doi: 10.1111/j.1467-789X.2009.00650.x

National Prevalence of Obesity

A national survey of the prevalence of childhood overweight and obesity in Italy

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Received 19 April 2009; revised 3 July 2009; accepted 20 July 2009

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Summary

To estimate the prevalence of childhood overweight and obesity among Italian schoolchildren and to examine geographic differences and present and future implications for health care, we used data from a nationwide representative survey performed in May 2008 among third-grade students in 18 of Italy's 21 regions. Cluster sampling was used to identify classes for participation. The study population included all children aged 8–9 years whose parents agreed to opt-out consent. Parents, children and teachers completed brief questionnaires, and children were weighed and measured by trained staff using standardized equipment. Consent was obtained for 97% of 50 197 third-graders, of whom 44 676 (89%) met study inclusion criteria. Obesity levels (defined using International Obesity Task Force cut-offs) ranged from 7.5% (95% confidence intervals 6.7–8.2) in the north to 16.6% (95% confidence intervals 15.8–17.4) in the south. Behaviours known to be associated with obesity also showed geographic differences. The estimated burden of obesity-related pathologies also increased from north to south. These findings suggest the need for community as well as individual interventions in all areas of the country but with particular attention to the south.

Keywords: Children, Italy, obesity, overweight.

obesity reviews (2010) **11**, 2–10

Introduction

In Italy, a strong geographic gradient in obesity has been observed in adult obesity, with far higher levels in the south. Recent age-adjusted self-reported data demonstrate that the prevalence of obesity in adult men in southern Italy as defined by a body mass index (BMI) > 30, is 1.7 times that of northern Italy; for women, the corresponding value is 2.2 (1). Objective data from 1998 to 2002 based on measurements of adults 35–74 years of age demonstrated even greater disparities as well as an overall shift of one BMI unit for men and three units for women between northwest and southern Italy (2).

Despite growing concern about paediatric obesity, no regular national surveys had been conducted to assess its prevalence. Several surveys conducted at local or regional level had noted some geographic differences in paediatric obesity levels (3,4), although their magnitude has been difficult to assess because of differences in methods and definitions and limited geographic coverage.

At the end of 2007, the Centre for Disease Control within the Italian Ministry of Health commissioned the creation of a national system to evaluate the nutritional status and key modifiable behaviours known to be associated with childhood overweight and obesity and to monitor trends over time at local and regional level. Responsibility for project coordination was given to the Centre for Epidemiology, Surveillance, and Health Promotion within the National Institute of Health. In this paper, we present estimates of the prevalence of childhood overweight and obesity by geographic area of Italy from 'OKkio alla SALUTE', the first population-based and nationally

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representative nutrition survey that involved more than 45 000 third-grade students (5). We also collected information on behaviours known to be associated with obesity, and we investigated the role of child and maternal demographic characteristics in explaining observed geographic differences. Finally, to evaluate the health implications of these differences, we compared the estimated number of children with obesity-related diseases and conditions by area.

Methods

The protocol for the survey and materials were developed by the National Institute of Health and reviewed in collaboration with regional coordinators and members of the technical committee. All but three of the country's 21 regions and autonomous provinces (Lombardy, Bolzano and Trento) agreed to participate in the initial round of what will become a biannual national survey.

Sampling

Regions had the option of conducting the study at regional level or at the level of their local health units, which cover populations of approximately 200 000 persons. The study population was children in the third grade of all public and private primary schools; almost all were 8 or 9 years old at the time of the survey in May 2008. Through the support and assistance of the Ministry of Education, lists of schools and classes with the number of children in each class were obtained from regional school authorities. Cluster sampling was performed according to World Health Organization cluster survey methodology (6), with classes as the unit of sampling. The number of children to be studied was calculated based on an expected prevalence of overweight and obesity of 30%, a desired precision using 95% confidence intervals of 1%, and a design effect of 2.

Agreement was obtained from the institutional review board of the National Institute of Health, which approved the protocol, to use opt-out consent, whereby parents were asked to specifically refuse participation and lack of a returned form was taken to imply consent to have their child participate.

Anthropometric measurements

The surveys were conducted by staff of the local health units. Regional coordinators attended a series of planning meetings and were trained in survey methods in a 2-day training session that included hands-on experience in weighing and measuring techniques, and each coordinator was provided with materials to use in the training of local health unit staff. Each region was provided with new Seca 872 scales and with Seca 214 (Seca, Hamburg, Germany) stadiometers for use during the survey.

Questionnaires

Four survey instruments were used: a child questionnaire, a parent questionnaire, a teacher questionnaire that contained information necessary to calculate participation rates as well as class activities such as gym class the previous day, and a school questionnaire about nutritional and physical activity programmes at the school. The child questionnaire, which was developed taking into consideration the limited recall abilities of 8-year-olds (7–9), asked about whether they had participated in specific leisure-time activities the previous day, as well as about breakfast, snacks and TV viewing on the morning of the survey. The parental questionnaire gathered information about the informants and their level of education and working status, a quantitative estimate of how often their child consumed sweetened drinks, days in which their child engaged in sports, the average daily hours during weekdays that the child watched TV and played with videogames or computers, and whether there was a TV in the child's room.

Data collection

The chosen schools were contacted; only 0.6% declined participation. Meetings were arranged at local level to explain the survey to the teachers whose classes had been chosen, and teachers were provided with a list of unique codes to be assigned to each of their students. Teachers then placed each child's unique code on the parental questionnaire and consent form that was sent home to parents approximately a week before the survey.

On the day of the survey, study staff collected the school questionnaire and parental questionnaires and administered a brief questionnaire to the teacher and to the participating children; on each questionnaire the teacher had previously written the child's unique code. No surveys were conducted on Mondays to guarantee that previous day's activities on the child's questionnaire referred to a weekday rather than a weekend.

A separate room was provided in each school where children were weighed and measured. Children were asked to remove shoes and any heavy outer clothing, and a simple checklist was used to describe the type of clothing that the child was wearing (e.g. long-sleeved or short-sleeved shirt, jeans, skirt, etc); the average weights of each type clothing was used in the analysis to calculate a tared weight. Each child was weighed to the nearest 50 g and measured to the nearest 1 mm.

Data analysis

A central web-based data entry system was used. Children's and parents' forms were linked using the unique identifiers,

and each child's record was then linked to information from the corresponding teacher's questionnaire. Final population estimates were weighted to take account of the population of each local health unit or region.

Body mass index was calculated using the formula, weight (in kg)/height (in m) squared. To assess levels of overweight and obesity, we used International Obesity Task Force (IOTF) cut-offs (10). Because these cut-offs are provided in 0.5-year increments, we linearly extrapolated values for each single month of age.

Regions were grouped into north, central and south geographic areas using the National Statistics Institute classification (11). Prevalences, odds ratios and 95% confidence intervals were calculated using the C-Sample routines for complex survey design in Epi Info version 3.4.3 (12), and multivariate analyses were performed using STATA version 9.2 (Stata Corporation LP, College Station, TX, USA) routines taking account of the survey design (13). Differences between groups were considered statistically significant at a $P < 0.05$ level if there was no overlap in the 95% confidence limits; odds ratios were considered significant at this same level if the 95% confidence interval did not include 1. Criteria for inclusion in the analysis were: (i) data of age, sex, weight and height available to calculate BMI; (ii) 8–9 years of age; and (iii) BMI ≥ 11 and ≤ 35. Median BMI values were calculated, and the distributions of BMI values by geographic area were examined by 0.5 BMI units.

For descriptive analyses of child characteristics taken from the children's questionnaire (age, sex, not eating breakfast, no physical activity the previous day), the population consisted of the 8- and 9-year-olds as described above. Because the percentage of respondents who were fathers and non-parental caretakers differed among geographic areas and because educational level and working status differ in Italy between men and women, sociodemographic and behavioural data from the parental questionnaire (educational level, working status, and television and videogame/computer-associated behaviours) were analysed only for those children for whom the mother was the respondent to ensure greater comparability, although findings were essentially identical when questionnaires of fathers and other caretakers were included. The maternal response subset was used for the crude and adjusted risk factor analyses; for the variables on the child questionnaire, crude odds ratios using the larger child dataset were virtually identical to those obtained using the subset.

The current burden of obesity among children in Italy was calculated using the weighted average estimated prevalence of selected cardiovascular and metabolic disease indicators as summarized from the literature by Lobstein and Jackson-Leach (14). For the purposes of this analysis, the prevalence of obesity among the 8- to 9-year-olds in this study was used to estimate the total number of children between the ages of 6–11 years (the ages corresponding to primary school in Italy) in each geographic area who would have been expected to have these diseases or conditions; the number of total children for each area was obtained from National Statistics Institute for 2007 (15). Furthermore, we assumed that the three non-participating regions/autonomous provinces in northern Italy would have the same overall prevalence as the adjacent regions that did participate.

Results

Overall, opt-out consent was obtained from 97% of parents of children enrolled in the 2610 classes that had been selected, and 91% of all the children were present on the day of the survey (Table 1). A total of 89% of all enrolled children met criteria for inclusion in the analysis; of the remaining children, 0.3% had data on age, sex, weight and/or height missing, 1.8% were younger than 8 or older than 9 years, and 0.1% had a BMI < 11 or >35.

Table 1 Study participation by geographic area, OKkio alla Salute, Italy, 2008

	Geographic area						Total population	
	North		Centre		South			
	Number	% of total students	Number	% of total students	Number	% of total students	Number	% of total students
Total students	16 620	NA	12 492	NA	21 085	NA	50 197	NA
Consent obtained*	16 236	97.7%	12 057	96.5%	20 219	95.9%	48 512	96.6%
Present on day of survey	15 387	92.6%	11 255	90.1%	18 614	88.3%	45 256	90.2%
Included in analyses†	15 262	91.8%	11 117	89.0%	18 297	86.8%	44 676	89.0%
Parental questionnaire also available	14 736	88.7%	10 464	83.8%	17 476	82.9%	42 676	85.0%
Mother respondent	12 756	76.8%	9 079	72.7%	15 387	73.0%	37 222	74.2%

*Negative consent; parents did not refuse participation.

†Age, sex, weight and height available + age 8–9 years and BMI ≥ 11 and ≤ 35.

NA, not applicable.

Table 2 Sociodemographic characteristics of study participants and their mothers by geographic area, Italy, 2008

Characteristic	North			Centre			South			Total population		
	n	%	95% CI	*n*	%	95% CI	*n*	%	95% CI	*n*	%	95% CI
Age (mean. SE)	106.8	(0.05)		106.0	(0.08)		105.1	(0.06)		105.9	(0.02)	
Sex												
M	7911	51.6	50.5–52.6	5713	51.8	50.4–53.1	9375	51.5	50.7–52.4	22 999	51.6	51.0–52.2
F	7351	48.4	47.4–49.5	5404	48.2	46.9–49.6	8922	48.5	47.6–49.3	21 677	48.4	47.8–49.0
Maternal educational attainment												
Less than high school degree	4482	34.9	33.2–36.5	2920	32.8	30.7–35.0	7237	49.4	47.3–51.5	14 635	40.9	39.7–42.1
High school degree	6419	50.2	48.9–51.5	4593	51.5	49.9–53.2	6353	39.5	37.9–41.1	17 365	45.7	44.8–46.6
University degree	1827	14.9	13.6–16.3	1537	15.6	14.1–17.2	1765	11.1	9.9–12.2	5 129	13.4	12.6–14.1
Mother works outside the home												
Full time	4866	35.7	34.3–37.0	3143	34.1	32.1–36.1	3445	21.5	20.3–22.7	11 454	28.9	28.1–29.8
Part time	4587	38.7	37.4–39.9	3183	34.6	32.9–36.2	3912	25.3	24.3–26.3	11 682	31.7	30.9–32.4
Does not work	3272	25.6	24.2–27.0	2735	31.4	29.3–33.4	7979	53.2	51.7–54.8	13 986	39.4	38.4–40.4

Because of rounding, totals may not add to 100%.
CI, confidence interval.

Eighty-five per cent also had a parental questionnaire available, and in 74% the mother was the respondent. Only minor differences were seen between the three study areas, and data for the main study outcomes were available for a minimum of 87% of enrolled children for all three geographic areas.

The mean age was 106 months (8 years and 10 months), with small but statistically significant differences in age between the three geographic areas (Table 2). There were more boys than girls, in keeping with Italian census data (15) in which the population in the 8- to 9-year-age group is 51.5% boys. Forty-one per cent of mothers in the total population had not completed high school, 46% had completed high school, and 13% had a university degree, although mothers in the south were substantially more likely to not have completed high school and less likely to be a university graduate. Overall, 61% of mothers worked outside the home; the percentage of mothers working full or part-time was highest in the north (74%), intermediate in the centre (69%) and lowest in the south (47%).

At national level, 24% of 8- to 9-year-old children were overweight and 12% were obese according to IOTF criteria (Table 3). The prevalence of overweight was similar for the three geographic areas, but obesity was 1.4 times higher in central than in northern Italy and 2.2 times higher in southern Italy. As can be seen in Fig. 1, the entire BMI curves for the centre and south were shifted with respect to the north; the median BMI for the north was 16.9, 17.5 for the centre, 17.9 for the south; this compared with a value of 15.8 for the IOTF reference population children 8 years and 10 months of age, the median age of the study population. In addition, all three curves show considerable skewing to the right, which is most pronounced in southern Italy.

Table 3 Nutritional status by geographic area, Italy, 2008

Area	Normo or underweight		Overweight		Obese	
	%	95% CI	%	95% CI	%	95% CI
North	72.3	71.2–73.4	20.2	19.2–21.2	7.5	6.7–8.2
Centre	64.7	63.2–66.3	24.6	23.4–25.8	10.6	9.6–11.7
South	58.0	56.9–59.0	25.4	24.5–26.3	16.6	15.8–17.4
All	64.1	63.4–64.8	23.6	23.0–24.2	12.3	11.8–12.8

CI, confidence interval.

With respect to sociodemographic risk factors for obesity, the prevalence of obesity decreased with increasing month of age and was significantly higher in men, in children of women with lower educational attainment, in those whose mothers did not work outside the home, and in children from central and southern Italy (Table 4). In the multivariate analysis, the association between obesity and geographic area remained after controlling for age, sex and maternal educational attainment and working status.

Geographic differences were also noted for some but not all behaviours that may be associated with an increased risk of obesity. No clear north-south gradient was observed for not having eaten breakfast, or in daily consumption of sweetened beverages. A slight gradient was observed for no physical activity in the past 24 h, but was not statistically significant (Table 5). By contrast, children in the centre and the south were considerably more likely to have a TV in their room (54% and 59%, respectively) compared with those in the north (32%). Finally, the percentage of children reported by their mothers to watch TV ≥3 h a day

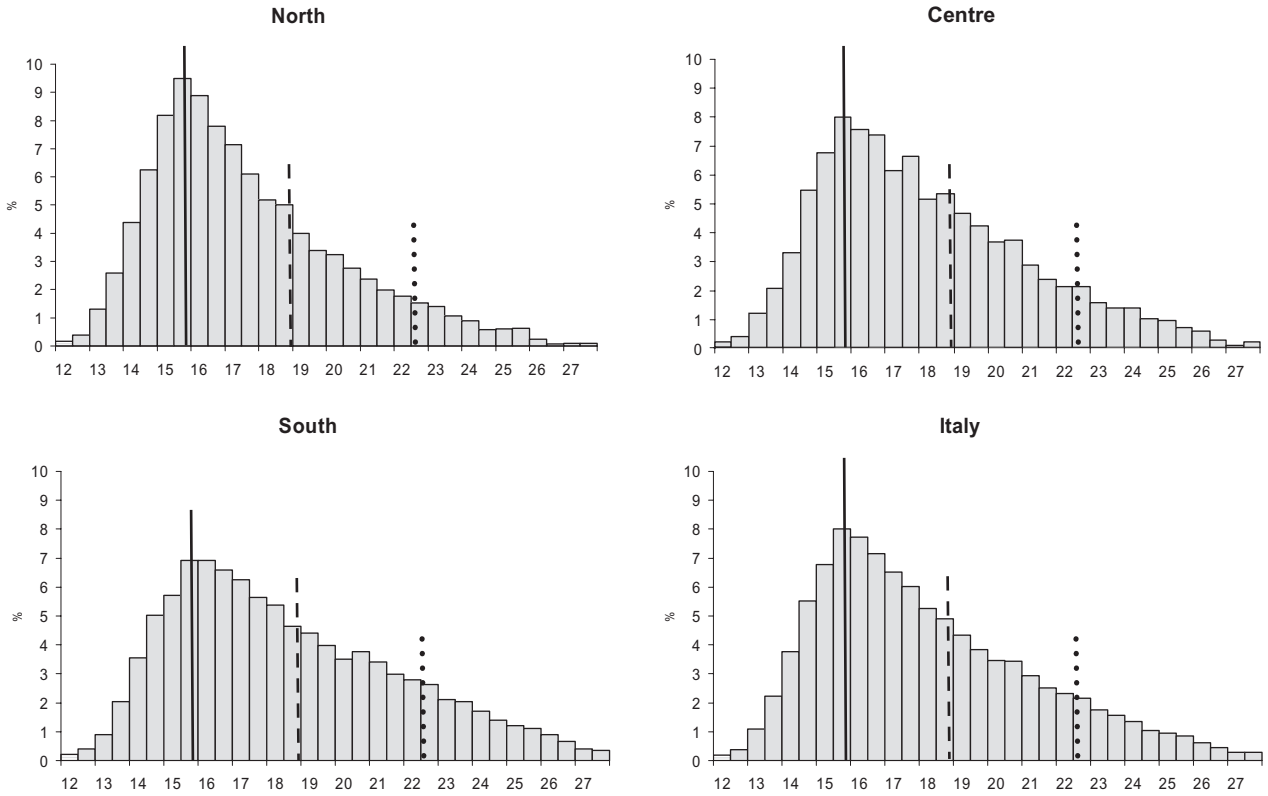

Figure 1 Distribution of body mass index by geographic area for children 8–9 years of age, Italy. Cut-offs refer to children 8 years and 10 months of age, the median age of the study population (solid line, International Obesity Task Force median; dashed line, cut-off for overweight; dotted line, cut-off for obesity).

Table 4 Sociodemographic risk factors for obesity, Italy, 2008

Characteristic	Obesity prevalence, %	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Age in months	Not applicable	0.97 (0.96–0.97)*	0.97 (0.96–0.98)
Sex			
M	13.3	1.2 (1.1–1.3)	1.2 (1.1–1.3)
F	11.4	Referent group	Referent group
Maternal education			
Less than high school	15.8	2.5 (2.1–3.0)	2.4 (2.0–3.0)
High school	10.9	1.7 (1.4–2.0)	1.7 (1.4–2.1)
University	7.0	Referent group	Referent group
Maternal employment			
Full time	11.4	1.1 (0.96–1.2)	1.0 (0.9–1.1)
Part time	10.8	Referent group	Referent group
Does not work outside home	14.2	1.4 (1.2–1.5)	1.2 (1.0–1.3)
Geographic area			
North	7.5	Referent group	Referent group
Centre	10.4	1.4 (1.2–1.7)	1.5 (1.3–1.8)
South	16.7	2.5 (2.2–2.8)	2.1 (1.8–2.4)

Analysis limited to children 8–9 years of age for whom it was possible to calculate a BMI and whose BMI was ≥11 and ≤35.
*unit = months.
CI, confidence interval.

Table 5 Prevalence of behaviours that may increase the risk of obesity, Italy, 2008

Characteristic	North		Centre		South		Total population	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
No breakfast on morning of study*	7.2	6.6–7.9	9.3	8.4–10.2	14.8	13.8–15.7	11.1	10.6–11.6
Drinks > 1 sweetened drink/day†	42.0	40.5–43.6	37.8	35.9–39.9	40.0	38.7–41.4	40.1	39.2–41.1
No physical activity in past 24 h*‡	22.3	20.5–24.0	25.1	22.6–27.6	28.9	27.3–30.9	26.0	24.9–27.1
Has television in room†	31.8	30.4–33.2	53.6	51.8–55.4	58.7	57.4–60.1	49.0	48.1–49.9
Hours of TV in average weekday†								
<1	1.7	1.4–1.9	1.1	0.8–1.5	0.7	0.6–0.9	1.1	0.96–1.2
1	40.8	39.3–42.3	37.8	35.8–39.8	27.8	26.8–28.8	34.0	33.2–34.8
2	40.3	38.9–41.6	42.3	40.7–44.0	39.3	38.2–40.2	40.2	39.5–41.0
≥3	17.3	16.2–18.3	18.8	17.0–20.6	32.2	31.2–33.2	24.7	24.0–25.4
≥5 h of screen time in average weekday†§	5.2	4.7–5.8	6.8	5.9–7.7	14.6	13.8–15.4	9.7	9.3–10.2

*Children for whom age, sex, weight and height available + age 8–9 years and BMI ≥ 11 and ≤35 (north 15 262, centre 11 117, south 18 297 total 44 676).
†Analysis limited to children with parental questionnaire for whom mother was informant (north 12 759, centre 9079, south 15 387, total 37 222).
‡No gym class, no after-school sports and did not play outdoors the previous day.
§Based on sum of reported hours of TV time + videogame and computer time.
CI, confidence interval.

Table 6 Mean weighted estimate of elementary school children 6–11 years of age with selected obesity-related conditions (Lobstein) by geographic area, Italy, 2008

Condition	Estimated prevalence, %	North (*n* = 1 402 852)		Centre (*n* = 593 277)		South (*n* = 1 293 504)		Italy (*n* = 3 289 633)	
		Number affected	% total children	Number affected	% total children	Number affected	% total children	Number affected	% total children
Elevated cholesterol	26.7%	27 983	2.0%	16 474	2.8%	55 949	4.3%	100 406	3.1%
Hypertension	25.8%	27 040	1.9%	15 919	2.7%	54 063	4.2%	97 022	2.9%
Impaired GTT	11.9%	12 472	0.9%	7 342	1.2%	24 936	1.9%	44 750	1.4%
Hyperinsulinemia	39.8%	41 713	3.0%	24 557	4.1%	83 400	6.4%	149 670	4.5%
Type 2 diabetes	1.5%	1 572	0.1%	926	0.2%	3 143	0.2%	5 641	0.2%
Hepatic steatosis	33.7%	35 320	2.5%	20 793	3.5%	70 618	5.5%	126 731	3.9%

was significantly higher in the south (32%) than in the north (17%) and centre (19%); similar differences were seen in the proportion of children exposed to ≥5 h of screen time per day.

Applying the prevalence of obesity in this study population to the actual number of children of elementary school age (6–11 years), we estimate that there are 383 000 obese children in Italy; 105 000 in the north, 63 000 in the centre and 215 000 in the south. In terms of childhood health outcomes associated with obesity, the estimated numbers of prevalent cases of selected cardiovascular and metabolic diseases and conditions among obese elementary school children in Italy are shown in Table 6. There would be approximately 100 000 children between the ages of 6 and 11 with hypertension and with high cholesterol (3% of the entire school age population), more than 150 000 with hyperinsulinemia (4.6%), 45 000 with glucose intolerance, more than 125 000 with hepatic steatosis, and nearly 5700 with type 2 diabetes (0.2%) (Table 6). The estimated number of children affected with each health problem was double for southern Italy compared with northern Italy despite the slightly larger population of children in the north.

Discussion

This study, which used standardized methods and equipment and had a high participation rate, represents the only recent population-based investigation of BMI in children in Italy. In addition to demonstrating a high level of childhood obesity in the overall population, which was higher than that of most Western countries (16), there were substantial geographic differences, with the prevalence of obesity twice as high in the south as in the north. Both the overall high

prevalence and the geographic disparities have profound present and future implications for the country's healthcare system.

Not only in the south but also in the centre and north, the median BMI was higher than the IOTF median, although the magnitude of the shift followed a geographic gradient, with the median 1.1 BMI units higher in the north, 1.7 in the centre and 2.1 in the south. Furthermore, in all three areas, there was considerable skewing to the right. A consequence of the upward shift in BMI distribution is that relatively small additional changes may produce substantial increases in the prevalence of obesity. These findings emphasize the need for a community-level approach to prevention which is not limited to children who are currently overweight or obese.

The geographic gradient in paediatric obesity is also seen for a wide variety of other paediatric health indicators in Italy, with the highest prevalence of most adverse outcomes in the eight regions of southern Italy, intermediate levels in the four central regions, and low levels in the seven regions and two autonomous provinces of the north. Contributing to these differences is the north-south gradient in educational level, poverty and access and efficiency of health services (17). Despite some efforts in the economic, social and medical spheres to diminish health disparities, including the creation of the national health service, the long-standing gap between north and south remains. Furthermore, disparities may become even greater as a result of the decentralization of the health service to the regional level, because it is not clear that the regions with greatest need will receive proportionately more resources.

This study demonstrates that the geographic differences were not accounted for by differences in maternal educational attainment and other child and maternal characteristics measured in our survey. Data from other sources suggest parental factors known to be associated with risk of childhood obesity are higher in the south, including insufficient breastfeeding (18) and having obese parents. Recent data from the Italian behavioural risk factor surveillance system show that among adults between 25 and 44 years who report having one or more child under 14 in the household, the obesity level is 1.6 times higher in women in the south compared with the north and centre; for men the corresponding value is 1.3 (unpublished data). Additionally, many behaviours known to be associated with an increased risk of obesity (19,20), including not eating breakfast, sedentary behaviour and television viewing, were especially high in the south. Undoubtedly, other factors not readily measured in the context our surveillance are also operating.

Regardless of its causes, the costs of children with obesity-related health problems are likely to represent a major burden to an already strained healthcare system. Among children who are obese, efforts to reduce or maintain their weight is labour-intense and requires a costly and complex team approach (21,22). Applying the prevalences obtained in our survey to the entire elementary school population of Italy, we estimate there are more than 380 000 obese children in Italy, with a disproportionate burden in southern Italy. Providing the type of comprehensive care recommended to clinically treat obesity, which includes family involvement, a developmentally appropriate approach, behaviour modification, dietary changes, and increased physical activity and decreased sedentary behaviour is beyond the current capacity of Italian paediatricians, the majority of whom are in individual practices, and the already strained hospital out-patient services. Furthermore, the management of obese children with conditions such as hypertension and hypercholesterolemia are likely to place a further burden on health resources. That the estimated number of obese children in the south is double that of the north is of particular concern in an area with a chronic shortage of funds and long waiting lists for specialist services.

This study has several limits that merit further examination. First, three regions, which account for 18% of the 8- to 9-year-old population in Italy, did not participate, although local-level data from Lombardy, which accounts for most of the 18%, suggest levels of obesity similar to those of other regions in the north (23). Second, data on child behaviours associated with obesity were self-reported and subject to cognitive limitations on the part of children, problems with accurate recall and provision of socially desirable responses by parents (7–9,24–26). Third, because the emphasis on the future data collection system is oriented towards causes of childhood obesity preventable through school and community interventions, data were not collected on birth weight, breastfeeding history or parental weight status, all important predictors of childhood obesity (19,20) that might be helpful in further understanding the origin of the geographic differences we observed. However, a smaller survey is under way to gather more detailed information on behaviours and on early childhood and parental risk factors. Finally, we applied the same prevalence of complications to the number of obese children in each geographic area, although differences in dietary practices, sedentary behaviours and other factors that differ between the three areas may influence these conditions as well. Thus, we may have over- or underestimated the number of children in each area with these conditions.

In conclusion, Italy appears to have a major childhood obesity problem that is differentially affecting the three areas of the country. Furthermore, with the decentralization of the healthcare system, it is likely that the most affected regions are precisely those that have the least resources to provide adequate management for those who are currently obese and to prevent further increases. It is

clear, given the large number of children involved and overall shift in the entire distribution of the population that community-based interventions are necessary (22,27). A comprehensive strategy to prevent obesity in both children and adults has been a central element of the recent initiative 'Guadagnare Salute' (Gaining Health) developed by the Ministry of Health (28), which is based on the World Health Organization's initiative of the same name. The strategy calls for the involvement not only of the health sector but also schools, transport and agriculture (29), although the feasibility of the sustained attention and interventions needed through different governments is not clear. However, unless rapid intervention is undertaken, the costs, both present and future and human and financial, will be profound.

Conflict of Interest Statement

None.

Acknowledgements

We gratefully acknowledge Drs. Stefania Salmaso and Donato Greco of the National Centre for Epidemiology, Surveillance and Health Promotion of the National Institute of Health, Dr Daniela Galeone of the Ministry of Health, and Dr Paolo D'Argenio of the Regional Health Authority of Campania for their support and critical input. Steno Fontanari and Mauro Bucciarelli provided invaluable assistance with data management, and Silvia Andreozzi and Silvia Meucci provided excellent secretarial help. We also wish to thank members of the Technical Committee, including Giulia Cairella, Margherita Caroli, Marcello Caputo, Franco Cavallo, Laura Censi, Amalia De Luca, Giordano Giostra, Gianfranco Mazzarella, Giuseppe Perri, Maria Teresa Silani, Annarita Silvestri and Lorenzo Spizzichino, as well as the many regional coordinators including Antonio Ciglia and Manuela Di Giacomo (Abruzzo), Gabriella Cauzillo and Gerardina Sorrentino (Basilicata), Giuseppina Fersini, Marina La Rocca and Giuseppe Perri (Calabria), Giuseppina De Lorenzo (Campania), Paola Angelini and Emanuela Di Martino (Emilia Romagna), Claudia Carletti and Rossana Rincorosi (Friuli Venezia Giulia), Giulia Cairella and Esmeralda Castronuovo (Lazio), Federica Pascali and Paola Oreste (Liguria), Giordano Giostra and Giuliano Tagliavento (Marche), Teresa Manfredi Selvaggi (Molise), Marcello Caputo (Piemonte), Savino Anelli and Vincenzo Pomo (Puglia), Pina Arras and Grazia Cattina (Sardegna), Achille Cernigliaro and Simonetta Rizzo (Sicilia), Mariano Giacchi and Giacomo Lazzeri (Toscana), Marco Cristofori and Mariadonata Giaimo (Umbria), Anna Maria Covarino and Giovanni D'Alessandro (Valle D'Aosta), Galesso Riccardo and Mary Elizabeth Tamang (Veneto), Silvano Piffer (Trento) for their input and assistance. We thank the students of Master Profea 2006 for their assistance in developing and testing the survey protocol. Finally, we thank the many healthcare workers, teachers and families throughout the country who participated in this study.

Funding for this study was provided by the Italian Ministry of Health/Centre for Disease Prevention and Control, Chapter 4393/2005 – CCM.

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