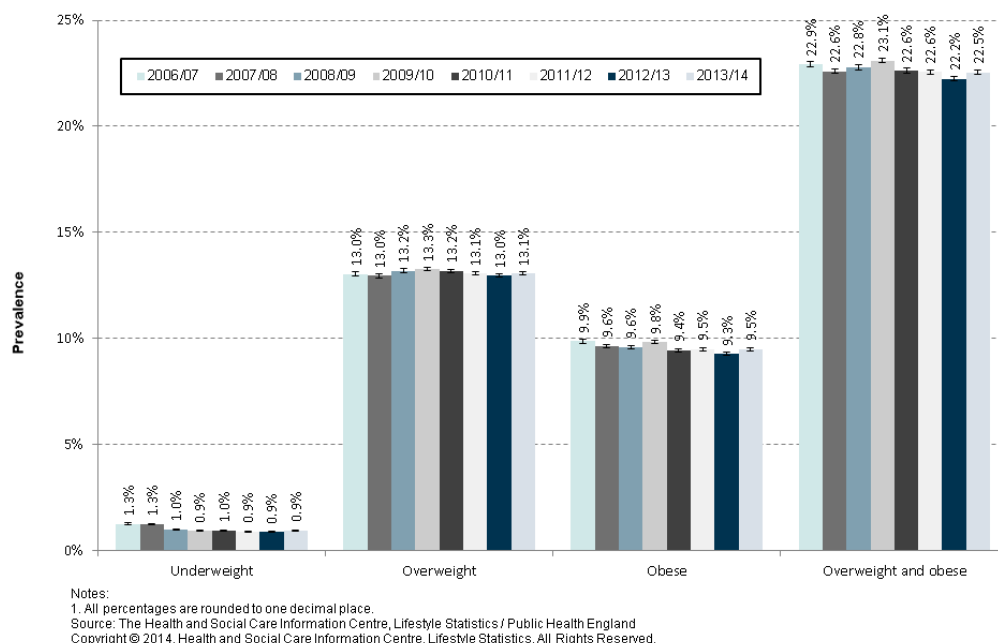
Eight years of reliable NCMP data are now available, and Figures 5 and 6 present the prevalence of underweight, overweight, obese and combined overweight and obese children by school year from 2006/07 to 2013/14.

### Key Findings:

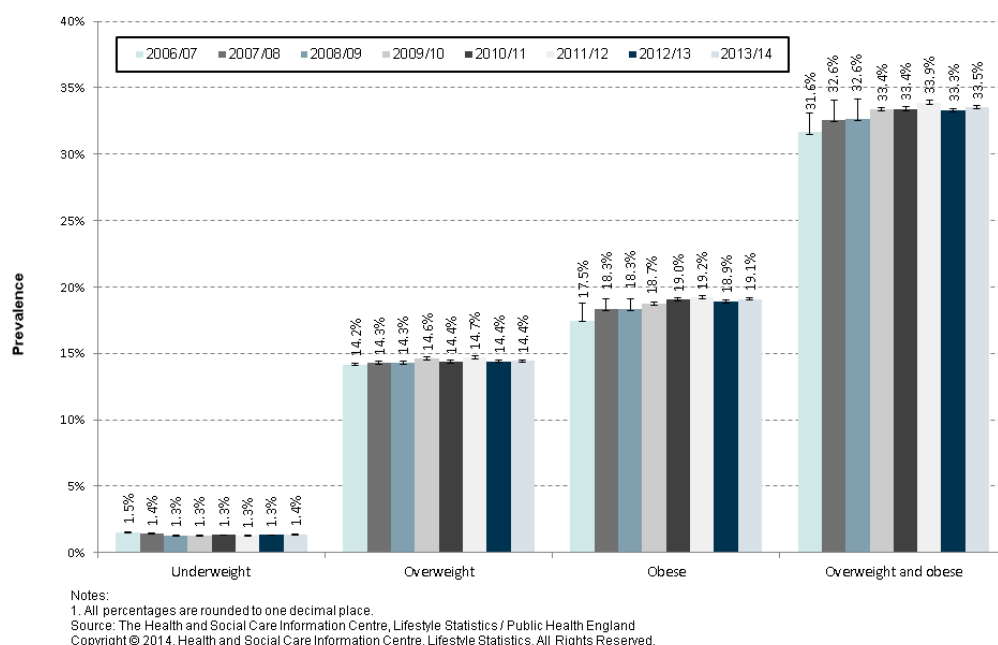
- **Comparisons with 2012/13:**
  - In reception, the proportion of obese children (9.5%) was higher than in 2012/13 (9.3%). The proportion of overweight and obese children combined (22.5%) was also higher than in 2012/13 (22.2%). The proportion of underweight children (0.95%) was higher than in 2012/13 (0.88%).
  - In year 6, the proportion of obese children (19.1%) was higher than in 2012/13 (18.9%). The proportion of overweight and obese children combined (33.5%) was also higher than in 2012/13 (33.3%). The proportion of underweight children (1.4%) was similar to the proportion in 2012/13 (1.3%).
- **Comparisons with 2006/07:**
  - In reception, the proportion of obese children (9.5%) was lower than in 2006/07 (9.9%). The proportion of overweight and obese children combined (22.5%) was also lower than in 2006/07 (22.9%). The proportion of underweight children (0.9%) was again lower than in 2006/07 (1.3%).

- In year 6, the proportion of obese children (19.1%) was higher than in 2006/07 (17.5%). The proportion of overweight and obese children combined (33.5%) was also higher than in 2006/07 (31.6%). The proportion of underweight children (1.4%) was lower than in 2006/07 (1.5%).

**Figure 5: Prevalence of underweight, overweight, obese and combined overweight and obese children by NCMP year and school year, 2006/07 to 2013/14**



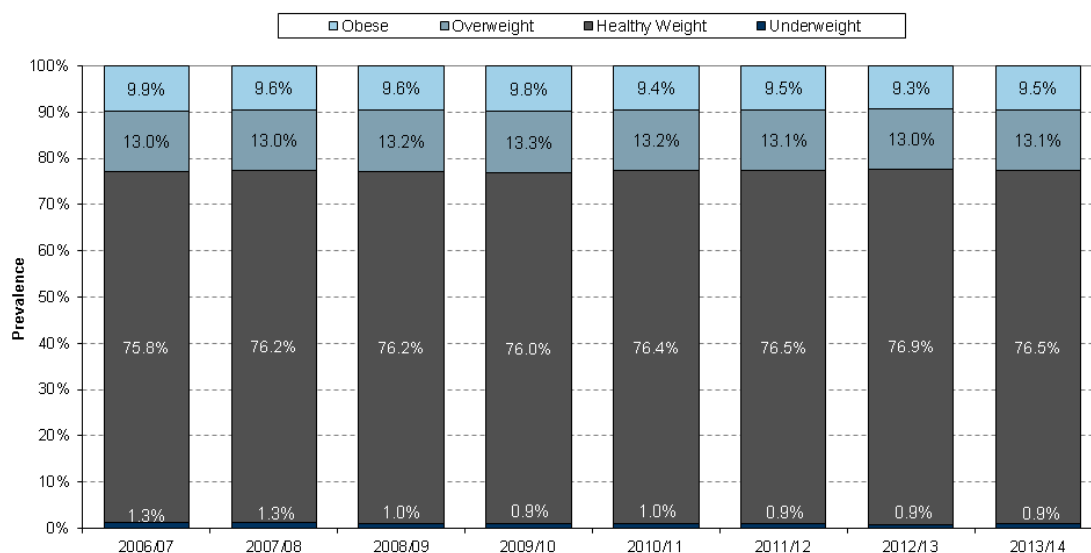
**Figure 6: Prevalence of underweight, overweight, obese and combined overweight and obese children by NCMP year and school year, 2006/07 to 2013/14**





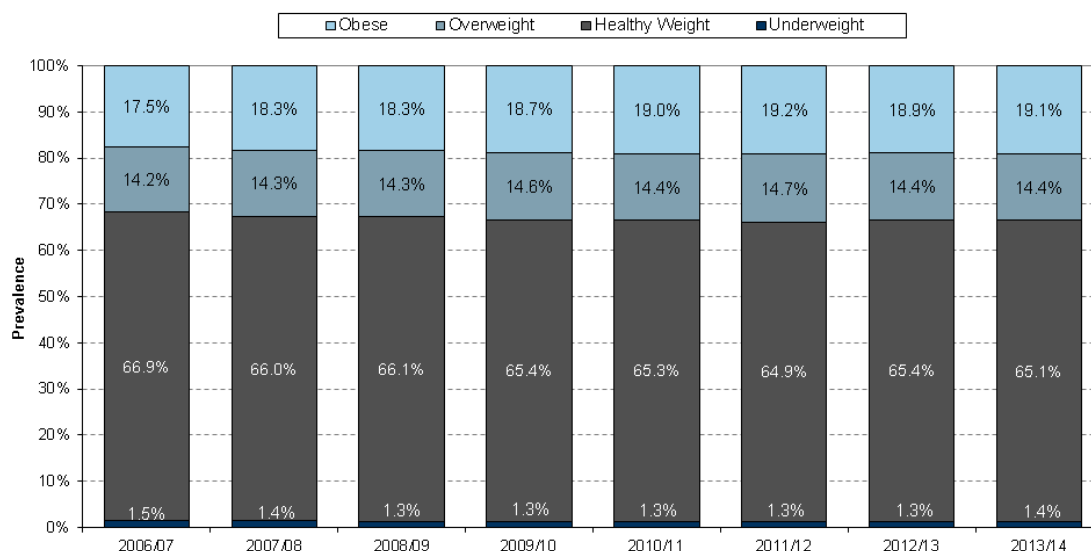
Figures 7 and 8 show prevalence breakdowns for each BMI category from 2006/07 to 2013/14

**Figure 7: Prevalence of underweight, healthy weight, overweight and obese children by NCMP year in reception, 2006/07 to 2013/14**



Notes:  
1. All percentages are rounded to one decimal place.  
Source: Health and Social Care Information Centre, Lifestyle Statistics / Public Health England  
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**Figure 8: Prevalence of underweight, healthy weight, overweight and obese children by NCMP year in year 6, 2006/07 to 2013/14**



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

### 3.1 Participation

The participation rate is the percentage of pupils eligible in state-maintained schools in each year group for whom valid measurements were recorded. Public Health England guidance suggests that, to ensure the information collected provides an accurate picture of the population, local authorities should aim to achieve participation rates by eligible children of at least 85%, and where possible build on higher participation rates previously achieved.

The overall participation rates achieved nationally in 2013/14 were very similar to those achieved in 2012/13:

- 94 per cent for reception and year 6 combined (1,101,611 children).
- 94 per cent for reception (587,336 pupils measured).
- 94 per cent for year 6 (514,275 children).
- All 152 local authorities provided data for reception and year 6 children in 2013/14<sup>17</sup>.

Figure 9 shows the participation rates for the LA who submitted the data for reception. It can be seen that:

- In 2013/14, 95 per cent of LAs (144 out of 151) met or exceeded the 85 per cent participation rate for reception, compared with 96 per cent of PCTs (145 of 151) in 2012/13. The LAs who did not meet the target for reception were:
  - Bracknell Forest Borough Council (Unitary) (participation rate of 29.5%).
  - Slough Borough Council (Unitary) (29.5%).
  - Royal Borough Of Windsor & Maidenhead (Unitary) (34.2%).
  - West Sussex County Council (61.2%).
  - Wokingham Borough Council (Unitary) (73.1%).
  - Reading Borough Council (Unitary) (79.2%).
  - City Of Bradford Metropolitan District Council (84.8%).

Of these LAs, Bracknell, Slough and Windsor had their data supplied by NHS Berkshire East and Wokingham and Reading had their data supplied by NHS Berkshire West. Both these data providers reported problems with their local information systems which particularly affected their ability to carry out measurements in reception year. West Berkshire also had their data provided by NHS Berkshire West but were less affected as their participation rate was 88 per cent which was above the target rate.

The low participation rate for West Sussex was due to data extraction problems following a change in provider information systems during the summer term.

An explanation was not sought from Bradford as they only narrowly missed the target of 85 per cent.

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<sup>17</sup> Data for the Corporation of the City Of London was submitted by London Borough of Hackney so the following figures showing the proportion of LAs who met the target for participation are based on 151 LAs.

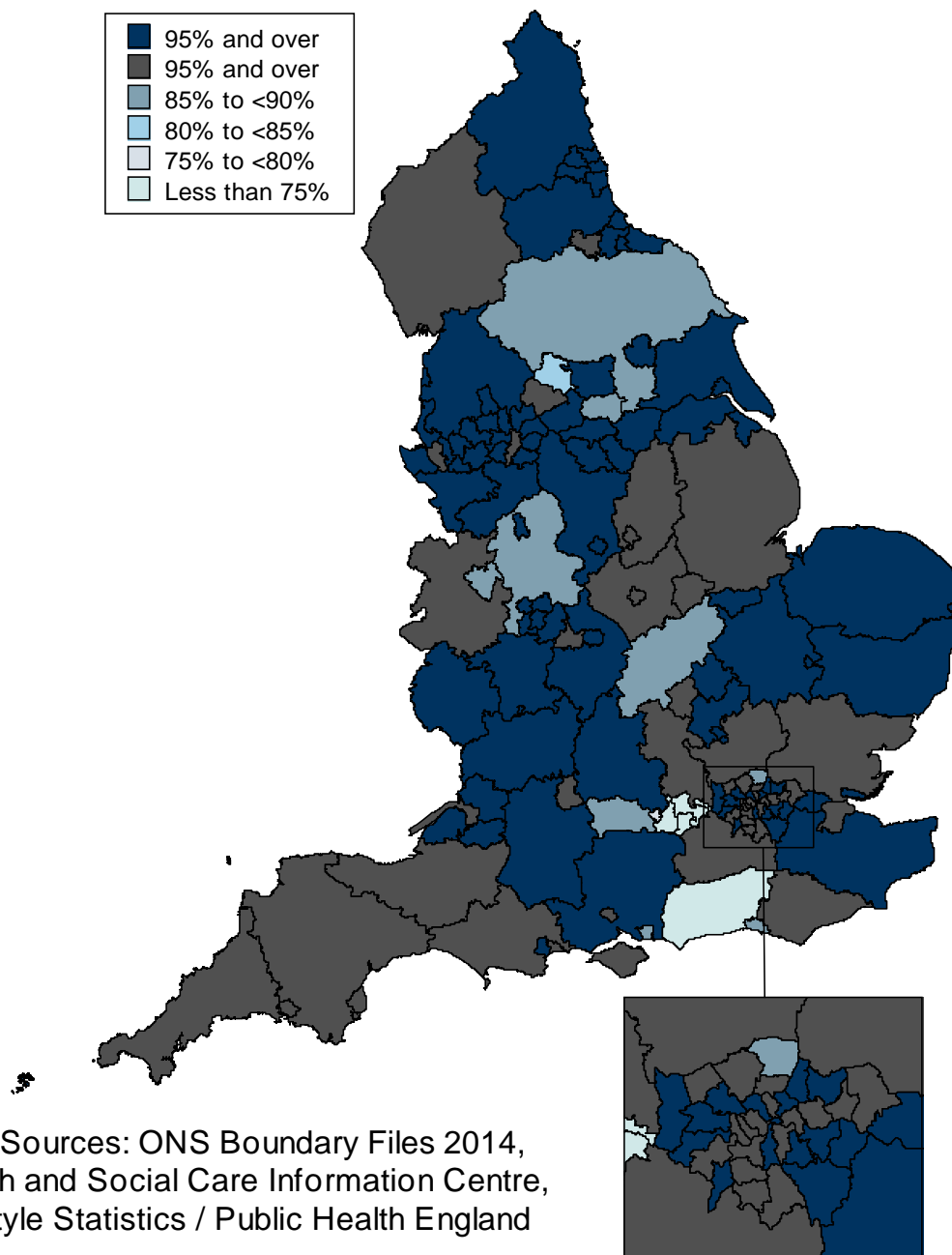
Figure 10 shows the same information for year 6. It can be seen that:

- All LAs (151 of 151) met or exceeded 85 per cent participation rate for year 6 compared with the 97 per cent of PCTs (146 of 151) who did so in 2012/13.

Online Table 2 shows overall participation rates for each LA.

Of the pupils measured, boys accounted for 51 per cent in reception and in year 6. It is not possible to calculate the participation rates by sex since the number of eligible pupils are not collected by sex.

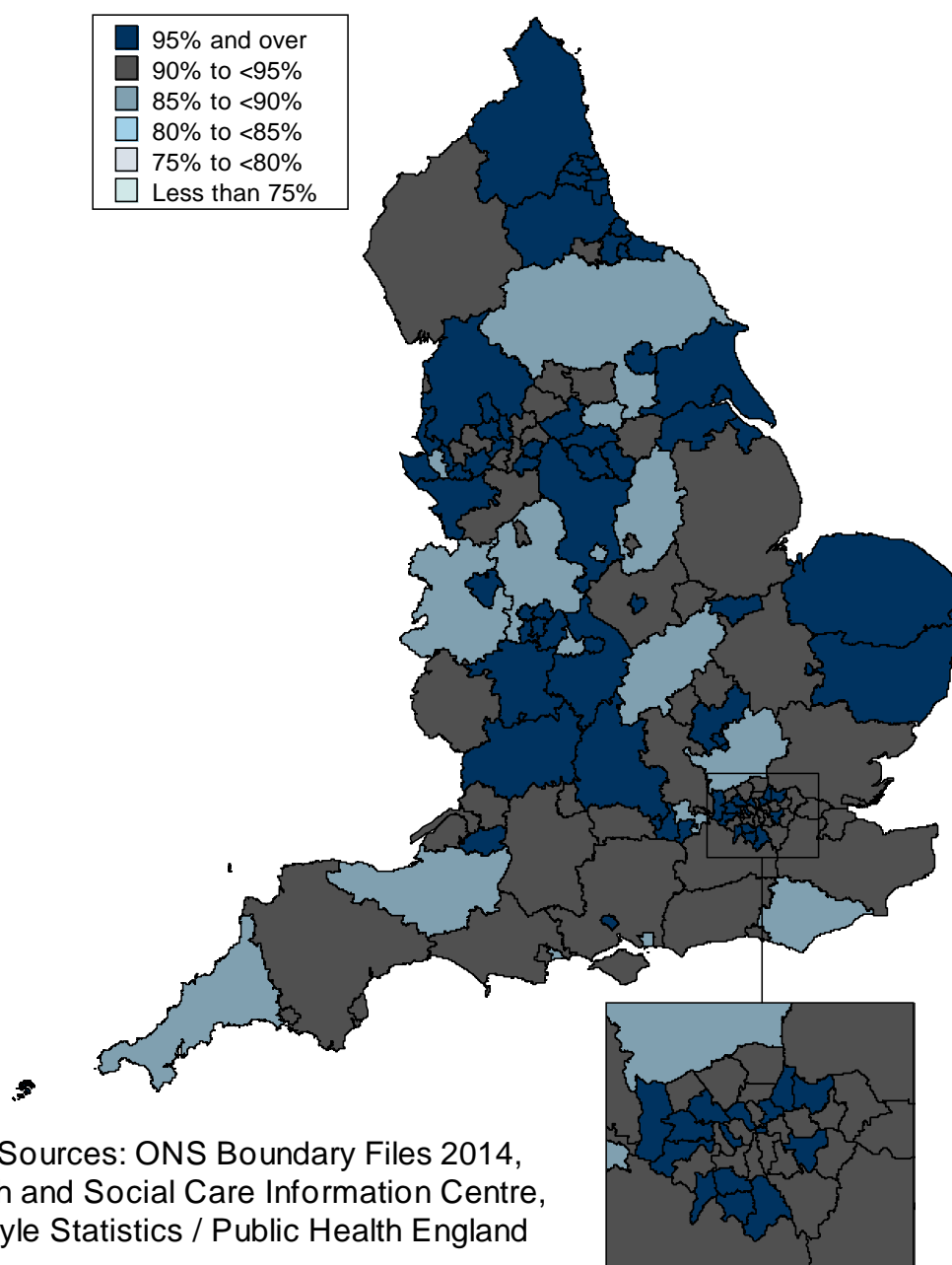
Figure 9: NCMP participation rates for reception, 2013/14, by local authority



Data Sources: ONS Boundary Files 2014,  
Health and Social Care Information Centre,  
Lifestyle Statistics / Public Health England

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Figure 10: NCMP participation rates for year 6, 2013/14, by local authority



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## 3.2 Prevalence

### 3.2.1 Prevalence by region

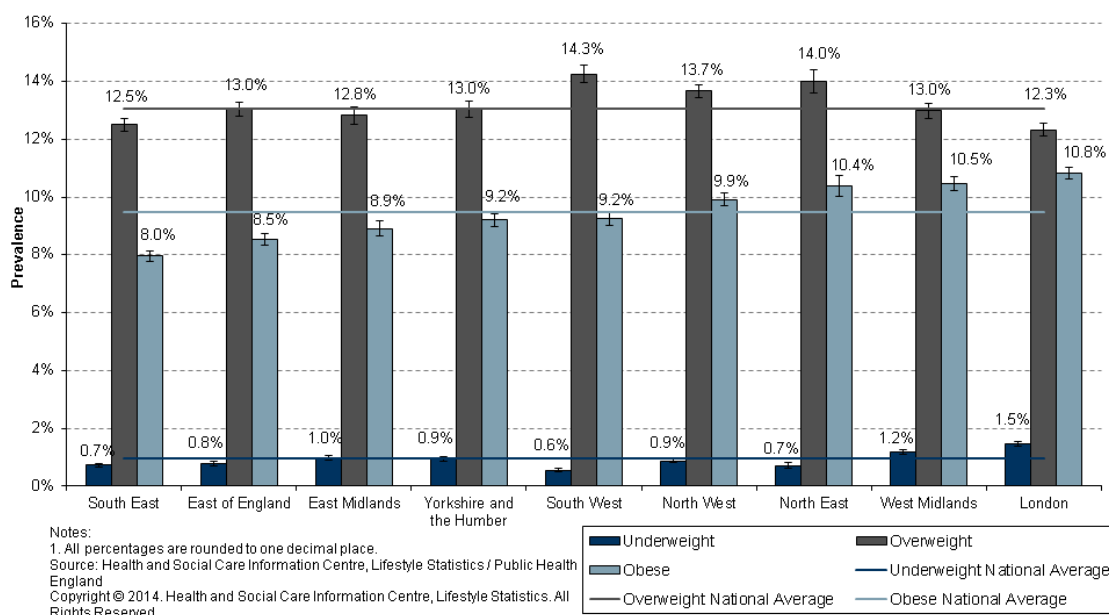
Prevalence of underweight, overweight and obese children, with associated 95 per cent confidence intervals, by the region of the local authority where the school is based in 2013/14, are shown in [Figure 11](#) for reception and [Figure 12](#) for year 6. [Figure 13](#) compares the prevalence of children who are overweight or obese ('combined overweight and obese'), with associated 95 per cent confidence intervals, in reception and year 6, by Region, in 2013/14.

Detailed tables are available in [Online Table 3A](#) showing underweight, healthy weight, overweight, and obese prevalence, with associated 95 per cent confidence intervals, by school year, by region and local authority of the school.

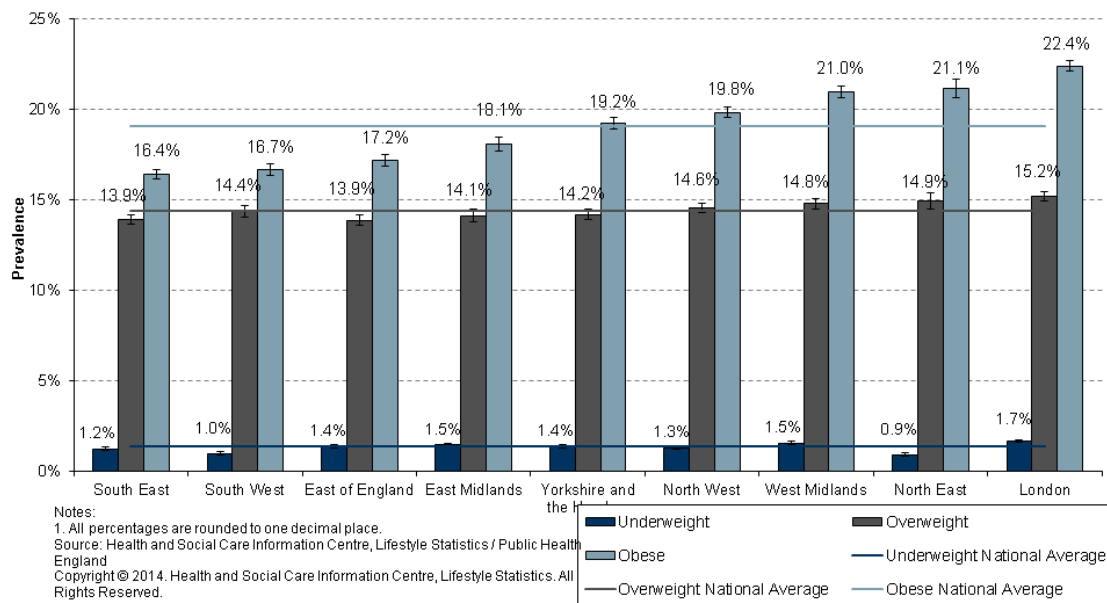
#### Key Findings:

- The South East, East of England and East Midlands had the lowest obesity prevalence in reception (8.0%, 8.5% and 8.9% respectively) and the South East, South West and East of England had the lowest obesity prevalence in year 6 (16.4%, 16.7% and 17.2% respectively).
- London reported the highest obesity prevalence for both years (10.8% for reception and 22.4% for year 6).
- Regions with high obesity prevalence in reception tended to also have high prevalence in year 6.

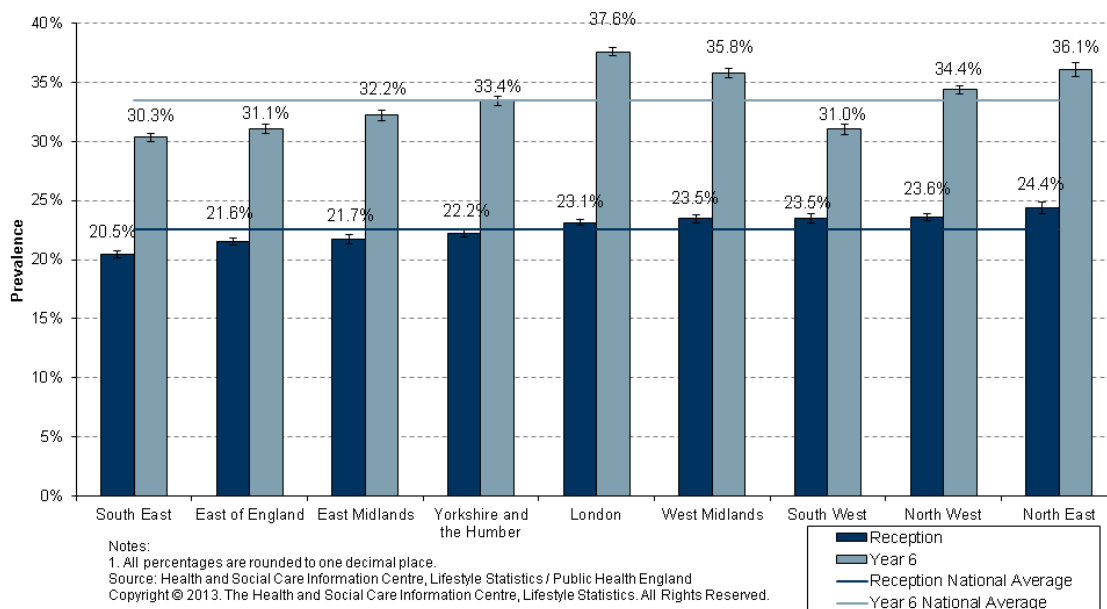
**Figure 11: Prevalence of underweight, overweight, and obese children in reception, by region, England, 2013/14**



**Figure 12: Prevalence of underweight, overweight, and obese children in year 6, by region, England, 2013/14**



**Figure 13: Prevalence of combined overweight and obese children, by school year and region, England, 2012/13**



### 3.2.2 Prevalence by local authority

NCMP data for 2013/14 is also presented by LA in three ways:

- By the LA who submitted the data ([Online Table 2](#)).
- The upper and lower tier LA area (introduced in April 2009) based on the LA in which the school is located ([Online Table 3A](#)).
- The upper and lower tier LA area (introduced in April 2009) based on the LA in which child lives ([Online Table 3B](#)).

Section 1.2 provides some guidance on which breakdowns to use for different situations.

The online tool produced by PHE Obesity K&I also contains NCMP data for previous years recalculated to the current LA areas (introduced in April 2009) to allow comparison over time.

#### Key Findings<sup>18</sup>:

- Obesity prevalence varied by LA.
- For reception this ranged from 5.5 per cent in the Royal Borough of Windsor and Maidenhead<sup>19</sup> and 6.0 per cent in the Royal Borough of Kingston Upon Thames to 14.4 per cent in the London Borough Of Hackney<sup>20</sup>.
- In year 6 the range was from 11.1 per cent, in the London Borough Of Richmond Upon Thames Council, to 26.7 per cent in London Borough Of Southwark Council.

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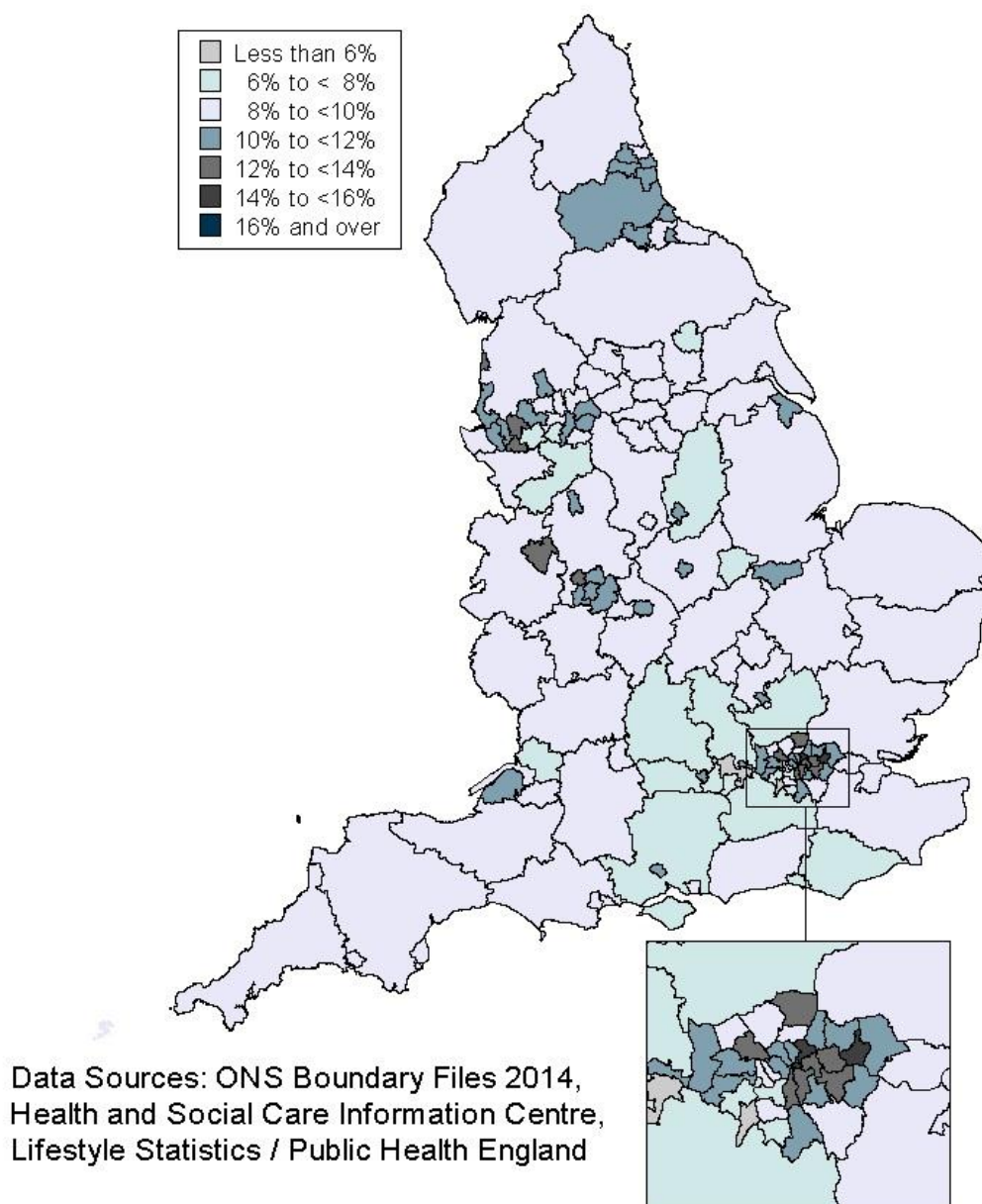
<sup>18</sup> The LA is based on where the school is located.

<sup>19</sup> It should be noted that the participation rate for Royal Borough of Windsor and Maidenhead was particularly low at 34.2 per cent. This may impact on the obesity prevalence rate if those children measured were not representative of all children in the LA.

<sup>20</sup> Figures for London Borough of Hackney also include City of London.



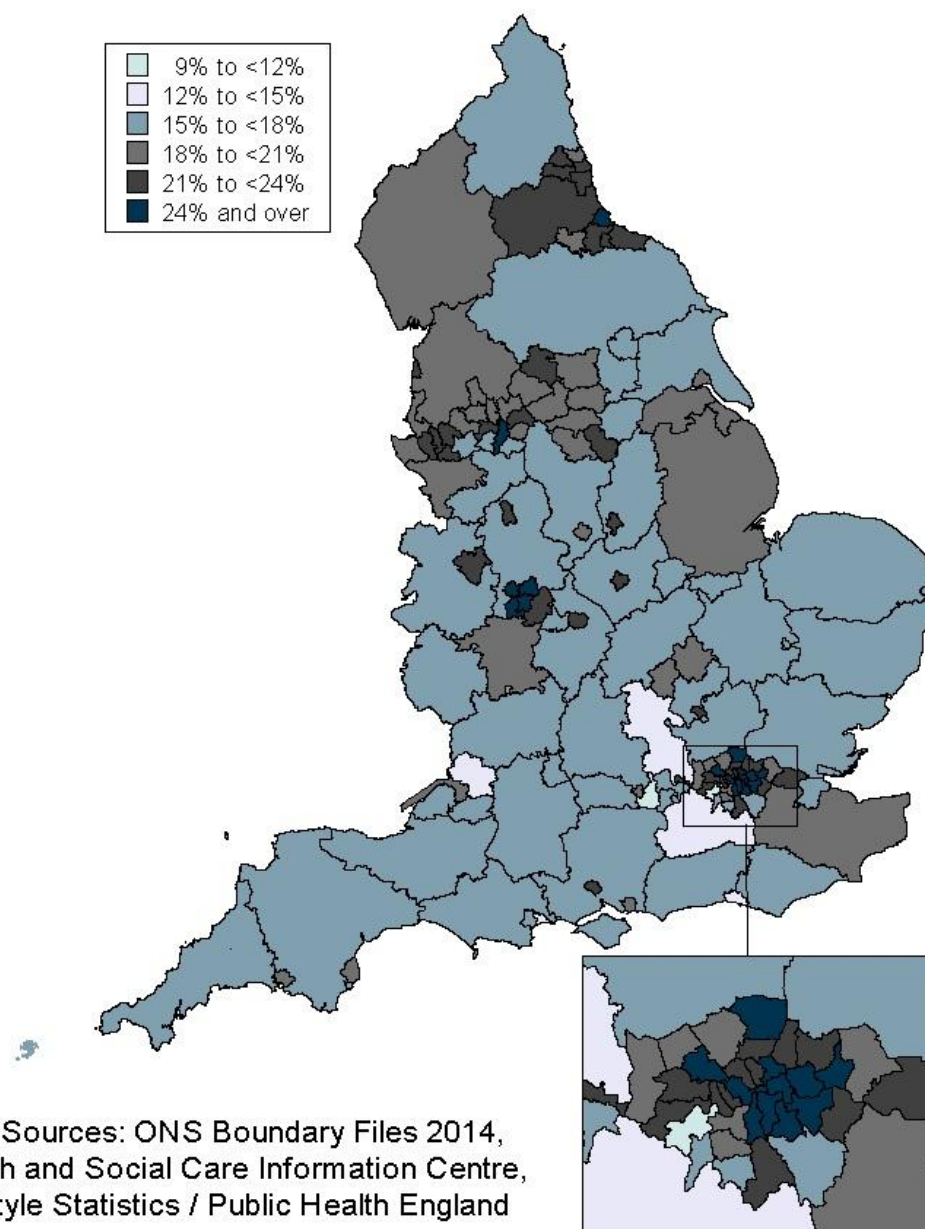
**Figure 14: Prevalence of obese children in reception, by local authority<sup>21</sup>,  
England, 2013/14**



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<sup>21</sup> This is based upon the LA that submitted the data and in a few cases this may be different to the LA in which the school is based. Prevalence rates for the LA who submitted the data are in [Online Table 2](#) and rates for the LA in which the school is based are available from [Online Table 3A](#).

**Figure 15: Prevalence of obese children in year 6, by local authority<sup>22</sup>,  
England, 2013/14**



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### 3.2.3 Prevalence by area deprivation

<sup>22</sup> This is based upon the LA that submitted the data and in a few cases this may be different to the LA in which the school is based. Prevalence rates for the LA who submitted the data are in [Online Table 2](#) and rates for the LA in which the school is based are available from [Online Table 3A](#).

This section explores the relationship between BMI categories and deprivation. Deprivation is based on the 2010 Index of Multiple Deprivation (IMD)<sup>23</sup> which classifies children into a deprivation decile based on the location of their school<sup>24</sup> where decile 1 is the least deprived and decile 10 is the most deprived.

Figures 16 and 17 investigate the relationship between deprivation and the prevalence of underweight, overweight and obese reception and year 6 children. The proportion of children with a healthy weight is not shown as it would affect the scale of the chart making it difficult to see differences in the other categories.

Figure 18 compares the prevalence of children who are overweight or obese ('combined overweight and obese'), with associated 95 per cent confidence intervals, in reception and year 6, by IMD decile.

### Key Findings:

- As in previous years, a strong positive relationship existed between deprivation and obesity prevalence for children in each school year.
  - The obesity prevalence among reception year children attending schools in areas in the most deprived decile was 12.0 per cent compared with 6.6 per cent among those attending schools in areas in the least deprived decile.
  - Similarly, obesity prevalence among year 6 children attending schools in areas in the most deprived decile was 24.7 per cent compared with 13.1 per cent among those attending schools in areas in the least deprived decile.
- There is also a relationship between the proportion of children classified as underweight and deprivation.
  - 1.3 per cent of children in reception attending schools in areas in the most deprived decile were classified as underweight compared to 0.8 per cent in the least deprived decile.
  - 1.7 per cent of children in year 6 attending schools in areas in the most deprived decile were classified as underweight compared to 1.3 per cent in the least deprived decile.

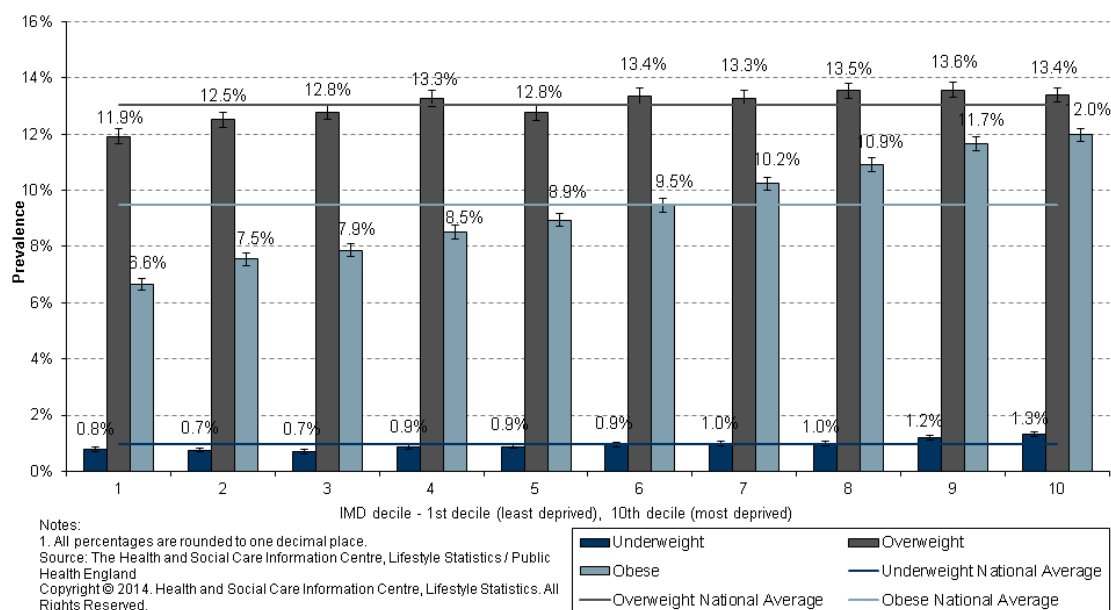
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<sup>23</sup> More information on IMD is available at:

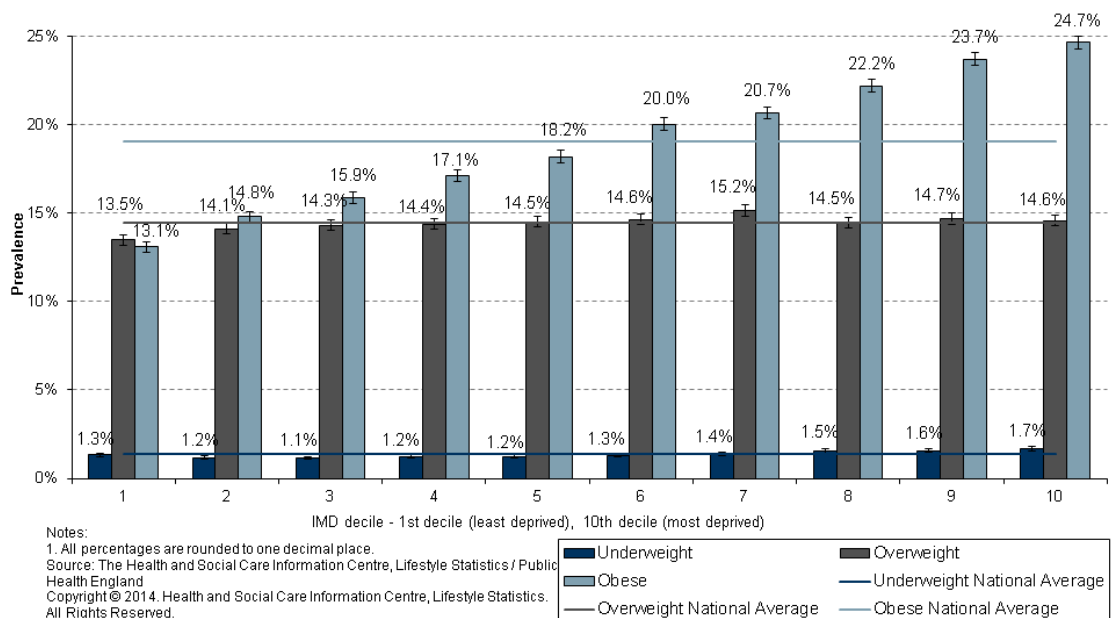
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/6871/1871208.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6871/1871208.pdf)

<sup>24</sup> The IMD decile is based on the location of school postcode to make the results comparable with those of previous years.

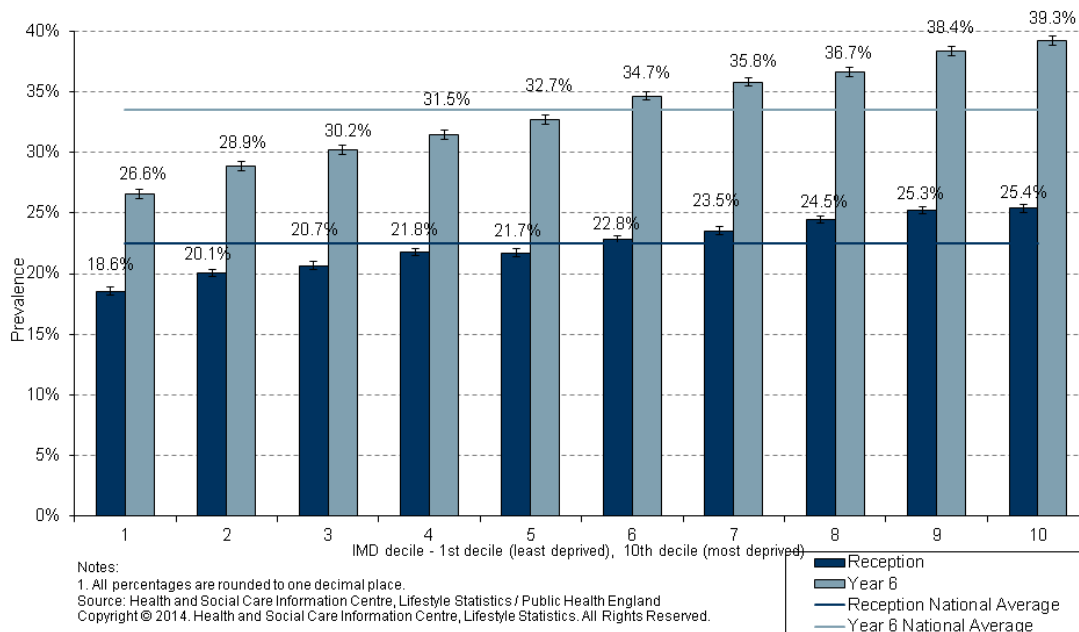
**Figure 16: Prevalence of underweight, overweight and obese children in reception by school area 2010 IMD decile, England, 2013/14**



**Figure 17: Prevalence of underweight, overweight and obese children in year 6 by school area 2010 IMD decile, England, 2013/14**



**Figure 18: Prevalence of combined overweight and obese children, by school area 2010 IMD decile, England, 2013/14**



### 3.2.4 Prevalence by rural/urban classification

Each record was assigned a rural/urban classification<sup>25</sup> based on the postcode of the child's address.

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.

Figure 21 compares the prevalence of children who are overweight or obese ('combined overweight and obese'), with associated 95 per cent confidence intervals, in reception and year 6, by rural/urban classification, in 2013/14.

#### Key findings:

- As in previous years, obesity prevalence was significantly higher in urban areas than in rural areas for each age group.
  - The obesity prevalence among reception children living in urban areas was 9.8 per cent compared with 8.2 per cent and 7.8 per cent of those living in town areas and village areas respectively.
  - Similarly, obesity prevalence among year 6 children living in urban areas was 19.9 per cent compared with 16.1 per cent and 15.0 per cent of those living in town areas and village areas respectively.
- The prevalence of underweight children was significantly higher in urban areas than in rural areas for both school years.
  - In reception, 1.0 per cent of children in urban areas were underweight compared to 0.7 per cent and 0.5 per cent of those living in town areas and village areas respectively.
  - In year 6 these percentages were 1.4 per cent, 1.1 per cent and 0.9 per cent respectively;

The PHE Obesity K&I's reports in 2006/07<sup>26</sup> and 2007/08<sup>27</sup> show 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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<sup>25</sup> 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:

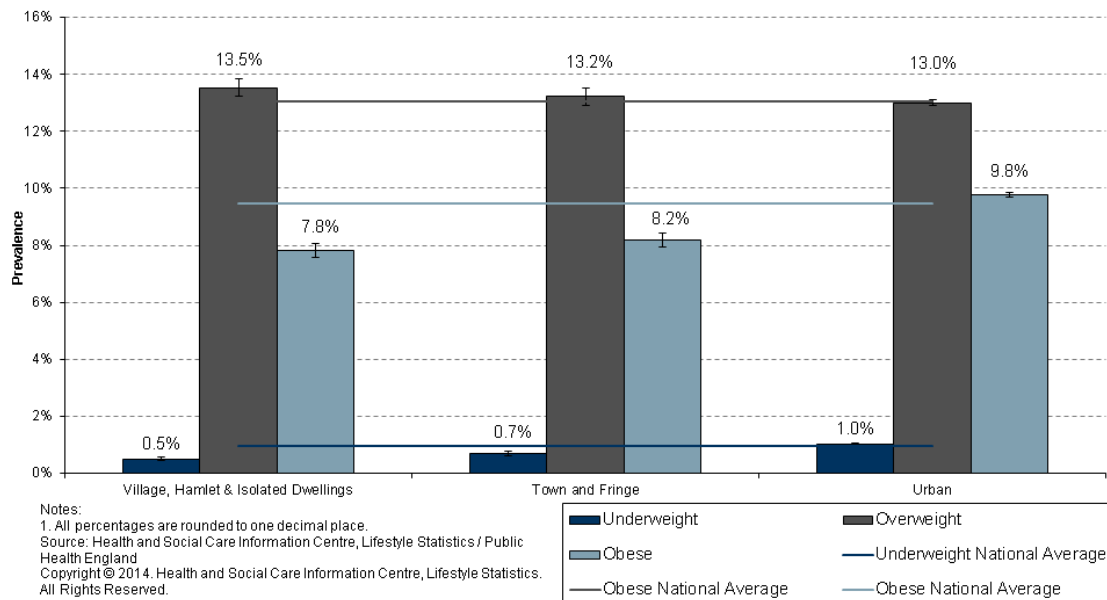
- settlement form: dispersed dwellings, hamlet, village, small town, urban fringe and urban (>10,000 population);
- sparsity - each hectare grid square is assigned a sparsity score based on the number of households in surrounding hectare squares up to a distance of 30 km.

The analyses in this report have combined 'sparse' with 'less sparse' so classifications are purely based on settlement form. Further details are available at: [www.ons.gov.uk/ons/guide-method/geography/products/area-classifications/rural-urban-definition-and-la/rural-and-urban-statistics-guidance-notes.pdf](http://www.ons.gov.uk/ons/guide-method/geography/products/area-classifications/rural-urban-definition-and-la/rural-and-urban-statistics-guidance-notes.pdf)

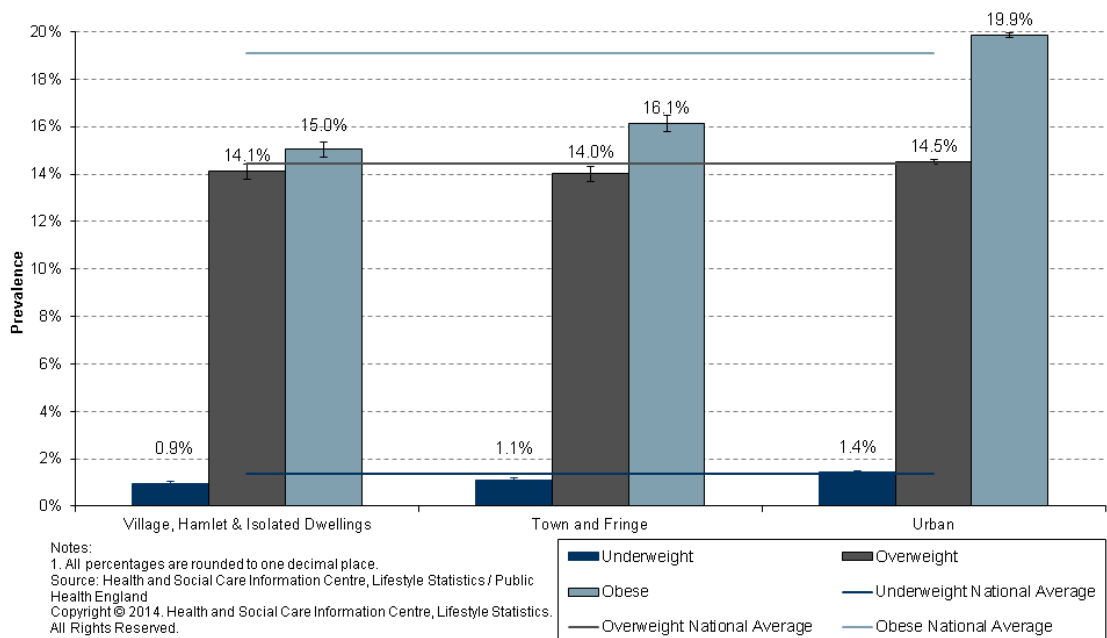
<sup>26</sup> 'National Child Measurement Programme: Detailed Analysis of the 2006/07 National Dataset': [www.noo.org.uk/uploads/doc168\\_2\\_NOO\\_NCMP\\_report230608.pdf](http://www.noo.org.uk/uploads/doc168_2_NOO_NCMP_report230608.pdf)

<sup>27</sup> 'National Child Measurement Programme: Detailed Analysis of the 2007/08 National Dataset' available at: [www.noo.org.uk/uploads/doc168\\_2\\_noo\\_NCMPReport1\\_110509.pdf](http://www.noo.org.uk/uploads/doc168_2_noo_NCMPReport1_110509.pdf)

**Figure 19: Prevalence of underweight, overweight and obese children in reception, by rural/urban classification, England, 2013/14**

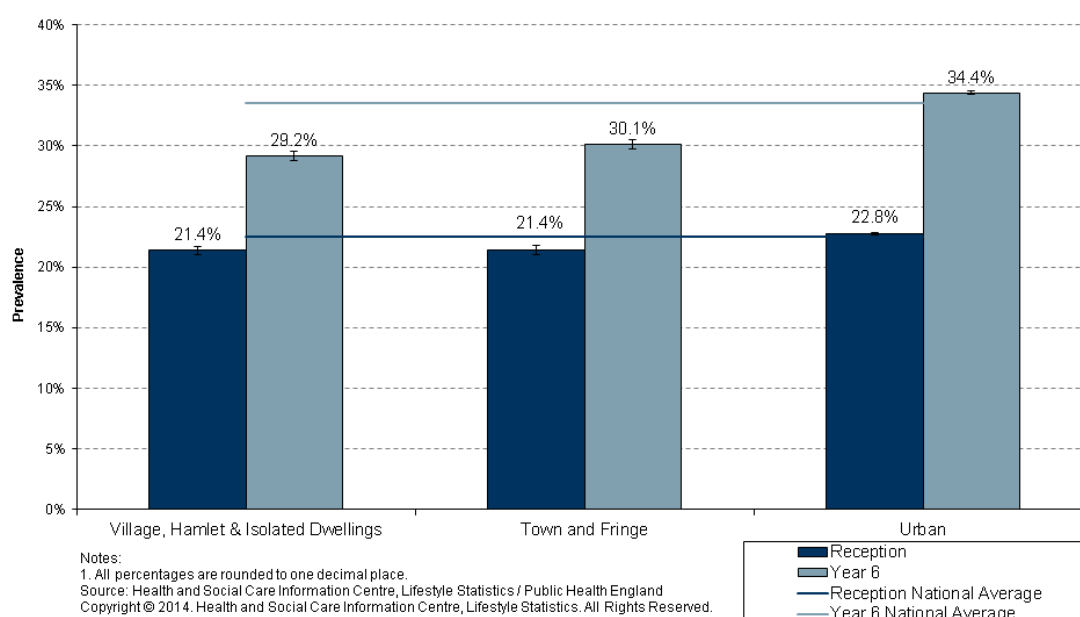


**Figure 20: Prevalence of underweight, overweight and obese children in year 6, by rural/urban classification, England, 2013/14**





**Figure 21: Prevalence of combined overweight and obese children, by rural/urban classification and school year, England, 2013/14**



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

NCMP data have been analysed using the Office for National Statistics Area Classification (ONS-AC). This classification is a system of population stratification that categorises local areas based on a range of socio-demographic characteristics, including deprivation, ethnicity and urban/rural environment into groups<sup>28</sup>.

The highest level of classification consists of seven groups which are called “supergroups”. These are named in a way that describes the type of population predominant in those areas, for example ‘Disadvantaged Urban Communities’ or ‘Professional City Life’. The individual children measured as part of the NCMP have been assigned to a supergroup based on their postcode of residence.

Figures 22 and 23 show obesity prevalence for the supergroups in the 2013/14 NCMP.

PHE Obesity K&I have produced a report ‘NCMP: Analysis using the ONS Area Classification’ which provides more information on this approach.<sup>29</sup>

#### Key findings:

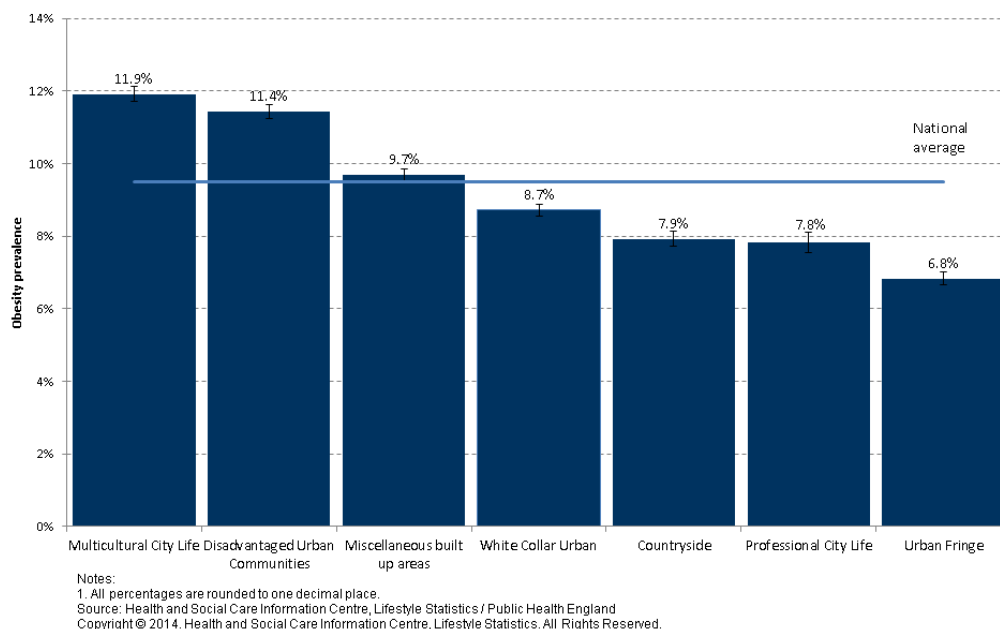
- Children in the Multicultural City Life group had the highest proportion classed as obese (11.9% in reception and 24.9% in year 6).
- Children in the Urban Fringe group had the lowest proportion classed as obese (6.8% in reception and 13.7% in year 6).

<sup>28</sup> More information on National Statistics 2011 Area Classification available at:  
[www.neighbourhood.statistics.gov.uk/dissemination/Info.do?page=nessgeography/areaclassification/area-classification.htm](http://www.neighbourhood.statistics.gov.uk/dissemination/Info.do?page=nessgeography/areaclassification/area-classification.htm)

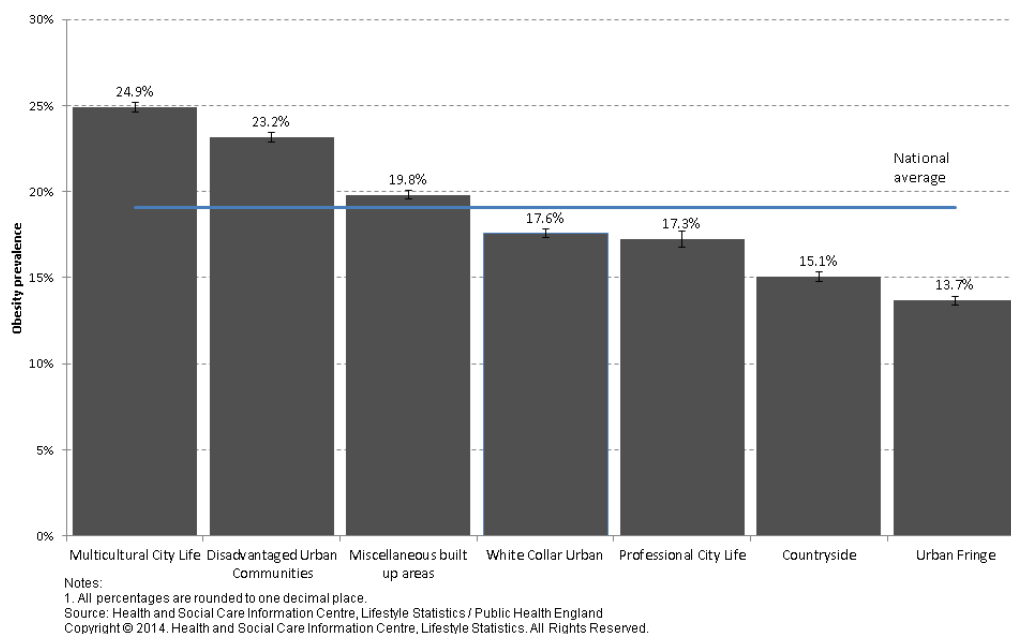
<sup>29</sup> ‘NCMP: Analysis using ONS Area Classification’  
[www.noo.org.uk/uploads/doc/vid\\_12524\\_NCMP\\_Analysis%20using%20the%20ONS%20Area%20Classification.pdf](http://www.noo.org.uk/uploads/doc/vid_12524_NCMP_Analysis%20using%20the%20ONS%20Area%20Classification.pdf)



**Figure 22: Prevalence of obese children in reception by ONS-AC supergroup, England 2013/14**



**Figure 23: Prevalence of obese children in year 6 by ONS-AC supergroup, England 2013/14**



## 4. Demographic Analysis

### 4.1 Prevalence by sex

As mentioned earlier, there were differences by sex which are repeated below for reference. Table 1 and figures 2, 3 and 4 contain a full breakdown.

- Prevalence of obesity was found to be higher among boys than girls in both school years. In reception, 9.9 per cent of boys and 9.0 per cent of girls were classified as obese. In year 6 the percentages were 20.8 per cent and 17.3 per cent respectively.
- In both reception and year 6 a higher percentage of girls were of a healthy weight than boys. In reception 77.7 per cent of girls and 75.4 per cent of boys were a healthy weight and in year 6 this was 66.7 per cent and 63.6 per cent respectively.
- In reception, a higher percentage of boys were underweight than girls (1.2% and 0.7% respectively); whereas in year 6, a higher percentage of girls were underweight than boys (1.6% and 1.2% respectively).

### 4.2 Prevalence by ethnicity<sup>30</sup>

Of the 1,101,611 children for whom valid measurements were submitted, 83 per cent (909,030) of records included a valid ethnic code (for the purpose of this report, 'not stated' and 'unknown' are considered invalid). This is an improvement on all previous years.

Figures 24 and 25 show the prevalence of underweight, overweight and obese children by ethnic category, for reception and year 6 respectively. Figure 26 compares the prevalence of children who are overweight or obese ('combined overweight and obese') in reception and year 6, by ethnic category, in 2013/14. The associated 95 per cent confidence intervals are also presented.

#### Key findings:

- Obesity prevalence was significantly higher than the national average for children in both school years in the ethnic groups 'Asian or Asian British' (10.4% in reception and 23.8% in year 6), 'Any Other Ethnic Group' (11.3% and 24.3%), 'Black or Black British' (15.6% and 27.4%) and for the 'Mixed' ethnic group (10.0% and 21.4%).

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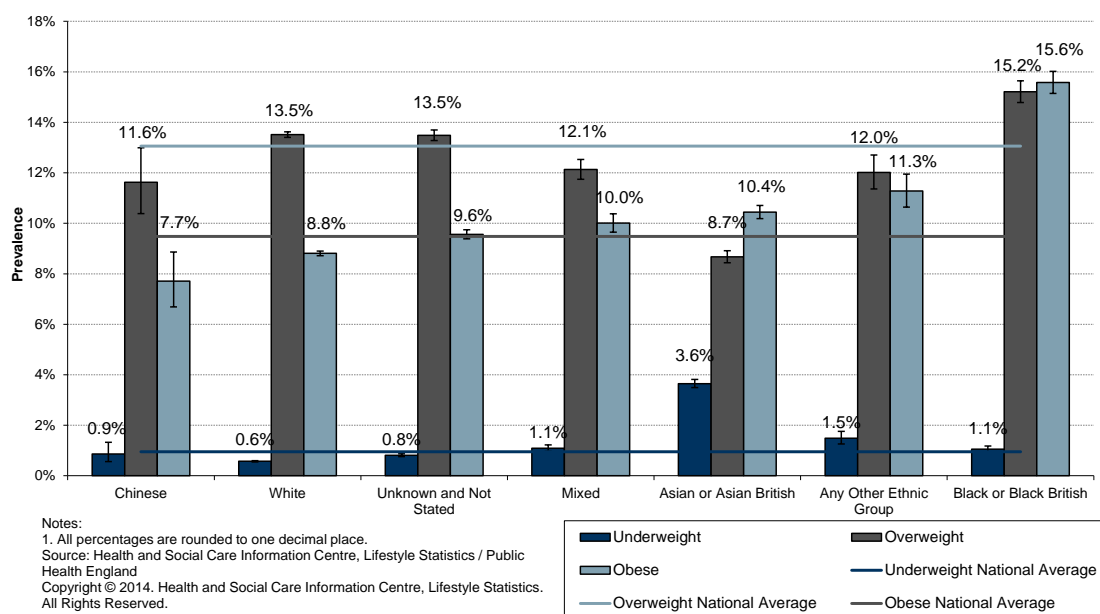
<sup>30</sup> Since 2007/08, collection of the ethnicity of participating children has been a mandatory requirement. PCTs (and now LAs) were able to supply ethnicity codes using either the NHS or the Department for Education (DfE) classification codes or those used within the Rio and System One child health systems. These codes were grouped into seven categories for national analysis. 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 LA.

- Obesity prevalence was significantly lower than the national average for children in both years in the 'White' ethnic group (8.8% and 17.6%); and for 'Chinese' in reception (7.7%).
- Underweight prevalence was significantly higher in the 'Asian or Asian British' group (3.6% in both years), 'Any Other Ethnic Group' (1.5% and 1.7%) and for the 'Chinese' group in year 6 only (2.3%).

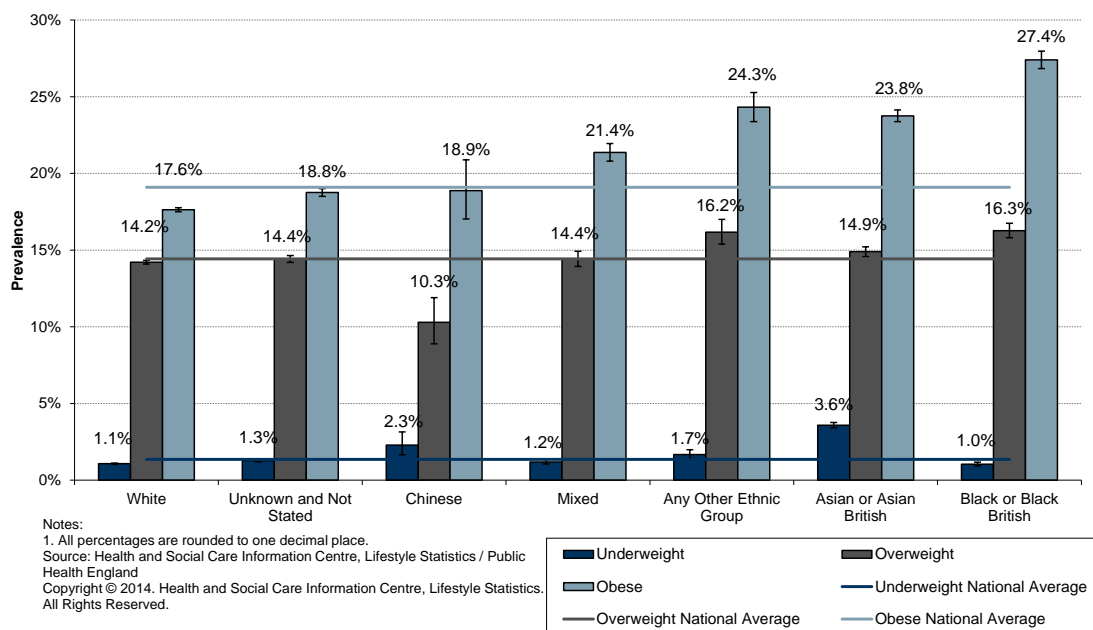
There are known associations between ethnicity and area deprivation<sup>31</sup>. Deprived urban areas in England tend to also have a higher proportion of individuals from non-White ethnic groups, so it is likely that there are confounding factors which affect obesity prevalence by ethnic group.

**Figure 24: Prevalence of underweight, overweight and obese children in reception, by ethnic category, England, 2014/15**

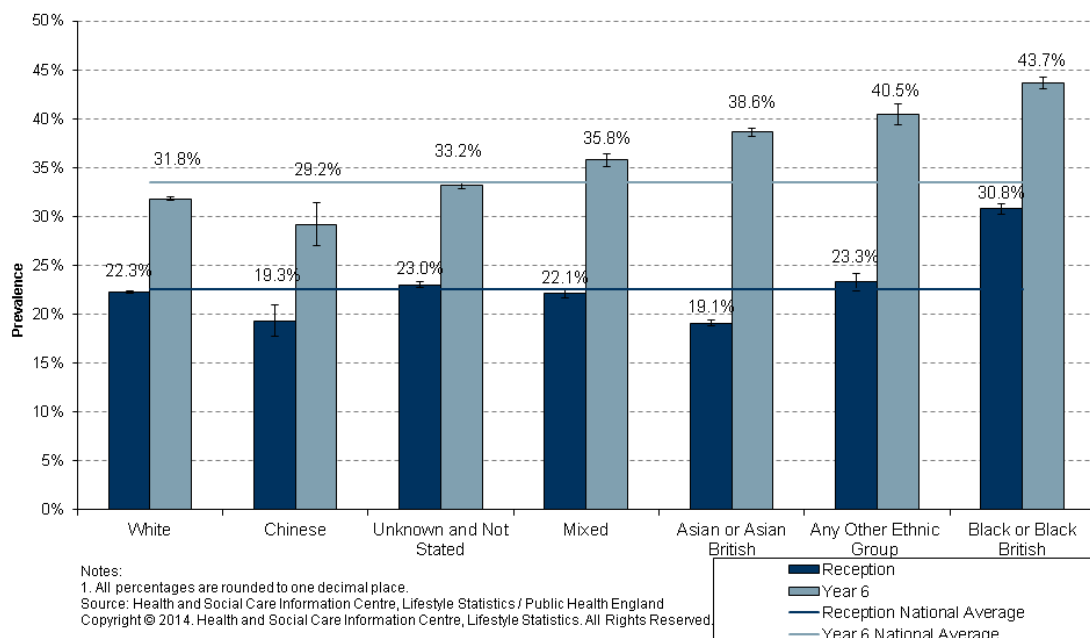


<sup>31</sup> 'National Child Measurement Programme; Detailed Analysis of the 2006/07 National Dataset'  
[www.noo.org.uk/uploads/doc168\\_2\\_NOO\\_NCMP\\_report230608.pdf](http://www.noo.org.uk/uploads/doc168_2_NOO_NCMP_report230608.pdf)

**Figure 25: Prevalence of underweight, overweight and obese children in year 6, by ethnic category, England, 2014/15**



**Figure 26: Prevalence of combined overweight and obese children, by ethnic category and school year, England, 2013/14**



## 5 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<sup>32</sup>. The HSE 2013 is expected to be published by the Health and Social Care Information Centre on 10th December 2014.

### 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 2012, with trend tables updated for 2013 expected to be published alongside the main report on 10<sup>th</sup> December 2014.

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

### Public Health England outputs (PHE Obesity K&I)

Public Health England's Obesity Knowledge and Intelligence Team (formerly the National Obesity Observatory) provides several resources relating to the NCMP and child obesity in general. NCMP resources include an online Local Authority NCMP data profile tool, NCMP data at Electoral Ward and Middle Super Output Area level, guidance for data sharing and analysis of NCMP data, and a variety of reports providing detailed analysis of NCMP data. Resources relating to child obesity in general include a slide set which presents key data and information on child obesity and a simple guide to classifying body mass index in children. All PHE Obesity K&I resources can be accessed via this website:  
[www.noo.org.uk/](http://www.noo.org.uk/)

Additionally, Public Health England issues a range of other resources to support local delivery of the NCMP, including operational guidance, template letters and practice examples. These are available here: <https://www.gov.uk/government/collections/national-child-measurement-programme>

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<sup>32</sup> As noted earlier in the report, Strategic Health Authorities were abolished on 1 April 2013.

## **Statistics on Obesity, Physical Activity and Diet: England 2013**

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

[www.hscic.gov.uk/searchcatalogue?productid=11194&q=Statistics+on+Obesity%2c+Physical+Activity+and+Diet%3a+England+&topics=0%2fPublic+health&sort=Most+recent&size=10&page=1#top](http://www.hscic.gov.uk/searchcatalogue?productid=11194&q=Statistics+on+Obesity%2c+Physical+Activity+and+Diet%3a+England+&topics=0%2fPublic+health&sort=Most+recent&size=10&page=1#top)

## Annex 1 – Data quality report

Table A1 shows a number of data quality measures since the first year of robust NCMP data was collected in 2006/07, and Figure A1 shows how the participation rate has improved over time.

As discussed at the beginning of Section 3, there have been considerable improvements in data quality for all the measures since 2006/07.

Online table 7 shows the data quality measures at LA level for 2013/14 and there is some commentary on these in the data quality note which accompanies this report.

**Table A1: LA data quality report for NCMP 2006/07 to 2013/14**

Year	Reception participation rate	Year 6 participation rate	Overall participation rate	Percentage of records with heights rounded to whole numbers	Percentage of records with weights rounded to whole numbers	Percentage of records with missing home/child postcodes	Percentage of records with missing ethnicity codes <sup>1</sup>
2006/07 <sup>2</sup>	83%	78%	80%	-	-	-	-
2007/08	89%	87%	88%	30%	23%	3%	33%
2008/09	91%	89%	90%	21%	15%	2%	23%
2009/10	93%	90%	91%	18%	12%	1%	17%
2010/11	93%	92%	93%	19%	12%	0%	17%
2011/12	94%	92%	93%	17%	10%	1%	15%
2012/13	94%	93%	93%	17%	10%	0%	14%
2013/14	94%	94%	94%	17%	10%	0%	9%

Notes:

1. Missing codes excludes 'Not Stated' which is considered a valid code for this table.

2. The values were not calculated for all data quality measures in 2006/07.

Key:

Data Quality indicator	Red	Amber	Green
Reception participation rate	<85%	≥85% or <90%	≥90%
Year 6 participation rate	<85%	≥85% or <90%	≥90%
Overall participation rate	<85%	≥85% or <90%	≥90%
Percentage of records with heights rounded to whole numbers	<25%	≥25% or ≤50%	>50%
Percentage of records with weights rounded to whole numbers	<25%	≥25% or ≤50%	>50%
Percentage of records with missing child postcodes	<25%	≥25% or ≤50%	>50%
Percentage of records with missing ethnicity codes	<25%	≥25% or ≤50%	>50%
Percentage of records with missing NHS numbers	<25%	≥25% or ≤50%	>50%

Figure A1: Participation rate by school year, 2006/07 to 2013/14





## Annex 2 – Methodology

### A2.1 Coverage

The NCMP covers children in mainstream state-maintained schools in reception (aged 4–5 years) and year 6 (aged 10–11 years). Inclusion of independent and special schools<sup>33</sup> is encouraged.

### A2.2 Measurements

The measurement of children's heights and weights, without shoes and coats and in normal, light, indoor clothing, was overseen by healthcare professionals and undertaken in school by trained staff. Measurements could be taken at any time during the 2013/14 academic year. Consequently, some children were almost two years older than others in the same school year at the point of measurement<sup>34</sup>, however, body mass index (BMI) centile results are adjusted for age.

### A2.3 Data validation

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

More information on the system's data quality checks is given below:

- 1) As data are submitted, the NCMP system checks that each entered data item meets certain required conditions.
  - a) Invalid data items (e.g. incorrect ethnicity codes) are rejected.
  - b) Unexpected data items (e.g. "extreme" heights) generate warning flags that require LA confirmation.
- 2) Once the data has been submitted, data quality indicators (e.g. percentage of records with "extreme" heights) are shown in real time and by different groups of schools allowing users to identify and resolve data quality issues early.
- 3) After the collection deadline, the HSCIC carries out further validation, eg. comparing data across LAs and over time. The HSCIC contact LAs to query unexpected findings and, where necessary, request that data be corrected.

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<sup>33</sup> Independent and special schools are those categorised as 'Academy Special', 'Community Special', 'Foundation Special', 'Non-Maintained Special', 'Other Independent', 'Other Independent Special School', or 'Pupil Referral Unit'. There were a total of 2,693 records relating to pupils in independent/special schools which represents only 0.2% of the total number of records across all state and independent / special schools. Records from independent / special schools are excluded due to concerns around how representative they are due to the low proportion of such schools that participate.

<sup>34</sup> Although there can potentially be a 2-year age gap dependent on the pupil's date of birth and when in the school year they were measured, 87% of Year R pupils were aged between 4.5 years and 5.5 years when they were measured and 79% of year 6 pupils were aged between 10.5 years and 11.5 years.

## Annex 3 – Confidence intervals and significance testing

### A3.1 Introduction

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 per cent 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 per cent of the confidence intervals calculated in this way to contain the true population value for that estimate.

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

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

## A3.2 Methodology

The significance of the difference between two rates or proportions has been carried out throughout this report using the approach outlined below. This is an improvement on the statistical significance testing methodology carried out in NCMP reports prior to 2009/10 and makes this analysis consistent with that used and advised by Public Health England Knowledge and Intelligence Teams.

### A3.2.1 Confidence intervals

Confidence intervals are calculated using the method described by Wilson<sup>35</sup> and Newcombe<sup>36</sup>. The steps needed are:

- 1) Calculate the estimated proportions of children with and without the feature of interest (e.g. percentage of obese children in reception year) as follows.

$p = r / n$  = proportion with feature of interest

$r$  = observed number of obese children in reception year in each area

$n$  = sample size

$q = (1 - p)$  = proportion without feature of interest

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

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

where  $z$  is  $z_{(1-\alpha/2)}$  from the standard Normal distribution.

- 3) Then the confidence interval for the population proportion is given by:

$$\left( \frac{A-B}{C} \right) \text{ to } \left( \frac{A+B}{C} \right)$$

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  $\frac{z^2}{n + z^2}$ .

When  $r = n$  so that  $p = 1$ , the interval becomes  $\frac{n}{n + z^2}$  to 1.

### A3.2.2 Testing for significant differences

In order to test for statistical significance, the use of the approach outlined by Altman et al. in Statistics with Confidence (edition 2)<sup>37</sup> should be followed. The steps needed are:

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<sup>35</sup> Wilson EB (1927) Probable inference, the law of succession, and statistical inference. J Am Stat Assoc; **22**:209-212

<sup>36</sup> Newcombe RG (1998) Two-sided confidence intervals for the single proportion: comparison of seven methods. Stat Med; **17**:857-72

<sup>37</sup> Altman DG, Machin D, Bryant TN and Gardner MJ (2000) Statistics with Confidence, 2<sup>nd</sup> edn. London; BMJ books; 49

- 1) Calculate the absolute difference between the two proportions,  $\hat{D} = \hat{p}_2 - \hat{p}_1$
- 2) Then calculate the confidence limits around  $\hat{D}$  as:

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

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

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

## Annex 4 – Calculation of prevalence

Prevalence rates were calculated by deriving every child's BMI<sup>38</sup> and referencing the age and sex specific centiles calculated using the British 1990 growth reference (UK90) to determine the number of children defined as underweight, healthy weight, overweight or obese as a proportion of the number measured.

The age and sex-specific UK90 growth reference centiles were based on UK growth data: a large representative sample of 37,700 children was constructed by combining data from 17 separate surveys. The sample was rebased to 1990 levels and the data were then used to express BMI as a centile based on the BMI distribution, adjusted for skewness, age and sex using Cole's LMS method.<sup>39</sup>

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

The data collection tool assigns a child to a BMI category using the following steps for each record:

1. calculate the BMI as follows:

$$BMI = \frac{10,000}{h^2 (cm^2)} \times w(kg)$$

2. calculate the BMI z-score as follows:
  - 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.

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<sup>38</sup> Body mass index (BMI) is an indicator of body fat based on height and weight. BMI=weight(kg)/height<sup>2</sup> (m<sup>2</sup>)

<sup>39</sup> 'Growth monitoring with the British 1990 growth reference'. Cole *Arch Dis Child*.1997; 76: 47-49.

4. Classify child into a BMI category as follows:
  - a. p-score of  $\leq 0.02$  are flagged as 'underweight'.
  - b. p-score  $> 0.02$  and  $< 0.85$  are flagged as 'healthy'.
  - c. p-score  $\geq 0.85$  and  $< 0.95$  are flagged as 'overweight'.
  - d. p-score  $\geq 0.95$  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, ie:

$$prevalence = \frac{\text{number of records in BMI category}}{\text{number of valid records uploaded}} \times 100\%$$

## Annex 5 – Calculation of participation rates

LAs' participation rates were calculated based on validated data. The numbers of pupils at each school were provided by the Department for Education (DfE), but LAs could edit these figures if necessary. LA provided pupil headcounts were automatically corrected by the NCMP collection system where the number measured exceeded the headcount. HSCIC validation investigated cases where LAs removed high numbers of schools from their school list to ensure that such removals were valid.

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

### Calculating participation rates:

The participation rate is the proportion of eligible children who were measured by the LA. It is calculated by:

$$\text{participation rate} = \frac{\text{number of pupils for whom valid measurements were recorded}}{\text{number of pupils who were eligible for measurement}} \times 100\%$$

Where:

- 1) **Number of pupils measured** is the total number of records with measurements entered by an LA into the NCMP collection system *excluding*:
  - i. Invalid records;
  - ii. Records from independent and special schools.
- 2) **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 LAs. LAs were then able to update these figures if they deemed them inaccurate.
  - ii. These 'eligible' figures were automatically validated by the NCMP collection system to ensure that the number measured at a school did not exceed the number eligible for measurement. When the number measured did exceed the number eligible, the system corrected the 'eligible' figure by increasing it to match the number measured thus ensuring a maximum school-level participation rate of 100 per cent.
  - iii. The NCMP system provides LAs with a real time indication of participation rates and they were able to amend their headcount figures at any point during the collection year.

## Annex 6 – Effect of participation rate on prevalence

There were year-on-year increases in the participation rates for the NCMP between 2006/07 and 2011/12 since when the rates have been similar and the rate for 2013/14 was 94 per cent. However, the dataset used to estimate prevalence is nevertheless based on a sample and 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 not perfect.

Analysis was undertaken in previous years to assess the strength of the relationship. The association between participation rate and obesity prevalence for year 6 pupils in 2006/07 to 2008/09 was found to be sufficient to warrant an extension to the confidence intervals on obesity and combined obesity and overweight prevalence figures. It is estimated that year 6 obesity prevalence may be underestimated by around 1.3 percentage points for 2006/07, around 0.8 percentage points for 2007/08, and around 0.7 percentage points for 2008/09. This may be due to obese children being less likely to participate in the NCMP than other children.

For other weight groups the relationship was found to be negligible. In 2009/10 and 2010/11 the national participation rate continued to increase. Analysis showed that no extension to the confidence intervals was necessary in either year. As the participation rate increased again in 2011/12 and has remained similar since 2012/13, and the regional variation has decreased, it was considered unnecessary to repeat the analysis this year. We will continue to monitor this in the future.

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

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



## Annex 7: How are the statistics used?

### Users and uses of the report

From our engagement with customers, we know that there are many users of the NCMP statistics. There are also many users of these statistics who we do not know about. We are continually aiming to improve our understanding of who our users are in order to enhance our knowledge on what the uses of these data are via consultations and feedback forms available online. Below is listed our current understanding of the known users and uses of these statistics. Also included are the methods we use to attempt to engage with the current unknown users.

#### Known Users and Uses

##### Department of Health (DH)

The NCMP is a key element of the Government's approach to tackling child obesity. NCMP statistics are used to inform policy and set national ambitions such as those detailed in *Healthy Lives, Healthy People: A call to action on obesity in England* (<https://www.gov.uk/government/publications/healthy-lives-healthy-people-a-call-to-action-on-obesity-in-england>)

##### Public Health England (PHE)

PHE are responsible for the Public Health Outcomes Framework (PHOF) which sets out the desired outcomes for public health and how these will be measured. The NCMP provides robust data for the child excess weight indicators in the PHOF.

The PHE Obesity Knowledge & Information team (formerly the National Obesity Observatory) conduct additional analyses on the NCMP data, including regional and local analyses, and produce a range of reports:  
[https://www.noo.org.uk/NCMP/National\\_report](https://www.noo.org.uk/NCMP/National_report)

Additionally, PHE Obesity K&I also present NCMP data in an online data tool that enables the user to examine patterns and trends at local authority level. This interactive data tool will be updated with the 2013/14 NCMP data in early January 2015 and will be available on the following link:  
<http://fingertips.phe.org.uk/profile/national-child-measurement-programme>.

**Local Authorities** - frequently use NCMP statistics for analyses, benchmarking and to inform decision making.

**Academia and Researchers** - Non-identifiable versions of the annual NCMP datasets are deposited in the UK Data Archive<sup>40</sup> and this NCMP data is used by academics in their research papers.

**Media** – NCMP data are frequently used to underpin articles in newspapers, journals, etc.

**Public** – Aggregated NCMP data, as published in the HSCIC's national report and PHE's more detailed analyses, is accessible for general public use.

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<sup>40</sup> UK Data Archive [www.data-archive.ac.uk](http://www.data-archive.ac.uk).

**Public Health Campaign Groups** - data are used to inform policy and decision making and to examine trends and behaviours.

**Ad-hoc requests** – NCMP statistics are used by the Health and Social Care Information Centre (HSCIC) to answer Parliamentary Questions (PQs), Freedom of Information (FOI) requests and ad-hoc queries. Ad-hoc requests are received from health professionals; research companies; public sector organisations, and members of the public, showing the statistics are widely used and not solely within the profession.

## Unknown Users

This publication is free to access via the HSCIC website <http://www.hscic.gov.uk/ncmp>. Consequently the majority of users will access the report without being known to the HSCIC. Therefore, it is important to put mechanisms in place to try to understand how these additional users are using the statistics and also to gain feedback on how we can make these data more useful to them. On the webpage where the publication appears there is a link on the right-hand side to a feedback form which the HSCIC uses to capture feedback for all its reports.

The specific questions asked on the form are:

- How useful did you find the content in this publication?
- How did you find out about this publication?
- What type of organisation do you work for?
- What did you use the report for?
- What information was the most useful?
- Were you happy with the data quality?
- To help us improve our publications, what changes would you like to see (for instance content or timing)?
- Would you like to take part in future consultations on our publications?

Any responses via this form are passed to the team responsible for the report to consider. We also capture information on the number of web hits the reports receive, although we are unable to capture who the users are from this.

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