

# **National Child Measurement Programme 2006/07:**

## ***Guidance for analysis by Public Health Observatories***

A report for the Cross-Government Obesity Unit by the  
National Obesity Observatory on behalf of the Association of  
Public Health Observatories

May 2008

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## **1. Introduction**

**This report provides guidance to public health observatories (PHOs) on further analysis they might undertake of the 2006/07 National Child Measurement Programme (NCMP) dataset to:**

- **produce a regional overview of the data**
- **obtain a better understanding of the epidemiology of child obesity and overweight within their area**
- **feed back useful information to PCTs**
- **help improve participation and data quality in the 2007/08 NCMP.**

**Further analysis of the NCMP 2006/07 dataset is optional. This guidance is designed to support observatories that wish to undertake additional investigation of the data.**

- 1.1**     The aim of this guidance is to provide PHOs with:
- Guidance on the appropriate use of the NCMP dataset, to comply with data protection and disclosure rules
  - Caveats associated with the NCMP data and interpretation
  - A standard set of recommended regional and local level analyses.

## 2. The NCMP 2006/07 national dataset

- 2.1. PHOs should by now have received a CD from the NHS Information Centre (the IC) containing the cleaned national dataset from the NCMP 2006/07 (as used for the IC's NCMP report<sup>1</sup>). Additionally, the CD contains two sets of pupil numbers – the original pupil numbers supplied by the Department for Children, Schools and Families (DCSF) and contained in the IC's data-capture tool, and the pupil numbers submitted by PCTs.
- 2.2. PHOs should note that since this dataset has been cleaned according to the IC's data cleaning protocol, it does not contain records that:
  - had school codes for independent or special schools, or schools added by PCTs
  - were outside the permitted age ranges of 48–83 (for Reception) and 120–143 months (for Year 6)
  - had invalid measures (e.g. no code for sex)
  - had extreme measures (heights, weights or BMI outside of seven standard deviations from the expected height, weight or BMI for age).
- 2.3. Additionally, the dataset contains several data fields that the IC has assigned to the data - e.g. codes for local government and health geographies. It is important to note that local authority (LA) district and LA county codes have been assigned on the basis of the postcode of school, whereas PCT, Strategic Health Authority (SHA) and Government Office region (GOR) have been assigned according to the PCT that provided the data for that school. Because of boundary differences between PCTs and LAs, as well as differences between those schools allocated to PCTs by postcode and the schools they routinely work with, these two methods of assigning geographies could lead to small differences between LA and PCT, or GOR and SHA, analysis for some areas.
- 2.4. In addition to the additional geographical fields, the IC has added the appropriate z and p scores for BMI, height and weight for each child\*. Also the final field in the main table, labelled 'indicator', shows whether individual children are classed as obese or overweight according to the 85<sup>th</sup> and 95<sup>th</sup> percentiles on the British 1990 growth reference (UK90).<sup>2,3</sup> Code 1 indicates obesity and code 3 indicates overweight for children in Reception, whereas code 2 indicates obese and code 4 indicates overweight for Year 6. To comply with licensing issues around access to the UK90 growth reference, and to ensure consistency with the IC's published figures, PHOs are advised to use these indicator fields to identify obese and overweight children in analysis.

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\* z scores for height, weight and BMI provide the number of standard deviations away from the expected value of height, weight or BMI for age. The corresponding p score expresses the z score as a percentile, using the normal distribution.

### **3. Sharing of the national NCMP 2006/07 dataset with PCTs**

- 3.1. PHOs must note that the conditions of the data-sharing agreement (DSA) between themselves and the IC state that these data can be shared with PCTs only in a suitably anonymised and aggregated form. PHOs can share data that refers to individual children with PCTs, but this must only include that PCT's own data. The DSA states that all record-level data must be treated in accordance with the Data Protection Act 1998,<sup>4</sup> and any data will, therefore, need to be transferred safely and securely to PCTs.
- 3.2. If a PCT requests access to the national or regional dataset, PHOs must ensure that the data are aggregated at a level that ensures anonymisation of the data. If this level of aggregation precludes useful analysis it may be that the PHO will wish to perform such analyses on behalf of the PCT.

#### **4. National findings for the 2006/07 school year**

- 4.1. PHO staff engaged in analysing the NCMP data should ensure they have read the IC's report *National Child Measurement Programme: 2006/07 school year, headline results*.<sup>1</sup>
- 4.2. Additionally, PHOs should familiarise themselves with the online resources to support analysis of the NCMP data that are available through the IC's website.<sup>5</sup> These include:
  - data tables used to produce the IC report in Excel format
  - an online database, which can be used to compare results for PCTs and SHAs with the national analysis.
- 4.3. Although the summary figures available in the online database are provided without confidence limits, these are published within the Excel data tables and should always be used when comparing prevalence figures between areas.

## **5. The forthcoming report from the National Obesity Observatory (NOO)**

- 5.1. An analytical report of the 2006/07 NCMP results will be published in June 2008 by NOO on behalf of the Cross-Government Obesity Unit. This report will examine in detail some of the issues raised by the IC's report, including:
- distribution and nature of PCT participation rates
  - comparison of prevalence figures with recent HSE figures and those from the NCMP 2005/06
  - effect of participation rates on prevalence of obesity and overweight
  - effect of data quality on reported prevalence of obesity and overweight
  - an apparent disproportionate opt-out rate for girls
  - effect of age at time of measurement on the reported prevalence of obesity and overweight
  - the relationship between deprivation, urban/rural setting and ethnicity on the prevalence of obesity and overweight
  - the combined effect of the factors discussed above on the variance between reported prevalence at PCT level.
- 5.2. We advise that PHOs wait until they have read the draft of the NOO report before publishing detailed analysis on the NCMP dataset. This will be circulated to PHOs prior to publication.
- 5.3. Although PHOs have access to the national dataset and so are able to do the same analyses as those in the forthcoming NOO report, doing so would result in considerable duplication of effort.
- 5.4. There is, though, substantial useful analysis that PHOs can undertake now, and this is detailed in section 6. If more detailed analysis, such as the local variation in prevalence is undertaken, PHOs should consider and mention the possible confounding effects of deprivation, ethnicity, participation rates and data quality and might want to reference the forthcoming NOO report.

## 6. Recommended analyses

- 6.1. To help standardise analyses and help comparability of findings across the country, we propose PHO outputs consist of the following analyses.
- 6.2. We recommend that all PHOs attempt the process-related analysis described in 6.8 to 6.20 as soon as possible, since this work could assist PCTs in improving data collection for NCMP 2007/08 that is now underway. The work described in sections 6.21 to 6.46 should be done during the next few months, but PHOs might want to wait for the publication of the APHO report before undertaking this additional work or the sort of analysis outlined in section 7.
- 6.3. If PHOs have further queries about conducting the analysis outlined in this guidance, they should contact the National Obesity Observatory:  
[ncmp@noo.org.uk](mailto:ncmp@noo.org.uk)

### *The importance of data quality checks*

- 6.4. Although the NCMP dataset provided to PHOs has undergone extensive cleaning at national level, there is a limit as to what checks and cleaning can be done centrally on a dataset with 800,000 records from 17,000 schools. As a result, PHOs must recognise that there are still some data quality issues within the NCMP dataset.
- 6.5. In a few cases, PCTs seem to have entered the same pupil records for two adjacent schools or schools have been inadvertently selected by the wrong PCT within the data-capture tool, overwriting pupil records submitted by the original PCT. Additionally, analysis suggests that a proportion of lower super output areas (LSOAs) in the 'Child\_SOA' field are the SOA of the school, rather than the child. Although these detailed issues have not been identified in the national data cleaning or analysis, they might become evident in the sort of detailed regional analysis PHOs will do – especially since PHOs are able to work far more closely with the PCTs responsible for submitting these records.
- 6.6. Some further data cleaning of the national dataset has been done for the forthcoming NOO report, and annex 1 of this report will contain a list of these changes. PHOs might want to view the contents of this annex before beginning detailed analysis of their local data to see if any of the issues already identified affect PCTs and schools within their region.
- 6.7. If PHOs do need to begin analysis before the NOO report is released, it is important that basic quality checks on the dataset are undertaken and anomalies are clarified with relevant PCTs. PHOs should not assume that the cleaning performed nationally has removed all data quality issues within the national NCMP dataset.

### ***Differences between provisional and final participation rates***

- 6.8. For all PCTs in their region, PHOs should be aware of any substantial differences between submitted participation rates and the final published IC figures. Final participation figures might differ from those submitted by PCTs because they have been subjected to validation checks by the IC to remove invalid records and correct for errors in claimed pupil numbers. **In addition, many PCT participation rates are based on a pupil denominator supplied by PCTs within the data-capture tool, rather than based on a sum of the pupil numbers within the school list. Further information on the process used to calculate final participation rates can be found on the NCMP pages of the IC's website.<sup>6</sup>**
- 6.9. SHAs and PCTs have been given the opportunity to verify the final results. However, if PCTs' provisional rates differ significantly from their final rates, PHOs might want to discuss this with the SHA or PCT to ensure PCTs understand why the rates differ and take steps to help ensure the 85% participation rate goal is met for NCMP 2007/08.
- 6.10. PHOs will not routinely have access to participation rates submitted by PCTs, but the SHA should be able to provide figures to enable checks to take place.
- 6.11. Although some of the differences between provisional and final participation rates are due to the removal of invalid records, some of the biggest changes are due to issues with school-level pupil numbers supplied by PCTs. Several PCTs supplied a pupil number for a school year-group that was less than the total number of pupils measured (ie, showing that they measured more children than were eligible in that school). In such cases, where participation rate for individual schools would have exceeded 100%, the IC adjusted participation rates to 100%.
- 6.12. This adjustment might have resulted in PCTs having lower than expected overall final participation rates. PHOs might want to stress to PCTs the importance of submitting accurate pupil numbers into the data-capture tool to minimise the need for adjustment by the IC. In particular, PCTs need to ensure that the eligible pupil numbers entered are equal to or are greater than the number of pupils measured at that school. Appendix 1 provides more detail on calculation of participation rates.

### ***School-level participation rates***

- 6.13. PHOs might wish to consider checking which schools were measured by each PCT and feeding back school-level participation rates to PCTs.
- 6.14. It is particularly vital that PCTs are aware of any schools in which measurements did not take place so they can ensure these schools are included in the NCMP 2007/08 so that higher participation rates are achieved. Equally, PCTs need to be made aware of schools in their area that had low participation rates and consider options for improving these for the current year's NCMP.
- 6.15. Detailed analysis of the 2006/07 dataset at school level shows that several pupils were coded to the wrong school by PCTs. This is evident if an infant school has Year-6-aged pupils allocated, or if a junior school has Reception pupils assigned. This problem seems most common where a junior and infant school share the same name and address. In such cases, it might be possible for pupils to be reallocated to the correct school before analysis is undertaken, but PCTs should be informed where this has occurred so they can ensure pupils are correctly allocated to schools in NCMP 2007/08.
- 6.16. Pupil numbers supplied to PHOs within the NCMP dataset include the DCSF pupil numbers originally provided to PCTs in the data-capture tool (field name 'DCSF\_Year\_R/6\_count'), as well as pupil numbers entered by PCTs and submitted to the IC ('PCT\_year\_R/6\_count'). In general, the pupil numbers provided by the PCT should be used for school-level participation rates, but in some instances PCTs did not provide pupil numbers. In such circumstances, the DCSF figure must be used. Equally, if a PCT did not measure any children at a school, no pupil number information was collected for that school and again the DCSF figure will need to be used.
- 6.17. To calculate accurate participation rates at school level, PHOs should use the larger number of: the number of pupils supplied by the PCT, and: the number of pupils measured for the pupil denominator. This will ensure school-level participation rates do not exceed 100% for any school year. Appendix 1 provides more detail on calculating response rates.

### ***Data quality issues: rounding of height and weight measures***

- 6.18. *The National Child Measurement Programme: guidance for PCTs - 2007–08 school year*<sup>7</sup> stated that PCTs should record children's heights and weights to the first decimal place (ie, height to the nearest mm and weight to the nearest 100g). Despite this, preliminary analysis of the NCMP dataset shows that some PCTs submitted heights and

weights rounded to a whole number (ie, nearest 10 mm or 1000 g) or a half number (ie, nearest 5 mm or 500g).

- 6.19. Such rounding is not a serious issue for height measures, since it results in only a small percentage error on the final measurements. For weight measures, however - especially those for children in Reception, where the average weight of a child is only 20kg—the resulting error can be much larger (around 5% of the overall weight). Furthermore, analysis suggests that PCTs might be systematically rounding down weight measures. Reported prevalence of obesity and overweight is lower for areas with a high proportion of records rounded, and so rounding is an important data-quality issue that needs to be tackled.
- 6.20. To help ensure good quality data for the NCMP, PHOs should feed back to PCTs the proportion of records that are rounded and whether this is greater than expected. If the number of rounded records is higher than expected (ie, approximately 10% rounded to a whole number, or 20% rounded to the whole or half) PCTs should consider what actions are needed to prevent this happening in future. Staff undertaking and recording the measurements and those performing data entry may need to be trained or retrained if data quality is to be improved.

### ***Prevalence figures for PCTs and LAs***

- 6.21. **Checking of prevalence rates:** PHOs should check that their analysis matches prevalence figures published by the IC for PCTs and LAs. To do this, we advise use of the indicator field in the dataset, rather than use of the BMI field and reassigning z scores or percentiles.
- 6.22. **BMI thresholds:** The NCMP 2006/07 uses the British 1990 growth reference (UK90) for BMI and the 85th and 95th percentiles to define children as obese or overweight according to age and sex. This definition is commonly used in the UK for population monitoring - eg, in recent Health Survey for England (HSE) figures.
- 6.23. Individual children can be classified as obese or overweight with the 'LMS Growth' Excel add-in software available at no charge from Professor Tim Cole's website<sup>8</sup>.
- 6.24. It is important to note that the 85th and 95th percentiles as used in the NCMP are intended for population-monitoring use only, and do not provide the number or percentage of individual children clinically defined as overweight or obese. In a clinical or individual setting, the 91st and 98th percentiles are used in the UK to define individual children as overweight and obese respectively, and several additional measures and indicators are usually taken into account before a clinical diagnosis is made.

- 6.25. As a result, when presenting prevalence figures based on the 85<sup>th</sup> and 95<sup>th</sup> cut offs, it is important to provide an explanation of the nature of the prevalence figures presented. Ideally wording such as 'x percent of children are obese or overweight' should be avoided. More appropriate wording may be 'x percent of children are classified as obese, as defined according to the UK90 95<sup>th</sup> percentile', or 'x percent of children are at risk of obesity'. The latter term is used in the NICE guidance on obesity,<sup>9</sup> though no formal recommendations are made as to the definitions or terminology that should be employed for public health purposes.
- 6.26. **Prevalence by school year:** Prevalence figures should always be produced separately for Reception and Year 6, rather than producing combined results. Prevalence of obesity and overweight differs with age, tending to be higher in the older age-groups. As a result, a combined prevalence figure will tend to be lower if a larger proportion of Reception children have been measured, and higher for areas in which a larger proportion of Year 6 children have been measured. If combined prevalence figures are produced some form of age standardisation should be used, rather than simply using crude rates for prevalence. We advise that PHOs do not publish combined prevalence figures – even when age standardisation is used.
- 6.27. PHOs might also want to compare the average age of children measured in each age-group with the reported prevalence. It is known that prevalence of obesity increases with age and that, since PCTs measure children throughout the year, there is potential for substantial variation in age by PCT even within the two age-groups.
- 6.28. **Prevalence - effect of participation rate:** analysis of the 2005/06 NCMP dataset and provisional analysis of the 2006/07 dataset (to be published shortly by APHO), suggests that the participation rate by PCT does affect the reported prevalence of obesity, especially for Year 6. This effect is likely to be due to selection bias in children who were measured, whereby children who do not participate in the NCMP are more likely to be obese than those who do participate. As a result, PHOs should examine whether participation rate is related to prevalence of obesity for PCTs in their region, before publishing figures showing differences in prevalence.
- 6.29. When examining participation rates in relation to prevalence figures, we advise that participation rate is measured with a different method from that used for performance management purposes. Participation rates calculated for performance management include numbers of children attending schools in which no measures were submitted. If no pupils within a school have been measured it is unlikely this is due to selective opt-out of obese children and so the possible effect on prevalence figures is minimal. PHOs should calculate participation rates for each PCT based on the proportion of children measured in

schools in which measurements were submitted. This rate is calculated by dividing the number of children measured by a PCT in each school year by the sum of the pupil numbers in schools in which measures were taken. This figure will be equal to, or higher than, the published participation rate for the PCT.

- 6.30. **Prevalence - effect of deprivation, setting, and ethnicity:** In line with the findings from the IC that deprivation, urban/rural environment and ethnicity influence prevalence, PHOs should use their local intelligence and data to determine to what extent the variation within their region can be explained by these variables (as well as by factors such as data quality and the participation rate).
- 6.31. If there are any clear outliers from the expected pattern, it is advised that PHOs discuss these with the relevant PCT to determine whether these are indications of higher or lower than expected prevalence, or whether factors, such as the participation rate, rounding of measures, the urban/rural setting (or other characteristics that have not been analysed), explain the differences?
- 6.32. **Prevalence by sex:** In addition to analysis of overall prevalence, PHOs might want to provide prevalence for their PCTs broken down by sex. The IC has produced national-level analysis for girls and boys separately, but has not done so at regional or local level.
- 6.33. **Children at risk of underweight:** Another area of analysis that will complement the figures produced by the IC is analysis of prevalence of children at risk of underweight. Although no agreed definition of underweight exists for the UK90 dataset, we recommended that the 5<sup>th</sup> percentile is used to provide an indication of the prevalence of underweight children for population-monitoring purposes.
- 6.34. The 2<sup>nd</sup> percentile tends to be used most frequently to define underweight in clinical settings. In clinical settings, specificity is important since a definition is required that classifies children as underweight only if low BMI is truly a problem. If a definition were used that flags many children as underweight who are in fact at a healthy weight, clinical resources would be wasted on unnecessary examination or monitoring of these children.
- 6.35. For population monitoring, however, sensitivity is more of a consideration than is specificity. It is important that the definition used includes all those children for whom a low BMI might be an issue. In population monitoring a few 'false positives' have little effect, since the classification made is not being used to allocate interventions or treatment to individual children. Additionally, inclusion of larger numbers of children provides greater statistical power to detect changes over time or differences between populations. Use of the 5<sup>th</sup> percentile is more consistent with use of the 85<sup>th</sup> and 95<sup>th</sup> population-monitoring percentiles for overweight and obese. By contrast, for

situations in which the 91<sup>st</sup> and 98<sup>th</sup> percentiles are used, the 2<sup>nd</sup> percentile would probably be the most appropriate underweight definition.

- 6.36. A discussion of the issues around defining underweight is provided in a publication by Professor Tim Cole<sup>10</sup> (see the section 'choice of cut offs at age 18').
- 6.37. **Confidence limits around prevalence:** Comparisons of PCT-level prevalence with the regional or national rate or between PCTs should always take into account the confidence limits around these figures. The IC dataset provides approximate confidence limits for PHO and LA prevalence rates. However if PCTs want to calculate their own confidence limits for other geographical areas, or if they need to produce confidence limits for prevalence by sex or for underweight, the Wilson Score method (as used in the Health Profiles) and the associated method for examination of differences between rates is recommended. *Appendix 2* provides further detail on these methods.
- 6.38. PHOs might also consider use of funnel plots or control charts to show PCT prevalence rates with an indication of the expected variation around these figures dependent on the size of the population.

### ***Feeding back school-level prevalence***

- 6.39. If this analysis shows no substantial data-quality concerns, PHOs might want to feed back some information to PCTs on school-level prevalence, or alternatively assist their local PCTs to produce this themselves. PCTs might then wish to provide this information to local schools (alongside the school level participation information described in section 6.8). If feedback is given, it is important to ensure it is based on robust data and does not risk identification of results of individual children.
- 6.40. PCTs must not feed raw results back to schools. The reasons for this are:
- With small denominator populations, such as those for primary schools, the numbers of overweight and obese children are likely to be small. Publication of these small number data might therefore allow individual children to be identified. This would contravene disclosure rules and is not permissible.
  - Class sizes in primary schools are small, so school-level prevalence figures will be subject to small number variation. They would, therefore, not provide robust measures of obesity prevalence, even if there were 100% coverage of all children in the relevant age-groups within a school.
  - Most schools will have less than 100% coverage. Some groups, such as overweight or obese children, are more likely to opt out of

the exercise than others, thus introducing bias into the results and rendering them less reliable at school level.

- 6.41. As a result, any school feedback should be provided using one the following categories (using the statistical methods provided in *appendix 2*):
- significantly higher than the national/regional/PCT average
  - significantly lower than the national/regional/PCT average
  - no different from the national/regional/PCT average
  - insufficient information to provide feedback.
- 6.42. The fourth category should be used if the sample size is small (eg, less than 20 pupils in a school year) or the participation rate was low (eg, less than 70%) in a school.
- 6.43. Since the limits set out above are likely to exclude at least a third of schools from school-level feedback, PHOs should consider clustering schools to enable feedback to be provided for all schools. Schools could be clustered geographically, or according to shared characteristics such as ethnicity or deprivation. PHOs should use local intelligence to determine how this should best be done for their area.
- 6.44. The choice of a suitable comparator (ie, national, regional or PCT) should be made by the PHO dependent on local data. For a small PCT, comparison with the PCT average is unlikely to show many significant differences at school level (because of the wide confidence limits around the PCT figure). Use of the national average reduces this problem, but for a region in which obesity prevalence is substantially lower or higher than the national average, this could mean that most schools are rated as being significantly higher or lower than the comparator. The regional average might provide a good compromise in such situations and will also reduce the workload if school-level feedback is to be produced at PHO level.
- 6.45. It is important that PCTs and PHOs ensure prevalence and participation information is fed back to the correct school (given the evidence that some pupils have been miscoded to schools within the NCMP dataset as described in section 6.13). If prevalence and participation information for Year 6 pupils is fed back to an infant school that does not have Year 6 pupils, or if a school is incorrectly told none of their pupils were measured in 2006/07, there is a real danger that this could prejudice school engagement in the NCMP for future years.
- 6.46. A standard school feedback letter – for PCTs to use to return school or school cluster data to participating schools is provided in *appendix 3*.

## 7. Further local analysis

- 7.1. Section 6 of this document details the recommended PHO analysis of the NCMP 2006/07. If PHOs wish to undertake additional analysis they should consider the following issues.

### ***Comparisons with NCMP 2005/06***

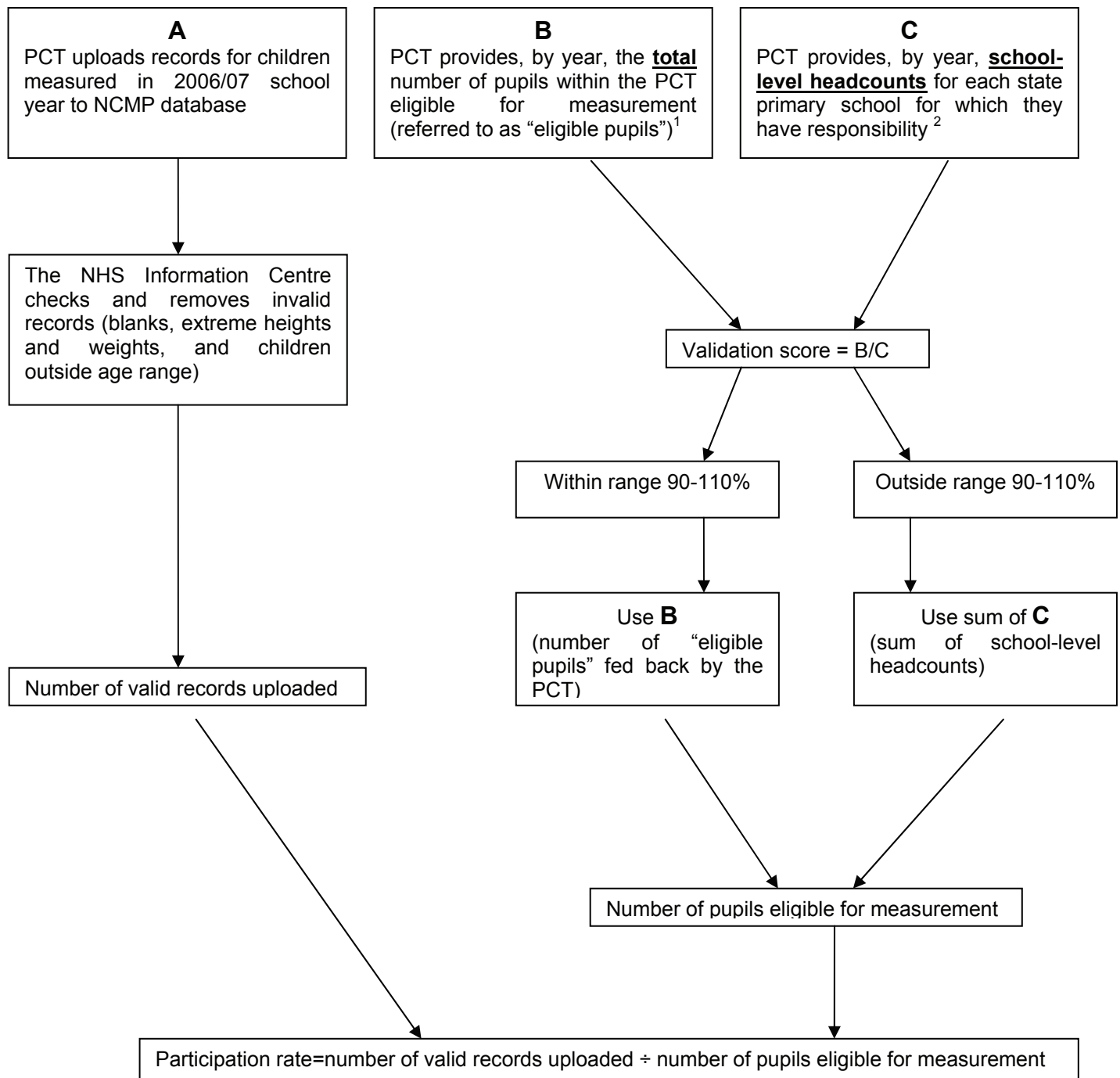
- 7.2. **Comparisons with the NCMP 2005/06 results:** Results from the NCMP 2005/06 are provided at regional and SHA level in the report *Analysis of the National Childhood Obesity Database 2005-06*.<sup>11</sup> Comparison at geographies smaller than regions or SHAs is difficult because of recent changes in PCT boundaries. There were also issues with data quality and low participation rates. As such, any comparisons between NCMP 2005/06 and 2006/07 should be treated with caution.

If PHOs do want to make comparisons with the NCMP 2005/06 data, regional or SHA figures are provided in the report.<sup>6</sup> More detailed local analysis can be undertaken only if the PHO previously collated child measurement data from their PCTs after the 2005/06 NCMP, since the national dataset from that year is not available below regional level.

- 7.3. **BMI distribution:** PHOs might want to make use of the full range of height, weight and BMI measures available in the NCMP 2006/07 dataset to comment on the population as a whole rather than only the overweight, obese and underweight children. If this is done, PHOs should consider the possible confounding effect of age on such analysis. The expected height, weight and BMI of children vary substantially with age, so if age is not considered, the shape of the distribution will be affected. PHOs should therefore consider use of the height, weight and z score for age of individual children (which is also available in the dataset provided by the IC). It is important to note however that use of z scores from the UK90 growth reference will have the effect of normalising the distribution, so these curves should be interpreted in terms of difference from the normal distribution, rather than as the population distribution per-se.
- 7.4. **Grouping according to socioeconomic indicators:** To do more detailed investigation than can be undertaken at PCT level, PHOs might want to use of the child (if available) or school super output area to group children across the region according to quintiles or deciles of socioeconomic indicators (eg, the Index of Multiple Deprivation 2007). Analysis can then be produced for these groupings to determine more accurately the links between factors such as deprivation or urban rural environment and prevalence of obesity.
- 7.5. If further detailed analysis is undertaken, PHOs must ensure that there is no risk of disclosure of individual children's details. Numbers of less

than five (including zeros) must be suppressed, in line with the IC guidance in the DSA. Note that suppression is not necessary at SHA/ or Government Office level, only for figures for PCTs or LAs or smaller geographies.

## Appendix 1: calculation of participation rates



1. PHOs do not currently have access to the “eligible pupils” figures supplied by PCTs within the data-capture tool. If required these can be obtained direct from PCTs themselves or from the IC
2. Where the “school-level headcount” provided by a PCT for an age-group is less than the number of pupils measured for that age-group, the number of pupils measured is used as the school-level headcount. This ensures participation rates do not exceed 100% for any school for either reception year or year six.

## Appendix 2: Methods for confidence limits

We recommend that 95% confidence intervals are calculated with the method described by Wilson<sup>12</sup> and Newcombe<sup>13</sup> which is a good approximation of the exact method.

The estimated proportions of children with and without the feature of interest were calculated:

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

sample size =  $n$

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

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

Three values ( $A$ ,  $B$  and  $C$ ) were then calculated as follows:

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

where  $z$  is the appropriate value,  $z_{1-\alpha/2}$ , from the standard Normal distribution. Then the confidence interval for the population proportion is given by

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

This method is superior to other approaches (e.g. the Aiken/Likelihood method currently used in the national Compendium of Clinical and Health Indicators) 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.

If the difference between two rates or proportions is being calculated, we recommend the use of the approach outlined in Statistics with Confidence (edition 2):<sup>14</sup>

Where the difference in two rates or proportions,  $\hat{D} = \hat{p}_2 - \hat{p}_1$

has confidence limits from:

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

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.

This method is also provided as 'method 10' in the Newcombe paper 'interval estimation for the difference between independent proportions: comparison of eleven methods'.<sup>15</sup>

## Appendix 3: Specimen school feedback letter

### Results from the National Child Measurement Programme 2006/07

Dear Headteacher,

I am writing to thank you for taking part in the National Child Measurement Programme (NCMP) in 2006/07 and to provide you with some feedback from the programme. Nationally, we are delighted that schools achieved a great improvement over the first year with 80% participation by eligible children.

The NCMP is an integral component of the Government's *Healthy Weight, Healthy Lives: A Cross-Government Strategy For England*, (published Jan 08) with the ambition: *of being the first major country to reverse the rising tide of obesity and overweight in the population by ensuring that all individuals are able to maintain a healthy weight*. Now in its third year, the NCMP is providing valuable information on rates of underweight, overweight and obesity in children. This vital information is already being used to inform children's service planning and delivery locally, regionally and nationally. Parents can also receive their children's results from the PCT, encouraging their engagement with healthy lifestyles and weight issues.

Your school's continuing engagement in the programme is important in helping to achieve the 100% coverage of the programme needed if we are to deliver the challenging ambition for healthy weight and growth.

The national results from the 2006/07 year of measurement were recently published by the NHS Information Centre. You can find the results for your local area at:

<http://www.ncmp.ic.nhs.uk/results.asp>

or you can download the full report at:

<http://www.ic.nhs.uk/webfiles/publications/ncmp/ncmp0607/NCMP%202006%2007.%20Bulletin.pdf>.

In addition I am attaching a summary of the 2006/07 results for your school / school cluster **[delete as appropriate]** with some supporting information. This includes a comparison of the prevalence of underweight, overweight and obese children in your school / school cluster **[delete as appropriate]** with national, regional and local Primary Care Trust figures. Please note that specific percentages cannot be disclosed for individual schools because of the need to avoid identification of individual children.

So thank you again for your school's participation. If you want to discuss these results, please feel free to contact **[Insert name and contact details for appropriate contact]**

Yours sincerely

PCT obesity lead

***\*\*If feedback applies to school clusters, the wording of this letter and the summary tables below will need to be changed accordingly.***

### **NCMP 2006/07 Results Summary**

- **School Name:** Local Primary / Description of school cluster
- **PCT Name:** Local PCT
- **Region used for comparison:** Region of PCT
- **National participation rate (%):**

|               |       |
|---------------|-------|
| <b>Year R</b> | 83.2% |
| <b>Year 6</b> | 77.9% |
| <b>Total</b>  | 80.5% |

- **National prevalence rates (%):**

|               | <b>Underweight</b> | <b>Overweight</b> | <b>Obesity</b> |
|---------------|--------------------|-------------------|----------------|
| <b>Year R</b> | 2.8%               | 13.0%             | 9.9%           |
| <b>Year 6</b> | 3.5%               | 14.2%             | 17.5%          |

- **Regional participation rate (%):**

|               |    |
|---------------|----|
| <b>Year R</b> | X% |
| <b>Year 6</b> | X% |
| <b>Total</b>  | X% |

- **Regional prevalence rates (%):**

|               | <b>Underweight</b> | <b>Overweight</b> | <b>Obesity</b> |
|---------------|--------------------|-------------------|----------------|
| <b>Year R</b> | X%                 | X%                | X%             |
| <b>Year 6</b> | X%                 | X%                | X%             |

- **PCT participation rate (%):**

|               |    |
|---------------|----|
| <b>Year R</b> | X% |
| <b>Year 6</b> | X% |
| <b>Total</b>  | X% |

- **PCT prevalence rates (%):**

|               | <b>Underweight</b> | <b>Overweight</b> | <b>Obesity</b> |
|---------------|--------------------|-------------------|----------------|
| <b>Year R</b> | X%                 | X%                | X%             |
| <b>Year 6</b> | X%                 | X%                | X%             |

It is important to note that the prevalence figures shown here use population monitoring definitions which are different, and less specific than the definitions that would be used in a clinical setting. As a result these figures will be slightly higher than the percentage of children who would be clinically diagnosed as being obese or overweight.

➤ **School / School cluster** [Delete as appropriate] **participation rate (%)**:

|               |    |
|---------------|----|
| <b>Year R</b> | X% |
| <b>Year 6</b> | X% |
| <b>Total</b>  | X% |

***\*\*PHO to insert commentary, i.e how do these compare with the PCT, regional and national averages.***

➤ **School / School cluster** [Delete as appropriate] **prevalence indicator**:

**Reception**

|                    | <b>Insufficient data</b> | <b>Significantly below regional average</b> | <b>Not significantly different from the regional average</b> | <b>Significantly above regional average</b> |
|--------------------|--------------------------|---------------------------------------------|--------------------------------------------------------------|---------------------------------------------|
| <b>Underweight</b> |                          |                                             |                                                              |                                             |
| <b>Overweight</b>  |                          |                                             |                                                              |                                             |
| <b>Obese</b>       |                          |                                             |                                                              |                                             |

**Year 6**

|                    | <b>Insufficient data</b> | <b>Significantly below regional average</b> | <b>Not significantly different from the regional average</b> | <b>Significantly above regional average</b> |
|--------------------|--------------------------|---------------------------------------------|--------------------------------------------------------------|---------------------------------------------|
| <b>Underweight</b> |                          |                                             |                                                              |                                             |
| <b>Overweight</b>  |                          |                                             |                                                              |                                             |
| <b>Obese</b>       |                          |                                             |                                                              |                                             |

**[USE ONE OF FOLLOWING THREE PARAGRAPHS AS APPROPRIATE]**

If your school has a higher obesity and overweight prevalence than the region as a whole, you will want to consider whether you can make your school a healthier place as part of contributing to the wider well-being of children at school. The Government wants all children and young people to be healthy and to achieve their full potential. A range of resources and support has been developed to help make schools healthier places for pupils and staff to work and learn in. Useful resources to help you do this are available at [www.teachernet.gov.uk/wholeschool/obesity](http://www.teachernet.gov.uk/wholeschool/obesity).

If your school has a prevalence rate as good, or better, than the region as a whole, I would encourage you to consider how you can continue this record and make your school healthier by further promoting healthy weight and wider well-being. Useful resources to help you do this are available at [www.teachernet.gov.uk/wholeschool/obesity](http://www.teachernet.gov.uk/wholeschool/obesity).

If your school is shown to have 'insufficient data' this is because your school is small or had a very low participation rate in the NCMP and so it is not possible to provide accurate comparisons of the levels of child obesity. If your school has a low participation rate, encouraging full participation in the 2007/08 NCMP as part of contributing to the wider well-being of children at school may make it possible to provide prevalence figures for your school next year. Useful resources to help you do this are available at [www.teachernet.gov.uk/wholeschool/obesity](http://www.teachernet.gov.uk/wholeschool/obesity).

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