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Contents

i. Abbreviations.....	4
ii. List of figures.....	5
iii. Key Findings.....	6
iv. Summary of key findings.....	8
1. Introduction.....	9
2. The National Child Measurement Programme dataset.....	10
3. Methods.....	11
4. Changing in children’s body mass index at population level.....	12
5. Changes in health inequalities within child obesity.....	18
6. Changes in child obesity prevalence by ethnic group.....	23
7. Conclusions.....	27
8. References.....	32
9. Reader information.....	33

i. Abbreviations

BMI	Body mass index
HSE	Health Survey for England
IMD	Index of Multiple Deprivation
LSOA	Lower Super Output Area
NCMP	National Child Measurement Programme
NHS IC	The National Health Service Information Centre for health and social care
NOO	National Obesity Observatory
SDS	Standard deviation score
SII	Slope index of inequality
UK90	British 1990 growth reference

ii. List of figures

Figure number	Figure description	Page number
Figure 1a:	Number of children measured by year of measurement, school year, and sex	10
Figure 1b:	Participation rate by year of measurement and school year	10
Figure 2:	Prevalence of obesity by year of measurement, school year, and sex	13
Figure 3:	Mean BMI z score by year of measurement, school year, and sex	14
Figures 4a–d:	Change in mean BMI z score since 1990, by twentile of BMI distribution, year of measurement, school year, and sex	16–17
Figure 5:	Index of Multiple Deprivation 2010 deciles of LSOAs in England	19
Figures 6a–d:	Prevalence of obesity by Index of Multiple Deprivation 2010 decile, year of measurement, school year, and sex	20–21
Figure 7:	Change in the slope index of inequality for obesity and deprivation by year of measurement, school year, and sex	22
Figures 8a–d:	Prevalence of obesity by ethnic group, year of measurement, school year, and sex	25–26

iii. Key findings

This report presents analysis of the first four years of National Child Measurement Programme (NCMP) data, and highlights any statistically significant differences that can be detected across survey years in the body mass index (BMI) of English children aged 4–5 and 10–11 years.

It provides an update on the analysis presented last year. Prevalence of obesity and mean BMI (adjusted for age) have been used to summarise the BMI of the child population by school year and sex. Analysis has also been conducted to examine change across the BMI distribution, by level of socioeconomic deprivation, and by ethnic group.

Changes in prevalence of obesity

There was a small but significant increase in obesity prevalence between 2008/09 and 2009/10 for both boys and girls in both school years. As a result of a more detailed analysis than has been undertaken previously with the 2009/10 data, this is the first time that statistically significant year on year increases have been seen across all age and sex groups within NCMP data.

Data from previous years of the NCMP have not shown signs of increasing obesity prevalence, and prevalence appeared to be decreasing for boys in Reception based on 2008/09 data. Obesity prevalence appeared to rise for children in Year 6 between 2006/07 and 2007/08, but this is thought to have resulted from the large improvements in participation and data quality over this time.

Changes in data quality and participation between 2008/09 and 2009/10 were small, and it seems unlikely that these could explain increases in obesity prevalence on the scale observed – there has been a 0.5% increase in prevalence over one year for girls in Year 6. However this possibility cannot be ruled out entirely. In addition, an assessment of the long term trajectory of child obesity prevalence cannot be made based on the change between two years of measurements.

Changes in mean BMI for age

Mean BMI has shown a more consistent pattern of increase over time within the NCMP dataset, and the 2009/10 measurements appear to confirm that mean BMI is rising among English children of the age groups covered by the NCMP.

The NCMP data suggest that mean BMI has increased by around one BMI centile since 2007/08 across the age and sex groups covered by the NCMP.

Changes in the distribution of children's BMI

The increase in mean BMI since 2008/09 is spread fairly evenly across the child population. However, over the whole period covered by the NCMP there have been greater increases in mean BMI among children whose BMI would be considered healthy than among children who would be classified as obese.

Analysis of previous NCMP datasets suggested that the BMI among the most obese children in Year 6 was staying constant, and possibly decreasing among the most obese children in Reception. However the 2009/10 data show increases in BMI even among the most obese children measured in all age and sex groups.

Changes in health inequalities

NCMP data suggest health inequalities among boys in Reception and girls in Year 6 are widening.

There is no evidence of health inequalities either widening or narrowing for girls in Reception or boys in Year 6. However, substantial health inequalities persist among these groups. Obesity prevalence among children who live in the most deprived areas is roughly twice that of children living in the least deprived areas.

Changes in obesity prevalence by ethnic group

The increases in obesity prevalence observed at national level do not seem to be limited to specific ethnic groups. There were some significant increases in obesity prevalence for certain ethnic groups between 2008/09 and 2009/10 but these do not show a consistent pattern by age and sex.

When all years of NCMP measurements are considered the Bangladeshi ethnic group seems to have shown the greatest increases over time. Children in the White Other ethnic group appear to be experiencing a decrease in obesity prevalence.

Important caveats

The surveillance approach used to collect NCMP data results in a sample of child measurements that cannot easily be controlled to ensure it is consistent and representative. Factors such as levels of participation and changes in data quality have previously been demonstrated to have an effect on statistics such as the reported obesity prevalence at national level. It is therefore very important to exercise caution when interpreting any findings based on NCMP data.

Between 2007/08 and 2009/10 the changes in levels of NCMP participation and data quality appear to be small. Although it seems unlikely that the changes observed in child BMI over this time can be entirely attributed to changes in participation or data quality, further investigation is needed before this can be ruled out.

Conclusions

Although we cannot be certain that the changes seen in NCMP data reflect real changes among the underlying population, they are cause for some concern. The fairly consistent pattern of increases, and a lack of apparent decreases, regardless of the method of analysis, certainly suggests that high BMI among English children is not reducing in frequency.

In order to achieve a reduction in obesity prevalence among children a particular focus on deprived groups may be required. This would help tackle persistent health inequalities. Children from the Bangladeshi ethnic group may benefit from particular attention, given the evidence that obesity prevalence is increasing for these children at a greater rate than for other ethnic groups. However, in order to tackle the trend in rising mean BMI across the BMI distribution some forms of interventions may need to be aimed across the whole child population, rather than just focussed on the most obese children.

iv. Summary of key findings

	Reception		Year 6	
	Boys	Girls	Boys	Girls
Changes in prevalence of obesity	Significant increase since 2008/09. This contrasts with the pattern of decreases observed over previous years.	Significant increase since 2008/09. There was no consistent pattern over previous years.	Significant increase since 2008/09. Between 2007/08 and 2008/09 prevalence had remained constant.	Significant increase since 2008/09. Between 2007/08 and 2008/09 prevalence had remained constant.
Changes in mean BMI for age	Significant increase since 2008/09 – the second year of significant increases.	Significant increase since 2008/09 – the second year of significant increases.	Significant increase since 2008/09 – as seen in all previous years.	Significant increase since 2008/09. Between 2007/08 and 2008/09 mean BMI had remained constant.
Changes in the BMI distribution	Increases in BMI across the whole child population since 2008/09 – including the most obese 20% of boys, among whom BMI appeared to be decreasing in previous years.	Increases in BMI across the whole child population since 2008/09 – including the most obese 5% of girls, among whom BMI appeared to be decreasing in previous years.	Increases in BMI across the whole child population since 2008/09 – including the most obese 20% of boys, among whom BMI appeared to be stable in previous years.	Increases in BMI across the whole child population since 2008/09 – including the most obese 70% of girls, among whom BMI appeared to be stable in previous years.
Changes in health inequalities	No change since 2008/09, although there is a pattern of widening health inequalities over time.	No significant change over time.	No significant change over time.	No change since 2008/09, although there is a pattern of widening health inequalities over time.
Changes in obesity prevalence by ethnic group	Year on year changes are inconclusive. However assessed over four years obesity prevalence among Bangladeshi children seems to have increased more than for other ethnic groups, and decreased among children from the White Other ethnic group.			

1. Introduction

The National Child Measurement Programme (NCMP) is an annual programme that measures the height and weight of children aged 4–5 years (Reception) and 10–11 years (Year 6). The 2009/10 NCMP was the fourth year of this system of national child measurement in England.

This report provides an update of the analysis first presented by the National Obesity Observatory (NOO) in the report 'Changes in children's body mass index between 2006/07 and 2008/09'.¹ That report was the first in-depth investigation into trends in the NCMP data and it is important to continue to monitor these trends.

This report employs the same approaches as used previously. It examines changes in obesity prevalence, mean BMI, and the distribution of BMI by age and sex, as well as looking at whether obesity prevalence has changed differently for different socioeconomic and ethnic groups.

2. The National Child Measurement Programme dataset

The 2009/10 NCMP dataset contains the largest number of child measurements collected to date by the programme, with a total of 1,026,368 children measured. Participation in the NCMP was 91.4% in 2009/10, the highest achieved to date. Figure 1a shows the number of children measured by the NCMP by school year, sex and year of measurement. Figure 1b shows the increases in participation in the NCMP for each year of measurement by school year.

Figure 1a: Number of children measured by year of measurement, school year, and sex

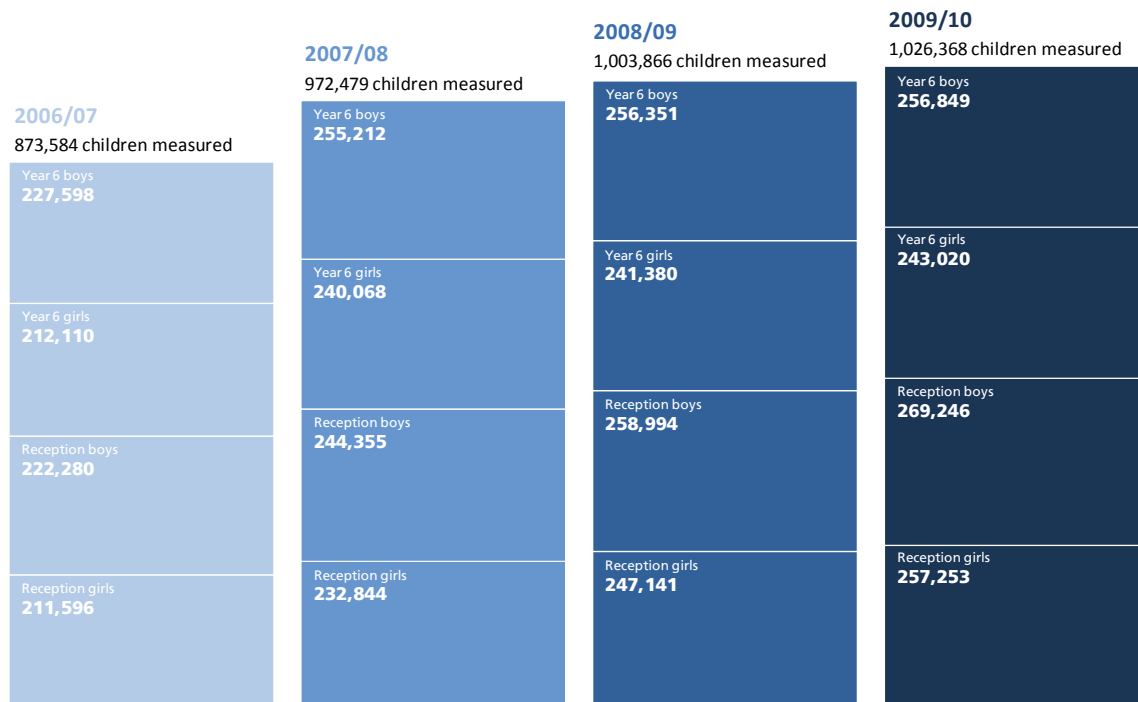
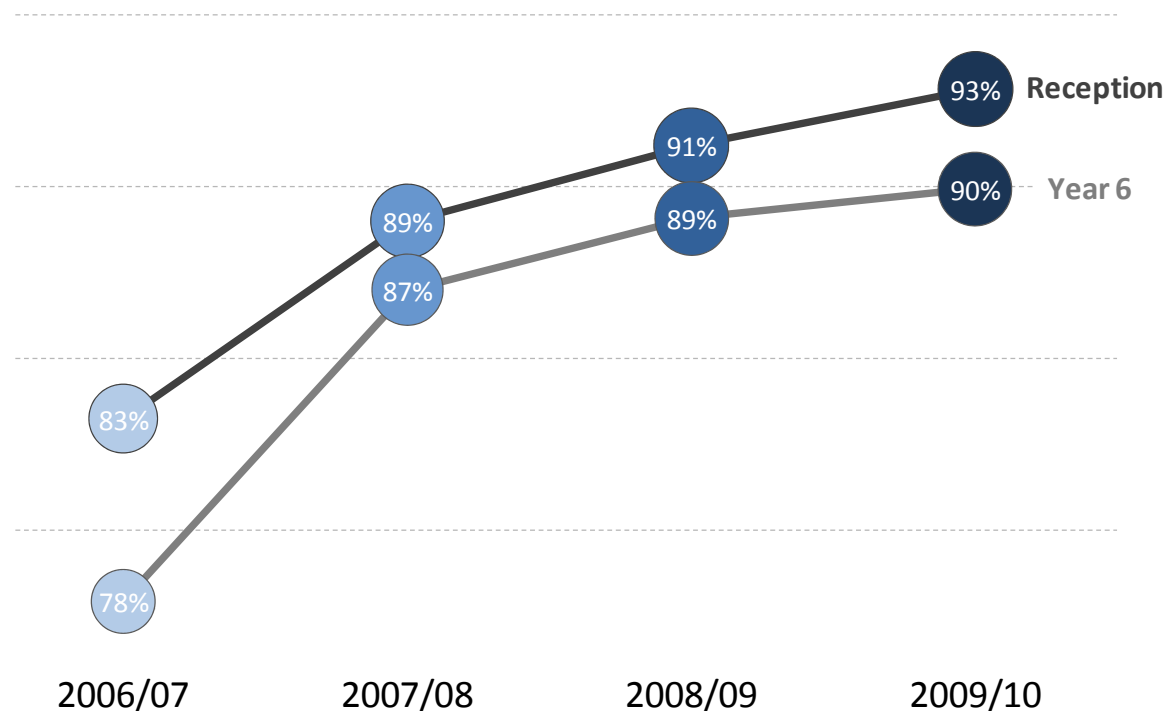


Figure 1b: Participation rate by year of measurement and school year



3. Methods

This report is based on the NCMP datasets for the four years 2006/07, 2007/08, 2008/09, and 2009/10.

Since the previous edition of this report was published in June 2010, The NHS Information Centre for health and social care (NHS IC) has undertaken additional extensive data cleaning on the older NCMP datasets. This cleaning has included the deletion of a number of suspected duplicate records, as well as improved coding of some data fields. As a result all the analysis within this report has been re-run to use the latest, and most accurate, data available. The resulting changes to the data previously reported are small and do not affect the overall pattern already presented for the 2006/07 to 2008/09 period.

Only data for pupils attending state-maintained schools have been included in the analysis, as only a very small proportion of independent and special schools are covered in the NCMP datasets. For consistency over time and between areas, these records have been excluded from the analysis for this and previous reports.

The number of valid records remaining after data cleaning by the NHS IC for the four years of measurement is shown in Figure 1a, broken down by school year and sex. The whole sample for each survey year has been used for the analyses presented, unless specified otherwise in the text.

In this analysis children with a BMI greater than or equal to the 95th centile of the British 1990 growth reference (UK90)² BMI distribution have been classified as obese. This definition is the most commonly used for child obesity prevalence figures in England, for example in most published Health Survey for England (HSE) and NCMP analyses.

Any statistically significant differences reported between population groups or between years of NCMP measurement have been tested to a 95% significance level using the techniques recommended by Altman et al.³ It is important to note that a statistically significant difference may exist between two values, even where 95% confidence limits appear to overlap on the charts shown.

The slope index of inequality (SII), and associated confidence limits (Figure 7), were calculated using weighted linear regression within PASW Statistics 18 (SPSS). All other analyses were conducted using Microsoft Access or Excel.

4. Changes in children's BMI at population level

- Obesity prevalence has shown a small but statistically significant increase for all age and sex groups for the first time since NCMP measurements began.
- This contrasts with the pattern of stable, or decreasing, prevalence seen between 2007/08 and 2008/09.
- Mean BMI has continued to increase, and appears to be doing so for all age and sex groups.
- The current child population as a whole has a mean BMI around one BMI centile higher than the population in 2007/08.
- The changes in mean BMI between 2008/09 and 2009/10 are spread relatively evenly across the whole child BMI distribution.
- Over the period covered by the NCMP, mean BMI among children in Reception and boys in Year 6 has increased more among children at the lower end of the BMI distribution than among children at the high end. The increase in mean BMI of girls in Year 6 is spread evenly across the whole child BMI distribution over time period covered by the NCMP.

4.1 Change in obesity prevalence

The NHS IC's annual report on the 2009/10 NCMP⁴ contains a comparison between 2009/10 data and data from earlier years. The prevalence of obesity in 2009/10 was slightly higher for children in both Reception and Year 6 compared to 2008/09, although based on this analysis alone these changes were not thought to be large enough to necessarily reflect a real change. As a result the NHS IC concluded that prevalence figures were similar across the two years.

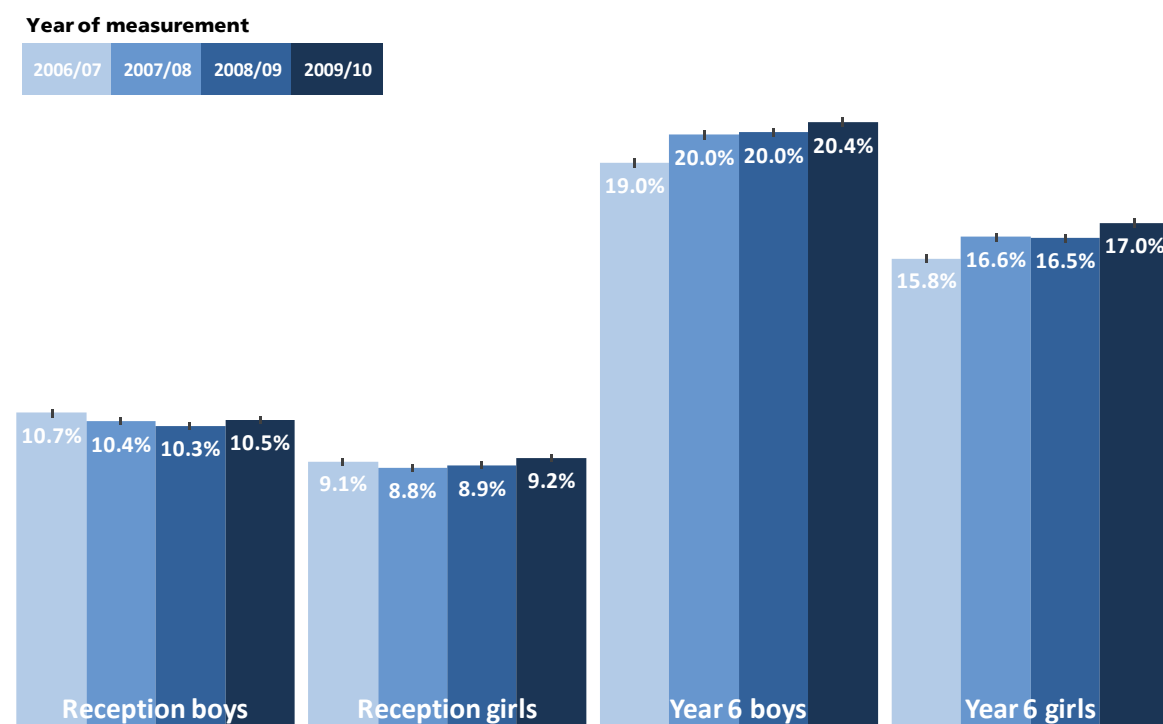
This report provides a more detailed assessment of the trend over time, comparing the change in obesity prevalence by sex as well as by age group. Assessed in this way, the increase in the prevalence of obesity between 2008/09 and 2009/10 can be shown to be small but statistically significant for all four age and sex groups covered by the NCMP. The consistency of the pattern when split by sex does suggest that the increases observed are more likely to reflect a real change.

Obesity prevalence among children in Reception rose by 0.21% (95% confidence limits of 0.04%-0.37%) for boys and 0.25% (0.10%-0.41%) for girls. In Year 6 the increases were 0.34% (0.12%-0.56%) for boys and 0.51% (0.30%-0.72%) for girls.

Although the observed change is, in absolute terms, greater for Year 6 than for Reception, relative to the prevalence of obesity in each age and sex group the increases are of a similar magnitude in each school year. Although the apparent changes in obesity prevalence are larger for girls than for boys, there is no significant difference in the rate of increase by sex.

As Figure 2 shows, such a pattern of consistent significant increases has not previously been observed within the NCMP data. Between 2007/08 and 2008/09 obesity prevalence appeared to remain constant, which was consistent with the findings of other surveys, such as the Health Survey for England, which showed the rise in child obesity prevalence to have levelled off.⁵ Between 2006/07 and 2007/08 there was a significant increase in the reported obesity prevalence for children in Year 6, but previous analysis has suggested that the apparent rise may have resulted from the substantial increase in both participation and data quality in the NCMP between these years.⁶

Figure 2: Prevalence of obesity (with 95% confidence limits) by year of measurement, school year, and sex



4.2 Change in mean BMI for age

Mean BMI z scoreⁱ provides an alternative summary measure of BMI across the child population. Children’s BMI changes with age, and so use of the BMI z score rather than actual BMI values will adjust for any small differences in the age of children between samples.

One advantage of examining the mean BMI of the child population, rather than only examining the prevalence of obesity, is that this measure takes account of the BMI of all children measured. It can therefore pick up changes in the BMI of children who are under the threshold for obesity.

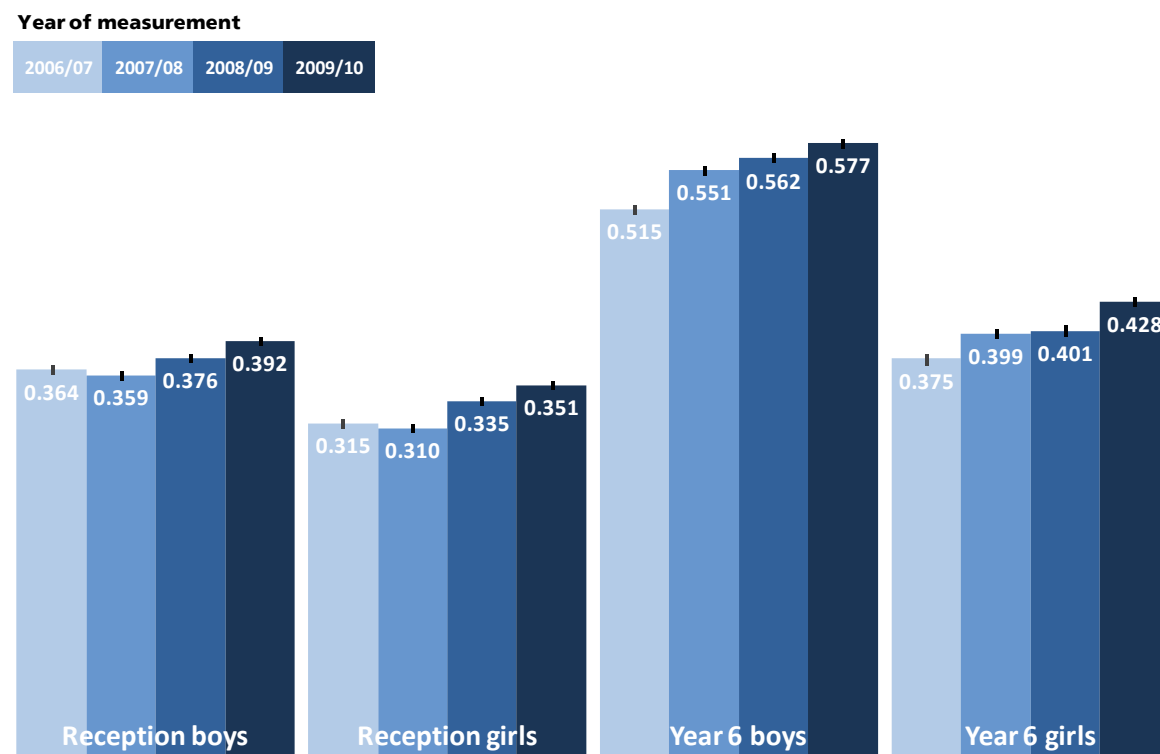
As with obesity prevalence, Figure 3 shows that mean BMI z score also increased for all age and sex groups between 2008/09 and 2009/10. A pattern of increases was also observed between 2007/08 and 2008/09 for boys and girls in Reception as well as boys in Year 6. The 2009/10 data show that these increases now also affect the older girls.

The observed changes in mean BMI represent an increase of around one BMI centile across the child population since 2007/08. The mean BMI of girls in Reception was on the 63.7th centile of the UK90 BMI reference in 2009/10, compared to the 62.2nd centile in 2007/08, an increase of 1.5 centiles. The mean BMI of boys in Reception increased from the 64th centile to the 65.2nd centile, an increase of 1.2 centiles. Girls in Year 6 increased from the 65.5th centile to the 66.6th (1.1 centiles), and boys in Year 6 from the 70.9th to the 71.8th centile over this time (0.9 centiles).

ⁱ BMI adjusted for age and sex, based on the UK90 BMI reference

The mean BMI of the 1990 reference population was on the 50th centile – and so the mean BMI of English children appears to have increased by around 15-20 centiles over a period of 20 years. The increase observed within NCMP data of one centile over a period of two years is slightly below this rate, although not entirely dissimilar in magnitude.

Figure 3: Mean BMI z score (with 95% confidence limits) by year of measurement, school year, and sex



4.3 Changes in child BMI distribution, analysed by twentile

It is possible to use NCMP data to examine how the observed changes in BMI z score are distributed across the population. To enable easier interpretation of changes in the distribution the data have been divided, for each age group and sex, into twenty groups (twentiles) based on the child’s BMI z score. The first twentile contains the 5% of the child population with the lowest BMI for age, and the 20th twentile contains the 5% of the population with the highest BMI for age.

Figures 4a-d show the change in mean BMI z score for each twentile of the population from that in the 1990 baseline population. As these figures show, the increases in BMI z score since 2008/09 were spread fairly evenly across the child population for both boys and girls in both Reception and Year 6.

In Reception year, for both girls and boys, most of the twentiles showed an increase between 2008/09 and 2009/10, with slightly larger increases occurring at the top and bottom of the child BMI distribution. The 2008/09 NCMP data showed a decrease in mean BMI compared to earlier years for the 5% of girls (20th twentile) and 20% of

boysⁱⁱ (17th – 20th percentiles) with the highest BMI among this age group. However the 2009/10 data show an increase within these sections of the child population.

In Year 6 the change in mean BMI since 2008/09 is spread more evenly across the BMI distribution. Only the 5% of boys (1st percentile) with the lowest BMI for age have not shown any increase in mean BMI over this time. There was no change in mean BMI between 2007/08 and 2008/09 for the 20% of Year 6 boys (17th – 20th percentile) and 70% of Year 6 girls (7th – 20th percentile) with the highest BMI, but between 2008/09 and 2009/10 these sections of the child population have shown an increase.

ⁱⁱ The 2008/09 NOO NCMP report noted a decrease among the 25% of boys with highest BMI between 2007/08 and 2008/09. However, as a result of the slight revisions that have been made to NCMP data from earlier years, this figure is now 20%.

Figure 4a: Change in mean BMI z score since 1990, by twentile of BMI distribution and year of measurement; Reception, boys

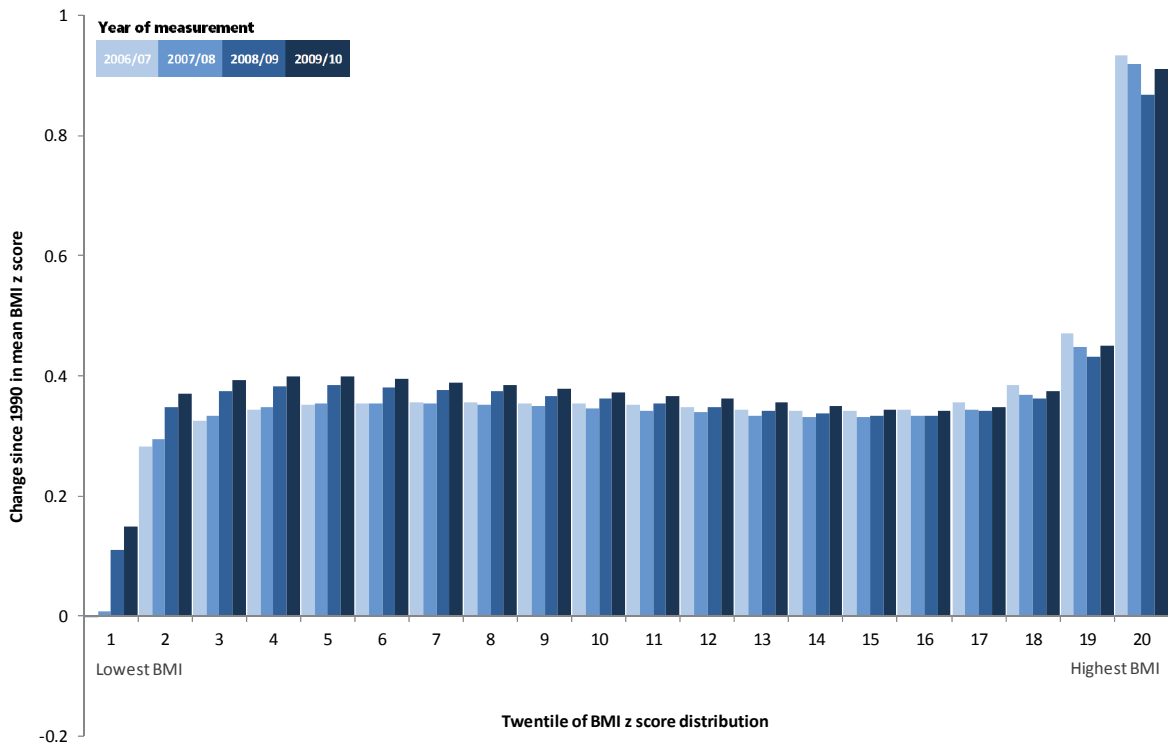


Figure 4b: Change in mean BMI z score since 1990, by twentile of BMI distribution and year of measurement; Reception, girls

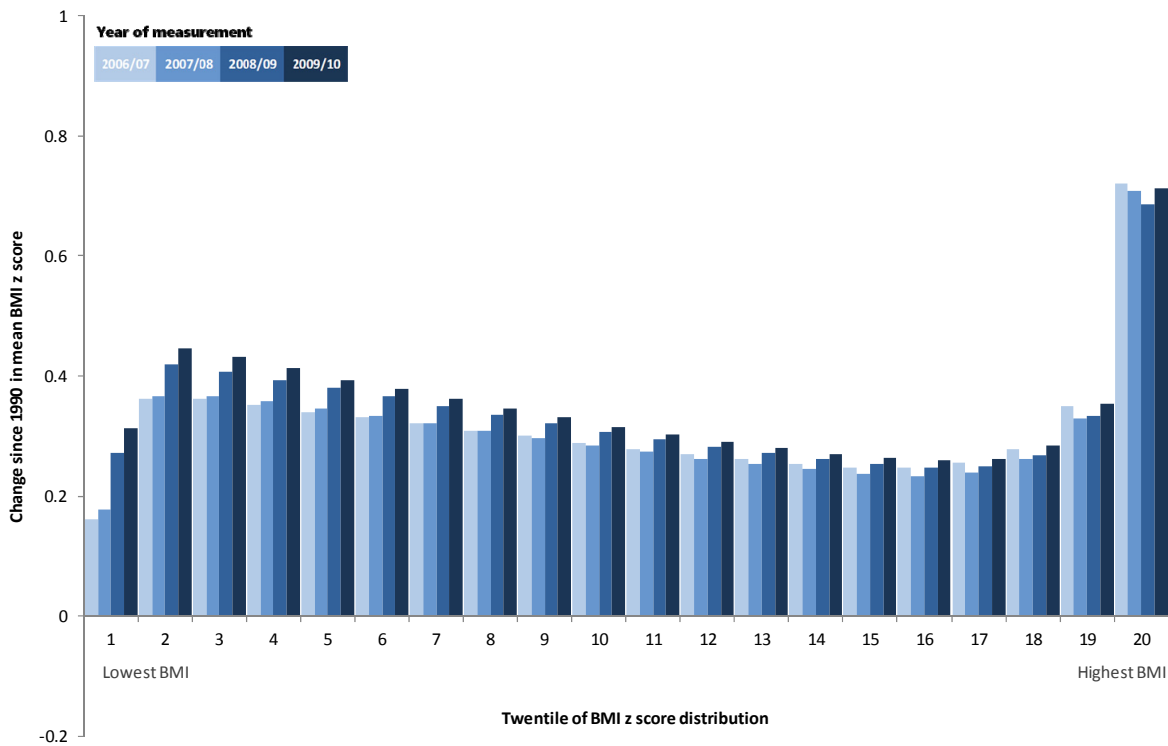


Figure 4c: Change in mean BMI z score since 1990, by twentile of BMI distribution and year of measurement; Year 6, boys

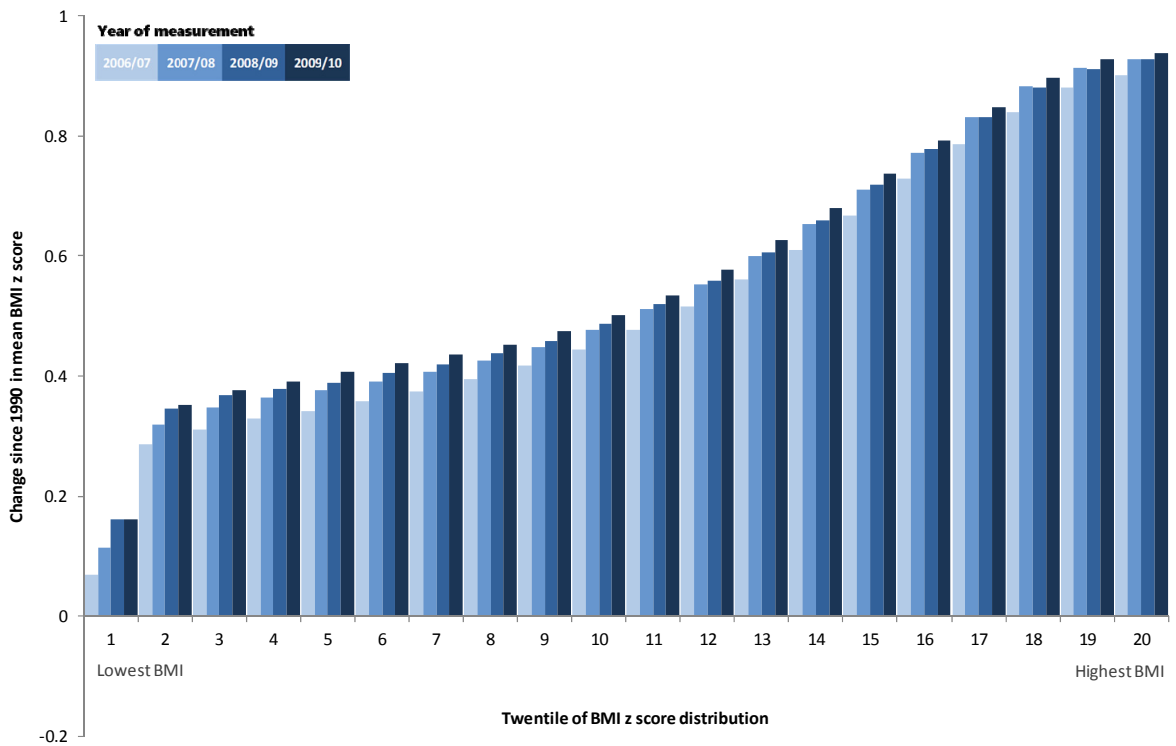
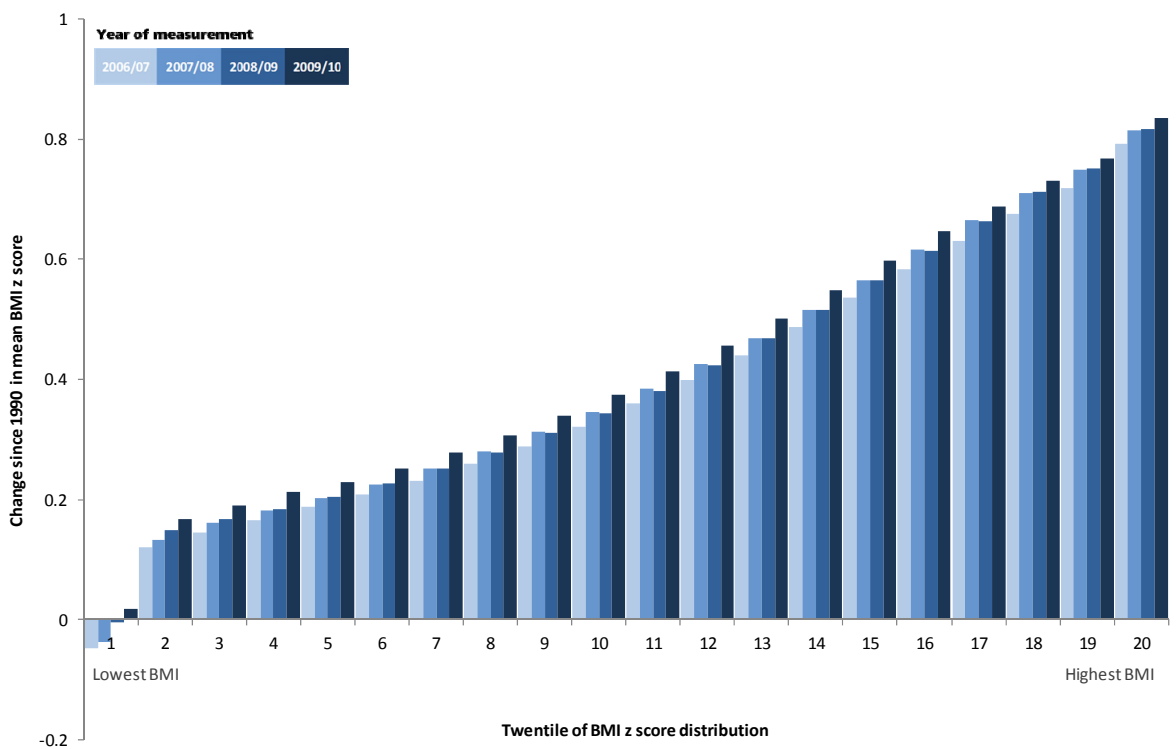


Figure 4d: Change in mean BMI z score since 1990, by twentile of BMI distribution and year of measurement; Year 6, girls



5. Changes in health inequalities within child obesity

- The gap in obesity prevalence between the most and least deprived areas appears to be widening for boys in Reception and girls in Year 6.
- There is no change in this gap for other population groups, but appreciable health inequalities persist within childhood obesity.

5.1 Obesity prevalence and deprivation

Child obesity prevalence shows a close association with socioeconomic deprivation. Obesity prevalence among children living in the most deprived 10% of areas around the country is nearly twice that for children living in the least deprived 10% of areas. Obesity prevalence increases in a near linear fashion between these extremes.

In order to assess how obesity prevalence has changed across socioeconomic groups, the child population has been divided into ten deciles based on the Index of Multiple Deprivation (IMD) 2010 for each child's place of residence.ⁱⁱⁱ In this analysis decile one contains the most deprived 10% of the child population, and decile ten contains the least deprived 10%.

Only children with valid geographical coding have been included in this analysis. The number of records with such coding has increased over the four years of the NCMP. In 2006/07 57% of child records included valid coding for place of residence, increasing to 95% in 2007/08, and 99% in 2008/09 and 2009/10. This increase means the change over time, especially when considering 2006/07 data, must be assessed with caution.

Figure 5 shows the distribution of these deciles across the country. The map shows that the most deprived Lower Super Output Areas (LSOAs) are predominantly found in the North West, North East, Yorkshire and The Humber, and West Midlands. However, all regions of the country have some LSOAs that are classed as being among the most deprived 10% in England.

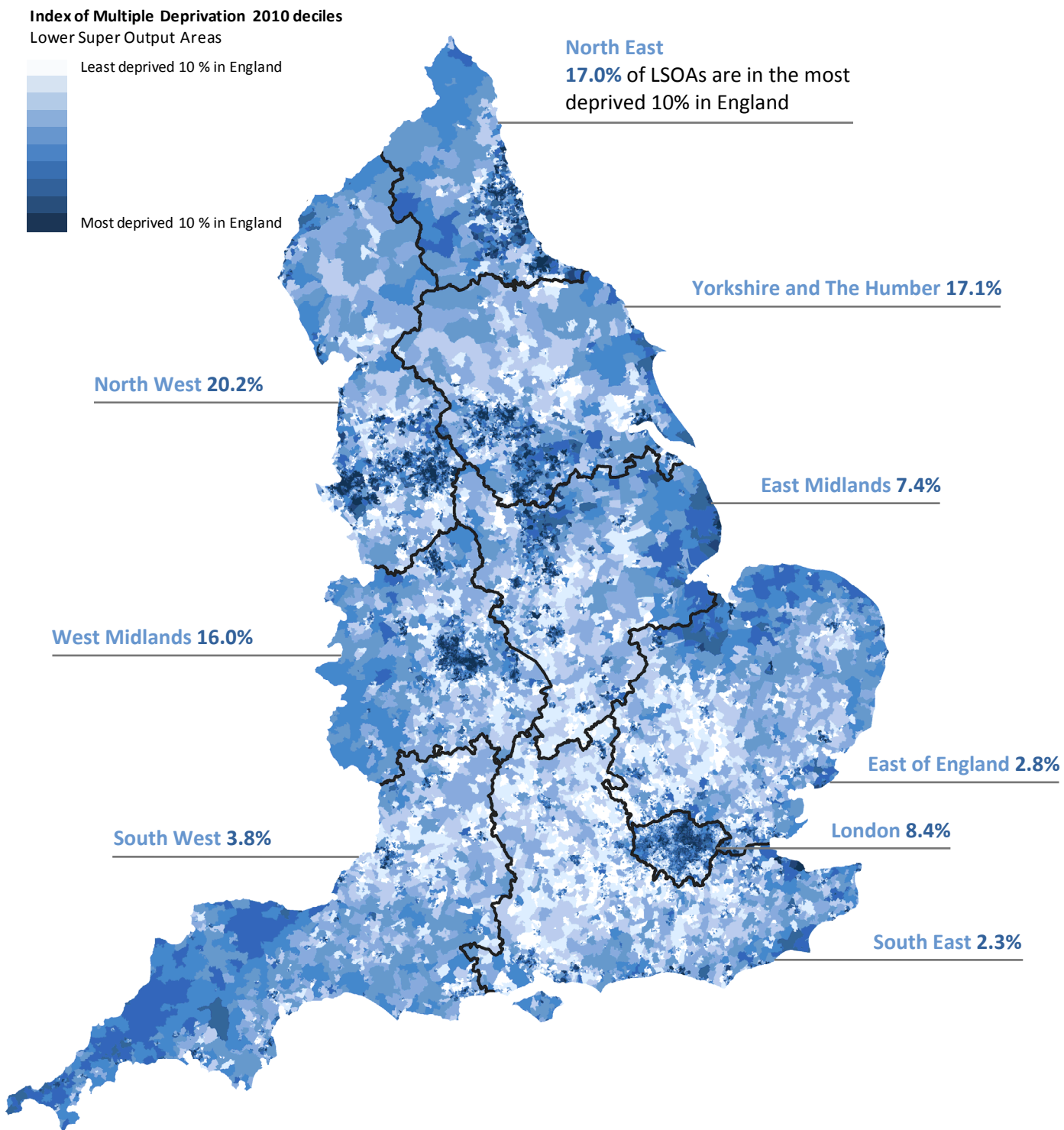
Figure 6 shows the association between obesity prevalence and deprivation by year of NCMP measurement. The dotted lines show the gradient of the 'line of best fit' for each year of measurement. The steeper the gradient of the line, the greater the difference in obesity prevalence between the most and least deprived areas.

No individual decile, for either age group or either sex, shows a statistically significant decrease in obesity prevalence between 2008/09 and 2009/10. Over this period there were significant increases in the Reception year within the first decile for boys and the fourth and ninth deciles for girls. In Year 6 significant increases were seen in the first and fourth deciles for boys and the first, second, sixth and ninth deciles for girls. Although more significant increases have taken place among the most deprived 50% of the population than among the least deprived 50%, this approach does not provide conclusive evidence of any change in health inequalities between 2008/09 and 2009/10.

When assessed over all years of NCMP measurement, there is still no consistent pattern of change over time. Some deciles have shown year on year increases across the years of NCMP measurement, particularly in Year 6, and greater increases appear to have occurred among the more deprived parts of the population. However these observations are again not conclusive, particularly when the data quality issues surrounding 2006/07 data are taken into account.

ⁱⁱⁱ The 2008/09 NOO NCMP report used the IMD 2007 to determine the socioeconomic status of children. As a result of using the IMD 2010 to assign deciles of deprivation some of the figures presented within this section have changed slightly from those shown in the 2008/09 report.

Figure 5: Index of Multiple Deprivation 2010 decile of LSOAs in England



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Figure 6a: Prevalence of obesity (with 95% confidence limits) by IMD 2010 decile and year of measurement: Reception, boys

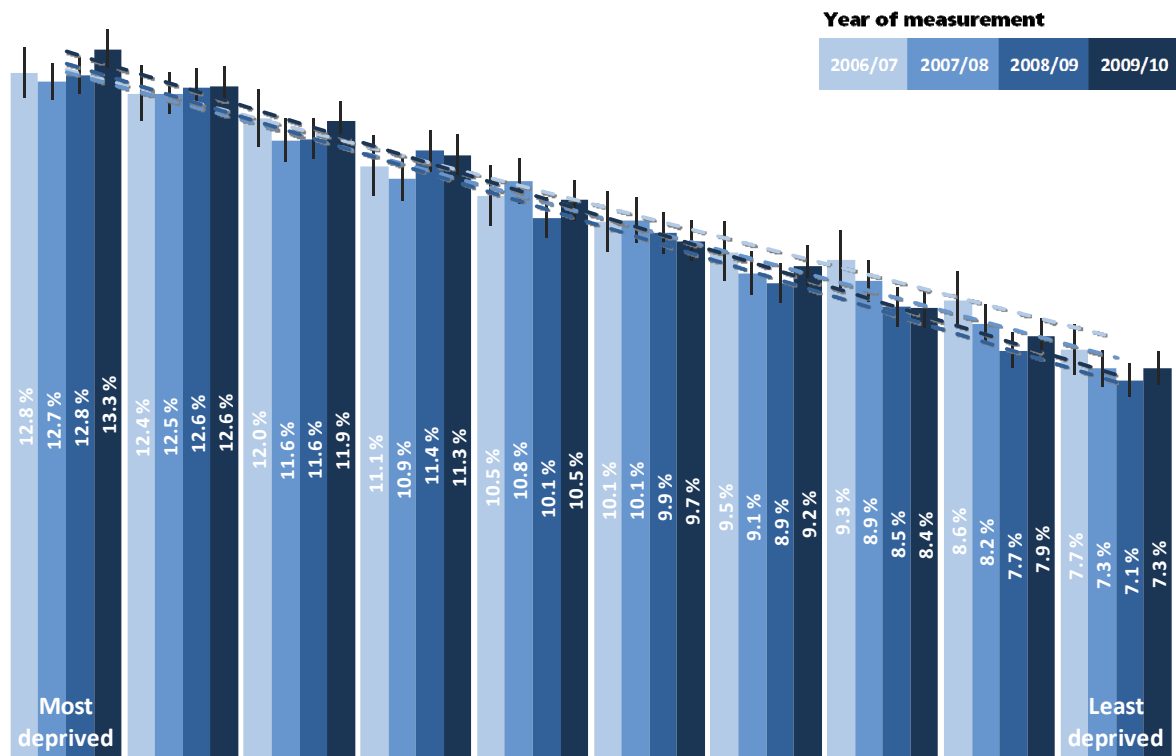


Figure 6b: Prevalence of obesity (with 95% confidence limits) by IMD 2010 decile and year of measurement: Reception, girls

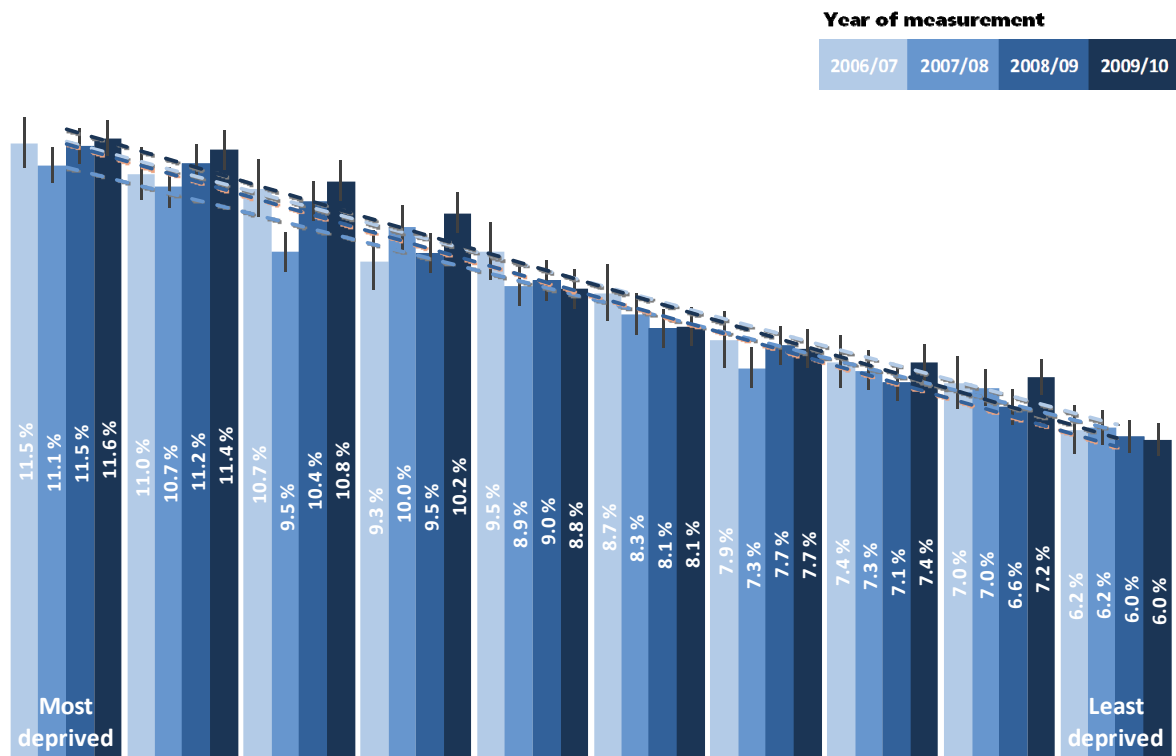


Figure 6c: Prevalence of obesity (with 95% confidence limits) by IMD 2010 decile and year of measurement: Year 6, boys

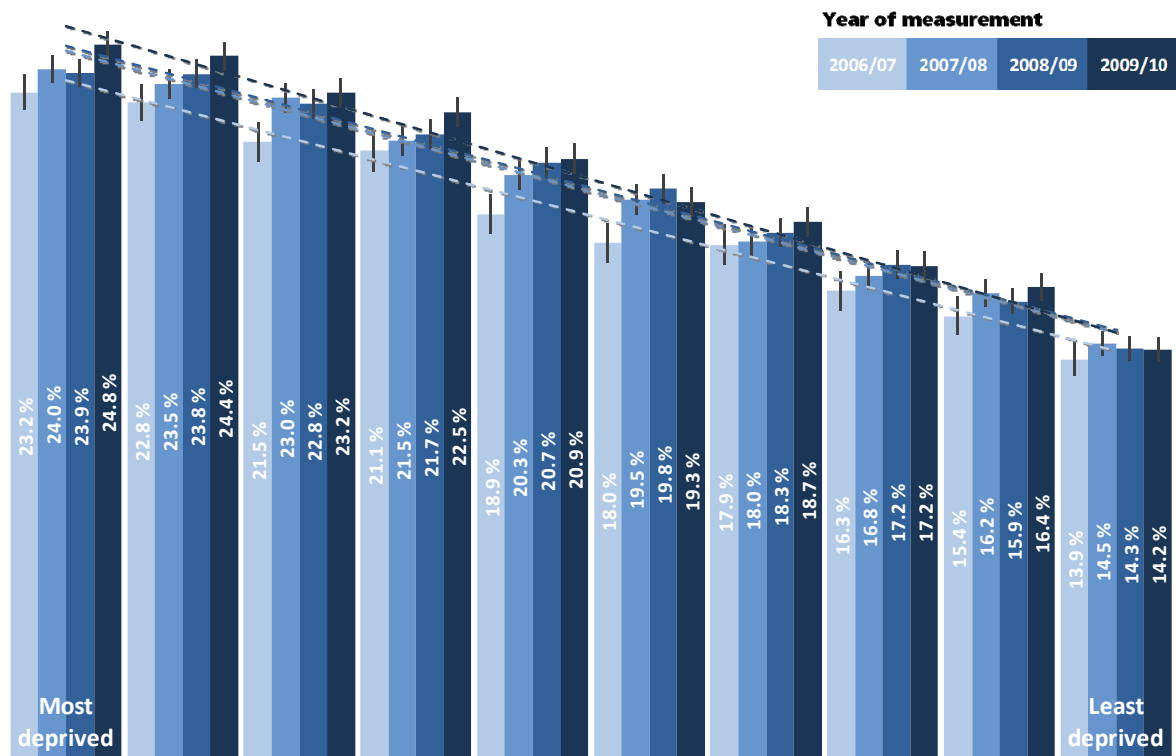
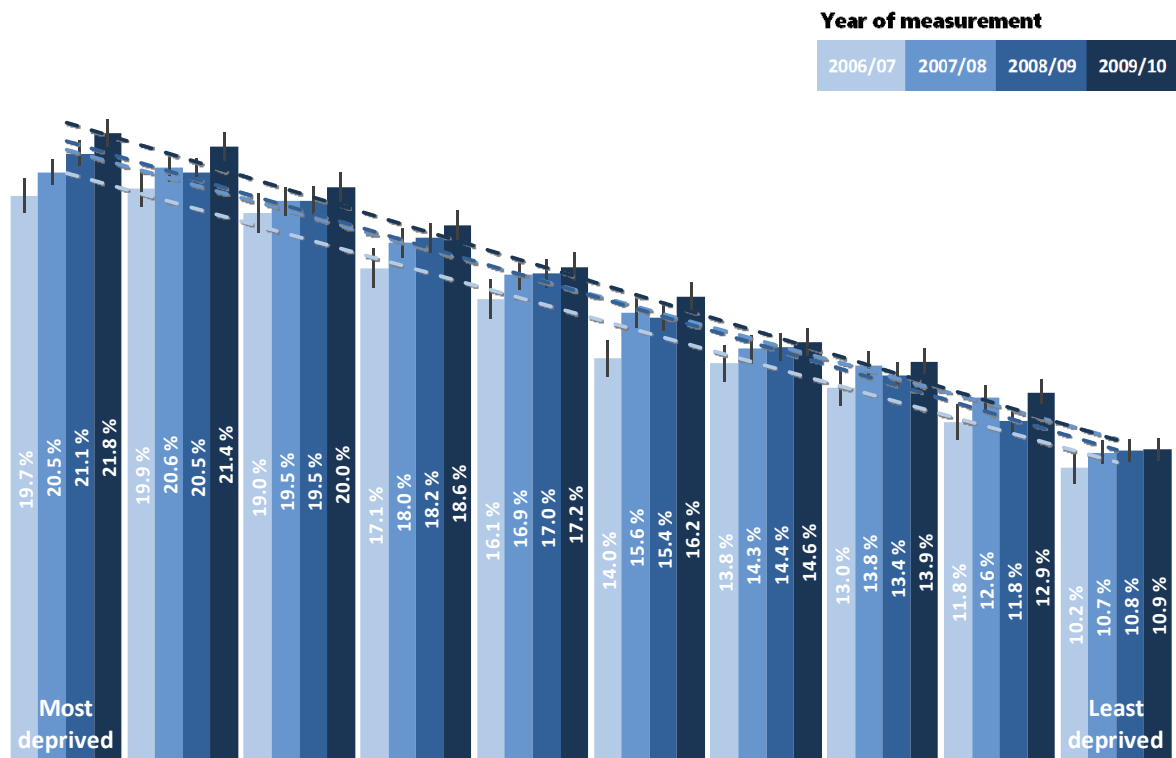


Figure 6d: Prevalence of obesity (with 95% confidence limits) by IMD 2010 decile and year of measurement: Year 6, girls



5.2 Change in the slope index of inequality

To better assess any change in the level of health inequality within child obesity, the obesity prevalence figures by IMD decile presented above have been analysed using the slope index of inequality (SII).

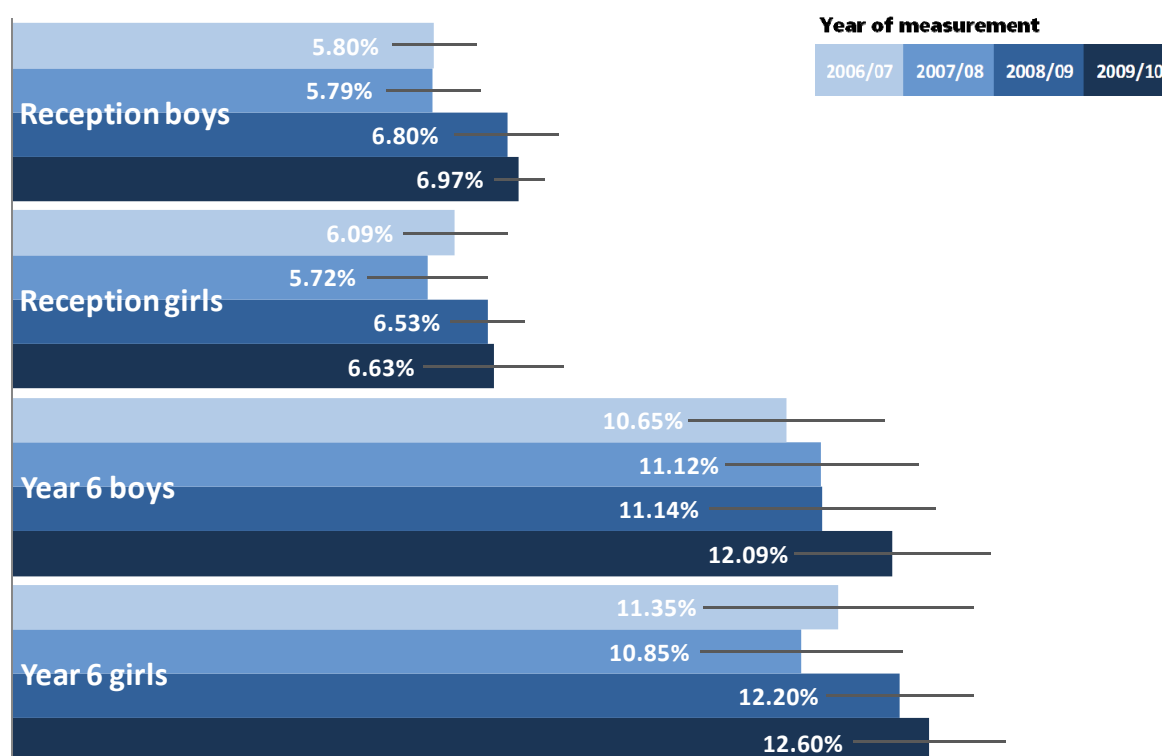
This estimates the size of the difference in obesity prevalence between the most and least deprived children in England.⁷ If the SII shows a significant increase over time this suggests a widening of health inequalities.

As Figure 7 shows, although the SII for 2009/10 is higher than previous years for both boys and girls in both age groups, none of the differences between 2008/09 and 2009/10 are statistically significant.

Viewed across all years of NCMP measurements, the SII for boys in Reception in both 2008/09 and 2009/10 was significantly higher than that for 2006/07 and 2007/08. However, the rapid increase evident between 2007/08 and 2008/09 did not continue between 2008/09 and 2009/10.

The SII for girls in Year 6 in 2009/10 is also significantly higher than that in 2007/08, suggesting that a widening of health inequalities might be taking place within that group over time. The SII for girls in Reception and boys in Year 6 shows no significant differences over time.

Figure 7: Change in the slope index of inequality for obesity and deprivation (with 95% confidence limits) by year of measurement, school year, and sex



6. Changes in child obesity prevalence by ethnic group

- Most ethnic groups show either no change or a small increase in obesity prevalence between 2008/09 and 2009/10. This suggests that the increases observed at national level over this time are not limited to any specific ethnic groups.
- Assessed over three years, prevalence of obesity among Bangladeshi children seems to be rising quicker than that for other ethnic groups.
- Prevalence of obesity among children in the White Other ethnic group shows some signs of a decrease over time. This may be linked with changes in the socioeconomic status of this group over this time.

Previous analysis, using both NCMP and HSE data, has shown that child obesity prevalence varies substantially between ethnic groups. In general, such analysis shows that children from most ethnic groups appear to have a higher prevalence of obesity than children of White British ethnicity.

Figures 8a–d show the prevalence of obesity by ethnic group across all years of NCMP measurement, split by school year and sex. In order to maximise the number of children in each ethnic grouping, and therefore reduce the confidence limits around the estimates presented, some ethnic groups have been combined.^{iv}

It is important to note that the number of records with valid ethnicity coding has increased over the four years of the NCMP. In 2006/07 only 32% of child records were provided with a valid ethnic code. This increased to 67% in 2007/08, 77% in 2008/09 and 83% in 2009/10. This increase means the change over time, especially when considering 2006/07 data, must be assessed with caution.

Obesity prevalence by ethnic group between 2008/09 and 2009/10 mainly shows either small significant increases or no significant change. However, this pattern is inconsistent across age and sex groups. There is therefore no evidence that the increases in obesity prevalence observed at national level over this time are driven by changes among particular ethnic groups.

Statistically significant year on year increases were seen between 2008/09 and 2009/10 for White British girls in both school years, Black Other girls in Reception and Black African girls in Year 6, as well as for the 'Any other ethnic group' for boys in Year 6. The White Other ethnic group showed a significant decrease in obesity prevalence for girls in Reception and boys in Year 6. There were no significant differences in obesity prevalence across all ethnic groups for boys in Reception between 2008/09 and 2009/10.

Considering changes across all years of NCMP measurement reveals more in terms of consistent trends. NCMP data up to 2008/09 suggested a pattern of increases in obesity prevalence among Bangladeshi children in all age and sex groups, but the 2009/10 data do not show quite the same pattern. There were no significant changes in obesity prevalence for Bangladeshi children between 2008/09 and 2009/10. However, over the

^{iv} White Irish and any other White background have been combined into the group White Other. White and Black Caribbean, White and Black African, White and Asian, and any other Mixed background have been combined into the group Mixed. Black Caribbean and any other Black background have been combined into Black Other. Chinese and any other ethnic group have been combined into Any other ethnic group.

period covered by the NCMP, the Bangladeshi ethnic group does show the most consistent pattern of increases both over time and across all age and sex groups. It therefore seems likely that, across all age and sex groups, obesity prevalence is increasing among Bangladeshi children at a faster rate than for other ethnic groups.

The White Other ethnic group also seems to be exhibiting a possible change over time, and this is the only ethnic group where the data suggest that obesity prevalence may be decreasing. This trend is of interest as further analysis shows that children from the White Other ethnic group have shown a statistically significant decrease in the average level of socioeconomic deprivation over the period covered by the NCMP.

In 2006/07 children from this ethnic group lived in areas with a mean IMD score of 25.5 (+/- 0.3). In 2009/10 this figure was 23.2 (+/- 0.1), and the intervening years have shown a gradual decrease. More detailed analysis of this trend is needed if we are fully to understand whether this apparent decrease in deprivation can explain the decrease in obesity prevalence.

Since 2007/08, children within the Indian ethnic group in Reception have shown year on year rises in obesity prevalence. A similar pattern is seen among Asian Other, Black African and Black Other boys in Reception, Pakistani and Mixed ethnicity girls in Reception, and girls from 'Any other ethnic group' in Year 6. It is too early to say whether these patterns reflect a real underlying trend, but continued monitoring will determine whether this is the case.

No firm conclusions can be drawn regarding other ethnic groups. Where differences in obesity prevalence by ethnic group are evident between years of NCMP measurements, these are not consistent over time or consistent across different age and sex groups.

Figure 8a: Prevalence of obesity (with 95% confidence limits) by ethnic group and year of measurement: Reception, boys

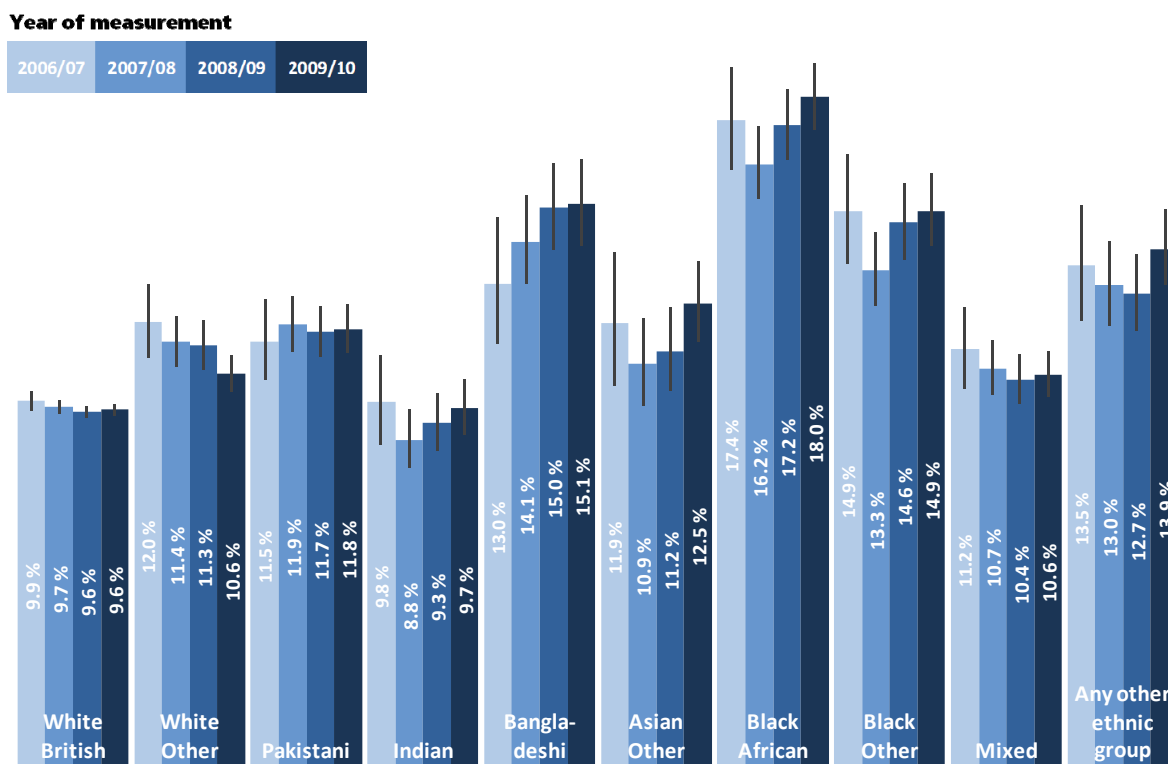


Figure 8b: Prevalence of obesity (with 95% confidence limits) by ethnic group and year of measurement: Reception, girls

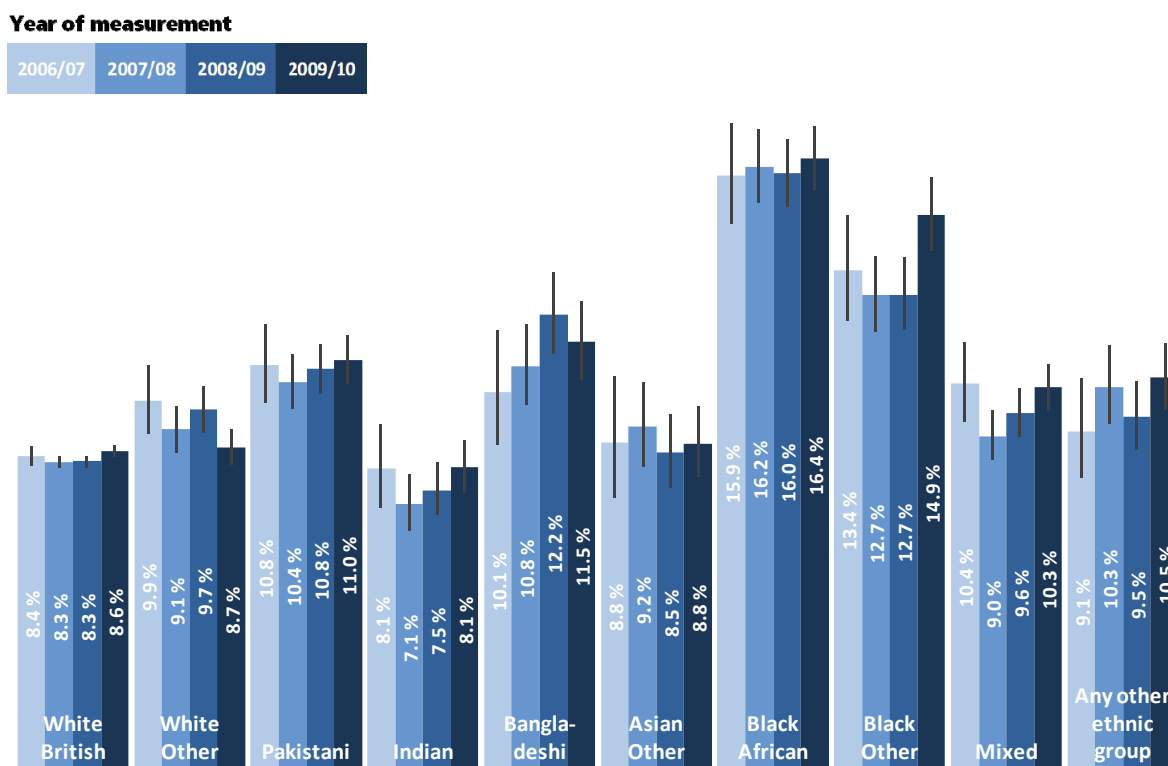


Figure 8c: Prevalence of obesity (with 95% confidence limits) by ethnic group and year of measurement: Year 6, boys

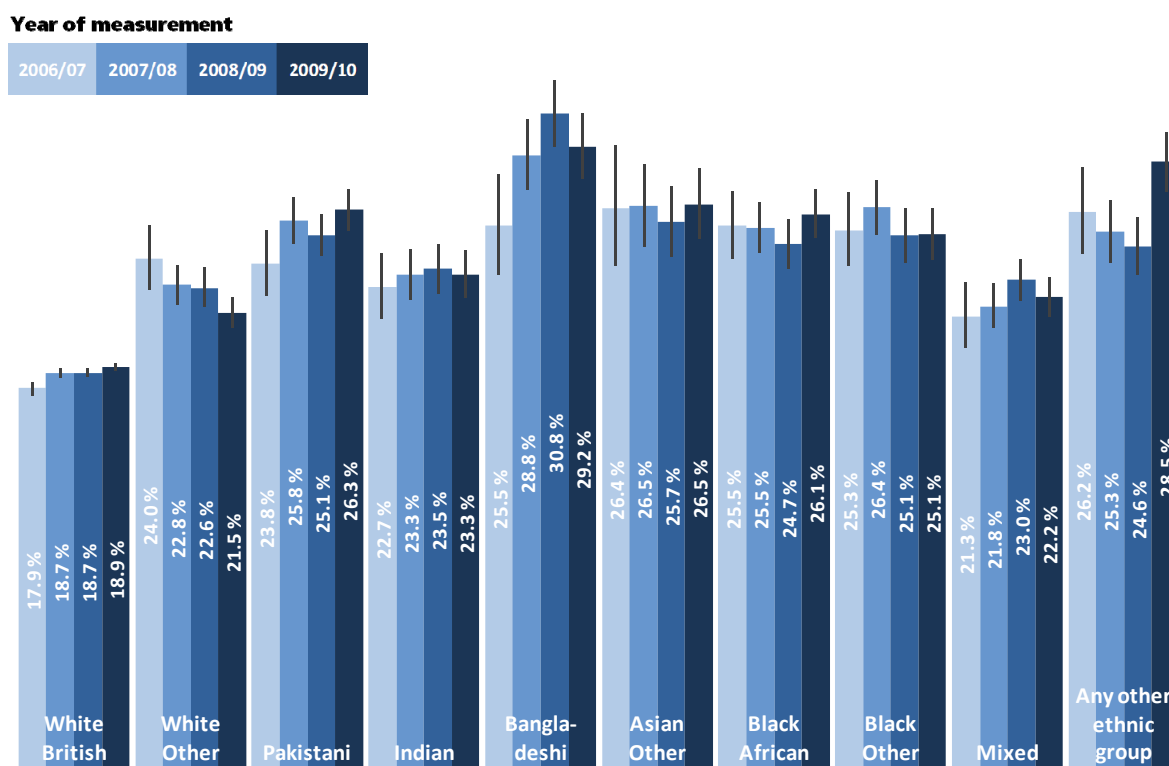
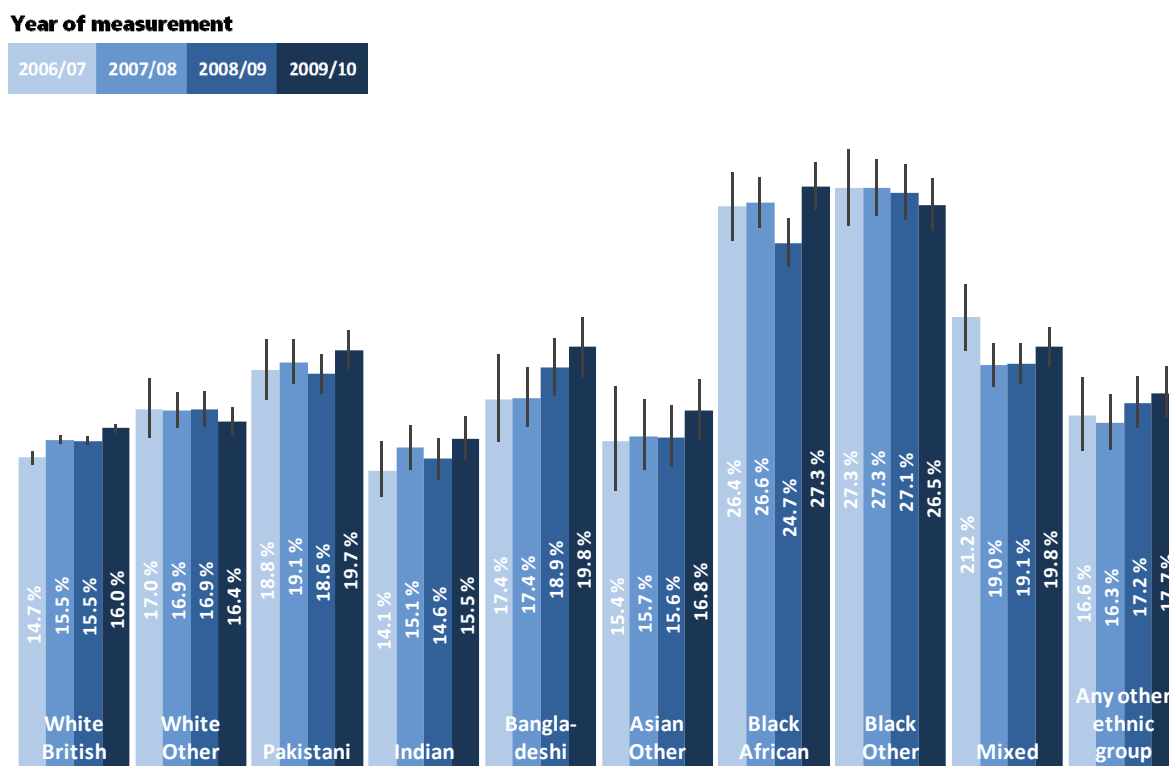


Figure 8d: Prevalence of obesity (with 95% confidence limits) by ethnic group and year of measurement: Year 6, girls



7. Conclusions

The addition of data from the 2009/10 NCMP better enables us to identify and interpret trends within the data. As a result of the relatively low levels of participation and data completeness in 2006/07, the assessments presented in the previous report were based primarily on change between 2007/08 and 2008/09. This report uses three years of good quality data on which to base assessments, and so these can be made with greater confidence.

Change in obesity prevalence

In terms of obesity prevalence, the 2009/10 data suggest a different pattern of change from that which would have been anticipated based on the measurements from earlier years, or on evidence from other data sources, such as the HSE.

Obesity prevalence based on NCMP data remained largely stable between 2007/08 and 2008/09, with a slight decrease for boys in Reception. By contrast, the 2009/10 data show an increase for both boys and girls in both school years.

This is the first time a statistically significant year on year increase in prevalence has been observed across all age and sex groups of the NCMP. The only time obesity prevalence based on NCMP data has shown an increase was that observed among children in Year 6 between 2006/07 and 2007/08. This increase was accompanied by substantial improvements in both participation and data quality which may have been the cause of the apparent increase. The rise in obesity prevalence between 2008/09 and 2009/10 has not been accompanied by such changes and so is more likely to represent a real increase.

The size of the apparent increase should not be underestimated. Obesity prevalence for girls in Year 6 has risen by around 0.5% since 2008/09. This is a similar annual rate of increase to that observed in HSE data during the period 1993-2005, before any suggestion of a 'levelling off' in obesity prevalence was apparent. Although the rate of increase is lower for other age and sex groups, there has been at least a 0.2% rise in prevalence for all groups.

Change in mean BMI

Analysis of the 2008/09 NCMP data showed that mean BMI for age, unlike obesity prevalence, had risen significantly since 2007/08 for all groups except girls in Year 6. The 2009/10 data appear to confirm that such increases are indeed taking place, and suggest that the pattern of increases now includes girls in Year 6.

The average BMI across the child population appears to have increased by around one BMI centile over a period of two years. Analysis of the distribution of these changes within the child population does not show any clear pattern. It appears that the rise between 2008/09 and 2009/10 is spread relatively evenly across the BMI distribution.

Between 2006/07 and 2008/09 there was a pattern of larger increases in mean BMI among those children in Reception and boys in Year 6 with lower BMI for age (i.e. predominantly among children whose BMI would be classified as healthy). Although this pattern was not evident between 2008/09 and 2009/10, over the whole period covered by the NCMP the biggest rises in BMI for these age and sex groups seem to

have occurred among children with a lower than average BMI for age. Girls in Year 6 do not show this pattern; increases in mean BMI have been spread evenly across the BMI distribution among girls of this age.

Comparison of the 2008/09 NCMP data with those data from earlier years also suggested that the most obese children in Reception might be displaying a decrease in BMI, whilst the BMI for the most obese children in Year 6 seemed to be remaining constant. The 2009/10 data however seem to suggest that this is no longer the case, and BMI is increasing among obese children as well as among those at a healthy weight.

As reported last year, although these changes are small at an individual level, we cannot discount a possible impact on health at the population level. For example, a small increase in levels of salt consumption across all individuals in a population has been shown to have a significant impact on health at a population level.⁸ It is therefore not impossible that the changes observed in the mean BMI of children could have a significant impact on morbidity and mortality in future.

Unfortunately, our understanding of the relationship between children's BMI and their health as adults is not robust enough to model or quantify the likely impact of the changes that have been observed.

The observed increase in mean BMI suggests that, in order to best reduce the risks of future obesity-related ill health for the current child population, interventions to tackle unhealthy weight among children should not be focussed only on the most obese children. Some interventions should also be aimed at the whole child population in order to ensure the BMI of children who are currently at a healthy weight does not continue to increase over time.

Changes in health inequalities within child obesity

The analysis presented last year suggested that health inequalities were widening among boys in Reception. Including the 2009/10 data appears to confirm this trend, and also suggests that health inequalities may be increasing among girls in Year 6.

The slope index of inequality for girls in Reception and boys in Year 6 shows no significant differences over time, suggesting that the increases observed in obesity prevalence have been spread evenly across all socioeconomic groups. There is therefore no evidence of any narrowing of the existing inequalities for any of the age and sex groups covered by the NCMP.

The evidence that health inequalities persist and may be widening for some groups highlights the importance of ensuring that any attempts to reduce obesity have a particular focus on deprived communities.

Change in obesity prevalence by ethnic group

Over the four years of NCMP data, children from the Bangladeshi ethnic group have shown increases in obesity prevalence that are both the most consistent across age and sex groups and the greatest in magnitude. Furthermore, Bangladeshi children now have the highest obesity prevalence among Asian ethnic groups, and have one of the highest rates of obesity among all ethnic groups for boys in Year 6. This finding

suggests that it may be worthwhile for local areas to consider targeting interventions at children from the Bangladeshi ethnic group.

The apparent decrease in obesity prevalence among the White Other ethnic group is also worthy of note. As it appears that this may be linked to a decline in deprivation among this group, this could provide an interesting avenue for further research. Such work has potential to further our understanding of the complex interaction between ethnicity and socioeconomic status – two variables which are known to act as independent, yet closely linked, determinants of obesity.

In terms of patterns for other ethnic groups, NCMP data suggest little in the way of a conclusive pattern. Some age and sex groupings within certain ethnic groups might be exhibiting a more rapid increase in obesity prevalence than others, but the changes observed are largely inconsistent in terms of the age and sex groups that are affected.

Impact of data quality, participation and other methodological variables

As noted in the previous report, the large number of records within the NCMP dataset allow a level of detailed analysis that is not possible with most datasets. However the surveillance approach that results in such large numbers of child measurements brings some disadvantages. Primarily, the sample cannot be controlled as carefully as it would be in most research studies. Such studies typically use a sampling framework to ensure the sample is representative of the national population, and employ quality control measures to ensure data quality is consistent across all data collection units and over time.

In previous years links have been shown between the reported prevalence of obesity and factors such as local participation rate and data quality measures. The significant increase in obesity prevalence among children in Year 6 between 2006/07 and 2007/08 has been attributed to the improvements made in this regard over this period.

Over the last three years of the NCMP, data quality has improved further. However, these changes have not been as dramatic as those between 2006/07 and 2007/08. It therefore seems unlikely that the changes between 2007/08 and 2009/10 presented within this report could be caused entirely by changes in participation or data quality.

However, it is possible that other factors, which have not yet been assessed in detail, could affect the observed trend over time. There have, for example, been some changes in the timing of NCMP measures throughout the school year over the past four years. These could potentially have had some impact on the reported trend in obesity prevalence. Further detailed analysis into such aspects of the NCMP dataset will be needed to fully understand whether these can explain some of the observed changes in obesity prevalence and mean BMI.

Discussion

The 2009/10 NCMP data suggest that child obesity prevalence has risen since 2008/09 for all age and sex groups covered by the NCMP. The continued increase in mean BMI, which was apparent within earlier years of NCMP data, provides further evidence that excess weight among English children is an increasingly important public health issue.

These findings are perhaps surprising, as they appear to contradict the findings of the HSE, which suggests that the rate of increase for both obesity prevalence and mean BMI has 'levelled off' since around 2005. We therefore cannot rule out the possibility that the increases in prevalence seen in the NCMP data have partly resulted from changes within the NCMP data collection process that have not yet been detected or fully investigated.

Another possible explanation is that the observed changes in obesity prevalence could result from differences in the sociodemographic mix of the children measured between NCMP years – either as a result of real changes in the underlying population or due to differential changes in levels of participation by different population groups over time. The NCMP does not take repeated measures of the same children so a different cohort of children is measured each year. We know that obesity prevalence varies according to factors such as ethnic group or socioeconomic status. Therefore, if the sociodemographic mix of the children measured had varied substantially from one year to the next, this could explain a change in the reported prevalence of obesity.

However, this seems an unlikely explanation. The main sociodemographic characteristics of the NCMP sample have shown limited change from year to year. Furthermore, the increases observed in obesity prevalence between 2008/09 and 2009/10 are still evident when viewed by ethnic and socioeconomic group. Increases have also been seen between 2007/08 and 2009/10 across a variety of Office of National Statistics Area Classification groups.⁹ If the increases seen at national level were solely a result of differences in the population mix of the children being measured, the apparent changes over time would not be evident when the sample was divided into groups based on such characteristics.

If the apparent change seen in the NCMP data does represent a real increase in child obesity prevalence among English children in Reception and Year 6, then this could describe two possible scenarios. The most likely explanation seems to be that child obesity prevalence among children of the age groups covered by the NCMP had stabilised (as suggested by HSE data and previous years of NCMP measurements), but that obesity prevalence has now begun to increase again.

An alternative explanation could be that obesity prevalence has always been rising within the population sampled by the NCMP, but that these increases were disguised within the NCMP data from earlier years by changes in the process of data collection, data quality or NCMP participation. It is possible that, as the NCMP has matured, the programme is now providing more robust and consistent statistics which enable an underlying increase in obesity prevalence for children of the age groups covered to be detected.

Unfortunately, based on NCMP data alone it is not possible to determine with certainty the real reason for the indicated rise in prevalence. Nor is it currently possible to be sure whether the observed rise is just for one year, or is the beginning of a new trend. The forthcoming publication of both 2010/11 NCMP data, and the 2010 HSE data, may shed more light on this issue.

Summary

The 2009/10 NCMP data show a pattern of increasing BMI among English children. Although we cannot be entirely confident that the patterns observed within NCMP data accurately reflect what is happening within the child population, these findings may still be cause for concern.

Even if the reported increase is not an accurate reflection of the real underlying trend, the fact that the 2009/10 NCMP data show very little by way of decreases, regardless of the method of analysis, certainly indicates that there is a great deal more to be done if levels of childhood obesity are to be reduced.

These findings provide useful information which will assist in achieving this objective. For example, the evidence of increasing mean BMI, persistent health inequalities, and differences by ethnic group provide information which can inform the development and targeting of interventions. It is therefore important to continue to monitor and investigate the patterns of obesity prevalence among English children using tools such as the NCMP, and continue to act on the findings from this surveillance. By making full use of such information we can ensure our attempts to tackle obesity are delivered in the most effective way.

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All web links accessed 21/10/2011

9. Reader Information

Title	NCMP: Changes in children's body mass index between 2006/07 and 2009/10
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