

Prevalence rates and comparisons of obesity levels in Ireland

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While the prevalence of obesity is rising significantly throughout the world, as is the number of those overweight, it is dramatically higher in economically developed countries (Lobstein et al, 2004). There is a need to identify if the Irish trends follow the same pattern of escalation. This article presents findings from data collected from a sample of 969 Irish children aged 4–13 years. The article adds to the existing body of knowledge on overweight Irish children and obesity levels in Irish children, and draws comparisons with data collected in 2002 by examining the changes in obesity levels and the proportion of those overweight, over a 5-year period.

Health consequences of childhood obesity

Many of the health problems related to being overweight or obese in childhood will appear in the next generation of adults. It is known that overweight and obese children are likely to be obese into adulthood (Freedman et al, 2005) and to have non-communicable diseases (Guo et al, 2002), such as heart disease, at a much younger age. Branca et al (2007) state that the health risks depend partly on the age of onset and duration of obesity, and that obese children suffer from both short- and long-term health consequences.

A very detailed review of the health consequences of obesity was conducted by Dietz and Robinson (2005). They concluded that obese children have an increased risk of metabolic abnormalities, such as type 2 diabetes (Haines et al, 2007). Approximately 10% of young people with type 2 diabetes are likely to develop renal failure by the time they reach adulthood, and these adults will require life-long dialysis treatment (Dean and Flett, 2002). Other health consequences of being overweight or obese in childhood are non-alcoholic fatty liver disease (Schwimmer et al, 2003) and sleep-associated breathing disorders (Mallory et al, 1989) such as obstructive sleep apnoea syndrome (Erler and Paditz, 2004).

Cook et al (2003) established that 4% of adolescents and nearly 30% of overweight adolescents in the United States met the criteria for metabolic syndrome. This has significant implications for their future risk of type 2 diabetes and cardiovascular diseases. An estimate of the number of children likely to be affected by several metabolic effects of obesity in the 25 countries belonging to the EU in 2004 was given by Lobstein and Jackson-Leach (2006), which identifies the risk of non-communicable disease to which children are exposed as

Abstract

This article compares the prevalence of the overweight and obesity levels in Irish school children aged 4–13 years from data collected by one of the authors in 2007, with data collected from a previous Irish study in 2002 by Whelton et al (2007). Both data sets were analyzed using the International Obesity Taskforce (IOTF) international cut-off points for body mass index (BMI). From the data collected in 2007 the overall prevalence of the overweight was 17.8% and the rate of obesity was 6.8%. The prevalence of the overweight and obese was 24.6%. No correlation was found between gender and BMI, however a positive and significant correlation was observed between age and BMI, indicating that as age increased so too did BMI ($R = 0.35$, $p < 0.001$). Comparing results with data from 2002 (Whelton et al, 2007), no statistically significant changes in the proportions of overweight and obese children were observed within this age group in the 5-year period from 2002 to 2007. While the results of our data suggest that rates of being overweight or obese among Irish children in this age group may be stabilizing, larger and preferably longitudinal Irish studies are required if this assertion is to be fully validated in the Irish context.

Key words: Body mass index ■ Children ■ Financial implications ■ Health risks of obesity ■ Ireland ■ Obesity ■ Overweight

a result of excess body weight (see *Table 1*). Running parallel to the possible risks of non-communicable diseases in children from the effects of being overweight or obese are the social and psychological ramifications related to stigmatization of obese children and young people (Branca et al, 2007). However, the social, emotional and psychological effects do not appear to receive the same attention as pathophysiological effects.

Financial implications to health services

As well as the health implications for overweight and obese children, there are also considerable monetary implications. The financial burden upon the health services in Ireland and throughout Europe due to the rise in overweight and obese children cannot yet be truly estimated. The total direct and indirect annual costs of obesity in 2002, in the 15 countries that were in the European Union prior to May 2004,

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Table 1. Estimated numbers of children aged 5.0–17.9 years with obesity-related disease indicators in the EU, 2006

Indicator	Obese Children	
	Lowest likely prevalence (%)	Lowest likely number affected (millions)
Raised triglycerides	21.5	1.09
Raised total cholesterol	22.1	1.12
High LDL cholesterol	18.9	0.96
Low HDL cholesterol	18.7	0.95
Hypertension	21.8	1.11
Impaired glucose tolerance	8.4	0.42
Hyperinsulinaemia	33.9	1.72
Type 2 diabetes	0.5	0.027
Metabolic syndrome (3 indicators) ¹	23.9	1.21
Metabolic syndrome (4 indicators) ²	4.6	0.13
Hepatic steatosis	27.9	1.42
Elevated aminotransferase	12.8	0.65

¹ Metabolic syndrome was defined as having a number of the following indicators: hypertension, central adiposity, raised HDL blood cholesterol, raised blood triglycerides, raised blood glucose levels.
² The age range is 10.0–17.9 years. Source: Lobstein and Jackson-Leach, 2006

was estimated to be €32.8 billion (Fry and Finley, 2005). This cost will increase as none of the studies considered the financial costs of the consequences of children being overweight or obese. Ireland has a mix of private and public health services and thus it is difficult to formulate accurate financial estimates of the financial cost to the state of children being overweight or obese. However, allowing for differences in the cost of drugs, GP visits, and hospital costs, the direct health care costs of obesity alone in Ireland was estimated at €70 million in 2002 (Department of Health and Children, 2005) and it is predicted that the cost of obesity to the NHS in the UK could exceed £5 billion by 2025 (The NHS Information Centre Lifestyle Statistics, 2009). There are also implications for the nursing workforce in terms of increased workload and new education needs to meet the health needs of these children and their parents in both community and clinical settings.

Overweight and obese European children

The prevalence of overweight and obese children in the WHO European region is based on data sets from national and regional studies compiled for the WHO by Branca et al (2007) from existing databases, published literature, scientists and health agencies. Among children of primary school age (both genders), the highest prevalence of being overweight was found in Spain (6–9 years, 35.2%) (Majem et al, 2003) and Portugal (7–9 years, 31.5%) (Padez et al, 2004). The lowest was found in Slovakia (7–9 years, 15.2%) (Majem et al, 2003; Novakova 2006), France (7–9 years, 18.1%) (Rolland-Cachera et al, 2002), Switzerland (6–9 years, 18.3%) (Zimmermann et al, 2004) and Iceland (9 years, 18.5%) (Arnardóttir, 2005). National surveys based on self-reported weight and height found a prevalence

of overweight children in both genders of 20.3% in Belgium (5–9 years) (Bayingana, 2006), 19.5% in Sweden (8 years) (Becker and Enghardt-Barbieri, 2004), 18.5% in Norway (8–9 years) (Andersen et al, 2005) and 14.5% in the Netherlands (2–9 years) (Branca et al, 2007). The International Obesity Task Force (IOTF) predicts that about 38% of school aged children in the WHO European Region will be overweight by 2010, and more than 25% of these children will be obese (Reilly, 2005).

Overweight and obese Irish children

Like many other countries within the European Union, Ireland set up a national taskforce on obesity, which published its report in 2005 (Department of Health and Children, 2005). They developed over 80 recommendations related to actions across six sectors: government; education; social and community; health; food, commodities, production and supply; and the physical environment. The recommendations also incorporated the complex, multi-sectoral and multi-faceted determinants of diet and physical activity. One of their recommendations focused on the need to extend the routine growth measurements in children, which is currently undertaken prior to school entry. Children's weight and height is not routinely measured after they commence school, at the age of 4 or 5 years. This lack of data on the national prevalence of children and adolescents who are overweight or obese in Ireland means it is not currently possible to monitor levels during the school age years (4–18 years). The need for ongoing prevalence studies is increasingly urgent. It is this need that is addressed within the study in this article.

In Ireland the prevalence of obesity has increased threefold since the 1980s in the adult population, rising by more than 0.8% points per year based on measured data (Branca et al, 2007). The Irish figures for overweight men and women, based on self-reported data, show the second highest annual increase in Europe (1.1 % points for both sexes from 1998–2002), second only to Denmark (1.2 for men and 0.9 for women from 1987–2001). If Irish adult rates of obesity are increasing at such an alarming rate it is reasonable to suggest that more data is required on Irish children's body mass index (BMI) to discover whether the childhood rates are paralleling the adult rates. Whelton et al (2007) collected the heights and weights of 19,617 school-going children and adolescents aged 4–16 years in the Republic of Ireland (RoI) and Northern Ireland in 2002 as part of a larger study. However, only the participants from the RoI (17,499) are discussed here for comparison purposes. Using the standard IOTF criteria they found that overall, almost one in four boys (23%) and over one in four girls (28%) were either overweight or obese. About one in 20 boys (6%) and about one in 15 girls (7%) aged 2–16 were obese in 2002; the overall prevalence of children who were overweight was higher among females than males in (28% vs 23%) Similarly, the prevalence of obesity was higher in girls (7% vs 6%). Across age groups, being overweight was most common among 13-year-old girls (32%) and obesity most common in 7-year-old girls (11%).

Methods

Data Collection

Data was collected in two primary schools in a town in Co Kildare in 2007 as part of a larger research project. This town is 20 kilometres from the centre of Dublin and is representative of many towns surrounding Dublin being a prime ‘commuter belt location’. The data collected for this study came from all classes of two single sex primary schools in the town. Ethical approval was received for this study from the ethics committee of The National University of Ireland, Maynooth. Both school governing bodies consented to the study, the parents of the children in both schools gave written consent for their children to take part in the study and the children also gave their verbal assent.

Population

The town has a total population of 17,262 (Central Statistics Office, 2007) of which 2,148 are children in the 4.5–13.5 year age group attending ordinary primary school in the town. The sample size of this study represents 45.11% of the town’s primary school-aged population.

Sample

The total population of the schools was 1,168 (640 boys and 528 girls). In total, 969 children had their BMI recorded – 544 boys and 425 girls. Ages ranged from 4.5–13.5 years of age. Children who had a recognized medical condition affecting their growth or weight, and any child who did not wish to have their BMI recorded on the day, irrespective of having parental consent, were excluded from the study.

Measurements and method of analysis

All weights were recorded during the children’s scheduled physical exercise class by the same researcher, who is a qualified paediatric nurse and very experienced in measuring and recording children’s weights and heights. The children were weighed in their school tracksuits

without shoes. The weight was recorded using the Tanita WB-100 digital medical weighing scales and the height was recorded using a portable rigid stadiometer (the Leicester Height Measure). Data was analysed using the statistical packages SPSS version 14 and Minitab version 15. A range of descriptive statistics on measures of centre and spread were prepared. In addition, error bars indicating the 95% confidence interval for the BMI measure at each age group were computed and plotted. In order to explore the associations between BMI and gender, and BMI and age, scatter plots were drawn. To measure any associations Chi squared tests and correlation coefficients were computed. Where these statistics were found to be significant a one-way analysis of variance and a regression analysis was performed to obtain further details. Finally, prevalence rates of children who were overweight or obese found within our 2007 cohort were compared, using z tests for the difference of two proportions, with the same age cohort from the 2002 study of Whelton et al (2007).

Results

In total 969 children had their BMI recorded (544 boys and 425 girls). Ages ranged from 4.5–13.5 years. The mean age for boys was 8.50 years with a 95% confidence interval (CI) of 8.30–8.70 years (n = 544). For girls the mean age was 8.21 years with a 95% CI of 8.00–8.42 years (n = 425). Using the Cole international cutoff values as recommended by the IOTF, the overall prevalence of children who were overweight was 17.8% (17.8% for boys, 17.6% for girls). The rate of obesity was 6.8% (6.6% for boys, 7.1% for girls). The overall prevalence of children who were overweight or obese (aged 4–13) was 24.6% with a 95% CI of 21.9–27.4%. Rates were computed up to age 13 only, as the sample size for the 13 to 13.5 age group was small. Among boys only, aged 4–13 years, the prevalence of those who were overweight or obese was 24.4% with a 95% CI of 20.9%–28.3% and among girls only, aged 4–12 the rate

Table 2. Sample sizes within genders and age and proportions: overweight, obese, and overweight or obese, by age and gender

Age	Males				N	Females			N	Totals		
	N	Ow	Ob	Ow + Ob		Ow	Ob	Ow + Ob		N	Ow	Ob
4	32	25.0	3.1	28.1	26	23.1	3.8	26.9	58	24.1	3.4	27.4
5	86	17.4	7.0	24.4	61	23.0	9.8	32.8	147	19.7	8.2	27.9
6	58	20.7	8.6	29.3	60	10.0	11.7	21.7	118	15.3	10.2	25.5
7	66	18.2	6.1	24.3	54	9.3	11.1	20.4	120	14.2	8.3	22.5
8	63	17.5	7.9	25.4	65	20.0	6.2	26.2	128	18.8	7.0	25.8
9	66	16.7	6.1	22.8	59	20.3	5.1	25.4	125	18.4	5.6	24.0
10	70	20.0	4.3	24.3	44	15.9	0.0	15.9	114	18.4	2.6	21.0
11	57	15.8	7.0	22.8	38	23.7	2.6	26.3	95	18.9	5.3	24.2
12	43	11.6	7.0	18.6	18	16.7	11.1	27.8	61	13.1	8.2	21.3
*13	3	0.0	33.3	33.3	0	-	-	-	3	0.0	33.3	33.3
Totals	544	17.8	6.6	24.4	425	17.6	7.1	24.7	969	17.8	6.8	24.6

N – Number; Ow – Overweight; Ob - Obese

*As the numbers of 13-year-old children are small, they are not reliable. This is a limitation for that age group but figures are provided for the reader’s information.

was 24.7% with a 95% CI of 20.7%–29.1%. Again rates were computed only up to 12 years for girls as there were no females in the sample aged 13 years or over. Full details of all the proportions: overweight, obese, and overweight or obese, by age and gender are provided in *Table 2*.

The mean BMI for boys was 17.84 with a 95% confidence interval of 17.60–18.08. The confidence interval for the girls' mean BMI overlapped with the boys, indicating that there was no statistically significant difference between the male and female mean BMI. For girls, the mean BMI was 17.62 with a 95% confidence interval of 17.40–17.88. An error bar plot showing the mean BMI by age group and the corresponding 95% CI is provided in *Figure 1*. It was observed from the figure that there was greater variability in the mean BMI reading for those in the youngest (4–4.49 years) and the oldest age groups (13–13.49 years). This variability may reflect the small sample sizes within these two groups ($n = 5$ and $n = 4$ respectively).

It was also noted that as age increased the BMI tended to increase. This was explored further. No correlation was found between gender and BMI, however a positive and significant correlation was observed between age and BMI indicating that as age increased so too did BMI ($R = 0.35$, $p < 0.001$). A one way analysis of variance comparing the mean BMI for each age group was found to be significant ($p < 0.001$) indicating that there was a difference in the mean BMI measures across the age groups. Finally, a linear regression analysis was performed on the BMI measures with age and gender as the independent variables. Age was again found to be a significant predictor of increasing BMI ($\beta = 0.42$, $t = 11.35$, $p < 0.001$). Keeping gender fixed, it was observed that for each increase in age by a year, BMI increased by 0.42.

Finally, in order to compare possible changes over a 5-year period, prevalence rates of overweight or obese

children observed in our 2007 cohort were compared with rates observed in children of the same age group in the Whelton et al (2007) cohort. The authors note that among those aged 4–13, a total of 3,632 children from a sample of 14,036 (25.9%) were found to be overweight, including those who were obese. Using a z test of the difference between two proportions, the authors found no statistically significant differences in proportions of those who were overweight, including those who were obese, in 2002 and in 2007 ($p_1 = 0.259$ vs $p_2 = 0.246$, $z = 0.92$, $p = 0.36$). Similarly, within the Whelton et al (2007) cohort, 23.2% (1,638 of 7,048) of males aged 4–13 were overweight, including those who were obese. Comparing this proportion with that observed within this 2007 cohort, the authors again found no statistically significant difference ($p_1 = 0.232$ vs $p_2 = 0.244$, $z = -0.63$, $p = 0.53$). Finally, the authors observed within the Whelton et al (2007) cohort that 28.5% (1,945 of 6,834) of females aged 4–12, were overweight, including those who were obese. Comparing this proportion with that observed within this 2007 cohort, the authors again found no statistically significant difference ($p_1 = 0.285$ vs $p_2 = 0.247$, $z = 1.74$, $p = 0.08$).

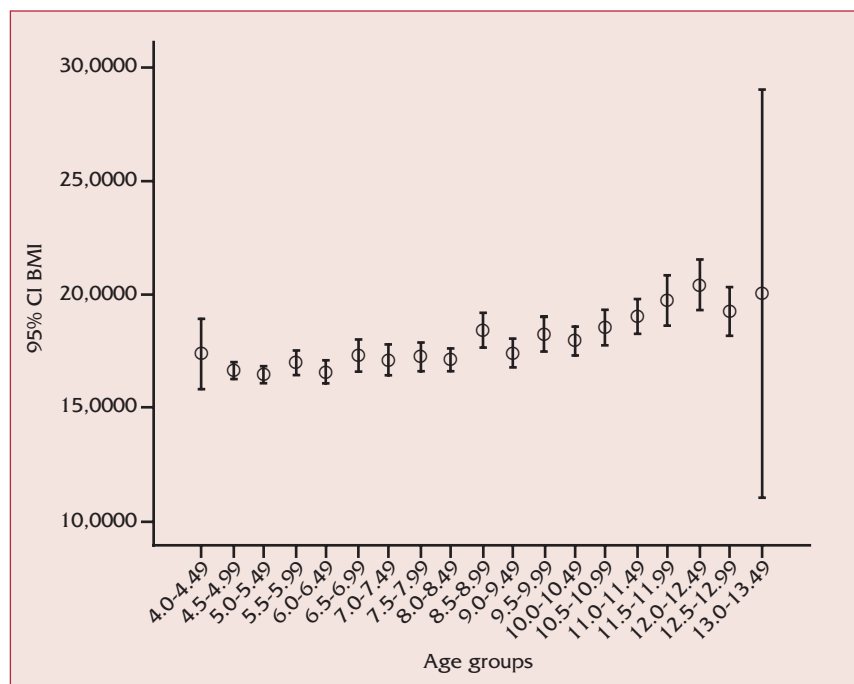
Discussion

The authors conclude from their analyses that prevalence rates of being overweight or obese among Irish primary school-going children in 2007 may be stabilizing, given the comparison with rates observed in 2002. This finding lends support to the suggestion from the NHS Information Centre Lifestyle Statistics (2009), that childhood obesity trend may be stabilizing. They report no statistically significant change in the prevalence of obesity year-on-year between 2005 and 2006, or between 2006 and 2007 (NHS Information Centre Lifestyle Statistics, 2009). However, numbers within this study are small by comparison with the 2002 cohort – further larger, and preferably longitudinal, studies are required if this assertion is to be fully validated. In addition to this finding, analysis within this study revealed that BMI increased significantly with age and this may increase the risk of non-communicable disease in the next generation of adults, and have a significant impact on the provision and financing of future health-care services.

Conclusion

The International Obesity Task Force predicts that about 38% of school-aged children in the WHO European Region will be overweight by 2010 (Wang and Lobstein, 2006) and more than 25% of these children will be obese (Reilly, 2005). In 2007, 17.7% of Irish primary school-aged children alone (4–13 years) were overweight and 6.85% were obese. The monitoring of overweight and obese children is vital (Jackson-Leach and Lobstein, 2006) as excess weight in childhood increases the risk of being obese in adulthood (Lobstein and Jackson-Leach, 2006). The authors suggest that the recommendations of the National Obesity Task Force, commissioned by the Department of Health and Children (2005) are implemented in relation to a robust monitoring system of weight and height measurements in school-aged children,

Figure 1. Error bar graph illustrating mean BMI and 95% confidence interval by age.



in order to have an accurate understanding of the progress of the obesity epidemic in Ireland, to evaluate preventative interventions that are introduced and to be able to draw comparisons within the data emerging from the WHO European region for children of the same age groups (WHO, 2000; James, 2004).

The authors suggest that the recommendations of the National Obesity Task Force (Department of Health and Children, 2005) are implemented in relation to a robust monitoring system of weight and height measurements in school-aged children, in order to have an accurate understanding of the progress of the obesity epidemic in Ireland. While the results of our data suggest that rates of overweight and obesity among Irish primary school-going children in 2007 may be stabilizing, further larger, and preferably longitudinal, studies are required if this assertion is to be fully validated. Finally, analysis within this study revealed that BMI increased significantly with age and this may increase the risk of non-communicable disease in the next generation of adults, and have a significant impact on the provision and financing of future health-care services in Ireland. BJN

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KEY POINTS

- There is a need for a robust monitoring system of weight and height measurements in school aged children in Ireland.
- The overall prevalence of children who were overweight was 17.8% (17.8% for boys, 17.6% for girls). The rate of obesity was 6.8% (6.6% for boys, 7.1% for girls). The prevalence of children who were overweight or obese was 24.6% (24.4% for boys and 24.7% for girls).
- No correlation was found between gender and BMI, but a positive and significant correlation was observed between age and BMI, indicating that as age increased so too did BMI ($R = 0.35$, $p < 0.001$).
- Prevalence rates of being overweight or obese among Irish primary school going children in 2007 may be stabilizing given the comparison with rates observed in 2002. However, larger and preferably longitudinal studies are required if this assertion is to be fully validated.
- The financial implications of childhood weight gain remain hard to assess, however, it is certain to increase the burden on already taxed health services throughout Europe.