

EVERY CHILD



The Child Measurement Programme for Wales

History, legislative framework, and technical aspects

This document provides information about the Child Measurement Programme for Wales, the history of the programme, the legislative framework, how the programme runs, and how information is gathered and analysed. This information supports the annual Official Statistics release and report which can be found on the Child Measurement Programme website www.publichealthwales.org/childmeasurement

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Introduction and acknowledgements

This document gives the history of the Child Measurement Programme for Wales (CMP); information about how the programme is run, including the legislative framework that underpins the CMP and technical detail about how the information is analysed and presented.

The programme would not be possible without the support of the children and their families; the school and child health teams in each of the health boards in Wales; and the staff responsible for preparing and analysing the information. The CMP programme office is grateful to all involved in the process.



History of the programme in Wales

Prior to the introduction of the Child Measurement Programme in Wales in 2011/12, a feasibility study was carried out in 2009. The programme was established following Directions¹ issued by the Minister for Health and Social Services in the National Assembly for Wales. These came into force in August 2011. The programme is governed by the Welsh Government's Child Measurement Programme (Wales) Regulations². The 2011/12 analysis was published in July 2013. The 2011/12 year was seen as a 'transitional year' as the full standards and guidance governing the programme were not agreed until 2012.

The only other UK country which has a national, annual measurement programme measuring children in this age group is England with their National Child Measurement Programme (NCMP). This has been in place since 2006/7. The same growth reference is used in England as is used in Wales (UK90) so comparisons can be made across the two countries. A second round of measurements are gathered in England from children aged 10/11 in year 6.

The 2009 feasibility study was carried out with children in both reception year and Year 4. However when the programme began in 2011/12 it was only implemented with reception year children. A further pilot study was carried out in 2013 (published in January 2015) exploring the possibility of extending the measurement programme to include Year 4 children. No decision on implementation has been made yet (spring 2017) following the pilot study.

Governance

The CMP is delivered by the seven health boards in Wales, with Public Health Wales having responsibility for coordination, data-analysis and reporting. There are identified lead professionals in each health board for the CMP, and they are asked to provide assurance on an annual basis on issues such as equipment calibration and staff training. Data checking and analysis is carried out in line with national guidance³ from the Government Statistical Service on presenting Official Statistics.

The Child Measurement Programme Steering Group oversaw the introduction of the programme from 2011, and this group was replaced in 2014 with the Child Measurement Programme Advisory Group. The Advisory group has a remit for advising on the strategic direction of the CMP, and is a multi agency group including representation from local health boards, education, the voluntary sector and Welsh Government.

Aim of the measurement programme

The aim of the programme as set out in 2011 is to "*describe population prevalence of underweight, overweight and obesity, at national and local authority levels. It will also allow anonymised population level information to be used for surveillance, research, monitoring or audit purposes and planning of health services*"⁴. Since its inception the CMP has also provided analysis at health board level.

The programme is designed as a surveillance programme and is not aimed at screening individuals.

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 small 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 the annual data release, in conjunction with the CMP programme office. The lead Consultant in Public Health responsible for the CMP writes a short report describing the data, and oversees the process of production. The process is supported by the Child Measurement Programme Advisory Group.

Who gets measured?

Parents of all children who are both resident in Wales and attending a reception class in school in Wales are contacted to let them know the measurements are planned. They are given the opportunity to opt their child out of the measurements if they so wish. The results are included in the analysis if the child's fifth birthday falls between the 1st September and 31st August of the year group being measured AND their parents have not opted them out of the programme.

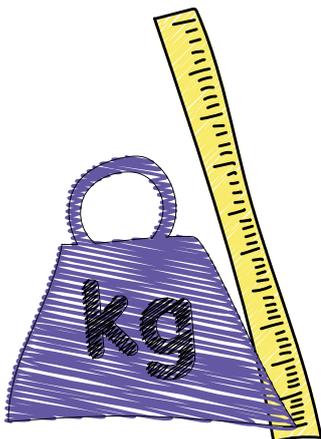
Measurements are taken in a standardised way – the school health team members received additional training in taking the measurements and the equipment used is standardised, maintained and calibrated. Most schools are visited by the local school health team twice for the CMP during the school year. This is 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 some children may also be excluded from the analysis where 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.

The measurement process

School Health teams across Wales have routinely weighed and measured children in the reception year age-group for many years. This was done as part of a traditional 'pre-school' check. With the introduction of the Child Measurement Programme in 2011/12 this measurement is now done in a standardised way, and all health professionals involved are given additional training to carry this out. Measurements of height and weight are recorded by school health teams to the nearest 0.1 kg and 0.1 cm respectively in order to establish an accurate Body Mass Index (BMI) measurement.

During 2014 an online training package was developed for use across the NHS in Wales, to enable school nurses and others involved in the measuring process to refresh their knowledge and skills in undertaking the measurements. Information about this is circulated to all health boards. The package includes an explanatory video which can be viewed on the Child Measurement Programme website www.publichealthwales.org/childmeasurement



BMI in adults

Once someone has reached adulthood (age 18+), the thresholds at which they are deemed to be of normal weight, under or overweight or obese remain the same. BMI is calculated by dividing a person's weight in kilograms by their height in metres squared (kg/m^2).

The BMI thresholds for adults, as classified by the World Health Organisation are as follows:

- BMI of less than 18.5 is deemed underweight
- BMI of 18.5 and above, but less than 25 is deemed normal weight
- BMI of 25 and above, but less than 30 is deemed overweight
- BMI of 30 and above, but less than 40 is deemed obese
- BMI of 40 or more is deemed morbidly obese.

Classifying a child's Body Mass Index(BMI)

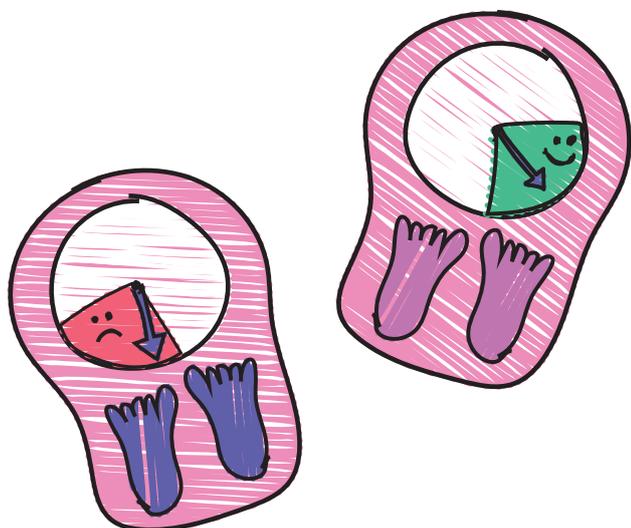
The classification of children's BMI differs from the classification of adult BMI. In children the BMI is categorised using variable thresholds that alter depending on a child's sex and exact age, as growth patterns differ depending on these variables. Each child's BMI is calculated and then assessed 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 the CMP, the British 1990 growth reference (UK90) has been selected. The BMI is calculated using a method proposed by Keys⁵ et al. The reference scale is divided into 100 units known as centiles.

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 universally accepted definition of morbid / severe obesity in children in common use, as there is in adults.



Prevalence rates for each category are calculated using age and sex-specific BMI centiles, derived using the British 1990 growth reference (UK90) from a method proposed by Cole⁶ et al. The 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 the UK90 were drawn from seven major studies of growth in the UK, and comprise measurements of over 30,000 children⁷ and young people between 33 weeks of gestation and age 23 years. One criticism⁸ 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.

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 guide⁹ which gives more information about each of the above growth references.

Epidemiological versus clinical thresholds for classifying weight

Different thresholds are used for clinical purposes rather than population surveillance purposes. The National Institute of Health and Care Excellence (NICE) recommend¹⁰ clinical interventions for children with a BMI on or above the 91st centile (rather than the 85th centile) as this is the threshold for obesity in clinical settings. Data on the clinical thresholds will be provided by the CMP to assist health boards and local government in planning services.

How are results analysed?

Information in the annual release is presented at a national, local authority and health board level. Aggregated data is also presented at MSOA level. 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; ethnicity; and deprivation of the area their postcode of residence is in. Every few years information will be analysed based on whether a child lives in an urban or rural area, based on Office for National Statistics (ONS) classifications¹¹. An assessment is then made about whether the results are (statistically) significant or not. Statistical significance is assessed using confidence intervals (CIs).

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 during the time period relevant for the report.
- The child's sex is recorded

Eligible records are included in the number measured, if they meet all of the following criteria:

- The height measurement is recorded and is not an implausible measurement^a
- The weight measurement is recorded and is not an implausible measurement^a
- Consent has not been withdrawn
- The measurement was collected during the relevant academic year.

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

^a In a very few cases it is apparent that human error results in the wrong figures being entered into the wrong fields. Although it appears as if the height and weight measurements had been switched there is no way to confirm this so measurements are not included.

Small number suppression

If the number of children in any one category is between one and four, the findings are suppressed to avoid the possibility of identifying individual children. This is because when information is released in detail there is the risk that individuals may be identified even though their names, addresses or dates of birth have been removed. This risk is exacerbated when two or more sources of data are compared, or the data is describing uncommon events. When the data describes 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.

For the most part this relates to children who are underweight or of low height. Suppression of related data is also performed where suppressed numbers could be derived from totals (secondary suppression). For the CMP this means that 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 sometimes 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 report the 95% CIs were calculated using a method proposed by Wilson et al. as described by Altman et al¹². (2000). 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 like that collected for the CMP, and inferring statistical significance between proportions (in this case through the use of confidence intervals). The caveat is that 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 are compared during analysis; 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.

Super output areas

Super output areas are a way of breaking down larger geographic areas (such as local authorities) in order to allow for reporting of small-area statistics. In Wales there are three tiers – lower, middle and upper. For the CMP information on the prevalence categories is provided at Middle super output area (MSOA) level as well as at national, health board and local authority area.

The average population for an MSOA is about 7,000, meanwhile the average population for a Lower super output area is about 1,600 people living in 650 households. According to the Office for National Statistics (ONS) there were 410 MSOAs and 1,909 Lower Super Output Areas (LSOA) in Wales following a reorganisation in 2011, and population minimum and maximum thresholds for SOAs are given in the table below. Both MSOAs and LSOAs may vary in geographical size but will not vary greatly in population size.

Geography	Minimum population	Maximum population	Minimum number of households	Maximum number of households
LSOA	1,000	3,000	400	1,200
MSOA	5,000	15,000	2,000	6,000

Analysis by deprivation

Deprivation is assessed using the Welsh Index of Multiple Deprivation (WIMD) which was last 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 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 who have their own deprivation measures.

There are pockets of deprivation right 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 in 2014 was Monmouthshire.

How is the CMP quality assured?

Children in reception year have been weighed at this stage for many years as part of the pre-school health check. 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 annual 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 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.



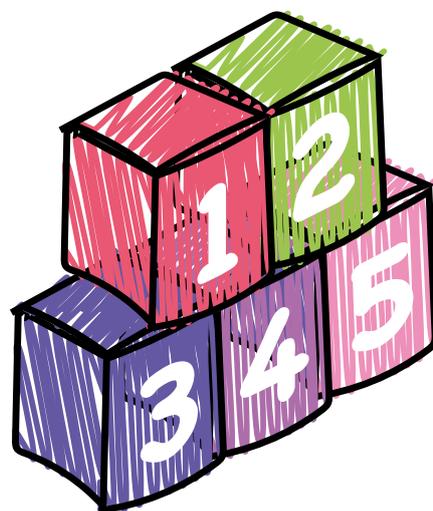
They contain information for local health teams including:

- 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.

Abbreviations

BME	Black and minority ethnic
BMI	Body mass index
CDC	Center for Disease Control
CI	Confidence interval
CMP	Child Measurement Programme for Wales
GSS	Government Statistical Service
LHB	Local health board
LSOA	Lower super output area
MSOA	Middle Super output area
NCCHD	National Community Child Health Database
NCMP	National Child Measurement Programme (England)
NHS	National Health Service
NICE	National Institute of Health and Care Excellence
NWIS	NHS Wales Informatics Service
ONS	Office for National Statistics
UK90	Growth reference system used in the CMP
WHO	World Health Organisation
WIMD	Welsh index of multiple deprivation



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