



The Childhood Obesity Surveillance Initiative (COSI) in the Republic of Ireland

Findings from Round 6: 2022 and 2023

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Foreword

We very much welcome the publication of this report which updates the data on trends in relation to healthy weight, overweight and obesity in primary school children in Ireland.

It is the sixth round of surveillance carried out in Ireland as part of the World Health Organization (WHO) Europe Childhood Obesity Surveillance Initiative (COSI) since 2008. As such continues to contribute to the knowledge base and inform policy and practice responses in Ireland and Europe to improve child health and prevent obesity.

The stabilisation of overweight and obesity prevalence which emerged in the 4th round of surveillance in 2015 appears to be continuing, despite of the impact of COVID-19 on children's health behaviours. However, the prevalence of overweight and obesity continues to remain relatively higher in older than in younger primary school age children. Across the cohort of schools who have participated in all rounds there continues to be a significant difference in prevalence of overweight and obesity between children attending schools designated as disadvantaged and their peers in other schools.

While participation rates of schools and children in COSI remains steady over recent rounds, it is notable that the research team caution that the data may represent a best-case scenario as the most at risk children may not be participating.

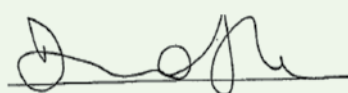
The report also highlights a number of areas that warrant focused research and examination, in particular the need to understand the continued gender differences in weight and the persistent differences in prevalence between DEIS and non-DEIS schools.

The findings of this report, and previous COSI reports indicate that we still have a significant way to go to create environments in our homes, schools and communities that support every child to grow and develop healthily from birth through to adulthood, particularly for those who experience socioeconomic disadvantage. Lifestyles and health are intrinsically linked and are heavily influenced by the prevailing environments we are born into, grow, work and age in.

We would like to thank the National Nutrition Surveillance Centre (NNSC), who were commissioned to carry out this research. In particular we wish to acknowledge and thank the children who participated in the body measurements and their parents for agreeing to participate. In doing so they provide us with a vital tool for monitoring the impact of our efforts to promote child health and prevent obesity.



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Introduction

Childhood obesity has been identified as a serious public health problem in the World Health Organisation (WHO) European region.¹ The Irish Childhood Obesity Surveillance Initiative (COSI) is an ongoing, systematic process of collecting, analysing, interpreting, and disseminating descriptive information for monitoring obesity and for use in programme planning and evaluation.

This surveillance system was first commissioned by the Department of Health and the Health Service Executive (HSE) in 2008 to be conducted by the National Nutrition Surveillance Centre (NNSC) based at the School of Public Health, Physiotherapy, and Sports Science in University College Dublin (UCD). Subsequent surveillance rounds were conducted in 2010, 2012, 2015, 2018 and 2022, each commissioned by the HSE. In 2016, the Department of Health launched the Obesity Action Plan 2016-2025, 'A Healthy Weight for Ireland', as part of the Healthy Ireland initiative.² The document sets out short-term targets for overweight and obesity to be achieved in a five-year time frame. These include a decrease of 0.5% per year in the level of excess weight in children and a reduction in the gap in obesity levels between the highest and lowest socioeconomic groups by 10%. The policy also presents the 'Ten Steps Forward', which gathers several priority actions to be taken to prevent overweight and obesity and achieve the short-term targets. The priority action areas under Step 10, 'Monitor research and review', include an action 'to sustain ongoing obesity surveillance through Healthy Ireland and Childhood Obesity Surveillance Initiative (COSI) as means of monitoring progress.' Regular surveillance of weight status among Irish children is essential to monitor any changes occurring in terms of childhood obesity to inform the policy and to evaluate the progress on achieving these targets.

COSI aims to systematically measure trends in overweight and obesity in primary school children to correctly understand the epidemic's progress in Ireland while allowing inter-country comparisons within the WHO European region. Implementing a simple, effective, and sustainable surveillance system has been crucial in providing valuable information to monitor and address the obesity epidemic in children, identify groups at risk, and evaluate the impact of obesity-preventative interventions.

In this context, it is important to highlight that surveillance is not equivalent to screening. Screening involves applying a test to a defined group of persons to identify a risk factor or a combination of risk factors of a disease at an early stage – the people who are identified as 'at risk' are then treated. In contrast, surveillance collects anonymised data from a representative sample of people to monitor trends for policy development and planning purposes.

The core objective of COSI in Ireland is to measure weight status in primary school children by describing:

- ▶ Weight, height, body mass index (BMI), and waist circumference.
- ▶ Prevalence of underweight, normal weight, overweight, and obesity.

Round 6 (R6) of COSI was originally scheduled to be conducted in 2021 but was postponed due to COVID-19. In March 2020, this respiratory infectious disease caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was declared a global pandemic. Public health measures, primarily based on containment measures to curb the spread of the infection, were enforced globally.

These unprecedented measures led to many alterations to the lifestyles of populations worldwide and had an enormous impact on health behaviours, particularly among school-going children.

There has been ongoing awareness among public health and research institutions of the lack of research on the impact of the pandemic on children's lifestyles and health. As a result, COSI R6 included a novel COVID-19 module in the family survey to assess children's daily routine, well-being, eating habits, sedentary behaviours, physical activity, and parental perception of the nutritional status pre- and during the pandemic. The findings of this research on the consequences of the pandemic will be crucial for participating countries to help prepare for the future.

Before initiating COSI R6, qualitative research was conducted by the NNSC to understand whether and how schools wished to engage in the initiative, considering the COVID-19 public health measures in schools.³ In April 2022, schools (n=18) were selected using a simple random stratifying technique from a master list of sentinel schools (n=189) invited to participate in COSI Round 5 (R5). This sampling method ensured that the sample selected represented the larger group of schools from which they were drawn. The principals of the selected schools were emailed invitation letters and invited to engage in a short 10–15-minute telephone interview. Interviews were conducted with 18 principals on receipt of their consent.

Overall, the principals' response to participation in COSI R6 was very positive. The research findings suggested that it would be feasible for COSI R6 to commence as scheduled in autumn 2022 once public health COVID-19 restrictions permitted and that planning should proceed on this basis. Subsequently, data collection for COSI-Ireland R6 commenced in October 2022.



Methods

Study Design

The WHO European COSI is a collaborative study with principal investigators from over 40 countries cooperating on survey content, methodology and timing, using a standard protocol. The Irish surveillance system followed the standard protocol of the WHO European COSI, which was jointly developed by the WHO Regional Office for Europe and the participating Member States. Strict adherence to the original protocol was required for inclusion in the European database, and this procedure was achieved with the current study.

A flowchart demonstrating the data collection process for COSI R6 is presented in Figure 1.

Ethical considerations

Ethical approval for the study was obtained from UCD's Human Research Ethics Committee.

Consent was obtained on three levels: school, parent, and child. An initial letter and consent form were sent to the principals in which the objectives of the surveillance system were explained. A total of 121 schools consented to participate in R6. Subsequently, all parents from the sampled classes in participating schools were given a letter explaining the surveillance system and the anthropometric measurements. Parents were fully informed about all study procedures, and before the child's enrolment in the study, signed informed consent was obtained from a parent or guardian. All information and consent forms for parents/guardians were approved by the Irish National Adult Literacy Agency (NALA). Verbal assent was also obtained from the child on the day of the measurements.

To ensure confidentiality for all collected and archived data, unique identification (ID) numbers were assigned to each child, and each register refers only to these numbers. The research team alone has access to the complete list of ID numbers and corresponding names of the children sampled, held separately from the examination data. All hardcopy records are stored in locked cabinets in UCD and used only for reference if required. For R6, the novel use of electronic phone devices facilitated the collection of the child measurement data instead of the traditional hardcopy child record forms.⁴ These devices allowed the children's information to be recorded and transferred securely and promptly to a server in the NNSC office where they are stored.

Recruitment of schools and children

Letters were sent initially to schools inviting them to participate in the study, and telephone calls followed up. In 2008, 498 schools were invited, of which 163 consented to participate in Round 1 (R1). These randomly selected schools were a representative sample of all Irish primary schools, taking into account the issue of small schools in the Republic of Ireland. The advice the Department of Education and Skills provided assisted in inviting a representative sample of 75 schools classified as Delivering Equality of Opportunity in Schools (DEIS), of which 23 consented to participate in R1.

Schools that participated in COSI R1 plus their associated senior schools (Second to Sixth class) were approached to participate in each subsequent round of COSI. As such, these same sentinel schools have been invited to participate in each round of COSI and remain a representative sample of all primary schools in Ireland.

In total, 121 of the 187 schools invited to participate consented to partake in COSI-Ireland R6. Due to extremely poor levels of parental consent, one school visit was cancelled. Therefore, a total of 120 school visits were conducted. Children in First, Second, Fifth, and Sixth classes were measured. These classes include children whose age groups precede puberty, and at these ages, identifying obesity is valuable to predict the condition in adulthood.⁵ For each participating school, one class from each year was randomly selected by the principal to participate.

Despite the challenges posed by COVID-19 in conducting COSI-Ireland R6, school participation was well preserved, notably in DEIS schools, demonstrating their commitment to equity in obesity trends (Table 1).⁶ In R6, school participation decreased marginally (65%) compared to R5 (73%).⁷ In total, 76% (n=32/42) of DEIS schools consented to partake in R6, substantially higher than non-DEIS school participation of 61% (n=89/145). The R6 DEIS school participation rate was also closely in line with R5 (81%; n=21/26), despite an increase in the number of DEIS schools following reclassification in 2022. The R6 DEIS participation rate was also similar to Round 2 (R2) and Round 3 (R3) participation (84%; n = 21/25 and 78%; n = 21/27, respectively) but less than Round 4 (R4) (100%; n = 26/26).

Child examination rates were also remarkably well-maintained relative to the preceding pre-pandemic R5.⁶ The examination rate of the total cohort in R6 was 56.12% (n = 5,072/9038), closely in line with R5 (57.6%). No differences were apparent for examination rates or parent refusal rates across classes and between boys and girls, following a similar trend to previous COSI-Ireland rounds (Table 3).

Fieldworker Training

Before their recruitment, all fieldworker candidates were Garda vetted to disclose any criminal convictions. A total of 18 fieldworkers were recruited, and each attended an in-person training session on anthropometric measurements and data collection, following a standardised protocol developed by the WHO. More specifically, the training included a review of the background and objectives of the surveillance system, standardised use of the forms and the calibration of the measurement instruments. The training also included taking children's anthropometric measurements and inputting data into the Open Data Kit (ODK) mobile phone app.⁸ The session also emphasised the importance of recording measurement values immediately after reading them and how to support children who may feel uncomfortable or anxious during measurement.

Covid-19 Public Health Guidelines

The fieldworkers strictly adhered to public health and school-specific COVID-19 guidelines, including using hand sanitiser and face masks during each school visit. The fieldworkers also travelled separately to each school and did not carpool as in previous COSI rounds to reduce the possible spread of the viral infection.

Anthropometric measurements

Measurements were conducted between October 2022 and January 2023, with a 3-week break in data collection during the Christmas holidays. Trained fieldworkers attended schools to collect all measurements. Anthropometric measurements followed a standardised weight, height, and waist circumference protocol.

Leicester Height Measure stadiometers were used to measure height, WB-100MA Tanita scales were used to measure weight, and waist circumference was measured using a retractable, non-stretchable plastic tape measure (SEXA 201). Body weight scales were calibrated before use.

All measurements were performed in a private room or behind screens to minimise potential harm or discomfort and to ensure confidentiality and privacy.

The fieldworkers worked in pairs and were all female. Children were asked to wear regular, light, indoor clothing without shoes. Hair ornaments were removed, ponytails undone, and all children were asked to empty their pockets.

Weight was measured in kilograms (kg) to the nearest 100 grams (0.1 kg). The stadiometers were mounted at right angles between a level floor and against a straight, vertical surface (wall or pillar). Children's height was measured in centimetres (cm), and the reading was taken to the last completed millimetre (mm). Waist circumference was taken at the midpoint between the most superior aspect of the iliac crest and the 12th rib, measured in cm, and recorded to the nearest mm.

Other data

Individual information on the date of birth, school grade, date and time of measurement, sex and clothes worn during the measurements were collected through the core electronic data collection form. Verbal assent was obtained from each child and recorded before the measurements were taken.

The school principal also completed an additional survey. The mandatory school record form reported the number of children registered and measured (examined) per sample class and the number for which no parental consent was obtained. The number of those who refused to be measured and those absent on the day of the measurements were also recorded. Additionally, several school (environmental) characteristics were also included, such as the frequency of physical education lessons, availability of school playgrounds, the possibility of obtaining certain foods and beverages on the school premises, and current and ongoing school initiatives organised to promote a healthy lifestyle (healthy eating, physical activity).

Parents of First and Second-class children were also invited to complete a family survey as part of the study. The survey was available in hard copy, sent out and returned to UCD by post or online using LimeSurvey, an online data collection tool. The online version was emailed to each consenting parent/guardian and accessed through a link and a token unique to each child. The online survey was then directly uploaded from LimeSurvey to a secure server in UCD. This survey obtained information regarding the child's diet, physical activity pattern, and the family's socioeconomic characteristics and co-morbidities. The R6 family survey also contained a COVID-19 module, which was developed to measure the impact of the pandemic on children's lifestyles and health behaviours.

Feedback to parents and children

The children's height, weight and waist circumference measurements were not routinely shared with parents/guardians; however, upon request, measurements were provided on a paper card and given to the child to take home.

Data entry

The child measurement data were digitally recorded on the ODK app using Android phones. The school record data were recorded on prepared hardcopy data sheets, then input into ODK by the fieldworkers at the end of each school visit, and then the hardcopies returned to the NNSC office by registered post. The hardcopy family surveys were entered

into ODK by the NNSC research assistants on receipt. The ODK app automatically uploaded all data collected to the NNSC secure server in UCD. Data was deleted from each Android device periodically. The online family surveys collected in LimeSurvey were downloaded directly onto the UCD secure server by the NNSC data manager. Data were checked for inconsistencies. The final child record dataset only included children with informed consent and complete information on age and sex.

Assessment of children's weight status

BMI is an easily calculated and accessible population marker for monitoring trends in obesity. It is calculated from the formula, weight in kg/height in m². Although it has many weaknesses as a measure of the adiposity of an individual, it is a valuable measure for monitoring whole population adiposity and trend data. Cut-off points of 18.5 kg/m², 25 kg/m², and 30 kg/m² define normal weight, overweight and obesity in adults, respectively.⁹ However, these cut-offs are not valid for children. Due to regular changes in the body fat content of children as they develop and differences between boys and girls, a single categorisation cannot be used to define childhood overweight and obesity; each sex and age group needs its own categorisation. Age- and sex-specific growth reference percentile charts and corresponding z-scores have been developed for this purpose. The percentile cut-off points at 18 years of age corresponding to the BMI cut-off points for underweight, normal weight, overweight, and obesity are used to calculate percentiles and z-scores for children of different ages and sex. These cut-offs, the International Obesity Task Force (IOTF) cut-offs, are recommended for international comparisons of the prevalence of overweight and obesity in childhood populations and were therefore used in the current study.⁹

Data analysis

Data were pseudonymised at the point of data entry. For participation rates and all demographic and anthropometric variables, descriptive statistics were calculated using IBM SPSS Statistics 27. Data is presented for all children by sex and by class. The prevalence of weight categories was calculated by class, gender, urban/rural location, and DEIS category (those schools classified as DEIS and Non-DEIS as of September 2022). Also, due to the major expansion of the DEIS programme in 2022 (see Appendix), 11/121 participating schools classified as non-DEIS schools in previous COSI rounds gained DEIS status before COSI R6 data collection commenced. This reclassification was considered, and schools were categorised as 'Always DEIS', 'New DEIS' or 'Always Non-DEIS' for this analysis.

Pearson's chi-squared test was used to compare the prevalence of overweight, including obesity, between classes, gender, children attending urban and rural schools, and children attending DEIS and non-DEIS schools. Significance was set at $p < 0.05$.

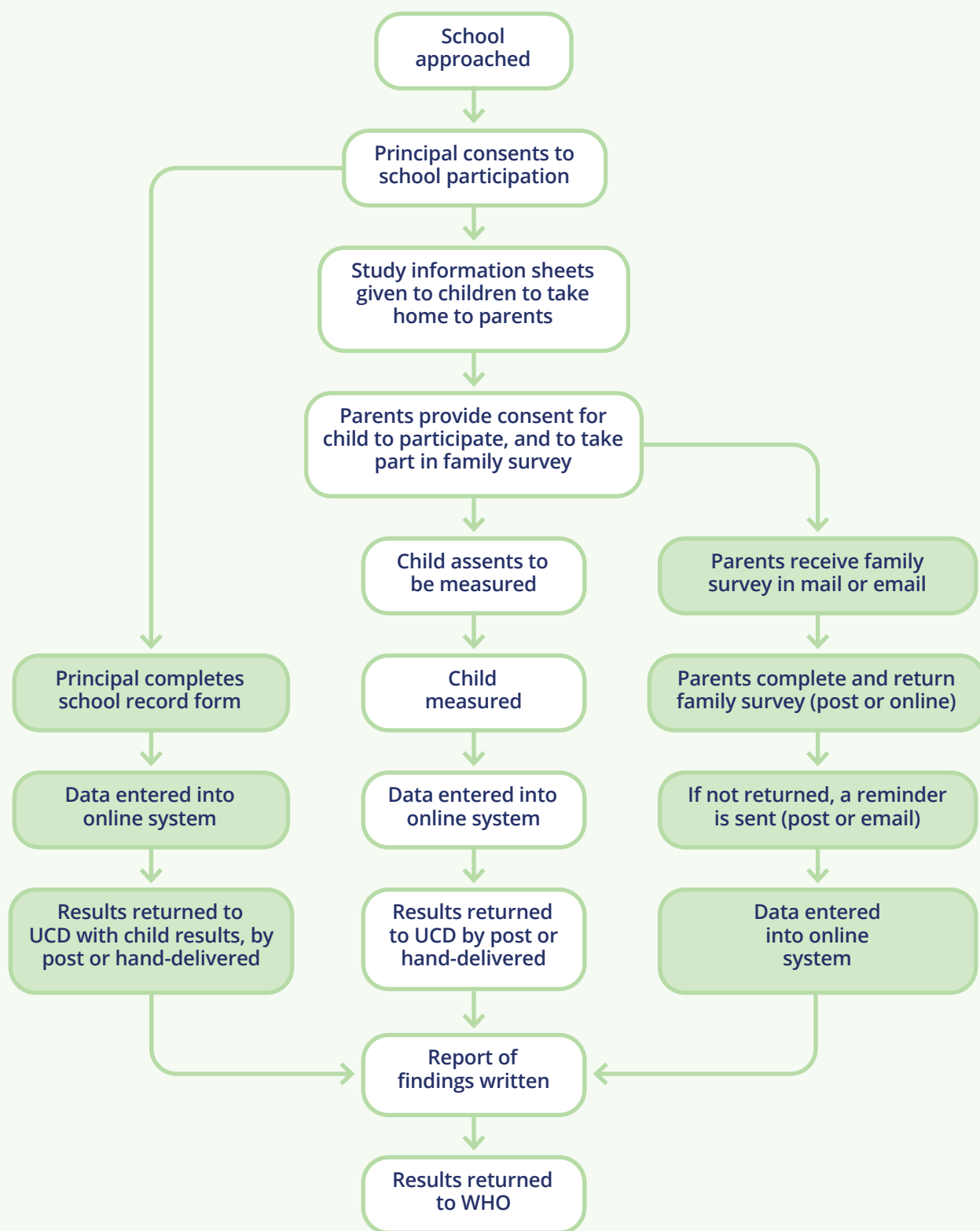


Figure 1

Flow chart of the data collection process for Childhood Obesity Surveillance Initiative Round 6. WHO, World Health Organization.

Study characteristics

Participation rates

School participation rates are presented in Table 1. In total, 121 schools consented to participate, with 66 schools declining participation. School participation rates for R6 (65%) were slightly lower than R5 (73.0%) and showed a considerable decrease when compared to R2 and R3 (79.6% and 81.0% respectively).

In total, 5180 children participated in COSI R6. Following the refusal of one child to be measured, the data of 5,179 children, composed of 1279, 1338, 1247, and 1315 children from First, Second, Fifth, and Sixth classes, respectively, and 2,390 boys and 2,789 girls are reported.

Table 1

Comparison of the Childhood Obesity Surveillance Initiative Round 6 and Round 5 school participation rates.

Round 6			Round 5		
Class	N	%	Class	n	%
1st	102		1st	118	
2nd	103		2nd	119	
5th	103		4th	110	
6th	104		6th	108	
Total	121/187*	65.0%	Total	135/185	73.0%
Non-DEIS	89/145	61.0%	Non-DEIS	114/159	72.0%
DEIS	32/42	76.0%	DEIS	21/26	81.0%

*187 schools were invited to participate in R6, 121 schools consented to participate, and 120 schools actually participated. DEIS, Delivering Equality of Opportunity in Schools.

Of the 120 participating schools, 65 sentinel schools participated in all previous rounds (consistent schools) (Table 2). In comparison, 55 schools did not participate in all rounds but did participate in at least one round (inconsistent schools). A total of six all-boys schools participated in COSI R6, all of which participated in all COSI rounds. Meanwhile, ten all-girls schools participated in COSI R6, three of which had participated in all COSI rounds and seven of which had partaken in at least one previous COSI round.

Table 2.

Number and percentage of schools by gender type in consistent and inconsistent schools participating in Round 6 of the Childhood Obesity Surveillance Initiative.

COSI participation	Mixed n (%)	All Girls n (%)	All Boys n (%)	Total n (%)
Consistent	56 (53.8%)	3 (30.0%)	6 (100%)	65 (54.2%)
Inconsistent	48 (46.2%)	7 (70.0%)	0 (0.0%)	55 (45.8%)

Child examination rates are presented in Table 3. Data for two schools were not completed by the principals during the school visit nor returned to the NNSC office; therefore, Table 3 accounts for 5,079 children and not the total number of children measured (n=5,179). The examination rate of the total cohort (n=118/120 schools) was 56.1%, with 60.8% of parents consenting for their child to participate. These results closely align with R5 examination (57.6%) and parental consent rates (61.3%). The difference in consent and examination rates can be explained by the small number of children absent or declining to be measured on the day of data collection. These rates were similar across classes and between boys and girls.

Table 3

Child examination rates in Round 6 of Childhood Obesity Surveillance Initiative.

Class	Gender	Registered children (n)	Examined children (n (%))	Absent (n (%))	Non-assent (n (%))	Refused consent (n (%))
1st	Girls	1131	643 (56.8%)	43 (3.8%)	0 (0.00%)	445 (39.4%)
	Boys	1061	612 (57.7%)	51 (4.8%)	1 (0.1%)	397 (37.4%)
	Total	2192	1255 (57.3%)	94 (4.3%)	1 (0.1%)	842 (38.4%)
2nd	Girls	1215	719 (59.1%)	59 (4.9%)	0 (0.0%)	437 (36.0%)
	Boys	1029	604 (58.7%)	52 (5.1%)	0 (0.0%)	373 (36.3%)
	Total	2244	1323 (59.0%)	111 (5.0%)	0 (0.0%)	810 (36.%)
5th	Girls	1281	662 (51.7%)	59 (4.6%)	0 (0.0%)	560 (43.7%)
	Boys	999	550 (55.1%)	45 (4.5%)	0 (0.0%)	404 (40.4%)
	Total	2280	1212 (53.2%)	104 (4.6%)	0 (0.0%)	964 (42.3%)
6th	Girls	1268	711 (56.1%)	59 (4.7%)	0 (0.0%)	498 (39.3%)
	Boys	1054	571 (54.2%)	57 (5.4%)	0 (0.0%)	426 (40.4%)
	Total	2322	1282 (55.2%)	116 (5.0%)	0 (0.0%)	924 (39.8%)
Total	Girls	4895	2735 (55.9%)	220 (4.5%)	0 (0.0%)	1940 (39.6%)
	Boys	4143	2337 (56.4%)	205 (5.0%)	1 (0.01%)	1600 (38.5%)
	Total	9038	5072 (56.1%)	425 (4.7%)	1 (0.01%)	3540 (39.1%)

Results

The results of anthropometric measurements collected on children per class are presented below. Table 4 shows the demographic and anthropometric characteristics of children by class.

Table 4

Demographic and anthropometric characteristics of children by class in Round 6 of the Childhood Obesity Surveillance Initiative

	Class	N	Median	P25-75
Age (years)	1st	1279	7.2	7.0-7.5
	2nd	1338	8.2	7.9-8.5
	5th	1247	11.1	10.9-11.4
	6th	1315	12.1	11.8-12.3
Age (mths)	1st	1279	86.0	83.0-90.0
	2nd	1338	98.0	95.0-102.0
	5th	1247	133.0	130.0-136.0
	6th	1313	145.0	142.0-148.0
Weight (kg)	1st	1279	24.7	22.4-27.6
	2nd	1338	27.6	25.1-31.2
	5th	1247	39.1	34.2-45.5
	6th	1313	43.3	38.1-50.0
Height (cm)	1st	1277	125.0	121.3-128.6
	2nd	1338	131.0	126.8-135.0
	5th	1246	147.8	143.0-152.4
	6th	1312	154.0	149.0-159.1
WC (cm)	1st	1275	55.3	52.0-59.0
	2nd	1336	57.3	54.0-61.2
	5th	1246	62.5	58.1-68.3
	6th	1315	64.0	59.8-69.6
BMI (kg/m²)	1st	1277	15.8	14.8-17.1
	2nd	1338	16.2	15.1-17.6
	5th	1246	17.8	16.2-20.1
	6th	1310	18.2	16.6-20.5

Median, the 50th percentile value; P25-75, the 25th and 75th percentile values; WC, waist circumference; BMI, body mass index.

Overweight and obesity prevalence

Descriptive statistics were used to summarise the frequency of IOTF weight status categories among the cohort. The analysis showed a slight decrease in the prevalence rates of overweight and obesity amongst all children in R6 (17.70%) compared to R5 (19.1%) (Table 5).

Table 5

The weight classification using the International Obesity Task Force BMI classification for all children of the Childhood Obesity Surveillance Initiative Round 6 and Round 5

IOTF classification	Round 6			Round 5		
	N	n	%	N	n	%
	5170			5583		
Underweight		449	8.7		359	6.4
Normal		3805	73.5		4159	74.5
Overweight		704	13.6		821	14.7
Obese		212	4.1		244	4.4
Overweight including Obesity		916	17.7		1065	19.1

The prevalence of overweight and obesity by sex and class are presented in Table 6. Differences in the prevalence of overweight including obesity between boys and girls were apparent amongst all children ($p = 0.028$). Examining these differences by class demonstrates a greater prevalence of overweight and obesity among girls than among boys in second class ($p = 0.012$), which is consistent with R5 findings ($p = 0.003$). No significant differences were observed between sexes in First, Fifth, and Sixth classes, aligning with previous R5 results.

Differences in the prevalence of overweight and obesity between classes were evident, with a significantly higher prevalence of overweight, including obesity observed in Fifth class children (20.4%) compared to First (17.1%), Second (16.1%) and Sixth classes (17.3%) ($p = 0.033$) (Table 7).

R6 results also show that the continued reduction in the prevalence of overweight and obesity in First class children identified in R5 appears to be plateauing and perhaps even reversing, albeit questionable given small numbers (Figure 2).



Table 6

Weight classification using the International Obesity Task Force BMI classification for all children by class and sex in Round 6 of the Childhood Obesity Surveillance Initiative.

Class	IOTF classification	Boys n (%)	Girls n (%)	Total n (%)	p-value
All	Underweight	204 (8.5%)	245 (8.8%)	449 (8.7%)	
	Normal	1791 (75.0%)	2014 (72.4%)	3805 (73.6%)	
	Overweight	300 (12.6%)	404 (14.5%)	704 (13.6%)	
	Obese	93 (3.9%)	119 (4.3%)	212 (4.1%)	
	Overweight including Obesity	393 (16.5%)	523 (18.8%)*	916 (17.7%)	0.028
1st	Underweight	49 (7.8%)	48 (7.4%)	97(7.6%)	
	Normal	480 (76.8%)	481 (73.8%)	961 (75.3%)	
	Overweight	66 (10.6%)	91 (14.0%)	157 (12.3%)	
	Obese	30 (4.8%)	32 (4.9%)	62 (4.9%)	
	Overweight including Obesity	96 (15.4%)	123 (18.9%)	219 (17.1%)	0.097
2nd	Underweight	49 (8.0%)	48 (6.6%)	97 (7.2%)	
	Normal	481 (78.6%)	544 (74.9%)	1025 (76.6%)	
	Overweight	60 (9.8%)	107 (14.7%)	167 (12.5%)	
	Obese	22 (3.6%)	27 (3.7%)	49 (3.7%)	
	Overweight including Obesity	82 (13.4%)	134 (18.5%)*	216 (16.1%)	0.012
5th	Underweight	39 (6.9%)	68 (10.0%)	107 (8.6%)	
	Normal	411 (72.5%)	474 (69.8%)	885 (71.0%)	
	Overweight	90 (15.9%)	110 (16.2%)	200 (16.1%)	
	Obese	27 (4.8%)	27 (4.0%)	54 (4.3%)	
	Overweight including Obesity	117 (20.6%)	137 (20.2%)	254 (20.4%)	0.842
6th	Underweight	67 (11.5%)	81 (11.2%)	148 (11.3%)	
	Normal	419 (71.7%)	515 (71.0%)	934 (71.4%)	
	Overweight	84 (14.4%)	96 (13.2%)	180 (13.8%)	
	Obese	14 (2.4%)	33 (4.6%)	47 (3.6%)	
	Overweight including Obesity	98 (16.8%)	129 (17.8%)	227 (17.3%)	0.631

*($p < 0.05$) – the prevalence of overweight, including obesity, in girls was significantly different than in boys

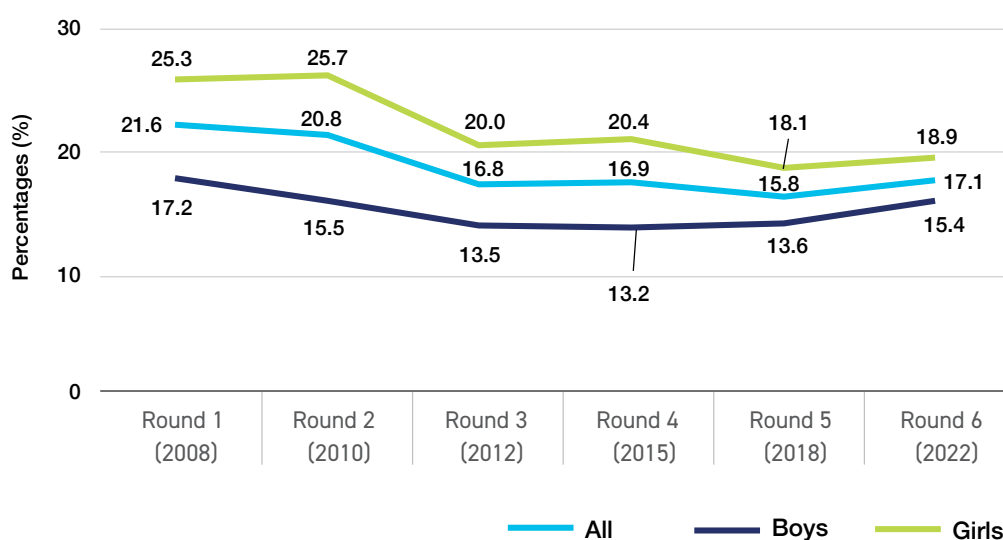
Table 7

Prevalence of overweight, including obesity by class in Childhood Obesity Surveillance Initiative round 6 as categorised using International Obesity Task Force standards.

Class	N	Overweight incl. obesity n (%)	p-value
1st	1277	219 (17.1%)	0.033
2nd	1338	216 (16.1%)	
5th	1246	254 (20.4%)*	
6th	1309	227 (17.3%)	

* ($p < 0.05$) – the prevalence of overweight, including obesity, in Fifth class children was significantly different than in other classes.

Table 8 depicts the prevalence of weight categories between children attending schools classified as urban and rural. No differences were apparent between urban and rural children across the complete cohort and by class ($p > 0.05$).

**Figure 2**

Prevalence of overweight, including obesity among First class children in each round of the Childhood Obesity Surveillance Initiative as categorised using International Obesity Task Force standards.

Table 8

Weight classification using the International Obesity Task Force BMI classification for all children and by class, based on urbanisation, in Round 6 of the Childhood Obesity Surveillance Initiative.

Class	IOTF classification	Urban n (%)	Rural n (%)	Total n (%)	p-value
All	Underweight	368 (8.9%)	81 (8.0%)	449 (8.7%)	
	Normal	3043 (73.3%)	762 (74.9%)	3805 (73.6%)	
	Overweight	570 (13.7%)	134 (13.2%)	704 (13.6%)	
	Obese	172 (4.1%)	40 (3.9%)	212 (4.1%)	
	Overweight including Obesity	742 (17.3%)	174 (20.0%)	916 (17.7%)	0.723
1st	Underweight	79 (7.6%)	18 (7.7%)	97 (7.6%)	
	Normal	785 (75.3%)	176 (75.2%)	961 (75.3%)	
	Overweight	128 (12.3%)	29 (12.4%)	157 (12.3%)	
	Obese	51 (4.9%)	11 (4.7%)	62 (4.9%)	
	Overweight including Obesity	179 (17.2%)	40 (17.1%)	219 (17.1%)	0.980
2nd	Underweight	73 (7.0%)	24 (8.1%)	97 (7.2%)	
	Normal	806 (77.4%)	219 (74.0%)	1025 (76.6%)	
	Overweight	130 (12.5%)	37 (12.5%)	167 (12.5%)	
	Obese	33 (3.2%)	16 (5.4%)	49 (3.7%)	
	Overweight including Obesity	163 (15.6%)	53 (17.9%)	216 (16.1%)	0.351
5th	Underweight	89 (8.8%)	18 (7.7%)	107 (8.6%)	
	Normal	707 (69.9%)	178 (76.1%)	885 (71.0%)	
	Overweight	170 (16.8%)	30 (12.8%)	200 (16.1%)	
	Obese	46 (4.50%)	8 (3.4%)	54 (4.3%)	
	Overweight including Obesity	216 (21.3%)	38 (16.2%)	254 (20.40%)	0.081
6th	Underweight	127 (12.0%)	21 (8.3%)	148 (11.3%)	
	Normal	745 (70.5%)	189 (74.7%)	934 (71.4%)	
	Overweight	142 (13.4%)	38 (15.0%)	180 (13.8%)	
	Obese	42 (4.0%)	5 (2.0%)	47 (3.6%)	
	Overweight including Obesity	184 (17.4%)	43 (17.0%)	227 (17.3%)	0.872

A difference in weight category distribution was apparent in schools classified as disadvantaged (n=31 as of September 2022). Table 9 demonstrates these differences, with disadvantaged schools having a higher prevalence of children with overweight and obesity across the whole cohort ($p < 0.001$).

The prevalence of overweight and obesity by DEIS status was further analysed (Table 10) and reflects the reclassification of the participating schools in R6 that were newly identified as DEIS schools using the Refined DEIS identification model. The COSI R6 prevalence of overweight and obesity in “New DEIS” schools lie intermediately between the “Always DEIS” (n=20) and “Always non-DEIS” (n=89) values for the whole cohort and in all classes except First class. This is further illustrated in Figure 3, where an inverse gradient is observed for the whole cohort and all classes except for First class (Figure 3). These results would be expected considering the refined version of the DEIS identification model extends the scope of disadvantage, allowing for the disadvantage of schools with a high proportion of students from borderline disadvantaged areas to be reflected. The disparity between disadvantaged and other schools also appears more apparent in higher grades (Tables 9 and 10).

Table 9

Weight classification using the International Obesity Task Force BMI classification for all children, based on DEIS status (as of 2022), in Round 6 of the Childhood Obesity Surveillance Initiative.

Class	IOTF classification	DEIS n (%)	Non-DEIS n (%)	Total n (%)	p-value
All	Underweight	79 (8.6%)	370 (8.7%)	449 (8.7%)	
	Normal	610 (66.1%)	3195 (75.2%)	3805 (73.6%)	
	Overweight	169 (18.3%)	535 (12.6%)	704 (13.6%)	
	Obese	65 (7.0%)	147 (3.5%)	212 (4.1%)	
	Overweight including Obesity	234 (25.4%)*	682 (16.1%)	916 (17.7%)	<0.001*
1st	Underweight	17 (8.5%)	80 (7.4%)	97 (7.6%)	
	Normal	140 (70.4%)	821 (76.2%)	961 (75.3%)	
	Overweight	31 (15.6%)	126 (11.7%)	157 (12.3%)	
	Obese	11 (5.5%)	51 (4.7%)	62 (4.9%)	
	Overweight including Obesity	42 (21.1%)	177 (16.4%)	219 (17.1%)	0.107
2nd	Underweight	13 (5.6%)	84 (7.6%)	97 (7.2%)	
	Normal	174 (74.7%)	851 (77.0%)	1025 (76.6%)	
	Overweight	33 (14.2%)	134 (12.1%)	167 (12.5%)	
	Obese	13 (5.6%)	36 (3.3%)	49 (3.7%)	
	Overweight including Obesity	46 (19.7%)	170 (15.4%)	216 (16.1%)	0.100

Class	IOTF classification	DEIS n (%)	Non-DEIS n (%)	Total n (%)	p-value
5th	Underweight	21 (9.1%)	86 (8.5%)	107 (8.6%)	
	Normal	135 (58.4%)	750 (73.9%)	885 (71.0%)	
	Overweight	58 (25.1%)	145 (14.3%)	200 (16.1%)	
	Obese	18 (7.8%)	36 (3.5%)	54 (4.3%)	
	Overweight including Obesity	75 (32.5%)*	179 (17.6%)	254 (20.4%)	<0.001*
6th	Underweight	28 (10.8%)	120 (11.4%)	148 (11.3%)	
	Normal	161 (61.9%)	773 (73.7%)	934 (71.4%)	
	Overweight	48 (18.5%)	132 (12.6%)	180 (13.8%)	
	Obese	23 (8.8%)	24 (2.3%)	47 (3.6%)	
	Overweight including Obesity	71 (27.3%)*	156 (14.9%)	227 (17.3%)	<0.001*

*Significantly different than non-DEIS schools ($p < 0.05$). DEIS, Delivering Equality of Opportunity in Schools.

Table 10

Comparison of overweight and obesity prevalence using the International Obesity Task Force BMI classification for all children and by class, based on DEIS classification: Always DEIS (n = 20), New DEIS (n=11) and Always non-DEIS (n=90) in Round 6 of the Childhood Obesity Surveillance Initiative.

Class	DEIS status	Overweight incl. obesity n (%)	p - value
All	Always DEIS	161 (27.7%)*	<0.001
	New DEIS	73 (21.3%)	
	Always Non-DEIS	682 (16.1%)	
1st	Always DEIS	31 (23.7%)	0.113
	New DEIS	11 (16.2%)	
	Always Non-DEIS	177 (16.4%)	
2nd	Always DEIS	32 (20.5%)	0.234
	New DEIS	14 (18.2%)	
	Always Non-DEIS	170 (15.4%)	
5th	Always DEIS	53 (37.6%)*	<0.001
	New DEIS	22 (24.4%)	
	Always Non-DEIS	179 (17.6%)	
6th	Always DEIS	45 (29.4%)*	<0.001*
	New DEIS	26 (24.3%)	
	Always Non-DEIS	156 (14.9%)	

*significantly different than non-DEIS schools ($p < 0.05$). DEIS, Delivering Equality of Opportunity in Schools.

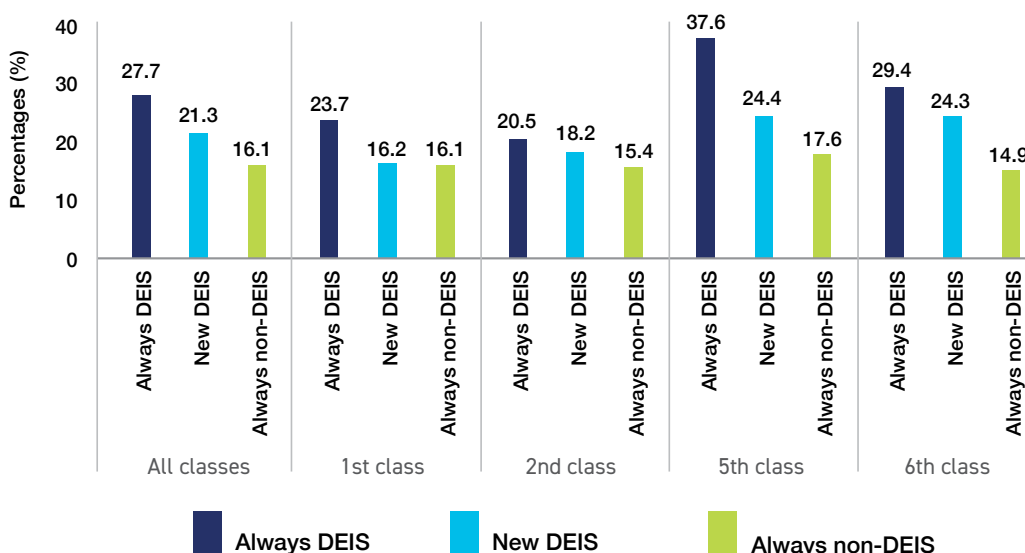


Figure 3

Comparison of overweight and obesity prevalence using the International Obesity Task Force BMI classification for all children and by class in Round 6 of the Childhood Obesity Surveillance Initiative, based on DEIS classification: Always DEIS, New DEIS, and Always non-DEIS.

The examination of overweight and obesity prevalence among First class children in disadvantaged schools across COSI rounds suggests that no major shifts in prevalence have occurred since R3, and the ongoing trend in differences between DEIS and non-DEIS schools holds firm (Figure 4). The graph also illustrates that had these borderline disadvantaged “new DEIS” schools been included with the schools that were classified as DEIS from the beginning, a smaller overweight/obesity gap between DEIS and non-DEIS schools would have been observed.

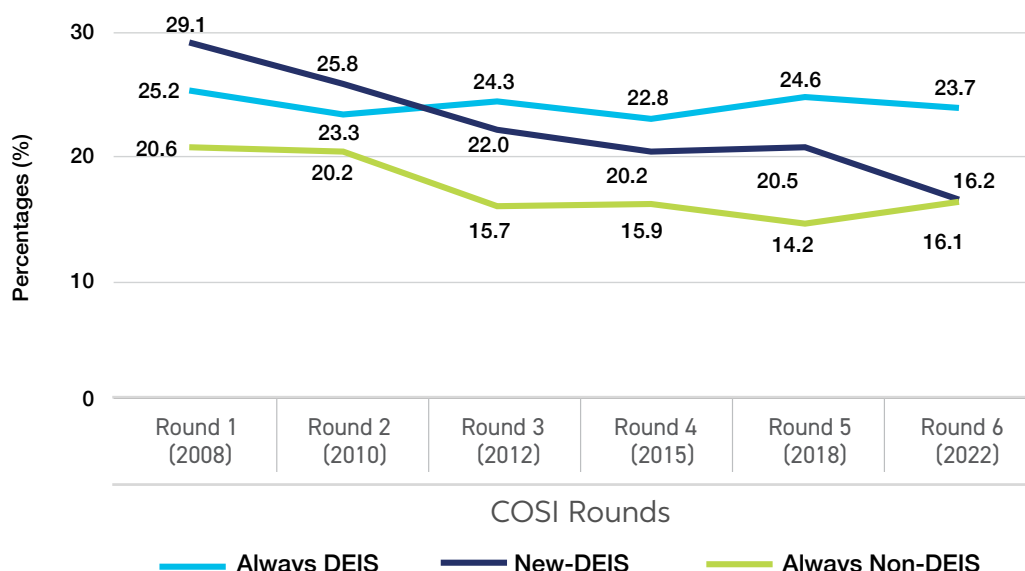


Figure 4

Comparison of overweight and obesity prevalence using the International Obesity Task Force BMI classification for First class children across all rounds of the Childhood Obesity Surveillance Initiative, based on DEIS classification: Always DEIS, New DEIS and Always non-DEIS.

School environment

The principals of the participating schools completed the school record form on the day of the school visits, which collected information about the availability of certain foods and beverages, access to indoor and outdoor play equipment and school-coordinated physical activities and the provision of health promotion initiatives and nutrition education. The results are presented below for 118 of the 120 participating schools in R6. School record forms for two schools were not completed by the principals during the school visit nor returned to the NNSC office by post at a later date.

Table 11

Availability of foods and beverages and access to advertising in schools participating in Round 6 of the Childhood Obesity Surveillance Initiative

	Free n (%)	Paid n (%)	Not available n (%)	Missing n (%)
Water	91 (77.1%)	2 (1.7%)	21 (17.8%)	4 (3.4%)
Tea	0 (0.0%)	0 (0%)	112 (94.9%)	6 (5.1%)
100% fruit juice	4 (3.4%)	2 (1.7%)	103 (87.3%)	9 (7.6%)
Sugar-sweetened fruit juice	0 (0.0%)	0 (0.0%)	110 (93.2%)	8 (6.8%)
Carbonated beverages, sugar-sweetened	0 (0.0%)	0 (0.0%)	110 (93.2%)	8 (6.8%)
Flavoured milk	0 (0.0%)	0 (0.0%)	110 (93.2%)	8 (6.8%)
Hot drinks with sugar	1 (0.8%)	1 (0.8%)	108 (91.5%)	8 (6.8%)
Dairy	18 (15.3%)	6 (5.1%)	88 (74.6%)	6 (5.1%)
Fresh fruit	26 (22.0%)	3 (2.5%)	82 (69.5%)	7 (5.9%)
Vegetables	14 (11.9%)	3 (2.5%)	93 (78.8%)	8 (6.8%)
Sweet snacks	6 (5.1%)	0 (0%)	104 (88.1%)	8 (6.8%)
Ice cream	0 (0.0%)	0 (0%)	110 (93.2%)	8 (6.8%)
Savoury snacks	8 (6.8%)	0 (0%)	102 (86.4%)	8 (6.8%)
Other	1(0.8%)	0 (0.0%)	106 (89.8%)	11(9.3%)
	Yes n (%)	No n (%)	Missing n (%)	
Are vending machines present?	0 (0.0%)	118 (100%)	0 (0.0%)	
Is the school free from advertising of energy-dense, nutrient-poor foods & beverages?	109 (92.4%)	9 (7.6%)	0 (0.0%)	

*Missing indicates that this question was not answered by the school.

Analysis of the school environment in COSI R6 showed similar results to R5:

- ▶ Sugar-sweetened fruit juice and carbonated beverages are unavailable in 9 out of 10 schools (Table 11).
- ▶ Similarly, 9 out of 10 schools are free from advertisement or marketing of energy-dense or nutrient-poor food and beverages (Table 11).
- ▶ Almost 7 out of 10 schools do not have fresh fruits available to children, either free or for purchase: this increases to 8 out of 10 schools for vegetables (Table 11).
- ▶ Almost twice as many schools offer their pupils free fresh fruit (22%) compared to free vegetables (11.9%) (Table 11).
- ▶ Almost a quarter of children do not have access to free drinking water (Table 11).
- ▶ All sampled schools were free of vending machines (Table 11).
- ▶ All schools include nutrition education in their curriculum as a separate lesson or integrated into other lessons (Table 12).
- ▶ Almost all schools have organised health promotion initiatives for all classes during the 2022/2023 school year (Table 12).
- ▶ All schools reported including physical education lessons for all classes in their curriculum, with an average weekly accumulated physical education duration of just over 60 minutes for each class (Table 13).
- ▶ All schools had outdoor play areas for children to access during school hours, while almost 85% of schools had an indoor gymnasium facility (Table 13).

Table 12

Provision of nutrition education and health promotion initiatives reported by schools in Round 6 of the Childhood Obesity Surveillance Initiative.

	Yes n (%)	No n (%)	Missing
Is nutrition education included in the curriculum?	118 (100%)	0 (0.00%)	0 (0.00%)
Have healthy promotion initiatives been organised during the current year per class			
1st class	94 (94.0%)	5 (5.0%)	1(1.0%)
2nd class	95 (94.1%)	5 (4.9%)	1 (0.95%)
5th class	95 (95.0%)	4 (4.0%)	1 (1.0%)
6th class	95 (94.1%)	5 (4.9%)	1 (0.9%)

Table 13

Physical activity and physical environment characteristics in schools participating in round 6 of Childhood Obesity Surveillance Initiative.

	Yes n (%)	No n (%)	Missing n (%)
Does your school have outdoor play areas?	118 (100%)	0 (0.0%)	0 (0.0%)
Does your school have an indoor gym?	100 (84.7%)	18 (15.3%)	0 (0.0%)
Does your school curriculum include PE lessons?	118 (100%)	0 (0.0%)	0 (0.0%)

	Mean \pm SD	Range
Minutes per week of physical education		
1st class	65.3 \pm 15.36	40-120
2nd class	64.7 \pm 15.89	40-120
5th class	66.55 \pm 17.05	40-120
6th class	66.14 \pm 16.93	40-120

SD, standard deviation.



Discussion

Overweight and obesity prevalence

Gender difference in overweight and obesity prevalence

The results of the child survey demonstrate that the trend for a plateau in overweight and obesity prevalence may be continuing. Almost 1 in 5 surveyed children were classified as overweight or obese for their age and sex. Examining prevalence rates more closely demonstrates a significantly greater prevalence of overweight and obesity in girls than in boys among all children. Comparing boys and girls by class shows the difference is apparent in Second class children but not First, Fifth and Sixth class children, which is consistent with R5 results. This is a continuation of the sex differences identified in previous COSI rounds and other research conducted in Ireland, where a greater prevalence was also shown in girls than boys.^{7,10-11} However, contrary to these findings, other global research on childhood obesity has reported a greater prevalence of obesity among boys than girls in high and upper-middle-income countries.¹²⁻¹⁵

Age difference in overweight and obesity prevalence

In addition to sex differences, the current survey identified differences in the prevalence of overweight, including obesity, between classes, with older classes shown to have a significantly greater prevalence rate than younger classes. Furthermore, the continued improvement in the prevalence of overweight and obesity among First class children identified in R5 appears to be plateauing and possibly reversing, albeit questionable due to the small sample size.

DEIS status differences in overweight and obesity prevalence

Previous rounds of COSI have also consistently shown differences in the prevalence of overweight and obesity among children attending disadvantaged schools compared to other schools.^{7,10} This ongoing trend holds firm for COSI R6. The prevalence of overweight and obesity was significantly greater in children attending schools classified as disadvantaged (DEIS) than in other schools. Also of note is the increasing prevalence rate in disadvantaged schools as age increases. The prevalence of overweight and obesity was most significant in Fifth class children attending disadvantaged schools, followed by Sixth class children.

The relationship between health and social disadvantage is well documented.¹⁶ The Marmot review argues that 'health is closely linked to the conditions in which people are born, grow, live, work and age and inequities in power, money and resources – the social determinants of health'.^{16(p.5)} More specifically, Marmot's social gradient in health describes the phenomenon whereby, in terms of socioeconomic position, less advantaged people have poorer health outcomes than their more advantaged counterparts. This social gradient in health has been mapped on childhood obesity data (as measured by BMI) worldwide, with higher prevalence observed in children from higher socio-economic deprivation, which is in line with COSI-Ireland findings.^{16,17}

These findings have several implications. As part of COSI-Ireland, the NNSC collects not only anthropometric data but also data on the possible predictors of childhood obesity; these include dietary factors, physical activity/inactivity patterns of children, family socioeconomic characteristics and co-morbidities. The NNSC has previously reported on the possible factors influencing childhood obesity in First and Third class primary school children in the Republic of Ireland.¹⁸

However, there is a pressing need to develop a better understanding of the higher prevalence of overweight and obesity among primary school girls compared to boys and older rather than younger primary school children, which has consistently been observed in childhood obesity research in Ireland. There has been limited discussion about the underlying reasons and implications of these sex and age differences in childhood obesity prevalence. However, such sex and age-difference analysis in childhood obesity studies may contribute to improved prevention and treatment, which is urgently warranted to address these continuing trends and meet the long-term goals of reducing childhood overweight and obesity.

While possible factors for the significant and consistent discrepancy in rates observed between disadvantaged and other schools have been previously identified in NNSC research, correcting these factors that possibly implicate weight gain in families experiencing socioeconomic difficulties must be achieved to alleviate these differences.¹⁸ The new EU Strategy on the Rights of the Child and the European Child Guarantee are crucial policy initiatives developed by the European Commission (EC), providing guidance and tools to all Member States to tackle child poverty and promote child wellbeing.¹⁹ This Guarantee will give Ireland an opportunity to re-focus and re-evaluate, where necessary, their current approaches to supporting children in need and to break cycles of intergenerational disadvantage. As obliged under the Child Guarantee, the Department of Children, Equality, Disability, Integration and Youth has developed a National Action Plan for the Child Guarantee for Ireland, in collaboration with multiple Government Departments.²⁰

School Environment

The school survey identified numerous positive outcomes. All schools were free from vending machines and most had no sugar-sweetened beverages or sweet and savoury snacks available. Most schools were also free from the advertising and marketing of energy-dense and nutrient-poor foods and beverages. Removing vending machines that dispense unhealthy foods and drinks has been suggested by the Oireachtas Education Committee to help students make healthy food choices, tackle childhood obesity, and protect the health of children.²¹ Children are more susceptible to food marketing compared to adults, therefore, reducing children's exposure to unhealthy foods is crucial to protect them from harm.²²

All schools also included nutrition and physical education in their curriculum and had an outdoor play area for children.

In conjunction with the positive outcomes identified, schools, which have long been recognised as important health promotion settings,²³ could be further strengthened to impact child growth positively. The Department of Education Wellbeing Statement and Framework for Practice 2018-2023, which was revised in 2019, is a preventative, whole-school approach to well-being promotion.²⁴ Every school and centre of education was required by 2023 to use the School Self-Evaluation (SSE) process to initiate a well-being promotion review and development cycle. Ensuring all schools implement this policy presents an opportunity for schools to place a greater focus on health and wellbeing. This will provide a focus on the environmental, cultural, and curriculum elements within the school that may impact students' weight.

Participation Rates

Approximately 65% of schools invited to participate in COSI-Ireland R6 accepted the invitation to partake. Participation rates in R6 of COSI Ireland were closely in line with R5 despite the challenges posed by COVID-19 in conducting this round. School participation was well preserved, notably in DEIS schools, demonstrating their commitment to equity in obesity trends.

The child participation rates were also similar to R5, with almost 61% of parents consenting to have their child participate in measurements. These rates, however, have reduced compared to earlier rounds. As such, although a representative sample of Irish school children was included in the measurements, the results obtained in the current survey may not wholly reflect the broader Irish children's population. Nevertheless, the child participation rates are similar to wider participation rates of epidemiological studies, and the slight reduction in rates also reflects trends in participation identified in epidemiological research.²⁵ It is possible that the most at-risk children may not be accounted for in the present data due to their parents declining to consent to have their child participate in measurements. This needs to be considered when interpreting the current findings. Indeed, the prevalence rates may, therefore, be a best-case scenario.

While the NNSC is always vigilant about the factors that may negatively influence participation, this report does not include the possible reasons for non-participation. However, the NNSC research team is currently undertaking this much-needed research, which will be reported separately. Previous research into participation attitudes in COSI conducted by the NNSC in 2013 showed parents express concerns about data being collected in a private setting, children's embarrassment about their results, the potential for bullying, and a possible increased likelihood of disordered eating or dieting behaviours. Despite this, parents were generally positive and accepting of having children measured in the school environment.²⁵ The research currently being conducted by the NNSC research team will use mixed methods of data collection, child focus groups, and school and parent questionnaires to examine the children's, parents and principals' attitudes and beliefs toward child anthropometric measurements conducted in school settings. This study aims to explore the possible barriers to participation while assisting in developing strategies to target a larger percentage of children. Increasing the reach and participation of children in surveillance is essential to provide a complete description of the current state of childhood obesity in Ireland.

Although the participation rates in the current round of COSI have reduced from earlier rounds, the school recruitment procedure employed in the initial iteration of the Childhood Obesity Surveillance Initiative (2008) ensured a representative sample of Irish primary schools was included in measurements. These sentinel schools have been invited to participate in each subsequent surveillance round and remain a representative sample of the Irish population of school children. This continues to be a major strength of the Childhood Obesity Surveillance Initiative.

Conclusions and policy implications

In conclusion, the results of COSI R6 suggest that the plateau in rates of childhood overweight, including obesity, appears to be continuing despite the impact of the COVID-19 pandemic on children's health behaviours. As in previous COSI rounds, R6 findings also show that the environment in both DEIS and non-DEIS primary schools across Ireland largely favours healthy eating and physical activity among school children. However, the ongoing trend in the differences in overweight and obesity prevalence between DEIS and non-DEIS schools holds firm, and the gap does not appear to be narrowing. Population health is borne out of the broader conditions in which individuals are born, grow and live. Consequently, this results in stark health inequalities between those living in areas of differing deprivation. The new EU Strategy on the Rights of the Child and the European Child Guarantee aim to help Ireland refocus and re-evaluate its current approaches to combating child poverty and social exclusion to break cycles of intergenerational disadvantage. Effective implementation will involve the active contribution and participation of multiple government departments, agencies, and key stakeholders. Such cross-sectional approaches that target other causes of disadvantage through a wider social determinants of health lens are crucial and urgently warranted to address the social gradient of health and health inequalities. Only then may we observe a narrowing of the overweight/obesity gap between COSI DEIS and non-DEIS schools.

A more nuanced examination of R6 data also shows that the prevalence of overweight and obesity remains greater in girls than boys and older than younger children. Identifying and addressing factors implicated in these sex and age differences is required and may contribute to improved prevention and treatment to meet the long-term goals of reducing childhood overweight and obesity.

In addition, the NNSC's current research work of exploring the attitudes and beliefs of children, parents, and principals regarding participation in childhood anthropometry surveillance will help identify barriers to participation in school-based child anthropometric measurements and will aid in the development of further strategies which can be employed to capture the broader population of Irish children.

Lastly, the reviewed Department of Education Wellbeing Statement and Framework for Practice has an essential role to play in primary school health and wellbeing promotion. Further support and investment are crucial to ensure the implementation of this framework in all schools across Ireland and to establish good practice and sustainability across the board, which may positively impact primary school children's growth.

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Appendices

Appendix A

Disadvantaged schools and the refined DEIS identification model

The Department of Education and Skills definition of disadvantaged schools is based upon the “educational disadvantage” in the Education Act (1998) as: “...the impediments to education arising from social or economic disadvantage which prevent students from deriving appropriate benefit from education in schools”.²⁷ The School Support Programme under the DEIS action plan for educational inclusion, run by the Department of Education and Skills, identified 631 disadvantaged schools in 2008. The number of schools identified as disadvantaged increased to 896 schools by 2018, of which 700 were primary schools.

In March 2022, the Irish Government announced a major expansion of the DEIS programme, resulting in an additional 322 schools (284 primary and 38 post-primary) benefitting from the programme from September 2022. The schools selected for inclusion in DEIS were identified using the refined DEIS identification model.²⁸ Like the previous DEIS identification model, the key data sources used in the refined DEIS identification process are the Department of Education enrolment databases and national census data as represented by the [Pobal HP Deprivation index](#). The HP index provides a theoretically sound and robust method of measuring a small geographical area's relative affluence or disadvantage using data compiled from the National Census.

Extension of the scope of disadvantage

Previously, the criteria used to identify schools for inclusion in the DEIS programme was based on the percentage of students in a school from small areas that had a HP index of -10 or below, where -10 represents the HP score that is one standard deviation below the mean and the point at which the label ‘disadvantaged’ is applied by the authors of the index. The new refined DEIS identification model now accounts for students from areas designated borderline disadvantaged, those with a HP index score of between -7.5 and -10. This extends the scope of disadvantage and allows for the relative severity of disadvantage within an individual school to be reflected in the new model.

Appendix B

Anthropometric variables and prevalence of weight categories by age(months)

Anthropometric variables of all children surveyed, and the prevalence rates of weight categories, presented by age in months, are presented in Tables B1 and B2, respectively.

Table B1

Anthropometric variables by age (months)

Age (months)		n	Median	P25-P75
70-75	Weight (kg)	7	24.6	20.3-27.4
	Height (cm)	7	121.3	117.0-124.6
	WC (cm)	7	53.3	47.7-64.4
	BMI (kg/m ²)	7	15.9	14.9-17.0
76-81	Weight (kg)	160	23.8	21.7-26.9
	Height (cm)	160	121.9	118.7-125.8
	WC (cm)	160	55.0	52.4-58.6
	BMI (kg/m ²)	160	15.9	15.0-17.5
82-87	Weight (kg)	593	24.5	22.2-27.3
	Height (cm)	592	124.6	121.1-128.1
	WC (cm)	590	55.1	51.8-59.0
	BMI (kg/m ²)	592	15.8	14.8-17.1
88-93	Weight (kg)	660	25.5	23.1-28.6
	Height (cm)	659	126.5	123.2-130.8
	WC (cm)	659	56.0	52.7-59.6
	BMI (kg/m ²)	659	15.9	14.8-17.3
94-99	Weight (kg)	640	26.9	24.6-30.5
	Height (cm)	640	130.1	126.2-134.0
	WC (cm)	638	56.6	53.7-60.6
	BMI (kg/m ²)	640	16.0	15.0-17.4

Age (months)		n	Median	P25-P75
100-105	Weight (kg)	501	28.2	25.8-31.9
	Height (cm)	501	132.6	128.4-136.4
	WC (cm)	501	58.0	54.3-61.6
	BMI (kg/m ²)	501	16.3	15.1-17.6
106-111	Weight (kg)	51	30.0	25.5-32.4
	Height (cm)	51	132.9	129.2-136.8
	WC (cm)	51	57.6	55.3-61.5
	BMI (kg/m ²)	51	16.3	15.4-18.3
112-117	Weight (kg)	4	27.2	24.2-35.2
	Height (cm)	4	134.0	127.8-137.7
	WC (cm)	4	59.1	50.9-62.5
	BMI (kg/m ²)	4	14.9	14.8-18.9
118-123	Weight (kg)	22	38.3	32.1-44.1
	Height (cm)	22	146.6	142.3-154.9
	WC (cm)	22	64.00	58.5-71.1
	BMI (kg/m ²)	22	18.1	15.6-19.9
124-129	Weight (kg)	234	37.9	33.00-45.1
	Height (cm)	234	144.7	140.9-150.2
	WC (cm)	234	62.0	57.7-70.3
	BMI (kg/m ²)	234	17.9	16.1-20.3
130-135	Weight (kg)	623	39.2	34.4-45.2
	Height (cm)	622	147.7	142.9-152.6
	WC (cm)	622	62.3	58.0-68.0
	BMI (kg/m ²)	622	17.9	16.3-20.1
136-141	Weight (kg)	648	40.8	35.9-47.8
	Height (cm)	648	150.2	145.9-155.6
	WC (cm)	649	63.1	58.5-69.6
	BMI (kg/m ²)	647	17.9	16.3-20.4

Age (months)		n	Median	P25-P75
142-147	Weight (kg)	632	43.2	37.9-50.2
	Height (cm)	633	153.9	148.8-158.8
	WC (cm)	633	64.0	60.0-69.4
	BMI (kg/m ²)	632	18.2	16.6-20.4
148-153	Weight (kg)	377	44.2	38.7-49.7
	Height (cm)	376	155.5	150.5-160.8
	WC (cm)	377	64.0	60.2-69.0
	BMI (kg/m ²)	376	17.9	16.4-20.1
154-159	Weight (kg)	21	46.3	39.9-55.9
	Height (cm)	21	158.0	152.4-164.7
	WC (cm)	21	65.2	61.9-74.3
	BMI (kg/m ²)	21	18.9	15.9-20.9
160-165	Weight (kg)	1	45.2	45.2-45.2
	Height (cm)	1	152.7	152.7-152.7
	WC (cm)	1	62.7	62.7-62.7
	BMI (kg/m ²)	1	19.4	19.4-19.4
166-171	Weight (kg)	1	80.3	80.3-80.3
	Height (cm)	1	170.5	170.5-170.5
	WC (cm)	1	90.3	90.3-90.3
	BMI (kg/m ²)	1	27.6	27.6-27.6

Table B2

International Obesity Task Force (IOTF) BMI classification, for all children by age (months)

Age (months)	Underweight n (%)	Normal n (%)	Overweight n (%)	Obese n (%)	Overweight incl. obesity n (%)
70-75	0 (0.0%)	6 (85.7%)	0 (0.0%)	1 (14.3%)	1 (14.3%)
76-81	11 (6.9%)	111 (69.4%)	28 (17.5%)	10 (6.3%)	38 (23.8%)
82-87	36 (6.1%)	448 (75.7%)	76 (12.8%)	32 (5.4%)	108 (18.2%)
88-93	54 (8.2%)	495 (75.1%)	82 (12.4%)	28 (4.2%)	110 (18.2%)
94-99	48 (7.5%)	500 (78.1%)	70 (10.9%)	22 (3.4%)	92 914.4%)
100-105	40 (8.0%)	382 (76.2%)	63 (12.6%)	16 (3.2%)	79 (15.8%)
106-111	5 (9.8%)	40 (78.4%)	4 (7.8%)	2 (3.9%)	6 (11.8%)
112-117	0 (0.0%)	3 (75.0%)	1 (25.0%)	0 (0.0%)	1 (25.0%)
118-123	2 (9.1%)	15 (68.2%)	3 (13.6%)	2 (9.1%)	5 (22.7%)
124-129	11 (4.7%)	163 (69.7%)	47 (20.1%)	13 (5.6%)	60 (25.6%)
130-135	47 (7.6%)	448 (72.0%)	96 (15.4%)	31 (5.0%)	127 (20.4%)
136-141	70 (10.8%)	450 (69.6%)	98 (15.1%)	29 (4.5%)	127 (19.6%)
142-147	71 (11.2%)	458 (72.5%)	85 (13.4%)	18 (2.8%)	103 (16.3%)
148-153	49 (13.0%)	273 (72.6%)	48 (12.8%)	6 (1.6%)	54 (14.4%)
154-159	5 (23.8%)	12 (57.1%)	2 (9.5%)	2 (9.5%)	4 (19.0%)
160-165	0 (0.0%)	1 (100%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
166-171	0 (0.0%)	0 (0.00%)	1 (100%)	0 (0.0%)	1 (100%)

Appendix C

List of Nutritionists

The authors would like to acknowledge and thank the following people for their work in collecting the data for this report.

Table C1

List of Nutritionists

Team	Area	Names
1	Dublin North	Anna O'Flaherty, Sarah Carroll
2	Dublin West	Lauren Kelly, Sarah Doheny
3	Dublin South	Katy O'Driscoll, Sophie McDonald
4	Southeast	Shannen Cowman Kehoe, Michelle O'Brien
5	Sligo/Donegal	Niamh O'Callaghan, Jenny Rose Flynn
6	Galway/Mayo	Aisling Rynn, Sinead Costello
7	Limerick/Kerry	Lauryn McMahon, Niamh O'Leary
8	Cork	Niamh Braham, Sophie Lyons
9	Midlands	Melanie Dyer, Sandra Nestor
	NNSC-based team	Clodagh Lee, Jamie Slattery, Emily Hunt

