This fourth release of the Child Measurement Programme (CMP) for Wales contains findings of the programme of child measurements carried out with children attending reception class in schools in Wales in 2014/15.

This technical summary provides information about how the information has been analysed and any issues which occurred which may have affected the quality of the information.

2014/15 was the fourth year the CMP was run in Wales and so this release about those measurements (published 2016) is the fourth release from the programme. During the first year of the programme (2011/12) the standards and guidance governing the programme were not fully implemented. Therefore the findings from that year have been excluded where data is aggregated or examined for trends.

# About the Child Measurement Programme

## Structure

There are several teams of professionals who have a part to play in the different stages of the programme and ultimately in its successful delivery. The CMP consists of a central programme office within the Health Intelligence Division of Public Health Wales, with input from staff across the NHS in Wales. School health teams in local health boards (LHBs) are responsible for communication with schools, parents and children and for carrying out the measurements. Local child health records teams are responsible for ensuring all the information is entered onto the National Community Child Health Database (NCCHD) using the correct software module.

The Public Health Wales Observatory analysts receive the information in an anonymised download from the NHS Wales Informatics Service (NWIS) who maintain the NCCHD and process the data before passing it on to the analysts. The Observatory Analytical Team prepare the data for use by staff in the programme office in the annual report. The process is supported by the Child Measurement Programme Advisory Group, which is a multi agency group including representatives from local health boards, education, the voluntary sector and Welsh Government.

## Who gets measured?

Parents of all children who were both resident in Wales and attending a reception class in school in Wales during 2014/15 were contacted to let them know the measurements were taking place and that they could opt their child out of the measurements if they so wish. The results have been included in the analysis if their fifth birthday was between the 1st September 2009 and 31st August 2010, and their parents had not chosen to opt them out of the programme. Measurements are taken in a standardised way – the school health team members received additional training in taking the measurements and the equipment used is standardised, maintained and calibrated. Most schools are visited twice in order to catch up with children who were not present or not able to be measured during a first visit. Where two measurements for the same child appear on the database, only the most recent is used.

Some children are not measured because their parents choose to opt them out of the programme or because they are not present on either visit when the measurements are taking place. The measurements of seven children from across Wales were excluded from the analysis as no accurate measurement could be obtained – this could be for a variety of reasons, but is usually because the child is wearing a plaster cast or has a health reason which prevents them from standing up straight when being measured. However those children can still be weighed and measured along with the rest of their class so they don’t feel excluded from the process.

## How are the results analysed?

The children’s measurements are assigned to categories based on body mass index (BMI), taking into account the sex and exact age of the child when measured. The prevalence categories used in the CMP in Wales are:

* Underweight: BMI less than but not including the second centile
* Healthy weight: BMI second centile up to but not including the 85th centile
* Healthy weight and underweight
* Overweight but not obese: BMI 85th centile up to but not including the 95th centile
* Overweight and obese
* Obese: 95th centile and above

There is no accepted definition of morbid / severe obesity in children in common use, as there is in adults.

Results are expressed as the percentage of children within each BMI category. Comparisons are then made looking at time periods; where children live; their sex; deprivation and ethnicity. An assessment is then made about whether the results are (statistically) significant or not. Statistical significance is assessed using confidence intervals (CIs).

If the number of children in any one category is less than five the result has been suppressed to avoid the possibility of identifying individual children.

During the first year (2011/12) the programme was run the Child Measurement Programme standards and guidance were not in place. As the results for that year may be less robust they will no longer be included where data has been aggregated or trends are being assessed.

For the report published in 2015, analysis was provided by urban, rural and very rural super output areas, using area classifications from the Office for National Statistics (ONS). This showed very little difference in the prevalence categories and the analysis has not been repeated this year, but will be repeated in the report to be published in 2018.

Information in the release is presented at a national, local authority and health board level.

## How is the CMP quality assured?

Children in this year group have been weighed at this stage for many years as part of the pre-school health check, however when the CMP was introduced, new standards and guidelines were introduced and school health team members were offered additional training to carry out the measurements in a more robust way. Each health board provides assurance to the CMP office that the standards and guidance are being adhered to.

The Child Measurement Programme Standards and Guidelines were agreed by the Child Measurement Programme Steering Group and Board in 2012. These were revised in 2014 and endorsed by the new Child Measurement Programme Advisory Group which has oversight of the whole programme. The Standards and Guidelines are designed to facilitate a uniform approach to child measurement, and results recorded and analysed so that the results will be seen as robust, comprehensive and comparable across Wales and over time. The Child Measurement Programme Standards and Guidelines are available on the CMP website in both Welsh and English. They contain information for local health teams including:

* how measurements should be carried out
* how equipment used in taking the measurements should be maintained and calibrated
* staff training
* recording and communication of results
* children not included in the programme
* assurance and audit

To support staff to deliver the programme, a CMP e-learning package was developed for use by NHS staff working in local health boards. This is designed to be used in conjunction with the staff training video available on the CMP website in both English and Welsh.

## Classifying a child’s BMI

The classification of children’s BMI differs from the classification of adult BMI. In children the BMI is categorised using variable thresholds that alter depending on a child’s age and sex, as growth patterns differ depending on a child’s age and sex. Each child’s BMI is calculated and then assessed against a reference population or growth reference derived from the measurements of a large sample of children of the same age and sex. There are a number of different growth reference scales available, but for this programme UK90 was selected. The reference scale is divided into 100 units known as centiles.

Prevalence rates are calculated using age and sex-specific BMI centiles, derived using the British 1990 growth reference (UK90) from a method proposed by Cole *et al*[[1]](#endnote-1). The BMI is calculated using a method proposed by Keys *et al*[[2]](#endnote-2). The British 1990 growth reference (UK90) is also used in the National Child Measurement Programme for England which allows comparisons to be made between the two countries. Measurements which informed UK90 were drawn from seven major studies of growth in the UK, and comprise measurements of over 30,000 children[[3]](#endnote-3) and young people between 33 weeks of gestation and age 23 years. One criticism of this growth reference is that measurements of only a small number of children from ethnic minority backgrounds were available in the studies and these were not included, although there are known variations in growth patterns between children from different ethnic groups[[4]](#endnote-4).

Other growth references used internationally include those developed by the World Health Organization (WHO), Center for Disease Control in the USA (CDC) and the International Obesity Task Force (IOTF). Comparisons between obesity prevalence across populations should only be made if the same growth reference has been used, as they do differ. The National Obesity Observatory in England have published a useful guide[[5]](#endnote-5) which gives more information about each of the above growth references.

## Which records are included?

Records are included in the programme if they meet all of the following criteria:

* The location of residence can be determined
* The child is resident in Wales
* The school is located in Wales
* They were born in the period September 2009 - August 2010
* The child’s sex is recorded

Eligible records were included in the number measured, if they met all of the following criteria:

* The height measurement is recorded and is not an implausible measurement[[6]](#footnote-1)
* The weight measurement is recorded and is not an implausible measurement
* Consent has not been withdrawn
* The measurement was collected during the academic year 2014/15.

## Small number suppression

When information is released in detail there is the risk that individuals could be identified even though their names, addresses or dates of birth have been removed. This risk is exacerbated if two or more sources of data are compared or the data is describing uncommon events. When the data is describing events or information that only applies to very few people in the information set, or to people living in a small geographical area, people’s identities can be protected by adding in safeguards such as ‘small number suppression’.

In this release, small numbers between one and four have been suppressed to avoid potential identification of individuals. In this release, this mainly relates to children who were underweight or of low height. Suppression of related data has also been performed where suppressed numbers could have been derived from totals (secondary suppression).

In order to avoid potentially identifying individual children in local authority or health board areas, the information about children who are categorised as underweight is combined with children categorised as being of healthy weight.

## Confidence intervals and statistical significance

When looking at any statistical information it is important to assess the robustness of that information. In particular it is important to assess whether any difference may in fact be only the result of a chance effect. Two ways to support this assessment are:

* Calculation and use of confidence intervals (CIs)
* Carrying out a statistical test for significance.

Confidence intervals are indications of the natural variation that would be expected around proportion (e.g. percent obese) and they should be considered when assessing or interpreting that proportion. The size of the confidence interval depends upon the size of the sample being studied. Generally speaking, rates based on small samples are likely to have wider confidence intervals. Conversely, rates based on large samples are likely to have narrow confidence intervals.

A simple explanation of the 95% confidence interval is that we can be confident that the true value is within the range given for obesity prevalence (for example) 95% of the time. In this release the 95% CIs were calculated using a method proposed by Wilson *et al* as described by Altman *et al* (2000)[[7]](#endnote-6). The level of confidence is not prescribed, but 95% confidence intervals are commonly used in public health and have been used for this release. 99% confidence intervals are more commonly used in research.

Statistical significance helps assess how likely it is that a difference between two values may or may not be due to chance alone. A ‘statistically significant’ finding suggests that the difference between two values is not due to chance. For the purposes of the Child Measurement Programme for Wales, a difference is considered statistically significant if the 95% confidence intervals do not overlap rather than carrying out a specific statistical test for significance. There is a caveat around using measurement data such as is collected for the CMP, and inferring statistical significance between proportions (in this case through the use of confidence intervals). The caveat is that in this release the difference between results is described as statistically significant if it appears unlikely that the difference could have occurred by chance alone. However, this can be misleading. Many different results were compared for this release, this is called multiple testing. Multiple testing increases the risk of inadvertently classifying a difference as being of statistical significance, when in reality the difference is due to chance (Type I error). Similarly, a difference may inadvertently be classified as not statistically significant, when in fact there are important factors (other than chance) that contribute to the difference (Type II error). This is most likely to occur when the numbers in the groups (e.g. number of children measured) are small.

**Analysis by deprivation**

Deprivation is assessed using the Welsh Index of Multiple Deprivation (WIMD), which was updated in 2014. The WIMD is the official measure of relative deprivation for small areas in Wales. This index is constructed by using a range of indicators to assign a deprivation rank to each of the 1,909 Lower Super Output Areas (LSOAs) in Wales. The WIMD is a way of identifying areas in the order of most to least deprived, but it does not provide a measure of the level of deprivation in an area, rather where an area is in relation to other areas in Wales.

Because the WIMD is constructed specifically for Wales, it is also not possible to draw comparisons between areas in Wales and areas in the other UK countries have their own deprivation measures.

There are pockets of deprivation across Wales, for example in 2014 the most deprived area in Wales was identified as being in Caerphilly, with an area in Rhyl West being the second most deprived. However deprivation is particularly concentrated in Merthyr Tydfil, Blaenau Gwent and Rhondda Cynon Taf. The only local authority with no areas ranked in the most deprived 20% (fifth) of areas in Wales is Monmouthshire.

Version 1, 17/5/2016

1. Cole T, Freeman JV, Preece MA. Body mass index reference curves for the UK, 1990. Arch Dis Child

1995; 73: 25-9. [↑](#endnote-ref-1)
2. Keys A et al Indices of relative weight and obesity. J Chronic Dis 1972; 25:329-43. [↑](#endnote-ref-2)
3. Freeman JV et al. Cross sectional stature and weight reference curves for the UK, 1990. Arch Dis

Child 1995; 73: 17-24. [↑](#endnote-ref-3)
4. Cole TJ et al. Establishing a standard definition for child overweight and obesity worldwide:

international survey BMJ 2000;320:1240. [↑](#endnote-ref-4)
5. National Obesity Observatory. A simple guide to classifying body mass index in children. Oxford:

NOO; 2011 Available at: http://www.noo.org.uk/uploads/doc/vid\_11601\_A\_simple\_guide\_to\_

classifying\_BMI\_in\_children.pdf[Accessed: 22nd February 2016]. [↑](#endnote-ref-5)
6. In some cases it was apparent that human error had resulted in the wrong figures being entered into the wrong fields. Although it appeared as if the height and weight measurements had been switched there was no way to confirm this so the measurements were not included. [↑](#footnote-ref-1)
7. Altman DG et al. eds Statistics with Confidence. Confidence intervals and statistical guidelines. 2nd

ed. London: BMJ Books; 2000. [↑](#endnote-ref-6)