



GIG
CYMRU
NHS
WALES

Iechyd Cyhoeddus
Cymru
Public Health
Wales

Child Measurement Programme 2021-2022

This report summarises the data collected during the 2021-2022 school year within the following Local Health Boards in Wales:

- Betsi Cadwaladr University Health Board
- Powys Teaching Health Board
- Hywel Dda University Health Board
- Swansea Bay University Health Board
- Cardiff and Vale University Health Board
- Aneurin Bevan University Health Board

Production Team

Dr Llion Davies, Consultant in Public Health Medicine

Gavin Collins, Project Support Officer

Mari Ann Jones, Advanced Public Health Intelligence Analyst

Lesley Roberts, Public Health Intelligence Analyst

Zac Watkinson, Public Health Intelligence Analyst

Victoria Middleton, Senior Public Health Intelligence Analyst

Nathan Lester, Head of Observatory & Cancer Analysis Team

Rosemary Walmsley, Advanced Data Scientist

Rachel Bath, Consultant in Public Health

Claire Beynon, Consultant in Public Health

Iain Bell, Director of Public Health Data Knowledge and Research

Katie Allen, Communications Officer

Monika Swiatek, User Centred Designer

Lance Webster, Ridler Webster Ltd

Translation by Testun Cyf

© 2023 Public Health Wales NHS Trust.

Material contained in this document may be reproduced under the terms of the Open Government Licence (OGL) www.nationalarchives.gov.uk/doc/open-government-licence/version/3/ provided it is done so accurately and is not used in a misleading context.

Acknowledgement to Public Health Wales NHS Trust to be stated. Copyright in the typographical arrangement, design and layout belongs to Public Health Wales NHS Trust.

Publication Details

Title: Child Measurement Programme 2021-2022

Publisher: Public Health Wales NHS Trust

Date: 23 May 2023

ISBN English version: 978-1-83766-161-9

Website: www.publichealthwales.org/childmeasurement

Acknowledgements

Many thanks to the families and children who participated in the programme and to all Health Board staff and teachers who have supported the programme across Wales.

Contents

Key Points	4
Introduction	5
Methods	6
Cohort Inclusions and Exclusions	6
Variables	6
Data Representativeness	7
Primary Care Cluster Pilot	7
Analyses	7
Limitations	8
Engagement and Results Reporting	9
Part 1: General Outputs from the Six Local Health Boards Included	10
Local Health Board Level	10
Local Authority Level	12
Ethnicity	16
Deprivation	16
Part 2: Local Health Board and Local Authorities Focussed Reports	17
Betsi Cadwaladr University Health Board	17
Powys Teaching Health Board	20
Hywel Dda University Health Board	23
Swansea Bay University Health Board	26
Cardiff and Vale University Health Board	29
Aneurin Bevan University Health Board	32
More Information	35
References	36
Appendix 1: Representativeness Testing	37

Key Points

- This report summarises the key findings of the Child Measurement Programme (CMP) for six Local Health Board (LHB) regions in Wales for the school year 2021-2022. This report relates to measurements taken of children resident in Wales, who attend reception class in Wales and turned 5 during the academic year.
- Data collection in 2021/22 was much improved compared with 2020/21. However, the collection remained interrupted with no data available for one LHB region. This means that we cannot provide an overall figure for Wales.
- Lower participation was noted in several Local Authority regions compared with pre pandemic coverage. Data science analytical techniques were used to explore the representativeness, concluding that it was appropriate to report raw (unweighted) data.
- The proportion of children with obesity varied across LHBs from 10.6% (95%CI 8.8-12.6) in Powys Teaching to 14.1% (95%CI 13.0-15.3) in Swansea Bay. The proportion of children with obesity also varied at Local Authority level, from 9.9% (95%CI 7.9-12.2) in Monmouthshire to 15.8% (95%CI 14-17.8) in Neath Port Talbot.
- Across five Health Board regions, the proportions of children with obesity were higher compared to the proportions reported for 2018/19. For Powys Teaching Health Board, the proportion with obesity was lower than reported in 2018/19.
- Aneurin Bevan and Swansea Bay University Health Boards were the only regions with comparable data from the previous year (2020/21). It was noted last year that the proportion of children with obesity had increased statistically significantly in both LHBs in 2020/21 compared with pre pandemic reporting. However, the current 2021/22 data reports a statistically significant reduction in the proportion of children with obesity.
- The proportions of children with obesity in the most deprived Welsh Index of Multiple Deprivation quintile were higher compared to the proportion in the least deprived quintile across all six LHBs. This difference was statistically significant in four of the LHB regions.
- Deprivation trends within Local Health Boards over time showed a similar pattern from pre pandemic to 2021/22 across three LHB regions. For Swansea Bay the deprivation gap appears to have reduced since 2018/19. However, for Cardiff & Vale and Hywel Dda the gap appears to have increased. As deprivation gap is a relative measure, these results should be interpreted separately for each LHB, and not used to compare LHBs. Furthermore, they should be interpreted with caution as there are only 1 or 2 measurements since the pandemic.
- When comparing the current deprivation related obesity proportions for Aneurin Bevan and Swansea Bay Health Boards with the 2020/21 data, it was noted that the proportion of children with obesity in the most deprived quintile had reduced statistically significantly in 2021/22 across both regions. This suggests that the observed increase in obesity measures reported for 2020/21 may have been driven by changes in the regions with higher levels of deprivation.
- For this report, data provision at Primary Care Cluster Level were provided as a pilot. This pilot was in response to requests from the Local Health Boards for provision of data to help identify local needs and potentially support service planning. Within four LHB regions there were significant differences in the proportion of children observed to have obesity between Clusters. Cluster maps are available for each LHB in Part 2 of the report.

Introduction

This report summarises the key findings of the Child Measurement Programme (CMP) for six Local Health Board (LHB) regions within Wales for the school year 2021-2022. Due to staffing and residual COVID-19 pandemic impacts on data collection we are unable to report at an all Wales level. However, we hope to return to all Wales reporting next year. This report is limited to the following LHB regions:

- Betsi Cadwaladr University Health Board (BCUHB)
- Powys Teaching Health Board (PTHB)
- Hywel Dda University Health Board (HDdUHB)
- Swansea Bay University Health Board (SBUHB)
- Cardiff and Vale University Health Board (CAVUHB)
- Aneurin Bevan University Health Board (ABUHB)

The first part of the report contains general outputs including comparison data for the included LHBs. It is anticipated that this section will be useful for those interested in the general situation across most of Wales, such as Welsh Government and National organisations. Given the incomplete geographical coverage the results should be interpreted with caution if extrapolating beyond the regions for which there are data. In other words, the results for the areas with coverage should not be assumed to reflect the situation across Wales.

The second part of the report contains individual sections with more detailed information for each of the LHBs and the Local Authorities (LAs). It is anticipated that these sections will be of more interest to local organisations, such as the relevant LHBs and LAs who may wish to use the information to monitor population needs and potentially support service planning. These sections may also be of interest to members of the public who wish to know the situation in their communities.

In addition to this summary report, the full results including data tables are available on the Child Measurement Programme website at *Child Measurement Programme for Wales*.



Methods

This report relates to measurements taken of children resident in six of the Local Health Board regions in Wales who attend reception class and turned 5 during the academic year 2021-22. For this year we chose to expand our analyses with two areas of focus. First, deprivation in relation to obesity at Local Health Board level. Second, a pilot project to provide results at primary care cluster (PCC) level geography. Detailed information explaining how measurements were taken and how data were collected and analysed are available on the website, see the downloadable document “The Child Measurement Programme for Wales: history, legislative framework and technical aspects”. However, the following paragraphs provide a summary of the methods.

Cohort Inclusions and Exclusions

Parents receive an information leaflet explaining the measurement programme. The leaflets are bilingual Welsh/English and are either delivered as hard copies or digital communication depending upon location. Records are included in the 2021/22 Child Measurement Programme for Wales if the child is resident in Wales, attends a school in Wales, has a recorded gender and was born in the period September 2016 to August 2017.

Children are excluded if their measurement occurred outside the 2021/2022 academic year, their height

or weight recorded is an implausible measurement or if their consent is withdrawn. Children are also excluded if they are unable to stand unaided.

Variables

Variables are the characteristics of the children that we are able to explore when analysing data, for example ‘gender’. We have expanded below on two variables, deprivation and ethnicity because of explicit details that are relevant to this report.

Deprivation is approximated according to postcode area of residence. The postcode maps to the Welsh Index of Multiple Deprivation (WIMD), a relative measure that ranks 1,909 small geographical areas in Wales from least deprived to most deprived. The index is derived from 8 domains: employment; health; education; access to services; community safety; physical environment; housing (see the Welsh Government StatsWales website for further details). For the purpose of results reporting in this report, the 1,909 small areas are grouped into quintiles.

Ethnicity is recorded according to categories defined by the ONS (for further information see ons.gov.uk) that are: White; Asian or Asian British; Black, Black British, Caribbean or African; Mixed or multiple ethnic groups; Other ethnic group; Not known. Given the low numbers of participants in some of the ethnicity group categories it is not possible to report at LHB level. Therefore, ethnicity data were reported grouped together for the six LHBs.

Data Representativeness

Representativeness refers to how well matched the collected data are to the entire cohort of eligible children. Usually the participation for the Child Measurement Programme is very high, and representativeness is less of a concern. However, as we recover from the pandemic the participation for 2021/2022 for several of the participating LHBs was lower than the participation observed in 2018/19. Also, we do not have 5 years rolling data due to the previous two years gaps in reporting.

The data were first explored with regard to the demographic factors (such as ‘gender’, ‘urban versus rural location’, ‘deprivation’ and ‘ethnicity’). Participants in the Child Measurement Programme were compared to children who were eligible but did not participate. More detail on the methodology and modelling analyses are given in Appendix 1 at the end of this report. The results of these analyses suggested that non-representativeness at Primary Care Cluster level was likely to only have a minimal impact on results. Therefore, raw data results (the collected data without adjustments) have been reported for all geographical levels.

Primary Care Cluster Pilot

A Primary Care Cluster (PCC) is a geographical area where more than one General Practice (GP) work together to provide some services relevant to their population needs. In response to requests from local teams based within LHBs, it was decided to pilot data reporting at PCC level as a new output.

The rationale for the PCC level pilot were based upon the constraints of the 2021/22 data and the opportunity to provide an output relevant to Primary Care planners. First, Middle Super Output Area (MSOA) level data were not available as MSOA analyses require 5 years of rolling data to include adequate numbers of children. As PCCs are larger geographical areas than MSOAs, it was practical to explore if outputs at PCC level were possible with a single year’s worth of data. Second, the PCC geographical unit is recognised by Primary Care providers within LHBs and may, therefore, be useful to identify population need and potential service provision.

Although the representative analyses were favourable, we selected a pragmatic cut off point for reporting at 70% participation because below this point the numbers of children in each category were reduced. Where a PCC area had a participation rate of less than 70%, prevalence figures have not been published. We are still reviewing the pilot PCC level data and there may be a supplemental report once this process is complete.

Analyses

Prevalence rates were calculated using the age and sex-specific body mass index (BMI) centiles calculated using the British 1990 growth reference (UK90) (from a method proposed by Cole et al 1995, cited in Dinsdale et al, 2011). The 95% confidence intervals (95% CIs) for the prevalence rates were calculated using a method proposed by Wilson et al, 1927, cited in Altman, 2000. The body mass index (BMI) was calculated using a method proposed by Keys et al (1972). The following clinical weight categories thresholds have been assigned:

- underweight: less than but not including 2nd centile.
- healthy weight: 2nd centile up to but not including 85th centile.
- overweight: 85th centile up to and not including 95th centile.
- obese: 95th centile and above.

Results are given in proportion (%) of cohort followed by the corresponding 95% Confidence Interval (95%CI) in brackets. The cohort is the total number of measured children resident within the geographical region for which the specific data are reported, for example LHB reporting includes the results of all children resident within that LHB. For the purpose of this report gender refers to a binary variable categorised as ‘boys’ or ‘girls.’

Statistically significant differences were defined when the 95% Confidence Intervals of the compared proportion results did not overlap. However, overlapping 95% Confidence Intervals cannot be assumed to mean that there is no statistically significant difference. This would require further



statistical analyses to compare proportions with overlapping 95% Confidence Intervals. These analyses were beyond the scope of this report.

Comparisons, where applicable, were made with the 2018/19 data. The 2018/19 report was selected as the comparator as it was the most recent report with all Wales coverage, and the data were collected pre-pandemic. For ABUHB and SBUHB, comparisons were also possible with the 2020-2021 data.

Limitations

Limitations for the CMP data in general are reported in the 'The Child Measurement Programme for Wales: history, legislative framework and technical aspects' document and the data quality statement. These are available on the website alongside the report. Limitations that are specific to this year's report are listed as follows:

- Given the limited geographical coverage of this report data are not provided at an all Wales level. Visuals requiring comparison to the National (Wales) average are not available.
- Analyses that rely upon national coverage for adequate numbers are not reported, such as UK comparisons.
- As there were insufficient data for a 2019-2020 official statistics report and limited data reported for the 2020-2021 year, there is a data gap within the past 5 years. Analyses included in previous reports that are based upon 5 years reporting, such as drilling down to MSOA level, are not available.
- The interactive dashboard has not been updated. We anticipate that the dashboard will be updated next year as we return to all Wales coverage.
- Deprivation breakdown is usually reported at National level. We have provided a LHB level breakdown. However, the numbers for some quintiles categories are fewer than 100 children.
- The WIMD is a place-based measure of deprivation and should be considered as an approximation, or best fit, when applied to individuals. This is because individuals living in a postcode associated with lower levels of deprivation may live in a

household that would be categorised as having higher levels of deprivation, and vice versa.

- For each LHB region we have provided estimates for the relative gap in deprivation over time comparing the least and most deprived quintiles. Whilst it is reasonable to consider the changes in relative deprivation gap within the LHB, these should not be used to compare between LHB regions. This is because deprivation within geographies is based upon the epidemiological profiling of the population resident within the region.
- Several LA regions had lower participation compared with pre pandemic participation. The results should, therefore, be interpreted with caution. This is flagged, when relevant, within the individual LHB sections in Part 2 of the report.
- Ethnicity data were reported for all six LHBs together. This should not be extrapolated to all Wales level. Furthermore, this must be interpreted with caution for the six LHBs as participation from ethnic groups is unlikely to be uniform across Wales due to variation in population demographics. Local teams should consider these results in the context of local knowledge of their population demographics.
- Primary Care Clusters data are built from small geographical levels called Lower Super Output Areas (LSOA). These LSOAs have been mapped to the cluster where the highest number of residents are registered to a GP practice within the cluster. Therefore, the cluster provided in this lookup is an approximate 'best-fit' for each LSOA. The Cluster mapping used was reported in October 2021 and is available on the *StatsWales website*.



- At this stage, data were not published for all PCCs within all LHBs due to lower participation in some areas.
- At PCC level it should be noted that these results are based upon one year of data collection only and numbers in some sub-categories are low.
- The PCC level data are provided for the CMP as a new output pilot. Results should be interpreted in the context of the limitations noted above.
- The PCC heat maps provided for each LHB in Part 2 of the report use different proportion ranges for the colour categories. Therefore, these should not be compared between LHB regions.
- The data reported for 2020/21 across ABUHB and SBUHB revealed large increases in the proportions of children with obesity in these regions. It should be noted that the current 2021/22 data does not provide evidence either way about the trajectories of the individual children included in the 2020/21 cohort. In other words we do not know if the 2020/21 cohort will have retained higher levels of obesity as they age. Follow up measurements of the same children at older ages are not currently undertaken in Wales.

Engagement and Results Reporting

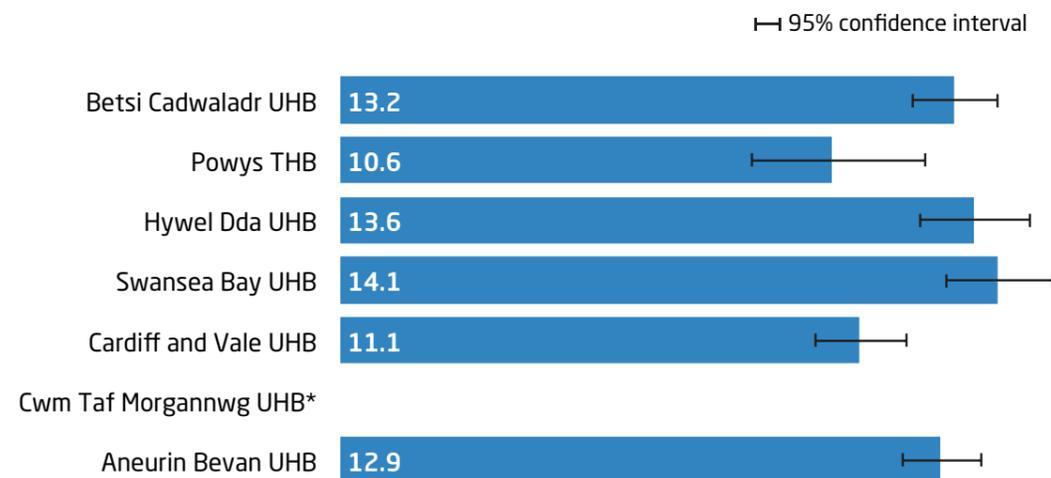
- As noted above, the CMP team pro-actively communicate to parents/guardians via the information leaflet. The team meet with healthcare professionals in Public Health and School Nursing regularly throughout the year. The team also engage with Welsh Government representatives via several forums, including Healthy Weight: Healthy Wales strategy meetings. The report and outputs are made available to the public on the Public Health Wales website as a pre-announced official statistics release.
- The summary, or key findings, of this report are published at the start of the report and are not repeated elsewhere within the report. The key findings section can also be considered as the executive summary. This report does not provide recommendations. It is anticipated that the data reported here may be triangulated with other sources of data and information by Government, Organisations and individuals to help inform weight management.

Part 1: General Outputs from the Six Local Health Boards Included

Local Health Board Level

The breakdown for the proportion of children with obesity by LHB is given in Figure 1. The proportion varies from 10.6% (95%CI 8.8-12.6) in Powys to 14.1% (95%CI 13.0-15.3) in SBUHB. This difference was statistically significant. Furthermore, CAVUHB at 11.1% (95%CI 10.2-12.2) had a statistically significantly lower proportion of children with obesity compared with BCUHB (13.2%, 95%CI 12.3-14.1), HDdUHB (13.6%, 95%CI 12.5-14.8) and SBUHB.

Figure 1 Percentage of children aged 4 to 5 years who are obese, Child Measurement Programme, health boards, 2021/22

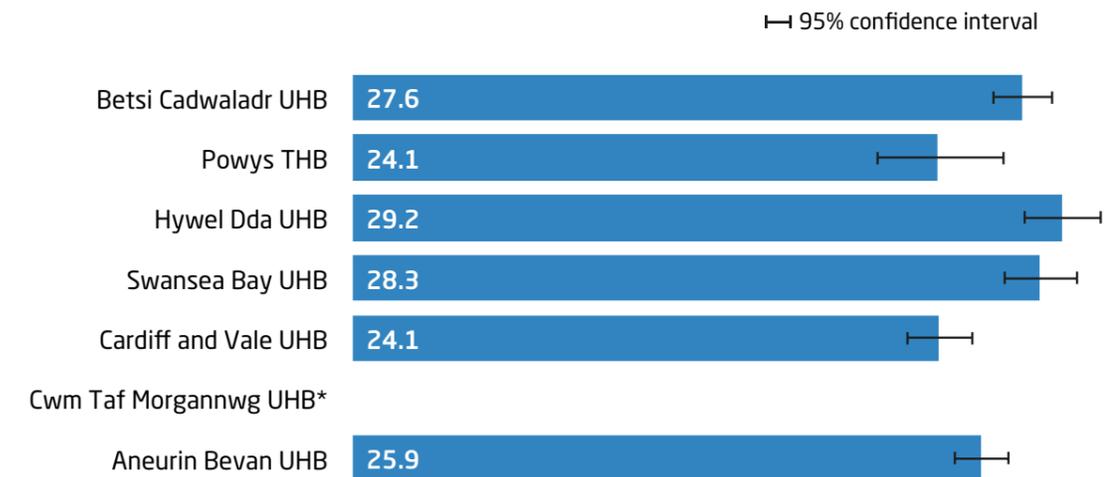


Produced by Public Health Wales Observatory, using CMP data (DHCW)
 *Reporting of the Child Measurement Programme has been severely affected due to the COVID-19 pandemic. The patterned area on the chart signifies where data was not available for that period.

The proportion of children with 'overweight or obesity' by LHB region also varied, ranging from 24.1% in both Powys (95%CI 21.6-26.7) and CAVUHB (95%CI 22.8-25.5) to 29.2% (27.6-30.8) in HDdUHB (see Figure 2). These differences were statistically

significant. The proportion with 'overweight or obesity' in CAVUHB was also statistically significantly lower than reported for SBUHB at 28.3% (95%CI 26.8-29.8) and BCUHB at 27.6% (95%CI 26.4-28.8).

Figure 2 Percentage of children aged 4 to 5 years who are overweight or obese Child Measurement Programme, health boards, 2021/22



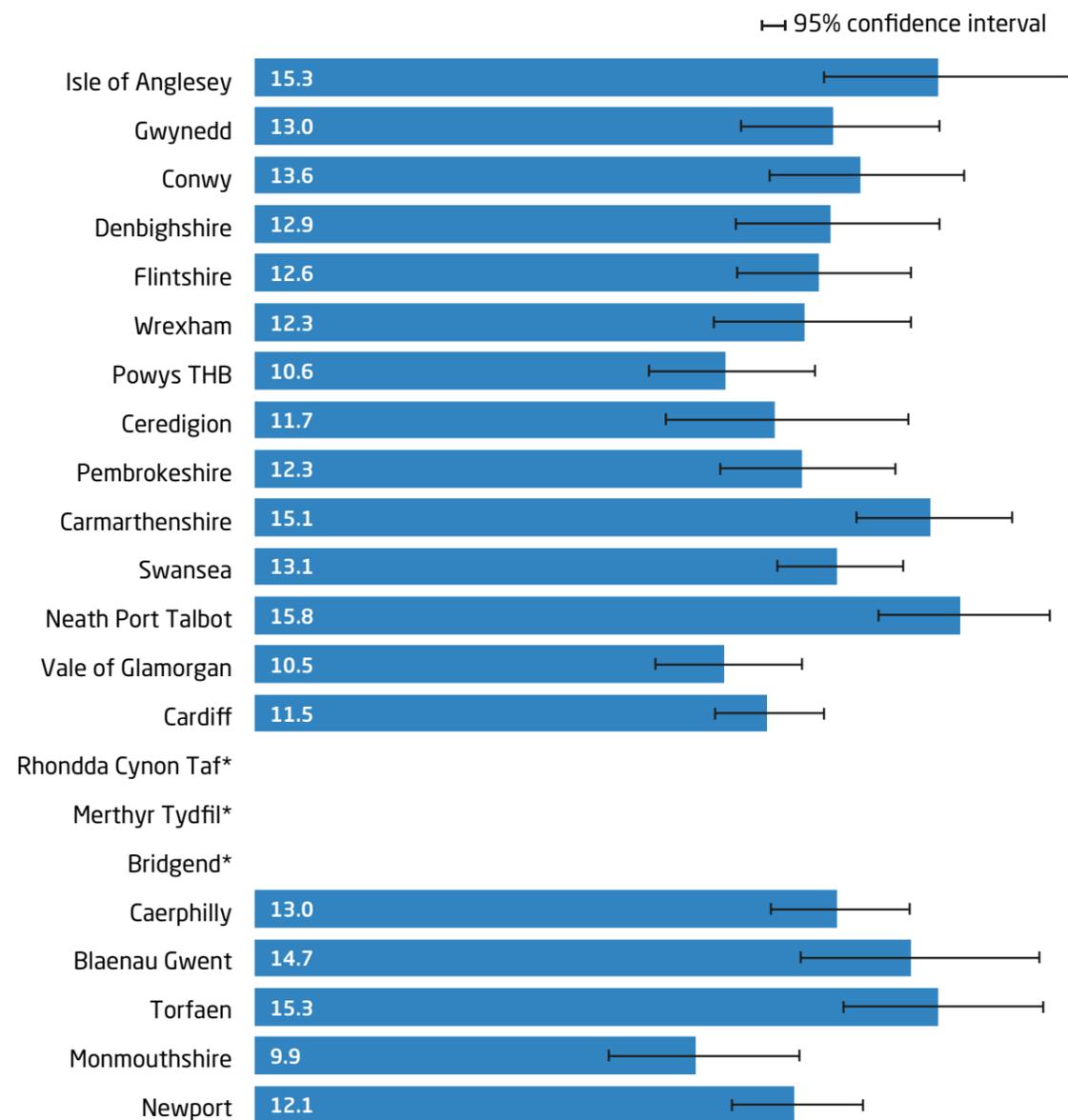
Produced by Public Health Wales Observatory, using CMP data (DHCW)
 *Reporting of the Child Measurement Programme has been severely affected due to the COVID-19 pandemic. The patterned area on the chart signifies where data was not available for that period.



Local Authority Level

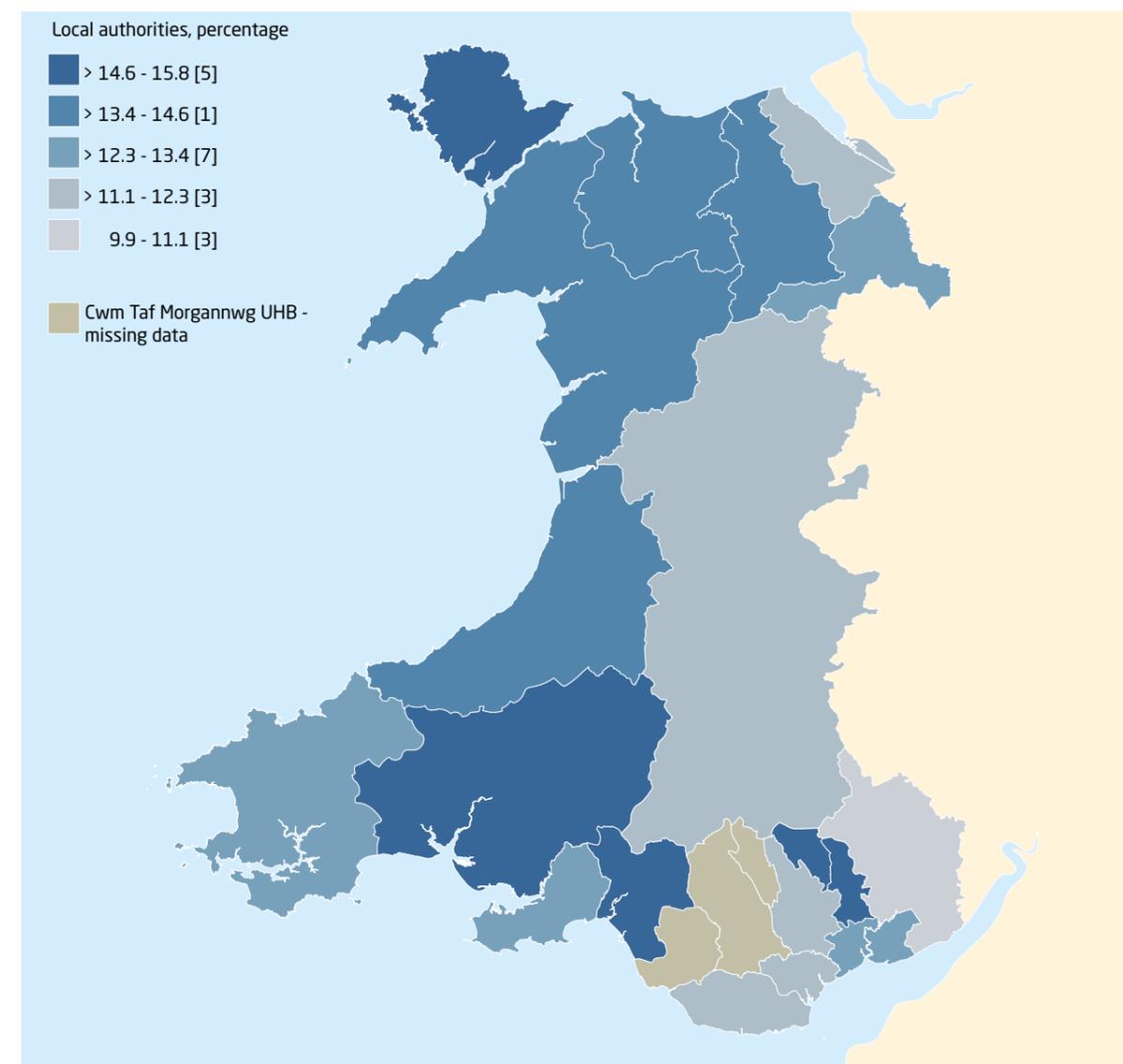
The breakdown for obesity by LA region is given graphically and by heat map in Figures 3 and 4 respectively. The proportions vary from 9.9% (95%CI 7.9-12.2) in Monmouthshire to 15.8% (95%CI 14-17.8) in Neath Port Talbot. This difference was statistically significant.

Figure 3 Percentage of children aged 4 to 5 years who are obese, Child Measurement Programme, local authorities, 2021/22



Produced by Public Health Wales Observatory, using CMP data (DHCW)
 *Due to the ongoing pandemic impact and its effects on priorities and staffing Cwm Taf Morgannwg UHB have not able to submit measurements for the 2021/22 academic year. This also impacts the ability to produce national figures for Wales.

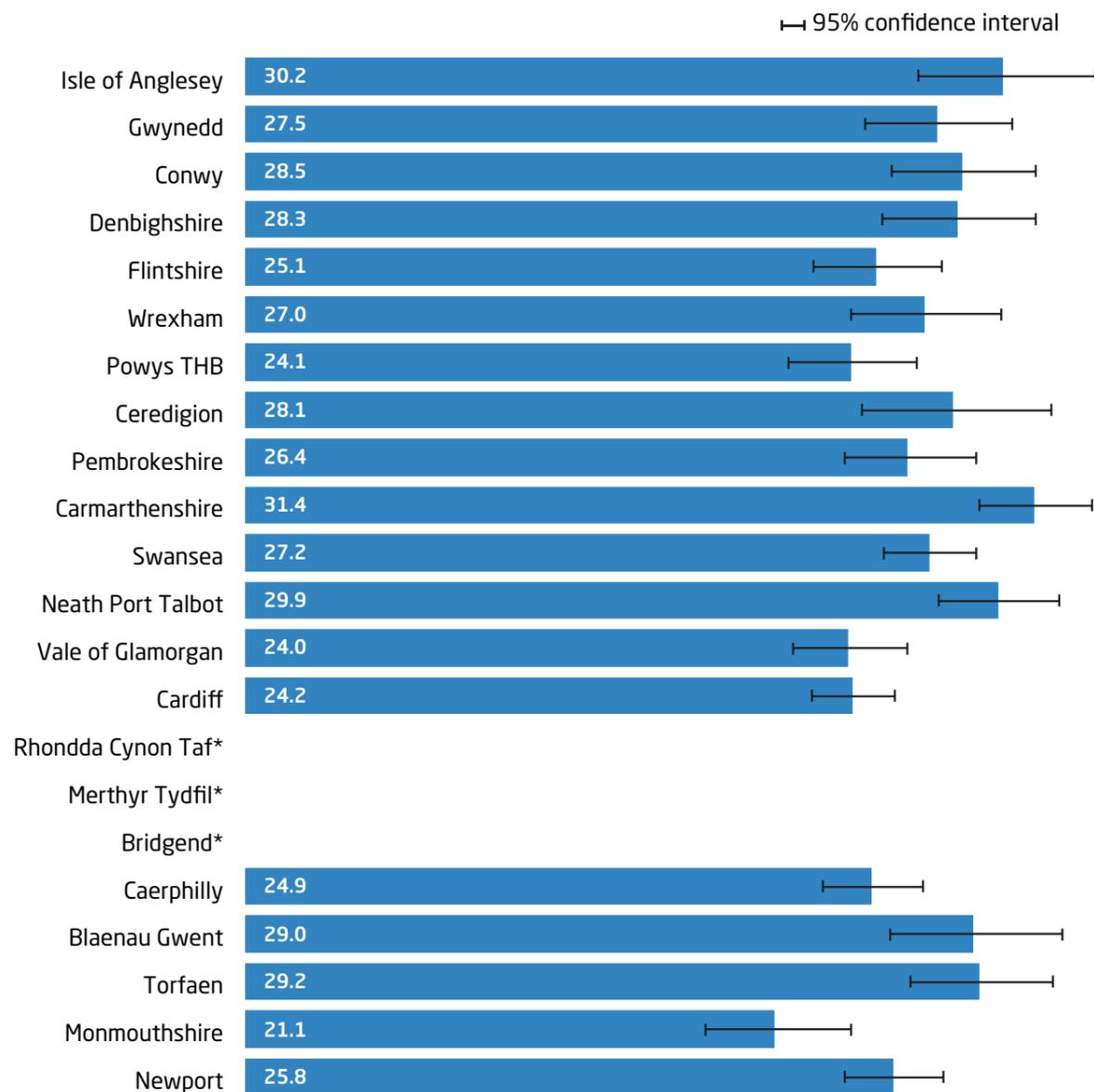
Figure 4 Percentage of children aged 4 to 5 years who are obese, local authorities Child Measurement Programme 2021/22*



*Due to the ongoing pandemic impact and its effects on priorities and staffing Cwm Taf Morgannwg UHB have not able to submit measurements for the 2021/22 academic year.
 Produced by Public Health Wales Observatory, using CMP data (DHCW) Contains National Statistics data © Crown copyright and database right 2023. Contains OS data © Crown copyright and database right 2023

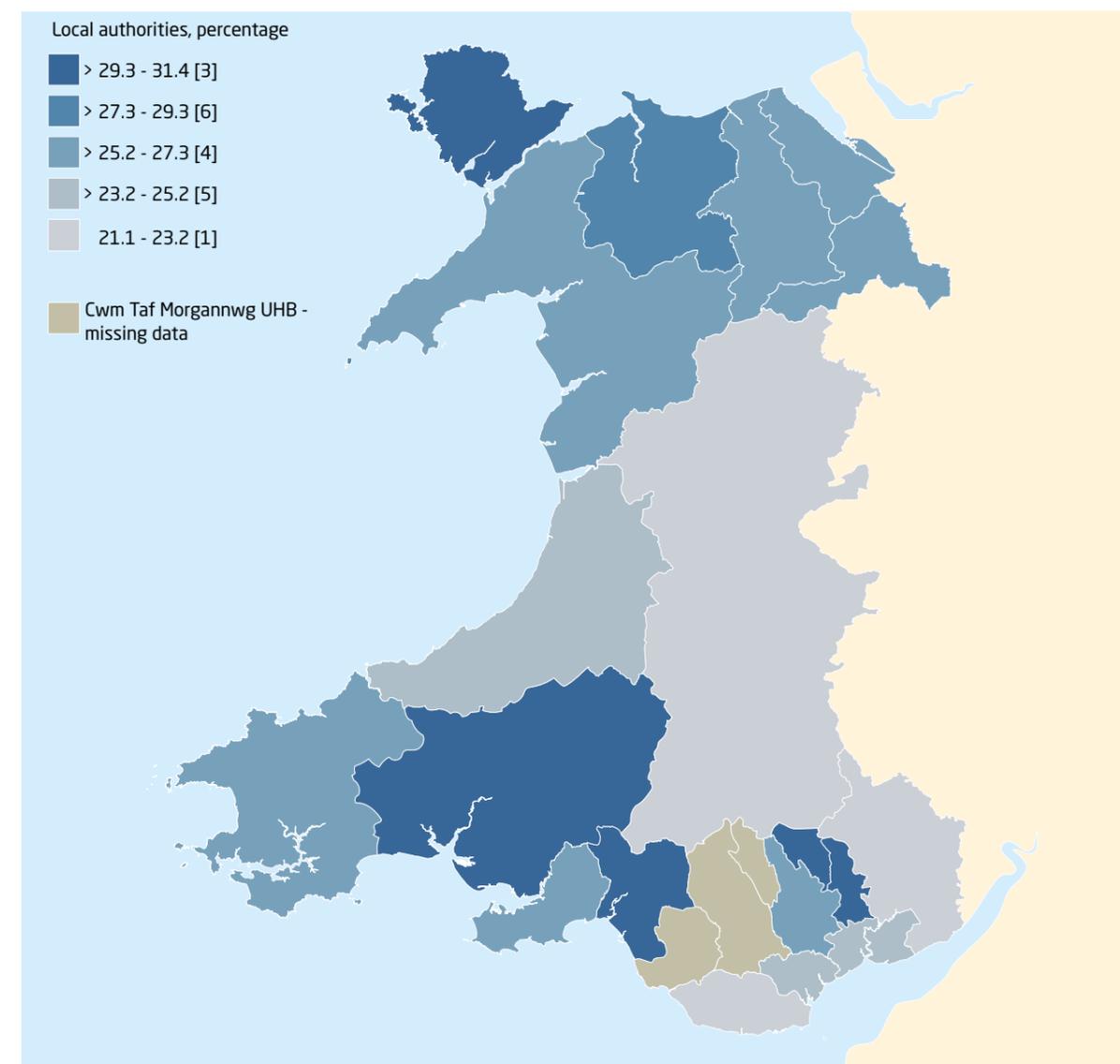
The breakdown for 'overweight or obesity' by LA region is given graphically and by heat map in Figures 5 and 6 respectively. The proportions varied from 21.1% (95%CI 18.3-24.1) in Monmouthshire to 31.4% (95%CI 29.2-33.7) in Carmarthenshire. This difference was statistically significant.

Figure 5 Percentage of children aged 4 to 5 years who are overweight or obese Child Measurement Programme, health boards, 2021/22



Produced by Public Health Wales Observatory, using CMP data (DHCW)
 *Due to the ongoing pandemic impact and its effects on priorities and staffing Cwm Taf Morgannwg UHB have not able to submit measurements for the 2021/22 academic year. This also impacts the ability to produce national figures for Wales.

Figure 6 Percentage of children aged 4 to 5 years who are overweight and obese, local authorities Child Measurement Programme 2021/22*



*Due to the ongoing pandemic impact and its effects on priorities and staffing Cwm Taf Morgannwg UHB have not able to submit measurements for the 2021/22 academic year.
 Produced by Public Health Wales Observatory, using CMP data (DHCW) Contains National Statistics data © Crown copyright and database right 2023. Contains OS data © Crown copyright and database right 2023

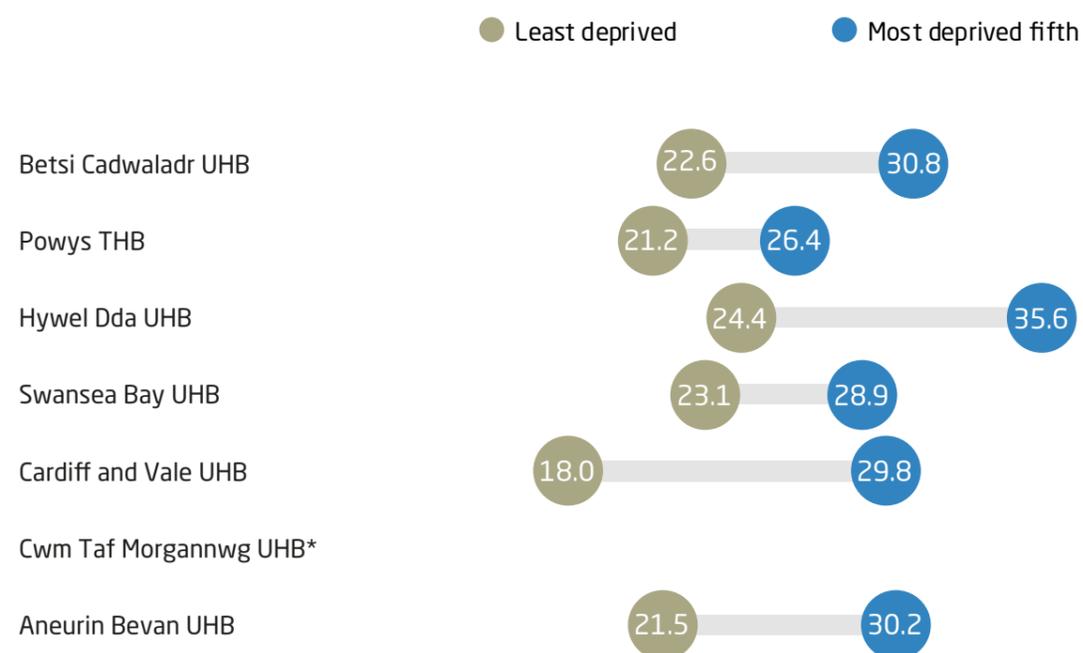
Ethnicity

These results are based upon combined data from the six included LHBs. Ethnicity statuses were missing from 7,963 (34.3%) participants. Given the low numbers in some categories, 'healthy weight' and 'underweight' were combined to a single variable. The proportion of 'Asian or Asian British' categorised as having a healthy weight or underweight was 78.5% (95%CI 74.7-81.9), statistically significantly higher when compared to those categorised as 'White' at 73.2% (95%CI 72.4-73.9). Differences between ethnicity categories with regard to the proportion of children with obesity were less clear, however, the numbers of children in some of the categories were low. When combining 'overweight' and 'obese' categories, children categorised as 'Asian or Asian British' had a statistically significantly lower proportion of 'overweight or obese' at 21.5% (95%CI 18.1-25.3) compared with children categorised as 'White' at 26.8% (95%CI 26.1-27.6).

Deprivation

The proportions of children living in the most deprived WIMD quintile regions who were 'overweight or obese' were higher than for those residing in the least deprived quintile regions for all six LHBs, see Figure 7. These differences were statistically significant in BCUHB, HDdUHB, CAVUHB and ABUHB. Further deprivation related data are provided in the individual LHB sections in Part 2 of this report.

Figure 7 Percentage of children aged 4 to 5 years who are overweight or obese, difference between most and least deprived (health board fifths), health boards, all children 2021/22*



Produced by Public Health Wales Observatory, using CMP data (DHCW) and WIMD 2019 (WG)

*Due to the ongoing pandemic impact and its effects on priorities and staffing Cwm Taf Morgannwg UHB have not able to submit measurements for the 2021/22 academic year. This also impacts the ability to produce national figures for Wales.

Part 2: Local Health Board and Local Authorities Focussed Reports

Betsi Cadwaladr University Health Board

The overall participation proportion was 75.2% across BCUHB, lower than the pre pandemic coverage of 94.8% for 2018-2019. There were 7 (0.1%) children that opted out of the programme. The participation proportion breakdown by Local Authority regions were: Isle of Anglesey 94.1%, Gwynedd 77.6%; Conwy 89.3%; Denbighshire 83.9%; Flintshire 67.4%; Wrexham 57.2%. The Isle of Anglesey and Conwy had similar participation to that observed in 2018-2019. However, the other four Local Authority regions had lower participation this year, especially Flintshire and Wrexham in the East. Prior to the pandemic all four had >95% participation in 2018-2019.

Underweight and Healthy Weight

The numbers of children categorised as experiencing underweight were small and represented 0.5% (95%CI 0.4-0.8) of the cohort. This proportion was similar to the proportion of 0.7% (95%CI 0.6 to 0.8) reported in 2018/19.

The proportion of children categorised as healthy weight was 71.9% (95%CI 70.7-73.1). This is similar to the observed pre-pandemic proportion of 70.7% (95%CI 69.6 to 71.8) observed in 2018/2019.

Overweight not obese

The proportion of children categorised as experiencing overweight not obesity was 14.4% (95%CI 13.5-15.3). This result was slightly lower compared with the pre pandemic 2018/19 report of 15.9% (95%CI 15.1 to 16.8).

Obese

The proportion of children categorised as having obesity was 13.2 (95%CI 12.3-14.1). This result was slightly higher than the pre pandemic proportion of 12.8% (95%CI 12.0 to 13.6) reported in 2018/19.

Gender

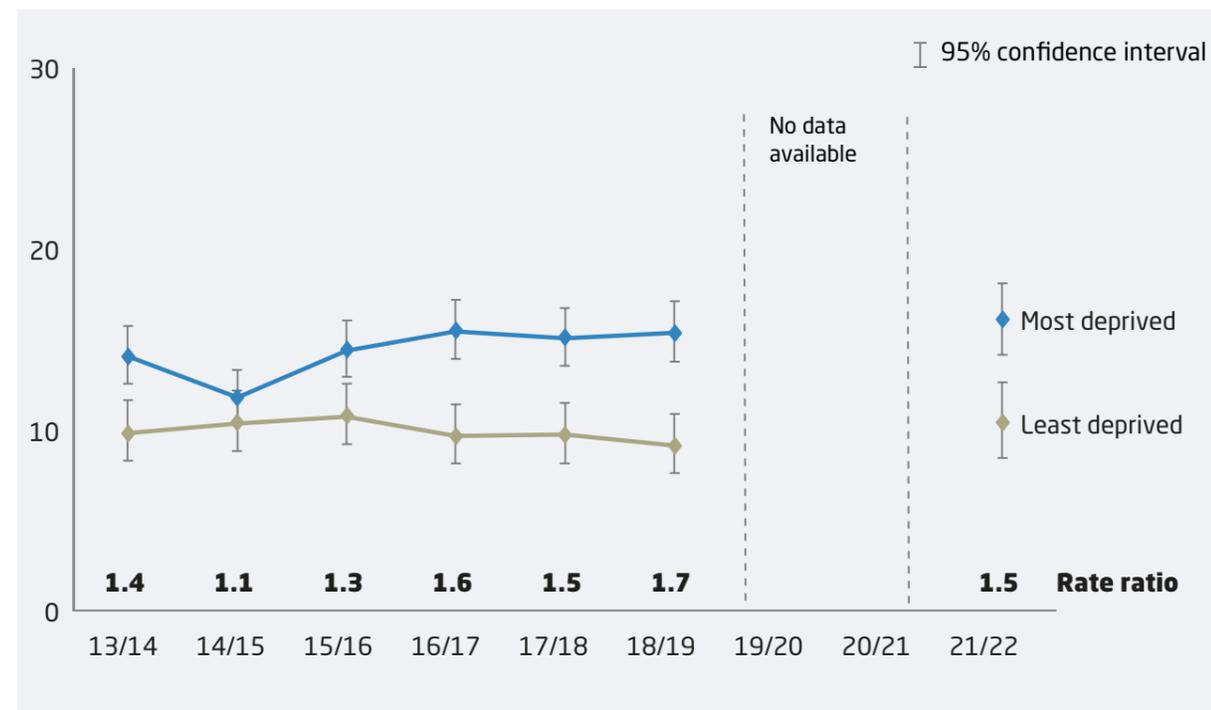
At LHB level the proportion of boys categorised as overweight not obese was statistically significantly higher than the proportion of girls at 15.7% (95%CI 14.4-17.1) versus 13.0% (95%CI 11.7-14.3) respectively. For the 'overweight not obese' category, a statistically significant higher proportion of boys compared with girls was also noted for the Isle of Anglesey (boys 19.5%, 95%CI 15.6-24.0 versus girls 10%, 95%CI 7.2-13.8) and Conwy (boys 18.7%, 95%CI 15.5-22.4 versus girls 10.9%, 95%CI 8.4-14.1) LAs.

Deprivation

At LHB level there was a statistically significantly higher proportion categorised as having obesity in the most deprived quintile (16.0%, 95%CI 14.2-18.1) compared with the least deprived (10.4%, 95%CI 8.5-12.6). A similar significant pattern was noted for Flintshire LA region (most deprived fifth 16.1%, 95%CI 12.3-20.7 versus least deprived fifth 5%, 95%CI 2.9-9.4). For the other LA breakdowns a deprivation trend was not observed. However, the LA data should be interpreted with caution given the low numbers of cases in each category. The proportions of children with obesity in the least deprived versus the most deprived quintiles over

time are shown in Figure 8. The rate ratio provides a relative estimate for the gap between the least and most deprived quintiles. There is some variation in gap over time, although, it does not appear that this gap has widened since the pandemic. This result should be interpreted with caution as there is only one post pandemic data observation.

Figure 8 Percentage of children aged 4 to 5 years who are obese, Child Measurement Programme, Betsi Cadwaladr UHB by most and least deprivation fifth, 2013/14 - 2021/22*

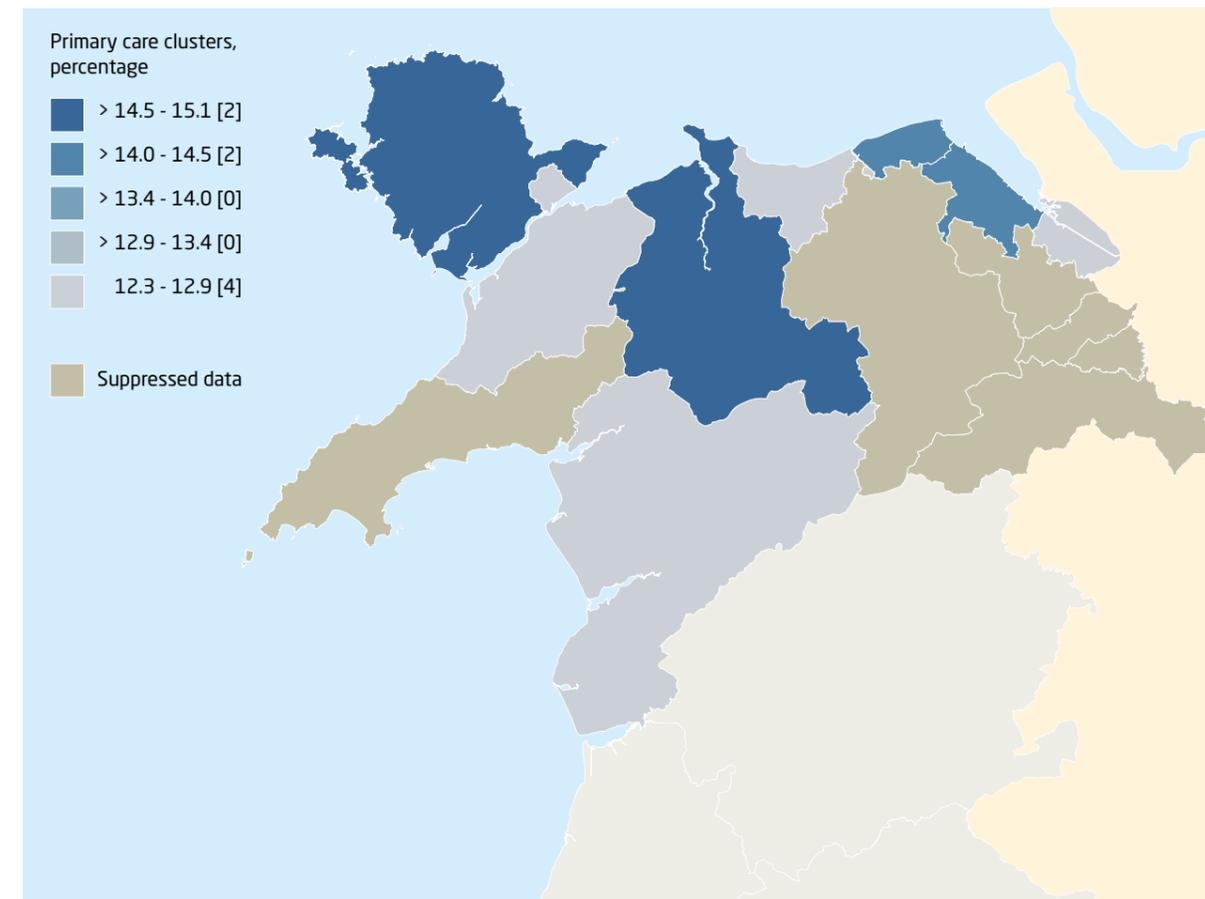


Produced by Public Health Wales Observatory, using CMP data (DHCW) and WIMD 2019 (2019)
 *Reporting of the Child Measurement Programme has been severely affected due to the COVID-19 pandemic. The patterned area on the chart signifies where data was not available for that period.

Primary Care Clusters

For those primary care clusters with adequate coverage, the proportion of children with obesity varied as shown in the heat map (Figure 9). The proportion with obesity ranged from 12.3% (95%CI 9.6-15.5) in Conwy East to 15.1% (95%CI 12.5-18.1) in Anglesey.

Figure 9 Percentage of children aged 4 to 5 years who are obese, Betsi Cadwaladr UHB, Child Measurement Programme 2021/22*



Primary care clusters as of October 2021
 Produced by Public Health Wales Observatory, using CMP data (DHCW) Contains National Statistics data © Crown copyright and database right 2023. Contains OS data © Crown copyright and database right 2023

Powys Teaching Health Board

The overall participation proportion was 92.1% across PTHB, the same geographical footprint as Powys LA. The participation was very similar to the 93% achieved in 2018-2019. There were 18 (1.6%) children that opted out of the programme.

Underweight and Healthy Weight

The numbers of children categorised as experiencing underweight were small and represented 0.5% (95%CI 0.2-1.1) of the cohort. This proportion was similar to the 2018/19 reported proportion of 0.7% (95%CI 0.4 to 1.4).

The proportion of children categorised as healthy weight was 75.5% (95%CI 72.8-78.0). This is higher than the proportion of 71.1% (95%CI 68.4 to 73.7) observed in 2018/2019.

Overweight not obese

The proportion of children categorised as experiencing 'overweight not obesity' was 13.5% (95%CI 11.6-15.7). This result was similar to the proportion of 13.9% (95%CI 12.0 to 16.1) observed in 2018-2019.

Obese

The proportion of children categorised as having obesity was 10.6 (95%CI 8.8-12.6). This is a reduction compared with the proportion of 14.2% (95%CI 12.3 to 16.4) reported in 2018/19.

Gender

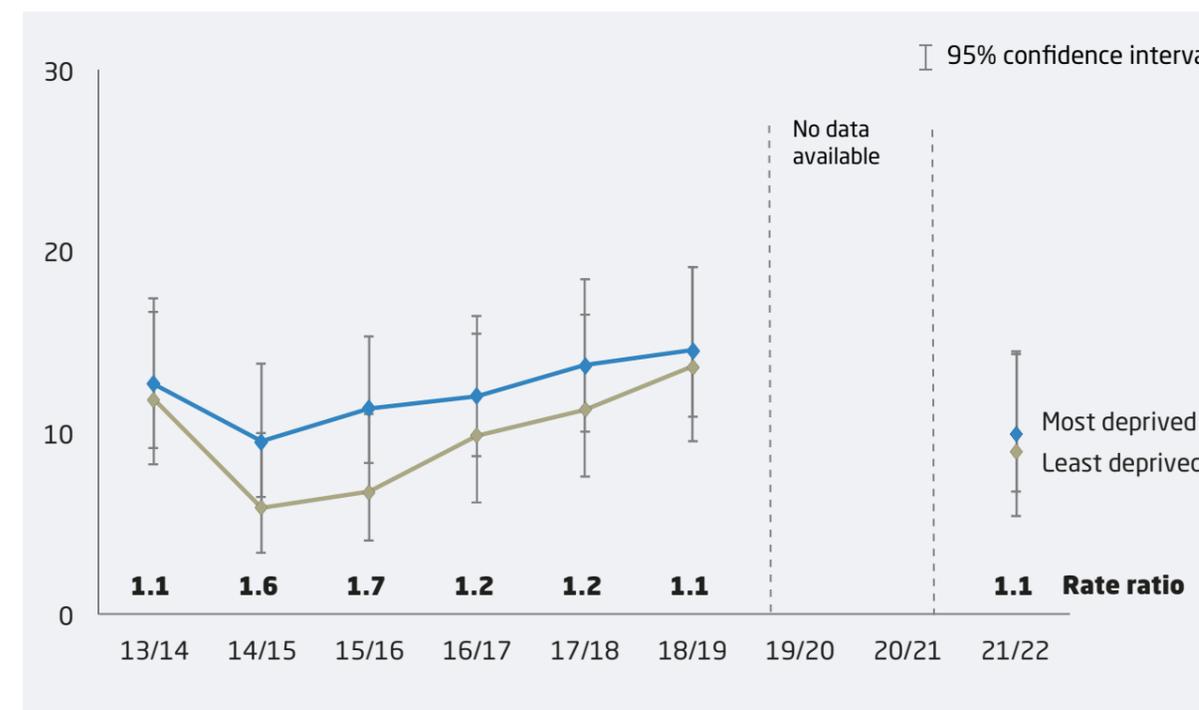
The proportions across weight measurement categories with sufficient numbers of children for comparison were similar for boys and girls in Powys.

Deprivation

At Powys level there was no observed pattern for the proportion of children with obesity by deprivation fifths. However, the numbers of children in each category were low. The proportions of children with obesity in the least deprived versus the most deprived quintiles over time are shown in Figure 10. The rate ratio provides a relative estimate for the gap between the least and most deprived quintiles. There is some variation in gap over time, with the largest relative gap noted for the 2014-2015 and 2015-2016 years. However, this gap subsequently narrowed to the last pre-pandemic observation in 2018-2019. The single post pandemic measure in 2021-2022 remains consistent with the 2018-2019 observation. This observation should be interpreted with caution as the numbers of children in each category are lower than for the other LHBs and there is only one post pandemic measurement.



Figure 10 Percentage of children aged 4 to 5 years who are obese, Child Measurement Programme, Powys THB by most and least deprivation fifth, 2013/14 - 2021/22*



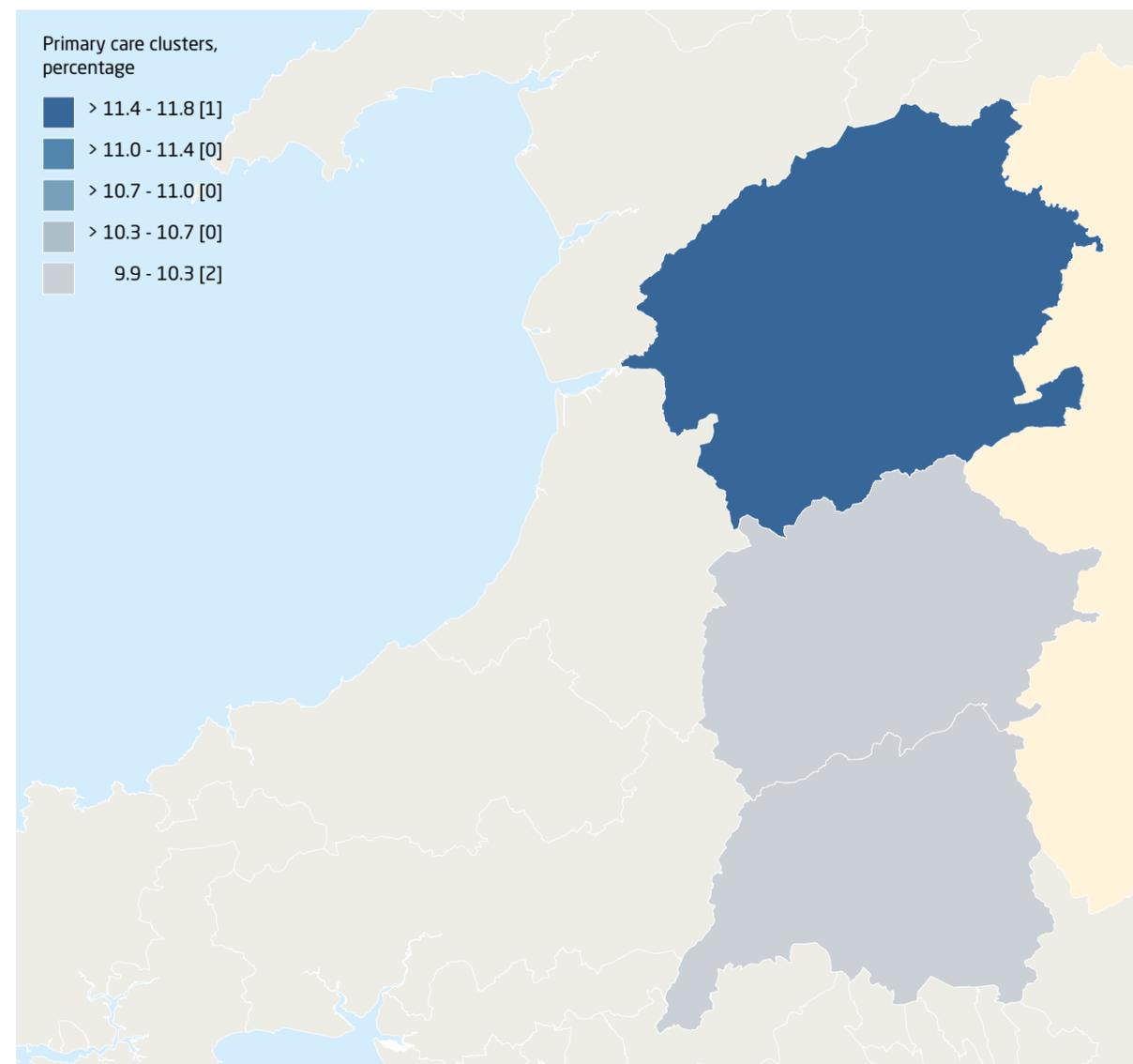
Produced by Public Health Wales Observatory, using CMP data (DHCW) and WIMD 2019 (2019)
 *Reporting of the Child Measurement Programme has been severely affected due to the COVID-19 pandemic. The patterned area on the chart signifies where data was not available for that period.



Primary Care Clusters

The proportion of children with obesity varied somewhat between the primary care clusters, as shown in the heat map (Figure 11) with a range from 9.9% (95%CI 7.2-13.4) in South Powys to 11.8% (95%CI 9.3-14.9) in North Powys. However, this variation was relatively small.

Figure 11 Percentage of children aged 4 to 5 years who are obese, Powys THB, Child Measurement Programme 2021/22*



Primary care clusters as of October 2021
Produced by Public Health Wales Observatory, using CMP data (DHCW) Contains National Statistics data © Crown copyright and database right 2023. Contains OS data © Crown copyright and database right 2023

Hywel Dda university Health Board

The overall participation proportion was 88.2% across HDdUHB, lower than the 95.8 reported for 2018-2019. There were 7 (0.2%) children that opted out of the programme. The participation proportion breakdown by LA regions were: Ceredigion 92.5%; Pembrokeshire 88.8%; Carmarthenshire 86.5%. All LA regions reported lower participation rates compared with 2018-2019.

Underweight and Healthy Weight

The numbers of children categorised as experiencing underweight were small and represented 0.6% (95%CI 0.4-0.9) of the cohort. This proportion was double the proportion of 0.3% (95%CI 0.2 to 0.5) observed in 2018-2019, however, this should be interpreted with caution as the absolute numbers are small.

The proportion of children categorised as healthy weight was 70.3% (95%CI 68.7-71.8). This result is similar to the pre-pandemic proportion of 70.6% (95%CI 69.1 to 72.0) observed in 2018/2019.

Overweight not obese

The proportion of children categorised as experiencing 'overweight not obesity' was 15.6% (95%CI 14.4-16.9). This result was similar to the proportion of 16.2% (95%CI 15.0 to 17.4) observed pre pandemic in the 2018/19 report.

Obese

The proportion of children categorised as having obesity was 13.6 (95%CI 12.5-14.8). The result is similar to the pre pandemic proportion of 13.0% (95%CI 11.9 to 14.1) reported in 2018/19.

Gender

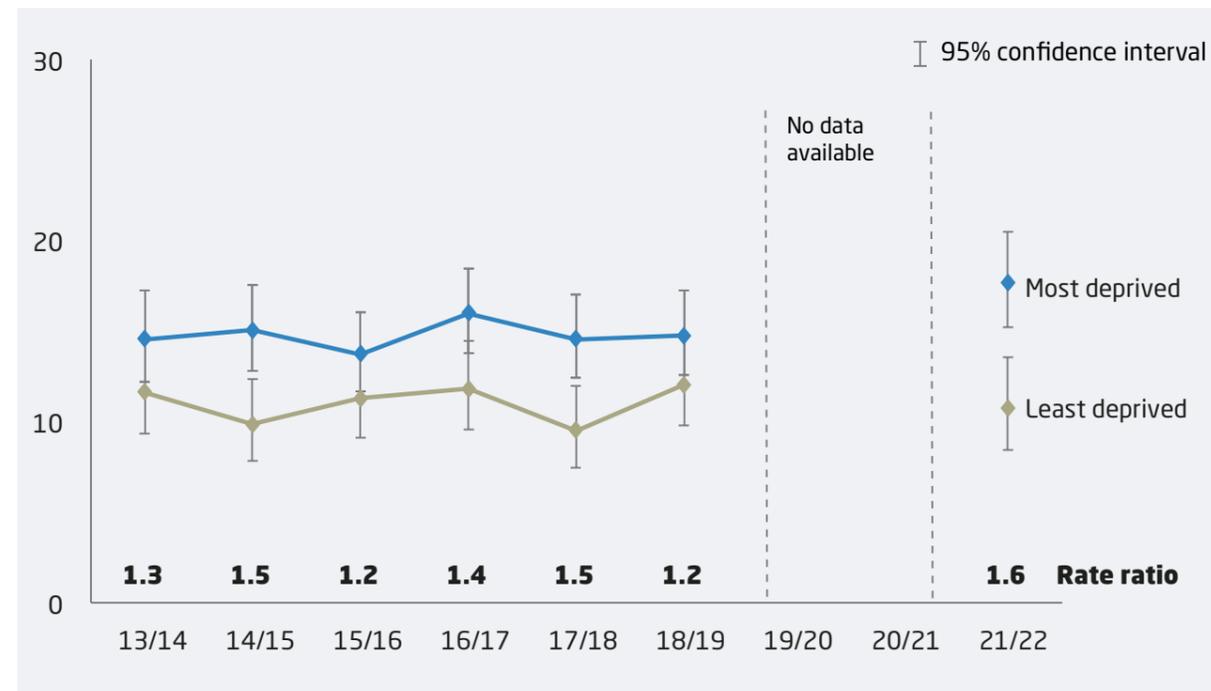
The proportions across all weight measurement categories were similar for boys and girls at LHB level, and at LA level for the comparisons with sufficient numbers of children.

Deprivation

At LHB level there was a statistically significantly higher proportion categorised as having obesity in the most deprived quintile (17.7%, 95%CI 15.2-20.5) compared with the least deprived (10.7%, 95%CI 8.4-13.5). A similar pattern was noted for the Local Authority areas. The difference observed for Pembrokeshire was statistically significant with a proportion of 17.5% (95%CI 13.6-22.3) in the most deprived compared with 8.7% (95%CI 5.6-13.4) in the least deprived fifth. The proportions of children with obesity in the least deprived versus the most deprived quintiles over time are shown in Figure 12. The rate ratio provides a relative estimate for the gap between the least and most deprived quintiles. There is some variation in gap over time, however, it does appear that this gap has widened since the pandemic. This result should be interpreted with caution as we only have one data point since the pandemic.



Figure 12 Percentage of children aged 4 to 5 years who are obese, Child Measurement Programme, Hywel Dda UHB by most and least deprivation fifth, 2013/14 - 2021/22*

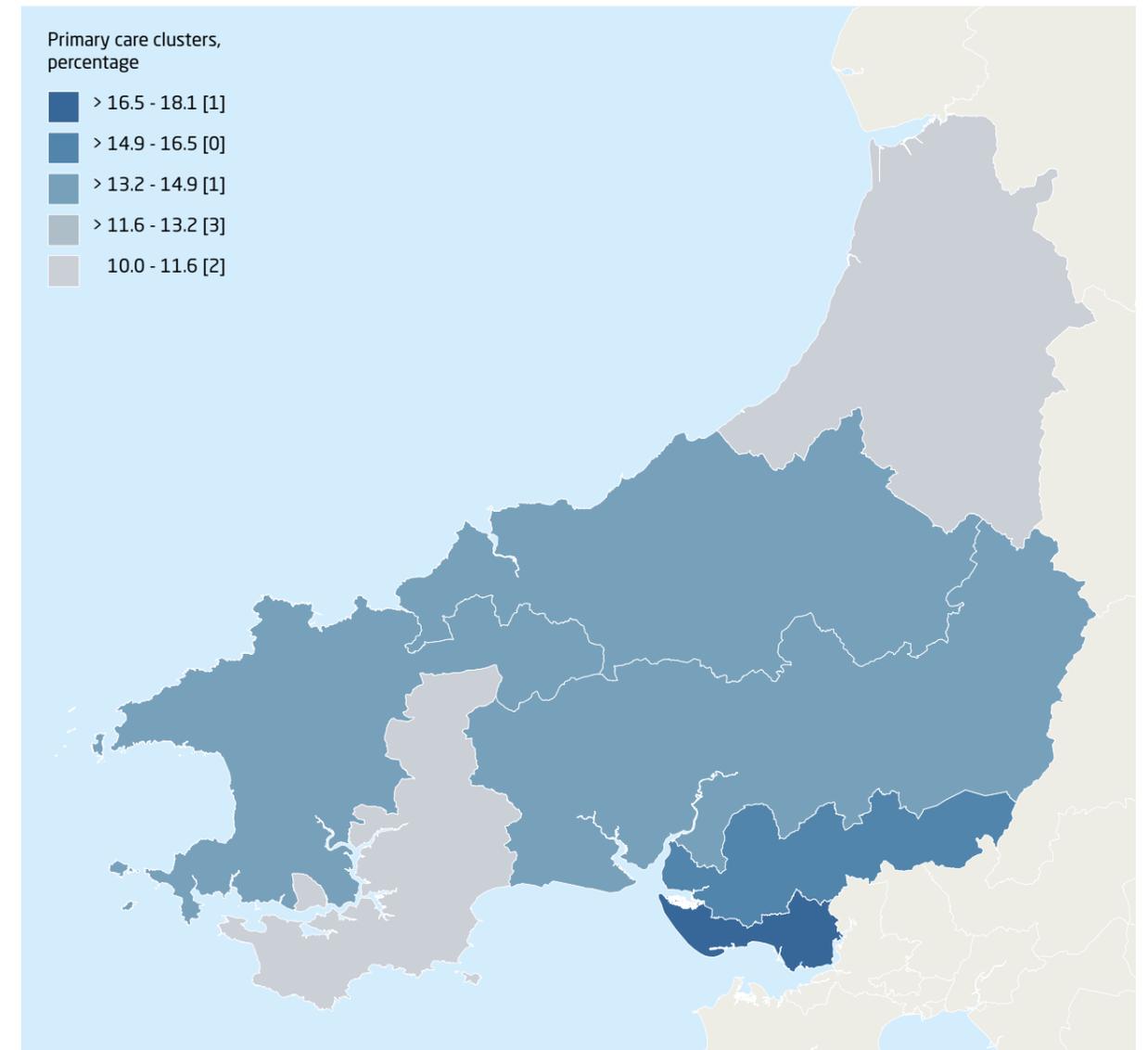


Produced by Public Health Wales Observatory, using CMP data (DHCW) and WIMD 2019 (2019)
 *Reporting of the Child Measurement Programme has been severely affected due to the COVID-19 pandemic.
 The patterned area on the chart signifies where data was not available for that period.

Primary Care Clusters

The proportion of children with obesity varied across primary care clusters, as shown in the heat map (Figure 13) with a range from 10.0% (95%CI 7.1-14.0) in North Ceredigion to 18.1% (95%CI 15.2-21.5) in Llanelli. This was a statistically significant difference.

Figure 13 Percentage of children aged 4 to 5 years who are obese, Hywel Dda, Child Measurement Programme 2021/22*



Primary care clusters as of October 2021
 Produced by Public Health Wales Observatory, using CMP data (DHCW) Contains National Statistics data © Crown copyright and database right 2023. Contains OS data © Crown copyright and database right 2023

Swansea Bay University Health Board

The overall participation proportion was 90.5% across SBUHB. For Swansea and Neath Port Talbot LA regions the participation proportions were 89.2% and 92.5% respectively. There were 9 children (0.2%) that opted out of the programme. The participation has increased since last year when it was 86.7% across SBUHB. However, it has not yet reached the pre-pandemic proportion of 95.4% achieved in 2018-2019.

Underweight and Healthy Weight

The numbers of children categorised as experiencing underweight were small and represented 0.8% (95%CI 0.5-1.1) of the cohort. This result was slightly higher than last year at 0.5% (95%CI 0.3 to 0.8) and 2018-2019 at 0.6% (95%CI 0.4-0.9). These differences should be interpreted in the context of low absolute numbers.

The proportion of children categorised as healthy weight was 71% (95%CI 69.5-72.4). This was statistically significantly higher than the observed proportion of 65.5% (95%CI 63.9 to 67.0) last year, and was similar to the pre pandemic 2018-2019 reported proportion of 72.2% (95%CI 70.8 to 73.6).

Overweight not obese

The proportion of children categorised as experiencing 'overweight not obesity' was 14.2% (95%CI 13.0-15.3). This was lower compared with the reported proportion of 16.4% (95%CI 15.2 to 17.7) last year. The result was very similar to the pre pandemic proportion of 14.2% (95%CI 13.1 to 15.3) observed in 2018-2019.

Obese

The proportion of children categorised as having obesity was 14.1% (95%CI 13.0-15.3), down significantly from 17.6% (95%CI 16.4 to 18.9) reported last year. However, the 2021/22 result remains slightly higher than the pre pandemic reported proportion of 13.0% (95%CI 12.0 to 14.1) in 2018-2019.

Gender

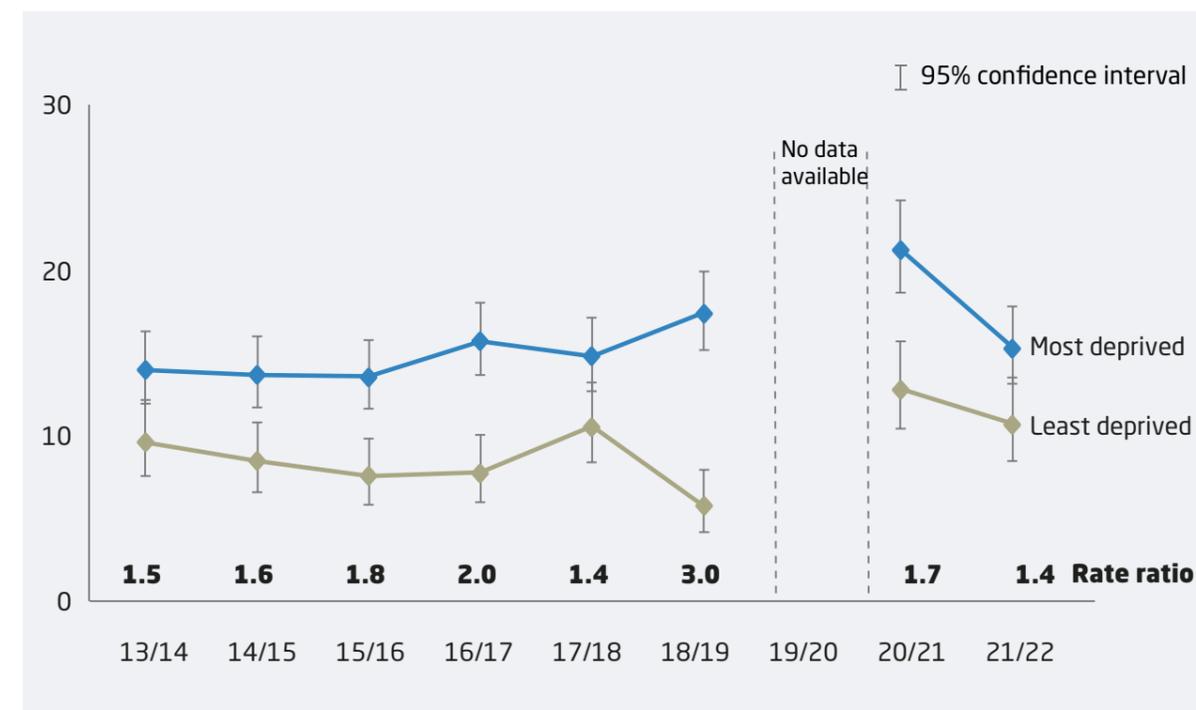
The proportions across all weight measurement categories were similar for boys and girls at LHB level, and at LA level for the comparisons with sufficient numbers of children.

Deprivation

At LHB and LA levels there was a trend that a higher proportion of children were categorised as having obesity in the most deprived quintile compared with the least deprived. At LHB level the proportion categorised as experiencing obesity in the most deprived quintile had reduced significantly from 20.7% (95%CI 18.4 to 23.2) in 2020-2021 to 15.3% (95%CI 13.1-17.8) in 2021-2022. For those in the least deprived quintile the observed reduction was less marked (12.8%, 95%CI 10.6 to 15.3 in 2020-2021 versus 10.7%, 95%CI 8.5-13.5 in 2021-2022).

The proportions of children with obesity in the least deprived versus the most deprived quintiles over time are shown in Figure 14. The rate ratio provides a relative estimate for the gap between the least and most deprived quintiles. There is variation in the relative gap over time, with the largest relative gap observed at the pre pandemic measurement in 2018-2019. The relative gap observed in 2020-2021 was lower than pre-pandemic, with a further reduction for 2021-2022. Given the prior fluctuation and as there are only two post pandemic measurements to date these findings should be interpreted with caution.

Figure 14 Percentage of children aged 4 to 5 years who are obese, Child Measurement Programme, Swansea Bay UHB by most and least deprivation fifth, 2013/14 - 2021/22*



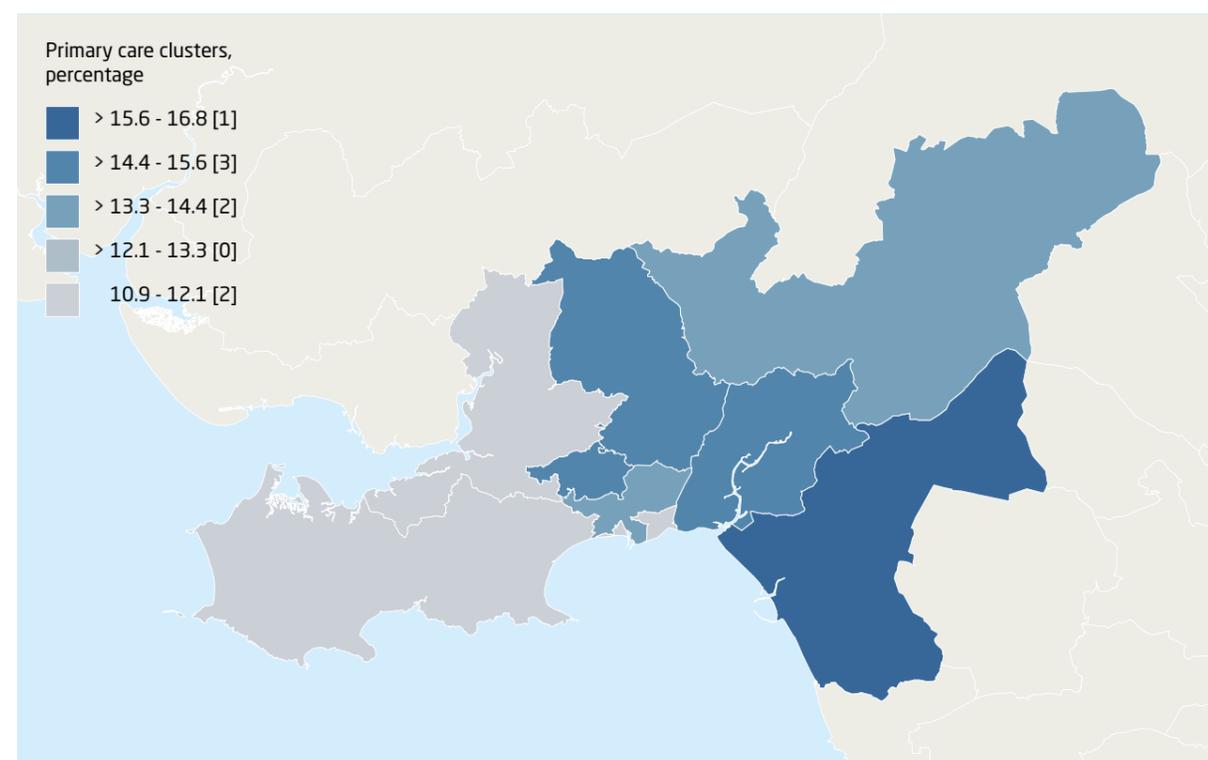
Produced by Public Health Wales Observatory, using CMP data (DHCW) and WIMD 2019 (2019)
*Reporting of the Child Measurement Programme has been severely affected due to the COVID-19 pandemic. The patterned area on the chart signifies where data was not available for that period.



Primary Care Clusters

The proportion of children with obesity varied across primary care clusters, as shown in the heat map (Figure 15) with a range from 10.9% (95%CI 8.5-13.8) in BayHealth to 16.8% (95%CI 13.9-20.2) in Afan. This was a statistically significant difference.

Figure 15 Percentage of children aged 4 to 5 years who are obese, Swansea Bay UHB, Child Measurement Programme 2021/22*



Primary care clusters as of October 2021
Produced by Public Health Wales Observatory, using CMP data (DHCW) Contains National Statistics data © Crown copyright and database right 2023. Contains OS data © Crown copyright and database right 2023

Cardiff and Vale University Health Board

The overall participation proportion was 72.1% across CAVUHB, down from 82.7 in 2018-2019. There were 23 (0.4%) children that opted out of the programme. The participation proportion breakdown by LA regions were: Vale of Glamorgan 89.3%; Cardiff 65.5%. The Vale of Glamorgan participation rate was up from 82.9% in 2018-2019. However, the participation in Cardiff was lower, down from 82.7% in 2018-2019.

Underweight and Healthy Weight

The numbers of children categorised as experiencing underweight were small and represented 1.3% (95%CI 1.0-1.7) of the cohort. This proportion was similar to the 2018/19 data of 1.4% (95%CI 1.1 to 1.8).

The proportion of children categorised as healthy weight was 74.6% (95%CI 73.2-75.9). This result is lower than the pre-pandemic proportion of 76.7% (95%CI 75.5 to 77.9) observed in 2018/2019.

Overweight not obese

The proportion of children categorised as experiencing 'overweight not obesity' was 13.0% (95%CI 12.0-14.1). This result was higher compared with the pre pandemic 2018/19 report of 11.7% (95%CI 10.8 to 12.6).

Obese

The proportion of children categorised as having obesity was 11.1% (95%CI 10.2-12.2). The result this year remains slightly higher than the pre pandemic proportion of 10.2% (95%CI 9.4-11.1) reported in 2018/19.

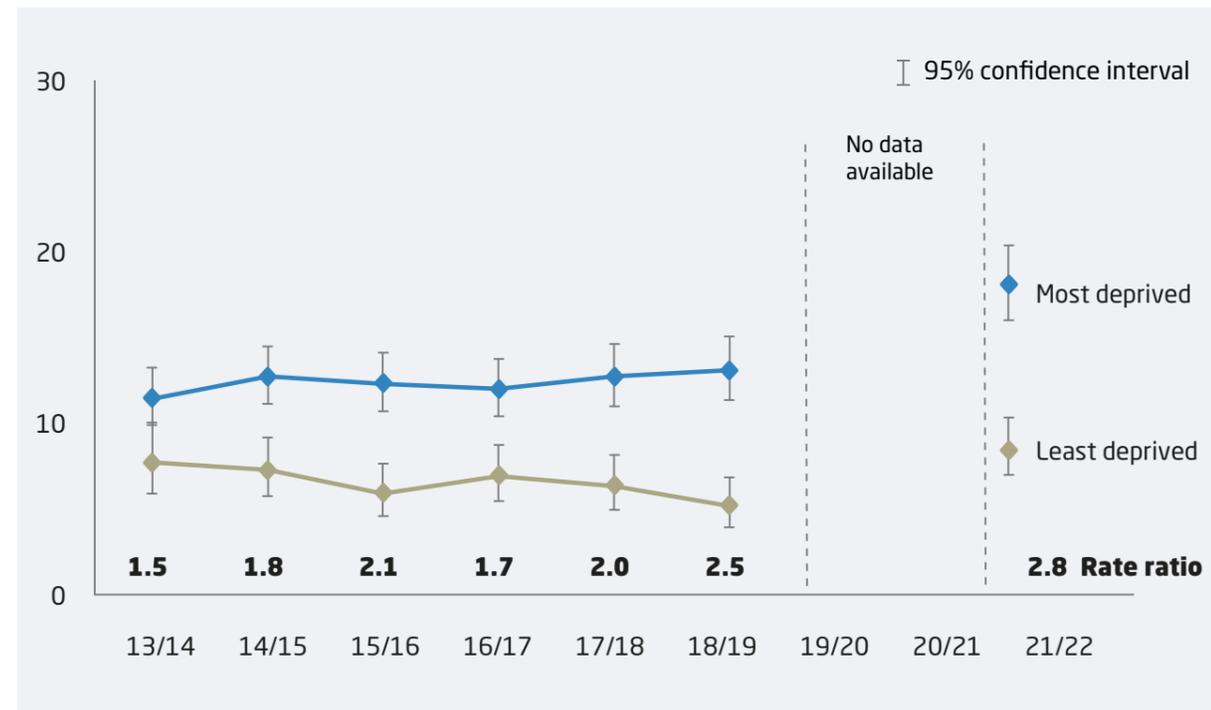
Gender

The proportions across all weight measurement categories were similar for boys and girls at LHB and LA levels.

Deprivation

At Health Board level there was a statistically significantly higher proportion categorised as having obesity in the most deprived quintile (15.1%, 95%CI 13.1-17.5) compared with the least deprived (5.5%, 95%CI 4.0-7.4). A similar statistically significant pattern was noted for the Local Authority areas (see website table for LA data). At LHB level there was also a significantly greater proportion of children with a healthy weight in the least deprived fifth (81.1%, 95%CI 78.1-83.3) compared to the most deprived fifth (68.3%, 95%CI 65.4-71.1). The proportions of children with obesity in the least deprived versus the most deprived quintiles over time are shown in Figure 16. The rate ratio provides a relative estimate for the gap between the least and most deprived quintiles. There is some variation in gap over time, however, it does appear that this gap has widened since 2018-2019. It also appears to have further widened since the pandemic (2021-2022). This finding should be interpreted with caution as we only have one data point reported since the pandemic.

Figure 16 Percentage of children aged 4 to 5 years who are obese, Child Measurement Programme, Cardiff and Vale UHB by most and least deprivation fifth, 2013/14 - 2021/22*

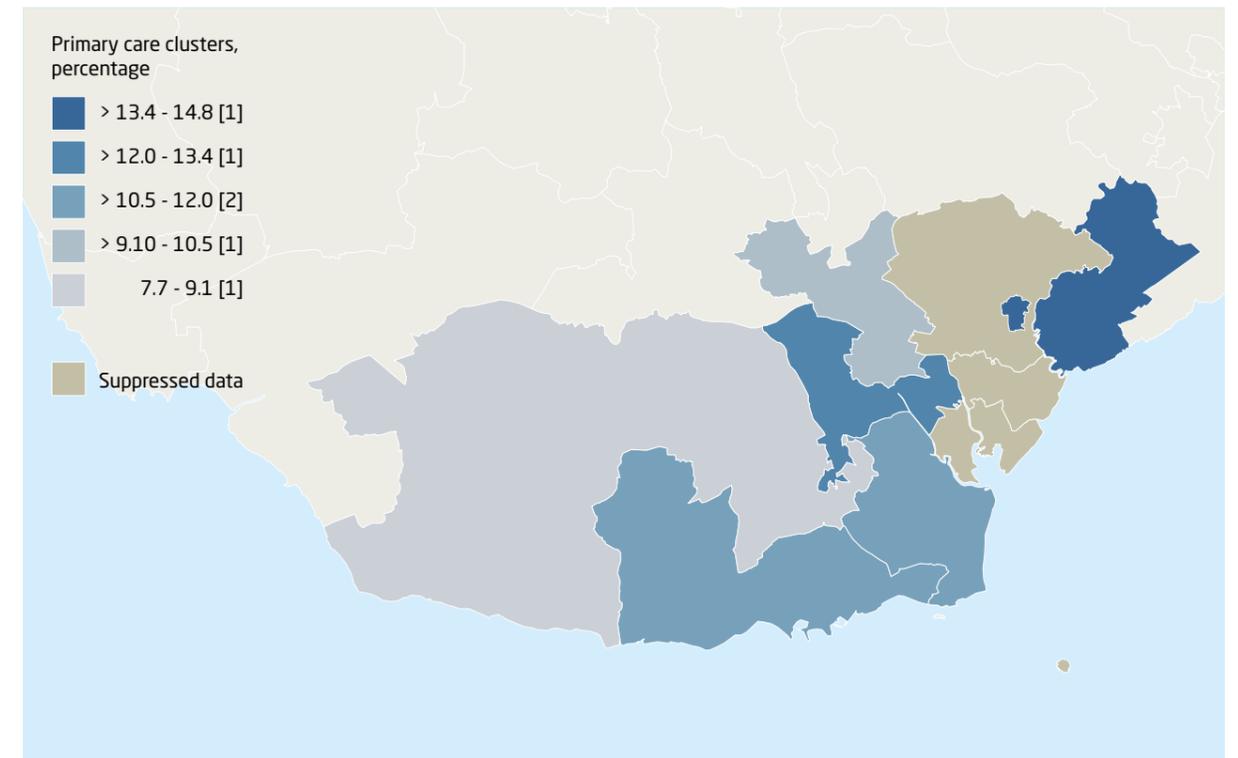


Produced by Public Health Wales Observatory, using CMP data (DHCW) and WIMD 2019 (2019)
 *Reporting of the Child Measurement Programme has been severely affected due to the COVID-19 pandemic.
 The patterned area on the chart signifies where data was not available for that period.

Primary Care Clusters

For those primary care clusters with adequate coverage the proportion of children with obesity varied, as shown in the heat map (Figure 17), with a range from 7.7% (95%CI 5.1-11.5) in Western Vale to 14.8% (95%CI 12.0-18.2) in Cardiff East. This difference was statistically significant.

Figure 17 Percentage of children aged 4 to 5 years who are obese, Cardiff and Vale UHB, Child Measurement Programme 2021/22*



Primary care clusters as of October 2021
 Produced by Public Health Wales Observatory, using CMP data (DHCW) Contains National Statistics data © Crown copyright and database right 2023. Contains OS data © Crown copyright and database right 2023



Aneurin Bevan University Health Board

The overall participation proportion was 93.7% across ABUHB, slightly higher than the 90.5% achieved last year. There were 127 (1.9%) children that opted out of the programme. The participation proportion breakdown by LA regions were: Caerphilly 93.4%, Blaenau Gwent 96.6%; Torfaen 95%; Monmouthshire 91.2%; Newport 93.2%. All LA regions reported higher participation rates compared with 2020-2021.

Underweight and Healthy Weight

The numbers of children categorised as experiencing underweight were small and represented 0.9% (95%CI 0.7-1.2) of the cohort. This proportion was similar to the 2018/19 data, and to the proportion of 0.8% (95%CI 0.6 to 1.0) observed last year.

The proportion of children categorised as healthy weight was 73.2% (95%CI 72.1-74.3). This is significantly higher than the proportion of 66.7% (95%CI 65.5 to 67.9) observed last year. This result is now similar to the pre-pandemic proportion of 73.9% (95%CI 72.8 to 74.9) observed in 2018/2019.

Overweight not obese

The proportion of children categorised as experiencing 'overweight not obesity' was 12.9% (95%CI 12.1-13.8). This result was slightly lower than the proportion of 14.2% (95%CI 13.3 to 15.1) observed last year, and the proportion of 13.7% (95%CI 12.9 to 14.5) reported for 2018/19.

Obese

The proportion of children categorised as having obesity was 12.9 (95%CI 12.1-13.8). This is a significant reduction compared with the proportion of 18.3% (95%CI 17.4 to 19.3) observed last year. The result this year remains slightly higher than the pre pandemic proportion of 11.8% (95%CI 11.0 to 12.6) reported in 2018/19.

Gender

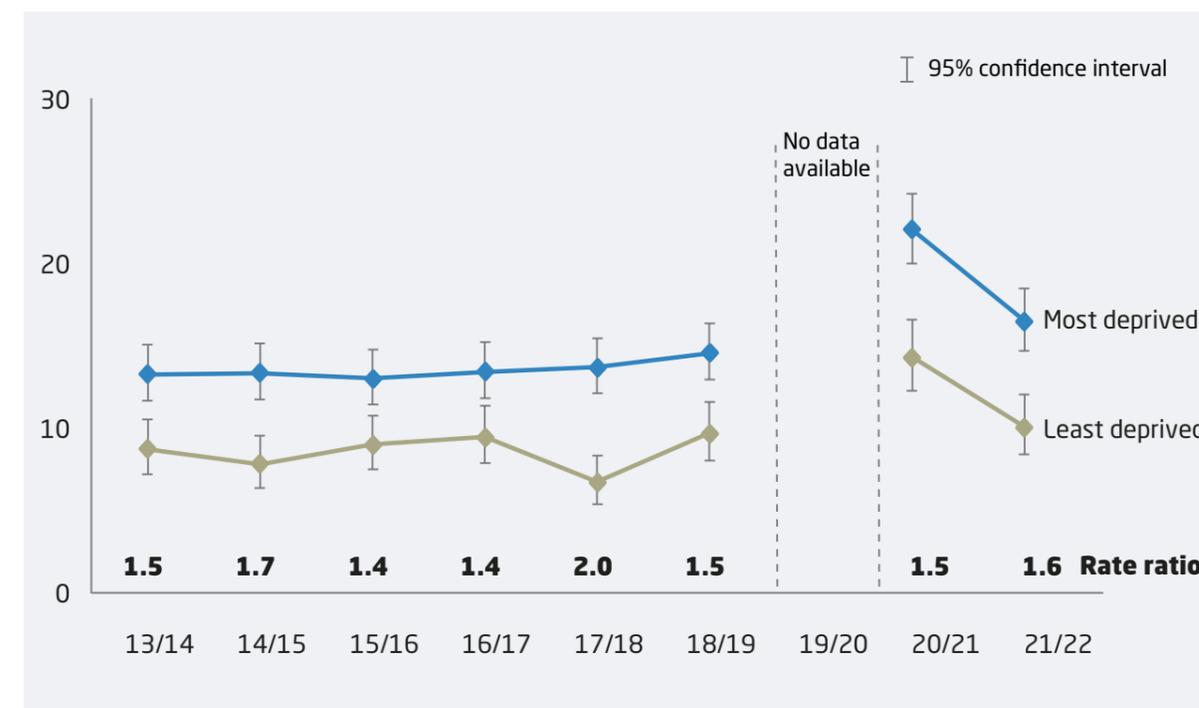
The proportions across all weight measurement categories were similar for boys and girls at LHB level, and at LA level for the comparisons with sufficient numbers of children.

Deprivation

At Health Board level the proportion of children with obesity in the least and most deprived quintiles was lower than reported last year for 2020-2021. However, there remained a statistically significantly higher proportion categorised as having obesity in the most deprived quintile (16.5%, 95%CI 14.7-18.5) compared with the least deprived (10.1%, 95%CI 8.4-12). A similar pattern was noted for the LA regions. The proportions of children with obesity in the least deprived versus the most deprived quintiles over time are shown in Figure 18. The rate ratio provides a relative estimate for the gap between the least and most deprived quintiles. There is some variation in gap over time, however, it does not appear that this gap has widened since the pandemic. The proportion with obesity in the most deprived quintile had reduced significantly in the 2021-2022 period compared with that observed last year at 21.1% (95%CI 19.3-23.0). It was also noted that the proportion with obesity in the least deprived quintile in 2021-2022 was lower than the proportion reported the previous year at 13.2% (95%CI 11.1-15.6).



Figure 18 Percentage of children aged 4 to 5 years who are obese, Child Measurement Programme, Aneurin Bevan UHB by most and least deprivation fifth, 2013/14 - 2021/22*

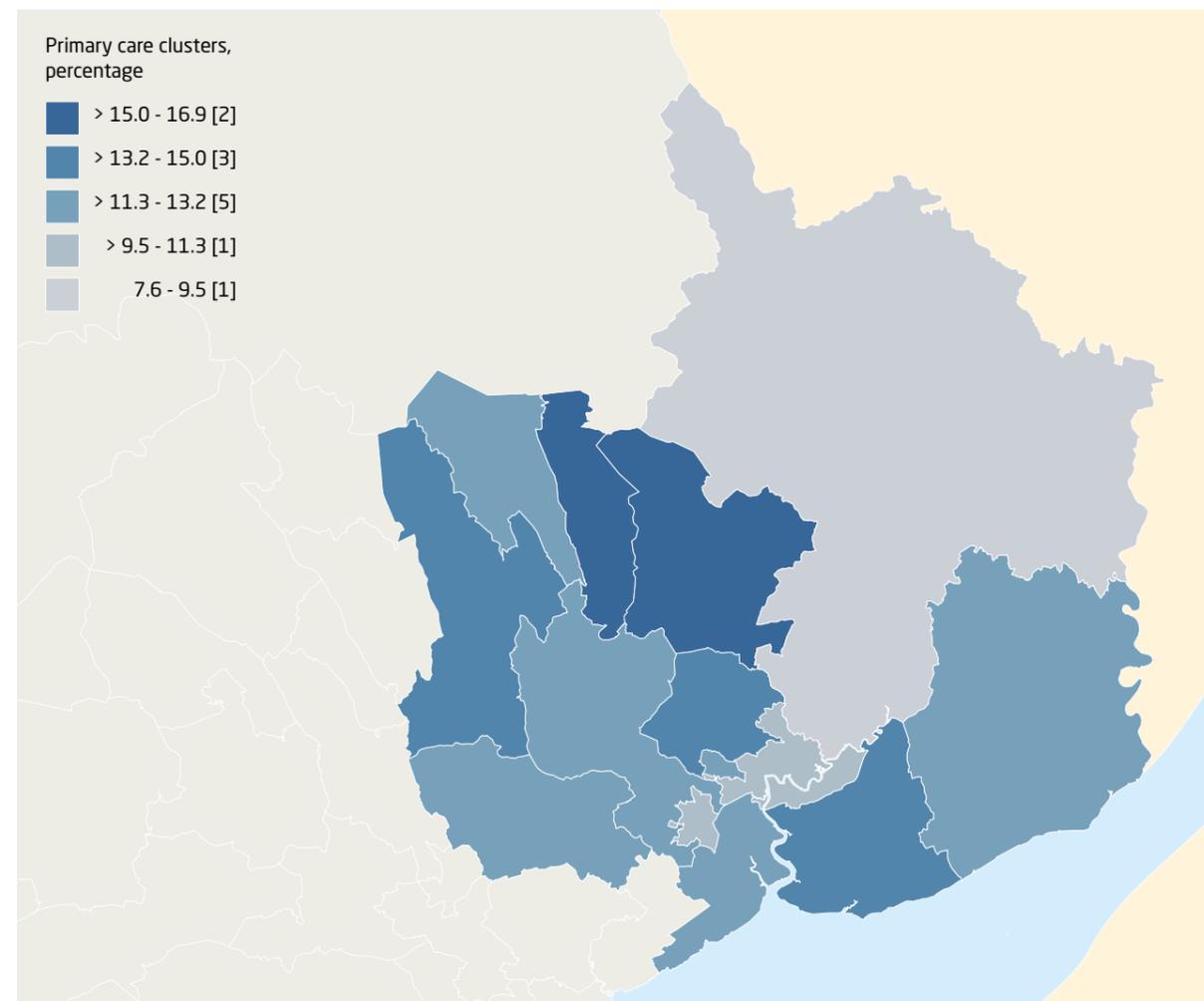


Produced by Public Health Wales Observatory, using CMP data (DHCW) and WIMD 2019 (2019)
 *Reporting of the Child Measurement Programme has been severely affected due to the COVID-19 pandemic. The patterned area on the chart signifies where data was not available for that period.

Primary Care Clusters

The proportion of children with obesity varied across primary care clusters, as shown in the heat map (Figure 19) with a range from 7.6% (95%CI 5.4-10.7) in Monmouthshire North to 16.9% (95%CI 13.1-21.5) in Blaenau Gwent East. This was a statistically significant difference.

Figure 19 Percentage of children aged 4 to 5 years who are obese, Aneurin Bevan UHB, Child Measurement Programme 2021/22*



Primary care clusters as of October 2021
Produced by Public Health Wales Observatory, using CMP data (DHCW) Contains National Statistics data © Crown copyright and database right 2023. Contains OS data © Crown copyright and database right 2023

More information

This report provides a summary of the analysis of the child measurements taken for the Child Measurement Programme in Wales. More comprehensive information displayed as tables can be found on our website at Child Measurement Programme NHS Wales. For specific enquiries beyond what is available online the team can be contacted via e-mail at publichealth.cmp@wales.nhs.uk.

For more information about tackling childhood obesity please go to the Public Health Wales Health Improvement website at: www.everychildwales.co.uk and follow the link to the "10 steps to a healthy weight" information.



References

Altman DG et al (2000) Statistics with confidence. 2nd ed. BMJ Books: London. pp46.

Dinsdale H, Ridler C and Ellis LJ (2011) A simple guide to classifying body mass index in children. Oxford: National Obesity Observatory.

Keys A et al (1972) Indices of relative weight and obesity. J Chronic Dis 25:329-43.

Welsh Government. StatsWales: WIMD 2019. Available from: <https://statswales.gov.wales/Catalogue/Community-Safety-and-Social-Inclusion/Welsh-Index-of-Multiple-Deprivation/WIMD-2019>.



Appendix 1: Representativeness Testing

Background

The Child Measurement Program participation was lower for 2021/2022 compared with pre pandemic participation. In 2018/19, prior to the COVID-19 pandemic, participation rates were around 93%. The participation rates for 2021/22 were lower at 71%. Although much of the missing measurement data was in Cwm Taf Morgannwg University Health Board, participation was more variable than previously in many areas. Nine Primary Care Clusters (PCCs) had participation under 70%.

It was, therefore, noted that representativeness of the data should be further explored in order to:

- Describe population-representativeness at PCC level (the lowest geographical level for drilled down reporting for the 2021/22 data).
- Apply weighting approaches to quantify the impact (if any) of non-participation on PCC level results.

Methods

Z-tests for proportions were used to test whether the proportion of each gender, WIMD quintile, ethnicity or rural/urban was equal between measured and unmeasured participants in each PCC. Fisher's exact tests were used where the chi-squared approximation was likely invalid (due to small counts). The significance level was set at 0.05 by convention, with p-values below 0.05 indicating evidence that the proportion in that group differed between respondents and non-respondents. No correction for multiple testing was applied. To further assess the extent of non-representativeness, non-participation was modelled dependent on gender, deprivation fifth, ethnicity, rural/urban and PCC in a logistic regression model across all PCCs in the included Local Health Boards.

To assess impact of non-representativeness on PCC level results, weighting approaches were used. Several approaches to generating weights were used and are summarised in Table 1. Proportions underweight, healthy weight, healthy weight or underweight, overweight, obese, and overweight or obese were generated with each approach.

Table 1 Summary of weighting approaches used.

Approach	Description	Variables
1. LR weights (gender, deprivation, ethnicity, rural/urban)	Logistic regression used to estimate probability of measurement participation; inverse probability used as weight.	gender, deprivation quintile, ethnicity, rural/urban.
2. LR weights (gender, deprivation, ethnicity, rural/urban, HB)	Logistic regression used to estimate probability of measurement participation; inverse probability used as weight.	gender, deprivation quintile, ethnicity, rural/urban, Health Board.
3. LR weights (gender, deprivation, ethnicity, rural/urban, PCC)	Logistic regression used to estimate probability of measurement participation; inverse probability used as weight.	gender, deprivation quintile, ethnicity, rural/urban, Primary Care Cluster.
4. Post stratified (gender, deprivation)	Poststratification: cells (based on variable combinations) weighted by population frequency divided by sample frequency.	gender, deprivation quintile.
5. Post stratified (gender, deprivation, LHB)	Poststratification: cells (based on variable combinations) weighted by population frequency divided by sample frequency.	gender, deprivation quintile, Health Board.
6. Post stratified (gender, deprivation, PCC)	Poststratification: cells (based on variable combinations) weighted by population frequency divided by sample frequency.	gender, deprivation quintile, Primary Care Cluster.
7. Post stratified (gender, deprivation, PCC, ethnicity*)	Poststratification: cells (based on variable combinations) weighted by population frequency divided by sample frequency. To avoid small cells, ethnicity only used in PCCs with >20% ethnicities other than "White", "Not known", and grouped as "White", "Named ethnicities other than white", "Not known".	gender, deprivation quintile, Primary Care Cluster, ethnicity (broad groups) in some clusters.

To further validate this approach, data from 2018/19 were used. Two scenarios were considered, with dropout simulated accordingly: an extreme non-representativeness scenario, and a "2021/22-like" scenario. Results using weighting in "simulated dropout" data over 1,000 simulations were then compared to the true 2018/19 data.

Results

Overall, the data from 2021/22 showed modest evidence of non-representativeness at the PCC level. Without adjustment for multiple testing, 26 (out of 53 PCCs) showed evidence of non-representativeness for at least one gender,

deprivation, ethnicity or rural/urban group (3 sex, 16 deprivation, 13 ethnicity, 7 rural/urban) at the 5% level. Multivariable-adjusted Odds Ratios (ORs) for non-participation across all included LHBs are shown in Table 2. Many ORs differ significantly from 1, but mostly relatively modestly so (to interpret magnitude: an OR of 1.5 with 10% non-participation in the baseline group would mean 14% non-participation in the comparator group).

Table 2 Odds Ratios for non-participation associated with different characteristics. Note model was also adjusted for Primary Care Cluster (estimates not shown).

Group	OR for non-participation (95% CI)
Sex (ref: Female)	
Male	1.13 (1.06, 1.21)
Deprivation (ref: Least deprived fifth)	
Second least deprived fifth	0.91 (0.80, 1.03)
Middle fifth	1.24 (1.10, 1.40)
Second most deprived fifth	1.26 (1.11, 1.43)
Most deprived fifth	1.37 (1.21, 1.56)
Rural/Urban (ref: Rural)	
Urban	1.03 (0.92, 1.15)
Ethnic group (ref: White)	
Asian or Asian British	1.21 (0.99, 1.48)
Black, Black British, Caribbean or African	1.64 (1.22, 2.20)
Mixed or multiple ethnic groups	1.01 (0.83, 1.23)
Not known	1.34 (1.23, 1.45)
Another ethnic group	1.18 (0.85, 1.62)

Consistent with modest non-representativeness, impact of weighting was generally modest. Proportion underweight, normal weight, overweight, obese, and overweight or obese by PCC were compared under different weighting approaches. There were only two PCCs in which any weighted result differed from the unweighted result by more than 1 percentage point. These were in Central Wrexham and City & Cardiff South, both of which fell below the 70% participation threshold for reporting disaggregated results at PCC level.

In simulation analyses, weighting approaches were effective at decreasing bias (although they did increase variance) of estimates under extreme non-representativeness scenarios, however, did not have a major impact in the "2021/22-like" scenario.

Conclusion

Based on these results, non-representativeness at PCC level was likely to only have a minimal impact on results. Therefore, it was appropriate to report raw (unweighted) results for the Primary Care Clusters.