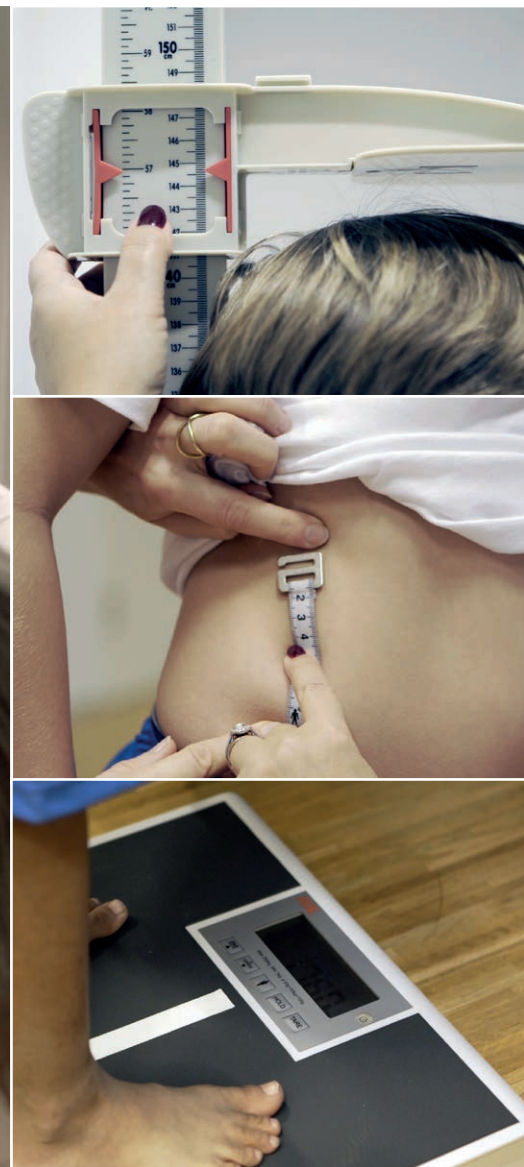


Childhood Obesity Surveillance Initiative (COSI)



Protocol

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PROTOCOL
October 2016

Abstract

The WHO Regional Office for Europe has established the Childhood Obesity Surveillance Initiative in more than half the countries in the Region for routine monitoring of the policy response to the emerging obesity epidemic. The aim of the Initiative is to measure trends in overweight and obesity in children aged 6.0–9.9 years to get a clear understanding of the epidemic and to allow inter-country comparisons. This document outlines the common protocol agreed for use in the Initiative.

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Acknowledgements

The Regional Office sincerely thanks the Ministry of Health of the Russian Federation, the Ministry of Health and of Social Policies of Italy and the Ministry of Health from Portugal for its support to the Regional Office's public health initiatives against childhood obesity.

The Regional Office also extends its gratitude to the Consumers, Health, Agriculture and Food Executive Agency (Chafea) of the European Commission for its financial support.

The WHO Regional Office for Europe is most grateful to Joop van Raaij (National Institute for Public Health and the Environment, Bilthoven, Netherlands) and Harry Rutter (National Obesity Observatory, Oxford, United Kingdom) for advice on the design of the WHO European Childhood Obesity Surveillance Initiative (COSI) and Trudy Wijnhoven (WHO Regional Office for Europe, Copenhagen, Denmark) for preparing the protocol.

Sincere appreciation is expressed to the following people for their valuable contributions provided at COSI meetings and on the revisions of the protocol and on experience gained with implementation of COSI (in alphabetical order): Edita Albaviciute (Lithuanian University of Health Sciences, Kaunas, Lithuania), Usama A. Tawfeeq Al-Ansari (Karolinska Institute, Huddinge, Sweden), Christine Baluci (Ministry of Health, the Elderly and Community Care, Floriana, Malta), Marie-Claire Bartolo (Primary Health Care Department, Floriana, Malta), Anna Biehl (Norwegian Institute of Public Health, Oslo, Norway), Lien Braeckvelt (Flemish Agency for Care and Health, Brussels, Belgium), Radka Braunerova (Institute of Endocrinology, Prague, Czech Republic), Genc Burazeri (Institute of Public Health, Tirana, Albania), Stef van Buuren (TNO Quality of Life, Leiden, Netherlands), , Katia Castetbon (University of Paris, Bobigny, France), Heidi Cloots (Ministry of the Flemish Community, Brussels, Belgium), Ana Rita Cruz (CEIDSS, Centre for Research on Social Dynamics and Health), Hywell Dinsdale (National Obesity Observatory, Oxford, United Kingdom), Vesselka Duleva (National Centre of Public Health and Analyses, Sofia, Bulgaria), Bettina Ehrenblad (Karolinska Institute, Huddinge, Sweden), Nazih Eldin (Health Service Executive, County Meath, Ireland), Kathrin Favero (Public Health Directorate, Bern, Switzerland), Victoria Farrugia Sant'Angelo (Ministry of Health, the Elderly and Community Care, Floriana, Malta), Alma van der Gref (Municipality Zaanstad, Netherlands), Sibel Gögen (Ministry of Health of Turkey Public Health Institution, Ankara, Turkey), Pedro Graça (Directorate General for Health, Lisbon, Portugal), Andrea Gualtieri (Ministry of Health, Borgo Maggiore, San Marino), Mirjana Gurinovic (University of Belgrade, Belgrade, Serbia), Maria Hassapidou (Technical Educational Institute, Thessaloniki, Greece), Mirjam Heinen (National Nutrition Surveillance Centre at University, Dublin, Ireland), Stefaan de Henauw (University of Ghent, Ghent, Belgium), Iris de Hoogh (Wageningen University, Wageningen, Netherlands), Ragnhild Hovengen (Norwegian Institute of Public Health, Oslo, Norway), Constanta Huidumac Petrescu (National Institute of Public Health, Bucharest, Romania), Ciáran Humphreys (National Public Health Service for Wales, Carmarthen, United Kingdom), Jolanda Hyska (Institute of Public Health, Tirana, Albania), Cecily Kelleher (National Nutrition Surveillance Centre at University, Dublin, Ireland), Vladimir Kendrovski (National Institute of Public Health, Skopje, The former Yugoslav Republic of Macedonia), Victoria Kovacs (National Institute for Food and Nutrition Science, Budapest, Hungary), Marie Kunesova (Institute of Endocrinology, Prague, Czech Republic), Brigitte Lefeuvre (Ministry of Health, Paris, France), Vera Lugutuah (International Crop Research Institute for the Semi-arid Tropics, Bamako, Mali), Lauren Lissner (Göteborg University, Göteborg, Sweden), Eliza Markidou (Ministry of Health, Nicosia, Cyprus), Eva Martos (National Institute for Food and Nutrition Science, Budapest, Hungary), Karina McHardy (University of Oxford, Oxford, United Kingdom), Jørgen Rajan Meisfjord (Norwegian Institute of Public Health, Oslo, Norway), Roseanne Metaal (Ministry of Health, Welfare and Sport, The Hague, Netherlands), Lotta Moraeus (Göteborg University, Göteborg, Sweden), Pedro Moreira (University of Porto, Porto, Portugal), Paola Nardone (National Institute of Health, Rome, Italy), Moe Thet Nyo (Karolinska Institute, Huddinge, Sweden), Galina Obreja (National Center for Public Health, Chisinau, Republic of Moldova), Ursula O'Dwyer (Department of Health and Children, Dublin, Ireland), John Osborn (University of Rome La Sapienza, Rome, Italy), Sandrine Peneau (University of Paris, Bobigny, France), Napoleón Pérez Farinós (Ministry of Health and Consumption, Madrid, Spain), Carmen Perez-Rodrigo (Department of Public Health, Bilbao, Spain), Ausra Petrauskiene (Kaunas University of Medicine, Kaunas, Lithuania), Stefka Petrova (National Centre of Public Health and Analyses, Sofia, Bulgaria), Eric Poortvliet (Karolinska Institute, Huddinge, Sweden), Iveta Pudule (Centre for Disease Prevention and Control, Riga, Latvia), , Ana Rito (National Institute of Health Dr Ricardo Jorge, Lisbon, Portugal), Marie Françoise Rolland-Cachera (France), Inta Mara Rubana (Public Health Agency, Riga, Latvia), Philippe Roux (European Commission, Directorate General for Health and Consumers, Luxembourg), Antonella Sammut (Ministry of Health, the Elderly and Community Care, Floriana, Malta), Marvic Sammut (Ministry of Health, the Elderly and Community Care, Floriana, Malta), Igor Spiroski

(Institute of Public Health, Skopje, The former Yugoslav Republic of Macedonia), Yvonne Schönbeck (TNO Quality of Life, Leiden, Netherlands), Agneta Sjöberg (Göteborg University, Göteborg, Sweden), Angela Spinelli (National Institute of Health, Rome, Italy), Gregor Starc (University of Ljubljana, Ljubljana, Slovenia), Lubica Ticha (Children's Hospital of Comenius University, Bratislava, Slovakia), Paola Vassallo (Health Promotion and Disease Prevention Directorate, Msida, Malta), Pieter van't Veer (Wageningen University, Wageningen, Netherlands), Machteld Wauters (Flemish Agency for Care and Health, Brussels, Belgium), Liesbeth de Wit (Wageningen University, Wageningen, Netherlands), Nazan Yardim (Ministry of Health of Turkey Public Health Institution, Ankara, Turkey) and Agneta Yngve (Karolinska Institute, Huddinge, Sweden).

Thanks are extended to WHO staff who contributed to the development of this protocol: Liza Villas, Nathalie Germain Julskov (WHO Regional Office for Europe, Copenhagen, Denmark) for administrative support and Francesco Branca (WHO Headquarters, Geneva, Switzerland), João Breda, Marta Buoncristiano and Jelena Jakovljevic (WHO Regional Office for Europe, Copenhagen, Denmark) for technical input.

We would also like to thank Gerben Rienk Visser (Trial Data Solutions, Netherlands), who made the Open Clinica online system available for data collection.

Summary

At the first consultation with Member States (Copenhagen, October 2005) before the WHO European Ministerial Conference on Counteracting Obesity (Istanbul, 15–17 November 2006), it was recognized that standardized, harmonized surveillance systems were required as a basis for policy development in the WHO European Region. As a follow-up to this recommendation, the nutrition, physical activity and obesity programme of the WHO Regional Office for Europe established a childhood obesity surveillance system in the Region.

The aim of the system is to measure routinely trends in overweight and obesity in primary schoolchildren, in order to form a correct understanding of the epidemic in this population group and to permit intercountry comparisons within the European Region.

Although each country is free to find a system suitable to its circumstances, it is imperative that data be collected according to an agreed, common protocol and that they include the stipulated core items. The system is designed to be as simple as possible and should not demand a major investment of public resources. There is no intention to replace health, anthropometric and dietary surveillance systems that are already in place or planned; on the contrary, the system should be integrated within them, if possible.

The target group is the national population of primary schoolchildren aged 6.0–9.9 years. Once a nationally representative sample of primary schools has been selected, these schools may remain national sentinel sites for repeated measurements at defined intervals. Alternatively, countries may choose to select a new nationally representative sample of schools at each round. A final effective sample size of 2800 children per age group (6.0–6.9, 7.0–7.9, 8.0–8.9 and 9.0–9.9 years) is determined for each round. Information is collected on two mandatory forms (child and school) and one optional form (family). The two mandatory forms contain some core variables (weight, height, age and sex) and some voluntary variables. The anthropometric measurements are taken by examiners who are trained and standardized according to the common protocol.

Each country is responsible for conducting and funding national data collection and for identifying an institute responsible for national coordination. WHO is responsible for preparing protocols, international coordination of the surveillance initiative, data analysis at European level and facilitating meetings of investigators. Each participating country signs a collaborative arrangement with WHO, declaring that a copy of the cleaned data file will be sent to the Regional Office with a detailed report of the data cleaning procedures. Data are analysed both at country level by the national coordinating team and at European level (common cross-country analyses) by the surveillance initiative investigators team.

A first round of data collection took place during the school year 2007–2008, a second during the school year 2009–2010 and a third during the school year 2012–2013. These will be followed by the fourth round in the school year 2015–2016.

Table 1 lists the core and optional items for each of the sections of this protocol. The core items are mandatory for the participating countries. The optional items are voluntary and additional to the core items.

Table 1. Core and optional items in the protocol

Section	Core (mandatory) items	Optional (voluntary) items
Study design	Semi-longitudinal design with repeated cross-sectional samples	Prospective cohort design with one follow-up of the initial sample after two years, repeated by rounds every three years
Site and setting	Primary schools	—
	Sentinel sites or new sample of schools at each round	All primary schools in the country
Study population and subjects	One or more of the following age groups: 6.0–6.9, 7.0–7.9, 8.0–8.9 or 9.0–9.9 years	Other age groups

Section	Core (mandatory) items	Optional (voluntary) items
Sampling design	Nationally representative sample	—
	Cluster sampling of schools or classes	—
Final effective sample size	Per age group: about 2800 children	All children in the respective age group in a country
Data collection form	Child's record form (examination)	Family's record form (self-reporting)
	School record form	
Variables	Child characteristics: child identification number, date of birth or age, sex, urbanization grade of residence, indication of breakfast, date and time of measurement, child's assent to measurement of weight and height, child anthropometric measurements, clothes worn when measured, examiner's code	Child characteristics: name, age in months, place of residence, postal code, population size, region or municipality, exact time of measurement, reasons for refusing measurement, second height measure, average height, waist circumference, hip circumference, associated co-morbid conditions, dietary intake patterns, physical activity and inactivity patterns, family's socioeconomic characteristics
	School characteristics: school's identification number, respondent's function at school, number and grades of classes sampled, numbers of registered, absent and measured children per class and refusals	School characteristics: name, postal code, geographical area
	School environment: existence of outdoor playground areas, existence of indoor gym, mandatory physical education, minutes of physical education per class, nutrition education in curriculum, initiatives or projects to promote healthy lifestyle, availability of food and beverage items at school, school canteen facility existence, access to vending machines, food advertising or marketing	Detailed school environment: active play in extreme weather conditions, outdoor playground area use and indoor gym use outside school hours, sports or physical activities organized by school outside school hours, children attending sport activities, availability of school bus transport, parents perceptions on safety of walking and bicycling routes to school, access to shop or cafeteria for purchase of foods and beverages in school
Translation	Translation of original English data collection forms into local language and back-translation into English	—
Administration	Examiners administer the child's record form and take anthropometric measurements according to the protocol	—
Measurement instruments	Same instruments in each country in accordance with the requirements	—
Calibration	Calibrated anthropometric instruments	—
Training standardization	All examiners trained and standardized	—
Period	Same academic year in each country; data collection within 4–10 weeks	—
Data entry	Data entered by countries themselves or in the online OpenClinica database	

Section	Core (mandatory) items	Optional (voluntary) items
Data management	Data quality procedures	—
	Data processing at national coordinating centre	—
	Data file with report on cleaning procedures sent to Regional Office (not applicable for countries that enter data in the OpenClinica database)	—
Ethical considerations	In accordance with international ethical guidelines	—
	Informed consent for measurements and data treatment (if required)	

Schedule

The estimated total time for a data collection round during one school year targeting one age group is approximately six months (Table 2). This is only an indication and might have to be adjusted to local circumstances, seasonal considerations and countries' ability to provide staff for the surveillance initiative.

Table 2. Schedule for a data collection round

Activity	Month					
	1	2	3	4	5	6
Establish the country coordination team	X					
Select the sample frame	X					
Make agreements with the sampled schools	X	X				
Obtain ethical approval	X	X				
Print and translate form(s) and instructions for their administration	X					
Organize an information event for teachers (and parents) of the selected classes	X					
Approach the parents of the pupils in the selected classes	X	X				
Obtain informed consent from parents	X	X				
Purchase anthropometric instruments	X					
Schedule data collection in the schools	X	X				
Recruit examiners, data clerks and data managers	X					
Train examiners in administering the form, taking anthropometric measurements and calibrating instruments		X				
Train data entry clerks and data manager on data management		X				
Data collection: mandatory items			X	X		
Data collection: optional items			X	X		
Data entry, cleaning and validation			X	X	X	

Activity	Month					
	1	2	3	4	5	6
If data are not entered online in the OpenClinica and/or LimeSurvey databases, send final cleaned data file with the report on data cleaning procedures to the Regional Office.					X	
Conduct national data analyses					X	X
Produce country report						X

1. Background

Obesity in children is an important health problem that is increasing in severity throughout the world, with particularly alarming trends in Europe (1, 2). It has a wide range of serious health and social consequences and increases the likelihood of morbidity in adults, such as dyslipidaemia, hyperinsulinaemia, hypertension and early atherosclerosis, as well as mortality in adulthood (3, 4). The health consequences of overweight during childhood are less clear, but a systematic review showed that childhood obesity is strongly associated with risk factors for cardiovascular disease and diabetes, orthopaedic problems and mental disorders (5). Moreover, childhood obesity is linked to underachievement at school and to lower self-esteem. Over 60% of children who are overweight before puberty will be overweight in early adulthood, reducing the average age at which noncommunicable diseases become apparent and greatly increasing the burden on health services.

Prevention is recognized as the only feasible option for curbing the epidemic, as the aim of current treatment practices is largely to bring the problem under control rather than effect a cure (2). A detailed, comprehensive assessment of the magnitude of this public health problem is imperative to stimulate an adequate political response. An unpublished assessment in 2005 by the Regional Office indicated that only 13 (25%) of the 53 European Member States of WHO had nationally representative data on the prevalence of overweight or obesity in children aged 6–10 years, based on objective measures available from 1999 onwards. For the age group 0–6 years, 15 (28%) countries had data on overweight. In addition, it is difficult to make intercountry comparisons owing to lack of standardization of obesity measurement tools at the international level and lack of standardized calculation and presentation of data. Furthermore, a global survey on child growth monitoring practices showed that less than one third of countries extend growth monitoring beyond six years of age and that only a few have surveillance system in place that monitor the weight and height distribution of children at regular intervals, which would allow early identification of children at risk of becoming overweight and/or obese (6). An updated questionnaire on current child growth monitoring practices and surveillance, sent in 2006 to WHO's nutrition counterparts in the European Region, gave similar results.

At the first consultation with Member States (Copenhagen, October 2005) before the WHO European Ministerial Conference on Counteracting Obesity (Istanbul, 15–17 November 2006), it was recognized that standardized, harmonized surveillance systems were required as a basis for policy development in the WHO European Region. As a follow-up to this recommendation, the nutrition, physical activity and obesity programme of the WHO Regional Office for Europe established a childhood obesity surveillance system in the Region, first in few countries within the Region and over the years more than half countries have joined the Initiative.

In April 2007, after the WHO European Ministerial Conference on Counteracting Obesity, the draft protocol was sent to a number of countries and experts. Country consultations took place in May 2007 to assess each country's possibilities, capacity, available resources and needs. The consultations also included an inventory of school surveys and already existing surveillance programmes in school-age children. The draft protocol was discussed at the inaugural meeting in Paris (5–6 June 2007) and finalized in September 2007. Further adjustments were made after the second meeting, in Madeira, Portugal (13–14 December 2007), to ensure that the final protocol would be available for the first data collection round in January 2008.

The experience gained and challenges faced during this round were discussed at meetings convened in Copenhagen, Denmark (3–4 June 2009), and in Rome, Italy (8–10 February 2010), which led to the protocol used for the second data

collection round. The 2012 protocol included a few alterations to the mandatory school record form but did not change the meaning of the questions. After the eighth COSI meeting, in Dubrovnik, Croatia (18–20 May 2015), the number of questionnaires was reduced to three (child, school and family), and a few changes were made to the forms. The 2015 protocol is to be used for the fourth round of COSI data collection, planned for the school year 2015–2016.

The main documents consulted in preparing this protocol were the protocol of the Health Behaviour in School-aged Children 2001–2002 survey (7), the manual of the Global School-based Student Health Survey (8), the manuals of the WHO STEPwise approach to surveillance (9), the surveillance protocol proposed by the European Childhood Obesity Group (10) and the child obesity monitoring guidance of the Department of Health of the United Kingdom (11).

2. Purpose and objective

The childhood obesity surveillance system is an ongoing, systematic process for collecting, analysing, interpreting and disseminating descriptive information in order to monitor excess body weight, which has been identified as a serious public health problem in the WHO European Region (1), and for using it in programme planning and evaluation (12). Although data can be extrapolated from research projects, routine surveillance data provide the most robust information for understanding the problem (13).

The aim of the system is to measure trends in overweight and obesity in children aged 6.0–9.9 years in order to gain a clear understanding of the epidemic, to reverse it and to allow comparisons among countries in the European Region. Use of a simple, standardized, harmonized, sustainable surveillance system will fill the current gap in longitudinal information on nutritional status and makes it possible to monitor the obesity epidemic in children and identify groups at risk. It is important that it be merged with other protocols to evaluate the impact of preventive interventions in school settings.

Surveillance is not equivalent to screening. Screening consists of applying a test to a defined group of people in order to identify, at an early or preliminary stage, a risk factor or a combination of risk factors of a disease. The people identified are then treated. The object of a screening service is to identify a certain disease or risk factor for a disease before the affected person seeks treatment, in order to cure the disease or prevent or delay its progression or onset by early intervention (13–15).

Although each country is free to develop a system that suits its local circumstances, it is imperative that data be collected according to an agreed common protocol and that they include the stipulated core items. The system is designed to be as simple as possible and should not demand a major investment of public resources. There is no intention to replace countries' existing or planned health, anthropometric and dietary surveillance systems; on the contrary, the system should be integrated with these systems, if possible.

At each data collection round, the core objective is to measure, in a new cross-sectional sample of primary schoolchildren:

- weight, height and body mass index (BMI);
- the prevalence of underweight, normal weight, overweight and obesity and median and mean BMI;
- changes over time in the prevalence of overweight and obesity and mean BMI relative to the previous cohort of children of the same age range (not applicable for the first round); and
- some characteristics of school nutrition and physical activity environment.

Countries can extend the core anthropometric measurements by collecting data on:

- children’s waist circumference, hip circumference, associated co-morbid conditions, dietary intake patterns and physical activity and inactivity patterns, as well as details on the parents and the school.

Many studies have documented secular increases only in the prevalence of overweight. A public school health surveillance system in Cambridge, Massachusetts, USA (16) also included a longitudinal cohort, the results of which indicate that children are more likely to become overweight at earlier ages and are more likely to remain overweight as they become older. Monitoring incidence and remission rates over time is valuable for identifying the target groups for prevention and intervention at the local level before overweight becomes established. Countries are therefore encouraged, on a voluntary basis, to include a follow-up of the initial sample of children and repeat the core measurements, in order to estimate the incidence and remission rates of overweight and obesity.

A first data collection round took place during the school year 2007–2008, a second round during the school year 2009–2010 and a third round during the school year 2012–2013. The 2015 protocol and the 2015 manual on data collection procedures will be used for the fourth round in the school year 2015–2016.

3. Study design and sample

3.1 Study design

A semi-longitudinal design is used, in which a new cross-sectional sample of children of the same age group is selected at each data collection round, repeated at defined intervals. Countries may opt for a prospective cohort design, in which the initial sample of children is followed up for one round.

3.2 Site and setting

The surveillance system target population is primary school-age children, the group that is most sensitive to environmental influences and is showing the greatest increase in the incidence of overweight and obesity (as high as 2.0 percentage points in some countries by the 2000s (1)). As education is compulsory in all countries in the European Region, most children can be reached through the education system. Once a nationally representative sample of primary schools has been selected at the time of introduction of the system, these schools may remain national sentinel sites for the system. Appropriate selection of these sentinel sites gives an overall picture of the population to be surveyed. In this approach, data can be gathered with limited instruments and human and financial resources, and good relationships can be established with the same schools. Furthermore, each sentinel site provides information for planning local school interventions, so that local progress against obesity can be tracked and the same cohort of children can be followed up. Some disadvantages of the sentinel approach may be the continuous burden on the same local school health system and too strong a focus of interventions in these schools. Thus, over time using the sentinel approach may lead to an underestimation of the national prevalence. Countries may therefore decide to select a new nationally representative sample of schools at each data collection round.

Countries have the option of implementing the surveillance system in all primary schools.

3.3 Study population

Measurements are done in primary schoolchildren. Countries can collect data for different age groups, selecting one or more of the following: 6.0–6.9, 7.0–7.9, 8.0–8.9 or 9.0–9.9 years. These four age groups were chosen because they precede puberty, thus eliminating possible differences between countries that could be attributed to variations in the age at puberty (10). Also, identification of obesity at these ages can predict the condition in adulthood (17). Moreover, the “adiposity rebound” – onset of the second period of rapid growth in body fat – begins at the age of about 6 years (18). It is further suggested that targeting prevention at children before the onset of puberty can reduce the incidence of obesity and promote remission (16).

3.4 Sampling design

Given the differences among countries in school systems, age at starting school, number of children held back and levels of pupils' advancement, it is difficult to propose a uniform approach to sampling that is equally applicable. It is therefore suggested that age be the first priority for sampling procedures (7). According to the first consultation with the participating countries in 2007, the majority of children in a specific age group (e.g. 6.0–6.9 years) are in one school grade. If all children in the targeted age group are in the same grade, the sample can be drawn within that grade level. If the targeted age group is spread across grades, however, all grades in which children from this age group are present should be sampled.

Cluster sampling is used, whereby the cluster or primary sampling unit is the primary school or the class. In the first option, a simple random sample of primary schools (public, private and special) is taken with probability proportional to size; and, in each school sampled, one class is randomly selected for each targeted age group(s). If less than 1% of the target children are enrolled in private or special schools, countries may exclude these schools from the sampling frame. In the second option, a simple random sample is taken of primary school classes.

Stratification may be applied if there are differences in BMI across strata.

If appropriate, sampling with replacement may be considered in order to reduce bias due to non-response, which should be kept as low as possible.

Countries may opt to include all children in a country in the selected age group. This might, however, require more logistics, for example, for collecting data on school nutrition and physical activity environment.

3.5 Sample size

Rudolf et al. (19) suggested use of standard deviation scores, or Z-score, of the mean BMI to determine whether the increase in obesity has been halted. A sample size of about 2300 children per age group should be selected on the basis of 80% power to detect a minimum difference of 0.10 Z-score in mean BMI per year at a two-sided 5% significance level.

A disadvantage of cluster sampling is that the overall estimate is less precise than one based on simple random sampling of the same total size of the whole population. Achieving the same precision as a simple random sample would require a larger total sample size in order to take into account this design effect (20, 21). Referring to the calculation above and taking a design effect of 1.2 based on analyses in the Health Behaviour in School-aged Children surveys (7), the final effective sample size would have to be about 2800 children (about 1400 boys and about 1400 girls).

Countries should also consider the expected consent rates in determining any oversampling. For example, if 90% of the targeted population gives consent, about 3100 children would have to be enrolled initially to achieve the minimum target sample size of about 2800 children. An estimated response rate of 80% would require the enrolment of about 3500 initially.

Assuming an average of 25 pupils per class, 124–140 classes would be required to achieve the final recommended sample size of 2800 pupils per targeted age group. Extra classes would have to be included if there are fewer than 25 pupils or when attendance rates are lower than expected.

4. Data collection

4.1 Data collection forms

Three data collection forms have been prepared: a mandatory child's record form, a mandatory school record form and a voluntary family's record form. They contain mainly closed questions with pre-coded answers (if applicable) and are kept as short as possible to improve response rates and sample retention. The child's record form and the school record form are accompanied by detailed instructions. Both forms include mandatory questions, which are numbered (e.g. (1), (2)), and voluntary questions, which countries can decide to use or not. These voluntary questions have a letter after the number, such as (1a) and (2a).

The three forms and instructions for their administration are presented in a separate manual.

4.1.1 Mandatory child's record form

The following variables are mandatory and are collected on the child's record form: identification code, date of birth (or age), sex, urbanization grade of residence, breakfast taken on the day of measurement, date of measurement, indication of time, clothes worn when measured, weight and height. The child's permission is obtained before measurements are taken.

Weight and height are easy to measure, but the anthropometric indices derived from these measures are often considered more useful than the measures alone (22). BMI is a measure of weight for height that is a well-recognized tool for determining whether a child is underweight, of normal weight, at risk for overweight, overweight or obese. When weight and height are measured by a trained person, BMI is more accurate than when these measures are self-reported or reported by parents, as people tend to under-report their weight (especially if they are obese) and to over-report their height (23, 24).

Examiners are advised not to calculate BMI at the point of measurement, because it requires time and special instruments. BMI also has some limitations (25). For instance, it provides only a crude measure of body fatness, as it does not distinguish between weight associated with muscle and that associated with fat (26). Measurement of abdominal fat is important, as an excess of abdominal fat (independently of total body fat) is associated with metabolic abnormalities such as hyperinsulinaemia and dyslipidaemia (27). In addition, a large waist circumference in childhood continues well into adulthood (28). Taylor et al. (29) found that waist circumference in relation to height and weight (the conicity index) was not as accurate a measure of central adiposity as waist circumference only in children. Hip measurements provide additional valuable information on gluteofemoral muscle mass and bone structure (26).

Therefore, it is recommended that waist and hip circumferences be measured on a voluntary basis to characterize a population in terms of abdominal fat distribution, independently of total fat (2). If this is done, countries should amend the examiner's record form accordingly.

4.1.2 Mandatory school record form

The school record form is completed by the school principal (headmaster or headmistress), by the teachers of the sampled classes or by another person who can document and report on the location of the school, the number of children registered and measured (examined) per sampled class, those who refused to be measured and those who were absent on the measuring day. It is strongly recommended that the form be given to the relevant school representative on the day of the measurements and that it be completed in the presence of the examiner.

A few mandatory characteristics of the school environment are included, such as the frequency of physical education, the availability of school playgrounds, the possibility of purchasing a number of listed food items and beverages on the school premises, and current school initiatives to promote a healthy lifestyle (healthy eating, physical activity).

Although obesity has many causes – biological, individual and environmental – the environment is a key factor in its rapid rise. School can influence children's diets by provided school meals, controlling the availability of certain foods and drinks, including nutrition education in the curriculum and limiting (or banning) advertising and marketing of energy-dense and nutrient-poor foods and beverages at school. Schools are also important settings for the promotion of

physical activity by providing physical education and outdoor playground areas and other facilities where children can be physically active.

The form should be completed by the school principal or the teachers of the sampled classes. The form can be handed to them during an information meeting before the examiner's visit to the school or at the time measurements are taken. It is strongly recommended that the form be completed in the presence of the examiner.

The responses to the mandatory components of the surveillance initiative and the information collected on this school record form may guide schools in preparing a prevention strategy or intervention based on a supportive environment with the aim of promoting healthy choices.

4.1.3 Voluntary family's record form

Two objectives – optimizing diet and increasing physical activity – are essential for combating the obesity epidemic. In addition to the anthropometric measures, it is thus important to obtain data on simple indicators of children's dietary intake and physical activity and inactivity patterns. The collection of additional information is, however, voluntary, and countries may choose all or only some of the items. The data are collected from the family's record form and completed by parents or caregivers. The family's socioeconomic characteristics and co-morbid conditions associated with obesity can also be obtained from the family's record form.

If countries decide to use the family's record form, it can be attached to the letter that is given to parents to inform them about the initiative and ask for their consent. The country may also choose to use the online programme, "Lime-Survey", set up for completing the family's record form.

4.2 Translation

All the original data collection forms and instructions for their administration are prepared in English, translated into the local language and back-translated into English. The translated forms are carefully checked for discrepancies with the original English version. The back-translation should be done independently from the initial translation from English, preferably by a professional translator.

4.3 Administration of the child's record form

Countries choose the most appropriate people to collect the core data from children according to local arrangements, circumstances and the budget. These people may be:

- school nurses, physicians or paediatricians linked to the school health system;
- suitable school personnel during various school functions, such as physical education teachers or health professionals during comprehensive, routine health screening for schoolchildren; or
- a small number of centrally based travelling examiners.

The surveillance initiative is undertaken in schools in collaboration with teachers and other school personnel. The basic principles of confidentiality, privacy and objectivity must be ensured throughout. Measurements are taken in a private room in the school. Children should not routinely be told their weight and height; if they were told, the process would become, in effect, a screening programme (11).

Children may be sensitive about their own size and those of children around them, and measurement of weight and height could accentuate their sensitivity and increase their risk for stigmatization and bullying. It is important that measurements be taken in such a way as to minimize any potential harm (11). Measurements may be taken as part of a whole-of-school approach to promoting health and well-being, so that they are not seen as an isolated, intrusive event but as part of initiatives to improve health.

It is envisaged that administration of the child's record form and measurement of weight and height for a class of 25 pupils will take 2–3 h. Children will be measured wearing normal, light indoor clothing. They will be asked to take off shoes

and socks as well as heavy clothing (e.g. coat, pullover, jacket) and wallet, mobile phone, key chain, belts and any other objects or ornaments.

During data analyses, body weight will be adjusted for the weight of the clothes worn by the children when measured.

4.4 Measurement techniques and instruments

Anthropometric measurements are preferably carried out in the morning, before lunch, by standardized procedures (22, 30–33).

Countries are required to use the same anthropometric instruments at all times and to calibrate them, preferably each day that measurements are taken (some scales are calibrated by the manufacturer and cannot be calibrated by the user). All instruments should be highly accurate and precise. Countries that purchase new equipment are advised to choose instruments that are used in other countries.

The measurement techniques, anthropometric instruments and calibration and maintenance procedures are described in a separate manual.

4.5 Training and standardization

For each data collection round, examiners are trained in taking standardized measurements as accurately and precisely as possible, according to the prescribed techniques and instructions for examiners.

Their training includes a review of the background and objectives of the surveillance system, standardized administration of the forms, taking measurements as described in the protocol, giving support to anxious children, calibrating instruments, recording values immediately after reading them and writing legibly to reduce mistakes during data transfer. Strict adherence to the measurement techniques and recording procedure is emphasized. Instruction is also given regarding confidentiality, preventing stigmatization or bullying of vulnerable children and answering questions from children, school staff and parents.

Both data managers and data clerks are trained at the beginning of data collection on all aspects of data management. In countries that have chosen to use the online data collection system, the data manager and data clerks should familiarize themselves with the system and pass a test before they are allowed to use it. The training materials and tests are outlined in separate manuals.

4.6 Timing

Data are collected once in a given school year. Countries are requested to measure all sampled children over as short a period as possible, preferably within 4 weeks and no longer than 10 weeks. Data should not be collected during the first 2 weeks of a school term or immediately after a major holiday. Countries can decide when measurements are taken in individual schools.

The comparability of data among countries would be improved if all data were collected in the same period during a school year. As local circumstances may not allow this, it is not mandatory.

Data collection rounds will be conducted at defined intervals (e.g. every 2 or 3 years). The surveillance initiative investigators team will agree on the interval.

5. Data management

5.1 Quality control

In data quality assurance, the examiner carefully fills in the forms, either on paper or online. The supervisor then checks the returned forms for completeness and correct coding or, for online data entry, checks only for completeness. For countries that choose to use the OpenClinica data entry system, range and consistency checks are already incorporated in the system for validation purposes. The data manager makes additional checks for inconsistencies and incompleteness, and cleans, validates (e.g. checks for outliers, entry errors and out-of-range values) and backs up the data.

5.2 Processing

After completion of data collection in a school, the child and school record forms are processed in two different ways:

- 1) Either by forwarding the forms to the national coordinating centre, where they are entered into either the OpenClinica system or another system chosen by the country, or
- 2) The examiners enter the data before forwarding them to the national coordinating centre for further processing.

The data manager is responsible for archiving the forms and for data cleaning, validation and back-up. Countries that do not use an online system send a copy of the cleaned data file to the Regional Office with a detailed report on the data cleaning procedures.

Countries can directly record the variables on the child and school record forms electronically instead of first filling out the paper form. In this case, examiners should have access to a computer and internet while making the measurements.

5.3 Analysis

Data are analysed both at the national level in a country's national coordinating centre and by the surveillance initiative investigators team at the Regional Office, which conducts common cross-country analyses of the pooled dataset. All the analyses are done with a common statistical package, such as Stata (StataCorp LP, College Station, Texas, USA) or SPSS (SPSS Inc., Chicago, Illinois, USA).

For the common cross-country analyses, children are classified as underweight, of normal weight, overweight or obese by the 2007 WHO reference for school-age children and adolescents (34). Countries may choose to use the growth references described by Cole et al. (35–37) or others for their own purposes and for national data analyses.

Each country is asked to sign a collaboration arrangement with WHO, in which it declares that a copy of the cleaned data file will be sent to the Regional Office and that it will comply with data copyright policies and procedures.

5.4 Reporting

The results of each data collection round will be reported, including an evaluation of the feasibility and sustainability of the surveillance system. The report will be used to correct the design of the network and its possible extension. The prevalence data will be included in the Regional Office's database on nutrition, obesity and physical activity.

Another route for disseminating the information from the surveillance system is publication in peer-reviewed scientific journals. Publication should be agreed by the surveillance initiative investigators team. A detailed policy for publication, presentation and dissemination of the results is included in the collaboration arrangement between WHO and participating countries.

Fig. 1 is a flow chart of the steps in collecting paper forms and processing and analysing the data. Fig. 2 shows collection and entry into the online database.

Fig. 1. Data collection on paper forms

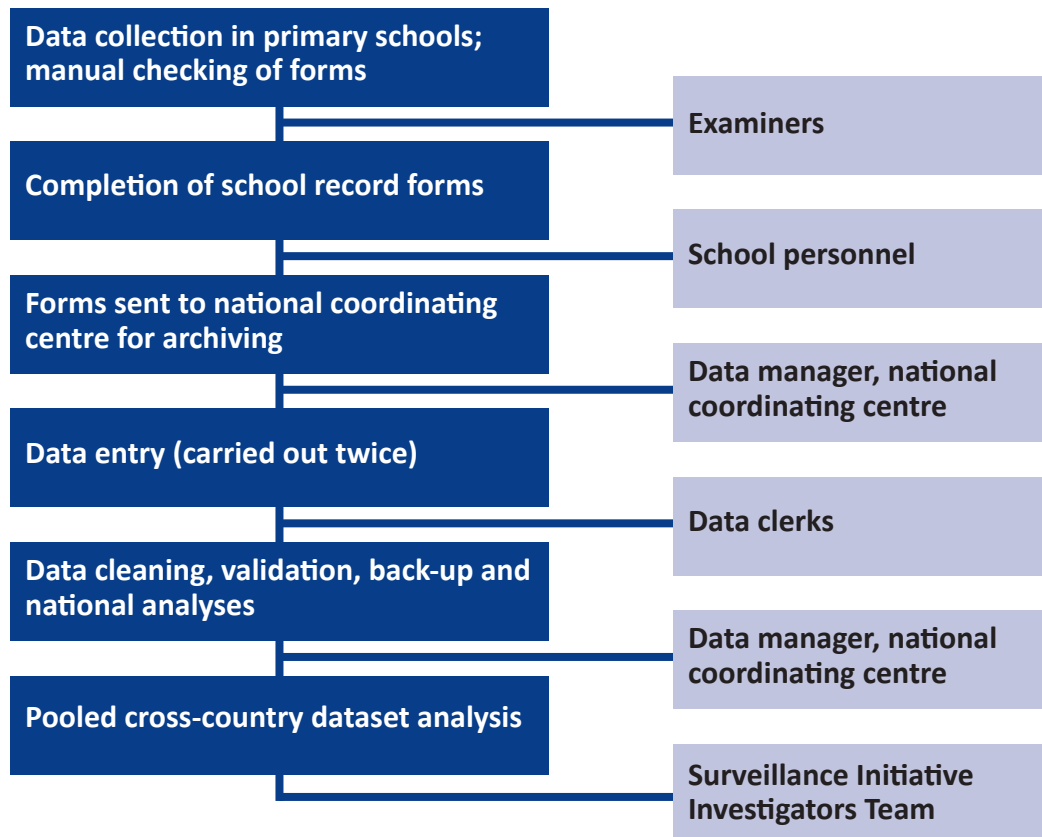
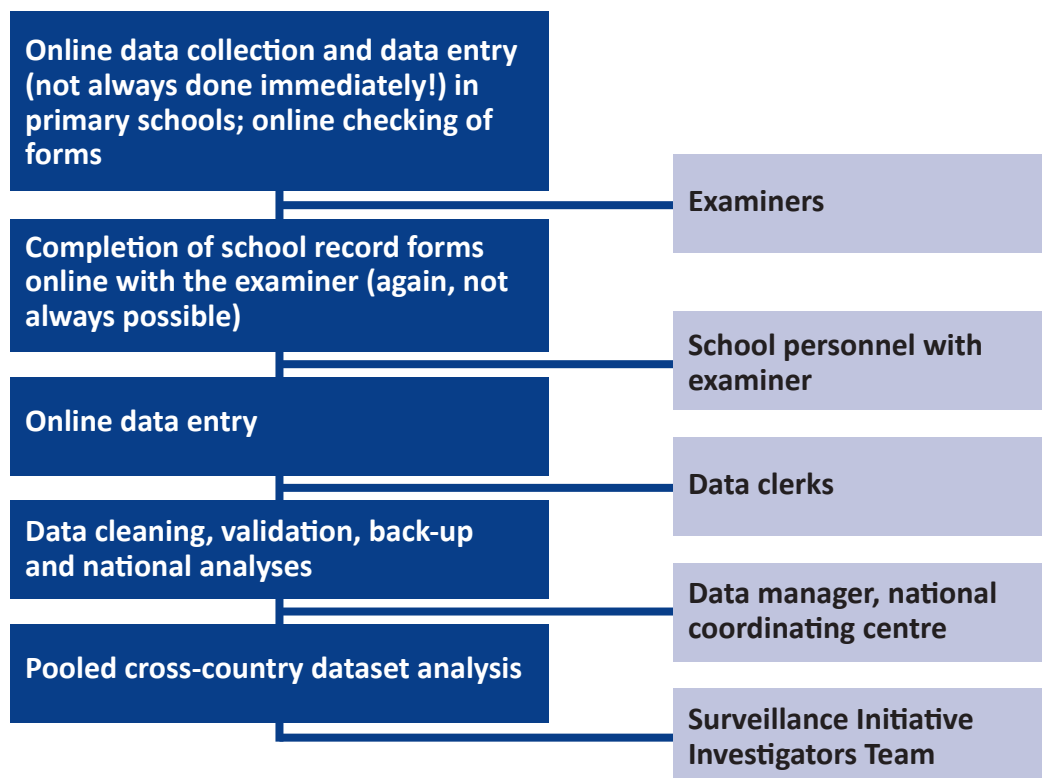


Fig. 2. Data collection on online forms



6. Ethical considerations

The surveillance system is implemented in accordance with the International Ethical Guidelines for Biomedical Research Involving Human Subjects (38). Depending on local circumstances, the relevant ethical committees are asked for permission.

Parents are fully informed about all study procedures, and their informed consent is obtained for taking measurements and for data treatment (written in the local language) on a voluntary basis before their child's enrolment in the system. Informed consent is sought either by letter or at a school information meeting. The objectives of the surveillance system, anthropometric measurements and data treatment are explained. Depending on local legislation, countries can choose passive or active informed consent. The approach that would result in the highest response rate is preferred. In exceptional circumstances, there may be no need to obtain informed consent from parents.

The confidentiality of all the data collected and archived is ensured. No information on the children is given outside the national coordinating centre. The forms are locked away in a secure location at the national coordinating centre. The children's names are not included in the electronic data files. School-specific results are not routinely provided to schools.

Parents have a right to know their child's height and weight. Although these are not communicated routinely, they are given on request. Children are never told the measurements of other children.

Examiners should work in such a way as to minimize stigmatization and bullying, and they should acknowledge the right of children and parents to withhold consent.

Examples of a letter giving informed consent are included in a separate manual.

7. Organization of the surveillance initiative

Each country is responsible for national data collection and analysis and for funding. Before introduction of the surveillance initiative, the institute that will be responsible for national coordination should be identified.

The coordination team in each country is composed of:

- a principal investigator, who is responsible for overall coordination and is a member of the surveillance initiative investigators team;
- supervisor(s), who are responsible for data collection in each sampled school; and
- a data manager, who is responsible for overall data management.

The country coordination team also includes:

- examiners, who are responsible for administering the examiner's record form and taking the anthropometric measurements;
- data clerks, who are responsible for entering data into electronic data files; and
- school personnel, who are responsible for completing the school record forms and other relevant tasks.

The involvement of each member of the country team depends on local organization of the surveillance initiative and whether staff can be seconded from the national coordinating centre. In some cases, countries may have to recruit new staff.

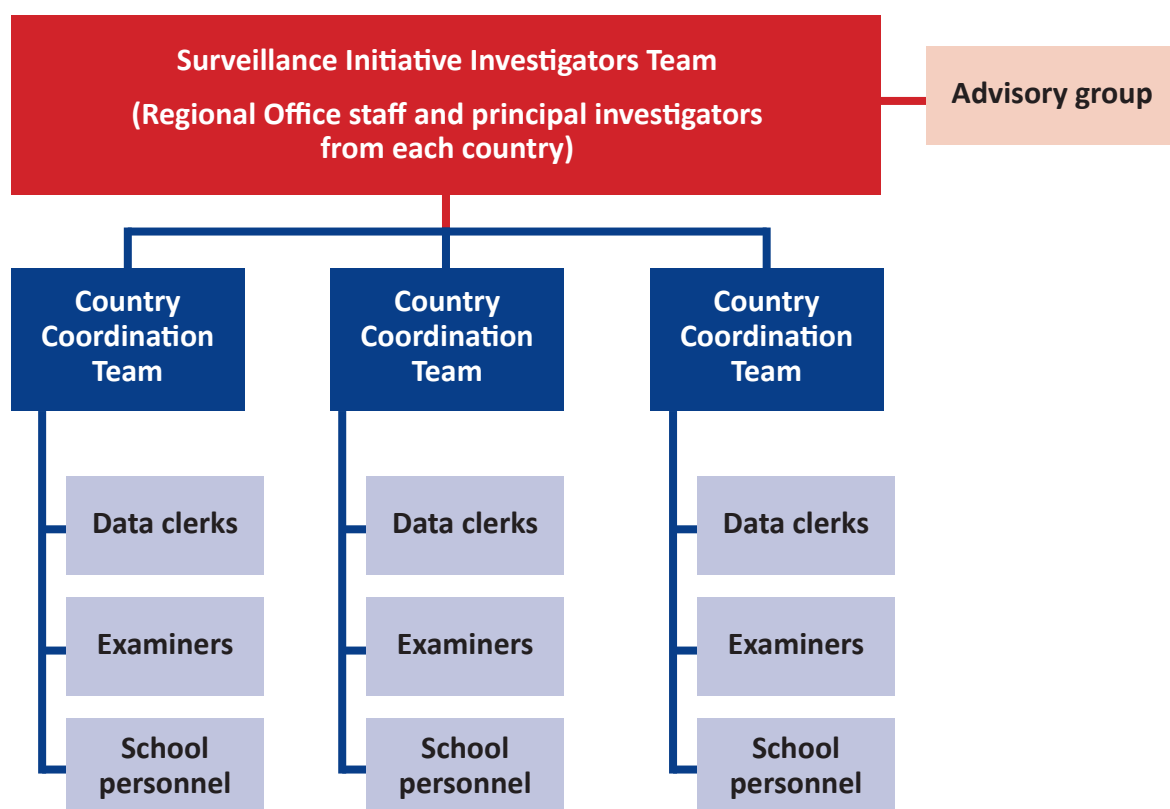
The surveillance initiative investigators team comprises staff from the nutrition, physical activity and obesity programme of the Regional Office and the principal investigators in each country. The team meets regularly throughout implementation of the surveillance initiative to review its progress, to ensure the uniformity of national data collection and to discuss any issues that arise.

WHO is responsible for preparing the protocols, international coordination of the initiative, analysis of data at European level and facilitating investigators' meetings.

An international advisory group has been formed to provide technical advice to the surveillance initiative investigators team.

Fig. 3 shows the organizational structure for implementing the surveillance initiative.

Fig. 3. Organizational structure



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The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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