National Obesity Observatory

NHS

National Child Measurement Programme 2008/09:

Guidance for analysis by Public Health Observatories and Primary Care Trusts

January 2010

NHS The Information Centre for health and social care

ASSOCIATION OF PUBLIC HEALTH OBSERVATORIES APH

Contents

1. Introduction

1.1 The National Child Measurement Programme (NCMP) is an annual programme which measures the height and weight of children in Reception and Year 6 within state maintained schools. Some independent and special schools also choose to participate, however these records are excluded from the analysis for national NCMP reports (see section 3.5).

1.2 The NHS Information Centre for Health and Social Care (IC) and the National Obesity Observatory (NOO) publish analysis of this dataset annually. However, Public Health Observatories (PHOs) and Primary Care Trusts (PCTs) might want to undertake additional analyses at regional or local level to inform the work of the NHS or local authorities on the healthy weight agenda.

1.3 This report provides guidance to PHOs and PCTs on analyses they might undertake using the 2008/09 NCMP dataset.

1.4 The aim of this guidance is to provide PHOs and PCTs 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 analyses.

2. National Reports

2.1. IC Headline findings for the 2008/09 school year

2.1.1. Headline results from the NCMP, at national and sub-national level, have been provided in the IC's report *'National Child Measurement Programme: England, 2008/09 school year',*[1] published in December 2009. This report shows prevalence of child obesity and overweight by socio-demographic groups and includes comparison with the 2007/08 data.

2.1.2. Excel data tables that were used to produce the IC report are available on the IC website (http://www.ic.nhs.uk/ncmp), and the NOO NCMP child obesity e-atlas, an online tool for Local Authority (LA) and PCT data is available on the NOO website (http://www.noo.org.uk/maps/eatlas).

2.1.3. It is vital that, wherever possible, any local analysis is checked against the IC's published figures to ensure consistency. The cleaned dataset distributed to PHOs differs slightly from that used by the IC for the national report and published figures, affecting data for 6 PCTs. See sections 5.3 and 5.4.

2.1.4. Confidence limits are published in the Excel data tables and should be used when comparing prevalence figures between areas.

2.2. The NCMP reports produced by the National Obesity Observatory (NOO)

2.2.1. Users of the NCMP dataset for analysis are advised to read the NOO reports on the 2006/07 and 2007/08 NCMP datasets, published in June 2008[2] and April 2009,[3] in addition to the 2008/09 report published by the IC.

2.2.2. The 2006/07 and 2007/08 NOO reports examined some of the data quality issues observed within the NCMP database and described the possible effect of these on reported prevalence of overweight and obesity.

2.2.3. The reports also showed the effect of socio-demographic variables (principally ethnicity and deprivation) on prevalence figures and showed that the combined effect of these, plus data quality indicators, could explain a substantial proportion of the variance in prevalence of obesity at PCT level.

2.2.4. An analytical report on the 2008/09 NCMP will be published in spring 2010 by NOO on behalf of the Cross-Government Obesity Unit. This report will present detailed analysis to complement the IC's report.

2.2.5. It is anticipated that the 2008/09 NOO NCMP report will examine trends in obesity and overweight prevalence and trends in data quality along with further investigation of factors such as deprivation and ethnicity.

2.2.6. It is not anticipated that the 2008/09 NOO NCMP report will overlap substantially with analyses likely to be done at regional level. Therefore, there is no need for PHOs or PCTs to wait for publication of this report before undertaking the types of local analyses that are outlined in section 6 of this document.

3. The NCMP 2008/09 national dataset shared with PHOs

3.1. The IC has sent PHOs the cleaned 2008/09 NCMP dataset through the 'Data Depot'. The dataset contains individual data records for all children measured for the NCMP.

3.2. The 2008/09 NCMP dataset consists of a single Access database with all the information required for local analysis.

3.3. The dataset is organised into a series of tables, which are outlined in Appendix 1. The tables hold data at pupil, PCT and SHA level. In

addition, a series of lookup tables are provided to allow the interpretation of coding used within the dataset (e.g. ethnicity, BMI classification and Local Authority coding).

3.4. PHOs should note that this dataset has been cleaned according to the IC's data-cleaning protocol.[4] All invalid records have been removed.

3.5. The dataset includes a column labelled 'Exclude_flag'. Records from independent schools and special schools are coded as 1. Since PCTs are not required to take measurements at these schools they are not included in the national analysis. **These records need to be excluded if analysis is to match the IC's figures**.

3.6. The dataset contains several data fields that the IC has assigned to the data - e.g. codes for local government and health geographies. Codes for **LA and Government Office Region (GOR) have been assigned on the basis of the postcode location of the child's school. PCT and Strategic Health Authority (SHA) have been assigned according to the PCT that measured the child**. There are some 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. As a result these two methods of assigning geographies may lead to small differences between LA and PCT, or GOR and SHA analysis in some cases.

3.7. The IC has also added the appropriate z and p scores for body mass index (BMI), height and weight for each child.* Also the 'BMI_class' field in the main table shows whether individual children are classed as underweight, healthy weight, overweight or obese, according to the 2nd, 85th and 95th centiles on the British 1990 Growth Reference (UK90).[5,6]

Codes used within 'BMI_class' field

BMI classification	School year	
	Reception	Year 6
Obese	1	2
Overweight	3	4
Underweight	5	6
Healthy weight	7	8

3.8. When making NCMP data publically available, counts of five or fewer children (excluding zeros) must be suppressed in figures for Local Authorities, Electoral Wards and Super Output Areas (SOA). Corresponding cells providing totals should also be suppressed to avoid disclosure by differencing. However, figures for PCTs, SHAs and GORs do

* 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 centile, using the normal distribution.

not need to be suppressed. This is in line with the guidance of the IC information governance team, as outlined in Annex A of the PHO data-sharing agreement.

4. Conditions for sharing of NCMP data

4.1. The terms of the data-sharing agreement between the IC and the Association for Public Health Observatories (APHO) state that these data can be shared under certain conditions.

4.2. Sharing with Local NHS

4.2.1. PCTs that want their own cleaned dataset should request it from their PHO. PCTs should note that they will be able to access individual level data for their PCT only. If a PCT requests wider access to NCMP data, for example to make comparisons with the national or regional average, PHOs must ensure that the data are aggregated to ensure individual children cannot be identified. If aggregation precludes useful analysis, the PHO might be better placed to do such analyses on behalf of the PCT.

4.2.2. Although PCTs will already have access to their own NCMP data, it is recommended that cleaned data from the IC are used for local analysis, rather than the records held by PCTs. This is important to ensure consistency with published figures.

4.2.3. The data sharing agreement states that all record level data must be treated in accordance with the Data Protection Act 1998,[7] and any data will, therefore, need to be transferred safely and securely to PCTs.

4.2.4. When sharing NCMP data with PCTs, PHOs are advised to ensure PCTs are aware of the terms of the data sharing agreement between PHOs and the IC, and that the relevant individuals in PCTs have read this guidance document. It is particularly important that PCTs appreciate the need to ensure any published analysis does not risk identification of individual children, and that any comparisons made between different prevalence figures are performed using confidence limits or appropriate statistical testing.

4.3. Sharing with Schools

4.3.1. A standard school feedback letter for PCTs to use when returning data to participating schools is provided in Appendix 2.

4.3.2. To support the use of this letter, NOO has developed an Excel-based tool which can be used by PHOs or PCTs to generate and populate these school feedback letters automatically. The latest version of this tool containing the 2008/09 NCMP data will be released to PHOs in February 2010 along with accompanying guidance. PCTs should contact their regional PHO to obtain a copy.

4.3.3. 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.

4.3.4. Neither school-level obesity prevalence rates, nor raw numerical data, should be fed back to schools. The reasons for this are:

4.3.5. 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.

4.3.6. 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 was 100% coverage of all children in the relevant age-groups within a school.

4.3.7. Most schools will have less than 100% coverage. Some groups, such as overweight or obese children, are more likely to opt-out of being weighed and measured than others, thus introducing bias into the results and rendering them less reliable at school level.

4.3.8. As a result, any school feedback should be provided using one of the following categories (using the statistical methods provided in Appendix 3):

- 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.

4.3.9. The fourth category should be used if the participation rate is low (e.g. less than 70%) in a school.

4.3.10. Since the limits set out above are likely to exclude at least a third of schools from school level feedback, PHOs may wish to consider clustering schools to enable feedback to be provided for all schools. Schools could be clustered geographically, or according to shared characteristics such as deprivation. PHOs should use local intelligence to determine how this could best be done for their area.

4.3.11. The choice of a suitable comparator (i.e. national, regional or PCT) should be made by the PHO or PCT depending 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.

4.3.12. It is important to take great care to ensure that 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 Appendix 4). If for example, prevalence and participation information for Year 6 pupils is mistakenly fed back to an infant school that does not have Year 6 pupils, or if a school is incorrectly told that none of their pupils were measured, there is a real danger that this could prejudice school engagement in the NCMP in the future.

4.4. Sharing with non-NHS and non-local authority organisations

4.4.1. PHOs and PCTs may receive requests for local NCMP data from non-NHS sources. It is recommended that such requests for data are forwarded to NOO, who will liaise with the IC to ensure any data shared does not identify individual children and is used for suitable purposes.

5. Recommended additional analyses

5.1. To help standardise analyses and compare findings across the country, NOO proposes that PHOs or PCTs that wish to further analyse their local NCMP data consider some of the following areas for investigation.

5.2. PCTs should use cleaned data from the IC for local analysis rather than using the records held by PCTs, to ensure consistency of published figures. Results of local analysis should be checked against the published figures wherever possible.

5.3. The cleaned dataset distributed to PHOs differs very slightly from that used for the national report and published figures as six schools (402 pupils) were incorrectly marked as being independent or special schools and so excluded from the national analysis.[†] Pupils attending these schools have been correctly coded to state maintained schools within the dataset distributed to PHOs. As a result the PHO dataset contains 1,004,251 records coded to state maintained schools (plus 1,804 coded to independent or special schools), as opposed to the 1,003,849 valid records used for the IC's published NCMP dataset.

5.4. Users of the NCMP dataset should include these 402 records in their local analysis. However analysts may need to temporarily exclude these six schools in order to check figures against the published data.

5.5. The IC performs extensive data quality checks before the dataset is distributed to PHOs and where data quality issues are identified this information is fed back to PCTs. However local areas may wish to perform further data quality checks of their own. Some suggested checks are outlined in Appendix 4.

[†]The six schools affected are coded as URN: -88130806 (5PV, West Essex), -88125961 (5PC, Leicester City), -87997951 (5NK, Wirral), -87996166 (5ND, Count Durham), -87993107 (5N8, Nottinghamshire County), and -87732248 (5J5, Oldham)

5.6. NOO is working with regional PHO obesity leads to support development of regional analysis and reporting and to share expertise. PCTs should check with their local PHO to avoid duplicating any analysis already being undertaken at a regional level.

5.7. Links to regional and local reports from previous years (based on NCMP data) are available on the NOO website (http://www.noo.org.uk/ncmp). These documents provide an illustration of the sort of analysis that can be done with this dataset. Analysts may wish to look at some of these reports before performing their own analysis.

5.8. PHOs or PCTs undertaking analyses are asked to publish their reports on their own websites where possible. **NOO is keen to receive information about, and links to, any such reports at** ncmp@noo.org.uk, so that such information can be posted on the NCMP pages of the NOO website and be available to all.

5.9. If PHOs or PCTs have queries about undertaking the analyses outlined in this guidance, they should contact NOO at ncmp@noo.org.uk

5.10. **Checking of prevalence rates**: Users should check that their analyses match prevalence figures published by the IC for PCTs, LAs and SHAs. To do this, we advise use of the 'BMI_class' field in the dataset, rather than use of the BMI field and reassigning z scores or centiles.

5.11. If for any reason users need to calculate their own BMI z scores for NCMP or other data, this can be done using the 'LMS Growth' Microsoft Excel add-in software available at no charge from Professor Tim Cole's website (http://homepage.mac.com/tjcole/FileSharing1.html). There are slight differences between this tool and the NCMP dataset, in how the age of children is calculated and the way L, M and S variables are allocated to individuals. Hence, the resulting BMI, height and weight z scores assigned may differ by a small amount. This effect is unlikely to have any noticeable impact on prevalence figures.

5.12. **BMI thresholds:** The NCMP uses the British 1990 Growth Reference (UK90) for BMI and the 2nd, 85th and 95th centiles to define children as underweight, overweight or obese according to age and sex. This definition is commonly used in the UK for population monitoring – e.g. in recent Health Survey for England (HSE) figures.

5.13. It is important to note that the 85th and 95th centiles 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.

5.14. In a clinical or individual setting, the 2nd, 91st and 98th centiles are used in the UK to define individual children as underweight, overweight and obese respectively, and several additional measures and indicators would be taken into account before a clinical diagnosis was made. The NCMP

parental feedback letters issued by PCTs use these clinical cut-offs to classify individual children as obese, overweight and underweight.

5.15. As a result, when presenting prevalence figures based on the 85th and 95th cut-offs, it is important to explain 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 obese, defined as above the 95th centile of the UK90 distribution', or possibly 'x percent of children are at risk of obesity'. The latter term is used in the NICE guidance on obesity,[8] though no formal recommendations are made on the definitions or terminology that should be used for public health purposes.

5.16. Users of the NCMP dataset should also note that other growth references are sometimes used to classify children as overweight or obese. For example, the World Health Organisation (WHO) 2007 or International Obesity Task Force (IOTF) thresholds are sometimes used in the UK. The IOTF thresholds were used in the Foresight obesity modelling[9] and for child obesity prevalence figures from the Millennium Cohort Study.[10]

5.17. Most published NCMP analyses use the recommended UK90 population monitoring thresholds to ensure consistency between published figures. Users must ensure that, if making comparisons with other published prevalence analyses, the same definition is applied across all figures to determine which children are obese and overweight.

5.18. **Children defined as underweight:** Although no agreed definition of underweight exists for the UK90 BMI reference, the IC's NCMP analysis uses the 2nd centile to define children as underweight.

5.19. The 2nd centile tends to be used most frequently to define underweight in clinical settings. Use of the 5th centile would be more consistent with use of the 85th and 95th population monitoring centiles for overweight and obese but will not provide figures that are consistent with those published by the IC.

5.20. A discussion of the issues around defining underweight is provided in a publication by Professor Tim Cole[11] (see the section 'choice of cut-offs at age 18').

5.21. **Prevalence by school year and age:** Prevalence figures should be produced separately for Reception and Year 6, rather than combining the data. 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.

5.22. If combined prevalence figures are produced, they must be age standardised, rather than created by simply combining crude prevalence rates.

5.23. **Prevalence by sex:** Obesity and overweight prevalence for children is known to vary by sex. Users of the NCMP dataset may wish to further investigate differences by sex within their local area. The NOO NCMP e-atlas (http://www.noo.org.uk/maps/eatlas) provides prevalence figures broken down by sex for LAs and PCTs, but users will need to create perform their own analysis for smaller geographies.

5.24. The 2006/07 NOO NCMP report noted substantial differences between the sex ratios of children measured in different areas. Although this appeared to have a minimal effect on PCT level prevalence figures, at a more local level the possible impact of a skewed sex ratio is greater. Users should be aware of this issue and, if prevalence figures are compared for boys and girls combined, ensure that there are no large differences between the populations being studied.

5.25. This issue is likely to be particularly important at school level. Comparing prevalence of obesity at a single sex school with a prevalence figure for the PCT or region that includes girls and boys would be inaccurate. This issue needs consideration, especially if feeding back results to schools. The NCMP school feedback tool standardises for sex when feeding back information on school level obesity prevalence.

5.26. **Prevalence - effect of participation rate:** Published analyses of the 2006/07 and 2007/08 NCMP datasets suggest that the participation rate by PCT affects the reported prevalence of obesity, especially for Year 6. This effect may 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.

5.27. Users of the NCMP dataset might wish to examine whether participation rate appears to be related to prevalence of obesity locally before using prevalence figures. The potential impact of participation should always be considered, especially if comparing areas with very different participation rates or looking at change over time.

5.28. 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. The latter calculation includes numbers of children attending schools in which no measurements were submitted. If no pupils within a school have been measured it is unlikely to be due to selective opt-out of obese children, so the effect on prevalence figures is likely to be minimal.

5.29. If investigating the impact of participation on prevalence, the participation rates used should be 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 measurements were taken. This figure will therefore differ from the published participation rate for the PCT.

5.30. The 2006/07 NOO NCMP report showed that the participation rate for girls nationally appeared to be lower than that for boys. If this is due to a selective opt-out of overweight and obese girls from the NCMP measurements, this bias could be stronger for girls than for boys. This issue might benefit from local analysis, where more detailed information may be available on the expected sex ratio of children within schools. It should also be considered when looking at differences in prevalence by sex.

5.31. **Prevalence - effect of deprivation, setting, and ethnicity:** Published NCMP analyses show that deprivation, urban/rural environment and ethnicity may influence prevalence of obesity, overweight and underweight.

5.32. PCTs and PHOs should use their local intelligence and data to determine to what extent the variation within their local area can be explained by these variables (as well as by factors such as data quality and the participation rate).

5.33. To undertake more detailed investigation, users of the NCMP dataset might want to use the child's Lower Super Output Area (LSOA) of residence to group children across the region according to quintiles or deciles of socioeconomic indicators (e.g. the Index of Multiple Deprivation 2007). The child's home postcode, which is converted to LSOA at time of upload, is a mandatory field in the NCMP and is available for the majority of children. Analyses can be produced for these groupings to determine more accurately the links between factors such as deprivation and prevalence of obesity.

5.34. An example of such analysis can be found in the May 2009 NOO newsletter.[12]

5.35. **Confidence limits around prevalence and change in prevalence:** Comparison of prevalence figures with the regional or national rate, between different populations or over time should always take into account the degree of uncertainty around these figures.

5.36. The IC report provides approximate confidence limits for PCT and LA prevalence rates. In some cases (e.g. for PCTs) these confidence limits have been adjusted to take account of the participation rate within the PCT, as where participation is low there is less certainty about where the true prevalence figure lies.

5.37. If users of the NCMP dataset 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 is recommended. This method is also used in the APHO Health Profiles. See Appendix 3.

5.38. If examining a reported change in rate for statistical significance, the approach recommended by Altman et al. should be used. See Appendix 3, section A3.5.

5.39. PHOs might also consider using 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. An example of such analysis can be found in section 4.2 of the 2007/08 NOO NCMP report.

5.40. **Sub-PCT level analysis:** Many areas wish to use the NCMP to identify 'hot spots' of child obesity within their locality, often with the intention of channelling resources to those areas. Sometimes users may wish to compare with other variables available for small geographies in order to investigate the local determinants of obesity.

5.41. Some local areas may wish to create school 'league tables' based on obesity prevalence from the NCMP. Such rankings are to be strongly discouraged as they are unlikely to give an accurate representation of true patterns of prevalence.

5.42. If schools or other small areas are to be ranked or graded based on obesity prevalence, the reliability of the rankings or grades presented should be considered by use of confidence limits or other statistical testing.

5.43. Whilst sub-PCT level geographical analysis is of course possible, for example using school, SOA or ward as a unit, such analysis needs to be performed with caution for two reasons.

5.43.1. Firstly, prevalence figures for sub-PCT populations are likely to be based on small numbers and so are subject to a high degree of natural variation. Confidence limits should always be used to ensure any apparent differences in prevalence between areas are statistically significant and not just the result of the small sample size at this level of analysis.

5.43.2. Secondly, the variation between wards or SOAs in terms of socio-economic deprivation, ethnic mix or even the degree of selective opt-out of the NCMP are likely to be far higher than in larger populations such as PCTs. Analysis of the 2006/07 NCMP dataset showed that a substantial proportion of the variation in prevalence between PCTs could be explained by such factors, and this effect is likely to be even stronger at sub-PCT level.

5.44. This does not mean that such analyses are not useful, but it is important to consider what any observed variation in prevalence really means. In some cases the priority may be to identify the areas with the most obese

or overweight individuals. If targeting an intervention the use of straight prevalence figures may be appropriate. In other situations it might be deemed more appropriate to standardise for any known confounders and determinants, for example if trying to gain a better understanding of local level geographical variations in prevalence.

5.45. If the purpose of sub-PCT analysis is to investigate the determinants of obesity, users of the dataset might be advised to use an approach such as grouping individual children, using their postcode of residence or school, into decile or quintile groups, based on the variable under investigation (as described in section 5.33). This approach means indicators or variables that are only available for very small geographies, such as SOA, can be used, yet the groups compared are still based on relatively large numbers.

5.46. It is also worth considering whether such investigation of determinants could also be used to target resources better than straight prevalence figures. For example, if children living in the most deprived 10% of SOAs in a PCT have a significantly higher prevalence of obesity than children in the most affluent 10%, this provides useful data for targeting resources that may overcome problems associated with small numbers in local level analyses of the NCMP.

6. Further local analysis

6.1. Section 5 of this document details the types of analyses that most users of the NCMP dataset will wish to perform. However, those who wish to undertake additional analyses might wish to consider the following issues.

6.2. If performing such detailed analysis of the NCMP dataset it is particularly important to ensure that the type of data quality issues outlined in Appendix 4 have been considered.

6.3. **Comparisons with the NCMP 2006/07 and 2007/08 results:** Results from the NCMP 2006/07 and 2007/08 can be downloaded from the IC website, or produced locally through analysis of the datasets provided to PHOs by the IC.

6.4. If users want to make comparisons with the NCMP 2006/07 and 2007/08, then the impact of changing participation rates and changes in data quality between the years should always be taken into account. Appropriate confidence limits or statistical testing should be undertaken to ensure any reported differences are indeed significant. The suggested method for use when detecting a change in prevalence is described in Appendix 3 of this guidance.

6.5. Where changes in prevalence are identified at local level users should be careful to ensure these changes could not have resulted merely from variations in data quality or participation rates.

6.6. When looking for change in populations over time a number of papers have suggested looking at change in a measure such as mean z score, rather than change in prevalence figures.[13, 14]

6.7. **BMI distribution:** Users of the 2008/09 NCMP dataset may wish to make use of the full range of height, weight and BMI measures to comment on the population as a whole rather than only considering the overweight, obese and underweight children.

6.8. In this case, the possible confounding effect of age on such analysis should be addressed. 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. Users should therefore consider the use of the height, weight and BMI z scores for age of individual children. These scores are 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.

Appendix 1: NCMP 2008/09 data fields

A1.1. The 2008/09 NCMP dataset is supplied to PHOs by the NHS IC in a single Access database.

A1.2. The database contains 4 data tables which contain information at pupil, school, PCT, and SHA level.

A1.3. Six additional tables are provided which allow users to assign descriptions to the coding used within the dataset. These lookup tables cover ethnic codes, Local Authorities (Former and Current), GORs, Urban/Rural classification, school establishment type, and BMI classification.

A1.4. The field names and descriptions for the four data tables are outlined below:

Table 1: Pupil_data

Field Name	Field Description
Pupil_ID	Unique ID code for each pupil
Exclude_flag	Pupils attending independent and special schools are flagged as 1 (these records need to be excluded to match the published figures)
Sex	Sex of pupil
Age	Age of pupil (in months)
School_yr	School Year of pupil - derived from child age (R: Reception, 6: Year 6)
Ethnicity_full	Ethnicity code as entered by PCT
Ethnicity	Ethnicity recoded to NHS classification (see table Ethnicity_codes)
Height	Height of pupil (in cm)
Height_z	Height z score - derived from British 1990 Growth Reference, using Age, Sex and Height fields
Height_p	Height centile - derived from British 1990 Growth Reference, using Age, Sex and Height fields
Weight	Weight of pupil (in kg)
Weight_z	Weight z score - derived from British 1990 Growth Reference, using Age, Sex and Weight fields
Weight_p	Weight centile - derived from British 1990 Growth Reference, using Age, Sex and Weight fields
BMI	BMI of pupil in kg/m2 - derived from height and weight
BMI_z	BMI z score - derived from British 1990 Growth Reference, using Age, Sex and BMI fields
BMI_p	BMI centile - derived from British 1990 Growth Reference, using Age, Sex and BMI fields
BMI_class	BMI classification to UK90 population monitoring centiles (85th/95th centiles for overweight and obese), plus 2nd centile for underweight (See table BMI_class)
Month_meas	Month of measurement (1: January, 2: February etc)
PCT	PCT that submitted measurement (see table PCT_data)
SHA	SHA - based on PCT that submitted measurement (see table SHA_data)
URN	DCSF Unique Reference Number for school (see table School_data)
LA_current	Current Local Authority (post April 2009) - derived from postcode of school (see table Current_LAs)
LA_former	Former Local Authority (pre April 2009) - derived from postcode of school (see table Former_LAs)
GOR	Government Office Region - derived from postcode of school (see table GORs)
Child_LSOA	Lower Super Output Area of child - derived from child postcode
Child_Urban	ONS Urban/ Rural classification - derived from child postcode (see table Urban_rural)

Table 2: PCT_data

Field Name	Field Description
PCT	PCT code
PCT_name	PCT name
Meas_R	Number of pupils measured - Reception
Meas_6	Number of pupils measured - Year 6
Eligible_R	Eligible pupils figure (pupil denominator used for participation rates, as agreed with IC) - Reception
Eligible_6	Eligible pupils figure (pupil denominator used for participation rates, as agreed with IC) - Year 6
Particip_R	Participation rate - Reception
Particip_6	Participation rate - Year 6
Storage_R	Mode of data storage – Reception
Storage_6	Mode of data storage - Year 6
Parentopt_R	Number of pupils not measured due to parental opt-out - Reception
Parentopt_6	Number of pupils not measured due to parental opt-out - Year 6
Childopt_R	Number of pupils not measured due to child opt-out - Reception
Childopt_6	Number of pupils not measured due to child opt-out - Year 6
Unable_R	Number of pupils not measured because child unable to stand on scales - Reception
Unable_6	Number of pupils not measured because child unable to stand on scales - Year 6
Absent_R	Number of pupils not measured because child absent on day of measurement - Reception
Absent_6	Number of pupils not measured because child absent on day of measurement - Year 6
Schl_opt_R	Number of pupils not measured because school opted out of measurement - Reception
Schl_opt_6	Number of pupils not measured because school opted out of measurement - Year 6
nSchl_opt_R	Number of schools which opted out of measurement - Reception
nSchl_opt_6	Number of schools which opted out of measurement - Year 6
Other_R	Number of children not measured for other reasons - Reception
Other_6	Number of children not measured for other reasons - Year 6

Table 3: SHA_data

Field Name	Field Description
SHA	SHA code
SHA_name	SHA name
Meas_R	Number of pupils measured - Reception
Meas_6	Number of pupils measured - Year 6
Eligible_R	Eligible Reception year pupils within SHA (derived from sum of PCT eligible figures)
Eligible_6	Eligible Year 6 pupils within SHA (derived from sum of PCT eligible figures)
Particip_R	Participation rate - Reception
Particip_6	Participation rate - Year 6

Table 4: School_data

Field Name	Field Description
URN	DCSF Unique Reference Number for school
Schl_name	School name
Schl_Addr1	School address line 1
Schl_Addr2	School address line 2
Schl_Addr3	School address line 3
Schl_Addr4	School address line 4
Schl_Addr5	School address line 5
Schl_pcode	School postcode
Schl_type	School establishment type (see table School_type)
Optional_schl	Schools where NCMP measurements are optional, i.e. independent and special schools, are flagged as 1
Particip_schl	Schools that participated in NCMP 0809 are flagged as 1
Schl_LSOA	Lower Super Output Area of school - derived from school postcode
LA_current	Current Local Authority (post April 2009) - derived from postcode of school (see table Current_LAs)
LA_former	Former Local Authority (pre April 2009) - derived from postcode of school (see table Former_LAs)
GOR	Government Office Region - derived from postcode of school (see table GORs)
Schl_urban	ONS Urban/ Rural classification - derived from postcode of school (see table Urban_rural)
PCT	PCT code of PCT responsible for taking NCMP measurements
Eligible_R	Eligible pupils figure supplied by PCT, or DCSF figure if no information supplied by PCT. Adjusted so not exceeded by number of pupils measured - Reception
Eligible_6	Eligible pupils figure supplied by PCT, or DCSF figure if no information supplied by PCT. Adjusted so not exceeded by number of pupils measured - Year 6

Appendix 2: Sample school feedback letter

<<PCT Name>>
<<PCT address line 1>>
<<PCT address line 2>>
<<PCT address line 3>>
<<PCT address line 4>>
<<PCT postcode>>

<<School name>>
<<School address line 1>>
<<School address line 2>>
<<School address line 3>>
<<School address line 4>>
<<School postcode>>

<<Date>>

Results from the National Child Measurement Programme 2008/09

Dear Headteacher

I am writing to thank you for taking part in the National Child Measurement Programme (NCMP) in 2008/09 and to provide you with some feedback from the programme. Nationally, we are delighted that schools achieved an improvement over the previous year with 90% 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). This has 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 fourth 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 will 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 2008/09 year of measurement were recently published by the NHS Information Centre. You can find the results for your local area or download the full report at:
http://www.ic.nhs.uk/ncmp

In addition I am attaching a summary of the 2008/09 results for your school with some supporting information. This includes a comparison of the prevalence of underweight, overweight and obese children in your school 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.

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

NCMP 2008/09 Results Summary

Results for: << School name>>

PCT: <<PCT name>>

Region: <<PCT region>>

In this report any differences between your school and the area of comparison have been checked for statistical significance. This means that, if your school appears to have a different participation rate or prevalence to the comparator, there is a 95% chance that these differences are real, and only a 5% chance that they have arisen by chance due to the random natural variation amongst schools.

Participation rates

	Reception	Year 6	Total
National participation rate:	x%	x%	x%
Regional participation rate:	x%	x%	x%
PCT participation rate:	x%	x%	x%
School participation rate:	x%	x%	x%

Your school's participation in the 2008/09 NCMP was << statistically significantly above / statistically significantly below / not statistically different from >> the England average.

<< For those schools with below average participation rates, it is very important that these are improved upon in future years. / Even in areas where participation was good, it is important to try and maintain, or ideally increase participation rates in future years. >>

Analysis at the national level shows that lower participation rates are associated with lower reported prevalence of obesity. This is likely to be due to a selective opt-out of heavier children from the programme.

<< If your participation rates are lower than the regional average, it is quite possible that the prevalence figures below may underestimate the true prevalence of obesity in your school. / Even for schools with a good participation rate in 2008/09, it is still possible that such selective opt-out may occur, leading to an underestimation of the true prevalence of obesity for your school. >>

It is therefore important that all schools strive to achieve as high a participation rate as is possible in future years of the NCMP.

If participation rates fall below 70%, the data for your school will be considered too unreliable to provide any meaningful information, and so your school will be shown as having 'insufficient information'.

Prevalence of obesity, overweight and underweight

		Underweight	Overweight	Obesity
National prevalence:	**Reception**	x%	x%	x%
	Year 6	x%	x%	x%
Regional prevalence:	**Reception**	x%	x%	x%
	Year 6	x%	x%	x%
PCT prevalence rates:	**Reception**	x%	x%	x%
	Year 6	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, overweight or underweight.

School prevalence indicator: Shaded cells indicate the position of your school

		No data or insufficient data	Below the England average	Not different to the England average	Higher than the England average
Reception	**Underweight**				
	Overweight				
	Obese				
Year 6	**Underweight**				
	Overweight				
	Obese				

If your school has a higher obesity and overweight prevalence than the area used for comparison, you may 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.

If your school has a prevalence rate below the area used for comparison, 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.

If your school is shown to have 'insufficient data' this is either because your school had a very low participation rate in the NCMP or because the number of pupils in the school was below the minimum number required and so it would not be possible to provide accurate comparisons of the levels of child obesity. If your school has a low participation rate, encouraging full participation in the 2009/10 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 make your school a healthier place, and to improve NCMP response rates, are available at: www.teachernet.gov.uk/wholeschool/obesity.

Appendix 3: Methods for confidence limits

A3.1. We recommend that 95% confidence intervals are calculated with the method described by Wilson[15] and Newcombe[16] which is a good approximation of the exact method.

A3.2. 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)

A3.3. Three values (A, B and C) were then calculated as follows:

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

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

$(A-B)/C$ to $(A+B)/C$

A3.4. This method is superior to other approaches because it can be used for any data. When there are no observed events, then r and hence p are both zero, and the recommended confidence interval simplifies to 0 to $z^2/(n+z^2)$. When $r = n$ so that $p = 1$, the interval becomes $n/(n+z^2)$ to 1.

A3.5. If the difference between two rates or proportions is being calculated, we recommend the use of the approach outlined by Altman et al. in Statistics with Confidence (edition 2):[17]

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

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

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.

A3.6. This method is also provided as 'method 10' in the Newcombe paper 'interval estimation for the difference between independent proportions: comparison of eleven methods'.[18]

Appendix 4: Suggested data quality checks at local level

A4.1. Although the NCMP dataset provided to PHOs has undergone extensive cleaning at national level, there is a limit on the checks and cleaning that can be done centrally on a dataset with over one million records from around 17,000 schools. As a result there may be some minor remaining data quality issues within the NCMP dataset.

A4.2. In the 2006/07 dataset a number of issues were identified during analysis that had not been flagged by the NCMP validation process. These include: entering the same pupil records for two adjacent schools; entering Year 6 pupils to infant schools or Reception pupils to junior schools; or submitting a large proportion of records with height and weight measurements rounded to the nearest whole number.

A4.3. Since the 2006/07 dataset a number of additional validation checks have been introduced as part of the NCMP upload process, and further validation has been done by the IC on the 2008/09 dataset. This process is described in the IC's annual NCMP report.[1] However, some data quality issues may remain despite these additional checks.

A4.4. These quality issues have minor effects on national analyses but may be more important in detailed regional or local analyses by PHOs or PCTs. It is therefore important that basic quality checks on the dataset are performed and any anomalies are clarified with the relevant PCT or with the staff involved in collecting and processing measurements.

A4.5. ***Recommended data quality checks*** Users of the 2008/09 dataset are advised to check the following issues before commencing detailed analysis.

A4.5.1. **Records assigned to the wrong school:** In previous NCMP datasets a number of children have been found to be coded to the wrong school. This issue could often only be easily identified in the most obvious cases, such as where infant schools had Year 6 pupils coded to them and where Reception pupils were coded to junior schools. As a result, the true scale of this issue is unknown.

A4.5.2. In many cases this miscoding seems to have occurred where schools share similar names (e.g. St Mary's Infants and St Mary's Junior) and all records for both schools have been assigned to one of the two institutions.

A4.5.3. The NCMP upload process includes checks to warn PCTs where such miscoding may have occurred. For example, PCTs are warned of the number of schools for which no records are entered and also of the number of schools where the number of pupils measured exceeds the number of pupils reported to be at the school. However, it is still possible that some incorrect school coding may have occurred within the 2008/09 dataset.

A4.5.4. If analysis is being undertaken at school level, and especially if NCMP feedback is being provided to schools, school level checks should be performed to identify those schools where pupils have been measured from a year group which DCSF headcounts suggest are not educated at that school.

A4.5.5. If NCMP analysis is done at PCT level, any issues flagged during such checks could be followed up with the school nursing teams which visit the schools to collect NCMP data, or with staff at the Local Education Authority. Although such staff are unlikely to remember exactly how many pupils at a given school were eligible for the NCMP on the day 2008/09 measures were taken, such staff may be able quickly to resolve whether pupils have been wrongly coded, or whether a school has recently expanded the ages of its intake.

A4.5.6. At regional level PHOs may wish to send details of any schools flagged by such checks to PCTs for further investigation before any school level feedback or detailed analysis at school level takes place.

A4.5.7. **Duplicate pupils:** Duplicate pupils assigned to a school should have been flagged during the upload process and removed before data were submitted to the NCMP database. However, if duplicate records were submitted to separate schools this would not have been picked up.

A4.5.8. Detailed analysis of the 2006/07 dataset showed that a few PCTs had submitted the same set of records for more than one school. Often this occurred where pupils had been inaccurately coded to schools, for example, in some cases a group of Reception year pupils had been incorrectly added to a similarly named junior school as well as to the correct infant school.

A4.5.9. Although the NCMP dataset is anonymised, it is possible to detect potential duplicate records by matching on fields such as age, date measured, sex, height and weight. Users of the 2008/09 dataset at local level are advised to check for such duplicate records, especially if errors are discovered in the way pupils have been coded to schools.

A4.5.10. **School participation rates:** The process of calculating PCT participation rates is complicated. As these figures are used for performance management it is important that PCTs agree they provide an accurate reflection of local participation levels.

A4.5.11. Most pupil denominators used to calculate participation rates are based on 'eligible pupil' denominators supplied to the IC by PCTs rather than on the sum of the school level pupil numbers entered by the PCT. These figures should be within 5-10% of each other but do not necessarily always match. Annex 5 of the IC's 2008/09 report provides further details on this process at PCT level and Appendix 5 of this document illustrates the same issue in the form of a diagram.

A4.5.12. As participation rates, and so pupil denominators, are only agreed at PCT level, school level pupil denominators have not undergone the

same scrutiny as the PCT figures and there is potential for these to be inaccurate for some schools.

A4.5.13. The school level pupil numbers supplied within the 2008/09 NCMP dataset present the best estimate available for the number of pupils eligible for the NCMP attending schools at the time of measurement.

A4.5.14. In general these are based on the pupil denominators supplied by PCTs. However in some cases, for example where the PCT supplied no pupil information, these pupil numbers are based on the DCSF pupil numbers originally included within the NCMP data collection tool.

A4.5.15. Where the number of children measured in a given school and year group exceeds the pupil denominator, the pupil denominator has been increased to ensure school level participation rates do not exceed 100%. These are the pupil number presented within the 'Eligible_R' and 'Eligible_6' fields of the 'School_data' table in the dataset.

A4.5.16. The 'School_data' table within the PHO dataset also contains details of schools where PCTs were required to take NCMP measurements, but where no measurements were entered into the NCMP dataset. These schools can be easily identified by using the 'Particip_schl' field within the 'School_data' table.

A4.5.17. In addition to checking participation rates, PHOs and PCTs may wish to check which state maintained schools within their area did not have NCMP measurements. Identifying which schools did not take part in the 2008/09 NCMP and engaging with these schools may help increase NCMP participation in future years.

A4.5.18. Some of the non-participating schools listed have no eligible pupils listed for either Reception or Year 6. The IC has verified the schools were open during the 2008/09 school year, but no pupil numbers were supplied by either the DCSF or the PCT. As a result of the null pupil numbers in 2008/09 these schools have not counted towards participation rates for this school year. However, when pupil numbers are updated, these schools are likely to count towards future participation rates. It is therefore important to engage these schools in the NCMP if possible.

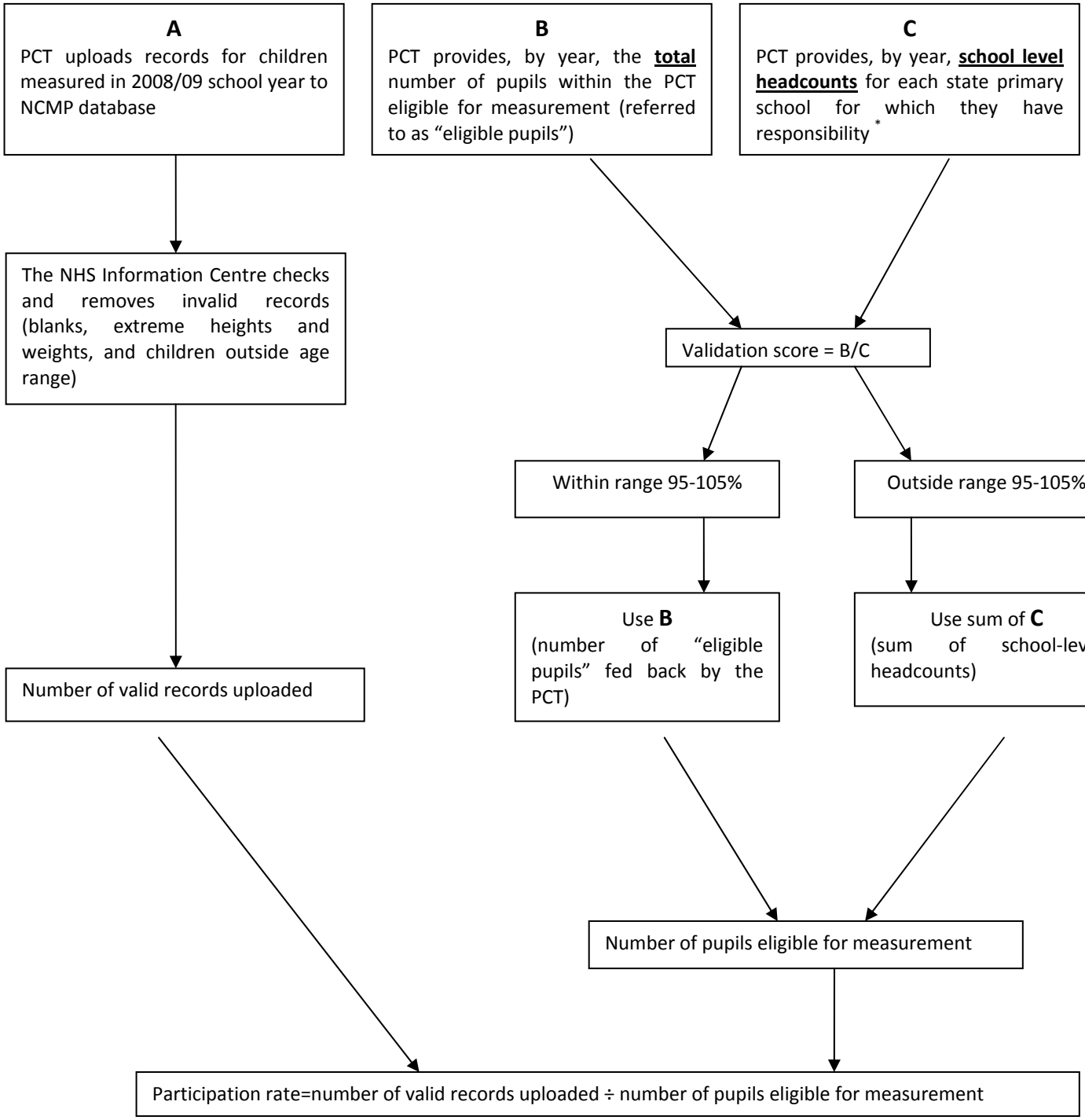
A4.5.19. **Rounded records:** NOO analysis of previous NCMP dataset has shown that incorrectly rounded records (especially those for weight in the Reception year) are associated with a lower reported prevalence of obesity.

A4.5.20. The IC run a validation check for rounded records during the data upload process, but as this warns PCTs of rounded records only after data have been collected, some PCTs are likely still to have a high proportion of rounded records in the 2008/09 dataset.

A4.5.21. A summary of the proportion of rounded records for every PCT has been provided within the IC's 2008/09 NCMP report (Annex 2). Users of the NCMP data at local level are advised to check this list and, if the data

for the population being studied have been submitted with rounded records, this issue may need to be taken into consideration when using prevalence figures for those areas.

Appendix 5: Calculation of participation rates



* 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 6.

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All web pages accessed on 8th January 2010.

Reader Information

Title	National Child Measurement Programme: Guidance for Analysis by Public Health Observatories and Primary Care Trusts
Author(s)	Hywell Dinsdale Caroline Ridler
Publication date	January 2010
Target audience	Public Health Observatories Primary Care Trusts
Description	Information and guidance for analysis by PHOs and PCTs of the 2008/09 National Child Measurement Programme dataset
How to cite	Dinsdale H, Ridler C. National Child Measurement Programme: Guidance for Analysis by Public Health Observatories and Primary Care Trusts. Oxford: National Obesity Observatory, 2010.
Contact	National Obesity Observatory www.noo.org.uk ncmp@noo.org.uk
Electronic location	http://www.noo.org.uk/NCMP
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