

# Availability of data assessing the prevalence and trends of overweight and obesity among European adolescents

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## Abstract

*Objective:* To review recent data on objectively measured overweight/obesity in national representative samples of European adolescents (aged 10–18 years), as well as availability of studies assessing trends in overweight/obesity in this target group. Attention was paid to the ability of the data to describe the obesity epidemic, especially in sociodemographic subgroups.

*Design/setting/subjects:* Data on prevalence and trends in overweight/obesity among adolescents in the twenty-seven European Community member states, Iceland, Norway and Switzerland, available as scientific publications as well as reports or unpublished data by the end of 2009, were retrieved. Reports on the most recent objectively measured data from national representative samples were selected and described with regard to the years of data collection, sample sizes, response rates, age ranges included, trends by age, type of measures of overweight/obesity, sociodemographic variables and the sources of information.

*Results:* Objectively measured data on national representative samples were identified for only half of the countries, and the trend studies were mainly conducted applying subnational samples. Most studies used the criteria from the International Obesity Task Force (IOTF) to define overweight/obesity, but the age ranges studied and the years of data collection varied, and information on sample sizes and response rates were often not presented. Data on trends of overweight/obesity over time are increasing, and the most recent studies indicate that the prevalence rate of overweight/obesity has stabilized. Few studies reported data by socio-demographic subgroups other than gender and age.

*Conclusions:* Objectively measured data on national representative samples of adolescents appear scattered, and there is a large heterogeneity with respect to the quality and comparability of available data. Increasing use of the IOTF criteria for overweight/obesity contributes to improved comparability across studies. Data by sociodemographic subgroups, and in particular by socio-economic status, are scarce.

**Keywords**  
Overweight  
Adolescence  
Prevalence  
Trends  
Europe

Several scientific reports have shown that the obesity epidemic has reached children and adolescents in Europe. The reports suggest that there are clear geographic differences within the continent, with southern Europe and the British Isles reporting the highest prevalence rates of overweight/obesity among children and adolescents<sup>(1–4)</sup>. In 2007, WHO Europe published a report on the challenge of obesity in Europe<sup>(1)</sup>. It was concluded that objectively measured and valid data on BMI were lacking for about half of the European countries. Furthermore, making comparisons between countries was difficult due to great variation in response rates, age ranges included, years of data collection and definition of overweight and obesity<sup>(1)</sup>. Considering the importance given

to childhood obesity in the current public health discourse, as well as the urgent need to have high-quality data to inform policy formation and interventions, it seems important to assess to what extent these methodological challenges are being addressed in the more recent publications. Thus, the aim of the present paper is to provide an updated review of available data objectively measuring overweight/obesity in national representative samples of European adolescents (aged 10–18 years). Furthermore, the aim was to review available studies assessing trends in overweight/obesity over time in this target group, and to evaluate the ability of these data to describe the obesity epidemic across sociodemographic subgroups.

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## Methods

Data on prevalence rates and trends in overweight/obesity among adolescents (aged 10–18 years) in the twenty-seven European Community member states, Iceland, Norway and Switzerland were retrieved up until the end of 2009 from the following three sources: (i) a systematic search in the MedLine database combining the general search: ((Child OR Adolescent) AND (Overweight OR Obesity OR Body Mass Index OR BMI) AND (Trend OR Prevalence)) with each of the country names and including only reports published in English. The reference lists of selected articles were screened for other relevant studies. (ii) Data from the WHO Nutrition Policy Database<sup>(5)</sup> and the report 'The challenge of obesity in the WHO European Region and the strategies for response'<sup>(1)</sup> were searched for additional data. (iii) The WHO regional office for Europe and the International Obesity Task Force (IOTF) were contacted to obtain the most recent data on overweight/obesity among adolescents in the region. The latter two sources also contained data not published in scientific international journals. From these three sources, reports on the most recent (from 1995 until the end of 2009) objectively measured height and weight of national representative samples of adolescents were abstracted.

No inclusion criteria with regard to study quality were used to present the total picture of the data available. To evaluate whether comparability across studies had improved and the ability of the studies/reports to describe the obesity epidemic among adolescents in Europe, the following information was abstracted for the prevalence studies: year of data collection, sample size, response rate, age range included, trends by age, definition of overweight/obesity, sociodemographic variables and the source of information. For the trend data, the following information was abstracted: year of data collection, age, definition of overweight/obesity, number of cross-sectional surveys, sample size, method of data collection (self-reported, measured or measured register data) and type of sample (national or other).

The 2001–2002 and 2005–2006 WHO Collaborative study: Health Behaviour in School-aged Children (HBSC) reports<sup>(3,4)</sup> were used to assess trends and checked for the availability of data in countries lacking objectively measured data on overweight/obesity from national representative samples. HBSC is a survey of 11-, 13- and 15-year-olds in forty-one countries (mainly in Europe and North America) conducted every fourth year.

## Results

### ***Prevalence of overweight in national representative samples based on objective measurements***

Prevalence data for overweight/obesity based on national representative samples and objectively measured data

were found for eighteen of the thirty countries (Table 1). The well-known geographical differences across Europe with the highest prevalence among adolescents from southern Europe and the British Isles were confirmed. All studies reported their data by gender, but there were no clear patterns of gender differences across the countries. Among girls, there seemed to be a decrease in the prevalence of overweight/obesity with increasing age (Table 1). The majority of the studies reported prevalence rates of overweight/obesity using the age- and gender-specific cut-offs recommended by IOTF<sup>(6)</sup>. However, the age ranges studied and the year of the data collection varied, as did the sources of the information. Sample sizes and response rates were often not reported. The type of data collected on other sociodemographic factors also varied, and their relationship with overweight/obesity prevalence rates was often not reported.

### ***Availability of other data on prevalence of overweight***

About half of the countries that did not have objectively measured national data had data on objectively measured height and weight from subnational or convenience samples, in addition to the self-reported HBSC data (data not shown). Prevalence data on overweight/obesity based on self-reported data from 11-, 13- and 15-year-olds were available from twenty-nine of the thirty countries (only Cyprus was missing) through the HBSC survey in 2005–2006. The majority of the countries ( $n = 24$ ) also participated in the HBSC survey in 2001–2002 in which such data were collected for the 13- and 15-year-olds. The new countries added in 2005–2006 were Bulgaria, Iceland, Luxembourg, Romania and Slovakia.

### ***Trends in overweight based on objective and self-reported measurements***

The WHO Europe report from 2007 and the paper by Jackson-Leach and Lobstein<sup>(1,2)</sup> reported increasing trends of overweight/obesity among adolescents in the following countries between 1958 and 2003: Greece (Crete), Denmark (Copenhagen), France (Northern), Germany (Zerbst, Hettsted, Bitterfeld), Northern Ireland, Spain (various regions), Sweden (Umeå and Gothenburg), Switzerland and the UK (England and Scotland and South Northumberland).

Additional reports on the trends in the prevalence of overweight and/or obesity were found for the following countries (Table 2): Cyprus, Greece, Portugal, Spain (Cuenca), Ireland (Co Kildare), UK (West Scotland), the Czech Republic, Poland (Cracow, East rural), Finland, France, the Netherlands (national, the Hague), Norway (Bergen, Trøndelag) and Sweden (national, Stockholm, Gothenburg)<sup>(10,16,18–37)</sup>.

The three recent studies from Sweden, all based on objective measurements, show stagnation or even a decrease in obesity prevalence among girls in the samples of

**Table 1** Prevalence of overweight (including obesity) based on objectively measured weight and height among national representative samples of adolescents in the twenty-seven European Community member states and Norway, Iceland and Switzerland: the HOPE project, WP4

Country	Year	n	r.r. (%)	Age (years)‡	Prevalence (%) and age trend* of overweight/obesity† (age: 10–18 years)				Sociodemographics§	Source
					Boys		Girls			
					Age (years)	Age trend	Age (years)	Age trend		
South/British Isles										
Cyprus <sup>(7)</sup>	1999–2000	2467	95	6–17##	20–38	No pattern	13–32	Decrease	U/R, Ot	Article
Greece <sup>(8)</sup>	2003	14 456	87	13–19###	26–32	Decrease	14–21	Decrease	U/R, Et	Article
Spain <sup>(9)</sup>	1998–2000	3534	n.r.	2–24###	31–33	No difference	13–21	Decrease	Ed, Ot	Article
Ireland <sup>(10)</sup>	2003–2004	596	n.r.	5–12###	20	N/A	27	N/A	n.r.	Article
UK										
England	2004	–	–	5–17##	18–41	No pattern	17–33	No pattern		Pers. Com./IOTF
North Ireland <sup>(11)</sup>	2000	2017	65	12, 15	20, 13	Decrease	26, 19	Decrease	Oc	Article
East										
Bulgaria	2004	–	–	10–19	22		14			WHO-NPD
Czech Republic <sup>(12)</sup>	2001	31 228	n.r.	10–18##	11–19	Decrease	8–18	Decrease	Ed, U/R	Article
Hungary	1997–2000	–	–	15–18	22		19			WHO-NPD
Poland	2000	–	–	10–18	20		13			WHO-NPD
Slovakia	2001	–	–	10–18	17		13			WHO-NPD
North/Central										
Austria <sup>(13)</sup>	2000	43 504	97	18	19		Not included		Ed, G	Article
France	2006	1675	68	3–17	16		19			Internet/IOTF
Germany <sup>(14)</sup>	2002–2003	14 836	n.r.	3–17###	17–18	No difference	17–19	No difference	Ot, Et, G	Article (DE)
Iceland	2004	–	–	15	20		10			WHO-NPD
Luxembourg	2000–2001	–	–	10–19	23		21			WHO-NPD
The Netherlands¶ <sup>(15)</sup>	2002–2004	90 071	N/A	4–16##	13–16	Increase	16–22	Increase	Et, G	Article
Norway <sup>(16)</sup>	2005–2006	1083	82	9–15	14	N/A	13	N/A	Ed, G, Et	Report (NO)
Switzerland <sup>(17)</sup>	2002	2600	76	6–12##	16–24	No pattern	21–23	No difference	G	Article

HOPE, Health-promotion through Obesity Prevention across Europe; WP, work package; r.r., response rate; n.r., not reported; N/A, not applicable; Ed, education; In, income; Oc, occupation; A, area social class; Et, ethnicity; U/R, urban/rural; G, geographical region; Ot, other; IOTF, International Obesity Task Force; WHO-NPD, WHO Nutrition Policy Database; ENNS, Etude National Nutrition Sante.

\* Age trend is indicated as no pattern, increasing or decreasing prevalence by increasing age.

†The prevalences are given as range for the adolescent age group 10–18 years. IOTF age- and gender-specific definitions for overweight (including obesity)<sup>(6)</sup> was used for all except: Austria (adult cut-offs for BMI), Germany (national standard) and Luxembourg (2000 CDC growth charts).

‡Age range for the entire study; ##Age can be disaggregated by year; ###Age can be disaggregated by age intervals.

§Data collected on other sociodemographic factors: Ed, In, Oc, A, Et, U/R, G, Ot (i.e. composite measures of socio-economic class).

||Source: Article, published scientific article (language if other than English); Pers. Com./IOTF, Tim Lobstein & Rachel Leach, Reanalysis of HSE 2004, personal communication, T Lobstein, May 2009; WHO-NPD<sup>(5)</sup>; Internet/IOTF, ENNS 2006 – Institute de Veille Sanitaire in personal communication, T Lobstein, May 2009 and <http://www.invs.sante.fr/surveillance/nutrition/enns.htm> (accessed August 2009).

¶Collected from community health services, weighted for ethnicity and municipality size to match the distribution in the general population.

**Table 2** Trends in prevalence of overweight/obesity or other measures of adiposity based on measured and self-reported weight and height among adolescents in the twenty-seven European Community member states and Norway, Iceland and Switzerland\*: the HOPE project, WP4

Country	Year	Age (years)†	Measures‡	Study quality§	Conclusion	Notes¶
<b>South/British Isles</b>						
Cyprus <sup>(18)</sup>	1997–2003	11	IOTF	CSS × 2, <i>n</i> > 5000, M, N	↑	For overweight in rural boys only
Greece <sup>(19)</sup>	1981–1995	6–15††	Median BMI	CSS × 2, <i>n</i> ?, N/O	↑	Lower increase in the older girls
Portugal <sup>(20)</sup>	1960–2000	9–11††	IOTF	CSS × 5, <i>n</i> 500–1000, Mr, O	↑	Sample: males, high SES
Spain (Cuenca) <sup>(21)</sup>	1992–2004	9–10	IOTF	CSS × 4, <i>n</i> 233–1166, M, O	↑	Only found in boys
Ireland <sup>(10)</sup>	1990–2005	8–12	IOTF+2	CSS × 2, <i>n</i> ≤ 500, Mr/M, N	↑	Not reported by gender/age
Ireland (Co Kildare) <sup>(22)</sup>	2002–2007	4–13	IOTF	CSS × 2, <i>n</i> < 1000, M, O	–	No change in either gender
UK						
England (Liverpool) <sup>(23)</sup>	1998–2006	9–10	IOTF	CSS × 8, <i>n</i> 1000–5000, M, O	↑–	Increase first, levelled off last three
Scotland (West) <sup>(24)</sup>	1987–2006	15	UK90	CSS × 3, <i>n</i> 500–5000, M, O	↑	Reported on obesity only
<b>East</b>						
The Czech Republic <sup>(25)</sup>	1951–2001	2.5–18††	BMI	CSS × 4, <i>n</i> > 50 000, M, N	↑	
Poland (Cracow) <sup>(26)</sup>	1971–2000	4/7–19††	IOTF	CSS × 3, <i>n</i> 1000–5000, M, O	↑	Lower increase in the older girls
Poland (East, rural) <sup>(27)</sup>	1980–2000	4–19††	BMI	CSS × 2, <i>n</i> > 5000, M, O	↑	Some variation by age/gender
<b>North/Central</b>						
Finland <sup>(28)</sup>	1977–1999	12–18††	BMI	CSS × 11, <i>n</i> > 2500, SR, N	↑	Linearly in all age/gender groups
Finland <sup>(29)</sup>	1979–2005	12–18††	IOTF	CSS × 14, <i>n</i> > 2500, SR, N	↑	Across sociodemographic groups
France <sup>(30)</sup>	1998–2007	3–14	IOTF	CSS × 2, <i>n</i> 1000, SR/M, N	–	No changes
The Netherlands <sup>(15)</sup>	1980–2003	4–15††	IOTF	CSS × 3, <i>n</i> N/A, M/Mr, N	↑	Steepest increase 1997–2003
The Netherlands (Hague) <sup>(31)</sup>	1999–2007	3–16†††	IOTF	CSS × 9, <i>n</i> 8000–10 000, Mr, O	↑↓	↑ Especially in the Turkish, Dutch girls ↓
Norway (Bergen) <sup>(32)</sup>	1971–2006	4–15††	Weight/height	CSS × 2, <i>n</i> 1000–5000, M, O	↑	Lower increase in the older ages
Norway (Trøndelag) <sup>(33)</sup>	1966–1997	14–18	BMI	CSS × 2, <i>n</i> > 5000, M, O	↑	Higher in the upper BMI groups
Norway (Trøndelag) <sup>(34)</sup>	1966–1997	14–18	IOTF	CSS × 2, <i>n</i> > 5000, M, O	↑	Slightly more in boys
Sweden <sup>(35)</sup>	2001–2007	16	IOTF/BMIstds	CSS × 2, <i>n</i> < 600, M, N?	–	No changes
Sweden (Gothenburg) <sup>(36)</sup>	1984–2005	10	IOTF	CSS × 3, <i>n</i> 4000–5000, Mr, O	↑↓	↑ Between 1984 and 2000, then ↓ in girls
Sweden (Stockholm) <sup>(37)</sup>	1999–2003	10	IOTF	CSS × 2, <i>n</i> 2000–3000, Mr, O	–	No change, slight decrease in girls

HOPE, Health-promotion through Obesity Prevention across Europe; WP, work package; IOTF, International Obesity Task Force; BMIstds, BMI standard deviation scores; N/A, not applicable; SES, socio-economic status.

? = data not clearly reported in articles.

\*References found in addition to those in the report 'The challenge of obesity in the WHO European Region and the strategies for response' (WHO, 2007)<sup>(1)</sup> and the article by Jackson-Leach and Lobstein<sup>(2)</sup>.

†Age range for the entire study; ††Age can be disaggregated by year; †††Age can be disaggregated by age intervals.

‡Anthropometric measures obtained/definition of overweight/obesity used: IOTF, age- and gender-specific definitions for overweight and obesity from the IOTF<sup>(6)</sup>.

§Study design: CSS × *n*, cross-sectional times number of measurement points; *n*, number of participants at each time point. Data collection: M, measured; Mr, measured, but collected from records; SR, self-reported; Representativity: N, national; O, subnational or other convenience sample.

||Overall conclusions from the articles: ↑, increase in overweight and/or obesity over time; ↓, decrease; – no change.

¶Notes are comments on whether the trends were only pertaining to overweight or obesity, special groups, whether there were different patterns over time or by age or gender.

**Table 3** Countries within the twenty-seven European Community member states and Norway, Iceland and Switzerland with a reported change ( $\geq 3\%$ ) in prevalence of overweight (including obesity) according to the IOTF criteria<sup>(6)</sup>: based on self-reported weight and height in national representative samples of 15-year-olds in the 2001–2002 and 2005–2006 HBSC surveys<sup>(3,4)</sup>

Country	Boys			Girls		
	2001–2002	2005–2006	Change	2001–2002	2005–2006	Change
South/British Isles						
Italy	20	23	+3			
Malta	28	32	+4	17	28	+11
Portugal	17	22	+5	7	13	+6
England*	16	13	–3	13	8	–5
Ireland*	11	15	+4	13	10	–3
East						
Czech Republic				6	10	+3
Lithuania	5	8	+3			
Poland	8	12	+4			
Slovenia				7	10	+3
North/Central						
Austria	13	19	+6			
Belgium–French	12	15	+3			
Finland				9	12	+3
Germany				7	11	+4
Switzerland	11	14	+3			

IOTF, International Obesity Task Force; HBSC, Health Behaviour in School-aged Children.

\*England had 30% or more missing data in the 2005–2006 survey, Ireland had 30% or more missing data in both the surveys<sup>(3,4)</sup>.

10-year-olds from Stockholm and Gothenburg<sup>(36,37)</sup> and in a sample of 16-year-olds<sup>(35)</sup> (Table 2). This recent indication of stabilized overweight/obesity trends was also reported from Ireland, England, France and among Dutch girls based on data collected from 1998 to 2007<sup>(22,23,30,31)</sup>, all based on objective measurements except for the first time point in the French study. In the Dutch study<sup>(31)</sup>, an increase was, however, found in the Turkish subsample<sup>(31)</sup>. In Finland, an increase in overweight/obesity rates was found up until 2005 based on self-reported measurements, and this trend was similar across the multiple sociodemographic indicators used<sup>(29)</sup>.

Considering only changes greater than  $\pm 3\%$  between the two latest HBSC surveys<sup>(3,4)</sup>, changes in the prevalence of overweight/obesity among 15-year-olds were found only in about half of the countries (Table 3). The majority of these changes were small (3–4%), and were not always seen for both genders within the same country. The only decreases in self-reported prevalence rates based on the HBSC data were seen for England and Ireland between 2001–2002 and 2005–2006.

## Discussion

The results presented in the present paper provide an overview of the most recent objectively measured data on overweight/obesity in the nationally representative samples of European adolescents, the availability of trend data in this age group and the ability of these data to describe the obesity epidemic across various subgroups. Earlier findings are supported in that we see large geographical differences in the prevalence of overweight/obesity among adolescents

(aged 10–18 years) within the twenty-seven European Community member states and Norway, Iceland and Switzerland. The results further suggest, based on the review of recent publications, that the prevalence rates of overweight/obesity among adolescents have been increasing in countries across Europe, but might have started stabilizing according to the most recently collected data (2005–2007). However, the large heterogeneity in the quality and comparability of the available data on prevalence rates and trends of overweight/obesity among adolescents in Europe remains.

A lack of objectively measured data on national representative samples was still evident by the end of 2009. However, as most of the data presented were based on the age- and gender-specific cut-offs from IOTF<sup>(6)</sup>, comparison between countries has become easier. In the WHO report from 2007<sup>(1)</sup>, there were twelve countries among the twenty-seven European Community member states, Iceland and Norway and Switzerland, which had objective measures on national representative samples of adolescents. In the present paper, such objectively measured data were found for eighteen of the thirty countries. The majority of these data were collected from 2000 to 2005, making them already 5–10 years old. Considering the rapid increase in the prevalence of overweight/obesity among adolescents in the USA over the past two to three decades<sup>(38)</sup>, and also the more recent publications on trends indicating stabilized rates in some countries/subgroups<sup>(22,23,30,31,35–37)</sup>, caution should be observed regarding whether the data presented in Table 1 can be considered representative of the current situation among European adolescents, despite including only prevalence studies reporting data collected after 1995.

No clear patterns regarding gender differences in prevalence rates of objectively measured overweight/obesity were observed. This is contrary to the results from the self-reported data among 15-year-olds in the latest HBSC survey in which higher prevalence rates among boys were found in the majority of countries<sup>(4)</sup>. The only other cross-national European survey – the Pro Children Study – used parent-reported data on weight/height among 11-year-olds from nine European countries<sup>(39)</sup>. They found the same geographical differences as in the HBSC surveys, and also consistent gender differences as found in the HBSC surveys<sup>(4,39)</sup>. However, a recent review of measured *v.* self-reported height and weight of adolescents in the USA found that girls and overweight youth underestimate their weight, and thus self-reported data underestimate the real prevalence of overweight and should only be used when measured data are not obtainable<sup>(40)</sup>. In addition, large variations in the response rates in these self- and/or parent-reported survey results<sup>(3,4,39)</sup> may further have biased the results. In studies employing objective measures (Table 1), the available response rates appeared high, but the total number of participants varied largely and might have weakened the precision of the prevalence estimates.

The results of the European HELENA study (promoting Healthy European Lifestyle through Exercise and Nutrition in Adolescence), with its thorough measurement of body composition of ten representative urban samples of 13–16-year-olds across Europe, will soon become available<sup>(41)</sup>. The data from the HELENA study will further enrich our insight into prevalence rates across Europe and by sociodemographic groups. Furthermore, the ongoing WHO European Childhood Obesity Surveillance Initiative among primary-school children (aged 6–10 years) in fifteen countries across Europe should provide good-quality data for this age group, as well as useful experiences in order to design a similar surveillance system among adolescents<sup>(42)</sup>. In the Norwegian part of the present survey, measurements were obtained for 89% of the 3952 invited children<sup>(43)</sup>. Measures were taken by trained school nurses using standardized protocols for calibration of measurement tools and to measure and report weight, height and waist circumference<sup>(43)</sup>. The experience so far clearly indicates that this is a highly feasible method for collecting data, and it shows that it is also possible to include other measures of adiposity (i.e. waist circumference) within such a surveillance system.

Other issues not properly addressed in the available literature were variation in prevalence by age through adolescence and by sociodemographic subgroups. It seemed that most studies measured several age groups (Table 1). Thus, data are available to address whether there are differences in prevalence by age, but repeated cross-sectional surveys in the same age groups are needed to address whether these are true age differences or cohort differences because of variation in year of data

collection in the different age groups. Data on other sociodemographic differences, such as indicators of socio-economic status (SES) and ethnicity, were only infrequently collected and presented. Finally, many of the identified reports were not published in scientific journals or in English, which makes it difficult to systematically review the results and poses serious questions about the quality of the data from studies since they have not undergone peer review. National public health institutes are likely to be in charge of national surveillance of available data on overweight/obesity in their populations, and they should be able to add to their routine by submitting reports to a cross-European surveillance system. Several of the studies on trends were already making use of various register data<sup>(10,15,20,31,36,37)</sup>.

The reports on trends in overweight/obesity among adolescents in Europe confirmed the finding that these data are largely subnational, based on two time points only, and still one-third reported on trends before the year 2000. On the positive side, these studies were mainly based on objectively measured data. Furthermore, recently published studies do, to a larger extent than previous ones, analyse by sociodemographic subgroups such as SES<sup>(29,30)</sup> and ethnicity<sup>(31)</sup>, and one also included a measure of thinness<sup>(21)</sup>. A scarcity of data on older adolescents and from Eastern European countries is noted as well. Data from these groups would be of particular interest as dietary habits and physical activity tend to deteriorate during adolescence, and the social and economic transitions in Eastern Europe are likely to influence these behaviours. The methodological weaknesses of the HBSC data (self-reported and variable response rates) make it impossible to draw any firm conclusion regarding the trends in overweight and obesity rates among European adolescents. In particular, the quality of data from England and Ireland, which showed a decreasing trend, might be biased because of larger proportions of missing data on height and weight in the more recent surveys<sup>(3,4)</sup>. However, regional trend data from Liverpool and Co Kildare<sup>(22,23)</sup> do support a possible levelling off and stabilization of overweight/obesity rates. The need for routinely collected, objectively measured data in national representative samples across Europe is thus strongly recognized.

In conclusion, current data indicate that there is geographical variation and that there has been an increase in the prevalence of overweight over time among adolescents in Europe, but that this increase might now be levelling off and stabilizing for some countries and some sociodemographic groups. Objectively measured data on national representative samples of adolescents appear scattered, and there is a great heterogeneity with respect to the quality and comparability of available data. Data by sociodemographic subgroups, and in particular by SES, are scarce and should be included in future analyses, given the indication that the stabilization might not be

equal across sociodemographic groups. A cross-national monitoring system of overweight/obesity in adolescence and with good data on SES and ethnicity may provide the best data, but in the mean time the increased use of the IOTF criteria for overweight/obesity in publications should be continued.

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