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NORTH EAST PUBLIC HEALTH OBSERVATORY

Childhood Obesity in the North East

2005/06 National Childhood Obesity Dataset (NCOD)

Authors:	Louisa Ells, Gillian Bryant, John Wilkinson
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KEY MESSAGES

Background

- As part of the Government priority to tackle childhood obesity, in 2005 the National Childhood Obesity Dataset (NCOD), now known as the National Child Measurement Programme (NCMP), was established.
- Under the NCMP all PCTs are required to measure all mainstream state educated children from year R (ages 4-5 yrs) and year 6 (ages 10-11 yrs).

Aim of this report

- To provide some provisional regional data for all North East PCTs who returned raw data sets to NEPHO by October 2007 (to comply with PIAG requirements): to assist with service planning and delivery, performance management, and facilitate comparisons with future years data.

Provisional findings

- Of the 16 old PCT boundaries, 14 returned data to NEPHO for analysis, resulting in a total of 34,202 records (17,507 from year R and 16,695 from year 6).
- Data from the January 2006 school census was used to estimate the number of eligible pupils within each trust (pupil denominator), which revealed that on average the North East achieved a coverage of 80% for year R and 85.1% for year 6.
- Growth distribution analyses of this data showed that the distribution of height, weight and BMI varied more in year 6 than year R, and that data from year 6 children was also positively skewed for weight and BMI.
- Although there were differences in obesity prevalence between different PCTs, overall no important variation between PCTs was observed based on this first year of data collection and the caveats attached to this.
- Using the British 1990 population monitoring classifications: 14.96% of children from year R were overweight whilst 11.29% of them were obese; for year 6, 14.50% were overweight and 18.99% were obese.
- Using the IOTF classifications: 16.35% of year R children were overweight and 5.31% were obese; whilst 19.95% of year 6 children were overweight and 6.09% obese.
- Using IOTF to classify underweight, 4.42% and 6.02% of children were classified as underweight in year R and 6 respectively however, less than 1% of these children fell into the most severe categories of underweight.
- Regionally, prevalence of obesity was higher in the older boys than in girls, particularly when using the British1990 cut points.

Conclusions

- Despite the practical challenges in establishing this complex data collection system in year 1, the North East provided good coverage and therefore a baseline for future comparisons, and trend analyses over time.
- There do however remain some inconsistencies in the pupil denominator and the influence of selection bias, supported by anecdotal evidence of larger children, and in particular older girls, opting out.
- Changes in childhood BMI definitions can alter the proportion of children in each category, although it is clear that an overall left-ward shift in the distribution of BMI is required to reduce the number of obese children irrespective of which definition is used.

CONTENTS

LIST OF ABBREVIATIONS

BMI	Body Mass Index
IOTF	International Obesity Task Force
NCMP	National Child Measurement Programme
NEPHO	North East Public Health Observatory
NOO	National Obesity Observatory
PCT	Primary Care Trust
PHNE	Public Health North East
UK90	British 1990 growth reference
WHO	World Health Organisation

BACKGROUND

Childhood obesity is a growing public health concern. Latest figures from the Health Survey from England[1] (using the UK90 population monitoring cut points for overweight and obesity), demonstrate a national rise in obesity prevalence for children aged 2-15 years, from 10.9% in 1995 to 18.0% in 2005 among boys, and from 12.0% to 18.1% in girls, over the same period[1]. Regional data from 2002-2004 for children aged 2-15 years showed a prevalence of 19.5% in the North East, the third highest nationally[1].

Tackling childhood obesity is a Government priority, part of which involved establishing the National Child Measurement Programme (NCMP)[2,3] (formerly the National Childhood Obesity Dataset[4] – NCOD). The NCMP, established in 2005, aims to annually weigh and measure all children from Reception (R) (ages 4-5) and Year 6 (ages 10-11), to inform local planning and service delivery; and gather population-level surveillance data to analyse trends in growth patterns and obesity[3]. The findings from the first year of the programme, revealed a number of practical difficulties which significantly impacted upon data quality and thus eliminated the possibility of more in depth analysis[5]. However the North East Strategic Health Authority (SHA) gained the highest provisional response rates nationally[5].

This report provides an overview of provisional PCT level obesity prevalence and response rates from 2005/06.

RESULTS

Data Collection

In October 2006 the Patient Information Advisory Group (PIAG) granted permission for the Public Health Observatories (PHOs) to analyse raw PCT data from the first year of height weight measurements. All 15 Primary Care Trusts (PCT) and 1 Care Trust within the North East SHA boundary during 2005/06 (old PCT boundaries), were asked to provide data. All trusts undertook measurements, although data was only received from 14 trusts (data was not received from Newcastle and South Tyneside PCTs).

All pupil level data was anonymised and cleaned where possible, to remove obvious duplicate records, records with missing data and measures which fell outside of conceivable biological limits. The final dataset, collated within one central data base, contained a total of 34,202 records: 17,507 from year R (9,056 boys and 8,451 girls) with a mean age of 5.07 years (S.E. 0.004; Range 2.86); and 16,695 from year 6 (8,748 boys and 7,947 girls) with a mean age of 11.23 years (S.E. 0.004; Range 2.82).

Estimates of the total number of pupils eligible for measurement were gained from January 2006 school census data for each PCT, however where PCT estimates were also provided (n=2) discrepancies did occur. This may have been accountable to numerous factors, including: 1) variability in the inclusion and exclusion of special needs and independent schools; 2) children who move PCT within the school year; 3) timing of measurement and staggered intake in Reception year; 4) possible discrepancies between Local Education Authority (LEA) and PCT boundaries. A summary of the estimated uptake rates by PCT is shown in Table 1. From this data it is clear that on average the North East PCTs achieved good estimated coverage for YR (80.0%) and even better estimated coverage for Y6 (85.1%), thus achieving the 80% Local Delivery Plan (LDP) in all but 2 PCTs for YR and for Y6 (figures shown in red italics).

Table 1: Estimated uptake rates by PCT

	Year R			Year 6		
PCT	**No. of eligible pupils***	**No. measured**	**% measured**	**No. of eligible pupils***	**No. measured**	**% measured**
Darlington	997	969	97.19	1213	1203	99.18
Derwentside	915	840	91.80	953	824	86.46
Durham & CLS	1345	1207	89.74	1579	1451	91.89
Durham Dales	821	794	96.71	967	924	95.55
Easington	546	524	95.97	679	600	88.37
Sedgefield	960	814	84.79	1132	936	82.69
Hartlepool	1043	990	94.92	1283	1244	96.96
Middlesbrough	1565	306	*19.55*	1815	1428	*78.68*
Redcar & Cleveland	1533	475	*30.98*	1735	1406	81.04
Stockton	1936	1629	84.14	2309	1970	85.32
Gateshead	1980	1818	91.82	no data	no data	no data
North Tyneside	2019	1802	89.25	2254	1860	82.52
Sunderland	2923	2533	86.66	no data	no data	no data
South Tyneside	no data	no data	no data	no data	no data	no data
Newcastle	no data	no data	no data	no data	no data	no data
Northumberland	3168	2806	88.57	3708	2849	*76.83*
REGIONAL AVERAGE			**80.0**			**85.1**

** Estimated from January 2006 school census data.*

Height, Weight and Body Mass Index (BMI) Distribution

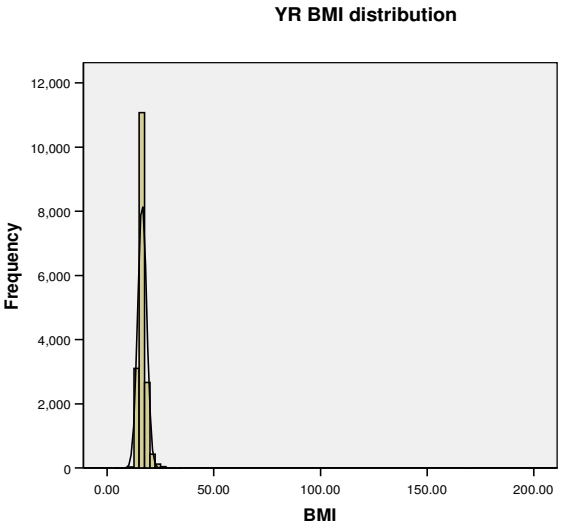
The regional distributions of height, weight and BMI for children in year R and year 6 are shown in Figure 1, with a summary shown in Table 2. The distribution of all three curves varies more for year 6 than year R. In year 6 weight and therefore BMI also, are positively skewed, with more measures present in the right hand tail of the curve.

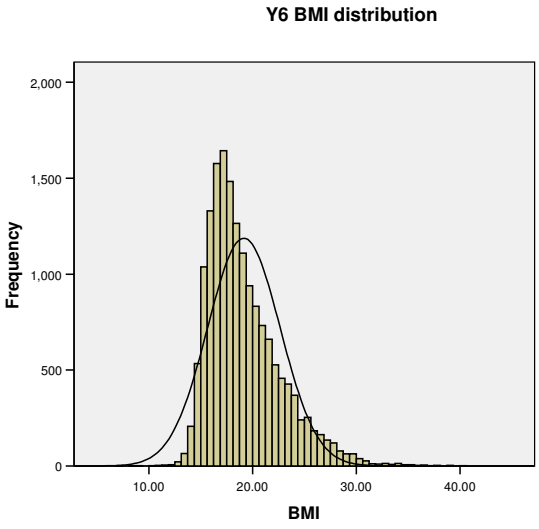
Table 2 Regional Height, Weight and BMI summary statistics for boys and girls in year R and year 6.

		Year R			Year 6		
		Boys	**Girls**	**Total**	**Boys**	**Girls**	**Total**
Mean	***BMI***	16.4	16.4	16.4	19.0	19.4	19.2
	Height cm	110.1	109.3	109.7	146.2	146.1	146.5
	Weight kg	20.0	19.6	19.8	40.9	41.8	41.5
Median	***BMI***	16.2	16.1	16.1	18.1	18.7	18.3
	Height cm	110.0	109.1	109.6	146.0	145.8	146.4
	Weight kg	19.5	19.2	19.4	38.8	39.8	39.5
IQR	***BMI***	15.4 - 17.1	15.2 - 17.2	15.3 - 17.1	16.5 - 20.7	16.8 - 21.3	16.6 – 21.0
	Height cm	106.6 - 113.5	106 - 112.8	106.2 – 113.0	141.5 - 150.9	141.6 - 151.9	141.5 - 151.2
	Weight kg	18.0 - 21.4	17.5 - 21.2	17.8 - 21.3	34.0 - 45.8	35.0 - 47.6	34.4 - 46.7

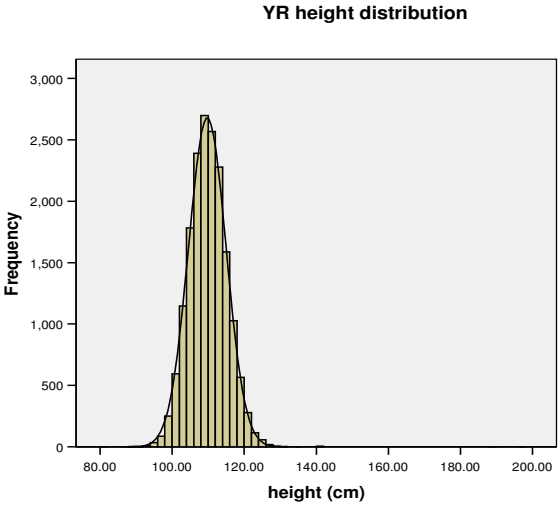
Figure 1: Height, Weight and BMI distributions for all children measured in year R and year 6. Distribution is mapped against a normal curve, bars represent the number of measurements)

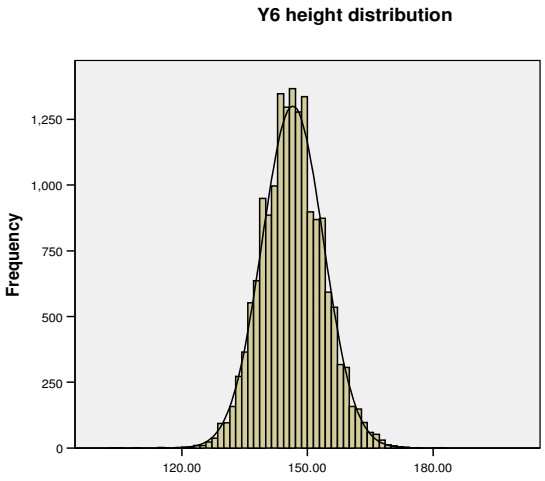
A shift in the direction of the distribution towards left hand side will reduce the number of children falling into the obese categories.



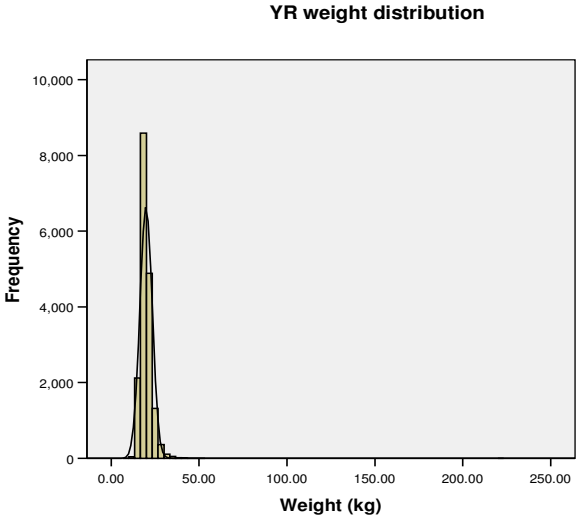


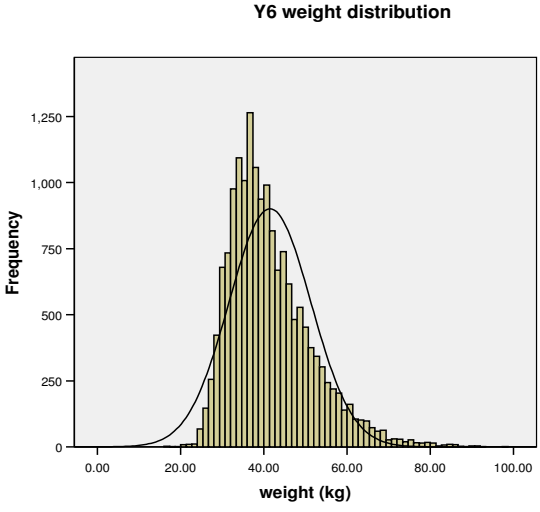
There is more variation in all Y6 curves.





Year 6 weight and BMI curves are positively skewed – i.e. they contain more measures in the right hand curve.





Due to the lack of a universally accepted system for the classification for childhood obesity, the results in this report are presented using both the UK1990[6] and IOTF[7,8] classification systems. An overview of the different classification systems used in the UK, are shown in Appendix 1. Provisional prevalence of each weight category, broken down by PCT, are shown for year R and year 6 in Tables 3 and 4 respectively. Where possible Confidence Intervals (CI) are shown to provide an indication of: 1) whether observed differences in prevalence are likely to be significant or not; and 2) the uncertainly of the estimates, given the size of the sample measured. Confidence Intervals are not able to account however, for response rates, selection bias or poor data quality.

For the 14 trusts that supplied data for year R (n=17,507), by UK1990 population monitoring definitions 14.96% (95% CI 14.4-15.5) of these children were overweight and 11.29% (95% CI 10.8-11.8) were obese. For the 12 trusts that supplied data for year 6 (n=16,695), by UK1990 population monitoring definitions, a similar proportion of these children were overweight 14.50% (95% CI 14.0-15.0), however a significantly higher proportion of these older children were obese 18.99% (95% CI 18.4-19.6).

Using the IOTF definitions, the prevalence patterns are slightly different with less significant year group differences and a much lower overall prevalence of obesity (Year R children overweight: 16.35% 95% CI 15.8-16.9 and obesity: 5.31% 95% CI 5.0-5.6) (Year 6 children overweight:19.95% 95% CI 19.3-20.5 and obesity: 6.09% CI 5.7-6.4). In the absence of a universally accepted system for classifying underweight using the UK1990 charts, the published IOTF definitions for underweight[8] were calculated. In year R 4.42% (95% CI 4.1-4.7) of children fell into an underweight category compared to a slightly higher proportion, 6.02% (95% CI 5.7-6.4) in year 6. However in both year groups the significant majority of these children were classified under the least severe grade of thinness (1), leaving just 0.72% and 0.82% of children from year R and 6, falling into the more severe underweight categories (grades 2-3).

Regionally, the prevalence of overweight was fairly consistent between both genders and year group. However, obesity prevalence was slightly higher in boys for year R (11.87%; 95%CI 11.2-12.5) and significantly higher during year 6 (21.16%; 95% CI 20.3-22.0) when compared to girls in year R (10.66%; 95% CI 10.0-11.3) and year 6 (16.61% 95% CI 15.8-17.4), by UK1990 definitions. Using IOTF definitions, the difference between boys (4.43%; 95% CI 4.0-4.9) and girls (6.25%; 95% CI 5.7-6.8) in year R is significantly different, but not for year 6 boys (6.10%; 96% CI 5.6-6.6) and girls (6.07%; 95% CI 5.5-6.6). Gender differences in obesity prevalence by PCT, are shown for year R and 6, in Figures 2 and 3. For most PCTs the CI for boys and girls overlap, which suggests the difference is not significant, however some potentially significant differences can be observed.

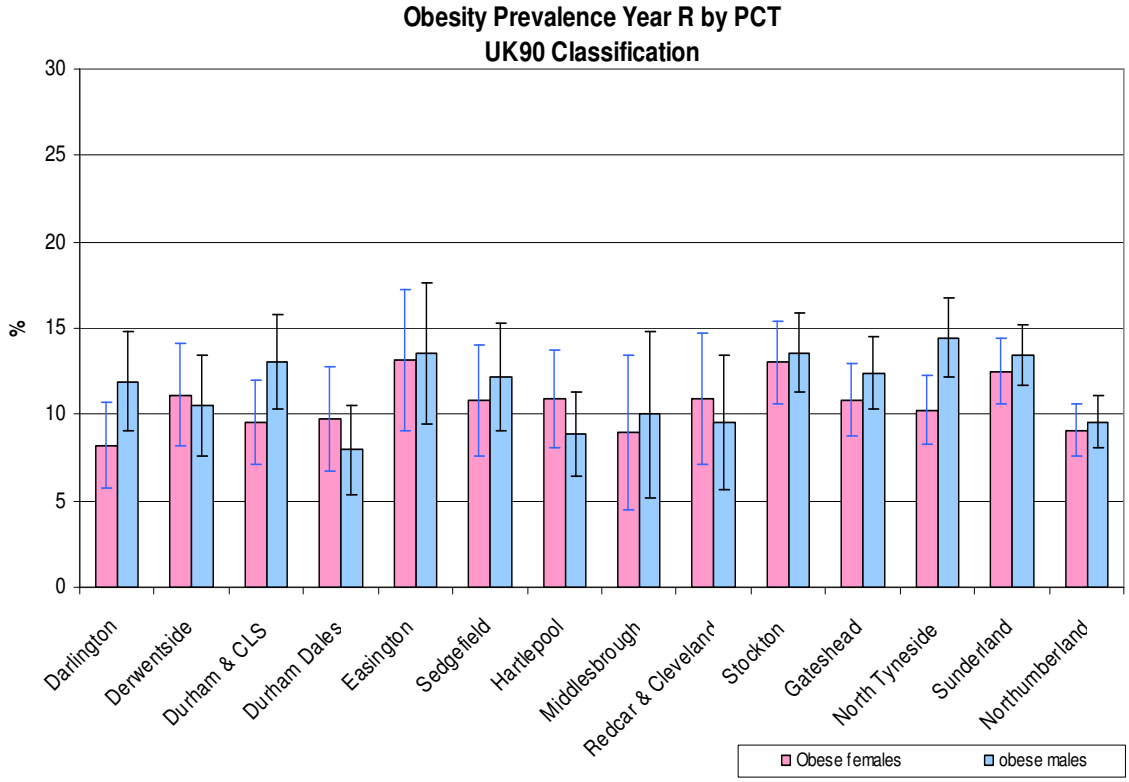
Table 3: Provisional prevalence of underweight, ideal weight, overweight and obesity for YR children by PCT using the UK1990 and IOTF BMI classifications. NB numbers of children less than or equal to 5 have been removed to prevent disclosure.

	UK90 classification			IOTF classification					
PCT	**% Ideal**	**% Over-weight**	**% Obese**	**% Thinness Grade 3**	**% Thinness Grade 2**	**% Thinness Grade 1**	**% Ideal**	**% Over-weight**	**% Obese**
Darlington	71.83	18.06	10.11	*	*	1.55	74.82	19.92	3.30
Derwentside	74.52	14.64	10.83	*	*	4.29	74.17	16.07	4.40
Durham & CLS	74.40	14.25	11.35	*	*	3.89	74.40	15.74	5.30
Durham Dales	76.32	14.86	8.82	*	*	3.27	77.33	14.23	4.79
Easington	72.33	14.31	13.36	*	*	4.58	71.37	17.56	6.11
Sedgefield	75.06	13.39	11.55	*	*	4.79	74.08	15.60	5.04
Hartlepool	82.12	8.38	9.49	*	*	11.31	72.02	10.20	4.95
Middlesbrough	79.08	11.44	9.48	*	*	6.21	74.18	11.76	5.56
Redcar & Cleveland	75.58	14.11	10.32	*	*	4.00	74.11	15.58	5.26
Stockton	70.78	15.90	13.32	0.37	0.55	2.76	72.62	17.43	6.26
Gateshead	69.25	19.09	11.66	0.00	0.00	1.87	72.94	20.08	4.79
North Tyneside	73.64	13.93	12.43	0.83	0.67	3.88	72.36	15.65	6.60
Sunderland	69.76	17.25	12.99	0.00	0.28	2.80	71.89	18.83	6.20
South Tyneside	-	-	-	-	-	-	-	-	-
Newcastle	-	-	-	-	-	-	-	-	-
Northumberland	77.55	13.11	9.34	0.00	0.36	3.24	77.66	14.04	4.60
REGIONAL AVERAGE - BOYS	*72.27*	*15.86*	*11.87*	*0.31*	*0.42*	*4.02*	*76.48*	*14.34*	*4.43*
REGIONAL AVERAGE - GIRLS	*75.34*	*14.00*	*10.66*	*0.22*	*0.47*	*3.37*	*71.18*	*18.51*	*6.25*
REGIONAL AVERAGE - TOTAL	**73.75**	**14.96**	**11.29**	**0.27**	**0.45**	**3.70**	**73.92**	**16.35**	**5.31**

Table 4: Provisional prevalence of underweight, ideal weight, overweight and obesity for Y6 children by PCT using the UK1990 and IOTF BMI classifications. NB numbers of children less than or equal to 5 have been removed to prevent disclosure.

	UK90 classification			IOTF classification					
PCT	**% Ideal**	**% Over-weight**	**% Obese**	**% Thinness Grade 3**	**% Thinness Grade 2**	**% Thinness Grade 1**	**% Ideal**	**% Over-weight**	**% Obese**
Darlington	65.00	14.88	20.12	*	*	3.66	67.66	21.20	6.98
Derwentside	63.23	16.38	20.39	*	*	4.85	66.75	20.75	7.16
Durham & CLS	65.82	14.33	19.85	*	*	4.00	68.78	19.50	7.03
Durham Dales	67.86	14.39	17.75	*	*	5.52	68.83	18.94	5.95
Easington	64.33	14.83	20.83	*	*	5.67	65.17	22.83	6.17
Sedgefield	63.14	14.74	22.12	*	*	5.24	64.10	22.01	7.59
Hartlepool	63.75	12.94	23.31	*	*	7.15	62.30	20.50	9.08
Middlesbrough	68.28	15.06	16.67	*	*	5.67	69.61	18.56	5.39
Redcar & Cleveland	65.93	15.29	18.78	*	*	5.55	67.71	20.55	5.48
Stockton	66.50	14.06	19.44	*	*	4.21	68.53	20.71	5.84
Gateshead	-	-	-	-	-	-	-	-	-
North Tyneside	67.74	14.62	17.63	0.70	0.81	5.32	69.03	18.76	5.38
Sunderland	-	-	-	-	-	-	-	-	-
South Tyneside	-	-	-	-	-	-	-	-	-
Newcastle	-	-	-	-	-	-	-	-	-
Northumberland	69.36	14.00	16.64	0.00	0.67	5.69	70.20	18.85	4.42
REGIONAL AVERAGE - BOYS	*64.86*	*13.98*	*21.16*	*0.18*	*0.42*	*4.98*	*68.93*	*19.38*	*6.10*
REGIONAL AVERAGE - GIRLS	*68.32*	*15.07*	*16.61*	*0.33*	*0.73*	*5.42*	*66.88*	*20.57*	*6.07*
REGIONAL AVERAGE - TOTAL	**66.50**	**14.50**	**18.99**	**0.25**	**0.57**	**5.20**	**67.95**	**19.95**	**6.09**

Figure 2: Gender differences in obesity for year R and year 6 by UK90 definition.



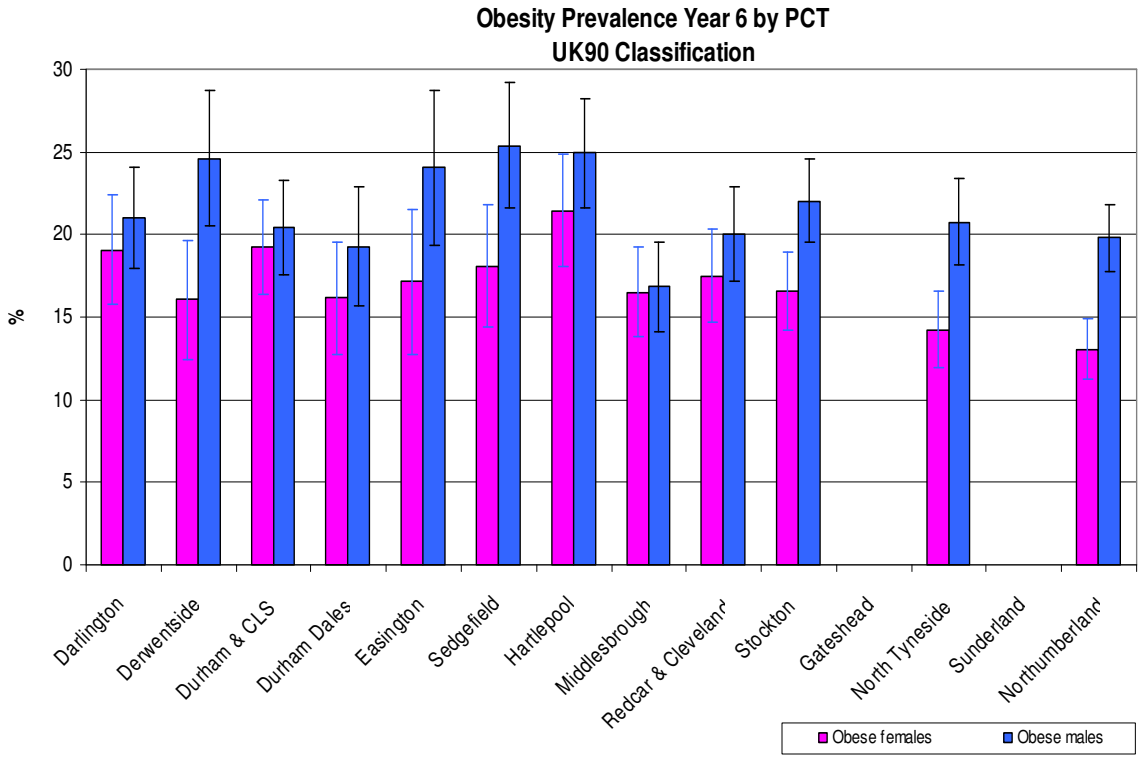
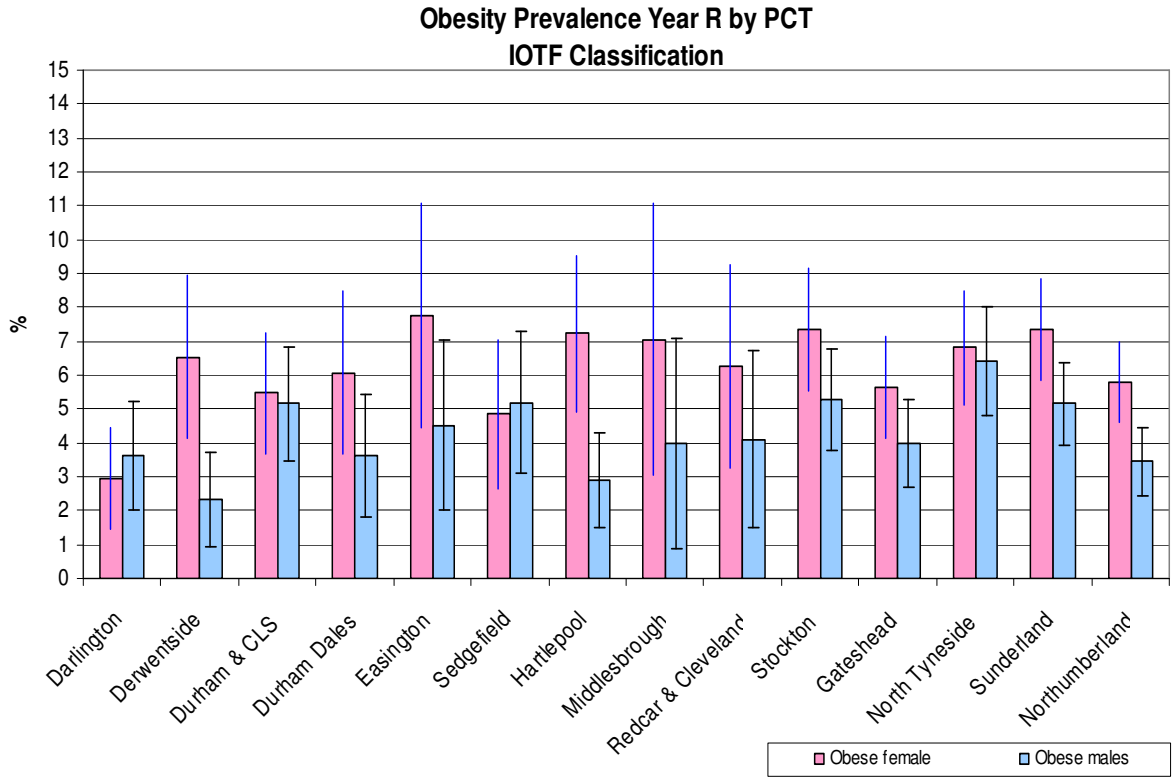
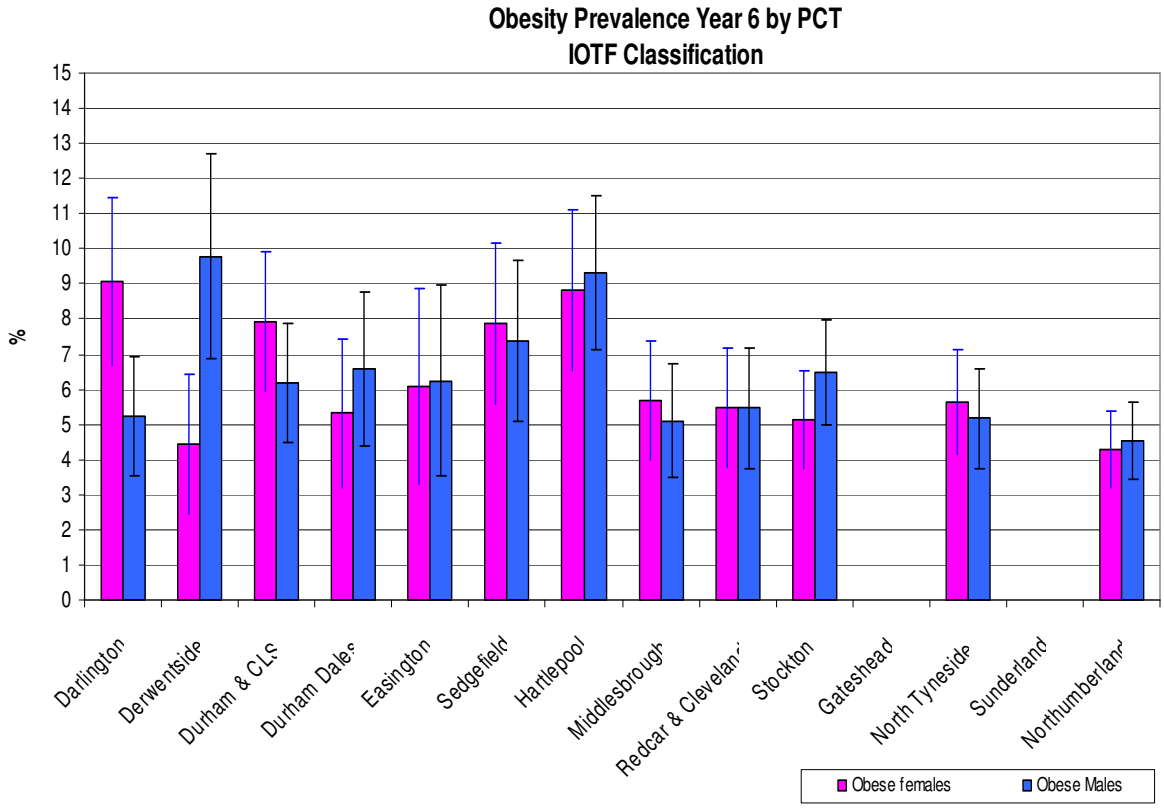


Figure 3: Gender differences in obesity for year R and year 6 by IOTF definition.





DISCUSSION

Compared to the national response rate of less than 50%[9], the North East achieved good coverage for the first years data collection. This may in part explain the higher rates of overweight and obesity in the North East, when compared to the National NCOD figures. The data gained for year 6 did however reflect regional data from the HSE 2002-2004 for ages 2-15 years: 18.99% compared to 19.5% respectively, using the UK1990 population monitoring definition for obesity.

In line with the national findings (which were calculated using UK90 definitions), aggregated data for the region demonstrated a similar prevalence of overweight for boys and girls in year R and 6. However obesity prevalence was significantly higher in year 6, particularly in boys, using the UK90 classification. Whether this is indicative of true prevalence rates or a reflection of higher opt out rates in older girls, is unclear. Indeed, anecdotal accounts of higher opt out in year 6 girls were reported across the country[9]. Similarly, anecdotal reports also indicated higher opt out rates in heavier children. This observation may, at least in part, explain the significantly lower prevalence of obesity and smaller gender, and year group differences, when using the IOTF cut points for obesity. As the IOTF definition for obesity equates, approximately, to the 99th centile of the UK90 charts (in comparison to the 95th centile used to define obesity in the UK90 charts during population monitoring), less children will therefore be classified as obese, and those children who do fall into this category, will be those with more extreme obesity, who may indeed be more likely to opt out.

Using the IOTF definitions to classify underweight, the percentage of children classified as underweight was similar to the number classified as obese. However, the majority of these children, in both year groups fell into the first least severe grade of thinness, which equates to an adult BMI of between 17 and <18.5. Under 1% of the total year R and 6 populations fell into grades 3-2, which equate to an adult BMI of <17, and matches the WHO existing criteria for wasting in children based on weight for height[8]. However the new underweight definitions were only published in June 2007, therefore the sensitively and specificity of these underweight definitions require further testing in the field.

Although there remains some debate over the suitability of BMI measures in children given the implications of gender, age, pubertal status, muscle mass and ethnicity in interpreting BMI, it has nevertheless become a fairly well established methodology. However, the current inconsistency in definitions must be resolved to facilitate comparisons of data and studies both within the UK and internationally. Until a unifying definition is reached, both definitions will be reported to help facilitate and contextualise comparisons with other datasets.

CONCLUSIONS

Despite the significant practical challenges in establishing this complex data collection system in year one, the North East achieved good coverage, providing a baseline for this extremely valuable data source. It is however, important to treat the prevalence figures with some caution as there remain some inconsistencies in the pupil denominator and will be subject to a degree of selection bias. It is hoped that this annual surveillance exercise will be strengthened by ongoing improvements resulting from lessons learnt. It is also anticipated that opt out rates will reduce as the process is integrated into routine standard practice. And, that with ongoing evaluation and research (such as the pilot work carried out by NEPHO and University of Teesside[10]) continue to inform future developments. The addition of new postcode and ethnicity fields collected from 2006/07 onwards, will also help improve the utility of the data by identifying potential health inequalities, targeting service provision and informing research. As trends in childhood growth patterns are tracked over time, it will become possible to evaluate progress towards weight related health targets and inform future planning and service development. Whilst the debate surrounding childhood BMI classification cut points continues, the continued development of strategies to shift the BMI distribution (illustrated in Figure 1) to the left, will help reduce the proportion of overweight and obese children irrespective of definition.

Declarations

Approval for the Public Health Observatories to analyse this dataset was granted by the Patient Information Advisory Group (PIAG) under Section 60 of the Health and Social Care Act 2001 to process patient identifiable information without consent.

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APPENDIX 1 AN OVERVIEW OF THE DIFFERENT CHILDHOOD BMI DEFINITIONS USED WITHIN THE UK

There is currently no universally accepted system for the classification of childhood obesity. Across the world numerous Body Mass Index (BMI) classification systems are in operation, giving rise to a plethora of definitions arising from the diversity in sample size, nationality of reference populations, and use of different obesity cut points[11-13]. For example, in the USA, the CDC 2000 centile charts (developed from a USA reference population) are used to establish overweight and obesity in individuals exceeding the 85th and 95th centile respectively[12,13]. In the UK, the UK90 reference charts[6] (developed from a British reference population) are used to define overweight and obesity in individuals exceeding the 91st and 98th centiles when used within a clinical setting, and 85th and 95th centiles when used for population monitoring. The International Obesity Task Force (IOTF), on the other hand, have proposed an international definition based on data from six different countries, with cut points extrapolated from the adult BMI cut points of 25kg/m2 and 30kg/m2 for overweight and obesity at age 18[7,8]. In addition, the World Health Organisation (WHO), have also released their new growth standards, in response to global surge in childhood obesity and the release of the new international growth standards for infants and preschool children[16-19].

Currently three BMI classification systems are available to the UK and are reviewed in Table A1.

Table A1: A Summary Comparison of the UK 1990, IOTF and WHO Definitions for Childhood Body Mass Index

	UK 1990[6]	IOTF[7,8]	WHO 2007[16,17]
Reference population size (dates of collection)	15,636 males & 14,899 females (1978-1990)	97,876 males & 94,851 females (1963-1993)	15,103 males & 14,915 females (NGRS 1997-2003) & (NCHS: 1963-1974)
Reference age range	0-23 years	2-18 years	0-19 years
Geography of reference population	UK population only	International population: UK, Brazil, Hong Kong, Netherlands, Singapore and the USA.	A combination of the USA National Centre for Health Statistics 1977 pooled growth data[22] and the WHO Multi-centre Growth Reference Study (MGRS) from Brazil, Ghana, Norway, India, Oman, USA
Methodology	Distribution based approach whereby overweight and obesity are defined by exceeding the 85th and 95th centiles for population monitoring and 91st and 98th centiles for clinical measurement.	Age and sex specific cut points that are extrapolated from the adult BMI cut points of 25kg/m^2 and 30kg/m^2 for overweight and obesity respectively.	Distribution based approach where by centile curves were also modelled to align with the WHO child growth standards at 5 years and the recommended adult BMI cut points of 25kg/m^2 and 30kg/m^2 for overweight and obesity at age 19.
Fit with adult BMI cut points	No	Yes at age 18	Yes at age 19
Copyright issues	Reference data owned by the Child Growth Foundation.	Data published.	Data published.
Definition for underweight	No agreed definition for underweight although lower centiles are published.	Definition for underweight published[8].	Lower centiles are published.
Ethnic / cultural variation	No	Yes	Yes
Comparability with other countries	No	Yes	Yes

Current uses	- Health Survey for England - NCMP - Recommended by the Royal College of Paediatrics and Child Health within in a clinical setting for children 2-17 years. - NICE and SIGN		- This approach will be used by WHO for international comparisons. - Recommended by SACN (Scientific Advisory Committee on Nutrition) and RCPCH in their September 2007 report for use between 2 weeks and 2 years[20].

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