World Health Organization
REGIONAL OFFICE FOR Europe

WHO European Childhood Obesity Surveillance Initiative

Implementation of round 1 (2007/2008) and round 2 (2009/2010)

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By: Trudy Wijnhoven, Joop van Raaij and João Breda

ABSTRACT

Nutritional surveillance in school-aged children, using measured weight and height, is not common in the WHO European Region. At the first consultation with Member States in the process leading to the WHO European Ministerial Conference on Counteracting Obesity in 2006, Member States recognized the need for harmonized surveillance systems among primary-school children on which policy development within the Region could be based. Establishment of the WHO European Childhood Obesity Surveillance Initiative (COSI) by the WHO Regional Office for Europe was a response to this need. COSI aims to measure trends in overweight and obesity in children aged 6.0–9.9 years in order to monitor the progress of the epidemic and to reverse it, and to make intercountry comparisons within the Region. This is the first official WHO report on the implementation of COSI during two data collection rounds (school years 2007/2008 and 2009/2010) in 16 participating countries. This document uses the strengths, weaknesses, opportunities and threats technique to evaluate the implementation and reports the experiences gained, the challenges encountered and the obstacles overcome by countries participating in COSI.

Keywords

Child nutritional sciences
Obesity- prevention and control
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Body height
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ACRONYMS

BMI	body mass index
COSI	WHO European Childhood Obesity Surveillance Initiative
ECOG	European Childhood Obesity Group
GSHS	global school-based student health survey
HBSC	Health Behaviour in School-aged Children (survey)
HSE	Health Service Executive
NA	not applicable
PI	principal investigator
PSU	primary sampling unit
SD	standard deviation
SSU	secondary sampling unit
SWOT	strengths, weaknesses, opportunities and threats

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1. INTRODUCTION

While it is generally known that nutritional surveillance data are crucial to develop targeted action and to monitor progress made in counteracting obesity, regular assessments – based on measured weight and height – of the magnitude of overweight and obesity among children and adolescents are not common in the Member States of the WHO European Region *(1–3)*. At the WHO European Ministerial Conference on Counteracting Obesity, which took place in Istanbul, Turkey on 15–17 November 2006, special attention was paid to childhood obesity *(4)*. The 2006 European Charter on Counteracting Obesity aims to strengthen action against obesity throughout the Region *(5)*. The Charter encourages the development of internationally comparable core indicators for inclusion in national health surveillance systems so that the resulting data can be used for advocacy, policy-making and monitoring purposes. The first consultation with Member States in the process leading to the Conference, which took place in Copenhagen, Denmark in October 2005, also expressed the need for a European-wide harmonized surveillance system on which obesity policy development within the Region could be based *(6)*. In 2006, the WHO Regional Office for Europe and 13 Member States initiated the WHO European Childhood Obesity Surveillance Initiative (COSI) as a response to this need. The importance of such international health surveillance systems was reinforced as one of the strongest dimensions in the *Vienna Declaration on Nutrition and Noncommunicable Diseases in the Context of Health 2020 (7)*, which was then endorsed at the sixty-third session of the WHO Regional Committee for Europe in September 2013 *(8)*.

A childhood obesity surveillance system is a current, systematic process of collection, analysis, interpretation and dissemination of descriptive information for monitoring excess body weight, which is a serious public health problem in the Region *(9)*, and for use in programme planning and evaluation *(10)*. Although data can be extrapolated from research projects, routine surveillance data often provide the most robust information used to understand obesity *(11)*. In this context, it is important to stress that surveillance is not equivalent to screening. Screening applies a test to a defined group of people in order to identify an early or preliminary stage, a risk factor or a combination of risk factors of a disease. People who screen positive are then treated. The objective 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 *(11–13)*. Westwood et al. highlighted that a consistent approach to population-level monitoring is likely to be useful in providing epidemiological data and guiding planning and resource allocation for preventative and general health promotion strategies. The use of population monitoring programmes to identify individual children and provide information to parents and caregivers, however, would be difficult to justify due to the lack of current evidence on its impact and on effective treatments for overweight in children *(14)*.

COSI aims to measure trends in overweight and obesity in children aged 6.0–9.9 years, in order to monitor the progress of the epidemic and to reverse it, and to make intercountry comparisons

within the Region. The COSI system should not replace countries' existing health, anthropometric and dietary surveillance systems or those in the planning stages; on the contrary, the COSI approach should be integrated into existing systems if possible. Countries are requested to collect data according to the COSI protocols *(15,16)*, which allow each participating country to develop a system that fits its local circumstances.

The establishment of COSI is the start of population-based monitoring of overweight and obesity among primary-schoolchildren (based on measured data) in the Region. This document is the first official WHO report on the implementation of COSI in some European countries. It describes the process from its initiation in 2006 to the implementation of the first two rounds (school year 2007/2008 and 2009/2010). This report uses the strengths, weaknesses, opportunities and threats (SWOT) technique to evaluate the implementation of the two COSI rounds by 16 participating countries that delivered their data to the WHO COSI database. The report documents the experiences gained, the challenges encountered and the obstacles overcome by countries participating in COSI and how they used the data collected to develop policy. Countries not yet participating in COSI may find these insights useful.

2. COSI INITIATION AND IMPLEMENTATION PROCESS

Representatives from countries interested in participating in a brainstorming session on the draft outline of the COSI protocol met in Stockholm on 18 October 2006. The draft outline of the surveillance initiative was presented at the 2006 WHO European Ministerial Conference on Counteracting Obesity *(4)* and at other meetings with Member States, such as those with WHO nutrition focal points.

Throughout 2007, WHO and 13 Member States – Belgium, Bulgaria, Cyprus, the Czech Republic, Ireland, Italy, Latvia, Lithuania, Malta, Norway, Portugal, Slovenia and Sweden – developed a common protocol. In April 2007, a draft COSI protocol was shared with a number of countries and experts. In May 2007, country consultations assessed each country's existing capacities, available resources and needs. The consultations included an inventory of school surveys and other existing surveillance programmes for school-aged children. The draft protocol was also discussed at the inaugural meeting in Paris, France (5–6 June 2007) and finalized in September 2007. Further adjustments have been made as a follow-up to the second meeting, which took place in Maceira, Portugal (13–14 December 2007), so that the final protocol of January 2008 could be used for the first data collection round *(15)*.

The main documents consulted in preparing the COSI protocol were the 2001/2002 Health Behaviour in School-aged Children (HBSC) survey protocol *(17)*, the 2006 Manual for conducting the global school-based student health survey (GSHS) *(18)*, the WHO STEPs surveillance manual *(19)*, the child obesity monitoring guidance published by the Department of Health in the United Kingdom *(20)*, and the surveillance protocol proposed by the European Childhood Obesity Group (ECOG) in 1996 to its Members in 14 European countries that had expressed interest *(21)*. Following the protocol recommended by ECOG, France carried out a study in 2000 *(22)* and repeated it in 2007 *(23)*.

This first COSI round took place from September 2007 to December 2008, with 13 countries participating – Belgium (Flemish region), Bulgaria, Cyprus, the Czech Republic, Ireland, Italy, Latvia, Lithuania, Malta, Norway, Portugal, Slovenia and Sweden – and Wales (the United Kingdom) pilot-tested the COSI protocol *(15)* in its health monitoring system. The experiences 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) and led to the 2010 protocol *(16)*.

The second round took place from September 2009 to April 2011, with four new participating countries: Greece, Hungary, Spain and the former Yugoslav Republic of Macedonia. At the fifth COSI meeting, which took place in Lisbon, Portugal (July 2011), principal investigators (PIs) discussed the results of the second COSI data collection round.

Fifteen countries were present at the sixth COSI meeting, which was convened in Oslo, Norway on 8–9 November 2012. The participating countries presented their plans for the implementation of the third COSI data collection round for the school year 2012/2013. An additional four countries – Albania, the Republic of Moldova, Romania and Turkey – have joined the third data collection round. The fourth COSI data collection round is planned for the school year 2015/2016.

The anthropometric results of the first COSI data collection round were published in Pediatric Obesity in 2013 *(24),* and the anthropometric results of the second COSI data collection round were published in BMC Public Health in 2014 *(25)*. The COSI methodology and results of both rounds are provided in the following sections. Annex 1 lists the country contributors, and Annex 2 lists the national COSI publications.

3. COSI METHODOLOGY

Study design

In general, systematic overviews often only document secular increases in overweight prevalence *(1–3,26)*. The Cambridge public school health surveillance system in the United States of America also included a longitudinal cohort, and its results 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 local level before overweight becomes established *(27)*. Countries have, therefore, been encouraged to include a follow-up of the initial sample of children and to repeat the core measurements, so that the incidence and remission rates of overweight and obesity can be estimated. Lithuania performed this follow-up; the children selected in COSI round 1 were measured again in COSI round 2. The other countries applied a semi-longitudinal design, meaning that a new cross-sectional sample of children was selected, both in COSI round 1 and COSI round 2.

Study population and sampling design

Age groups

COSI targets children aged 6–9 years. The main reason for choosing this population group was that intercountry-comparable, nationally representative surveys carried out in the Region mainly target preschool children aged 0–5 years (e.g. through the demographic and health surveys *(28)* and the multiple indicator cluster surveys *(29)*) or adolescents aged 11–15 years (e.g. through the HBSC survey *(17)* and the GSHS *(18)*).Given the differences in school systems among countries, the age of children entering the first class of primary school (reception year), and the number of children repeating a grade, implementing a uniform sampling approach that was applicable in every country was difficult. Age was, therefore, the first condition considered for the sampling procedures. Countries could select one or more of the four age groups: 6.0–6.9, 7.0–7.9, 8.0–8.9 or 9.0–9.9 years. Since children of this age in all countries are enrolled in primary schools, this school population was, therefore, taken to be representative of the total population in these age groups. Table 1 provides an overview of the age groups targeted by the participating countries in the two COSI data collection rounds.

Sampling units

Nationally representative samples from all countries except Belgium (Flanders only) were included. Either the entire population of interest was included or cluster sampling was employed. The sampling units for Belgium (Flanders only) and Malta (all second grade primary-school classes) included the entire population of interest. When employing cluster sampling, the primary sampling unit (PSU) was the primary school or the class (except in the Czech Republic and Norway). The PSU in the Czech Republic was composed of paediatric clinics, since COSI was integrated with the mandatory health checks that are performed by paediatricians. The PSU in

Table 1. Target age groups in COSI round 1 (2007/2008) and/or round 2 (2009/2010), by country

Countries	Age groups (years)	
	Round 1	Round 2
Belgium (Flanders)	6, 7, 8, 9	6, 7, 8, 9
Bulgaria	7	–
Czech Republic	7	7
Greece	–	7, 9
Hungary	–	7
Ireland	7	7, 9
Italy	8, 9	8, 9
Latvia	7	7
Lithuania	7	7, 9
Malta	6	6
Norway	8	8
Portugal	7	7
Slovenia	6, 7, 8	6, 7, 8, 9
Spain	–	6, 7, 8, 9
Sweden	7, 8	–
The former Yugoslav Republic of Macedonia	–	7

–, no participation.

Norway was composed of counties, which were selected by simple random sampling and with probability proportional to size.

Primary schools and classes were selected randomly from the list of all primary schools (public, private and special schools) centrally available in each country through the education ministry or in the national school registry. If less than about 1% of the target children were enrolled in private or special schools (e.g. schools for mentally handicapped children or children with visual impairment and blindness), countries could choose to exclude these schools from the sampling frame. If the majority of children in the targeted age group were in the same grade, then the sample was drawn from within that grade level. If the targeted age group was spread across grades, however, all grades where most children from this age group were present were sampled. In every sampled class, all children were invited to participate.

Countries that participated in COSI round 1 could decide, for COSI round 2, to select a new nationally representative sample of schools or to return to the same schools selected in round 1 and randomly select classes from these sentinel sites. Four countries – Ireland, Lithuania, Norway and Portugal – chose the sentinel site approach, and the other seven countries used new nationally representative samples in COSI round 2.

Table 2 shows the sampling design chosen by countries participating in the two COSI data collection rounds. Tables 3 and 4 show the participation rates of PSUs and the secondary sampling units (SSUs) in the countries, respectively.

Table 2. Sampling designs in COSI round 1 (2007/2008) and/or round 2 (2009/2010), by country

Countries	Round 1	Round 2	
	Sampling design	Sampling design	Schools selected
Belgium (Flanders)	Entire target age group included	Entire target age group included	NA
Bulgaria	Cluster	–	–
Czech Republic	Cluster[a]	Cluster[a]	New sample[a]
Greece	–	Cluster	New sample
Hungary	–	Cluster	New sample
Ireland	Cluster	Cluster	Same as round 1
Italy	Cluster	Cluster	New sample
Latvia	Cluster	Cluster	New sample
Lithuania	Cluster	Cluster	Same as round 1
Malta	Entire target age group included[b]	Entire target age group included[b]	Same as round 1
Norway	Cluster	Cluster	Same as round 1
Portugal	Cluster	Cluster	Same as round 1
Slovenia	Cluster	Cluster	New sample
Spain	–	Cluster	New sample
Sweden	Cluster	–	–
The former Yugoslav Republic of Macedonia	–	Cluster	New sample

–, no participation; NA, not applicable.
[a] Paediatric clinics formed the PSU.
[b] All second grade classes in 95 primary schools in Malta were included.

Stratification

Stratification was applied if differences in anthropometric measurements and indices across strata were expected to be observed. Countries that applied stratification are the Czech Republic by region and level of urbanization; Greece by prefecture; Hungary by county; Ireland by Health Service Executive; Italy by region; Latvia by level of urbanization and language of instruction; Lithuania by district and level of urbanization; Norway by county and administrative health region; Spain by autonomous region and size of village; Sweden by type of municipality and type of school (public/private); and the former Yugoslav Republic of Macedonia by level of urbanization. Countries took into account the expected refusal rates to determine the necessary oversampling.

Table 3. Characteristics of PSUs and participation rates in COSI round 1 (2007/2008) and/or round 2 (2009/2010), by country

Countries	Round 1			Round 2		
	PSU	Total approached (n)	Participation rate (%)	PSU	Total approached (n)	Participation rate (%)
Belgium (Flanders)	NA	NA	NA	NA	NA	NA
Bulgaria	School	184	100	–	–	–
Czech Republic	Paediatric clinic	60	76.7	Paediatric clinic	85	78.8
Greece	–	–	–	School	150	82.0
Hungary	–	–	–	School	164	59.8
Ireland	School	498	32.7	School	192	80.2
Italy	Class	459[a]	99.3	Class	2 437[a]	100
Latvia	School	193	98.4	School	174	97.1
Lithuania	School	161	96.9	School	164	98.8
Malta	School	95	100	School	95	100
Norway	County	10	NA	County	10	NA
Portugal (all regions except Madeira)[b]	School	185	95.1	School	185	93.0
Slovenia	School	118	100	School	167	100
Spain	–	–	–	School	163	88.3
Sweden	School	220	42.7	–	–	–
The former Yugoslav Republic of Macedonia	–	–	–	School	115	87.0

–, no participation; NA, not applicable.

[a] Italy provided the Regional Office with a subsample of its entire dataset from COSI round 1 and with the entire dataset from COSI round 2. In round 2, of the 2437 classes initially approached, 35 chose not to participate and were replaced by other randomly sampled classes.

[b] Data from four schools in Madeira, collected one year after the other Portuguese regions, were not taken into account.

Table 4. Characteristics of SSUs and participation rates in COSI round 1 (2007/2008) and/or round 2 (2009/2010), by country

Countries	Round 1			Round 2		
	SSU	Total approached (n)	Participation rate (%)	SSU	Total approached (n)	Participation rate (%)
Belgium (Flanders)	NA	NA	NA	NA	NA	NA
Bulgaria	Class	190	100	–	–	–
Czech Republic	NA	NA	NA	NA	NA	NA
Greece	–	–	–	Class	337	78.6
Hungary	–	–	–	Class	346	48.3
Ireland	Class	164	100	Class	328	79.3
Italy	NA	NA	NA	NA	NA	NA
Latvia	Class	301	99.7	Class	279	95.7
Lithuania	Class	310	99.7	Class	604	100
Malta	Class	192	100	Class	190	100
Norway	School[a]	131	96.9	School[a]	131	95.4
Portugal (all regions except Madeira)[b]	Class	345	100	Class	372	85.5
Slovenia	Class	774	100	Class	950	100
Spain	–	–	–	Class	594	100
Sweden	Class	306	100	–	–	–
The former Yugoslav Republic of Macedonia	–	–	–	Class	221	95.0

–, no participation; NA, not applicable.

[a] Four selected schools were excluded because they had only one pupil from the targeted age group.

[b] Data from four schools in Madeira, collected one year after the other Portuguese regions, were not taken into account.

Sample size

Rudolf et al. suggests using the standard deviation (SD) scores or Z-scores of a body mass index (BMI) distribution to demonstrate whether a halt in the rise in overweight or obesity is achieved *(30)*. The calculated sample size of ≈2300 children per age group was based on an 80% power to detect a minimum difference of 0.10 Z-score in mean BMI per year at a two-sided 5% significance level. To achieve the same precision with a cluster sample design as with a simple random sample, the minimum final effective sample size should be ≈2800 children per age group, whereby a design effect of 1.2 was taken into account *(17)*.

Table 5 gives an overview of the number of children who had complete information on their age, sex, weight and height, and who fell within the country's targeted age group(s) in the participating countries in the two COSI data collection rounds.

Data collection procedures

The COSI protocols *(15,16)* are in accordance with the *International Ethical Guidelines for Biomedical Research Involving Human Subjects (31)*, and local ethical committees in the countries also approved their use. Ethical approval was not needed when the data collection procedures were part of legislation (Belgium), a compulsory school programme (Slovenia), the National Annual Program of Public Health (the former Yugoslav Republic of Macedonia) or were regulated by the National Health Authority and regional health authorities (Spain). Parents were fully informed about all study procedures, and their informed consent for the measurements and data treatment (written in local language) was obtained on a voluntary basis prior to the child's enrolment in the system. Informed consent was done either through a letter or through a school information meeting. The objectives of the surveillance system, anthropometric measurements and data treatment were explained. Depending on local legal circumstances, countries had the option of choosing passive or active informed consent. Parents had a right to know their child's body height and body weight measurements, which were given only upon request.

Children were never told the measurements of other children. Children's consent was always obtained before the measurements were taken. Confidentiality of all collected and archived data was ensured. The children's names and, in some cases, the entire date of birth were not included in the electronic data files sent by the countries to the Regional Office.

Countries decided on the measurement period. Data collection, however, was avoided during the first two weeks of a school term or immediately after a major holiday. Measurements were taken over as short a period as possible, preferably within four weeks and no longer than ten weeks. Taking into account the local arrangements, circumstances and budget, countries chose the most appropriate professionals, called examiners, to collect data on the children. Examiners included school nurses, physicians or paediatricians linked to the school health system; other suitable school personnel who collected data at various school functions, such as physical education

Table 5. Number of children with complete information and who fell within the targeted age groups in COSI round 1 (2007/2008) and/or round 2 (2009/2010), by country

Countries	Round 1 No. of children		Round 2 No. of children	
	With complete information[a]	Fell within targeted age group(s)	With complete information[a]	Fell within targeted age group(s)
Belgium (Flanders)	unknown	126 078	133 156	133 156
Bulgaria	3 381	2 511	–	–
Czech Republic	1 692	915	2 442[b]	1 271[b]
Greece	–	–	5 682	5 269
Hungary	–	–	1 235	1 235
Ireland	2 634	2 383	4 021	1 986
Italy	7 997	7 997	42 035	41 672
Latvia	4 487	3 251	4 285	2 838
Lithuania	4 939	3 309	9 796	6 721
Malta	3 376	2 115	3 533	2 302
Norway	3 474	2 834	3 172	2 621
Portugal (all regions except Madeira)[c]	3 593	1 815	3 737	1 813
Slovenia	11 941	11 940	15 975	15 938
Spain	–	–	7 659	7 656
Sweden	4 521	3 665	–	–
The former Yugoslav Republic of Macedonia	–	–	2 843	2 744

–, no participation.
[a] Complete information on age, sex, weight and height.
[b] Data collected from October 2009 to December 2009 and from January 2011 to April 2011 were not taken into account.
[c] Data from four schools in Madeira, collected one year after the other Portuguese regions, were not taken into account.

teachers during physical education lessons or health professionals as part of a comprehensive health screening routine for all schoolchildren; or a small number of nationally or regionally based travelling examiners.

In most countries, all original data collection forms and administration instructions were prepared in English, translated into local languages and then back-translated into English. The translated forms were carefully checked for discrepancies with the original English version. In general, the back-translation was carried out independently from the initial translation from English. None of the translated data collection forms and administration instructions indicated that the data collection referred to the assessment of the prevalence of overweight and obesity in schoolchildren.

Table 6 shows the data collection period and the type of field examiners used in the two COSI data collection rounds. Table 7 gives an overview of the surveillance system established and the consent approach applied.

Data collection variables

At each subsequent data collection round – in a new cross-sectional sample of primary-schoolchildren – the core objective is to measure body weight and body height; to calculate BMI; to estimate the prevalence of thinness, normal weight, overweight, obesity, median BMI and mean BMI; and to estimate the annual changes in the prevalence of overweight and obesity and mean BMI relative to the previous cohort of children of the same age range, which was not applicable in the first round.

The examiner's record form was used to collect child variables: date of birth, sex, geography of residence, school grade, date of measurement, clothes worn during measurement, school code, body weight and body height. Countries had the choice of expanding the core anthropometric measurements with the collection of data on: children's waist circumference, hip circumference, associated co-morbidities, dietary intake patterns and physical activity/inactivity patterns, as well as details on the family and the school environment.

Anthropometric measurements

Prior to data collection, all examiners were trained in measuring weight and height – the core anthropometric measurements – using standardized techniques *(32)*. Measurements were carried out in close collaboration with teachers and other school personnel in a private room in the school (except in the Czech Republic, where measurements were made in paediatric clinics). The basic principles of confidentiality, privacy and objectivity were ensured throughout the process. Children were not routinely informed of their body weight and body height because this programme is for surveillance, not screening, which would entail a referral to treatment and follow-up of children who had been identified as being overweight or obese *(11)*.

Table 6. Data collection period and type of field examiners in COSI round 1 (2007/2008) and/or round 2 (2009/2010), by country

Countries	Round 1		Round 2	
	Data collection period	Field examiners	Data collection period	Field examiners
Belgium (Flanders)	September 2007–July 2008	Regionally based	September 2009–August 2010	Regionally based
Bulgaria	March–May 2008	Regionally based	–	–
Czech Republic	January–December 2008	External health professionals linked to the school	January–December 2010[a]	External health professionals linked to the school
Greece	–	–	November 2010–March 2011	Regionally based
Hungary	–	–	April–June 2010	External health professionals linked to the school
Ireland	April–June 2008	Nationally based	October–November 2010	Nationally based
Italy	April–June 2008	External health professionals linked to the school	April–October 2010[b]	External health professionals linked to the school[c]
Latvia	February–March 2008	Nationally based	March–April 2010	Nationally based
Lithuania	April–May 2008	Nationally based	February–May 2010	Nationally based
Malta	April–June 2008	External health professionals linked to the school	April–June 2010	External health professionals linked to the school
Norway	September–November 2008	External health professionals linked to the school	September–December 2010	External health professionals linked to the school
Portugal (all regions except Madeira)[d]	May–June 2008	Regionally based	April–December 2010	Regionally based
Slovenia	April 2008	Physical education teachers	April 2010	Physical education teachers
Spain	–	–	October 2010–May 2011	Regionally based
Sweden	March–June 2008	Nationally based	–	–
The former Yugoslav Republic of Macedonia	–	–	October–December 2010	Nationally based

–, no participation.
[a] Data collected from October to December 2009 and from January to April 2011 were not taken into account.
[b] The majority of data (46 315 children) were collected from April to June 2010. One local health unit in the Veneto Region collected data from September to October 2010 (419 children).
[c] In Italy, data collectors were health professionals from the National Health Service.
[d] Data from four schools in Madeira, collected one year after the other Portuguese regions, were not taken into account.

Table 7. Type of informed consent and type of implemented surveillance system in COSI round 1 (2007/2008) and/or round 2 (2009/2010), by country

Countries	Round 1		Round 2	
	Informed consent	Surveillance system	Informed consent	Surveillance system
Belgium (Flanders)	NA	Integrated with routine measurements	NA	Integrated with routine measurements
Bulgaria	Passive	Newly established	–	–
Czech Republic	Active	Integrated with routine measurements	Active	Integrated with routine measurements
Greece	–	–	Active	Newly established
Hungary	–	–	Active	Integrated with routine measurements
Ireland	Active	Newly established	Active	Continuation of round 1
Italy	Passive	Newly established	Passive	Continuation of round 1
Latvia	Passive	Newly established	Passive	Continuation of round 1
Lithuania	Active	Newly established	Active	Continuation of round 1
Malta	Active	Integrated with routine measurements	Active	Integrated with routine measurements
Norway	Active	Newly established	Active	Continuation of round 1
Portugal	Active	Newly established	Active	Continuation of round 1
Slovenia	Active	Integrated with routine measurements	Active	Integrated with routine measurements
Spain	–	–	Active	Newly established
Sweden	Passive	Newly established	–	–
The former Yugoslav Republic of Macedonia	–	–	Active	Newly established

–, no participation; NA, not applicable.

The measurements could be carried out within the context of a whole-school approach to promote health and well-being, so children would not experience it as an isolated and intrusive event but in support of their health. For instance, Slovenia measured children as part of its yearly growth and fitness check-up event in schools.

Children were asked to take off their shoes, socks and all heavy clothing (coats, sweaters, jackets, etc.). Children removed wallets, mobile phones, key chains, belts or any other objects, such as hair ornaments. Body weight was measured to the nearest 0.1 kg with portable digital (mainly manufacturer-calibrated) scales, and body height was measured to the nearest 0.1 cm with a portable stadiometer. For the data analyses, body weight was adjusted for the weight of the clothes worn. Each country provided the average weights of each type of clothing (underwear only, gym clothes, light clothing and heavy clothing). Waist and hip circumferences – optional anthropometric measurements – were done with a non-elastic tape and taken to the nearest 0.1 cm.

In general, the same anthropometric measuring instruments were used throughout a country. A few countries that participated for the first time in a COSI data collection round were unable to use the same measuring instruments due to cost implications. The monitoring of data quality procedures was stressed throughout the measurement period. The weighing scales and height board were checked for accurateness and preciseness. Scales were manually calibrated provided that calibration features were available, and the scales could be calibrated by the user.

School nutrition and physical activity environmental characteristics

COSI employs a mandatory school form that involves the collection of information on a few school (environmental) characteristics such as: the frequency of physical education lessons, the availability of school playgrounds, the possibility to obtain food items and beverages on the school premises, and current school initiatives organized to promote a healthy lifestyle (healthy eating, physical activity) (Table 8).

This mandatory school form was completed either by the school principal (headmaster/headmistress), by the teachers involved with the sampled classes, or by someone who could document and report on the location of the school, the number of children registered and measured (examined) per sampled class, and the number of children who declined to be measured or were absent on the day of measurement.

In addition to the mandatory core items, countries could choose to include optional questions, such as the availability of safe routes to school, transport to school, inclusion of nutrition education or physical education in the school curriculum, provision of school meals, availability of vending machines on the school premises and the availability of fruit/vegetable/milk schemes.

Food frequency and physical activity/inactivity patterns among children

A family record form was used to gather information on a voluntary basis on simple indicators of the children's dietary intake and physical activity/inactivity patterns such as usual transport to school, membership of a sport or dancing club, time typically spent playing outside or watching television, or food frequency consumption (Table 9). The form collected information on the family's socioeconomic characteristics and co-morbidities associated with obesity. The parents or caregivers, possibly together with the child, completed the form. Schools gave the form to parents and could include it with the letter informing parents about the COSI initiative and asking their consent.

Responsibilities

Before introducing COSI, each country assigned an institute responsibility for the overall national coordination and management, and assigned a PI as the institute's authorized representative. This institute signed a collaboration arrangement with the Regional Office that described the roles of

Table 8. Mandatory and optional school nutrition and physical activity environmental data collected in COSI round 1 (2007/2008) and/or round 2 (2009/2010)

School form items	Countries	
	Round 1	Round 2
Total minutes per week of physical education the school provides to pupils from participating classes[a]	Bulgaria, Czech Republic, Ireland, Latvia, Lithuania, Malta, Norway, Portugal, Slovenia, Sweden	Czech Republic, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Norway, Portugal, Slovenia, Spain
Initiatives/projects organized to promote a healthy lifestyle among pupils from participating classes[a]	Bulgaria, Czech Republic, Ireland, Latvia, Lithuania, Malta, Norway, Portugal, Slovenia, Sweden	Czech Republic, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Norway, Portugal, Slovenia
Existence of outside playgrounds or inside play areas where children can play during school breaks[a]	Bulgaria, Czech Republic, Ireland, Latvia, Lithuania, Malta, Norway, Portugal, Slovenia, Sweden	Czech Republic, Greece, Hungary, Ireland, Latvia, Lithuania, Norway, Portugal, Slovenia, Spain, The former Yugoslav Republic of Macedonia
Foods or beverages that can be obtained on school premises[a,b]	Bulgaria, Czech Republic, Ireland, Latvia, Lithuania, Malta, Norway, Portugal, Slovenia, Sweden	Czech Republic, Greece, Hungary, Ireland, Latvia, Lithuania, Norway, Portugal, Slovenia, Spain, The former Yugoslav Republic of Macedonia
Availability of vending machines with foods or beverages on school premises[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Portugal, Slovenia, Sweden	Czech Republic, Hungary, Italy, Latvia, Portugal, Slovenia, Spain
Availability of shop or cafeteria where foods or beverages can be purchased[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Portugal, Slovenia, Sweden	Czech Republic, Latvia, Portugal, Slovenia, Spain
Availability of school canteen[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Portugal, Slovenia, Sweden	Czech Republic, Italy, Latvia, Portugal, Slovenia, Spain
Meals served at the school canteen meet the country-specific nutrition (or healthy eating) guidelines[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Slovenia, Sweden	Czech Republic, Hungary, Italy, Latvia, Slovenia, Spain
School provides pupils with free fresh fruit[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Portugal, Slovenia, Sweden	Czech Republic, Italy, Latvia, Portugal, Slovenia, Spain
School provides pupils with free vegetables[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Slovenia, Sweden	Czech Republic, Latvia, Portugal, Slovenia, Spain
School provides pupils with free milk[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Portugal, Slovenia	Czech Republic, Latvia, Portugal, Slovenia

Table 8 contd

School form items	Countries	
	Round 1	Round 2
School provides pupils with milk at a low price[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Portugal, Slovenia	Czech Republic, Latvia, Portugal, Slovenia
School curriculum includes nutrition education[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Portugal, Slovenia	Czech Republic, Hungary, Italy, Latvia, Portugal, Slovenia, Spain
School is free from advertising and marketing of any energy-dense and nutrient-poor foods and beverages[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Portugal, Slovenia, Sweden	Czech Republic, Hungary, Latvia, Portugal, Slovenia, Spain
School provides bus transport[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Malta, Slovenia, Sweden	Czech Republic, Latvia, Portugal, Slovenia, Spain
Routes to and from school are safe for most pupils to walk or ride a bicycle[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Portugal, Slovenia, Sweden	Czech Republic, Hungary, Latvia, Portugal, Slovenia, Spain
School curriculum includes physical education lessons[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Portugal, Slovenia, Sweden	Czech Republic, Italy, Latvia, Portugal, Slovenia, Spain
School runs sport clubs or provides sport facilities outside school hours[c]	Bulgaria, Czech Republic, Latvia, Lithuania, Portugal, Slovenia, Sweden	Czech Republic, Hungary, Italy, Latvia, Portugal, Slovenia, Spain

[a] Mandatory core items.
[b] Fresh fruit, 100% fruit juices without sugar, fruit juices containing sugar, cold drinks without/with sugar, hot drinks without/with sugar, diet or light soft drinks, vegetables, yoghurt, milk/flavoured milk, water, candy bar/chocolate/cake/other sweet snacks, potato chips, corn chips/popcorn/peanuts/other salted snacks.
[c] Optional items.

Table 9. Optional children and family data collected in COSI round 1 (2007/2008) and/or COSI round 2 (2009/2010)

Family form items	Countries	
	Round 1	Round 2
Items targeting children		
Child's birth weight	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Lithuania, Portugal, Spain
Child born at term (in general after 37 weeks of pregnancy)	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Lithuania, Portugal, Spain
Child's usual transport from home to school	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Italy, Lithuania, Portugal, Spain
Child's usual transport from school to home	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Lithuania, Portugal, Spain
Routes to and from school are safe for the respondent's child to walk or ride a bicycle	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Lithuania, Portugal, Spain
Distance from the child's school to home	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Lithuania, Portugal, Spain
Child's membership in one or more sport or dancing clubs	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Lithuania, Portugal, Spain
Child's usual amount of sleep per day	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Lithuania, Portugal, Spain
Amount of hours per day the child is usually playing outside on weekdays/weekends	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Lithuania, Portugal, Spain
Amount of hours per day the child usually spends doing homework or reading a book on weekdays/weekends	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Hungary, Italy (only during weekdays), Lithuania, Portugal, Spain
Amount of hours per day the child usually spends playing games on a computer on weekdays/weekends	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Italy (only during weekdays), Lithuania, Portugal, Spain

Table 9 contd

Family form items	Countries	
	Round 1	Round 2
Amount of hours per day the child usually spends watching television (including videos) on weekdays/weekends	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Italy (only during weekdays), Lithuania, Portugal, Spain
Computer available at home	Bulgaria, Czech Republic, Portugal, Sweden	Czech Republic, Greece, Hungary, Portugal, Spain
Frequency of child eating breakfast in a typical week	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Lithuania, Portugal, Spain
Frequency of child eating certain food items[a] in a typical week	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Italy (only fresh fruits, vegetables and soft drinks containing sugar), Lithuania, Spain
Child ever breastfed	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Lithuania, Portugal, Spain
Items targeting family		
Household member had high blood pressure during past 12 months	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Lithuania, Portugal, Spain
Household member had diabetes during past 12 months	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Lithuania, Portugal, Spain
Household member had high cholesterol during past 12 months	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Lithuania, Portugal, Spain
Number of people aged 18 years or older living in the household	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Lithuania, Portugal, Spain
Number of people less than 18 years old living in the household	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Lithuania, Portugal, Spain
Mother's highest completed level of education	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Italy, Lithuania, Portugal, Spain
Father's highest completed level of education	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Hungary, Italy, Lithuania, Portugal, Spain

Table 9 contd

Family form items	Countries	
	Round 1	Round 2
Household's average gross income over the past calendar year	Bulgaria, Czech Republic, Lithuania, Sweden	Czech Republic, Greece, Lithuania, Spain
Mother's main work over the last 12 months	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Lithuania, Portugal, Spain
Father's main work over the last 12 months	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Lithuania, Portugal, Spain
Type of house	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Lithuania, Portugal, Spain
Kind of accommodation occupation	Bulgaria, Czech Republic, Lithuania, Portugal, Sweden	Czech Republic, Greece, Lithuania, Portugal, Spain

[a] Fresh fruit, vegetables (excluding potatoes), 100% fruit juice, soft drinks containing sugar, diet or light soft drinks, low-fat/ semi-skimmed milk, whole-fat milk, flavoured milk, cheese, yoghurt/milk/pudding/cream cheese/quark/other dairy products, meat, fish, foods such as potato chips, corn chips, popcorn or peanuts, foods such as candy bar or chocolate, foods such as biscuits, cake, doughnuts or pie, foods such as pizza, French fries, fried potatoes, hamburger, sausage or meat pies.

the participating country and the Regional Office, including data release and publication policies, principles, terms and procedures.

Each participating country was responsible for national coordination and management – including training standardization, data collection and management, and country-specific analyses – and was funded by local resources. The Regional Office – through its Division of Noncommunicable Diseases and Life-course – was responsible for international coordination and management, including: development of the common protocol and manuals; communication with PIs; development of a system for data entry and validation; periodically monitoring study progress; cross-country statistical analyses of pooled international data; arranging meetings with PIs and the Advisory Group; and coordination of the preparation of publications on the cross-country data analyses. The Regional Office served as the international data coordination centre.

The collaboration arrangement stipulated that countries own their own data sets. The Regional Office, however, has a non-exclusive license to use the data for the purpose of cross-country statistical analyses at European level and for subsequent publications. As countries have primary ownership of their own data sets, the Regional Office will not make the pooled international data publicly available.

Summary COSI implementation characteristics

Table 10 summarizes the core and optional COSI implementation characteristics. Core characteristics were mandatory and needed to be followed by the participating countries. Optional characteristics were voluntary and supplemental to the core characteristics.

Table 10. Overview of the core and optional COSI implementation characteristics

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
Study population and sampling design		
Age groups	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
Sampling units	Nationally representative sample Cluster sampling of primary schools or classes Sentinel site approach, or new sample of schools at each round	All primary schools in the country
Sample size	Final effective sample size, per age group: ≈2800 children	All children in the respective age group in a country
Data collection procedures	In accordance with international ethical guidelines *(31)* Informed consent for measurements and data treatment (if required)	NA
	Same time period within a country; data collection within 4–10 weeks	NA
	Translation of original English data collection forms into local language and back-translated into English	NA
Variable (characteristics)		
Children	Date of birth or age, sex, geography of residence, school grade, date and time indication of measurement, body weight, body height, BMI and clothes worn during measurement	Time of measurement, associated co-morbidities, dietary intake patterns, physical activity/ inactivity patterns, family's socioeconomic characteristics
School	Address, number and grade of classes sampled, number of registered/absent/measured children per class, refusals, a few school nutrition and physical activity environmental characteristics	Detailed school nutrition and physical activity environmental characteristics
Anthropometric measurements	All examiners trained in standardized techniques	NA
	Examiners administer the examiner's record form and take anthropometric measurements according to protocol	NA
	Same instruments used within a country in accordance with requirements	NA

NA, not applicable.

4. CORE RESULTS

Data elaboration

Data quality assurance began when the examiner carefully filled out the forms and the supervisor checked the returned forms for completeness and correct coding. Cleaned country datasets were sent to the Regional Office where they were reviewed in a standard manner for inconsistencies and completeness before merged for intercountry analyses. The final anthropometric dataset included children with informed consent and complete information on age, sex, weight and height.

The 2007 WHO recommended cut-offs for school-aged children and adolescents were used to compute BMI-for-age (BMI/A) Z-scores and estimate the prevalence of overweight and obesity *(33,34)*. BMI was calculated using the formula: weight (kg) divided by height squared (m^2). Overweight and obesity were defined as the proportion of children with a BMI/A value above +1 Z-score and above +2 Z-scores, respectively *(33)*. According to WHO definitions, the prevalence estimates for overweight children include those who are obese *(35)*. Children with biologically implausible (or extreme) BMI/A values were excluded from the analysis (values below –5 or above +5 Z-scores relative to the 2007 WHO growth reference median) *(34)*.

Prevalence of overweight and obesity

Fig. 1 shows the prevalence of overweight and obesity among boys aged 6–9 years in 12 countries participating in COSI round 1. The results for girls aged 6–9 years in round 1 are in Fig. 2. The two figures indicate that up to 49% of boys and 43% of girls were overweight and up to 27% of boys and up to 17% of girls were obese *(24)*.

Fig. 3 shows the prevalence of overweight and obesity among boys aged 6–9 years in 13 countries participating in COSI round 2. The results for girls aged 6–9 years in round 2 are in Fig. 4. The two figures show that the prevalence of overweight ranged from 18% to 57% among boys and from 18% to 50% among girls, and the prevalence of obesity ranged from 6% to 31% among boys and from 5% to 21% among girls *(25)*.

In both rounds, multi-country comparisons suggested the presence of a north–south gradient with the highest level of overweight found in southern European countries *(24,25)*. From round 1 to round 2, the highest significant decrease in prevalence of overweight was found in countries with higher absolute BMI values in round 1 (e.g. Italy, Portugal and Slovenia) and the highest significant increase in countries with lower BMI values in round 1 (e.g. Latvia and Norway).

School characteristics

Some or all of the mandatory school form items were collected by 10 countries in COSI round

1 and by 12 countries in COSI round 2 (Table 8). Data on some of these items are presented in Fig. 5 and 6.

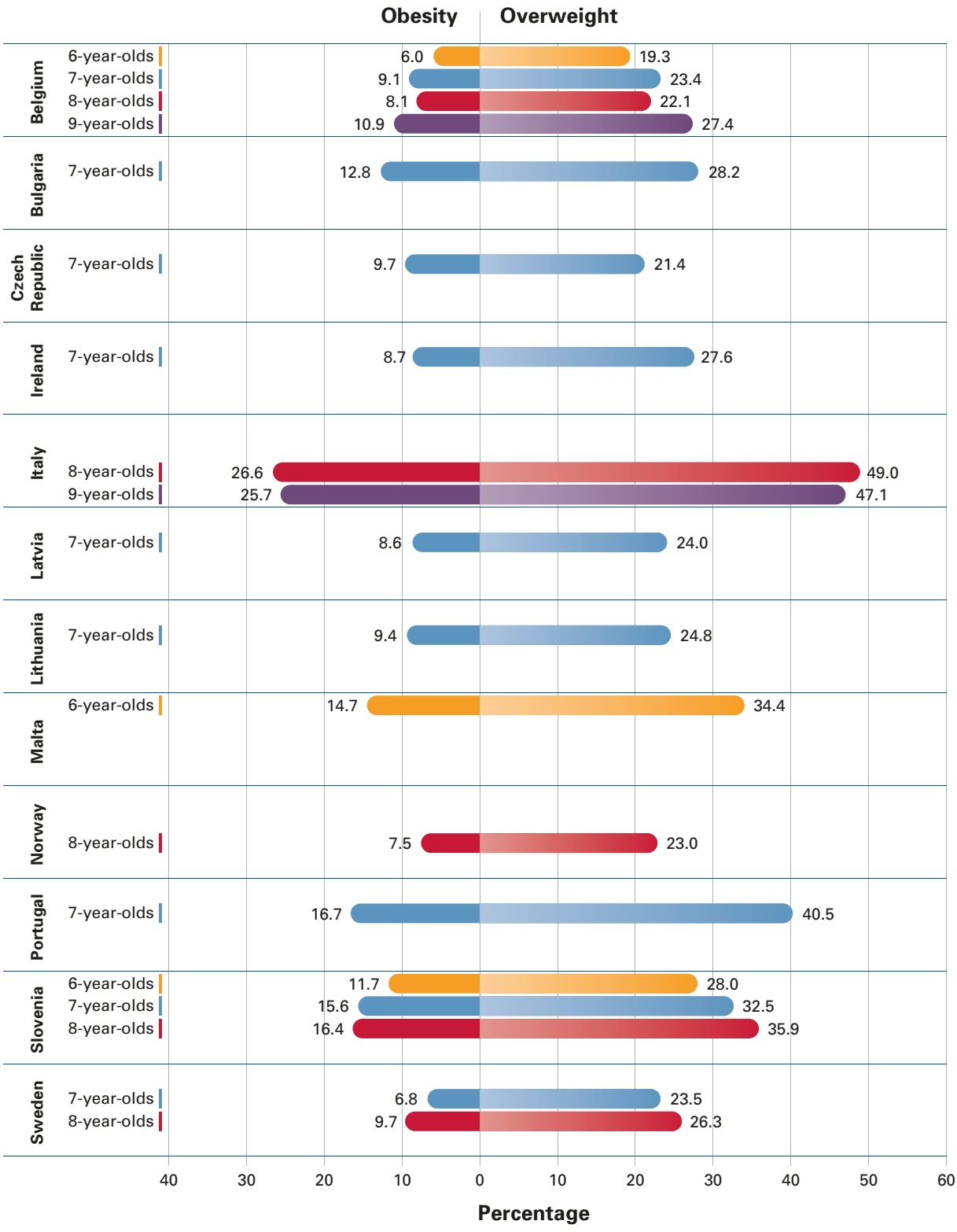
The mean number of minutes of physical education provided weekly by schools to pupils from the participating classes ranged from 67 minutes in Ireland to 163 minutes per week in Hungary (Fig. 5).

The proportion of schools that introduced initiatives or projects to promote a healthy lifestyle (with a focus on physical activity promotion and/or healthy eating) among pupils from the participating classes ranged from 42% in Bulgaria and Greece to 97% in Latvia (Fig. 6).

The lowest proportion of schools that provided fresh fruit on their premises was found in Greece (12%), Ireland (23%) and Malta (22%) and the highest in Hungary (83%) and Slovenia (75%, round 1; 95%, round 2). Milk could be obtained in 33–95% of schools in round 1 and in 18–95% of schools in round 2 (Fig. 6).

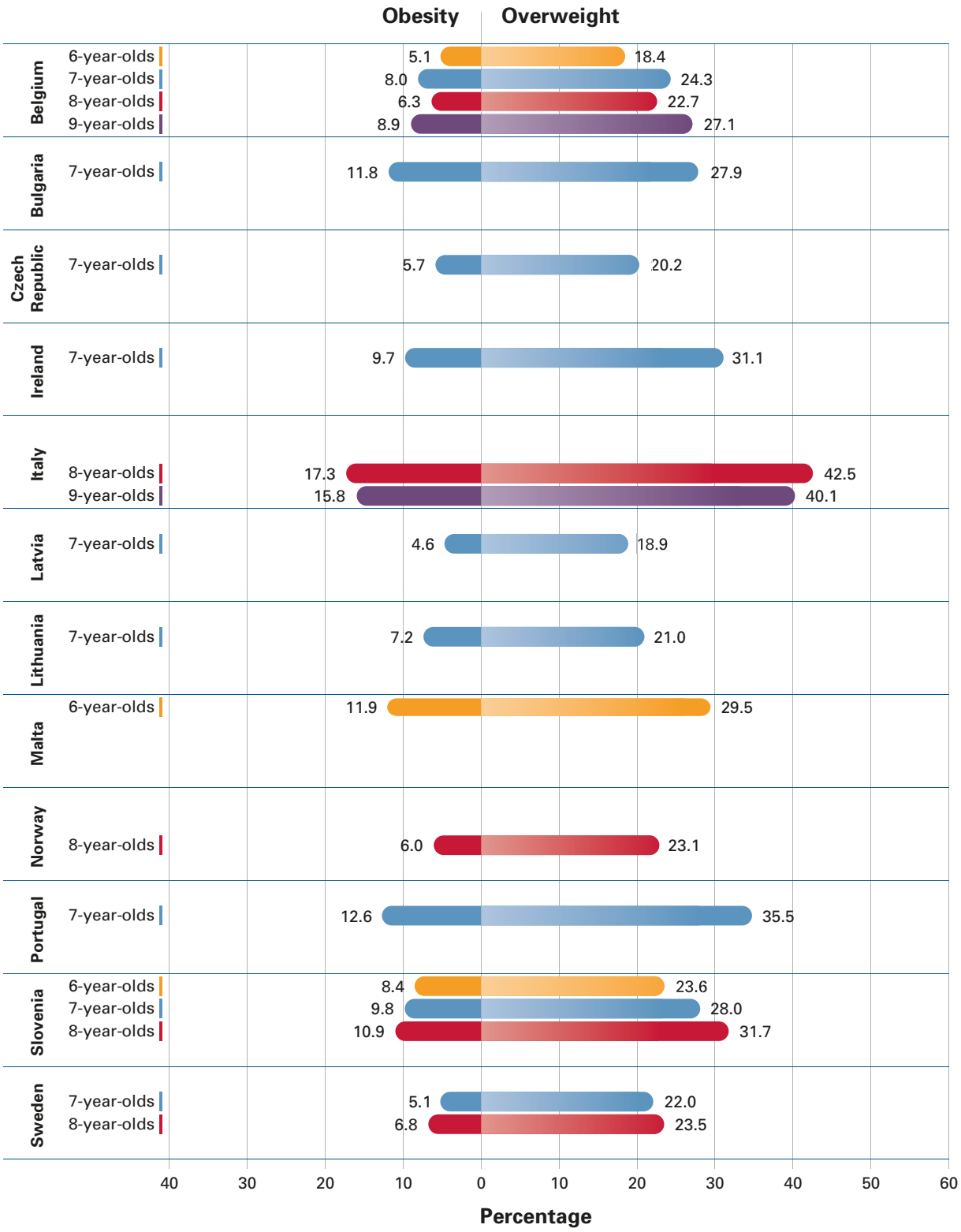
Cold drinks containing sugar could be obtained on the premises of 40% or more of schools in Bulgaria, the Czech Republic (round 1), Hungary, Latvia, Lithuania and Slovenia (round 1). The highest proportion of schools that provided sweet snacks on their premises was found in Bulgaria (77%), Lithuania (69%, round 1; 60% round 2), Hungary (51%), Latvia (51%, round 1; 49% round 2). and the Czech Republic (47%, round 1; 27% round 2). Fewer schools made salted snacks available on their premises than sweet snacks, but 37% of Hungarian schools and 74% of Bulgarian schools still provided them. Norway was the only country in both rounds that did not make cold drinks containing sugar, sweet snacks and salted snacks available to pupils on their school premises (Fig. 6).

Fig. 1. Prevalence of overweight and obesity among boys aged 6–9 years in COSI round 1 (2007/2008), by country and age group



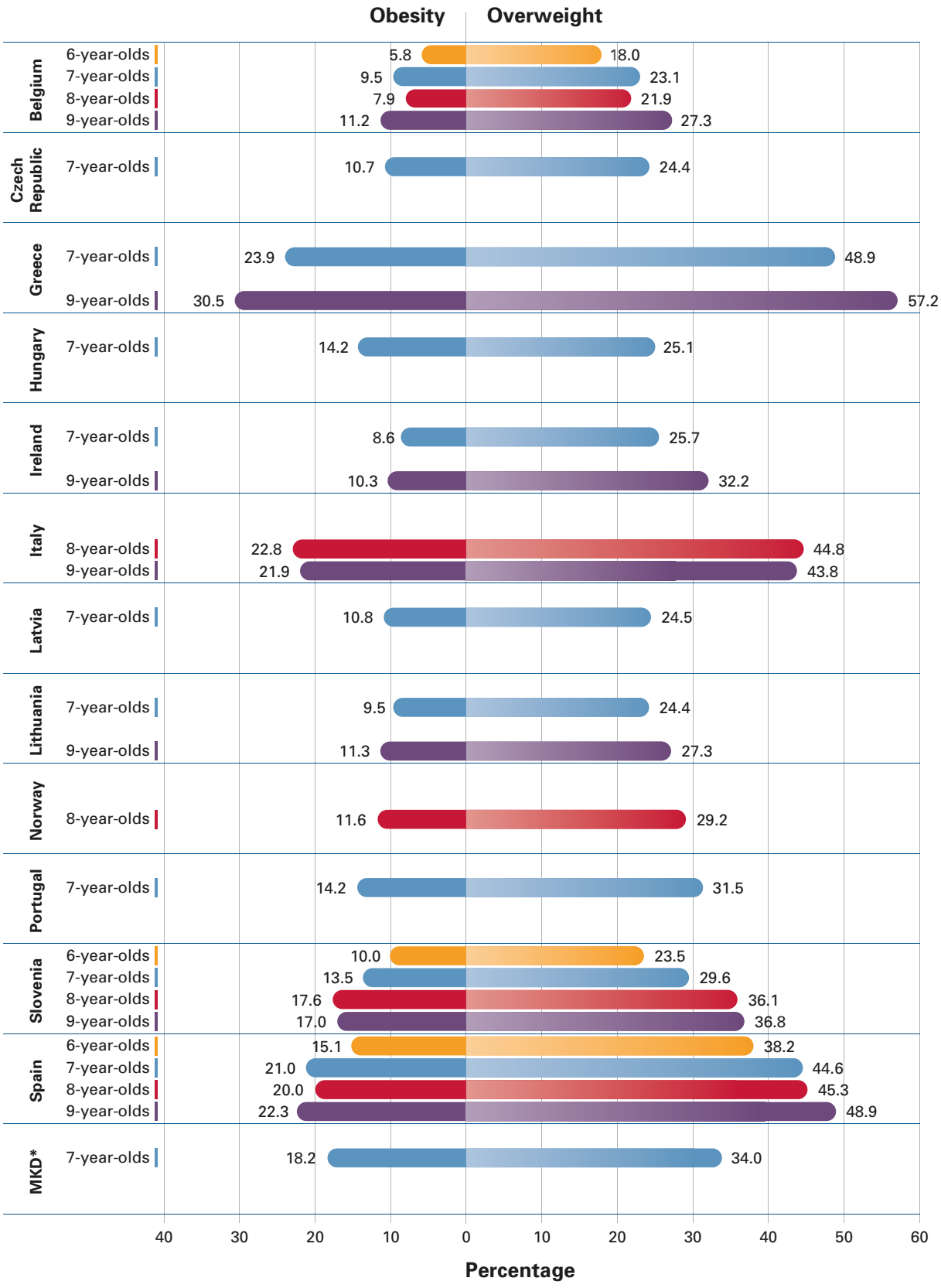
Note. Overweight and obesity are defined as the proportion of children with a BMI-for-age value above +1 Z-score and +2 Z-scores, respectively, relative to the 2007 WHO growth reference median *(33)*.
Source: Wijnhoven et al. *(24)*.

Fig. 2. Prevalence of overweight and obesity among girls aged 6–9 years in COSI round 1 (2007/2008), by country and age group



Note. Overweight and obesity are defined as the proportion of children with a BMI-for-age value above +1 Z-score and +2 Z-scores, respectively, relative to the 2007 WHO growth reference median *(33)*.
Source: Wijnhoven et al. *(24)*.

Fig. 3. Prevalence of overweight and obesity among boys aged 6–9 years in COSI round 2 (2009/2010), by country and age group

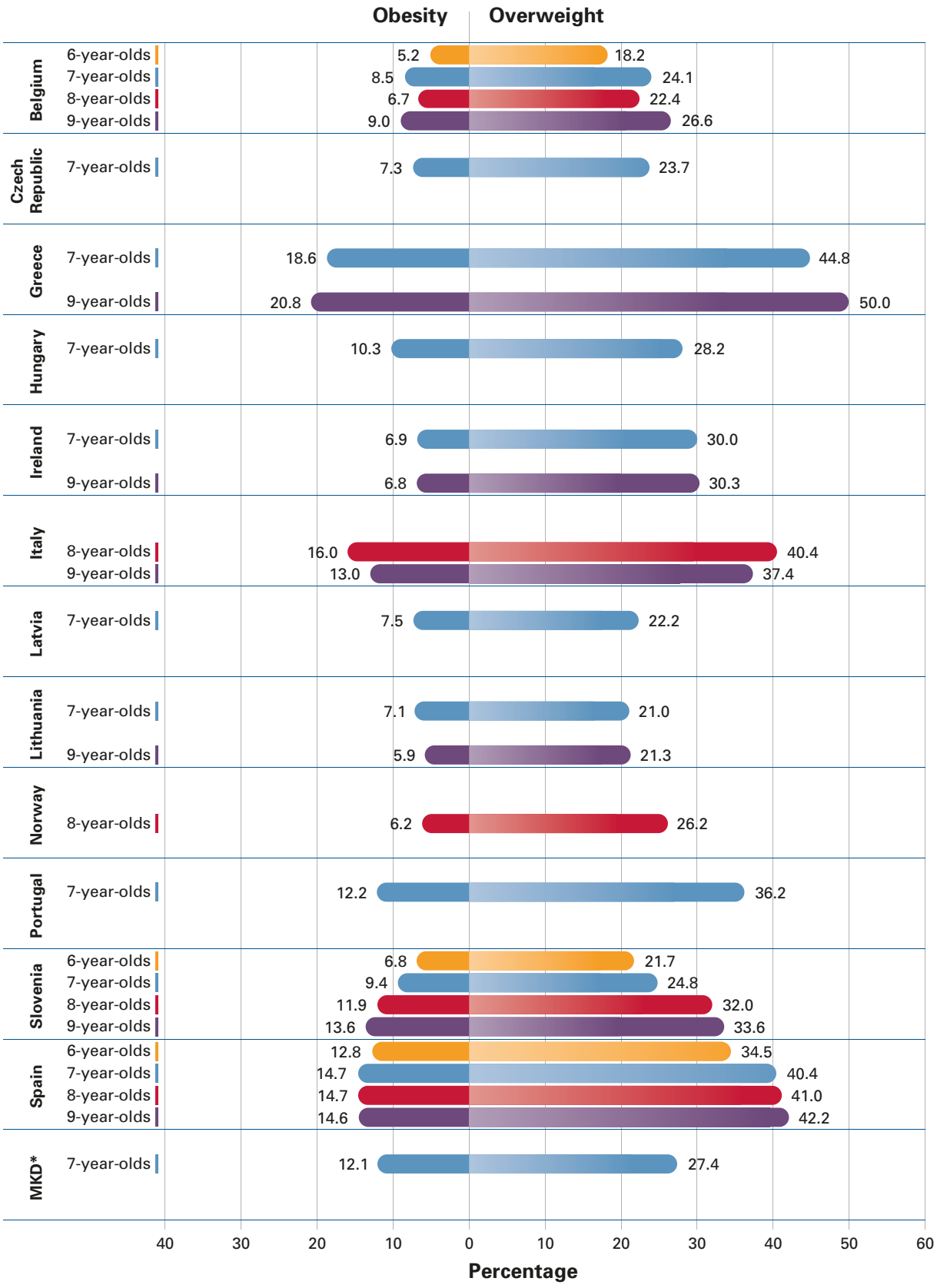


* MKD, The former Yugoslav Republic of Macedonia. MKD is an abbreviation of the International Organization for Standardization (ISO).

Note. Overweight and obesity are defined as the proportion of children with a BMI-for-age value above +1 Z-score and +2 Z-scores, respectively, relative to the 2007 WHO growth reference median *(33)*.

Source: Wijnhoven et al. *(25)*.

Fig. 4. Prevalence of overweight and obesity among girls aged 6–9 years in COSI round 2 (2009/2010), by country and age group



* MKD, The former Yugoslav Republic of Macedonia. MKD is an abbreviation of the International Organization for Standardization (ISO).

Note. Overweight and obesity are defined as the proportion of children with a BMI-for-age value above +1 Z-score and +2 Z-scores, respectively, relative to the 2007 WHO growth reference median *(33)*.

Source: Wijnhoven et al. *(25)*.

Fig. 5. Mean weekly provision of physical education to pupils by their schools in COSI round 1 (2007/2008) and/or round 2 (2009/2010), by country

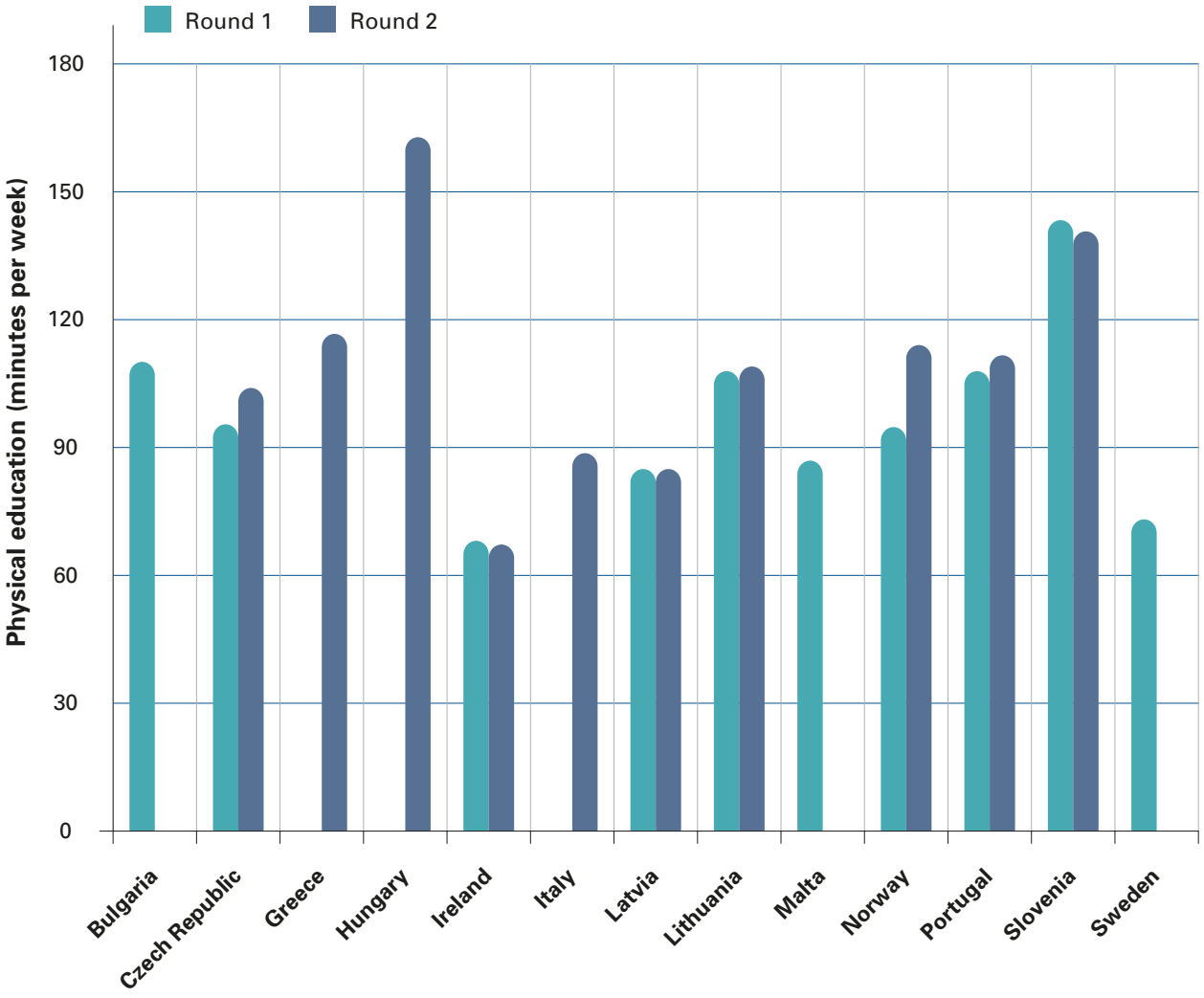
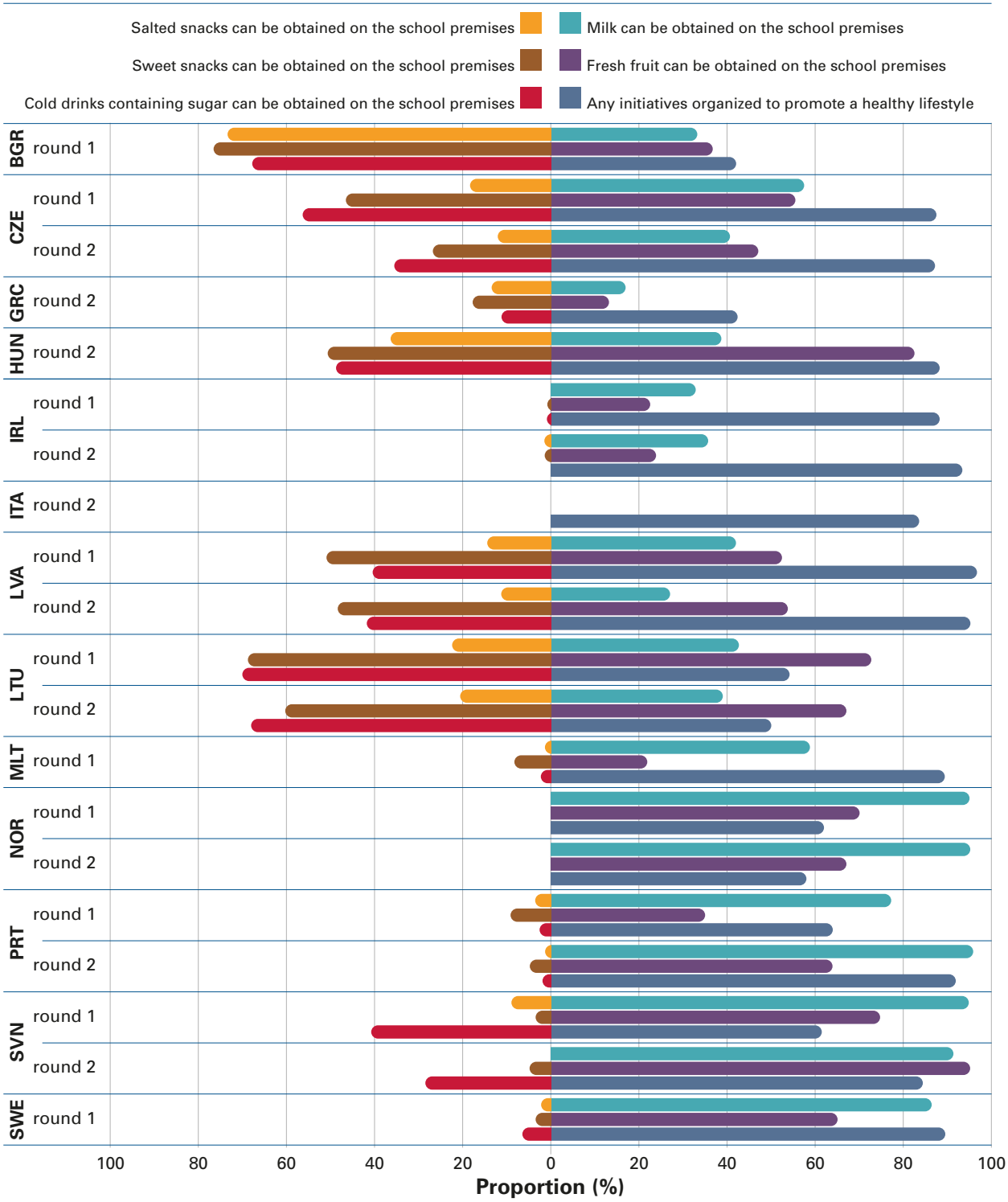


Fig. 6. School nutrition environment characteristics in COSI round 1 (2007/2008) and/or round 2 (2009/2010), by country



BGR, Bulgaria; CZE, Czech Republic; GRC, Greece; HUN, Hungary; IRL, Ireland; ITA, Italy; LTU, Lithuania; LVA, Latvia; MLT, Malta; NOR, Norway; PRT, Portugal; SVN, Slovenia; SWE, Sweden.
Notes. The country codes refer to the International Organization for Standardization (ISO) 3166-1 Alpha-3 country codes. The value for 'cold drinks containing sugar' was 0.0 in Ireland (round 2) and Norway (both rounds). The value for 'sweet snacks' was 0.0 in Norway (both rounds) and the value for 'salted snacks' was 0.0 in Ireland (round 1), Norway (both rounds) and Slovenia (round 2). Italy did not collect data on the kinds of foods and beverages that could be obtained on the school premises.

5. COUNTRY EVALUATIONS

PIs were asked to write up their experiences with the implementation of COSI in round 1 and/or in round 2 in their country using the SWOT analysis method *(36)*. In 2013, the countries provided the Regional Office with a draft of their evaluation of the COSI implementation as input to this document and subsequently revised their SWOT analysis based on feedback provided by the Regional Office.

An analysis of the strengths and weaknesses referred to an internal assessment of the national and/or local organization's ability to implement COSI. Opportunities and threats referred to an assessment of the environment that is external to the national and/or local organization.

In addition, strengths were strong factors internal to the organization that enabled a good implementation of COSI (smooth implementation of all or some elements), whereas weaknesses were weak factors internal to the organization that led to a poorer implementation of COSI (troublesome implementation of all or some elements). Both strengths and weaknesses were within the control of the country team or organization and related, for instance, to internal human resources, internal financial resources, past experiences, activities or processes within the organization.

Moreover, opportunities were factors external to the organization that had a positive impact on or was a positive result of the COSI implementation. Threats were factors external to the organization that had a negative impact on or was a negative result of the COSI implementation. These two factors could not be controlled by the country team or organization and related, for instance, to external financial sources, events, legislation or use of data.

After completion of the SWOT figure, PIs were then asked to elaborate on some or all of the listed internal and external factors by answering questions.

- Are steps needed to maintain the current strengths of the implementation?
- Which steps could be taken to reduce the identified weaknesses in future COSI data collection rounds?
- How could the current implementation of COSI and its impact be strengthened by the identified opportunities? Would any of the identified opportunities be pursued?
- What could be countermeasures against the identified threats?

Belgium

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The PI's analysis of the implementation of COSI in Belgium is presented in Fig. 7, followed by a short analysis of some of the identified factors.

Fig. 7. SWOT analysis of the COSI implementation in Belgium

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• Complete registration of all school-aged children throughout the school year was performed.[a]	• None of the COSI questions from the school or family forms could be incorporated into the Belgian questionnaires. • Not all primary school grade levels were questioned; children were only measured a few times during primary school (e.g. 1st, 3rd and 5th grades).
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• The comprehensive database contains other data (for instance, referral to health professionals, vision, pubertal development, etc.) that allows for new national analyses of the Belgian COSI data. • Linking the anthropometric data with socioeconomic data (native language, maternal education, etc.) from the Flemish Ministry of Education and Training may be possible. • Linking the anthropometric data to the data collected by the Flemish Institute for Health Promotion and Disease Prevention (VIGeZ) on healthy nutrition and physical education in schools, which is stored in the VIGeZ database, may be possible in the near future.	• In the future, anthropometric data might not be included in the international WHO COSI database because complying with all mandatory questions has not yet been possible.

[a] Registration refers to the age range from 3 to 18 years. The Centres for Pupils Counselling (Centra voor Leerlingenbegeleiding) performed registration, which included the measurement of height, weight, vision, position of the eyes, depth perception, colour vision and pubertal development for boys and girls. Thereafter the Flemish Agency for Care and Health received the data according to Belgian decree.

No additional steps are needed to maintain the current strengths of the implementation because the questionnaires have been administered in a similar way since 1948.

Making changes to the Flanders health registration system to include the school and family form questionnaires is not possible in the short-term. The process to include additional questions in the Flemish questionnaires would be complicated and cumbersome, as approval for collaboration with the Centres for Pupils Counselling and then with the Flemish Ministry of Welfare, Public Health and Family is necessary.

Linking anthropometric data with data from VIGeZ on nutrition and physical education in schools might be possible in the autumn of 2013. This linkage would provide interesting information, and then most of the questions included in the COSI school form could be answered.

Bulgaria

Submitted by: Vesselka Duleva, Head of Department, Food and Nutrition, National Center of Public Health and Analyses, Sofia, Bulgaria

The PI's analysis of the implementation of COSI in Bulgaria is presented in Fig. 8, followed by a short analysis of some of the identified factors.

Fig. 8. SWOT analysis of the COSI implementation in Bulgaria

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• Data collection in a school setting as opposed to a student's home, study centre, or other location, which optimized the allocated time and data quality, and reduced financial and personnel • Use of passive parental consent form, which increased the response rate and facilitated collection of the consent forms[a] • Excellent collaboration between the National Center of Public Health and Analyses and the 28 regional health inspectorates[b] • Well coordinated support from the Ministry of Health and the Ministry of Education, Youth and Science[c]	• Difficult to implement and collect the required data within the timeframe using the study protocol *(15)* in the first COSI round[d] • Logistical difficulties in sharing the limited number of stadiometers
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• Possible to make new types of analyses[e] due to collection of current nationally representative data on schoolchildren • Possible to compare national data with international data since implementation of the 2007 WHO growth reference *(33)* for assessment of anthropometric status • Able to monitor trends in anthropometric status of children • Possible to use COSI results to improve the national nutrition policy	• Insufficient financial resources • Potential changes to governmental policy and priorities in public health and nutrition, which poses uncertainty for the sustainability of the implementation of COSI • Changes in the available human resources[f]

[a] Passive consent required parents to fill out, sign and return the consent letter to exclude their children's participation in the study.

[b] The National Center of Public Health and Analyses implemented COSI. They organized and coordinated the study, provided methodological support to and trained the data collection personnel from the 28 regional health inspectorates, and collected and entered all the raw data. The Department of Disease Prevention and Health Promotion within the 28 regional health inspectorates organized and implemented the study in their respective region. The personnel involved had previous experience in carrying out national representative studies on the nutritional status of the target population, established effective communication and cooperation with the local community and institutions, accomplished the tasks efficiently and in a timely manner, and collected quality data. The cooperation between these two structures of the healthcare system positively affected the implementation of COSI.

[c] The Ministry of Health financially supported the implementation of COSI and assured the involvement of the regional health inspectorates. The Ministry of Education, Youth and Science gave its permission to implement COSI in schools, and provided the cooperation of its regional inspectorates and other necessary personnel in the selected locations.

Fig. 8 contd

[d] First the ethics committee needed to grant consent. Then the Ministry of Education, Youth and Science granted consent and informed its regional inspectorates. Inspectorates contacted the directors of the schools selected in the study sample and requested that interviewers be allowed to access schools and receive support to implement the study. Teachers helped to arrange meetings, informing parents of the study objectives, and distributed the necessary forms. Once the student information forms were completed, the fieldwork started. Some schools are located in remote villages, which increased the time needed for a Regional Health Inspectorate team to collect data from its region. The latter was especially true for the inspectorates with the highest proportion of schools in the sample. Despite establishing preliminary contacts between the involved institutions, these steps were time consuming.

[e] COSI overcomes some of the existing constraints associated with the regular collection of nationally representative nutritional data. Current and high-quality data that is beneficial to policy-makers increases the value and support of initiatives like COSI. Previous national nutrition and anthropometric surveys included children but not as a distinct and representative age group, which would allow for the monitoring of trends and dynamics in the period before puberty.

[f] The number of certified specialists in the field of nutrition and dietetics is limited in Bulgaria. Qualifications vary widely among personnel, requiring additional training hours and efforts. Hiring specialists only for the duration of the project, which would optimize the financial costs and allow for more flexible planning, is not possible. The current reorganization of health care organizations and insufficient financial remuneration further limit the human resources available to implement COSI.

The first COSI round in Bulgaria in 2008 demonstrated that the potential benefits significantly outweighed the implementation difficulties. Successful implementation of future COSI rounds requires careful analysis and measures to maintain the identified opportunities and strengths, as well as taking appropriate steps to reduce and counteract the weaknesses and threats described above.

Good cooperation between the National Center of Public Health and Analyses and the 28 regional health inspectorates has contributed to their success in conducting national and regional studies, including COSI. The methodological support from the National Center of Public Health and Analyses and the established and well-functioning network of the regional health inspectorates provide a unique and efficient organization to collect reliable data. Further steps are needed to maintain the identified strengths: continue the good dialogue between the two institutions, keep training current to maintain high professional standards for the personnel involved in the study, and secure adequate funding.

The experience gained from the first round in 2008 can be used to counteract some of the noted weaknesses. The stadiometers, used for height measurement, can be reused in future rounds. Keeping the same sampling frame will facilitate implementation of future COSI rounds and provide a basis for monitoring trends. The established connections with the involved institutions, as well as practical experiences for organizing the study, can be used to optimize future COSI rounds.

The opportunities identified include the structured use of reliable data to assist policy-making in the field of nutrition at national and international levels (e.g. one of the results from the first round of COSI in Bulgaria was the 2009 adoption of the Ordinance on Healthy Nutrition of Schoolchildren).

The negative effects of the identified threats could be mitigated by seeking cooperation and financial support from parties that might be interested in using the collected data and analyses. New educational degrees in the field of nutrition (e.g. bachelor degree in nutrition) could be established to increase the number of specialists available to conduct future rounds.

Czech Republic

Submitted by: Marie Kunešová, Head of Obesity Management Centre, Institute of Endocrinology, Prague, Czech Republic

The PI's analysis of the implementation of COSI in the Czech Republic is presented in Fig. 9, followed by a short analysis of some of the identified factors.

Fig. 9. SWOT analysis of the COSI implementation in the Czech Republic

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• Data were collected in paediatricians' clinics as part of existing preventive check-ups. The COSI protocols *(15,16)* expanded the type of data collected.[a] • Parents were available during check-ups to give informed consent and fill out family questionnaires. • All 7-year-old children visiting selected paediatricians were included. • The COSI implementation enabled data collection (weight, height) on 7-year-olds, which were previously measured but not statistically evaluated. • The COSI implementation enabled collection of new data (waist and hip circumference) and obtained data related to nutrition and physical activity of children and their school and family environments. • Participating paediatricians showed strong commitment to the project.	• Parents did not answer some sensitive questions (e.g. income) even though the confidentiality of answers was ensured (e.g. sealable envelopes were provided for completed forms). • Collecting data in the allotted timeframe required a minimum number of paediatricians as the time spent on data collection was inversely proportional to the number of paediatricians participating in the study (e.g. fewer paediatricians meant a longer data collection period). • Relying on the availability of students from the Faculty of Science, Charles University in Prague to perform database work as part of their masters theses was necessary.
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• Add the COSI protocols *(15,16)* to programmes supported by the European Union through the Ministry of Health using the data to make changes in environments, specifically school environments. • Integrate the COSI initiative into regular activities (in 2–3 year intervals) supported by the Ministry of Health coupled with financial support to participating paediatricians. • Organize regular meetings with participating paediatricians to inform them of the results of previous rounds. • Use data as a basis for programmes and policies on obesity prevention by informing health professionals, stakeholders and the public on the project results in specialized journals, congresses, and popular magazines and newspapers.	• A lack of financial support for the programme may prevent future participation.

Fig. 9 contd

Country-specific external assessment of the environment	• Establish a chief public health officer who follows obesity prevention guidelines according to the WHO European Charter on Counteracting Obesity *(5)*.

[a] The Czech Republic has a system of obligatory preventive check-ups performed by paediatricians; one check-up is carried out on 7-year-old children. During the preventive check-up, weight, height and other data are collected, including the optional waist and hip circumferences and the family record form. Additionally, paediatricians contacted schools and completed the school record forms.

To maintain the last indicated strength and to recognize the additional work performed by paediatricians, it would be necessary to integrate the COSI project as a whole into a framework of activities financed by the Czech Ministry of Health.

One weakness could be addressed by ensuring the participation of a minimum number of paediatricians to shorten the time needed to obtain data from the recommended sample size of children. If an insufficient number of paediatricians participate in the study, then the time needed to collect data increases.

Regarding opportunities, the process of expanding the national plan on obesity prevention and treatment in line with the European Union initiative Horizon 2020 *(37)* will help to continue implementation of future rounds of COSI, and to support local and international evaluations and utilization of the data. Support from the Government through the Ministry of Health combined with European Commission support would help this process.

Related to the identified threat, the obesity prevention and treatment system is professionally guaranteed by the Czech Society for the Study of Obesity. Establishing a national action plan against obesity as part of Health 2020 *(38)*, which can target obesity prevention at population level, would be helpful.

Greece

Submitted by: Maria Hassapidou, Professor of Nutrition and Dietetics, Department of Nutrition and Dietetics, Alexander Technological Educational Institute of Thessaloniki, Thessaloniki, Greece

The PI's analysis of the implementation of COSI in Greece is presented in Fig. 10, followed by a short analysis of some of the identified factors.

Fig. 10. SWOT analysis of the COSI implementation in Greece

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• Co-financing by the Hellenic Medical Association for Obesity and the Alexander Technological Educational Institute of Thessaloniki using its own resources kept the cost of COSI low. A university covered many of the costs (photocopies, postgraduate students who recorded data, etc.). • Members of the local coordination team were experienced scientists, and the whole procedure ran smoothly. • All fieldworkers were very well-trained dieticians who showed strong commitment to and good collaboration with the schools in their region.	• Due to the use of active parental consent, only 76% of parents allowed their children to be measured. • The response rate for the family questionnaire was 50%, and parents felt that some questions were asking for sensitive data (e.g. type of house in which they live). • Some schools noted that other programmes were conducted in primary schools at the same time, limiting their willingness to participate in COSI.
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• Have COSI co-funded by the Ministry of Health and Social Solidarity, and establish it as a national monitoring system for childhood obesity. • Use COSI data as a source for the national nutrition policy for childhood obesity. • Use COSI data to accurately compare the prevalence of obesity in Greece with other European countries since all use the same methodology.	• Future funding by the Hellenic Medical Association for Obesity is unsure due to the current financial crisis. Funding would be more secure if the Ministry of Health and Social Solidarity becomes financially responsible for COSI.

In order to establish COSI and its methodology as a national monitoring system in Greece, contacts were made with the Ministry of Health and Social Solidarity with the hope that the fourth COSI round will be adopted by the Government. In the future, COSI can be used in the national nutrition policy to reduce the prevalence of childhood obesity and improve children's health in Greece.

Hungary

Submitted by: Éva Martos, Director General, National Institute for Food and Nutrition Science, Budapest, Hungary

The PI's analysis of the implementation of COSI in Hungary is presented in Fig. 11, accompanied by a short analysis of some of the identified factors.

COSI required a substantial amount of human resources from the National Institute for Food and Nutrition Science. Continuously providing this support is essential to maintain the current strength of the implementation. External financial resources are also important to conduct future

Fig. 11. SWOT analysis of the COSI implementation in Hungary

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• The examiners were school nurses who have decades of experience in performing anthropometric measurements. • COSI examiners were trained using a CD, which was more cost-effective than in-person training and reduced travelling costs. • A recently set-up county coordinator system, staffed with experienced school nurses who were specifically trained for COSI, was used. They were responsible for control and coordination of examiners. Based on the experiences gained, utilizing this system to coordinate data collection was the most efficient way to conduct the study. • Staff from the National Institute for Food and Nutrition Science performed random inspections to validate measurements and procedures against the COSI protocol *(16)*. • All schools used identical anthropometric devices. • Obtaining approval from the Hungarian ethical committee and informed consent from parents went smoothly.	• The response rate of schools was low because many schools were already involved in other intervention programmes and surveys. • Integration of COSI into the existing mandatory health check-up system was sometimes difficult. For example, nurses noted the redundancy of the measurements, questioning the necessity of measuring some pupils twice a year, once as part of the mandatory health check-up system and then again for COSI. • The low number of measuring devices – 28 identical scales and stadiometers – caused some logistical difficulties by limiting the study to 28 schools at a time. The other schools/examiners had to wait until devices were available. • No children in the target age group were in many of the pre-selected classes.[a] • A flood prevented access to some schools so nurses were unable to collect data.
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• Data from COSI has been and can continue to be effectively utilized in preparation for various regulations[b] and health promotion programmes,[c] and results can be communicated to decision-makers at national and international levels. • Overweight and obesity prevalence data can be linked with data from voluntary family and school record forms allowing detailed analysis. • Data from the family and school record forms can provide an invaluable basis for childhood obesity interventions. Although surveys on school environment or the nutritional status of children, etc. exist, COSI is the only one that studies these factors together. • COSI provides high-value reference data at national level, which provides an opportunity to communicate to stakeholders and a good basis to track trends in obesity. • The reliable reference data obtained from COSI have facilitated participation in national and international tenders[d] and can continue to do so.	• Regular financing of the surveillance is not secured. • Although regular monitoring of childhood obesity prevalence together with the nutritional environment is part of the *Action Plan of the Hungarian National Nutrition Policy for 2010–2013 (39)*, there is no currently approved document. COSI data are not comparable with the existing anthropometric measurements gathered during the regular school health check-ups.[e]

Fig. 11 contd

Country-specific external assessment of the environment	• COSI helps to keep childhood obesity high priority on the political agenda.

[a] During the study, it became clear that children belonging to the target age group (7.0–7.9 years) were not in second grade classes, but in first grade classes.
[b] In August 2011, the Chief Medical Officer issued nutritional recommendations for mass catering in Act CIII of 2011 on the Public Health Product Tax.
[c] Programmes include the Hungarian Aqua Promoting Programme in the Young (HAPPY), Start with Breakfast! and Stop Salt!, a national salt reduction programme.
[d] Tenders include the INFORM Network (European Commission); Evaluation of Hungarian Fruit School Scheme 2010–2011 (Ministry of Rural Development); and the Start with Breakfast! programme (Ministry of Health).
[e] Measuring devices used during the regular school health check-up system are not identical, which the COSI protocol *(16)* requires. Moreover, the school health check-up system only reports overweight and obesity prevalence data; individual data are not entered into a common database. Their definition of overweight and obesity differs from the one used in COSI (WHO criteria) *(33)*.

COSI rounds as the COSI coordinating institute is not fully funded by the Government. Building a partnership with the actors of the reorganized school system is important to reduce weaknesses in future COSI data collections. Also, better integration of COSI into the existing mandatory health check-up system is essential. The redundancy of measurements could be avoided by selecting the COSI schools in advance and giving them sufficient notice. More measuring devices will be needed to implement COSI in a timely manner.

Children of the target age were hard to identify. Existing legislation allows parents to withhold their children from entering primary school up until the age of eight years and resulted in a very heterogeneous age distribution within classes. In addition, the nationwide school registry system does not contain information on the age and number of children in classes. This problem seems to be solved with a new law that enters into force in the 2013/2014 school year, which sets the age for children to start school uniformly at six years.

Endorsing a nutrition health policy program for 2013–2016 (an updated version of the Action Plan of the Hungarian National Nutrition Policy for 2010–2013 *(39)*) by the Minister of Human Resources, and securing a dedicated budget could safeguard the regular implementation of COSI.

Ireland

Submitted by: Nazih Eldin, Health Service Executive (HSE) Lead on Obesity and Head of Health Promotion HSE Dublin North East, HSE Dublin North East, Navan, County Meath, Ireland; Mirjam Heinen, Post Doctoral Research Fellow, National Nutrition Surveillance Centre, School of Public Health, Physiotherapy and Population Science, University College Dublin, Dublin, Ireland

The PIs' analysis of the implementation of COSI in Ireland is presented in Fig. 12, followed by a short analysis of some of the identified factors.

Fig. 12. SWOT analysis of the COSI implementation in Ireland

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• A high number of 7-year-old children, as per COSI protocol *(15)*, participated in the first round (>2400). • A cost-effective data collection strategy was implemented through use of trained nutritional graduates.[a]	• Due to the fact that many schools in Ireland are small, using a proportional-to-size cluster sample would have resulted in an unavoidable undersampling of pupils in small schools. Therefore, the number of small schools in the sample was reduced.[b] • New nutritionists were trained for every round, since nutritionists participating in the previous round had found other employment when the subsequent round took place.[c] • For cost-effectiveness reasons, in order to also examine 9-year-olds, fewer 7-year-old children were measured in round 2 than in round 1.
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• COSI provides a large longitudinal database of a nationally representative sample schoolchildren aged 7–9 years, with the ability to follow up.[d] • Information on lifestyle factors[e] are available, which will be used to perform additional analysis by the National Nutrition Surveillance Centre and University College Dublin. • Data can be compared with other national datasets such as Growing Up in Ireland: National Longitudinal Study of Children *(40)*, a University College Cork dental survey *(41)* and the Lifeways Cross-Generation Cohort Study *(42)*.	• Funding has to be secured for each round in the context of serious budget cuts in the Irish health sector.[f]

[a] Using trained nutritional graduates is cost-effective in the sense of time needed to train them in performing anthropometric measurements as this is part of their education. Also, they take less time to perform the measurements during the fieldwork and collect more reliable data.

[b] The dataset contained a sample of 498 schools, which were ordered by size. This dataset was then divided into 10 groups depending on class size. Next, 11 schools were randomly selected from each of the first 5 groups of smaller sized schools (55 schools) and 25 schools were randomly selected from each of the final 5 groups of larger sized schools (125 schools). Therefore, the expected outcome was a selection of: 55 small schools (11 x 5) with an average of 10 students per class, i.e. 550 pupils and 125 large schools (25 x 5) with an average of 20 students, i.e. 2500 pupils.

[c] Although nutritional graduates do not need much training in performing anthropometric measurements, they do need training in the COSI protocols *(15,16)*. It would be even more cost-effective if the same nutritionists could be used for every round.

[d] It was possible to collect longitudinal data as the same schools were approached in round 2 whereby children in first and third class were measured. This approach provided Ireland with longitudinal data on anthropometric measurements with the ability to follow up when a new round is taking place.

[e] From round 2 (2010) onwards, data on lifestyle factors, using the family survey format provided by COSI, have been collected together with the anthropometric data.

Fig. 12 contd

[f] The HSE provides funding for Ireland's participation in each COSI round. However, the HSE, which is publicly funded, has undergone serious cuts in its budgets over the last few years and securing funding for future rounds may be difficult.

No additional steps are needed to maintain current strengths.

To reduce the identified weaknesses, as many schools as possible are included in each round, with an emphasis on larger schools (which are overrepresented in the Irish sample anyway). Reminder letters are sent and schools are called for their consent. However, the number of schools that can be included also depends on how large the budget is, which has decreased over the years. Also, every attempt is made to retrain the same staff, if possible, to do the data-collection in subsequent rounds.

Regarding opportunities, the National Nutrition Surveillance Centre and University College Dublin will execute all the proposed analyses and follow-up of the longitudinal data.

Regarding threats, every attempt is made to maintain funding for this project.

Italy

Submitted by: Angela Spinelli, Director, Woman, Child and Adolescent Health Unit, National Centre for Epidemiology, Surveillance and Health Promotion, National Institute of Health, Rome, Italy; Daniela Galeone, Director of the II Office, Ministry of Health, Rome, Italy

The PIs' analysis of the implementation of COSI in Italy is presented in Fig. 13, followed by a short analysis of some of the identified factors.

Fig. 13. SWOT analysis of the COSI implementation in Italy

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• COSI was a great financial investment by the Ministry of Health, which considers childhood obesity an important health problem. • Health professionals working in local public services on food safety, nutrition and health prevention, i.e. *Servizio Igiene Alimenti Nutrizione* (Food Hygiene Nutrition Service) were involved in making COSI a cost-effective data collection. • Collaboration between the health and school sectors at all levels (ministries of health and education, regional workers, local health workers and teachers), which was strengthened by the implementation of *OKkio alla SALUTE* (Italian COSI) *(43)*, was good.	• Secure financial investment was needed by the Ministry of Health and regions in order to buy other instruments (scales and stadiometers) and support some of the activities at national, regional and local levels. • In some cases, insufficient human and logistic resources were reported at local level because of difficulties accessing funds. • A lack of interest by local workers performing data entry was observed. • Available human resources were stretched because COSI overlapped with other data collections (e.g. HBSC) or activities.

Fig. 13 contd

Country-specific internal assessment of the national and local organization	• The National Institute of Health had experience in implementing and coordinating surveillance systems; training regional and local workers; and preparing materials to communicate results to different stakeholders (children, parents, teachers, paediatricians and local authorities). • Regional and local coordinators who were responsible for data collection and communication of results showed strong commitment. • Response rates of schools and parents were high. • All procedures were standardized. • A large sample size of data (more than 40 000 children), using representative samples at regional level and a high precision of the estimated prevalence estimates were collected. • Data on risk factors of childhood obesity (nutrition, physical activity, family factors, school environment and activities, etc.) were collected.	
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• The *OKkio alla SALUTE* data are considered the official data on childhood prevalence of overweight and obesity in Italy and in all regions, and the data can be used in future analyses. • The results have been used in the last national health plan and all the official documents from the Ministry of Health and the Ministry of Education, University and Research and will continue to be used. • The results could be used as a data source for the development of a nutrition action plan. • The regional and local data are used to communicate the results to different stakeholders (children, parents, teachers, paediatricians, local authorities, etc.) and to start actions to prevent overweight and obesity in children. • The data collected in Italy can be compared with those of other European countries, which used, more or less, the same methodology. • The results have helped start a public discussion on some related topics, such as a tax on sweetened and carbonated drinks, an increase in the number of hours of physical activity in primary school curricula, etc.	• Future funding is unsure due to the current spending review, although *OKkio alla SALUTE* has been included in many regional health plans. • Due to the current financial situation, workers who go on pension may not be replaced. • A possible reorganization of local health authorities (as a consequence of spending review and cuts) could reduce their involvement in prevention and nutrition activities (the specific services could disappear or employees could be given other tasks).

After the first round of data collection in 2008, *OKkio alla SALUTE* (Italian COSI) *(43)* became a stable surveillance system on childhood overweight and obesity and associated factors in all Italian regions. The collected data allow the comparison between regions and, at international level, between Italy and other European countries. The data have been used to prepare communication instruments (leaflets, posters, multimedia educational kits and web instruments) and to start prevention activities. It is considered one of the most important and useful surveillance systems in Italy, and health workers and teachers are happy to take part. The results have been used in the last national health plan and in official documents from the Ministry of Health and the Ministry of Education, University and Research.

The cost of the surveillance system is not very high (about €6 at national level and about €8 at local level per child). However, financial support is necessary to help the national coordination and local activities. Italy, as other European countries, has economic difficulties, which may reduce its interest towards prevention.

In order to overcome some of the identified threats, human resources in particular, the National Institute of Health tries to put together the resources involved in all the surveillance systems in order to help them and aid their survival.

Latvia

Submitted by: Iveta Pudule, Senior Public Health Analyst, Centre for Disease Prevention and Control, Riga, Latvia

The PI's analysis of the implementation of COSI in Latvia is presented in Fig. 14, followed by a short analysis of some of the identified factors.

Fig. 14. SWOT analysis of the COSI implementation in Latvia

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• The same team of researchers implemented COSI in both rounds. • Collaboration between the public health system,[a] the Ministry of Education and Science and participating schools was strengthened. The Ministry of Education and Science supported COSI data collection in both rounds and wrote a support letter to each selected school. Schools were cooperative during the data collection period.	• Use of the same anthropometric measuring equipment throughout the country was a challenge. • School health services could not provide data to COSI. • Twenty sets of anthropometric measuring equipment were purchased, and their transport logistics were a concern for the data collection company.

Fig. 14 contd

	OPPORTUNITIES	THREATS
Country-specific external assessment of the environment	• Additional financing from the Ministry of Health would allow data collection from the family record form and supplement data that are already collected. • COSI data can be used as a data source to develop a national health strategy and several other public health programmes.	• Despite four reorganizations of the implementing institution during the two COSI rounds, the same survey management team was maintained. Additional reorganizations could jeopardize the sustainability of COSI. • Changes in legislation may require active parental consent for data collection among schoolchildren, which could reduce participation rates among children.

[a] The two national institutions responsible for public health activities in Latvia are the Ministry of Health and the Centre for Disease Prevention and Control (since 2011).

Due to a lack of human resources in the public health system, COSI fieldwork will need to be (and was for previous COSI data collections rounds) outsourced. Legislation requires a new procurement procedure for each round, which complicates fieldwork management in terms of time and fieldwork staff training.

Lithuania

Submitted by: Aušra Petrauskienė, Associate Professor, Department of Preventive Medicine and Institute of Health Research, Lithuanian University of Health Sciences, Kaunas, Lithuania; Janina Petkevičienė, Professor, Department of Preventive Medicine and Institute of Health Research, Lithuanian University of Health Sciences, Kaunas, Lithuania

The PIs' analysis of the implementation of COSI in Lithuania is presented in Fig. 15.

Fig. 15. SWOT analysis of the COSI implementation in Lithuania

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• Collaboration between public health bureaus,[a] school public health specialists and the Lithuanian University of Health Sciences was strengthened. • Public health students from the Lithuanian University of Health Sciences participated actively in COSI as part of their practical training and research work.	• Insufficient financial and human resources to perform COSI across the country were observed.[b] • Insufficient dissemination of information about the COSI project and the results were noted. • A lack of understanding from school directors and parents and their lack of collaboration were noted. • The directors of schools in bigger cities (with several universities) did not participate, as children and parents were already involved in a variety of surveys.

Fig. 15 contd

	OPPORTUNITIES	THREATS
Country-specific external assessment of the environment	• Possible co-funding by the Ministry of Health might be used to supplement COSI. • COSI data could be used to contribute to the development of Lithuanian growth standards of 7- and 9-year-old children. • Many bachelor and master theses in public health have been prepared using the data. • Data could be used to develop and evaluate national programmes for prevention and control of overweight and obesity in school-aged children.	• Future funding is unsure because COSI is not included as a governmental responsibility.

[a] Public health specialists who work at schools belong to public health bureaus. Due to insufficient funding particularly in round 2, public health bureaus were asked to help conduct the survey in some cities. Public health specialists from bigger cities (with more schools) have more responsibilities and are unable to participate in other surveys, such as COSI, whereas specialists from smaller cities are able to participate in large international surveys.

[b] A nationally representative sample was drawn for the first time. The sample was based on all 7-year-olds in all 10 districts, and a sample for each district was calculated proportionally. If university students could not access schools in remote areas, public health specialists from public health bureaus helped measure the children instead.

Malta

Submitted by: Victoria Farrugia Sant'Angelo, Medical Coordinator Primary Child Health, Primary Health Care Department, Floriana, Malta

The PI's analysis of the implementation of COSI in Malta is presented in Fig. 16, accompanied by a short analysis of some of the identified factors.

Malta has taken advantage of its relatively small population size when implementing COSI. The work being carried out by School Health Service staff incorporates the data collection for COSI, and this arrangement could be maintained for future rounds. The data collection methodology could be strengthened further if parents of children in the cohort are involved prior to the data

Fig. 16. SWOT analysis of the COSI implementation in Malta

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• A relatively small general population was used to capture a whole cohort by age group. • Data collection was integrated within the work of the School Health Service.[a] • Due to the previous point, few participants declined to participate. • The longitudinal study[b] was easy to carry out.	• Some parents resisted filling out the family form. • The problem of overweight was identified but not addressed.

Fig. 16 contd

	OPPORTUNITIES	THREATS
Country-specific external assessment of the environment	• The prevalence data obtained is a good baseline to plan for strategy on a national basis. • Educational authorities can be made more aware of the problem of overweight children and modify the national curriculum to include more physical activity in the syllabus.	• Data input depends on extra funding, which is not always easy to obtain. • A lack of funding threatens the future of COSI, as analysing, not just collecting, the data is necessary. • Some educational authorities consider the data collection in schools as an infringement on their environment.

[a] The School Health Service presently provides a child health monitoring and preventive care service in State and (Catholic) Church primary schools with an emphasis on early detection of developmental, growth, sensory and learning problems, as well as physical disorders. The School Health Service teams, made up of doctors and nurses, also provide the basis of delivery of a comprehensive immunization programme for all schoolchildren in State, (Catholic) Church and independent schools. Health screening programmes are run from the age of 6 weeks at well-baby clinics and are continued at specified ages up to 11 years of age. The School Health Service strives for continuity of care for all schoolchildren and supports a multidisciplinary team approach to child health care.

[b] A longitudinal study was carried out on the 2001 birth cohort (first COSI collection round 2008) over four years with three measurements carried out in total. Participants were seen regularly during the school year, which made follow-up easier.

collection, so as to ensure more cooperation from their side when filling in the family record form. Collaboration of the individual school authorities to organize parents' meetings prior to the data collection round would be required.

The main problem that Malta faces with COSI implementation is financing. No budget is allocated to the project. A suggestion is that each country could be provided with an allocation of funds to carry out the data collection and input in a standardized manner.

The greatest difficulty is to obtain financing for data input. COSI data collection is integrated with an existing health check-up system that assesses the growth and development of children that fall within the COSI age range. The family record form was only filled in by 52% of parents, whereas it was possible to obtain measurements from practically all children, except for a few who were absent on the day of measurement.

Norway

Submitted by: Ragnhild Hovengen, Senior Adviser, Norwegian Institute of Public Health, Oslo, Norway

The PI's analysis of the implementation of COSI in Norway is presented in Fig. 17, accompanied by a short analysis of some of the identified factors.

Cooperation with the Ministry of Health and Care Services will be strengthened because data are shared with them, and a white paper with guidelines for health promotion and prevention of overweight and obesity in schools will be prepared based on the results from the Norwegian COSI.

Fig. 17. SWOT analysis of the COSI implementation in Norway

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• The project was rooted in the Ministry of Health and Care Services and the Norwegian Institute of Public Health as a joint project. • The project manager at the Norwegian Institute of Public Health knew the Government and local health officials and school health service well.[a] • A COSI Norway web page was set up with all information made available to partners, parents and the public. • All the school nurses within each region were invited to a seminar that included a training session on calibration routines and measurements.[b] • Results from each round were published at the Norwegian Institute of Public Health web site and published by the press.[c]	• Low budget affected the acquisition of anthropometric measuring equipment.[d] • Harmonization of the calibration routines for the weight and height measurements was challenging.[e]
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• COSI results are broadly used in health promotion plans in health regions and in white papers.[f] • The health ethics committee and written parental consent allowed the children's national identification number to be merged with their anthropometric data in registries, which provides research opportunities.[g]	• A lack of resources in the school health services may undermine school participation.[h]

[a] To implement COSI at 127 randomly chosen schools in 10 health regions in Norway, the health authorities in regions and municipalities had to be informed step by step. Having good knowledge of the organization of municipal school health services was advantageous and helped establish good cooperation with each school's health services. Each of the school health services was asked if it had resources to participate and perform the measurements for the COSI project team. This telephone request established a valuable cooperation between the project team at the Norwegian Institute of Public Health and the school health services during the two COSI rounds. Third graders were chosen because all schools in Norway currently measure weight and height among pupils.

[b] The training courses and the seminars held before each round were very well received and encouraged schools to participate in the two COSI rounds. It also contributed to a 90% participation rate among third graders in each round, even though parents had to give written consent for their children.

[c] When COSI started in 2008, broad public opinion held that some pupils could be insulted by having their height and weight measurements taken at school. Great efforts were taken to present the results from each round and explain how the study was conducted at schools. No negative press or comments from parents about COSI were noted.

[d] Calibrated new scales could not be provided for each school; many schools had old equipment.

[e] The project team worked out its own calibrating methods for the scales and height instruments, which caused extra work for the nurses.

[f] Making results publically available will hopefully strengthen the positive response rate from grant applications sent by the COSI coordinating institute and strengthen its project budget.

[g] An opportunity was given to link COSI data files together with child growth data (under the age of five years) from well-being baby clinics to the Norwegian Birth Registry and the Statistics Norway Registry. This data linkage is an important source for research on child health.

[h] School participation is voluntary. School health services are under severe pressure to undertake lots of tasks and participate in different projects. Several schools have reported that COSI in general, and calibration routines in particular, represent a workload.

Concerning the calibration procedures worked out for the surveillance, there were no significant differences in calibrated and uncalibrated measurements at national level. Schools will have less work implementing COSI if they do not need to calibrate measuring equipment, which may strengthen their commitment to participate in future rounds. Further strategies are under discussion. Ideally, and if budget permits, schools with older equipment might be able to obtain new measuring scales.

Portugal

Submitted by: Ana Rito, Researcher, National Institute of Health Doutor Ricardo Jorge, Lisbon, Portugal

The PI's analysis of the implementation of COSI in Portugal is presented in Fig. 18, accompanied by a short analysis of some of the identified factors.

Portugal is one of the European countries with the highest prevalence of childhood obesity; therefore a comprehensive and detailed assessment of the magnitude of the problem of obesity through the COSI study has become essential. In order to maintain the identified strengths in the following COSI rounds, the support of the Ministry of Health and the Ministry of Education and Science is essential. To meet the processing time that the Directorate-General of Health and the Directorate-General of Education need to authorize schools to participate in the study, commitment to the COSI study would need to be reinforced at least 12 months prior to each round.

Fig. 18. SWOT analysis of the COSI implementation in Portugal

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• Since COSI Portugal was not integrated into an existing health check-up system, there was a unique opportunity to establish and develop a robust surveillance mechanism at national level. • At regional level, costs were kept to a minimal because of integration into existing resources within the regional health centres. • Regional health centres responsible for data collection in the sampled schools in their respective region showed strong commitment. • COSI implementation strengthened the collaboration between the national health agencies (the Directorate-General of Health and the National Institute of Health Doutor Ricardo Jorge), the regional health centres and the regional education system.	• The time needed to obtain authorizations from the Ministry of Education and Science in general, and an inability to acquire official authorization at school level in particular, hindered the COSI implementation at regional and local levels. • The Ministry of Education and Science did not provide updated official information to primary schools in round 2. Each school provided its own information, which was time consuming. • Insufficient human and financial resources at national level in general and for data analysis (statistician) and training in particular, were observed throughout the country.

Fig. 18 contd

Country-specific internal assessment of the national and local organization	• Training on standardized anthropometric measurement techniques was offered to 164 examiners (mainly health professionals). Examiners who were trained delivered accurate data and acquired skills that were applicable in their daily professional lives. • Good and comparable data were collected across Portuguese regions and across European countries.	• Calibration of the anthropometric measuring equipment throughout the country was not possible. • No financial resources were available to purchase and maintain new equipment.
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• COSI data can be used as a data source to develop the new food and nutrition programme from the Directorate-General of Health *(44)*. • COSI methodology can be used and applied to other monitoring and surveillance mechanisms in Portugal. • Particularly for Portugal, which has one of the highest prevalence of childhood obesity in Europe, COSI could provide broader visibility of the national and European results among scientific (more reports and papers) and general audiences (media) in order to continuously raise awareness about this issue and keep it on the political agenda.	• Without a national budget or funding, continuing COSI in Portugal is very uncertain, since it relies only on resources from health centres. • Health professionals, particularly in one of the biggest regions (Lisbon and Tagus Valley region), which contributes one third to one fourth of the national data, are spread throughout the region and therefore training them is difficult. • Childhood obesity might not continue to be high priority if there is no reinforcement (particularly at government level) that childhood obesity is a form of malnutrition, and is more prevalent in low-income families. Keeping childhood obesity at the highest level of the political agenda particularly in Portugal and even in a period of financial constraints is important.

Since the COSI study is also integrated into the new food and nutrition programme from the Directorate-General of Health, COSI data need to continuously be analyzed, presented and interpreted. This continuous analysis is to remain a top priority, even during periods of financial constraint, since childhood obesity is a form of malnutrition and is more prevalent in low-income families.

Slovenia

Submitted by: Gregor Starc, Researcher, University of Ljubljana, Ljubljana, Slovenia

The PI's analysis of the implementation of COSI in Slovenia is presented in Fig. 19, accompanied by a short analysis of some of the identified factors.

The main prerequisite to implement COSI in Slovenia is to keep the existing SLOfit monitoring system. The funding for COSI is tied to the SLOfit monitoring system, and no alternative funding

Fig. 19. SWOT analysis of the COSI implementation in Slovenia

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• Minimal additional costs because of integration into existing physical and motor development monitoring system[a] • Increased motivation of physical education teachers who were responsible for data collection in the sampled schools because of the international recognition of their professional work[b] • Strengthened collaboration between the Faculty of Sport at the University of Ljubljana and the Slovenian Institute of Public Health[c]	• Lower response rate of schools completing the school form[d] • Not possible to harmonize the anthropometric measuring equipment throughout the country[e] • Insufficient human resources to communicate the COSI results to the general public
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• Able to use the data included in the entire physical and motor development monitoring system by public health experts and perform new analyses[f] • Possible co-funding by the Ministry of Health to supplement existing funding by the Ministry of Education, Science and Sport • Able to use data to establish new national plan on nutrition and physical activity	• Future funding of the entire monitoring system uncertain because of governmental saving measures • Possible personal data protection issues[g] • Possible reluctance by some medical professionals[h]

[a] COSI was integrated into a system that assesses the growth and motor development (including measurements of weight and height) of children that fall within the COSI age range. The only additional costs were the administration of the school form and the transformation of data that were processed in the Slovenian SLOfit database *(45)* to match the prescribed format for the international WHO COSI database.

[b] For the last three decades, physical education teachers in Slovenia have been involved in data gathering without being recognized as reliable and competent experts by national medical professionals. To contribute to the work of WHO by gathering precise data was accepted as a sign of international recognition, which positively influenced the attitudes of the Slovenian medical professionals.

[c] After participating in COSI, the Faculty of Sport at the University of Ljubljana started working closely with nutritionists from the Slovenian Institute of Public Health and the Faculty is currently developing joint research in the field of physical activity, nutrition, obesity and physical fitness.

[d] Some schools were unable to provide data from the school form due to the high workload of physical education teachers and school administrators.

[e] COSI protocols state that the same anthropometric measuring equipment should be used throughout the country *(15,16)*. Each primary school is already equipped with a scale and a stadiometer because children are measured every year, but the measuring tools are not the same throughout the country. Insufficient financial resources prevented the purchase of a new set of measuring equipment for all schools.

[f] The SLOfit database was included in the Slovenian Statistical Office's national statistics programme because public health experts would like to link it to other public health databases.

[g] Although the data are anonymized, the Information Commissioner's Office is concerned that children's data are transferred to a foreign third-party. The Personal Data Protection Act in Slovenia is very restrictive, and care is taken to ensure compliance with it.

[h] Some medical professionals (for example paediatricians) feel threatened and see it as an intrusion into their domain that non-medical professionals are monitoring children's growth.

sources exist. Currently, the Faculty of Sport at the University of Ljubljana is on annual contracts with the Ministry of Education, Science and Sport, and future planning would benefit from longer-term contracts. A guarantee from the Government to provide future funding would allow the SLOfit system to be developed further. All the other weaknesses and threats are minor and do not need to be addressed.

Spain

Submitted by: Napoleón Pérez Farinós, Epidemiologist, Spanish Agency for Consumer Affairs, Food Safety and Nutrition, Madrid, Spain

The PI's analysis of the implementation of COSI in Spain is presented in Fig. 20, accompanied by a short analysis of some of the identified factors.

The continuous reinforcement of institutional collaboration will gradually reduce the identified weaknesses. Progress is already being made.

In a context of global financial crisis, a countermeasure against the first identified threat could be to find alternative ways of funding. If staff from the 17 regional health centres would be allowed to participate in data collection, the costs would be much lower.

Fig. 20. SWOT analysis of the COSI implementation in Spain

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• The Ministry of Health, Social Services and Equity conducted the study with the collaboration of regional governments. Although the political cooperation was sometimes difficult, the technical work between colleagues from different institutions was efficient. • The Spanish Agency for Consumer Affairs, Food Safety and Nutrition (the former Spanish Agency for Food Safety and Nutrition) designed the study according to COSI protocol *(16)*. Regional departments of education were involved and collaborated in contacting schools. A university department led the fieldwork. • COSI provided the first update of measured, not self-reported, childhood obesity data since 2000. • The quality of the data was remarkable, as the study was designed to obtain a nationally representative sample of children. The study took into account the major and minor regional divisions, the size of villages, and the types of school (public/private). The sample size was optimized according to COSI recommendations *(16)*. The fieldwork was carefully planned, with training for and standardization of every step (e.g. anthropometric measurements and questionnaire administration). • A general report was completed and has recently been published *(46)*.	• The approval process was complex and required approval first from the regional governments that have authority over health and education policy, and then by the Ministry of Health, Social Services and Equity, which cannot conduct a national study without regional governments' approval. Unique ethical approval was also required. • Data collection was expensive because the entire implementation had to be outsourced to an external company.

Fig. 20 contd

	OPPORTUNITIES	THREATS
Country-specific external assessment of the environment	• COSI information can become an important part of the new Spanish Observatory of Nutrition and Study of Obesity. • COSI data could raise more awareness and keep the prevention of childhood obesity on the political agenda, even in times of financial crisis.	• Finding new funding for future rounds may be difficult. The financial crisis makes it difficult for the Ministry of Health, Social Services and Equity, who funded round 2, to afford periodical rounds. • Administrative difficulties may prevent participation in future rounds.

In 2013, the Government created the Observatory of Nutrition and Study of Obesity in response to Law 7/2011 on Food Safety and Nutrition. The Observatory has been launched as a general information system, which includes information and data on healthy food, physical activity and obesity (including COSI data). The Observatory will include existing sources of information, such as national health surveys, and new periodic surveys and indicators. Studies on the prevalence of childhood obesity will be relevant to the Observatory because the only current childhood obesity data that are based on measurements are the COSI data. The Observatory includes a web site to provide easy access to information *(47)*.

Sweden

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The PIs' analysis of the implementation of COSI in Sweden is presented in Fig. 21, accompanied by a short analysis of some of the identified factors.

The most important countermeasure against the identified threats would be that the Ministry of Health and Social Affairs encourages the use of a common protocol, allocates resources and provides adequate training to school health services. Thus, data that are already collected regularly would be collected according to the same protocol, reported regularly to a national office, have a high participation rate of children and involve all schools. Further, one way to participate in future COSI rounds with a nationally representative sample would be to approach more of the regional health authorities throughout Sweden for funding.

Fig. 21. SWOT analysis of the COSI implementation in Sweden

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• Schools considered to be representative with regard to type of community, as well as educational level of inhabitants in the communities, were included. • The participation rate of children in the included schools was high (>85% of children in class lists and of these >80% submitted family questionnaires). • Collaboration took place between Gothenburg University and Karolinska Institute.[a] • Anthropometric measurements were performed by trained staff using standardized methods and equipment.	• The school response rate at <50% (94 out of 220 schools) in 2008 was low. • Food frequency questions did not work in Sweden (but may still be a marker for potential health promoting habits in Sweden compared to other participating countries).[b]
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• School nurses could be included on a voluntary basis in the project. • Awareness of the consequences of the obesity epidemic and the health promoting potentials of schools, as well as the importance of monitoring children's height and weight among decision-makers in schools, as well as among politicians on local, regional and national levels could be raised. • Scientific publications using COSI data have been contributing to doctoral work.	• No financial support is provided by the Ministry of Health and Social Affairs. • Funding is dependent on external/regional sources and may dry up. • COSI is not synchronized with the most common physical examinations of students, including practically all fourth-graders, at age 10 years.[c] • Ethics committees differ on use of active/passive consent.[d] • Difficulties in getting positive responses from parents might pose a threat to representativeness. • An increase in the number of private schools (which currently account for 15% of Swedish schools for grades 1–9) may result in more private schools being sampled. The COSI participation rate of private schools is lower than for public schools, which may result in even lower response rates.

[a] Researchers at the Public Health Epidemiology Unit at Gothenburg University performed COSI data collection in schools in southern and western Sweden, while researches from the Karolinska Institute covered the eastern and northern parts. Data were merged into one database.

[b] In western Sweden, the number of food frequency options has been increased from four to eight, which has resulted in better discrimination of the data.

[c] Children are measured regularly as part of the child and school health care system. Measurements of body height and weight are taken in connection with a health interview. However, the data are not aggregated at national level, and the measurement methods and equipment are not standardized.

[d] Passive parental consent forms were used in the first COSI data collection. Since 2010, data collection among schoolchildren requires active informed parental consent, which is expected to reduce the children's participation rate.

The former Yugoslav Republic of Macedonia

Submitted by: Igor Spiroski, Senior Researcher, Department of Physiology and Monitoring of Nutrition, Institute for Public Health of the Republic of Macedonia, Skopje, The former Yugoslav Republic of Macedonia

The PI's analysis of the implementation of COSI in the former Yugoslav Republic of Macedonia is presented in Fig. 22, followed by a short analysis of some of the identified factors.

Fig. 22. SWOT analysis of the COSI implementation in the former Yugoslav Republic of Macedonia

	STRENGTHS	WEAKNESSES
Country-specific internal assessment of the national and local organization	• COSI was integrated into the National Annual Program of Public Health adopted by the Government at minimal additional costs. • Collaboration was intensive between the Institute for Public Health of the Republic of Macedonia as coordinator and the centres of public health, which were responsible for data collection. • The capabilities of public health professionals were enhanced through training and implementation of the procedures outlined by the internationally validated COSI methodology *(16)*. • COSI required raw data to be collected *(16)*. Access to raw data allowed the Institute for Public Health of the Republic of Macedonia to perform in-depth analyses.[a] • Implementation of COSI fostered communication between schools and public health authorities.	• Human and logistic resources were insufficient to perform fieldwork.[b] • Data from some regions were delivered to the national database at a later stage due to the sharing of measurement instruments between regional offices within one Center for Public Health.[c] • Human resources (needed for entering data, and sharing and communicating findings) in the Department of Physiology and Monitoring of Nutrition at the Institute for Public Health of the Republic of Macedonia were insufficient.
	OPPORTUNITIES	**THREATS**
Country-specific external assessment of the environment	• COSI can be established as a national, internationally comparable, monitoring system of schoolchildren aged 6–8 years. • COSI protocol can be implemented in annual data collections in the years when a COSI data collection round is not scheduled. • COSI data could be used to help develop different policies that improve children's health and well-being (e.g. a new nutrition action plan). • COSI data could provide broader visibility about childhood obesity to the scientific community and the general public.	• A possible reallocation of the financial resources that are planned for the next COSI implementation from the National Annual Program of Public Health may occur in mid-year. • Health professionals participating in COSI data collection in some regions of the country (primarily medical doctors) are near retirement age and if no appropriate health professionals are employed and educated in the regions, COSI implementation might be at risk.

[a] Before COSI, the Institute for Public Health of the Republic of Macedonia used measured data for children that were already processed and analyzed by the same custom-made nutritional software (which included the 2006 WHO growth standards *(48)* and the 2007 WHO growth references *(33)*) available in every Center for Public Health.

Fig. 22 contd

With raw data available, the Institute for Public Health of the Republic of Macedonia can perform different analyses using other variables of interest. Going forward, COSI procedures will be used to measure and collect data on the nutritional status of children outside the COSI age groups, on an annual basis.

[b] The COSI round 2 data collection in 2010 was performed in the winter and required the use of vehicles (e.g. jeeps) to reach schools in remote areas.

[c] Limited financial resources prevented the purchase of a separate set of measuring instruments for each public health regional office in the country. A delay in completing the national database was of minor importance compared to receiving data gathered with malfunctioning measuring instruments.

COSI is growing as an important and essential public health activity in the former Yugoslav Republic of Macedonia. With little additional costs, COSI is implemented through the National Annual Program of Public Health adopted by the Government. It provides continuous collaboration between the Institute for Public Health of the Republic of Macedonia as coordinator and the centres for public health that are responsible for data collection. The area of public health nutrition is continually improved by a national development process based on better collaboration and exchange of information. In addition, COSI intensifies the communication among health and educational authorities in relation to children's well-being.

Since its first implementation in 2010, COSI became the national nutrition and obesity monitoring system for schoolchildren aged 6–8 years, and its methodology is established as a national standard, even in the years between COSI collection rounds. Nationally obtained data allow for international comparisons of obesity among schoolchildren and could be used as a powerful tool to create child-oriented public health policies.

Beside its great importance and stated benefits, the COSI implementation process identified several weaknesses. The most important is a lack of human resources who are properly educated and trained to implement activities (fieldwork and processes to enter/process/communicate data). The public health system faces challenges in training and employing health professionals, particularly in some regions of the country, who can contribute to future COSI implementations.

The recommendation is to continue COSI in the former Yugoslav Republic of Macedonia and not let its implementation be compromised by the identified threats and weaknesses.

6. REGIONAL EVALUATION

A summary was made of the main points based on the SWOT analyses indicated by the 16 COSI countries. These key points are listed below along with some illustrative examples.

Strengths

Strong commitment of national teams

One of the strengths frequently mentioned refers to the strong commitment of the national COSI teams that were involved in data collection or in the coordination of COSI implementation. For instance, Bulgaria specifically mentioned the excellent collaboration observed between the National Center of Public Health and Analyses, which is the national coordination institution, and the 28 regional health inspectorates involved in data collection. The Czech Republic indicated the strong commitment shown by the paediatricians who collected the data, Italy referred to the excellent collaboration between the health sector and the school sector at all levels (ministries of health and education, regional workers, local health workers and teachers) and Portugal highlighted the strong commitment shown by the regional health centres that were responsible for data collection in the sampled schools in their respective region.

Cost-effective implementation

Another strength mentioned by more than one country was the realization of COSI implementation at minimal additional costs because it had been possible to integrate COSI within an existing monitoring system. For instance, COSI was integrated into the Flanders health registration system in Belgium, into the preventive check-ups by paediatricians in the Czech Republic, into the child health monitoring and preventive care service in primary schools in Malta and into the physical and motor development monitoring system in Slovenia. The cost-effectiveness of data collection could be further increased through the use of well-trained dieticians (Greece), through the use of trained nutritional graduates (Ireland) or public health students (Lithuania), through the use of existing human resources within the regional health centres (Portugal), through the use of physical education teachers (Slovenia) and through the use of school nurses (Hungary, Malta and Norway).

Weaknesses

Difficult to fulfill requirements

Commonly identified weaknesses were the COSI protocol requirements to use identical anthropometric equipment throughout a country (Latvia, Norway, Portugal and Slovenia) and the required calibration of the scales and stadiometers *(15,16)*. The required time frame of 4–10 weeks within which the children should be measured was noted as a challenge (Bulgaria and the Czech Republic). It has not yet been possible for Belgium to implement the mandatory questions from the school form.

Burden on schools

In some schools, other intervention programmes or surveys were conducted at the same time as COSI, limiting the willingness of schools to participate (Greece, Hungary, Lithuania, Slovenia and Sweden).

Reluctance of parents

Three out of eight countries that applied the voluntary family record form noted that parents did not want to answer some sensitive questions even though the confidentiality of answers was ensured, such as on income (Czech Republic) or on the type of house in which the family lives (Greece). Malta observed a general reluctance from parents in completing the family record form.

Insufficient financial and human resources

Insufficient financial and human resources were reported by Lithuania and The former Yugoslav Republic of Macedonia to perform COSI across the country and by Portugal at the national level in general and for data analysis and training in particular. Italy referred in some cases to insufficient human and logistic resources at local level because of difficulties accessing funds, and Slovenia mentioned the availability of insufficient human resources to communicate the COSI results to the general public as one of the weaknesses.

Opportunities

Source of policy and programme development

Countries reported using COSI data as a source to develop a nutrition action plan or programme (Italy, Portugal, Slovenia and The former Yugoslav Republic of Macedonia), a national health strategy (Latvia and Malta) or a national nutrition policy for childhood obesity (Greece); to improve current national policies (Bulgaria); or to provide a basis for programmes for the prevention and control of overweight in school-aged children (Czech Republic, Hungary and Lithuania) or for health promotion plans in health regions (Norway).

Official national data

COSI helps to keep childhood obesity as a high priority on the political agenda (Hungary, Portugal, Spain and Sweden). The COSI system can be established as a national monitoring system for childhood obesity (Greece, Portugal, Spain and The former Yugoslav Republic of Macedonia). COSI data are considered the official data on childhood prevalence of overweight and obesity in Hungary, Italy and Norway.

Threats

Insufficient financial resources

All countries except Belgium and Latvia specifically mentioned insufficient financial resources as one of the threats to secure continuous participation in future COSI data collection rounds. In addition, Italy and The former Yugoslav Republic of Macedonia reported that some of the health

professionals participating in COSI data collection are near retirement and will most likely not be replaced due to the current unstable financial situation.

Changes in governmental policy and priorities

Potential changes to governmental policy and priorities in public health and nutrition may pose uncertainty for the sustainability of the COSI implementation in Bulgaria. A possible reorganization of local health authorities could reduce their involvement in prevention and nutrition activities in Italy.

Change in parental consent policy

Latvia and Sweden listed a possible change in legislation or a change in opinion of ethical committees' decisions as possible threats. The change requires active (instead of passive) parental consent for data collection among schoolchildren and could subsequently reduce the parental consent rate.

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Country and role	Name	Institution[a]	Place
Belgium[b]			
Principal Investigators	Lien Braeckevelt (round 2), Heidi Cloots (round 2), Machteld Wauters (round 1)	Flemish Agency for Care and Health	Brussels
Bulgaria[c]			
Principal Investigator	Stefka Petrova	National Center of Public Health and Analyses	Sofia
National Coordinator	Vesselka Duleva	National Center of Public Health and Analyses	Sofia
Data Collectors	Krasimira Filatova, Ivanka Shkevova	Regional Health Inspectorate	Blagoevgrad
	Tsvete Koleva, Galina Kolibarova, Rumyana Todorova, Polina Zheleva		Burgas
	Vasil Kozhuharov, Neli Todorova		Dobrich
	Totka Koleva, Krasimira Simova		Gabrovo
	Mariana Choncheva, Ivan Todorov		Haskovo
	Valentin Kolev, Maria Pancheva		Kardjali
	Giulka Dzhabirova, Virginia Stoilova		Kustendil
	Temenuga Angelova, Polinka Sokolarska		Lovech
	Asia Filipova, Petia Kirilova		Montana
	Irina Atanasova, Nadia Paliiska		Pazardjik
	Marina Atanasova, Slaveia Garova, Anna Yordanova		Pernik
	Tsetan Dimitrov, Irena Penkova		Pleven
	Nikolay Argirov, Maria Galibarska, Ani Gaydadzhiiska		Plovdiv
	Violeta Avramova, Emilia Petrova		Razgrad
	Petko Ekov, Desislava Yovcheva		Ruse

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[b] The country participated in both COSI rounds. When a contributor was only involved in one round, the respective round is inserted in parenthesis after the name.
[c] The country and contributors only participated in round 1.

Annex 1 contd

Country and role	Name	Institution[a]	Place
Data Collectors	Elka Ivanova, Yovko Paspaldzhiev	Regional Health Inspectorate	Shumen
	Todorka Nikolova, Violeta Slavova		Silistra
	Velichka Karsheva, Silvia Stoyanova		Sliven
	Vesa Georgieva, Liliana Karagegova		Smolian
	Mariana Chavdarova, Irinka Haralanova, Kalina Ivanova, Svetlana Kiryakova, Valia Radeva		Sofia
	Anelia Badzhina, Tsvetelina Georgieva		Sofia Region
	Rositsa Nikolova, Veneta Stoeva		Stara Zagora
	Margarita Drumeva, Nina Nikolova, Olga Todorova		Targovishte
	Mirianka Atanasova, Veselina Bozhilova, Liudmila Poptomova, Julia Vitlianova		Varna
	Mariana Georgieva, Ralitsa Manafova, Svetlana Mominska		Veliko Tarnovo
	Liubov Kamenova, Marusia Nakova		Vidin
	Maria Dashova, Rositsa Petkova		Vratsa
	Veselina Boyarkina		Yambol
Head of Data Clerk Team	Galina Milkova	National Center of Public Health and Analyses (in collaboration with Sova Harris – an agency specialized in conducting surveys)	Sofia
Data Clerks	Daniela Bojilova, Zornitsa Duneva	National Center of Public Health and Analyses	Sofia
Technical Adviser	Emilia Tontcheva	WHO Country Office, Bulgaria	Sofia
Czech Republic[b]			
Principal Investigator	Marie Kunešová	Obesity Management Centre, Institute of Endocrinology	Prague
National Coordinators	Radka Braunerova (round 2)	Obesity Management Centre, Institute of Endocrinology	Prague
	Bohuslav Prochazka	Paediatric clinic	Kolin

Data Collectors	Vera Raisova	Obesity Management Centre, Institute of Endocrinology	Prague
	Jaroslava Poláková (round 1)	Paediatric clinic	Aš
	Jana Kepková		Beroun
	Zdena Adamová (round 1), Miroslava Doleželová (round 2), Kateøina Špiøíková (round 2), Jarmila Szturzová (round 2)		Brno
	Zdenka Lojdová (round 2)		Benátky nad Jizerou
	Miluše Sáblíková (round 2)		Bystøice pod Pernštýnem
	Rut Adamová		Èáslav
	Lenka Kavanová (round 2)		Èelákovice
	Vladimíra Bílá (round 2)		Èeská Tøebová
	Jitka Gregušová		Dolní Louèky
	Jana Schejbalová (round 2)		Domažlice
	Hana Volšíková		Habartov
	Sylva Tomeèková (round 2)		Havíøov
	Zdeòka Kuhn-Gaberová (round 2)		Hostinné
	Jaroslava Urbanová (round 2)		Hradec Králové
	Markéta Kubešová (round 2)		Hrochùv Týnec
	Miroslava Solaøíková		Hroznová Lhota
	Stanislava Fuòková		Jihlava
	Antonín Šauer (round 2)		Jílové u Prahy
	Daniela Verdánová		Jindøichúv Hradec
	Irena Bumbová (round 1)		Kamenné Žebrovice
	Jarmila Aronová, Zdena Rùžièková		Karlovy Vary
	Karina Grácová (round 2)		Karviná
	Eva Hájková, Vladimíra Karasová		Kladno

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[b] The country participated in both COSI rounds. When a contributor was only involved in one round, the respective round is inserted in parenthesis after the name.

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Country and role	Name	Institution[a]	Place
Data Collectors	Jiøí Mlèoch (round 2)	Paediatric clinic	Kolín
	Ctirad Kozderka		Kralovice
	Zdenìk Weiss (round 1)		Krchleby
	Bohuslav Procházka		Kutná Hora
	Jana Smejkalová		Ledeè nad Sázavou
	Šárka Èechová (round 2)		Lešná
	Olga Roškotová (round 1), Jiøina Zímová (round 1)		Litomìøice
	Renata Bulvasová (round 2)		Mariánské Láznì
	Milan Poláèek (round 2)		Mikulov
	Marie Bolková		Milevsko
	Marta Melmuková (round 2)		Mladá Boleslav
	Romana Balatková		Most
	Vladimír Rouèka		Nová Paka
	Ludmila Navrátilová		Nový Bydžov
	Alena Kyjonková		Odolená Voda
	Jiøina Dvoøáková (round 1)		Pardubice
	Jana Babánková, Jaroslava Chaloupková, Vìra Dvoøáková (round 2), Alena Hanzlová, Jana Hejhalová (round 2), Marta Jedlièková (round 2), Nadìje Koènarová, Gabriela Kubátová, Marie Mucková, Renáta Rùžková, Vlasta Schùtová, Marie Schwartzová, Jelena Strnadová (round 2), Jana Vávrová (round 2)		Prague
	Petra Èermáková (round 2), Jiøina Štrobachová		Pøíbram
	Zuzana Jirkù (round 2)		Radnice
	Marie Strejcová		Sedlèany
	Ludmila Fialová		Strakonice
	Vìra Hudeèková		Strážnice
	Eva Hejlová		Šumperk
	Eva Matoušková (round 1)		Telè

Data Collectors	Helena Letáková Parvine Gricová, Dagmar Honová Jana Kulhánková Miroslav Schubert (round 2) Jana Kupková (round 2) Božena Slámová (round 2) Hana Nacházelová	Paediatric clinic	Turnov Uherské Hradištì Ústí nad Labem Vrbno pod Pradìdem Vrchlabí Žiár nad Sázavou Zruè nad Sázavou
Data Managers	Martin Hill Jana Vignerova	Institute of Endocrinology National Institute of Public Health	Prague
Data Clerks	Veronika Markova, Barbora Prochazkova Tereza Guttenbergova (round 2)	Faculty of Science, Charles University Obesity Management Centre, Institute of Endocrinology	Prague
Consultant	Jana Parizkova	Obesity Management Centre, Institute of Endocrinology	Prague
Technical Adviser	Alena Steflova	WHO Country Office, Czech Republic	Prague
Greece[b]			
Principal Investigator	Maria Hassapidou	Alexander Technological Educational Institute of Thessaloniki	Thessaloniki
Regional Coordinators	Anet Abrahamian, Ioannis Kaklamanos, Efthimios Kapantais, Themistoklis Tzotzas	Hellenic Medical Association for Obesity	Athens
Supervisor	Sofia Mansola	Hellenic Medical Association for Obesity	Athens
Data Collectors	Nansi Dimitriou, Athanasia Papalabrou, Tzina Tsihlia Eleni Nikolaou, Eleni Pennia Dimitra Leivaditi Konstantina Stavropoulou Antigoni Georgiou Sotiria Andreou, Kali Danavara, Georgia Dania	Private dietician	Ahaias Aitoloakarnanias Argolidas Arkadias Artas Athens

[a] The name of the institution at the time that the COSI round took place is given.
[b] The country and contributors only participated in round 2.

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Country and role	Name	Institution[a]	Place
Data Collectors	Lenia Fragkoskou, Ioannis Kalfas, Kostalenia Kallianioti, Sophia Kalliarda, Maria Karvela, Labros Kontogiannis, Emmanouela Leounaki, Evanthia Leounaki, Natassa Margelli, Mirto-Maria Milona, Anastasia Rodarou, Dorina Sialvera, Dimitra Sitzani, Sissi Tsouverlakidou, Korina Voga, Sophia Vroulou, Maria Ziakou	Private dietician	Athens
	Christina Adamopoulou, Stamatina Antoniou, Aggeliki Asimakopoulou, Katerina Giannoulaki, Efi Grigoriou, Katerina Karakike, Katerina Pelka		Attiki
	Giouli Fragkiadoulaki, Christina Makratzaki, Georgia Petraki, Maria Petraki, Eirini Theodoraki, Giorgos Vasileiou		Crete
	Emmanouil Moraris		Dodekanisa
	Maria Papakosta		Dramas
	Athanasios Makris		Evias
	Neli Milona		Fliotida
	Elena Zoumpou		Frorinas
	Anna Migdani		Halkidikis
	Giorgos Politis		Hios
	Panagiota Andiopoulou		Ilias
	Dafni Amprikidou		Imathias
	Christina Papazoglou		Ioanninon
	Konnos Petropoulos		Karditsas
	Thomai Kogiopoulou		Kastorias
	Athina Denikarou, Dimitrios Louloudis		Kavalas
	Tina Vlahou		Kerkiras
	Maria Karvounari		Kilkis
	Dimitra Christou		Korinthias
	Panagiota Mpoutsali		Lakonias

Data Collectors	Anna Garifallopoulou, Giannis Migdanis	Private dietician	Larisas
	Eustratia Kouniarelli		Lesvou
	Christou Pashou Eudoxia		Magnisias
	Panagiotis Alexopoulos		Messinis
	Theodoros Bones		Naxos
	Efi Argiri, Despina Marsellou, Marietta Mihail, Maria Pelagidou		Peiraia
	Anastasia Foudoukidou		Pellas
	Athina Roudou		Pierias
	Sophia Masoura		Prevezis
	Sefasti Metaxa		Rodopis
	Flora Karnava		Samou
	Stilianos Siopis		Serron
	Christina Karampina		Thesprotias
	Eleni Fotiadou, Reveka Moutsoukidou, Konstantina Papa, Konstantina Papadaki, Despina Papanikolaou, Vasilis Tsironis		Thessaloniki
	Giorgos Haralampidis		Tinos
	Maria Gravani		Trikalon
	Violeta Gkanasou		Viotias
	Kiriaki Papalexandrinou		Xanthis
	Lida Giatra		Zakinthou
Data Manager	Eirini Andreou	Hellenic Medical Association for Obesity	Athens
Data Clerks	Efi Daskalou, Eutuxia Kotronia, Alexandra Koulouri, Konstantina Papadimitriou, Elisavet Parlapani, Nikos Rodopaios, Danai Rossiou, Ioanna Sakellari	Alexander Technological Educational Institute of Thessaloniki	Thessaloniki
Data Analyst	George Vlahavas	Alexander Technological Educational Institute of Thessaloniki	Thessaloniki

[a] The name of the institution at the time that the COSI round took place is given.

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Country and role	Name	Institution[a]	Place
Hungary[b]			
Principal Investigator	Viktória Kovács	National Institute for Food and Nutrition Science	Budapest
Supervisor	Éva Martos	National Institute for Food and Nutrition Science	Budapest
National Coordinators	Katalin Csősz, Jolán Kubányi Tímea Ráczkevy	Chamber of Hungarian Health Care Professionals National Institute for Food and Nutrition Science	Budapest
County Coordinators	Klementina Répásné Fodor Katalin Csősz Éva Hősné Anda Klára Kokas Valéria Tóthné Erdős Ildikó Hőgye Beáta Pátkai Krisztina Póka Viktória Szebellédi Judit Ágfalvi Bernadett Piriczki Henrietta Gőgös Ildikó Sandó Balázsné Vaderna Erika Majorné Molnár Anikó Virágh Tímea Garamváriné Pezenhoffer Béláné Bertók Katalin Tuifelné Véber Andrea Horváthné Balogh	School Nurse Service	Bátonyterenye Budapest Csanádpalota Győr Hajdúböszörmény Kamut Kaposvár Karácsond Kecskemét Kisújszállás Miskolc Pápa Pécs Réde Szabadbattyán Szeged Szombathely Teskánd Vecsés Zomba
Data Manager	Márta Bakacs	National Institute for Food and Nutrition Science	Budapest
Data Clerks	Katalin Dánffyné Ripper, Mónika Lázin	National Institute for Food and Nutrition Science	Budapest

Administrative Staff	Ildikó Kenyeresné Domokos, Pálné Kiss, Mariann Papp	National Institute for Food and Nutrition Science	Budapest
Technical Adviser	Zsofia Pusztai	WHO Country Office, Hungary	Budapest
Ireland[c]			
Principal Investigators	Ursula O'Dwyer (round 1) Nazih Eldin (round 2) Cecily Kelleher	Department of Health Health Promotion Department, Health Service Executive Dublin North East National Nutrition Surveillance Centre, School of Public Health, Physiotherapy and Population Science, University College Dublin	Dublin Navan Dublin
Project Manager	Patricia Heavey	National Nutrition Surveillance Centre, School of Public Health, Physiotherapy and Population Science, University College Dublin	Dublin
Data Collectors	Aimi Baker (round 1), Louise Basquille (round 1), Siobhan Boyle (round 2), Orla Brady (round 1), Melissa Byrne (round 1), Maria Carr (round 1), Lorraine Carrabine (round 2), Mona Connolly (round 1), Grainne Corrigan (round 1), Cathy Cronin, Karen Cronin (round 1), Elaine Cunniffe (round 1), Gillian Dawson (round 2), Sinead Duffy (round 2), Sinead Duignan (round 2), Thais Ferguson (round 1), Michelle Gray (round 1), Sinead Hopkins (round 1). Ingrid Hutchinson (round 1), Heather Jordan (round 1), Soniya Kaluskar (round 1), Clare Kelly (round 2), Jean Kennedy (round 1), Laura Kennedy (round 2), Louise Mahony (round 2), Elaine McCarthy (round 2), Aine McConnon (round 1), Orla McMahon (round 2), Fiona McVeigh (round 1), Amy Mullee (round 2), Sinead O'Brien (round 2)	National Nutrition Surveillance Centre, School of Public Health, Physiotherapy and Population Science, University College Dublin	Dublin

[a] The name of the institution at the time that the COSI round took place is given.
[b] The country and contributors only participated in round 2.
[c] The country participated in both COSI rounds. When a contributor was only involved in one round, the respective round is inserted in parenthesis after the name.

Annex 1 contd

Country and role	Name	Institution[a]	Place
Data Collectors	Aine O'Connor (round 1), Katrina O'Hagan (round 1), Mary Clare O'Hara (round 1), Gillian O'Loughlin (round 1), Heidi O'Neill (round 1), Tonya O'Neill (round 2), Sarah Jane O'Sullivan (round 1), Darina Quigley (round 1), Eilis Sutton (round 2), Nicola Taylor (round 1), Claire Toher (round 1), Nuala Tully (round 1), Olive Tully (round 1)	National Nutrition Surveillance Centre, School of Public Health, Physiotherapy and Population Science, University College Dublin	Dublin
Data Manager	Deidre O'Mahony (round 1)	National Nutrition Surveillance Centre, School of Public Health, Physiotherapy and Population Science, University College Dublin	Dublin
Data Clerks	Adeline Gruel (round 2), Patricia Heavey (round 1), Orla McMahon (round 2), Michelle O'Brien (round 2)	National Nutrition Surveillance Centre, School of Public Health, Physiotherapy and Population Science, University College Dublin	Dublin
Statistical Adviser	Leslie Daly	School of Public Health, Physiotherapy and Population Science, University College Dublin	Dublin
Research Adviser	Celine Murrin	National Nutrition Surveillance Centre, School of Public Health, Physiotherapy and Population Science, University College Dublin	Dublin
Chairperson, Steering Group Committee	Catherine Hayes (round 1)	Departments of Public Health, Health Service Executive	Dublin
Steering Group Committee Members	Marita Glacken (round 1)	Departments of Public Health, Health Service Executive	Galway
	Maria Lordan-Dunphy (round 1)	Health Promotion Department, Health Service Executive	Dublin
	Adrienne Lynam	Health Promotion Department, Health Service Executive	Galway

Steering Group Committee Members	Jean Kilroe (round 1), Aileen McGloin (round 1)	National Nutrition Surveillance Centre, School of Public Health, Physiotherapy and Population Science, University College Dublin	Dublin
	Regina Reynolds (round 1)	Public Health Nursing, Health Service Executive	
Italy[b]			
Principal Investigators and National Coordinators	Angela Spinelli	National Institute of Health	Rome
	Daniela Galeone	Ministry of Health	
National Coordinators	Maria Teresa Silani, Silvana Teti	Ministry of Education, University and Research	Rome
	Paolo D'Argenio (round 1), Maria Teresa Menzano (round 2)	Ministry of Health	
	Giovanni Baglio, Nancy Binkin (round 1), Chiara Cattaneo, Gabriele Fontana (round 1), Anna Lamberti, Paola Nardone (round 2), Alberto Perra (round 1)	National Institute of Health	
National Coordinators, Data Managers and Data Analysts	Mauro Bucciarelli, Marta Buoncristiano (round 2)	National Institute of Health	Rome
National Coordinators and Data Clerks	Silvia Andreozzi (round 2), Marina Pediconi (round 2), Sonia Rubimarca (round 2)	National Institute of Health	Rome
Regional Coordinators	Antonio Ciglia, Manuela Di Giacomo	Abruzzo Regional Office	Pescara
	Giuseppina Ammirati (round 2), Gabriella Cauzillo, Gerardina Sorrentino	Basilicata Regional Office	Potenza
	Caterina Azzarito (round 2), Giuseppina Fersini (round 1), Marina La Rocca, Giuseppe Perri	Calabria Regional Office	Catanzaro
	Giuseppina De Lorenzo (round 1), Gianfranco Mazzarella (round 2), Renato Pizzuti (round 2)	Campania Regional Office	Naples

[a] The name of the institution at the time that the COSI round took place is given.
[b] The country participated in both COSI rounds. When a contributor was only involved in one round, the respective round is inserted in parenthesis after the name.

Annex 1 contd

Country and role	Name	Institution[a]	Place
Regional Coordinators	Paola Angelini, Emanuela Di Martino, Marina Fridel (round 2)	Emilia Romagna Regional Office	Bologna
	Claudia Carletti, Adriano Cattaneo (round 2), Rossana Rincorosi (round 1)	Friuli Venezia Giulia Regional Office	Trieste
	Giulia Cairella, Esmeralda Castronuovo	Lazio Regional Office	Rome
	Paola Oreste (round 1), Federica Pascali, Sergio Schiaffino (round 2)	Liguria Regional Office	Genoa
	Elisabetta Benedetti (round 2), Simona De Introna (round 2), Giordano Giostra, Giuliano Tagliavento (round 1)	Marche Regional Office	Ancona
	Concetta Di Nucci (round 2), Teresa Manfredi Selvaggi, Ornella Valentini (round 2)	Molise Regional Office	Campobasso
	Marcello Caputo, Paolo Ferrari (round 2)	Piemonte Regional Office	Turin
	Savino Anelli, Vincenzo Pomo (round 1), Giovanna Rosa (round 2), Elisabetta Viesti (round 2)	Puglia Regional Office	Bari
	Pina Arras (round 1), Grazia Cattina (round 1), Rita Masala (round 2), Serena Meloni (round 2), Maria Letizia Senis (round 2)	Sardegna Regional Office	Cagliari
	Achille Cernigliaro, Simonetta Rizzo	Sicilia Regional Office	Palermo
	Mariano Giacchi, Giacomo Lazzeri, Valentina Pilato (round 2)	Toscana Regional Office	Florence
	Marina Brinchi (round 2), Marco Cristofori, Maria Donata Giaimo	Umbria Regional Office	Perugia
	Anna Maria Covarino, Giovanni D'Alessandro (round 1)	Val D'Aosta Regional Office	Aosta
	Riccardo Galesso, Mary Elizabeth Tamang (round 1)	Veneto Regional Office	Venice
	Antonio Fanolla, Lucio Lucchin, Sabine Weiss	Autonomous Province Bolzano, Regional Office	Bolzano
	Silvano Piffer	Autonomous Province Trento, Regional Office	Trento
	Anna Rita Silvestri	Local Health Centre (*Azienda Sanitaria Locale*) of Milan, Lombardia Region	Milan

Technical Committee Members	Margherita Caroli	Local Health Centre (*Azienda Sanitaria Locale*) of Brindisi	Brindisi
	Amalia De Luca	Provincial Health Centre (*Azienda Sanitaria Provinciale*) Cosenza	Cosenza
	Lorenzo Spizzichino	Ministry of Health	Rome
	Barbara De Mei (round 2)	National Institute of Health	
	Laura Censi, Dina D'Addesa, Amleto D'Amicis (round 1)	National Institute of Research for Food and Nutrition	
	Franco Cavallo	University of Turin	Turin
Latvia[b]			
Principal Investigators	Iveta Pudule (round 2) Inta Mara Rubana (round 1)	Centre of Health Economics Public Health Agency	Riga
National Coordinator	Biruta Velika	Centre of Health Economics (round 2), Public Health Agency (round 1)	Riga
Supervisors	Daiga Grinberga, Iveta Pudule (round 1), Nikola Tilgale (round 1)	Centre of Health Economics (round 2), Public Health Agency (round 1)	Riga
Data Manager	Marcis Trapencieris	Institute of Sociological Research (round 2), Public Health Agency (round 1)	Riga
Technical Adviser	Aiga Rurane	WHO Country Office, Latvia	Riga
Lithuania[b]			
Principal Investigator and Data Collector[c]	Aušra Petrauskienė	Institute for Biomedical Research, Kaunas University of Medicine	Kaunas (city) Kaunas District, Siauliai District, Telsiai District
Supervisor	Janina Petkevičienė	Institute for Biomedical Research, Kaunas University of Medicine	Kaunas (city)

[a] The name of the institution at the time that the COSI round took place is given.
[b] The country participated in both COSI rounds. When a contributor was only involved in one round, the respective round is inserted in parenthesis after the name.
[c] The column 'place' indicates the area where the Lithuanian data collectors collected data.

Annex 1 contd

Country and role	Name	Institution[a]	Place
Data Collectors[b]	Justina Ajauskaite (round 2)	Birzai Region Public Health Bureau	Birzai
	Lina Martinaitiene (round 2)	Joniskis Public Health Bureau	Joniskis
	Vidita Ražaniene (round 2)	Kaisiadorys Public Health Bureau	Kaisiadorys Region
	Paulius Gradeckas (round 2)	Kaunas University of Medicine	Kaisiadorys (city)
	Edita Albavicute		Kaunas (city), Kaunas District, Alytus District
	Jovita Stoskute (round 1), Simona Tamuleviciene (round 2)		Kaunas District
	Sarune Vainauskaite (round 1)		Klaipeda District
	Reda Alesiute (round 1), Mantas Cesna (round 1), Birute Stalioraitiene (round 2)		Marijampole District
	Sandra Buzeviciute (round 1)		Panevezys District
	Vaida Malinauskaite (round 1)		Siauliai District
	Rima Kairyte (round 1), Toma Mateviciute (round 2)		Taurage District
	Rasa Matuzaite (round 1)		Telsiai District
	Inga Marinciute (round 2)		Utena District
	Olita Rusickaite (round 2)		Vilnius (city)
	Ivita Pinkule (round 1), Evelina Railaite		Vilnius (city and district)
	Vaida Svetuleviciute (round 2)		Vilnius District
	Edita Zakarauskaite (round 2)	Kelme Public Health Bureau	Kelme
	Neringa Tarvydiene (round 2)	Klaipeda Region Public Health Bureau	Klaipeda Region
	Laima Mieziene (round 2)	Pakruojis Public Health Bureau	Pakruojis
	Jordana Javtokaite (round 2)	Panevezys Public Health Bureau	Panevezys (city)
	Andrius Busila (round 2)		Panevezys Region
	Renata Nevulyte (round 2)	Pasvalys Region Public Health Bureau	Pasvalys
	Ausra Ciudariene (round 2)	Radviliskis Public Health Bureau	Radviliskis
	Tadas Stakėnas (round 2)	Rokiskis Public Health Bureau	Rokiskis
	Jovita Atkočaitiene (round 2)	Siauliai Public Health Bureau	Siauliai

Data Collectors[b]	Loreta Petkuviene (round 2) Daiva Vinogradova (round 2) Alma Gaidiene (round 2) Irma Lukminiene (round 2) Roma Bartkeviciute (round 1)	Silale Public Health Bureau Svencionys Public Health Bureau Utena Public Health Bureau Varena Public Health Bureau Vilnius National Centre of Nutrition	Silale Svencionys Utena Varena Vilnius (city and district)
Data Managers	Rima Kregzdyte, Edita Sakyte, Apolinaras Zaborskis	Kaunas University of Medicine	Kaunas (city)
Technical Adviser	Robertas Petkevicius	WHO Country Office, Lithuania	Vilnius (city)
Malta[c]			
Principal Investigator and National Coordinator	Victoria Farrugia Sant'Angelo	Primary Health Care Department	Floriana
Administrative Assistant	Antoinette Farrugia	Primary Health Care Department	Floriana
Data Collectors	Dominic Agius, Josephine Agius, Christine Baluci, Pauline Bonnici, Joyce Borg, Carmen Brancaleone, Josephine Farrugia, Astrid Fearne, Josephine Gambin, Rita Hili (round 2), Catherine Micallef, Dorothy Mifsud, Antonella Sammut, Marvic Sammut (round 1), Christopher Scerri, Elizabeth Zammit Lupi	School Health Service	Throughout the country
Data Clerks	Stephanie Brincat Kent (round 1), Roberta Falzon (round 2), Sandra Mizzi	Primary Health Care Department	Floriana
Norway[c]			
Principal Investigator and National Coordinator	Ragnhild Hovengen	Department of Health Statistics, Norwegian Institute of Public Health	Oslo
Data Collectors	Hilde Aandal, Grace Aarøen, Eva Andreassen, Hilde Armo, Anne Katrine Bachmann, Eli Kristin Bakkejord	School Health Service	Throughout the country

[a] The name of the institution at the time that the COSI round took place is given.
[b] The column 'place' indicates the area where the Lithuanian data collectors collected data.
[c] The country participated in both COSI rounds. When a contributor was only involved in one round, the respective round is inserted in parenthesis after the name.

Annex 1 contd

Country and role	Name	Institution[a]	Place
Data Collectors	Johanne Silseth Bakken, Britt Birkeland, Hilde Bjerkreim, Liv Aartun Børnick, Marthe Brommeland, Berit Brusdal Havre, Margaret Bull-Tornøe, Ellen G Buseth, Inger Dahl, Marita Monsås Dahle, Anne Britt Dale, Gunnveig Eidem Dvergsnes, Synnøve Eidsaa (round 2), Gøril Eik, Liv-Åse Eikseth, Elin Rita Enæs, Magnhild Engebrethsen, Veronica Eriksen, Vivi Eriksson, Anne Liv Evjen, Kari Marte Føinum, Nora Fossåskaret, Lisa Friborg (round 2), Bodil Glendrange, Marit Aarsland Grødem, Hilde Ø Haagensen, Undis Haagensen, Karen Haagensen Haga, Margrethe Haldorsen, Hanne Hammond-Moe, Marit Handeland, Sonja Haslerud, Marianne Elton Hauge (round 2), Annamaria Havros, Linn-Heidi Helgesen, Liv Karin Helland, Linda Henriksen, Tordis Gabrielsen Hoel, Marit Kleven Holmeide, Inger Elisbeth Holmelin, Anette Moxness Horn, Sølvi Qvale Hovland, Sigrun Idsal, Ann-Eva Isaksen, Unni Jacobsen, Anita Johansen, Kristin Kinserdal, Kari Kjellnø, Nina Kleiven, Rigmor Knutsen, Anne Korsvold (round 1), Kjersti Marie Kristiansen, Kjellaug Kvammen, Tuija Helena Lauri, Kjellaug Lemstad Lea, Gunnlaug Lekve, Eva Lindø, Gunhild Båtnes Lislevand, Sølvi Ljones, Torill Lohne, Eva Måøy, Sandra Tveite Medic, Bente Lervold Melås (round 2), Ann Catrin Melstveit, Anita Mørk, Ragnhild Næss, Berit Nilsen, Bergliot Nordmo (round 1), Cecilie Nordvik, Mariann Nordvik, May-Eva Norland, Aid Bente Normann (round 2), Astrid Nummedal	School Health Service	Throughout the country

Data Collectors	Anne Marit Orseth, Siri Orvall, Anne Karine Østerud, Guri Østhassel, Margit Holm Pedersen, Lisbeth Reindal (round 1), Anne Mette Røilid Vollan, Gro Sjøblom Roppestad, Vibeke Rosland, Marit Røstad, Verna Bertheussen Rothenpieler (round 1), Inger Runnestø, Maria Sand, Tone Sandaaker, Svanhild Lien Sandnes (round 1), May Hilde Sataslåtten, Magnhild Siqveland, Sylvi Sjøholt, Inger Skaar, Ingvild Lye Skretting, Kari Soleim, Wenche Solhaug, Gunn Heidi Steine, May-Brit Stensnes, Ann Helen Stensletten, Bjørg A. Stokland, Else Live Thue Stokstad, Oddrun Frantsen Strand, Hilde Strøm, Marita Strømnes (round 1), Hanne Gro Støldal, Hilde Sundsby, Solveig Terøy, Magnhild Thomsen, Kamilla Torrissen, Ingvill Mork Trondal, Norunn Tveikra, Inga Ulvevadet, Arna Undheim, Mona Valdersnes (round 1), Elin Vasseng, Cathrine Vasstrand, Heidi Engdal Vean, Sølvi Vindenes, Bodil Walle, Elin Metveit Wallin, Åse B Welde, Birgit Wold, Mari Woldseth	School Health Service	Throughout the country
Data Manager and Data Analyst	Jørgen Meisfjord	Norwegian Institute of Public Health	Oslo
Data Manager and Data Clerk	Arve Sjølingstad	Norwegian Institute of Public Health	Oslo
Data Analyst	Bjørn Heine Strand	Norwegian Institute of Public Health	Oslo
Data Clerk	Anna Biehl	Norwegian Institute of Public Health	Oslo
Technical Adviser	Else-Karin Groholt	Department of Health Statistics, Norwegian Institute of Public Health	Oslo

[a] The name of the institution at the time that the COSI round took place is given.

Annex 1 contd

Country and role	Name	Institution[a]	Place
Portugal[b]			
Principal Investigator	Ana Rito	National Institute of Health Doutor Ricardo Jorge	Lisbon
National Coordinators	João Breda (round 1), Pedro Graça (round 2)	Directorate-General of Health	Lisbon
Regional Coordinators	Rita Brotas Carvalho, Delia Sousa	Regional Directorate of Health – Açores	Angra do Heroísmo
	Maria Rosa Espanca	Regional Directorate of Health – Alentejo	Évora
	Teresa Sofia Sancho	Regional Directorate of Health – Algarve	Faro
	Zélia Cerqueira	Regional Directorate of Health – Centre	Coimbra
	Elsa Feliciano	Regional Directorate of Health – Lisbon and Tagus Valley	Lisbon
	Carmo Faria	Regional Directorate of Health – Madeira	Funchal
	Débora Claudio (round 1), Teresa Rodrigues (round 2)	Regional Directorate of Health – North	Porto
Regional Supervisors	Silvia Cunha, Hugo Lopes (round 2)	Regional Directorate of Health – North	Porto
Data Managers and Data Analysts	Maria Ana Carvalho, Carlos Ramos	University Atlântica, Research and Development Centre for Health and Nutrition	Oeiras
Data Analyst	Eleonora Paixão	National Institute of Health Doutor Ricardo Jorge	Lisbon
National Education Data Manager	Rui Lima	Directorate-General of Education	Lisbon
Regional Data Reviewer	Claudia Borralho (round 2)	Baixo Alentejo Local Health Unit	Beja
Slovenia[b]			
Principal Investigator	Gregor Starc	Faculty of Sport, University of Ljubljana	Ljubljana
National Coordinator	Janko Strel	Faculty of Sport, University of Ljubljana	Ljubljana
Data Analysts	Gregor Jurak, Marjeta Kovač	Faculty of Sport, University of Ljubljana	Ljubljana
Technical Adviser	Marijan Ivanusa	WHO Country Office, Slovenia	Ljubljana

Spain[c]			
Principal Investigator	Napoleón Pérez Farinós	Spanish Agency for Food Safety and Nutrition	Madrid
Co-investigators	Rosa Mª Ortega Anta, Ana Mª López Sobaler	Faculty of Pharmacy, Complutense University of Madrid	Madrid
	Teresa Robledo de Dios, Estefanía Labrado Mendo, Mª Ángeles Dal Re Saavedra, Carmen Villar Villalba	Spanish Agency for Food Safety and Nutrition	
Sweden[d]			
Principal Investigator and Data Collector	Agneta Sjöberg	Department of Food and Nutrition, and Sport Science, University of Gothenburg	Gothenburg
Principal Investigator	Agneta Yngve	Department of Biosciences and Nutrition, Karolinska Institute	Stockholm
Co-investigator	Lauren Lissner	Department of Public Health and Community Medicine, Sahlgrenska Academy, University of Gothenburg	Gothenburg
Data Collectors and Data Clerks	Emil Häger, Lotta Moraeus, Annika Olsson	Department of Public Health and Community Medicine, Sahlgrenska Academy, University of Gothenburg	Gothenburg
Data Collectors	Camilla Bredberg, Elisabeth Gramatkovski, Brita Palsenius	Department of Public Health and Community Medicine, Sahlgrenska Academy, University of Gothenburg	Gothenburg
	Harneet Ahluwalia, Karolina Biel, Mimi Danielsson, Linda Jonsson, Nina Julius, Marie-Christine Kauffmann, Josefine Lindqvist, Petter Norwalder, Josefin Nylund, Moe Nyo Thet, Annalena Petersen, Doris Rittenschober, Anna Stadig, Annika Tängmark	Department of Biosciences and Nutrition, Karolinska Institute	Stockholm

[a] The name of the institution at the time that the COSI round took place is given.
[b] The country participated in both COSI rounds. When a contributor was only involved in one round, the respective round is inserted in parenthesis after the name.
[c] The country and contributors only participated in round 2.
[d] The country and contributors only participated in round 1.

Annex 1 contd

Country and role	Name	Institution[a]	Place
Data Clerks	Usama Al-Ansari, Eric Poortvliet	Department of Biosciences and Nutrition, Karolinska Institute	Stockholm
	Niklas Nordlander	Department of Public Health and Community Medicine, Sahlgrenska Academy, University of Gothenburg	Gothenburg
The former Yugoslav Republic of Macedonia[b]			
Principal Investigator	Igor Spiroski	Institute for Public Health of the Republic of Macedonia	Skopje
National Coordinator	Vladimir Kendrovski	Institute for Public Health of the Republic of Macedonia	Skopje
Data Collectors	Emilija Bogoevska, Fani Jakamozie, Sonja Spirovska	Center for Public Health	Bitola
	Nadica Acovska, Olga Pendevska		Kocani
	Svetlana Pesevska		Kumanovo
	Mira Mitreska, Lidija Simonoska		Ohrid
	Zora Filiposka		Prilep
	Mirjana Srbinovska		Skopje
	Marijan Josifovski		Stip
	Nake Tufekciev		Strumica
	Ivanka Naumceska, the late Azize Veliu		Tetovo
	Nikolina Krsteva, Marija Penova, Snezana Petrova, Trajce Rizov, Ivanka Todorova		Veles
Data Manager	Zlatanka Dimitrovska	Institute for Public Health of the Republic of Macedonia	Skopje
Technical Adviser	Marija Kisman	WHO Country Office, the former Yugoslav Republic of Macedonia	Skopje

[a] The name of the institution at the time that the COSI round took place is given.
[b] The country and contributors only participated in round 2.

ANNEX 2. NATIONAL COSI PUBLICATIONS

Bulgaria

Journal article

Petrova S, Duleva V. Nutritional status of Bulgarian 1-st grade schoolchildren – WHO childhood obesity surveillance initiative in Bulgaria. *Annals of Nutrition & Metabolism*, 2011, 58(Suppl. 3):286–287.

Czech Republic

National reports or books

Kunešová M. Vyšetření v obezitologii [Examination in obesity]. In: Hainer V et al. *Základy klinické obezitologie - 2., přepracované a doplněné vydání [Essentials of clinical obesity, 2nd ed.]*. Prague, Grada Publishing, 2011:163–180.

Kunešová M. *Monitorování dětské obezity [Monitoring childhood obesity]*. Final report on the project supported by the Internal Grant Agency of the Ministry of Health, NS 9832-4/2008. Prague, Institute of Endocrinology, 2012.

Kunešová M, Müllerová D, Hainer V. Epidemiologie a zdravotní rizika obezity [Epidemiology and health risks of obesity]. In: Hainer V et al. *Základy klinické obezitologie - 2., přepracované a doplněné vydání Essentials of clinical obesity, 2nd ed.]*. Prague, Grada Publishing, 2011:15–34.

Journal articles

Braunerová R et al. Současný stav stravování a pohybové aktivity ve vztahu k obezitě u sedmiletých dětí. Studie WHO [Relation between dietary and physical activity patterns and obesity in seven-year-old children – current situation. WHO study]. *Časopis lékařů českych [Journal of Czech Physicians]*, 2010, 149(11):533–536.

Kunešová M et al. Long-term changes in prevalence of overweight and obesity in Czech 7-year-old children: evaluation of different cut-off criteria of childhood obesity. *Obesity Reviews*, 2011, 12(7):483–491.

Dissertation or thesis

Guttenbergerová T. *Sledování antropometrických charakteristik u 7-letých dětí v závislosti na faktorech zevního prostředí (rodina, škola). Projekt WHO: Monitorování dětské obezity [Monitoring of anthropometric characteristics in 7-year children. Relation to family and school environment. WHO project: monitoring of childhood obesity]* [thesis]. Prague, Charles University, Faculty of Science, 2012.

Greece

National report or book

Hassapidou M. *Η παιδική παχυσαρκία στην Ελλάδα: αποτελέσματα του προγράμματος COSI, 2010 [Childhood obesity in Greece: project results COSI, 2010]*. Thessaloniki, Alexander Technological Educational Institute of Thessaloniki, 2012.

Hungary

National report or book

Martos É. A fizikai aktivitás szerepe az elhízás megelőzésében gyermek- és felnőttkorban [The role of

physical activity in prevention of obesity in childhood and in adulthood]. In: Szőts G, ed. *A fittség mértéke mint a megbetegedések rizikóját befolyásoló tényező [Fitness as preventive factor in different diseases]*. Budapest, Akadémiai Kiadó, 2012:96–110.

Journal article

Martos É et al. Táplálkozási prioritások népegészségügyi jelentősége [Nutritional priorities of public health]. *Népegészségügy [Public Health]*, 2013, 91(2):101–111.

Ireland

National report or book

Heavey P et al. *Childhood Obesity Surveillance Initiative in Ireland. Main report*. Dublin, Health Service Executive, Department of Health and Children, 2009.

Journal articles

Heavey P. Waist circumference combined with BMI; a better predictor of childhood obesity? ROI data for 6609 children from the WHO surveillance initiative. *European Heart Journal*, 2012, 33(Suppl. 1):295–296.

Heavey PM et al. Parents' attitudes and acceptability of anthropometric measurement of Irish school children. Proceedings of the Nutrition Society, 2013, 72 (OCE3):E144.

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Hardie M. *Early Childhood influences and obesity: Results from WHO database on 7- and 9-year-old school going children* [unpublished thesis]. Dublin, University College Dublin, 2012.

Jikeme O. *Early Childhood influences and obesity: Results from WHO database on 7- and 9-year-old school going children* [unpublished thesis]. Dublin, University College Dublin, 2012.

O'Flynn A. *Early Childhood influences and obesity: Results from WHO database on 7- and 9-year-old school going children* [unpublished thesis]. Dublin, University College Dublin, 2012.

Italy

National reports or books

Cairella G et al. L'epidemiologia dell'obesità e del sovrappeso nel bambino e nell'adolescente [Epidemiology of obesity and overweight in children and adolescents]. In: Gentile MG, ed. *Nutrizione e salute dall'infanzia alla quarta età [Nutrition and health from infancy to old age]*. Fidenza, Mattioli 1885, 2010:11–24.

Spinelli A et al. *OKkio alla SALUTE: promozione della salute e della crescita sana nei bambini della scuola primaria [OKkio alla SALUTE: health promotion and healthy growth in primary-school children]*. In: Ricciardi W, Murianni L, eds. Rapporto Osservasalute 2008 [Health Watch Report 2008]. Milan, Prex, 2008:80–82.

Spinelli A et al. Sovrappeso e obesità nei bambini [Overweight and obesity in children]. In: Ricciardi W, Murianni L, eds. *Rapporto Osservasalute 2009 [Health Watch Report 2009]*. Milan, Prex, 2009:74–76.

Spinelli A et al. Sovrappeso ed obesità nei bambini [Overweight and obesity in children]. In: Ricciardi W, Murianni L, eds. *Rapporto Osservasalute 2010 [Health Watch Report 2010]*. Milan, Prex, 2010:85–87.

Spinelli A et al. Obesità infantile: un problema nazionale [Childhood obesity: a national problem]. In: Mele A, Marzolini A, Caserta C, eds. *Approccio interdisciplinare al fenomeno dell'obesità: un disagio dell'Occidente.*

Rapporti ISTISAN 11/42 [Interdisciplinary approach to the obesity: a western world malaise. National Institute of Health Report 11/42]. Rome, National Institute of Health, 2011:23–35 (http://www.iss.it/binary/publ/cont/undici42web.pdf, accessed 3 July 2014).

Spinelli A et al. *Sistema di sorveglianza OKkio alla SALUTE: risultati 2010. Rapporti ISTISAN 12/14 [The Surveillance system OKkio alla SALUTE: results 2010. National Institute of Health Report 12/14]*. Rome, National Institute of Health, 2012 (http://www.iss.it/binary/publ/cont/dodici14web.pdf, accessed 3 July 2014).

Spinelli A et al, eds. *OKkio alla SALUTE: sistema di sorveglianza su alimentazione e attività fisica nei bambini della scuola primaria. Risultati 2008. Rapporti ISTISAN 09/24 [OKkio alla SALUTE: Surveillance system on nutrition and physical activity in children attending primary-school. Results 2008. National Institute of Health Report 09/24]*. Rome, National Institute of Health, 2009 (http://www.iss.it/binary/publ/cont/0924.pdf, accessed 3 July 2014).

Journal articles

Baldi A et al. Bambini sovraesposti alla televisione e fattori correlate [Children overexposed to television and related factors]. *Notiziario dell'Istituto Superiore di Sanità [News of the National Institute of Health]*, 2009, 22(1):i–ii.

Bilei S et al. I bambini fisicamente "non attivi": un'analisi dei dati sui bambini di otto anni delle scuole primarie [Physically inactive children: an analysis of 8-year-old primary-school children]. *Notiziario dell'Istituto Superiore di Sanità [News of the National Institute of Health]*, 2009, 22(2):i–ii.

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De Luca A et al. Il punto sui bimbi che "saltano" la prima colazione [The situation of children who "skip" breakfast]. *Notiziario dell'Istituto Superiore di Sanità [News of the National Institute of Health]*, 2008, 21(12):iii–iv.

Lamberti A, Baglio G. Merenda sana o junk snack: giovani generazioni a un bivio [A healthy snack or a junk snack: younger generation at a crossroad]. *Salute Internazionale [International Health]*, 2010:122 (http://www.saluteinternazionale.info/2010/10/merenda-sana-o-junk-snack-giovani-generazioni-a-un-bivio/, accessed 3 July 2014).

Lamberti A et al. Sistema di indagini sui rischi comportamentali in età 6–17 anni [Surveillance systems on behaviour risks for the ages of 6–17]. *Panorama della Sanità [Panorama of Health]*, 2008, 36(Suppl):411.

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Lamberti A et al. Sviluppare nuove alleanze per promuovere la salute: il ruolo della scuola e della sanità nel favorire una corretta alimentazione dei bambini [Development of new collaboration: the role of school and health services to promote balanced diets for children]. *Notiziario dell'Istituto Superiore di Sanità [News of the National Institute of Health]*, 2013, 26(4):i–ii.

Mazzarella G et al. Obesità severa del bambino e fattori correlate [Severe obesity in children and related

factors]. *Notiziario dell'Istituto Superiore di Sanità [News of the National Institute of Health]*, 2008, 21(12):i–iii.

Nardone P et al. Maternal education and prevalence of obesity among children. *European Journal of Public Health*, 2010, 20(Suppl. 1):248–249.

Nardone P et al. Il sistema di sorveglianza OKkio alla salute: i principali risultati della seconda raccolta dati [The surveillance system OKkio alla salute: main results of the second data collection]. *Notiziario dell'Istituto Superiore di Sanità [News of the National Institute of Health]*, 2012, 25(1):i–ii.

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