PREVENTION OF OVERWEIGHT AND OBESITY IN CHILDHOOD

A GUIDELINE FOR SCHOOL HEALTH CARE

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INTRODUCTION AND MOTIVATION

The prevalence of overweight and obesity in children is increasing rapidly in many regions of the world, including Europe. Obese children are not only at risk to become obese adults, and consequently suffer from ill health and premature death, but serious complications are already emerging during childhood.

In order to combat this alarming epidemic, overweight and obesity should be monitored systematically during childhood and adolescence, and action (prevention and treatment) should be taken, both on the individual and population level. Most European countries have a school health service network, in which the health of nearly all children is checked on a regular basis during school age. Therefore, these services are key-players for the primary prevention and early detection of ill health and developmental problems in general, and of overweight and obesity during childhood in particular.

Such a monitoring programme should be based on standardized definitions of terms such as “obese”, “overweight” and “normal weight” for a specified gender and age group. These definitions and components of the programme should rely on scientific evidence in order to elaborate an effective and efficacious school-based strategy for the prevention, early detection and guidance of children with overweight or obesity. Amongst others, cost-effectiveness, applicability in daily practice, uniformity of screening- and follow-up procedures with respect for individual variability, are key elements to be taken into consideration when outlining this programme.

The model of guideline development for school health care that is actually used in Flanders, was derived from the Dutch example, and was considered a good approach for the development of European guidelines for school health care. The developmental plan of this guideline is described in detail in annexe 1 to this report.

The aims of this report are:

- to summarize published evidence regarding strategies for the primary and secondary prevention of childhood overweight and obesity;
- to identify, evaluate and summarize published information about the assessment of overweight and obesity;
- to provide evidence-based guidelines for school health care and other health care practitioners, and other people working with children to prevent overweight and obesity in childhood;
- to identify the most promising elements of existing programmes and successful interventions that could be implemented and evaluated on a large scale;
- to identify areas for future research.

GLOSSARY AND DEFINITIONS

Abbreviations

AHA: American Heart Association
BIA: Bioelectrical impedance analysis
BMI: Body Mass Index
CDC: Centers of Disease Control and Prevention
CIHR: Canadian Institutes of Health Research
CPC: Centre for Pupils' Counselling
CT: Computerized Tomography
DEXA: Dual Energy X-rayed Absorptiometry
GP: General Practitioner
IOTF: International Obesity Task Force, a division of IASO, the International Association for the Study of Obesity
MRI: Magnetic Resonance Imaging
NCHS: National Centre for Health Statistics
NIH: National Institutes of Health
NMR: Nuclear Magnetic Resonance
PMS: Psycho-Medical-Social Service
RCT: Randomized Controlled Trial
SGA: Small for Gestational Age
SHS: School Health Service
STI: Sexually Transmitted Infections
TSF: Triceps Skin Fold
WHO: World Health Organization
WHZ: Weight for Height Z-score

Primordial, primary and secondary prevention

Prevention is the key strategy for controlling the current epidemic of childhood obesity. It may include primary prevention of overweight and obesity itself, secondary prevention or avoidance of weight regains following weight loss, and prevention of further weight increase in obese individuals unable to lose weight (Dehghan et al., 2005).

In a recent WHO publication regarding basic epidemiology, the term "**primordial prevention**" is defined as the level of prevention that is related to the underlying conditions that are leading to causation of the disease. The target population of this type of preventive strategies is the total population and/or selected groups. In contrast, the term "**primary prevention**" refers to preventive strategies aiming at limiting the incidence of disease by controlling the factors that have been identified as being *causes* and/or *risk factors* for the condition that prevention is aimed at. In this case, the target population consists not only of selected risk groups, but also the total population, including healthy individuals (Beaglehole et al., 2003).

Level of prevention	Phase of disease	Target
Primordial	Underlying conditions leading to causation	Total population and selected groups
Primary	Specific causal and/or risk factors	Total population, selected groups and healthy individuals

(Beaglehole et al., 2003)

Secondary prevention aims to cure patients and reduce the more serious consequences of disease through early diagnosis and treatment. It is directed at the period between onset of the disease and the time when symptoms emerge. Secondary prevention aims to reduce the prevalence of disease.

Tertiary prevention aims at reducing the progress or complications of established disease and is an important aspect of therapeutic and rehabilitation medicine (Beaglehole et al., 2003).

Other definitions that are used with respect to overweight and obesity refer to **primary prevention** as the intervention to prevent the population of children, unselected by weight status, from becoming obese (CIHR, 2004). **Obesity prevention** refers to avoiding the occurrence of obesity during childhood and adolescence (Daniels, 2005).

Throughout this document the following formal definitions of primary and secondary prevention will be applied:

- **Primary prevention** includes all actions and measures that are aimed at avoiding children from becoming overweight. It explicitly includes the primary and primordial prevention levels discussed above.
- **Secondary prevention** includes all actions and measures that are aimed at shifting overweight children towards a normal “healthy” weight.

The treatment of complications attributable to overweight and obesity (tertiary prevention) is outside the scope of this guideline.

Target audience

The main target audience for this guideline are school health care professionals (school doctors, school nurses, and other team members), although it provides interesting information for other primary health care professionals as well (paediatricians, GPs, health visitors, nurses, hospital and dieticians, play therapist…). It can – and should – also be passed to other people that are – or will be – involved in the management of overweight in children, as it will clarify the role of school health care in this emerging problem. This includes policy makers and other professionals that are part of the “network” (teachers, school meal providers, …). Obesity is after all more than a pure medical issue, and the management of this problem can be situated largely outside school health care itself.

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PART I
LITERATURE REVIEW

METHODOLOGY OF LITERATURE STUDY

The chapter on overweight and obesity (chapter 1) gives an overview of current well known aspects on the epidemiology of overweight and obesity in childhood, and is based on a number of relevant review articles.

For the chapters on primary and secondary prevention (chapters 2 and 3, respectively), an initial selection of articles was made based on Medline searches, Cochrane review, PubMed and other relevant websites in 2005 (including review articles, meta-analyses, controlled trials, focused articles, reports), which has been updated in 2006. Internet(web)-searches using references from published reviews, and additional Medline searches of authors reporting ongoing intervention studies resulted in the identification of some reviews that were used in this literature overview as well. The keywords were 'overweight', 'obesity', 'childhood', 'primary prevention', and 'secondary prevention'. The original literature search was limited to the last 10 years (1995-2005), except for some older articles that were selected because of their importance.

According to a well established system for grading recommendations in evidence based guidelines, study types were hierarchically ordered as follows:

(1) systematic reviews and meta-analysis of randomised controlled trials;
(2) randomised controlled trials;
(3) non-randomised interventional studies;
(4) observational studies;
(5) non-experimental studies; and
(6) expert opinions.

Evidence based recommendations that are based on systematic reviews, meta-analyses of randomised controlled trials, or randomised controlled trials were considered as high grade recommendations (Harbour and Miller, 2001).

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Harbour R and Miller J. A new system for grading recommendations in evidence based guidelines. *BMJ* 2001;323:334-336

Chapter 1
OVERWEIGHT AND OBESITY IN CHILDHOOD

Mathieu Roelants and Karel Hoppenbrouwers

1.1 Defining overweight and obesity

Overweight is generally defined as an excess of body *mass* (in practice this is mostly body fat), whereas obesity is defined as an abnormal excess of body *fat*. For this reason, the Centers for Disease Control and Prevention (CDC) uses the terminology "extreme overweight" instead of "obesity" when estimates are based on relative weight indices (like the Body Mass Index, see below) rather than on direct measurement of body fat. For most other authorities the terms obesity and extreme overweight are synonymous and mutually interchangeable, as it is the case throughout this document. Please note that generally "overweight" also includes "obesity".

1.1.1 Methods for assessment

A clear distinction can be made between direct methods, where corporal fat mass is measured, and indirect methods, where corporal fat mass is estimated from some anthropometric measures through a (generally imperfect) prediction equation.

1.1.1.1 Direct methods

Densitometry: under water weighing and air displacement plethysmography

Using *under water weighing*, the body volume is determined from which the density can be obtained. Based on known differences in the density of fat mass (0.9 kg/l) and lean body mass (1.1 kg/l), the percentage body fat can be estimated. Corrections for residual air in lungs and gastrointestinal tract should be made. This technique requires complete immersion of the subject in water while holding its breath, and is clearly not suitable for young or less confident children. Moreover, there are some concerns regarding the validity of the equations which translate density to fat mass in normal children and the obese.
Air displacement plethysmography is basically the same technique, but the subject's volume is determined by the volume of air that is displaced when sitting in an enclosed chamber. The same reservations as for under water weighing apply.

Isotope dilution methods

Isotope dilution methods are used to measure total body water. Deuterium is analysed in a saliva sample before and 4 hours after administration of a standardized dose of deuterium oxide. Based on the (presumed) known hydration fraction of fat free mass, lean body mass and hence fat mass can be calculated.

Magnetic resonance imaging (MRI) or nuclear magnetic resonance (NMR)

Total and local body fat volume and fat mass are obtained from NMR images. The results are accurate and reliable, but the procedure is time consuming and expensive. It requires the subject to lie still enclosed in a scanner, and is therefore not suitable for young children.

Computerized tomography (CT)

Total and localised body fat is quantified with a high degree of accuracy and reliability from high resolution X-ray images. The subject is however exposed to a significant amount of radiation and the equipment is very expensive.

Dual energy X-ray absorptiometry (DEXA)

DEXA is based on differences in the attenuation of X-rays by bone mineral and soft tissue, further subdivided in fat and lean tissue. The radiation levels are lower compared to a CT scan, but DEXA can not distinguish between intra abdominal and subcutaneous fat. The procedure is time consuming, expensive and requires a good cooperation of the subject.

Bioelectrical impedance analysis (BIA)

BIA measures the resistance of body tissues to the flow of a small alternating current. Fat mass is considered anhydrous (hence non conductive), such that conductivity reflects fat free mass. Fat free mass, and (by subtraction) fat mass, are estimated through prediction equations (based on impedance, weight and length). BIA is therefore not a true direct method, since the measurement (impedance) is linked with the outcome (body fat) through a statistical relation rather than based on biophysical principles (NIH, 1994). The test is non invasive and has a high repeatability, but the equations are equipment and population specific.

Classical BIA included hand to foot measurements (electrodes attached to hands and feet), but recently (relative inexpensive) foot to foot models became available (Goldfield, 2006). These are bathroom scales with two electrodes. Weight and bipedal impedance are measured simultaneously, and length must be entered. The necessity of brand and population specific prediction equations is however still a major concern, which does not outweigh the more general applicability of the other indirect methods (see below).

The de facto gold standard for body composition analysis is Fuller's four compartment model based on body volume (obtained from densitometry), total body water (isotope dilution), bone mineral (DEXA), and weight (Fuller et al., 1994).

1.1.1.2 Indirect methods (anthropometry)

Weight for age and weight for height

Weight is measured and (in children) generally plotted on a reference growth chart to compare recorded measurements with a reference population. Weight for age is widely used in small children to detect malnutrition, but weight for length is more appropriate when linear growth is impaired (stunting), and to detect overweight it is important to account for differences in body size (length/height). Weight can be measured accurately if the equipment is well calibrated, and requires no intervention. To evaluate weight for age, the subject's age should be known with reasonable accuracy. To evaluate weight for length/height, height should be measured, which is a more delicate procedure that requires a rigorously standardized technique and equipment.
The World Health Organisation (WHO) recommends the use of weight for height up to 10 years of age to detect both under- and overweight, but failed to identify a suitable growth chart for general (international) use (WHO 1995). NCHS charts were deemed inappropriate, mainly because of breast feeding practice in the reference population (USA). Weight for height should be converted to a weight for height z-score by subtracting the median from the measurement and by dividing by the standard deviation, $WHZ = (x - m) / SD$. Overweight and obesity cut-offs are based on statistical convenience ($WHZ > 2$) rather than on known health risks (Lobstein et al., 2004).

Body Mass Index (BMI)

The Body Mass Index is defined as the weight (in kilograms) divided by height squared (meter^2), BMI = kg/m^2. BMI is an index of relative weight rather than an index of adiposity, but it is widely adopted for use in children, adolescents and adults by the WHO, the CDC, the International Obesity Task Force (IOTF) and many local health authorities. It correlates well with DEXA, with a true positive rate of 0.7 – 0.8 and a false positive rate of 0.1 or less (Lobstein et al., 2004). Therefore, most "detected" subjects will indeed have overweight, but some overweight subjects will wrongly be considered as having a normal weight. The BMI is reliable when length and weight are measured by a trained person using the appropriate equipment (e.g. not based on reported height and weight). In adults, a BMI of 25 or higher is considered overweight, and a BMI of 30 or higher is considered obesity (WHO, 1995). These limits have been linked to morbidity and mortality, but the true relation between the BMI and body fat might depend on race and body proportions. In children these limits do not apply as such, since the BMI changes with age (figure 1.1)(see below).

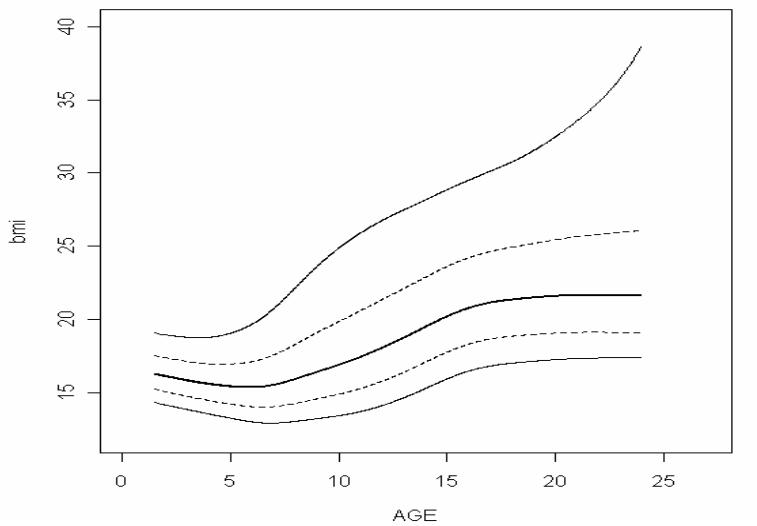

Figure 1.1: Evolution of the Body Mass Index with age for girls (Flemish Growth Charts 2004)

Percentage of overweight

The percentage of overweight is the ratio of a subject's weight and his or her ideal weight. It is an arbitrary criterion based on the weight for age, weight for height or BMI charts, depending on how ideal weight is defined (median weight for age, for height or obtained from the median BMI by age). A percentage overweight of 120% or more is considered overweight and a percentage overweight of 140% or more obese. This criterion does not account for the changing variability during childhood and has therefore a different meaning at different ages, as can be seen from figure 1.2. During the ages of pubertal growth a considerable larger amount of children would be classified overweight/obese than compared to other ages.

Skin folds

Skin folds are measured at well defined sites using a skin fold calliper. Possible locations include triceps, biceps, the subscapular and supra-iliac position, and front thigh and medial calf. The equipment is simple but inter- and intra-observer reliability is poor. Proper training of observers is therefore of paramount importance. The percentage fat mass is calculated with a suitable prediction equation and correlates well with direct measures of body fat. The widely used triceps skin fold (TSF) may however fail to detect abdominal obesity. Skin fold thickness varies with age, sex and race, and the equations should be validated in each population.

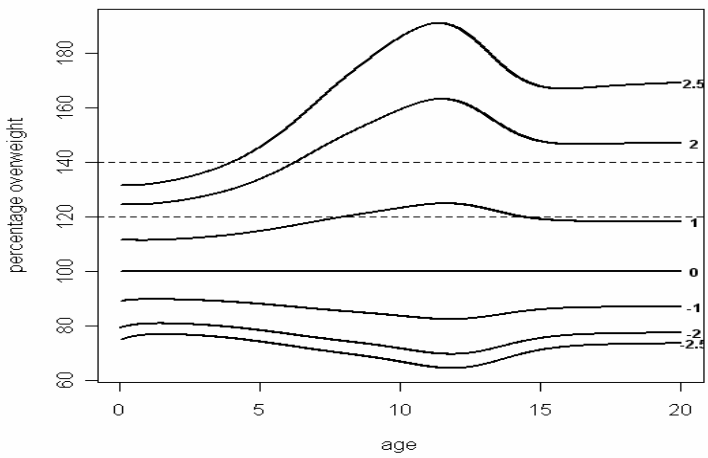

Figure 1.2: Percentile distribution of the relative weight (weight/median weight) by age. Broken lines show cut offs for overweight (120%) and obesity (140%) (Flemish Growth Charts 2004)

Waist Circumference – Waist/Hip ratio

Waist circumference is the smallest abdominal circumference between the iliac crest and the rib cage. It is easily measured with a good reliability. Waist circumference is a measure of abdominal adiposity, and is strongly related to cardiovascular disease in adults and hyperinsulinemia and adverse lipid profiles in children (Lobstein et al., 2004). It is highly correlated with DEXA measures of abdominal fat. The waist/hip ratio is used in adults to identify high central adiposity, but is less well correlated with trunk fat (overall obesity could “hide” a high amount of trunk fat). In children, waist circumference and hip circumference are age dependent (so centile charts are necessary for their interpretation), and it is not recommended to use the ratio.

1.1.1.3 Conclusions

In practice, direct methods are mainly used in research and clinical settings, and to validate/calibrate indirect methods. The indirect methods are only approximations, but they have a number of important advantages, especially for routine use: they are relatively easy to learn, non-invasive, well established in the medical community (e.g. length, weight), and do not require expensive equipment.

1.1.2 Criteria for overweight and obesity during childhood

From the direct methods, only bipedal bioelectrical impedance analysis would be a likely candidate for routine use, but the need for population specific approximation equations make this instrument less convenient. Note that this method also requires the measurement of length.
Within the range of indirect methods, the Body Mass Index is the best marker available. It is a reliable measure related to adiposity in children and adolescents. The use of BMI in children results in a consistent estimate, since it is a long time established measure for adiposity in adults. From figure 1.1 above, it is however clear that BMI as such is not meaningful in childhood. BMI by age reference charts are needed, and criteria to identify overweight and obese children should be established.

BMI by age reference charts are available since the early eighties (Rolland-Cachera et al., 1982) and many countries have since constructed their own BMI charts (in some cases from existing data on length and weight).

With respect to the cut-off values for overweight and obesity (c.q. which centile lines will we use as cut off), the CDC proposed the 85th centile for overweight and the 95th centile for obesity. This was based on the observation that in the reference population they used for their BMI charts, the prevalence of overweight and obesity (extreme overweight) was 15% and 5% respectively. For this reason the CDC

2000 growth reference charts for the United States (Kuczmarski et al., 2000) do not include recent data of BMI (only data from approximately 1960 to 1980 were included in the chart). By including recent data (childhood overweight was on the rise since approximately 1980), they would have reverted prevalence estimates to the baseline of 15% and 5% for overweight and obesity respectively.

A more convenient and objective way to define overweight and obesity cut-off limits is to extrapolate WHO adult criteria on a growth chart. At 18 years of age (from which age WHO criteria apply), the centile lines that correspond to a BMI of 25 and 30 are determined, and these centile lines are used as cut-off limits. This approach was proposed by an IOTF working group, and put into practice first by Cole and Roede in the Dutch population (Cole and Roede, 1999), and in other populations thereafter (Cole et al., 2000). The principle is demonstrated by using data from Flemish boys in figure 1.3.

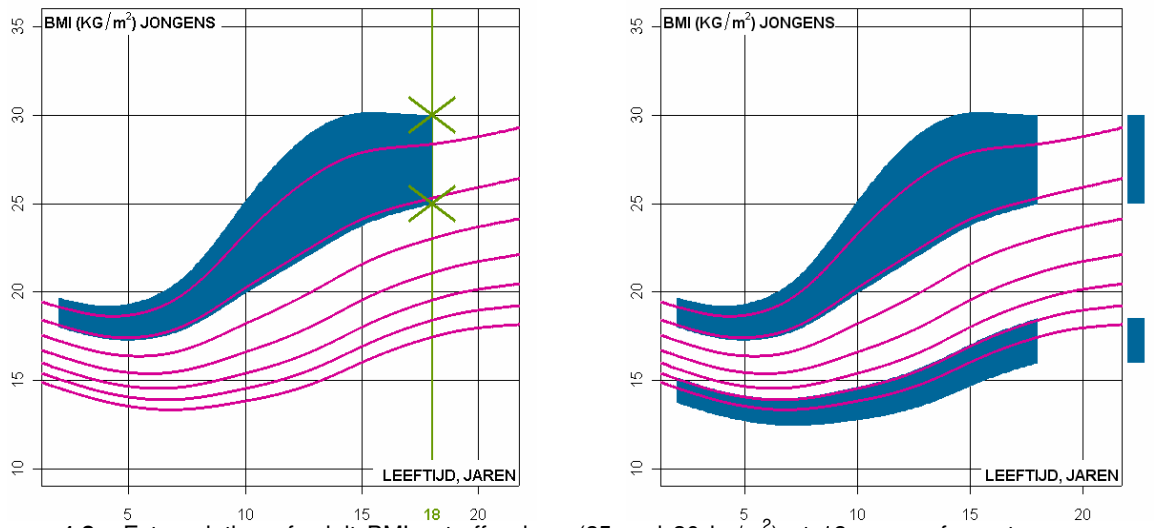

Figure 1.3: Extrapolation of adult BMI cut-off values (25 and 30 kg/m^2) at 18 years of age to younger ages through the centile chart (left panel), boys, Flemish growth charts 2004. The shaded region is the area that corresponds to a BMI between 25 and 30. Children within or above this region are overweight, children above the shaded area are obese. The same principle can be used for underweight using appropriate limits at 18 years of age (here 18.5 for underweight and 16 for extreme underweight; right panel).

A certain similarity exists between the NCHS/CDC and IOTF cut-off values (Flegal et al., 2001), but the choice of the 85th and 95th percentile cannot be extrapolated to other reference charts, unless the prevalence of overweight/obesity is 15%/5% in the reference population as well.

An important disadvantage when making international comparisons or when evaluating historical trends is the plethora of criteria and techniques used to define overweight/obesity. Different criteria are often not compatible and could mask true differences that exist between or within populations. The IOTF therefore adopted the “international reference” by Cole et al. (2000) for international use. Cole calculated cut-off limits from data resulting from 6 large national representative growth studies worldwide (Europe, the America’s and Asia), and averaged the country specific cut-off limits to obtain a single list of reference values (table 1.1). These limits are the primary choice for comparison of different data sources on the prevalence of overweight / obesity, especially between countries and in some cases also within countries.

When local BMI charts are not available, these international reference data can also be used to evaluate relative weight of individuals. However, the exact position of the individual cannot be quantified. It is only known whether a subject is (not) overweight or obese, but his SD scores (z-scores) or position on the centile chart cannot be determined. It is clear that the follow-up of an individual’s BMI is therefore impossible since a child may become relatively less overweight even when his BMI increases (see figure 1.1 as an example of the evolution of BMI with age). In the next paragraph a number of other remarks with respect to the use of IOTF reference values for local use are discussed.

Table 1.1: International cut-off points for body mass index for overweight and obesity by sex between 2 and 18 years (adapted from Cole *et al., 2000)*

Age (years)	Body mass index 25 kg/m^2		Body mass index 30 kg/m^2	
	boys	girls	boys	girls
2	18.41	18.02	20.09	19.81
2.5	18.13	17.76	19.80	19.55
3	17.89	17.56	19.57	19.36
3.5	17.69	17.40	19.39	19.23
4	17.55	17.28	19.29	19.15
4.5	17.47	17.19	19.26	19.12
5	17.42	17.15	19.30	19.17
5.5	17.45	17.20	19.47	19.34
6	17.55	17.34	19.78	19.65
6.5	17.71	17.53	20.23	20.08
7	17.92	17.75	20.63	20.51
7.5	18.16	18.03	21.09	21.01
8	18.44	18.35	21.60	21.57
8.5	18.76	18.69	22.17	22.18
9	19.10	19.07	22.77	22.81
9.5	19.46	19.45	23.39	23.46
10	19.84	19.86	24.00	24.11
10.5	20.20	20.29	24.57	24.77
11	20.55	20.74	25.10	25.42
11.5	20.89	21.20	25.58	26.05
12	21.22	21.68	26.02	26.67
12.5	21.56	22.14	26.43	27.24
13	21.91	22.58	26.84	27.76
13.5	22.27	22.98	27.25	28.20
14	22.62	23.34	27.63	28.57
14.5	22.96	23.66	27.98	28.87
15	23.29	23.94	28.30	29.11
15.5	23.60	24.17	28.60	29.29
16	23.90	24.37	28.88	29.43
16.5	24.19	24.54	29.14	29.56
17	24.46	24.70	29.41	29.69
17.5	24.73	24.85	29.70	29.84
18	25	25	30	30

A second disadvantage of the IOTF reference values is that they are only available for overweight and obesity. The above mentioned trick of extrapolating reference values at 18 years of age can also be applied to reference values for underweight (figure 1.3), to obtain a single instrument that evaluates both extremes of the relative body weight.

Body Mass Index cut-off values

In adults, overweight is defined as a BMI of 25 and above, and obesity as a BMI of 30 or above (table 1.2). Be aware that this definition implies that prevalence estimates of overweight also include obesity. A prevalence of 15% overweight and 3% obesity would mean that 12% are overweight grade I and 3% overweight grade II or III.

Table 1.2: Adult limits for the Body Mass Index (WHO, 1995)

Body Mass Index	Weight class (WHO)	Terminology
< 18.5	underweight grade I	underweight
18.5 – 24.99	normal	normal
25 – 29.99	overweight grade I	overweight
30 – 39.99	overweight grade II	obesity*
≥ 40	overweight grade III	morbid obesity*

* since the BMI is an index of relative body weight rather then of adiposity, some instances (most notably the CDC) use the term extreme overweight instead of obesity.

In children, local BMI charts with extrapolated cut-off values should be used when available (either tabulated or charted, see figure 1.4 for an example), and the IOTF international reference set (table 1.1) otherwise.

Clinical appraisal

Although the Body Mass Index is the best available parameter today (in terms of properties and feasibility), it is still an imperfect measure, and should in school health practice be accompanied by a clinical evaluation of the child before it is referred or treatment is started. Extreme muscular or disproportional body build or impaired linear growth (stunting) are examples that should be approached differently.

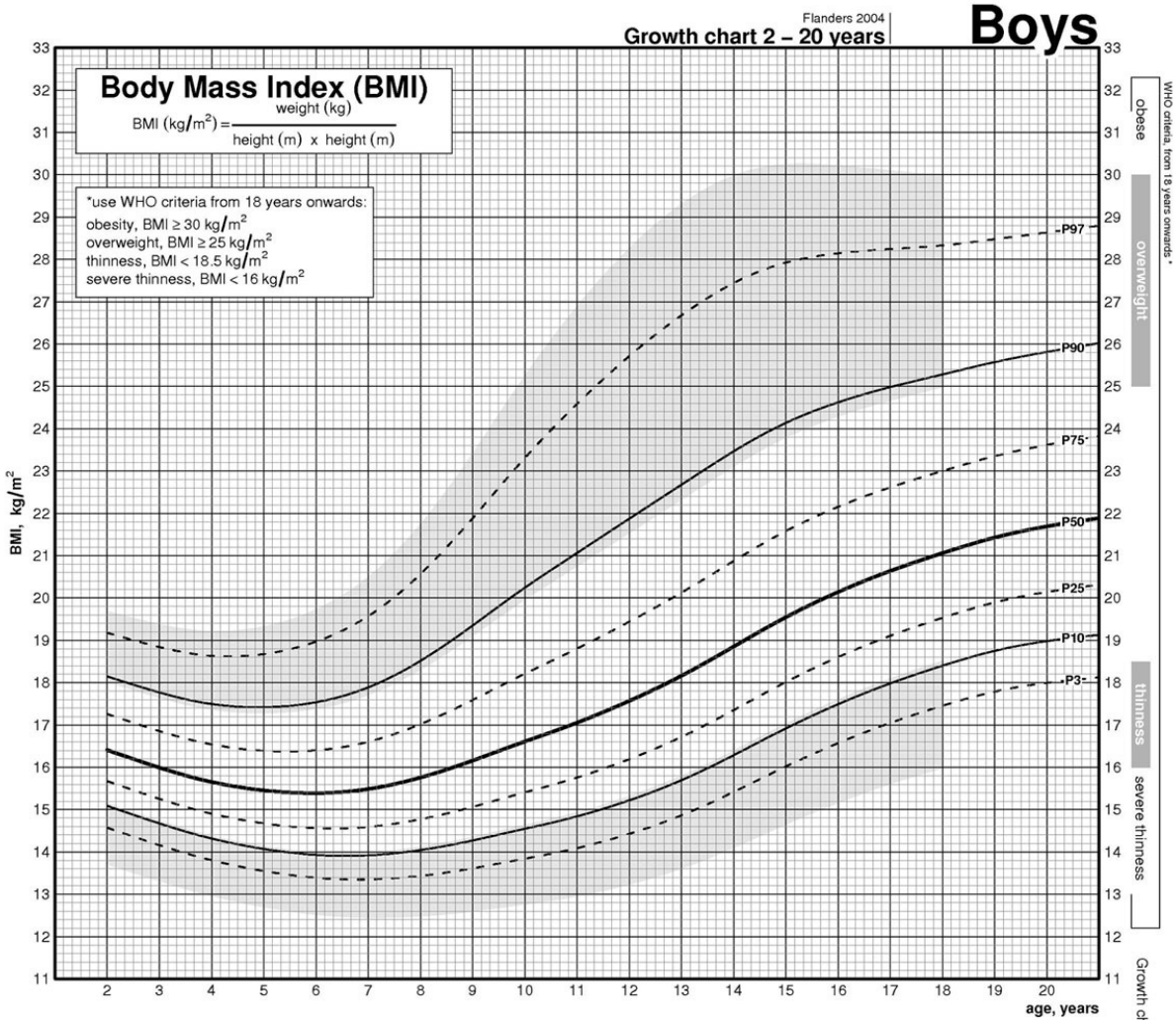

Figure 1.4: BMI for age in Flemish boys, extract from the Flemish growth reference charts 2004 which shows the extrapolated WHO criteria at 18 years of age (grey areas, over- and underweight).

In summary, it is recommended to use BMI in children, adolescents and adults. It is a reliable index of relative body weight that – given its simplicity – is reasonably well correlated with adiposity. Although direct evidence relating BMI to health risks is scarce, it tracks well into adulthood, where consequences of overweight and obesity are well established. In children, percentile charts should be used to evaluate BMI.

The limits that define overweight and obesity (or extreme overweight) can be based on a given centile line only when the prevalence in the reference population is known. When updating reference charts, the choice of cut-off centiles should be adapted likewise, or the prevalence would be reverted artificially to the baseline. Alternatively, the cut-off centile lines can be defined by an "objective" criterion. The centiles that cross BMI values of 25 and 30 at the age of 18 years (the age after which the adult WHO limits apply) are the best candidates at present day.

In the absence of local BMI reference charts, IOTF international cut-off points for overweight and obesity can be used. These are based on the latter approach, but do not allow to position a child within its contemporaries (e.g. no percentile position or SD score can be determined), and apply only to overweight/obesity, whereas a full reference chart can equally be used to detect underweight. The IOTF cut-off points are however the first choice to make international comparisons.

Other indirect measures like skin fold thickness and waist circumference can be used to determine local fat distribution and associated health risks (e.g. abdominal or trunk fat), but they are not the preferred method for overall obesity.

1.2 Prevalence of overweight and obesity during childhood

Due to difficulties to compare estimates obtained by different criteria in the past, all estimates discussed here are – unless otherwise specified – obtained by the IOTF criterion.

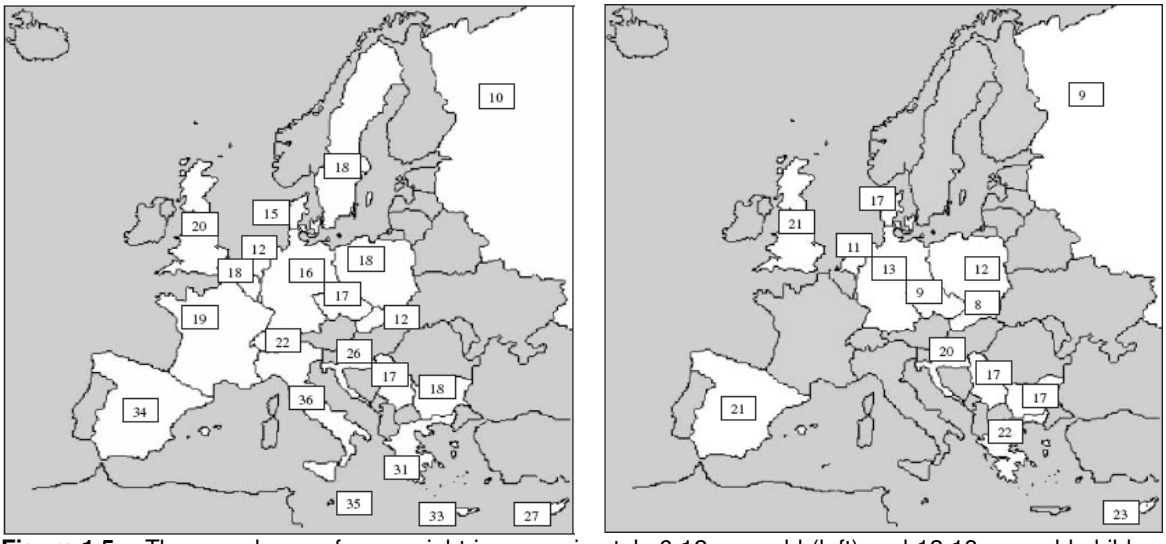

Figure 1.5: The prevalence of overweight in approximately 6-12 year old (left) and 12-18 year old children (right) in the European Region. All estimates date from 1990 or a more recent period (Lobstein and Frelut, 2003).

Figure 1.5 shows that overweight was already abundant in the European region in the 1990's, both in the pre- and post-pubertal age groups, and that there was a remarkable north to south gradient (the Croatian data were collected in the Zagreb area in 1995-1998 by A. Kaic-Rak).
The global prevalence of childhood obesity in the European region varies from 2 to 7%, and is somewhat higher before puberty and in females.

Recent IOTF-based estimates from Slovenia (Avbelj et al., 2005) show a prevalence of overweight of 12.5% and 16.7% in 5-year old Slovenian boys and girls. Obesity was present in respectively 4.1% and 4.7%. In 15-16 years old adolescents these estimates are equal or higher for overweight (18.9% in boys, and 16.7% in girls) and a little lower for obesity (3.5% in boys and 3.4% in girls). When compared to data from the early nineties, there is a dramatic increase in obesity, but not (or to a lesser extent) in overweight (Juričič and Roelants, 2005). In that time period the overall prevalence of overweight was 14.0% in 7-18 year old boys and 14.1% in girls, but obesity (based on IOTF criteria) was rare, with estimates of only 1.7% in boys and 1.2% in girls.

In Croatia, the prevalence of overweight in childhood (7-14 years) was 10.6% in 1997-2000, and 11.9% in 2000-2005. The prevalence of obesity increased in the same period from 3.5% (1997-2000) to 6.9% (2000-2005). Both estimates were based on weight for height measurements (z score distribution, NCHS standards) (Croatian National Institute of Public Health, 2006).

Lobstein et al. (2004) list however a number of constraints with respect to the interpretation of the results in figure 1.5:

- Some samples are not *representative*: e.g. “Belgian“ estimates are from one province in the Walloon region only, and more recent data, representative for the Flemish region, show lower estimates (e.g. 15 and 14 % before and after puberty)(Flemish Growth Charts 2004).

- *Sexual maturation* temporarily influences the body proportions and the gain in fat mass. Large differences in the pattern of sexual maturation between and within populations are well known.

- *Secular trends* may result in growth patterns that differ strongly from the reference population and render these references less reliable (f.e. In the Netherlands it is shown that the secular trend is mainly due to an increase in leg length). Therefore, the trunk (which carries most weight) becomes relatively smaller and the BMI may decrease.

- The BMI does not increase monotonically with age. There is a steep increase during the first year of life, after which it decreases until 3 – 7 years of age, when it starts rising again until adulthood (figure 1.3 – 1.4). The period where the BMI starts rising again, is known as the *adiposity rebound*. Some authors have speculated that an early adiposity rebound is predictive for obesity in later life (Rolland-Cachera, 1984), but others (Cole, 2004) consider it as a statistical phenomenon related to the changing skewness in the BMI distribution with age. The higher percentiles therefore start rising again at a more advanced age compared to the lower ones.

- Finally, the data collected from different studies do not necessarily have the same quality (i.e. measurement error and representativeness of the sample).

Trends in overweight

It is well known that overweight is on the rise in the whole industrialized world, and that this grows to alarming proportions in some countries (figure 1.6). The UK for instance has seen an increase in overweight prevalence of almost 1% per year over the past two decades.

1.3 Causal factors of overweight and/or obesity

Overweight and obesity are always the direct result of an imbalance between energy intake and energy expenditure. The excess of energy is not wasted, but stored in the body under the form of adipose tissue. When food is less available than it is in the developed countries today, this could be seen as a survival mechanism, but when food is abundant and the physical activity level decreases, this results in an imbalance. The imbalance might be due to excess energy intake (overeating) or reduced energy expenditure.

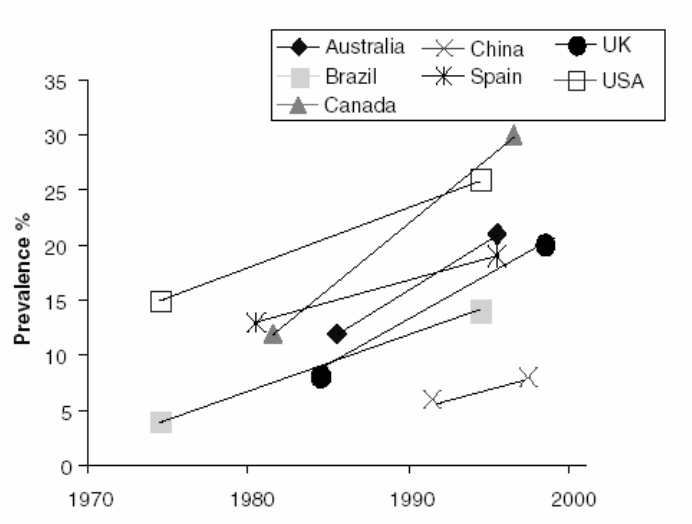

Figure 1.6: Trends in the prevalence of overweight 1970 – 2000 (Lobstein et al., 2004)

1.3.1 The physiology of the development of overweight (Lobstein et al., 2004)

Adipose tissue is the prime source of energy storage in the human body. The storage of energy as adipose tissue is controlled by several complex mechanisms that produce a number of signals like appetite and satiety, and controls the body energy household through the nervous and endocrine systems. In the short term, regulatory signals from the gastrointestinal tract before and during food metabolism regulate hunger and satiety. In the longer term, homeostatic mechanisms are involved in regulating fat storage and release, resting metabolic rate and energy expenditure, which may be largely determined by genetic mechanisms and is susceptible to genetic variation.

Developmental aspects:

It is shown that birth weight, as a crude summary of prenatal growth, is related to subsequent fatness, suggesting that the foetal environment plays a role in the development of obesity. Shortly after birth, young infants will put on a high percentage of body fat, but the rate of fat deposition slows down after the first year of life.

Children that are becoming progressively fatter at ages where other children tend to show a fall in fatness and in BMI (between 6 months and 5 years), are at risk for significant and perhaps persistent obesity later in childhood and adolescence.

Adolescence is characterized by significant growth and maturation of secondary sexual characteristics. The onset of puberty occurs due to a change in the pituitary–gonadal axis, which results in an increase in testosterone levels in boys and oestrogen levels in girls. Somatic growth is orchestrated primarily through the action of growth hormone and insulin like growth factors. The timing of these maturational changes shows a marked inter-individual variability. Obese children characteristically have accelerated growth. In the early pubertal stages they show advanced height and bone age, but the pubertal growth spurt is less pronounced such that adult height is not different from non-obese subjects. Puberty is also associated with significant changes in body composition. Girls tend to accumulate more fat than boys. Fat gain occurs early in adolescence, and then ceases and even reverses temporarily in boys, but continues throughout adolescence in girls.

Genes and the environment

Observations in families have shown that an individual's chances of being obese increase when he or she has relatives who are obese, and that persistence of obesity from childhood to adulthood is also linked to family obesity. Research into physical activity levels and sedentary behaviour in families

suggests only a moderate genetic component, but weight gain in response to food intake could be contributing for up to 50% of the variability. The overall heritability of the BMI is likely to be around 70%. The genetic component is probably complex and unlikely to be related to a single gene. These figures might lead to the conclusion that the environment has little or no impact, but this would be erroneous. Genes are best expressed in appropriate environments.
The role of the environment is however difficult to study directly, but several lines of evidence suggest that there is a substantial non-genetic component:

(i) a dramatic increase in childhood obesity in developing countries is apparent as their diet and physical activity levels become more comparable to those in the industrialized world (and the genetic profile of those populations have not changed);
(ii) studies have also documented the coexistence of underweight and overweight within the same family, which implies environmental rather than genetic factors; and,
(iii) in migrant studies, obesity rates in second generation children significantly exceed rates in first generation children, again suggesting environmental rather than genetic factors alone.

A certain genetic profile may make a subject more susceptible for developing overweight, but it is the environment that triggers the actual onset of overweight. A common model that incorporates this idea is the “lipostatic regulation hypothesis”. This system postulates that the amount of body fat is regulated by a “lipostat”, which is set at an inappropriate high level in many obese subjects. When exposed to an environment with abundant food and energy, obesity develops (Speakman, 2004). With the rise in obesity prevalence in so many countries, it is also clear that the environmental conditions for obesity expression are being created in large parts of the world.

1.3.2 Genetic factors

Apart from the delicate relation between genetic predisposition and the environment, some specific syndromes are directly linked to obesity. These include amongst others:

- Down syndrome
- Prader-Willi syndrome
- Duchenne muscular dystrophy
- Albright hereditary osteodystrophy
- Bardet-Biedl syndrome
- A number of single gene disorders: a.o. congenital leptin deficiency; defects in the leptin receptor (children are hyperphagic, and may fail to undergo pubertal development due to hypogonadotrophic hypogonadism); defects in pro-opiomeloncortin; defects in pro-hormone convertase 1; defects in the melanocortin 4 receptor.
  Most of these conditions cause severe early-onset obesity.

1.3.3 Environmental factors

Whereas a child's genetic background cannot be altered (but this background might help to identify children at risk), the primary focus for the management and prevention of obesity is the environment.
Relevant environmental factors (with regard to overweight and obesity) are diet and the level of physical activity. Especially the environmental conditions that encourage the consumption of more energy than required, or conditions that encourage sedentary behaviour or discourage physical activity, are important. During human evolution, sparse and erratic food supply and huge physical demands have selected a genotype that is good at storing an excess of energy (as adipose tissue). This genotype is however badly adapted to our modern society, where there is a decreased energy demand (no more walking to school), and increased energy consumption (snacks, fast food, soft drinks) (this is sometimes referred to as the 'obesogenic environment').

It is also important to consider the micro-environment created at home. Especially for younger children, the family environment plays an important role in determining their risk of obesity (f.i. parental physical activity level, eating behaviour and television viewing habits).

1.3.4 Psychological factors

Psychological factors may influence eating habits. Some people eat in response to negative emotions such as boredom, sadness, or anger, but most overweight people have no more psychological problems than non obese people. Special cases are 'binge eaters'. During episodes of binge eating they eat large amounts of food and cannot control how much they are eating. Binge eaters are also likely to have symptoms of depression and low self-esteem, and may have more difficulty losing weight and keeping a normal weight compared to people without binge eating problems.

1.3.5 Other causes of obesity

The list of other causes of abnormal weight gain and obesity includes a number of diseases or conditions that have an impact on either energy intake or expenditure, some examples are hypothyroidism, Cushing's disease, depression, certain medical drugs (see below, § 1.4 'Risk factors' for some examples) and other neurological conditions that lead to overeating or reduced energy expenditure (physiological or related to reduced physical activity).

1.4 Risk factors for the development of overweight and/or obesity

1.4.1 Genetic predisposition

The risk of a child becoming overweight is linked to parental overweight and obesity. This association is partly due to genetic factors, and partly related to (a shared) lifestyle (see § 1.3.3, 'Environmental factors'). Of course, all gene defects and genetic syndromes listed above imply an important risk for (often) severe obesity.

1.4.2 Maternal diabetes

Children born to a mother who had diabetes during pregnancy are more likely to become obese later in childhood than children born to a mother who was non-diabetic. This was shown by comparing siblings born before and after their mother developed maternal diabetes. The BMI in adolescence was also related to insulin levels in the amniotic fluid during pregnancy, even after adjusting for the mother's BMI.

Although maternal diabetes results in offspring with higher birth weights, heavier babies tend to revert to a normal weight by 1 year of age, but then show an increase in BMI after about age 4 years (i.e. an early adiposity rebound, see § 1.4.3). This implies that these children's obesity is metabolically programmed during their intrauterine experience, rather than reflecting a persistence of obesity acquired before birth.

The effect of maternal diabetes extend to other cardiovascular risk factors, as it was demonstrated that children of diabetic mothers show greater body fatness, higher blood pressure and raised fasting levels of blood glucose, insulin, glucagon and triglycerides (the latter measures remained significantly raised after controlling for the higher BMI levels in these children) (Lobstein et al., 2004).

1.4.3 Age of start of overweight – adiposity rebound

Adiposity rebound is a much debated issue in the development of obesity. The BMI increases in the first year of life, decreases thereafter, and starts rising again around 5 to 7 years of age (as can be seen in figure 1.4). The point where the BMI starts increasing again is known as the 'adiposity rebound', and is linked to the development of obesity at a later age. According to some authors this is mostly a statistical phenomenon since higher centiles (and therefore heavier children) show an earlier rebound compared to lower centiles (Cole et al, 2004). Others have illustrated, by plotting BMI growth

trajectories of individual children, that this early or late rebound effect might be independent of the BMI in absolute terms (Rolland-Cachera et al., 1984, INSERM, 2000; figure 1.7).

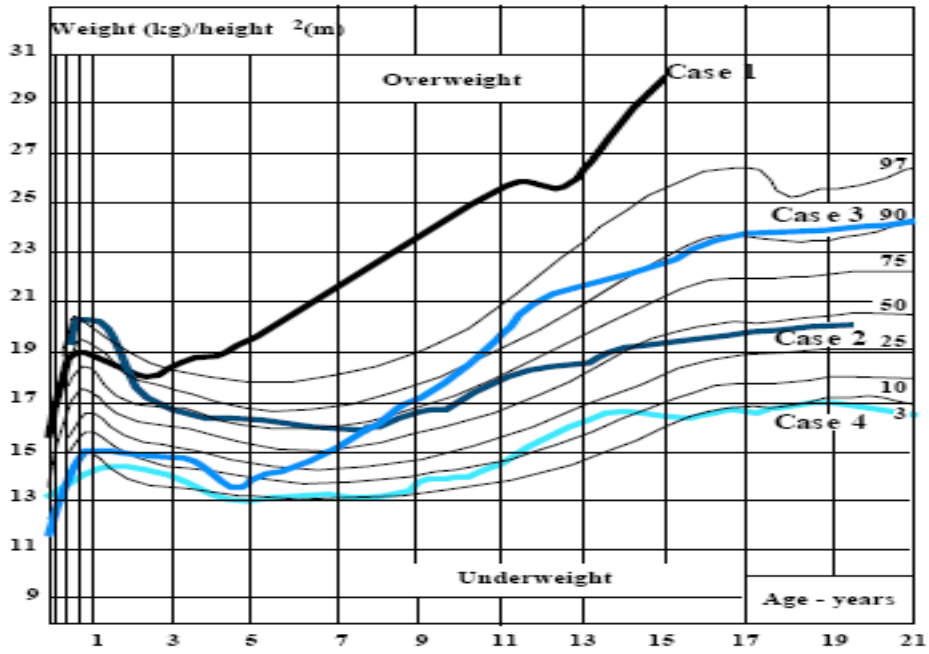

Figure 1.7: Evolution of the Body Mass Index of four children with early or late adiposity rebound (INSERM, 2000)

The practical applicability of the adiposity rebound in school health practice is more problematic, since it requires that children are measured on a very regular basis.

1.4.4 Socio-economic status

Lobstein (2004) stated that “overweight prevalence is high among the poor in rich countries and high among the rich in poor countries”. In the western world, children growing up in a socio-economic deprived environment are more at risk for the development of obesity. This is mainly attributed to a lower quality of the diet, and less physical activity (or opportunity to be physically active).

1.4.5 Ethnicity

The prevalence of overweight and obesity is larger in children from a non-Caucasian origin living in western societies, but this effect becomes less strong when correcting for social background.

In the USA, children of African or Hispanic origin contribute more to the obesity prevalence compared to their Caucasian counterparts. In the Netherlands, children with a Turkish or Moroccan origin are more at risk then Dutch children (Fredriks et al., 2003; Fredriks et al., 2004). In the UK, children of Asian descent have relatively less overweight, but are more prone to complications (type 2 diabetes) related to obesity. It has to be noted that current guidelines for the use of BMI and other weight for height indices might have to be revised for Asians (see above).

Cultural issues, especially their impact on lifestyle (food, physical activity), could have a considerable impact on both the development and treatment of obesity. Recommendations regarding diet and physical activity should be compliant with cultural habits.

1.4.6 Dysmaturity

The relationship between birth weight and the risk of obesity is a U-shaped curve: both (abnormal) high and low birth weight are linked to obesity in later life. Physiological mechanisms that are triggered by chronic under nutrition might encourage excess weight gain when exposed to environments where high energy foods are plentiful. Especially at risk are children born small for gestational age (SGA) with early catch-up growth. Obese children and adults born with low birth weight are also more prone to coronary heart disease and type 2 diabetes compared to obese people who had higher birth weights. It was Barker who demonstrated that intra-uterine growth failure resulted in more frequent adult obesity and obesity related pathology (cardiovascular, type 2 diabetes) compared to obese adults with a normal birth weight (Barker, 1995).

1.4.7 Sedentarism – lack of physical activity

Energy expenditure – through physical activity – has a direct effect on the energy balance (see above, § 1.3.1 'Physiology'; and below, § 1.4.8 'Eating behaviour'). For an individual child, physical activity is an important factor in the development of (and protection against) obesity.
There is however no direct evidence that (total) *energy expenditure* levels have decreased in recent years (and would therefore have caused the current epidemic). With respect to *physical activity*, and more specifically indicators of an (in)active lifestyle, studies are more conclusive: television viewing and video games for longer periods of time, and not participating in sports outside school, promote overweight and obesity. In some studies the link was weak, but some could demonstrate a strong dose-response relationship. It has to be noted that in many cases, television viewing is related to eating behaviour (consumption of snacks; exposure to unhealthy food related advertisements).

1.4.8 Eating behaviour and diet

Like the energy expenditure, the energy intake has a direct effect on the energy balance. The energy intake is largely influenced by the dietary pattern and eating behaviour. The dietary pattern is complex and difficult to investigate, and paradoxically, a US study showed a decrease in energy intake in adolescents during a period where the prevalence of obesity doubled. Further investigation showed however that the real intake increased, while the reported intake decreased.

Infant feeding

Several studies have demonstrated that breast-feeding is associated with a lower cardiovascular risk profile in general, and a lower risk of obesity in childhood and adolescence in particular, but others showed no relationship at all. The mechanisms underlying this association remain to be clarified, and particularly the effects of potential confounders have to be excluded. Possible confounders are the social class and other factors related to the decision to breast-feed (Daniels et al., 2005). Potentially behavioural benefits that may result from breastfeeding are taste preference, and self regulation of energy intake (Gidding et al., 2005). Given the multiple other benefits of breast-feeding that are already known, encouraging breast-feeding for the prevention of obesity is considered a low risk intervention that is included in many prevention programmes.

Soft drinks

Soft drinks (especially carbonated soft drinks) have become an important part of the children's diet (even in young children), and are often the most important source of extrinsic sugar intake among youngsters. Several studies have demonstrated a positive relation between soft drink intake and obesity, but this relation might also be due to general dietary and lifestyle habits associated with the consumption of soft drinks.

Eating patterns

The *frequency* of meals has no effect under controlled (iso-energetic) laboratory conditions, but outside this strict controlled environment, frequent meals might be related to the amount and type of food (and drinks) consumed.
Skipping breakfast increases the risk for obesity in adults, and possibly also in children, but the exact mechanism is unclear.
Snacks consumed outside of the home are often high in fat or carbohydrates. Studies have shown that these types of snacks reduce the time to a subsequent meal by 50% when compared to protein rich snacks, although the time to a subsequent meal was too low for all types of snacks.
Standard *portion sizes*, which have increased in and outside homes in countries with a well established food supply, are known to have a positive association with energy intake in 5 year old children (very young children have an innate control of appetite). The impact on subsequent food consumption is however unknown.

1.4.9 Other

Medication induced

Children treated for epilepsy (notably with sodium valproate) can develop obesity, possibly caused by medication induced hyperinsulinemia. Other anti-epileptic drugs might result in weight-loss.
Anti-depressants, anti-psychotics and other drugs targeting behaviour control may influence physical activity and dietary patterns, and cause abnormal weight gain.
Long term systemic glucocorticoid therapy and high-dose inhaled steroid therapy are well known causes of overweight.

Psychological and psychosocial problems

Children with psychological (a.o. learning difficulties) and psychosocial problems (difficulties making friends) could become overweight, because withdrawal from social life may result in a more sedentary lifestyle.

Eating disorders

There is only a weak link between bulimia and obesity, but the presence of bulimia in obese children is an indicator of poor diet control. The negative perception of the society towards overweight children (see below, § 1.5.1 'Psychosocial consequences'), may encourage vulnerable non-obese children to develop eating disorders.

1.5 Complications of obesity

1.5.1 Psycho-social consequences of overweight and obesity

Stigmatization and prejudice are among the first consequences an overweight child has to face. It is well recognized that negative personality characteristics are attributed to obese children and adolescents as they are for example described as lazy, mean, ugly, stupid, etc … The degree of negative stereotyping increases with age, and adolescent girls might be more affected than boys. On the social plan, obese adolescents in the US and the UK ended up with a lower educational attainment, earned less money and had higher poverty rates, and had a lower likelihood of marriage. Evidence for social isolation (having fewer friends) is inconclusive. Studies on the effect of obesity on the child's self-esteem generally indicate a weak association or no relation at all. Body dissatisfaction is present even in young overweight children, but it is not limited to overweight children alone. Note

that psycho-social consequences probably depend on the socio-cultural environment of the child, and different results can be expected in different populations (Lobstein et al., 2004).

1.5.2 Physical consequences of obesity (Lobstein et al., 2004; Must and Strauss, 1999)

Table 1.3 lists a selection of the most common health risks directly related to (childhood) obesity. The consequences can be of metabolic, anatomic or degenerative nature.

Not all overweight children will experience the immediate consequences, but the heavier the child the larger the likelihood than one or more pathological conditions will appear, and persist in adult life. Some of these conditions will appear only later in life, when the overweight child has become an overweight adult, but a.o. sleep disorders, non alcoholic fatty liver disease, type 2 diabetes, dys/hyperlipidaemia and hypertension might appear already in childhood.

Not listed in table 1.3 is the possible relation between overweight and cancer in later life. This process is probably mediated through hormonal abnormalities related to the development of cancer (Gascon et al., 2004).

Apart from immediate consequences of overweight in childhood, overweight children are more likely to be overweight in later life, and thus risk, indirectly, all consequences of adult overweight.

Table 1.3: Physical consequences of childhood and adolescent obesity

Pulmonary
Sleep apnoea
Asthma
Pickwickian syndrome
Orthopaedic
Slipped capital epiphyses
Blount's disease (tibia vara)
Tibial torsion
Flat feet
Ankle sprains
Increased risk of fractures
Neurological
Idiopathic intracranial hypertension (e.g. pseudotumour cerebri)
Gastroenterological
Cholelithiasis
Liver steatosis / non-alcoholic fatty liver
Gastro-oesophageal reflux
Endocrine
Insulin resistance/impaired glucose tolerance
Type 2 diabetes
Menstrual abnormalities
Polycystic ovary syndrome
Hypercorticism
Cardiovascular
Hypertension
Dyslipidaemia
Fatty streaks
Left ventricular hypertrophy
Other
Systemic inflammation/raised C-reactive protein

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Chapter 2
PROGRAMMES AND METHODS FOR THE PRIMARY PREVENTION [1] OF OVERWEIGHT AND OBESITY DURING CHILDHOOD

Nives Letnar Zbogar and Mojca Juricic

2.1 Background and rationale

While genetic factors play a part in the development of overweight and obesity, environmental factors appear to be of overriding importance. Food consumption and time trends in physical activity are important for the energy balance and the prevention of weight gain. There is strong evidence that various physical, economic and socio-cultural factors (the so-called "obesogenic environment") prompt individuals to eat large amounts of food and to take little exercise.
To fit the conditions of childhood obesity interventions Doak et al. integrated two complimentary models, namely the "specific risk factors related to childhood obesity", as defined by Davidson & Birch (2001), with the "environmental risk factors" that affect the whole community, as modelled by Kumanyika et al (2002), and applied to the condition of obesity risk in children. This resulted in an overview of causes of childhood overweight and obesity as presented in table 2.1 (see also § 1.3 'Causal factors of overweight/obesity')(Doak et al., 2006). There is general expert agreement that prevention of obesity is easier than treatment. Potential interventions for obesity in youth span a continuum from preventing the development of overweight to treating established obesity and its complications. Long-term follow-up studies show that obese children tend to become obese adults. Treatment of obese children can be a strategy for preventing adult obesity. Furthermore, effective prevention of overweight during early childhood is the first step towards preventing obesity. Prevention and treatment of overweight and obesity may be somewhat easier in children than in adults, because children are still growing in height. Therefore, when considering the prevention and treatment of childhood obesity, dietary energy restriction, increase in physical activity, and decrease in sedentary behaviour must not compromise normal growth and development. However, the explosive increase in the prevalence of obesity and its associated serious medical problems requires a common-sense approach involving preventive interventions, which are based on modern views of health promotion.

2.2 Objectives

The primary objective of this paragraph is to summarize published evidence regarding strategies for the primary prevention of childhood obesity. In addition, this search should result in the identification of the most promising elements of existing programmes and successful interventions that could be implemented and evaluated on a large scale. Last but not least, the areas for future research regarding primary prevention of overweight and obesity in childhood will be identified.

2.3 Interventions

Preventing overweight and obesity requires understanding and addressing the "obesogenic environment" (physical, economic and socio-cultural factors) in which children live. Interventions should be directed to the specific behavioural determinants and environmental factors, which underpin high-risk behaviour in the target population.

To that end, in this chapter we focus on population-based prevention programmes, particularly interventions that address environmental determinants and can be applied to a large scale and are multi-sectorial. Many settings and sectors need to be engaged for optimal effectiveness in the

[1] A formal definition of primary prevention is given at the beginning of this guideline

Table 2.1: Causes of childhood overweight and obesity (from Doak *et al.* (2006)

International factors	1. Globalization of markets: more convenience food, sedentary entertainment 2. Marketing of food to children, child-oriented food 3. Food and nutrition 4. Development: children's spending power
National factors	1. Transport 2. Urbanization 3. Manufactured/imported goods 4. Sanitation 5. Health 6. National education 7. Child labour protections 8. Vending machines 9. Media and culture 10. Economy
Community/locality	1. School buses 2. Safety of children 3. Community awareness/attitudes 4. Adult obesity prevalence 5. Community sports clubs 6. Local school board and Parent Teacher Organizations 7. Paediatric care 8. Agriculture/gardens 9. Local markets 10. Playgrounds/parks 11. Education level of community 12. Median income of community
School	1. Active play at school: time and space, physical education, school playground 2. Walking/cycling to school 3. Teacher knowledge/attitudes 4. School nurse knowledge/attitudes 5. School lunch programme 6. School snack shop 7. Education regarding diet and activity
Home	1. Family diet 2. Number of televisions 3. Family activity patterns 4. Family socioeconomic status 5. Child care 6. Parent knowledge/attitudes 7. Family paediatrician knowledge/attitudes
Individual	1. Child's diet and activity patterns at school 2. TV in child's room 3. Child's diet and activity outside school

prevention of obesity. These interventions require a broad coalition of actors, in which local and national authorities, industry, the healthcare system and the population at risk must each shoulder their own share of responsibility. Whereas formal treatment for overweight children and adolescents is delivered almost exclusively in medical settings, the settings in which preventive interventions function extend from medical settings to families and communities.

Two different approaches can be used for the implementation of interventions for the primary prevention of childhood obesity: (1) population-oriented or (2) setting-oriented approaches.

Population-oriented approaches focus on environmental and policy changes (upstream approaches) with the broadest reach and the lowest intensity and cost, and are critical for reaching the least-advantaged population segments (Figure 2.1). All children would benefit from the implementation of

population-based prevention approaches that hold the greatest promise for reducing the onset of obesity among children and adolescents.

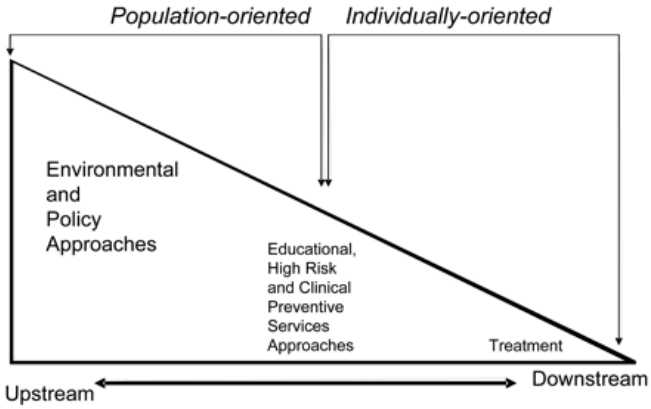

Figure 2.1: Relative emphasis on population-oriented and individually oriented interventions along the prevention-to-treatment continuum (Daniels et al., 2005).

2.3.1 Population-oriented Approaches

For a public health approach, the most desirable prevention goal is to prevent children with a normal, desirable BMI from becoming at risk of overweight or obesity. Weight status is not a perfect proxy for health status. Therefore, multiple indicators of a healthy lifestyle and improved health should be used to evaluate the success of overweight interventions and should be the primary goals (Ritchie et al., 2001).

In order to really prevent child and adolescent overweight, healthful behaviours must be introduced, modelled, and reinforced early in childhood. Here, obesity prevention refers to avoiding the occurrence of obesity during childhood and adolescence. Rather than weight loss, a reduced or stabilized BMI-for-age percentile or percentage overweight are appropriate outcomes for interventions in children. Other appropriate goals include increased physical activity levels and improved fitness levels, dietary habits, sharing of eating responsibility between parent and child, self-esteem, self-efficiency at physical activity, body image and physiological measures (decreased lipids, blood glucose, blood pressure or breathing difficulties).

Other levels of prevention, aiming at preventing at-risk-of-overweight children from becoming overweight, or aiming at the treatment of overweight children to reduce co-morbidities, reduce the severity of the problem, and normalize weight, also apply to a lesser degree. There are still no clearly effective intervention strategies for the prevention of weight gain.

More attention should be given to how prevention programs achieve effective results. In Figure 2.2 a hypothetical case of the frequency distribution of a population with excess overweight and obesity is presented. Two very different types of intervention programs might both result in an effective change in overweight and obesity.

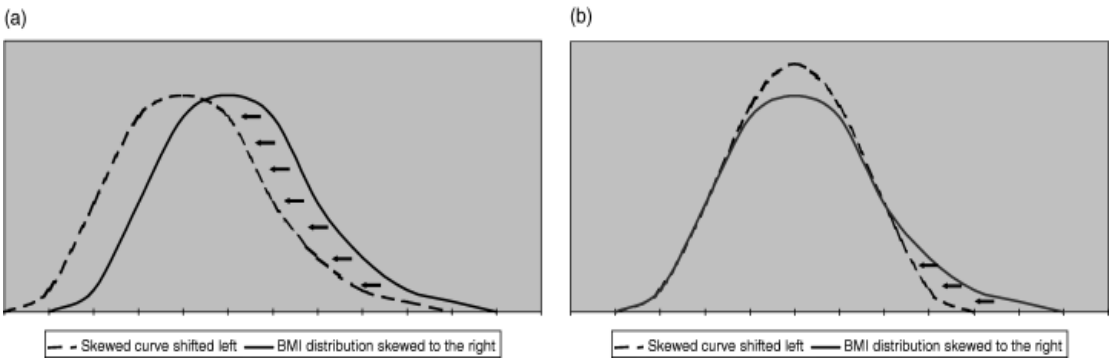

Figure 2.2: Preventing obesity by shifting the skewed curve to the left (a) and by normalizing the curve (b) (Doak et al., 2006).

The first method is to simply reduce body weight overall by shifting the mean to the left (Figure 2.2a) and thus adds to underweight and under-nutrition. A second method requires prevention of the excess overweight and obesity in a targeted way to address overweight and obesity without shifting the curve as a whole (figure 2.2b). Such programmes identify and address only those risk factors that are specifically related to causing obesity and overweight. In populations without excess overweight and obesity the goal of a primary prevention programme should be to maintain a normal distribution. This requires a very specific targeting to prevent overweight/obesity-related behaviours without contributing to weight loss in healthy children (Doak et al., 2006).

Successful prevention as defined in this report involves the maintenance of normal weight status in children over time. The interventions described have been applied to populations which are unselected by weight status (e.g., schools). These populations are expected to include overweight and obese children as well as children of normal weight. Strategies which are designed to maintain normal weight status (i.e., prevent the development of obesity) cannot be assumed to have any pre-determined effect on the weight status of children who are already overweight or obese. For this reason, the prevalence of overweight or obesity may be the most specific outcome to measure the success of prevention interventions. Some studies report this outcome based on measures of adiposity, most often BMI. Changes in the BMI of individual children will influence the BMI of the group as a whole. Therefore, increases in group mean BMI could result from development of obesity in previously normal weight children or from an increasing degree of obesity in those who were already obese. Without separating normal weight and obese children for analysis, group mean BMI data cannot distinguish between these outcomes. Given that the outcome of particular interest concerns children of normal weight, it is impossible to evaluate preventive interventions based on group BMI data alone.

The success of a prevention programme is most likely to occur if appropriate prevention strategies and interventions are initiated throughout the life course, beginning in infancy. Several recently published intervention programs and research studies have demonstrated that small changes in behaviour can result in changes in weight prevalence in the population of children.

2.3.1.1 Infants

The initiation and the duration of breast-feeding may reduce the risk of later overweight, in addition to the other benefits of breast-feeding; however, not all studies have found breast-feeding to be protective against the future development of obesity. Children who were bottle-fed seem to be more at risk of obesity later in childhood than those who were breast-fed. The explanation for this finding could relate to permanent physiological changes caused by some intrinsic factor(s) unique to human milk or to psychological factors, such as locus of control over feeding rate (baby versus parent) or taste preferences.
Breast-feeding is an ideal nutrition and sufficient to support optimal growth and development for approximately the first 6 months after birth. Promoting breast-feeding is a promising prevention strategy given its potential protective effect on later obesity and overall benefits for nutrition. Such efforts require more attention to the incentives and barriers that affect rates of breast-feeding by different subgroups within the population, including the social and environmental variables that support or discourage women's decisions to breast-feed (Kramer and Kakuma, 2002).

2.3.1.2 Toddlers

Early childhood is a time of rapid growth, development, and learning. Reasons to emphasize prevention in early childhood include adipocyte physiology, adiposity rebound, and the limited potential for reversing metabolic changes associated with overweight. During early childhood, BMI normally decreases until the age of 5–6 years, and then increases through adolescence. The age at which this BMI nadir occurs has been termed the adiposity rebound. Several observational studies (Rolland-Cachera et al., 1984; Whitaker et al., 1998; Wisemandle et al., 2000) have described an increased risk for obesity later in life in individuals who have an early adiposity rebound. However, the biological importance and predictive value of this association remains a matter of debate (Freedman et al., 2001; Dietz, 2000; see also § 1.4.3 'Age of start of overweight – adiposity rebound'). Findings from the *Healthy Start Preschool Study* suggest that a reasonable goal for preschool interventions would be to

aim a weight gain of 2.5 lb/in (1.0 kg/2 cm) of growth. This rate of gain from preschool age (3 to 4 years) onward predicted desirable weight at 8 to 9 years of age, whereas a gain of 5 lb/in (1.8 kg/2 cm) predicted overweight at elementary school age (Williams et al., 2004).

Strategies to achieve an optimal rate of kilograms gained per cm growth might help families and children acquire the critical life skills to enable them to better balance energy intake (diet) with energy expenditure (physical activity). Goals are to work toward establishing healthy environments at home, at school, and in the community that encourage families and children to practice and maintain the life skills that are conducive to maintaining a healthy weight. It is estimated that for every 20% of excess body weight, a child will need 1.5 years of weight maintenance to attain ideal body weight (Dietz, 1983). The important role of parenting skills and teacher training in helping young children to learn and practice healthful behaviours has increasingly been recognized. With regard to eating behaviour, it has been established that food preferences are often acquired at an early age and the preferences for energy-rich foods are easily acquired (Birch, 1999). So, behaviour targets include increasing consumption of fruits and vegetables ("5-a-day"), increasing consumption of fibre-containing grain products, switching from full-fat to 1% fat or fat-free dairy products after 2 years of age, preparing and eating family meals at home, increasing daily physical activity (e.g., active play 1 h/d), and limiting sedentary time (e.g., watching television ≤ 2 h/d).
The outcome of Dennison's study (2002) was that children with TV in their bedroom were more likely to be overweight and spent more time (almost five hours per week more) watching TV/videos than children without a TV in their bedroom.

Early interventions targeting toddlers and early childhood diet and physical activity should be followed by booster interventions in elementary years and beyond, seeking to increase the length of time spent in physical education, decrease sedentary behaviours such as TV viewing, decrease accessibility to high fat, high sugar, caloric dense foods and beverages, improve availability of physical activity programmes and ensure safe environments promoting physical activity. The pre-adolescent and adolescent years are accompanied by a fall-off in both physical education and physical activity outside of schools and an increase in less healthy eating behaviours associated with dieting, particularly in girls (Ritchie et al., 2001).

In younger children, most of the recommendations will target on parents, because the involvement of parents and their child is a prerequisite for the effectiveness of an intervention. In adolescents the advice should be targeted directly on the adolescent him/herself. Even at young ages, however, the child should be included in identifying feasible and desirable behaviours and strategies as targets for change.

2.3.1.3 School aged children and adolescents

Most efforts to prevent obesity among school age children and adolescents have been implemented in school settings. There is ample evidence that interventions that include classroom curricula, physical education curricula, changes in school meals, vending machines, cafeterias, and after-school programs, can increase physical activity and improve dietary patterns in children and adolescents (Resnicow and Robinson, 1997; Campbell et al. 2001). However, many of these interventions have not successfully changed weight and body fat.

Two recent reviews and one evidence report have summarized the outcomes of different interventions for primary prevention of obesity and overweight in childhood. The first review (Doak et al, 2006) and the evidence report (Canadian Institutes of Health Research, 2004) include respectively 25 and 19 studies/articles addressing the primary clinical questions (cited 34 articles). Twenty citations are overlapping in both overviews. The second review (Ritchie et al., 2001) includes 19 studies, of which some are also cited in both other reviews. An overview of the included studies in all three documents is presented in tables 2.2 and 2.3. The first review and the evidence report are discussed here below. The results of the second review (Ritchie et al., 2001) are presented in § 2.3.2.2 'School-setting' below.

Doak et al. (2006) used the six criteria of action and the 10 action principles by Kumanyika et al. (2002) to assess interventions. In order to be included in this review a study must meet the four following inclusion criteria:

- The study must focus on school aged children (6-19 years of age);
- The study must have taken an anthropometric measurement of body weight or adiposity (such as BMI or skin-folds) at baseline and follow-up;
- The study must include an intervention on a diet or physical activity-related behaviour or both;
- The study must be monitored and evaluated in a manner that has been documented (i.e. as a published paper or with publicly accessible documentation).

The list of interventions included in the review is presented in table 2.2.

Table 2.2: Interventions included in the review, *(a) effective studies* §

Author(s)	*Type of program*	*Location*	*Study length*	*Age, years*	*Sex difference*	*Schools (n)*	*Students (n)*	*Height/weight***	*Skinfolds*
Alexandrov et al., 1992	Diet + Activity	Russia	1 y	11–12	only boys included	23	766	Effect on BMI	
Dwyer et al., 1983	Activity	Australia	2 y	10		5	216	No effect on BMI	Effect on sum of four skinfolds
Flores, 1995	Diet + Activity	USA	12 w	10–13	Effect in girls only	1	110	Effect on BMI	
Gortmaker et al., 1999	Diet + TV + Activity	USA	22 m	11–12	Effect in girls only	10	1.295	Effect on obesity prevalence**	Effect on obesity prevalence**
Harrell et al., 1996	Diet + Activity	USA	8 w	8–9		12	1.274	No effect on BMI	Effect on skinfolds (not specified)
James et al., 2004	Diet Beverage	UK	3y	7–11		6	644	Effect on overweight and obesity prevalence**, not on BMI	
Kain et al., 2004	Diet + Activity	Chile	26 w	Grades 1–8	Effect in boys only	5	3.086	Effect on BMI and waist circumference	No effect on skinfolds
Killen et al., 1988	Diet + Activity	USA	8 w	14–16	Effect in girls only	4	1.130	Effect on BMI	Effect on triceps and subscapular skinfolds
Manios et al., 1998	Diet + Activity	Greece	3 y	6		40	962	Effect on BMI	Effect on suprailiac skin-folds, but not by three other skinfold measures
McMurray et al., 2002	Activity	USA	8 w	11–13		5	1.140	No effect on BMI	Effect on subscapular skinfolds
Müller et al., 2001	Diet + TV + Activity	Germany	1 y	5–7		–	1.640		Effect on triceps skin-folds and percentage fat mass
Robinson, 1999	TV	USA	30 w	8–9		2	192	Effect on BMI, waist circumference, waist-hip ratio	Effect on triceps skinfolds
Rodgers et al., 2001	Diet + Activity	USA	10 w	9		1	109	No effect on BMI	Effect on triceps skinfolds
Sallis et al., 2003	Diet + Activity	USA	2 y	11–13	Effect in boys only	24	26.616	Effect on BMI	
Simonetti D'Arca et al., 1986	Diet	Italy	1 y	4–9		3	1.321	Effect on ** overweight and obesity prevalence	
Tamir et al., 1990	Diet + Activity	Israel	2 y	Grade 1 (6 y)		16	829	Effect on BMI	
Vandongen et al., 1995	Diet + Activity	Australia	36 w	10–12		30	971	No effect on BMI	Effect on triceps skinfolds in FIT+SN group. No effect on subscapular skinfolds

Table 2.2 (cont): Interventions included in the review, *(b) non-effective studies* §

Author(s)	Type of program	Location	Study length	Age, years	Sex difference	Schools (n)	Students (n)	Height/weight**	Skinfolds
Alexandrov et al., 1992	Diet + Activity	Russia	3 y	12–15	Only boys included	23	766	No effect on BMI	
Bush et al., 1989	Diet + Activity	USA	2 y	9–13		9	431	No effect on BMI	No effect on triceps skinfolds
Caballero et al.,2003	Diet + Activity	USA	3 y	8–10		41	1.704	No effect on BMI and BIA	No effect on triceps skinfolds and subscapular skinfolds
Donnelly et al., 1996	Diet + Activity	USA	2 y	8–12		(*)	338	No effect	No effect
Leupker et al., 1996; McKenzie et al., 2001; Nader et al., 1999; Perry et al., 1990; Webber et al., 1996	Diet + Activity	USA	30 m	8–10		96	3.959	No effect on BMI	No effect on triceps skinfolds and subscapular skinfolds
Sahota et al., 2001	Diet + Activity	UK	1 y	7–11		10	595	No effect on BMI	
Sallis et al. 1993	Activity	USA	2 y	9–10		7	550	No effect on BMI	No effect on sum of triceps and calf skin-folds
Walter et al., 1988 and 1989	Diet + Activity	USA	60 m	9–13		37	2.474	No effect on BMI	

BMI, body mass index; FIT + SN, fitness + school nutrition
(*) 2 school districts
** Percentage overweight/obesity based on BMI in height/weight column, or based on skinfolds in skinfolds column
§ The authors in this table refer to the reference list in the review article of Doak et al., 2006. All references are also included in the reference list at the end of this chapter

The effectiveness of the interventions was based on observed statistical differences between the intervention and control groups according to height/weight measures (e.g. BMI), skinfolds or both.

Conclusions are the following:

- Seventeen of the 25 selected articles were found to be effective in reducing overweight, obesity or one of the adiposity measures for at least one subgroup.
- Four of the 17 effective interventions showed an effective outcome both in terms of BMI and skinfold measures. Only two of these four studies were also equally effective for both boys and girls. In total, five studies showed different results by gender (three were effective for girls, two for boys).
- Only three studies commented on the intervention impact on underweight. Eating disorders have been assessed separately only for the *Planet Health study* (Gortmaker et al., 1999) showing a beneficial effect on the intervention. Thus an intervention shown to be effective against overweight/obesity was also associated with reduction in eating disorders. No other studies had separate assessments of eating disorders.
- Three other studies showed that the intervention was not related to a reduction, but rather a statistically significant increase in weight for height measures in part of the target population or in the whole intervention group (increase lean body mass).
- The four interventions showing an effective outcome both in terms of BMI and skinfold measures all intervened on activity, and two included in addition an intervention on television.
- Given an intervention focusing on increasing physical activity, a significant reduction in skinfolds can occur in the absence of a change in height for weight or BMI centiles. Such a result may be a positive indication. Killen et al. (1988) showed an increase in BMI simultaneous to reduction in skinfolds thickness. This result indicates that a reduction in adiposity can occur while maintaining or even increasing children's lean body mass. (This could be one of the reasons why some interventions were found to be ineffective in reaching weight maintenance goals in terms of BMI measures).
- A simple approach that intervenes on only one behaviour can also be successful. For example, the three programs included in this review that attempt to reduce television viewing were effective, even when this was done through education. Reducing television viewing in children is a simple

approach that targets a single behaviour. (Quantitative comparison indicates that effective studies focus on a limited number of factors.)
- Another effective intervention consisted of a clear and simple message of reducing consumption of carbonated beverages.
- The extent to which caregivers' involvement contributes to program effectiveness is not clear. However, parental involvement should be encouraged, as parental support is helpful for the continuation of most school-based programs.

Compared to the effective interventions the non-effective interventions intervene more on diet and activity, include more activity outside school as part of the intervention and target more on the physical environment, more frequently require active participation of children and also more actively involve parents and the broader community, and more frequently address family level factors. These findings, however, reflect the limitations of a purely quantitative comparison of interventions. The mean participation rates and sample sizes varied considerably between interventions. This may have resulted in a considerable bias of the findings of this review. The so-called "effective" interventions might have included samples of more motivated participants, with the involvement of fewer and larger schools, on average resulting in a better outcome of the intervention.

To improve future interventions, Doak and his colleagues proposed the following recommendations: (i) indicators of the body composition (skin folds, weight, height) should be used as parameters for measurement; (ii) more attention should be given to the improvement of participation rates of the intervention; (iii) targeting heterogeneous groups, as exist in larger school, should be avoided; (iv) health promotion messages should be tailored according to ethnicity, gender and age; (v) the intervention should directly alter the physical and social environment(physical education, school canteen); (vi) more attention should be given to long-term sustainability - incorporating the intervention into the school curriculum; (vii) the frequency distribution of BMI and adiposity should be reported; (viii) side effects of interventions, such as stigmatizing of obese children should be reported; and (ix) all interventions, even with small sample sizes, or without proven effectiveness should be published.

Doak and his colleagues also propose that the best practice for obesity prevention is an intervention that includes both physical activity and diet, is aimed at sustainability of the infrastructure, and is tailored to the circumstances of the target school. Results should be reported not only as changes in percentiles of overweight and obese children, relative to the control, but also in terms of the population distribution for adiposity and weight/height measures, in comparison with the controls. These interventions can be used as a starting point to be improved and adapted to local circumstances.

The Canadian Institutes of Health Research (2004) identified systematic reviews and meta-analyses, and evaluated the quality of evidence by means of the *Levels of Evidence* produced by the Oxford Centre for Evidence-based Medicine (Phillips et al., 2001).

Studies must have met the following criteria to be included in the report:

- Evidence summary, meta-analysis, systematic review or narrative summary of prevention and/or treatment of obesity;
- Subjects 0-18 years of age;
- Outcomes summarized using some measure of adiposity (e.g., BMI or % overweight); and
- Outcomes summarized using some measure of dietary intake and/or physical activity.

Review papers, identified by the Canadian Institutes of Health Research, evaluating preventive approaches using measures of adiposity as primary outcome measures, are presented in table 2.3.

Table 2.3: Review papers which evaluated approaches to prevention using measures of adiposity as primary outcome measures (Canadian Institutes of Health Research, 2004) §

Study	Objective	Population	Quality Score
Systematic reviews			
Campbell et al., 2003	To assess the effects of a range of lifestyle interventions designed to treat obesity in childhood	Less than 18 years excluding pregnant and critically ill	7
Hardeman et al., 2000	To inform an ongoing intervention aimed at the prevention of weight gain among people not selected by weight	Mothers & daughters, school children, family	3
Reilly et al., 2002	To provide evidence based answers to five frequently asked questions: 1. How should obesity be diagnosed? 2. What is its prevalence in the UK? 3. Is it preventable? 4. Is it treatable? 5. How should it be managed?	Children	4
Resnicow and Robinson, 1997	Reviews 16 major school-based cardiovascular disease prevention trials	School children with quantitative assessment of at least one major cardiovascular disease (CVD) physiologic risk factor or two major CVD behavioural or cognitive risk factors	3
Schmitz et al., 2002	To outline the known or suspected risk factors for obesity, summarize a proposed three tiered obesity prevention approach, review prior studies focusing on general population obesity prevention and outline future research efforts towards obesity prevention	General population including United States and Europe	2
Swedish Council on Technology Assessment in Health Care, 2002	Reviews the scientific evidence concerning the medical interventions against obesity	School children 5 - 13 years; parents	2
Narrative Reviews			
Dietz and Gortmaker, 2001	To review what is known about effective strategies for preventing obesity that can operate within our changing environments	Children, adolescents, parents	1
Fulton et al.,2001	To review the weight loss treatment and weight gain prevention studies conducted among youth, consider the current issues related to these studies and outline new approaches for weight loss treatment and weight gain prevention research	Children, adolescents, Indian children	1
Muller et al., 2003	Not stated	Children & adults, children & parents	1
Raine (2004)	To provide adequate surveillance of obesity and associated non-communicable diseases for targeting appropriate and effective public health interventions.	General population, concentrating on North American data	1
Resnicow, 1993	To review the methods, results, and limitations of the major school-based studies as well as to discuss their potential for large-scale dissemination	Elementary and Junior High students	1
Story , 1999	To review the research on school-based interventions to treat or prevent obesity	Children, adolescents, youth	1

§ The authors (and years of publication) cited in tables 2.3 refer to the reference list in the review article of the Canadian Institute of Health Research (2004). All references are also included in the reference list at the end of this chapter

Among the 6 systematic reviews:

- The majority of interventions were school-based, but some included components in the family or community setting;
- Information delivered in a classroom setting was often accompanied by changes in scheduled physical activity and food available within the school;
- Duration of the intervention and follow-up periods were highly variable, ranging from weeks to years;
- Outcomes were commonly expressed as change in Body Mass Index (BMI), change in percent overweight (% OW), change in skinfold measurements or change in obesity prevalence;
- One of the reviews (Resnicow and Robinson, 1997) focused specifically on programmes designed to reduce cardiovascular risk in children.

In general, out of these systematic reviews it was concluded that current evidence is insufficient to support the effectiveness of interventions directed at obesity prevention in children and adolescents.

In their systematic review Resnicow and Robinson (1997) evaluated the effect of multi-component cardiovascular prevention programmes. Across the studies, they found significant improvement in the smoking outcomes reported (65% of the outcomes), in the objective physical outcomes (36%), in the dietary intake outcomes (34%), in the lipid outcomes (34%), in the physical activity outcomes (30%), in 18% of the blood pressure measures reported, and only in 16% of the adiposity outcomes reported. These results suggest that obesity may be more difficult to change through school-based health education interventions than some other cardiovascular disease risk factors. Sixteen studies provided information on 77 individual interventions using a measure of adiposity as an outcome. Of these 77 interventions, only 7 produced a significant positive outcome. It was concluded that cardiovascular prevention programmes are not effective in improving adiposity in children.

Among the 6 narrative reviews, conclusions regarding preventive strategies were based on the results of selected intervention studies or obtained by deduction from literature on related topics and opinion statements (Dietz and Gortmaker, 2001). Despite the differences between the studied approaches, several of these reviews also concluded that preventive interventions lack supporting evidence.
Dietz and Gortmaker (2001) suggested that anticipatory guidance delivered by health care providers with regard to energy intake and expenditure within the family setting would be a useful strategy in preventing childhood obesity.
Examples of advice, such as sharing of parent/child responsibility with regard to eating, limitation of television viewing and incorporation of physical activity into daily life, were provided.
Resnicow and Robinson (1997) recognized the variable outcomes for school-based prevention programmes, but described components of successful programs as for example nutritional information, skills training, behaviour modification, screening and parental involvement.
Muller and colleagues (2003) also suggested that parental involvement was valuable in the setting of prevention among children at high risk (e.g., children of obese parents).
Raine (2004) made several recommendations regarding school, family and community prevention.
While supporting evidence is provided, it should be noted that the evidence does not support a direct effect on obesity prevention, but rather an effect on dietary and physical activity behaviours.

Although genetic factors play a part in the development of overweight and obesity, environmental factors appear to be of overriding importance (school playing fields, safe environment in which to walk or cycle to school, physical play at home, transport polices that favour cycling or walking).

Further research is needed to evaluate the specific reasons for this lack of change in body weight, including insufficient duration of the intervention and lack of consistent lifestyle changes outside school.

Children in Ethnic Minority Populations

The challenge of obesity prevention includes the need to develop tailored strategies that are well matched to the social and cultural contexts of children in ethnic minority populations with a high risk of obesity. Eating behaviour, the level of activity, and perceptions of weight and health are strongly influenced by cultural norms and culturally influenced attitudes and values. The relevant variables can be considered from programmatic, child-related, familial or environmental perspectives, which each in turn are specified along multiple related dimensions such as ethnic identification and related cultural attitudes, beliefs and values, family and household characteristics, and variables related to socio-economic status. The theoretical background to develop culturally specific prevention strategies is available, but not yet fully used or outlined with regard to the specifics of obesity prevention (Kumanyika, 2004).

Culturally adapted obesity prevention studies in ethnic minority populations identify strategies that deserve further testing (Flores, 1995; Kumanyika, 2004). Culturally specific programming tends to shift control to the client population and challenges providers to acknowledge their own personal and professional cultural concepts and biases. A fundamental issue is whether the social and familial relationships and cultural practices defining the patterns of daily living in the client population are viewed as targets for change, as difficulties to be overcome, or as positive forces that can be

leveraged in favour of the programmatic goals. Other important issues are the respective roles of those from inside versus outside the communities of interest and the ability to sustain over the long-term programs that are well received and effective in the short term.

2.3.2 Setting-oriented Approaches

Interventions in health care that teach providers effective counselling or deliver additional services can be effective, but there are significant barriers to the implementation in such settings. Overall, the strength of setting-specific approaches is the ability to intervene in the setting itself - in other words -, to consider the setting as an environment in which policies and practices can be changed to enable targeted behaviours and discourage competing behaviours. The key limitations of setting-specific approaches are that they reach a limited portion of the population and they do not coordinate strategies or messages across settings.

2.3.2.1 Family-setting

Physical activity and eating often take place in the family-setting. Interactions among family members determine leisure-time activities and types of food purchased as well as the timing, setting, preparation, size, and composition of meals. Interactions between parents and children, role-model behaviour by parents, and rules imposed during upbringing are major factors that can effect the development of overweight in children. Family life has changed a lot over the past two decades, with trends towards eating out, less physical activity and greater access to television than previously.

Families play an important role in the physical activity of children. The more time children are outdoors, the more likely they are to be physically active. Parental support for physical activity and parental modelling of physical activity are likely to influence the levels of children's physical activity. Moreover, social support from parents and others correlate strongly with participation in physical activity (Sallis et al., 2000). Reliance on the automobile has increasingly replaced walking and bicycling as modes of transportation. Neighbourhood design, safety, and zoning regulations all may have an impact on the lifestyle and physical activity of children, adolescent, and adults. The effectiveness of interventions targeting environmental factors (in areas such as housing, transport systems, education, pricing and fiscal measures, and available food) has also been too poorly studied to be conclusive.

The duration of television viewing is associated with the risk of obesity as a consequence of diminished physical activity or increased food consumption while watching television. The energy intake of children is higher when meals are eaten in restaurants than at home (Zoumas-Morse et al., 2001), possibly because restaurants tend to serve larger portions of energy dense foods. By contrast, eating family dinner seems to decrease television-viewing (Wiecha et al., 2001).

Children and adolescents with overweight parents are at increased risk of being or becoming overweight themselves and may benefit from more intensive counselling (Williams et al., 2002). Assessment of usual diet and activity patterns will highlight simple preventive measures to increase physical activity, decrease inactivity, and encourage healthier food choices and portion control. Utilization of a clinical dietician may also be beneficial for this purpose.
There has been scarcely any systematic research into the effectiveness of preventive interventions in family-settings used in accordance with modern views on health promotion.

2.3.2.2 School-setting

Schools are an important channel for obesity prevention programmes, because most children and adolescents are enrolled in school and spend a large part of most days in school. Schools are a major setting for eating and physical activity. Schools also provide strong links to families and community-based organisations. Barriers to school-based obesity prevention programs include an already crowded curriculum and emphasis on academic subjects, the placement of low priority on health and high priority on test scores, modest intervention effects and dissemination challenges.

Most studies have targeted changes in physical activity, dietary intake or school practices as the primary study outcomes, with adiposity measured as a secondary outcome. The underlying theoretical

models prompted interventions that addressed changes in schools as a whole including administrator and teacher behaviours, in addition to the children's behaviours themselves. Typical interventions in specific settings are based on individual behavioural theories and designed to enhance motivation and teach behaviour-change skills in large groups. In-group settings, hands-on experiences with food or activity are often provided on site.

Ritchie et al (2001) prepared an overview on paediatric overweight for the California Department of Health Services.

From this overview of selected school-based interventions the following was concluded:

- It is not clear which elements of physical activity are most crucial to body weight regulation or health (intensity, duration, type of activity, overall energy cost,..);
- One of the most promising areas of intervention focuses on television viewing. TV viewing is believed to result in both reduced energy expenditure and increased energy intake (food advertising and increased consumption while watching TV);
- Focusing on calorie counting does not appear to be an effective strategy for preventing overweight among children. Diet low in fat, in the absence of other lifestyle changes, appears to hold limited promise;
- School-based interventions have been successful in increasing fruit and vegetable consumption, with decrease in fat intake. The effect on weight status has not been systematically evaluated;
- Limiting fast food and less healthy vending machine food at schools may be one way to impact dietary behaviours of school-age children, but effect on overweight remains to be determined;
- Skipping breakfast and frequent intake of high-fat snack food has been associated with overweight among children;
- Teaching parents' ways to improve parent-child interactions related to eating, meal time and physical play is likely an area for successful overweight intervention. It is recommended that parents be responsible for selecting healthy food and the manner in which this food is presented, and children be allowed to select from the food choices and determine the quantity consumed. Similar - positive promotion of physical activity is recommended;
- Family involvement is critical to successful overweight intervention among children (one of the reasons why school-based programmes failed);
- Interventions that begin in early childhood are recommended;
- Providing health promoting environments and education, and empowering children to make healthy lifestyle choices are examples of strategies that need to be investigated for their effects on children's health outcomes;
- Children must be equipped not only with the "know what" but also with the "know how" and "where";
- Lifestyle interventions must be long-term. Interventions that incorporate "booster" messages or that can be continuously modified to be relevant for older age groups are recommended.

In her overview, Ritchie also focuses on critical periods and persistence of overweight into adulthood. The predictive value of overweight in childhood as a risk factor for adult obesity was highest in 10 to 15 years olds. In addition to early adolescence, there appear to be at least 2 other periods during childhood characterized by an increased risk of developing overweight which persists into adulthood: prenatal and during the period of adiposity rebound which generally occurs between 4 and 8 years of age (Dietz, 1997). Studies suggest that the adiposity rebound is a critical period at which to institute overweight interventions. According to other authors this is mostly a statistical phenomenon since higher centiles (and therefore heavier children) show an earlier rebound compared to lower centiles (Cole et al, 2004) (see also paragraph 1.4.3 of this report). Some data (Crawford et al., 2001) suggest that BMI is extremely stable between 9 and 17 years of age and primary prevention of overweight should begin prior to 9 years of age.

While theoretically multiple risk factors are amenable to preventive interventions, focusing on a few behaviours may be most efficacious. Physical activity promotion, strategic dietary changes (lower fat milk and decreased soda consumption), promotion of family mealtime and activity represent examples of risk or protective factors that could be targeted.

Diet and Physical Activity Behaviour Change (Canadian Institutes of Health Research, 2004)

The most direct evidence for the efficacy of obesity prevention or treatment is provided by studies using measures of prevalence or degree of adiposity as the measured outcomes, such as those described above. Interventions which measure dietary and/or physical activity change, without specifically focusing on adiposity are described below. Search strategies yielded 18 reviews evaluating the effects of interventions designed to promote change in dietary and physical activity behaviours.

Strategies to Promote Increased Physical Activity (eight reviews)

There is evidence to support some effectiveness of school-based intervention.

- Changes to physical education classes were highly effective in increasing physical activity during school hours;
- Low-intensity leisure time activity (analogous to "lifestyle" activity) was associated with favourable outcome;
- Schools should provide children with the knowledge, attitudes and skills necessary for life-long physical activity. The effectiveness of programmes in meeting this goal can only be measured by long-term follow-up.

In conclusion: interventions to increase physical activity in the school setting are strongly recommended.

Strategies to Promote Dietary Change (6 reviews and included data from approximately 59 individual studies)

The majority of studies (42/59) demonstrated some positive outcome related to dietary intake behaviour.

- Strategies are aimed at supporting changes in diet-related behaviour not specifically set in the context of childhood obesity;
- Positive outcomes defined by changes in food-related behaviours, were identified in the two studies that focused on knowledge enhancement and strategies for behaviour change;
- As these interventions were school-based, classroom instruction was a constant feature, but was supplemented by a variety of other interventions (e.g., modifications to school lunch programs, enhanced physical activity, parental participation).

In conclusion: there is good evidence to support the use of school-based interventions to improve dietary behaviour, in favour of behaviourally-based approaches over knowledge-based approaches.

It could be learned also that we must focus on obesity as a behavioural problem by targeting specific, “countable” and changeable types of behaviour that contribute to energy intake and expenditure (Ritchie et al., 2001).

2.3.2.3 Community-wide

This approach includes co-ordinated interventions in multiple settings and may include mass media components. An underlying concept is that behaviour-change interventions in multiple sectors, reaching many segments of the population, are needed to create population change. Community-based interventions to promote healthy dietary patterns offer a promising but relatively unexplored strategy to control obesity. The effectiveness of community-wide interventions is not yet well established.

2.3.2.4 Environmental policy

This approach is based on the concept that education and motivational interventions will be more effective in social and physical environments where healthful choices are the easier choices. The environment includes not only physical (what is available and promoted; e.g., food choices in homes,

fast food advertisements on television, opportunities for or barriers to physical activity) and economic aspects (financial factors; e.g., the price of soda versus water, subsidies to sugar farmers), but also mass media, policy (rules; e.g., school food service standards, regulations on marketing that targets young children) and socio-cultural characteristics (attitudes, perceptions, beliefs, and values such as fast food, everyday food, personal responsibility, and the ethos of governments) (Swinburn at al., 1999).

2.3.2.5 Media

Exposure to various media may be important in considering population-based prevention efforts. For example, a substantial proportion of the advertising on children's television promotes food, and there is a direct relationship between television viewing and obesity. Furthermore, reducing television viewing has reduced weight gain and the prevalence of obesity in experimental trials (Robinson, 1999; Gortmaker et al., 1999). It has been hypothesized that television promotes obesity through the consumption of food while watching television, the consumption of food advertised on television, or through reduced physical activity (Gortmaker et al., 1996; Robinson, 2001; Matheson et al., 2004). Food advertising has become a particularly controversial issue. The Kaiser Family Foundation recently suggested that the relationship between television viewing and overweight in childhood was mediated by the effect of televised food advertising directed at children (Kaiser Family Foundation, 2004), and the American Psychological Association called for a ban on all televised advertising directed at children <8 years old (American Pathological Association, 2005). The conclusions of all of the bodies that reviewed this literature, however, have not been consistent (British Office of Communications, 2004). Despite supporting evidence, there is insufficient causal evidence to definitively link advertising directly to childhood obesity.

2.4 Conclusions

- Recommend strategies to prevent obesity including exclusive breastfeeding, child-regulated energy intake, promotion of active lifestyle including limitation of television viewing, promotion of fruits and vegetables, and restriction of energy-dense, nutrient-poor foods and sugar-sweetened drinks. In addition, it is recommended that the environment be adapted to enhance physical activity.
- There is insufficient evidence to support the recommendation of a specific strategy for the prevention of obesity in children. Prevention is disturbingly under-represented in the existing literature and no specific approach to intervention can be recommended.
- This document does not propose a specific approach to action, but merely provides the tools with which to develop an approach uniquely suited to the population it is developed for.
- Investments are needed to implement large-scale childhood overweight and obesity prevention initiatives. The necessary investments are not only a financial commitment, from all sectors of society, but an investment in time, effort and emphasis. Overweight and obesity prevention programmes can be sustained only through ongoing support from multiple sectors in society, including parents, teachers, school administrators, industry and government agencies. The problem of childhood obesity is too extensive, and the consequences too severe and costly, to postpone intervention.
- Despite of the potential benefits of obesity prevention, current prevalence data indicate that many children will also be candidates for treatment. It is clear that treatment programmes should include strategies to address diet, physical activity and behavioural change.

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Chapter 3
PROGRAMMES AND METHODS FOR THE SECONDARY PREVENTION [2] OF OVERWEIGHT AND OBESITY DURING CHILDHOOD

Ivana Pavic Simetin, Nina Perkovic and Marina Kuzman

Taking into consideration the increasing prevalence of obesity in the world, the need for investment in the primary and secondary prevention in child- and adolescenthood is widely recognised. Primary prevention should establish a healthy, active lifestyle and keep children and adolescents within a range of body weight considered to be healthy. Secondary prevention should be mandatory for those already overweight or obese, aiming at long-term weight maintenance and normalisation of body weight and body fat. Therapeutic intervention programmes have to modify eating and exercise behaviour of the overweight/obese child and establish new, healthier behaviour and lifestyle (Zwiauer, 2000).

Primary care services could play an important role in secondary prevention of overweight and mild obesity in children (Wake and McCallum, 2004). After attending training sessions on management of childhood obesity in Australia, GP-s felt more competent to manage childhood obesity and felt more that they could make a significant difference to children's weight (McCallum et al., 2005). The *British Medical Association* issued "Preventing Childhood Obesity" (2005), which is a guide for general practitioners and other health care professionals on aspects of childhood obesity. It is stated that primary care is the ideal setting for opportunistic delivery of dietary advice. Of primary importance is the recognition of young children with obesity, as they are likely to benefit most from simple clinic-based approach, offering regular education and support with the health professionals playing an important role in this process.

3.1 Systematic reviews, scientific statements, longitudinal observational studies and guidelines

3.1.1 General remarks

According to the recommended grading, in this literature search the main focus was on systematic reviews and RCTs (Harbour and Miller, 2001). Thus for the evaluation of secondary prevention interventions we have included RCTs and systematic reviews. However, general recommendations on secondary prevention are based on expert committees, recommendations, guidelines, and longitudinal observational studies, since formal trials are not easily carried out.

Although different in many aspects, all systematic reviews and guidelines have in general the same implications regarding the methodology and outcomes of the studies. Thus, there is no conclusive evidence to prove that any one particular programme can prevent obesity in children, although some studies resulted in some improvement in eating behaviour and physical activity. No generalisable conclusion can be drawn with confidence that one strategy or combination of strategies is more successful than others in the treatment of childhood obesity.

There is some evidence that the following interventions may help to reduce obesity in childhood:

(1) comprehensive strategies (dietary and physical activity change, psycho-social support and environmental change);

[2] A formal definition of secondary prevention is given at the beginning of this guideline

(2) multifaceted school-based programmes (promoting physical activity, modification of dietary intake, targeting of sedentary behaviours);
(3) multifaceted family-based programmes (involving parents, increasing physical activity, providing dietary education, and reducing sedentary behaviour) with better outcomes if parents take primary responsibility and act as agents of change, and participate in initiatives of family therapy or lifestyle modification.

Authors concluded that the methodological quality of most of the studies was poor, most studies were too small, had high drop-out rates and unreliable outcome measurements, to have enough statistical power to detect the effects of the treatment. More research is required.

3.1.2 Main conclusions of systematic reviews

Whitlock et al (2005) examined the evidence for the *benefits and harms of screening and early treatment of overweight among children and adolescent in clinical settings*. The reviewers graded 22 trials with US Preventive Services Task Force criteria that addressed interventions feasible in primary care settings. Only few studies have taken place in primary care settings, and most studies were executed in research or specialty obesity clinics, offering intensive and comprehensive behaviour treatment. For all ages, there is **very limited evidence for behaviour or other overweight treatment that is feasible in primary care settings.** If larger studies confirm that behavioural skills and approaches are key to treatment success, then creation of referral clinics or the involvement of clinic team members with expertise in the management/psychology of weight-related behaviour will be critical.

Summerbell et al. (2005) investigated *interventions for preventing obesity in children based on selection criteria for randomised controlled trials and controlled clinical trials, with minimum duration of twelve weeks.* Twenty-two studies were included: ten long-term (at least 12 months) and twelve short-term (12 weeks to 12 months). The studies tested a variety of intervention programmes, which involved increased physical activity and dietary changes, singly or in combination. Participants were under 18 years of age. Studies that focused on combined dietary and physical activity approaches did not significantly improve BMI, but some studies that focused on dietary or physical activity approaches showed a small but positive impact on BMI status. Nearly all studies included resulted in some improvement in diet or physical activity. **There is not enough evidence from trials to prove that any particular programme can prevent obesity in children, although comprehensive strategies to address dietary and physical activity change, together with psycho-social support and environmental change, may help.**

In another review, *Summerbell et al. (2003)* included selected *randomised trials of lifestyle intervention for treating obesity in children, with minimum interventions of six month.* Lifestyle interventions include dietary, physical activity and/or behaviour therapy interventions, with or without inclusion of family members. There are 18 randomised controlled trials included with in total 975 participants: five studies on physical activity and sedentary behaviour, two studies compared problem-solving and usual care or behaviour therapy, nine studies focused on behaviour therapy and two other studies compared cognitive behaviour therapy with relaxation. **It was concluded that no direct conclusions can be drawn from this review with confidence. More research is needed to find the best way to treat children who are overweight.**

Wilson et al. (2003) identified 35 *randomised controlled trials* selected on the basis of the issue of effective health care being present in its content (2002) and he combined this with Cochrane reviews (2002), *focusing on the effectiveness of interventions in the prevention and treatment of childhood obesity.* There is a lack of good quality evidence on the effectiveness of interventions on which to base national strategies or to inform clinical practice. There is **some evidence that multifaceted school-based programmes that promote physical activity, the modification of dietary intake, and the targeting of sedentary behaviours,** may help to reduce obesity in school children, particularly girls. **Multifaceted family-based programmes that involve parents, increase physical activity, provide dietary education, and target reductions in sedentary behaviour, may help children to lose weight.**

Reilly et al. (2002) concluded that there is **no conclusive evidence that childhood obesity is preventable at present,** based on systematic reviews and meta-analyses. A number of approaches to treatment are promising, notably the control of sedentary behaviour such as TV viewing.

Robinson (1999) suggests that **structural and organizational components in the treatment content are most likely to be successful.** These include a group format with individualized behavioural counselling; parent participation; frequent sessions; a long treatment duration; a simple and explicit diet that produces a calorie deficit; a physical activity programme emphasizing choice and reinforcing reduced sedentary behaviours; changes in the home and family environment to help reduce cues and opportunities associated with calorie intake and inactivity, and to increase cues and opportunities for physical activity; self-monitoring; goal setting and contracting; parenting skills training; skills for managing high-risk situations; and skills for maintenance and relapse prevention.

Epstein et al (1998) reviewed major components of treating paediatric obesity (32 clinical interventions and only 6 school-based treatments) including dietary, activity and behaviour change components, and in addition pharmacological and surgical interventions. Although progress has been made in treating obese children**, research is needed** regarding developments in nutrition, exercise, and behavioural science to improve long-term weight regulation, **maximizing the positive benefits of weight regulation and minimizing the negative side effects of treating obese children.**

Glenny et al. (1997) concluded that for obese children **family therapy and lifestyle modification appear to be effective in prevention and treatment,** respectively. Ninety seven papers were identified as meeting the inclusion criteria, only twelve studies focusing on children/adolescents.

3.1.3 Main conclusions on guidelines and scientific statements

3.1.3.1 General recommendations on secondary prevention

General recommendations on secondary prevention of overweight and obesity are based on expert committees' and guideline recommendations:

- The AHA Scientific Statement on "overweight in children and adolescents: pathophysiology, consequences, prevention, and treatment" examines the **pathophysiology and epidemiology** of overweight in children and adolescents and present updated information on the **adverse outcomes** associated with childhood overweight (Daniels et al., 2005).

- Expert Committee Recommendations on Clinical Guidelines for Overweight in Adolescent Preventive Service were established to determine and propose specific criteria for overweight or obesity to be integrated into routine annual preventive screening of adolescents (ages 11-21 years) in clinical or public health settings. The guidelines provide a **protocol to identify those at the greatest risk of obesity** and its adverse sequelae. The aim was not to propose specific guidelines for management or treatment (Himes and Dietz, 1994, Barlow and Dietz, 1998).

- The American Heart Association published recommendations for **obesity assessment** as part of a statement for Cardiovascular Health in Childhood (Williams et al., 2002).

- The Scottish Intercollegiate Guidelines Network issued a national clinical guideline "Management of obesity in children and young people" (2003). Based on evaluation of RCTs in preventive interventions, **school, family and societal interventions should be considered in the prevention of obesity in children.** In the absence of individual trials, recommendations for treatment of childhood obesity were based on the advice of the US Expert Committee (1994).

- ✚ In Australia, the National Health and Medical Research Council issued "Clinical Practice Guidelines for the Management of Overweight and Obesity in Children and Adolescents" (2003) as the result of a comprehensive assessment of the current scientific evidence. Weight-management programmes using conventional therapeutical methods show modest success in children and adolescents in the medium to long term. There is **no direct evidence of the impact of either optimal dietary prescriptions or behaviour modification strategies** in the management of obesity. There is some **limited evidence that increasing physical activity or reducing sedentary behaviours improve weight-loss outcomes.** Weight-management **programmes that involve parents have better outcomes** than programmes that do not. There is also evidence in children of primary school age that a programme that involves parents alone has better results than one that requires regular attendance by their children as well.

Insufficient evidence to recommend for or against routine screening for overweight in children and adolescents as means to prevent adverse health outcomes:

- ⊘ U.S. Preventive Services Task Force (2006)

3.1.3.2 Recommendations on screening for cardiovascular risk factors

As part of general recommendations on secondary prevention of obesity, medical evaluation for hypercholesterolemia and hypertension is needed. Therefore, literature search was extended to evidence for **screening for hypercholesterolemia and hypertension in obesity:**

Recommendations in favour of routine screening for high blood pressure in children (over 3 years) on the occasion of every medical contact:

- ✚ The National Association of Paediatrics Nurse Practitioners Practice guidelines (Cromwell et al., 2005)
- ✚ The National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents (2004)
- ✚ The AHA Scientific Statement from the Atherosclerosis, Hypertension, and Obesity in the Young Committee and the Diabetes Committee (Steinberger and Daniels, 2003)
- ✚ The AHA Statement, Cardiovascular health in childhood (Williams et al., 2002)
- ✚ Bright futures: guidelines for health supervision of infants, children, and adolescents (Green and Palfrey, 2002)
- ✚ Guidelines for adolescent preventive services (GAPS) (Fleming et al., 2001)
- ✚ The AAP Recommendations for preventive paediatric health care (1995)

Insufficient evidence to recommend for or against routine screening for high blood pressure in children and adolescents to reduce the risk of cardiovascular disease:

- ⊘ US Preventive Services Task Force Screening for High Blood Pressure: Screening for high blood pressure: a review of the evidence for the U.S. Preventive Services Task Force (Sheridan et al., 2003)

Routine cholesterol screening is recommended for all obese children:

- ✚ The AHA Scientific Statement (Daniels et al., 2005)
- ✚ Shamir R and Fisher EA. (2000)
- ✚ Kavey RE (2000)

Universal screening for hypercholesterolemia in obese children is not recommended (only optional); screening is recommended only in children with a positive family history (premature cardiovascular disease or parental hypercholesterolemia):

- ⊘ National Cholesterol Education Program (NCEP): Expert Panel on Blood Cholesterol Levels in Children and Adolescents (1992).
  The NCEP recommendation is inadequate as it identifies only half of those with high LDL cholesterol as the consequence of the obesity epidemic (Gidding, 2006).

3.1.4 Longitudinal observational studies:

Several long-term longitudinal studies investigated the relationship of childhood obesity to cardiovascular risk factors in adulthood:

- the Muscatine Study (1971-1992, 2445 subjects, 7 →20-30 years old)
- the Bogalusa Heart Study (1975-1993, circa 2500 subjects, 10→27 years old)
- the Minneapolis Children's Blood Pressure Study (1977-1995, 10423 pupils 1th-3th grade)
- the third National Health and Nutrition Examination Survey (1988-1994, 40 000 subjects, 2-65 years old)

The following relevant conclusions can be drawn from these studies:

Childhood obesity is associated with cardiovascular risk factors in adulthood, including syndrome X:
Minneapolis Study, (Sinaiko et al., 1999)
Bogalusa Study, (Srinivasan et al., 2002)
Bogalusa Study, (Freedman et al., 2005)
Muscatine Study, (Lauer et al., 1997)

Weak associations exist between childhood overweight and adverse risk factor levels among adults (r =0.1-0.3), attributable to the strong persistence of weight status between childhood and adulthood:
Bogalusa Study, (Freedman et al., 2001)

Elevated levels of cholesterol during childhood are associated with elevation in adult life:
Muscatine Study, (Lauer et al., 1989)
Bogalusa Study, (Bao et al., 1996)

Adult blood pressure correlates with childhood blood pressure:
Muscatine Study, (Lauer and Clarke, 1984)

3.2 Studies, mainly RCTs, divided by type of intervention

3.2.1 Dietary interventions

Several dietary interventions (all RCTs) to reduce obesity were conducted in different settings (individually based, school-based and family-based) and with different levels of success.
There is some evidence that the following interventions targeting dietary changes might help to reduce obesity: (1) moderately energy-restricted diet with normal fat content, (2) increased fruit and vegetable intake, (3) reduced consumption of carbonated drinks and ad libitum reduced-glycemic load diet.

Ebbeling et al. (2006) conducted a pilot study to examine the effect of decreasing sugar sweetened beverages (SSB) consumption on body weight. They randomly included 103 adolescents aged 13 to 18 years who regularly consumed SSBs into an intervention group (mean age 16.0±1.1 years) and a control group (mean age 15.8±1.1 years). The intervention, 25 weeks in duration, relied largely on home deliveries of noncaloric beverages to displace SSBs and thereby decrease consumption. Change in SSB consumption was the main process measure, and change in body mass index (BMI) was the primary end point. Consumption of SSBs decreased by 82% in the intervention group and did not change in the control group. Among the subjects in the upper baseline-BMI tertile (BMI ≥ 25.6 kg/m^2), BMI change differed significantly between the intervention and control groups. Therefore, the higher the baseline body weight the more prominent was the beneficial effect on body weight of reducing SSB consumption.

Reducing consumption of carbonated drinks and promoting drinking water was part of *James' et al (2004)* school-based study called CHOPPS (The Christchurch obesity prevention project in schools). This educational intervention study was conducted among 644 students (325 in intervention group, 319 in control group, mean age=8.7 years). At the end of one year intervention, BMI was not significantly different between the intervention and control groups. On the other hand, there was a reduction in the soft drink consumption (self-reported, over three days) in the intervention group.

Effects of two interventions: (i) increased fruit and vegetable intake and (ii) decreased high-fat/high-sugar intake were observed in a study by *Epstein et al. (2001)* among 27 families with obese parents and non-obese children (families at risk for childhood obesity). Changes over 1 year showed that treatment influenced targeted parent and child fruit and vegetable intake and high-fat/high-sugar intake, with the "increased fruit and vegetable" group also decreasing their consumption of high-fat/high-sugar foods. Parents in the "increased fruit and vegetable" group showed significantly greater decreases in percentage of overweight than parents in the "decreased high-fat/high-sugar" group.

Comparison between two weight-reducing diets with the same energy (1750 kcal) and fat (31%) content, but different protein (15% vs. 19%) and carbohydrate (54% vs. 50%) contents was made in a study reported by *Rolland-Cachera et al. (2004)*. Massively obese 11- to 16-year-old children (32 boys and 89 girls) were included in a 9-month treatment. BMI z-score decreased to 1.7 at the end of treatment and went back to 2.8 two years after treatment. Also, energy intake increased and physical activity decreased two years after treatment. A higher protein content of the diet did not confer any benefit in the treatment of childhood obesity. Substantial weight loss was obtained with moderately energy-restricted diet and normal fat content.

Ad libitum reduced-glycemic load diet (food with low to moderate glycemic index, 45-50% energy from carbohydrates and 30-35% from fat) appears to be a promising alternative to a conventional diet in obese adolescents. It was compared in a study of *Ebbeling et al. (2003)* with an intervention consisting of an energy restricted, reduced-fat diet among obese adolescents (n=16, age=13-21 years). The intervention lasted 6 months with a 6-month follow-up. At 12 months, BMI and fat mass had decreased more in the experimental group.

3.2.2 Physical activity and sedentary behaviour

Effects of increased physical activity and decreased sedentary behaviour in reducing obesity interventions were observed in many studies (all RCTs), mainly family- or school-based.
There is restricted evidence that those interventions limited only to increasing physical activity and decreasing sedentary behaviour might help to reduce obesity, with greater effect when decreasing the sedentary behaviour, especially in boys.

School-based fitness programmes significantly improved the cardiovascular fitness level, fasting insulin level and body consumption in obese children in absence of change in BMI. Thus, comparison between fitness-oriented gym classes (treatment group, 27 children) and standard gym classes (control group, 23 children) was demonstrated in a study by *Carrel et al. (2005).* Participants were children with BMI above 95th percentile, mean age 12±0.5 years, who participated in a 9-month intervention, consisting of 5 gym classes every two weeks. The same class topics were thought in both groups with the same frequency but in different formats: smaller class size, more fun and achievable exercises and maximized amount of movement in the intervention group.

The influence of eight weeks of circuit training (CT) was examined in 19 obese subjects (14.3±1.5 years) by *Watts et al. (2004)* to determine whether an exercise programme reverses abnormalities in endothelial function. Exercise training improved the functional capacity, muscular strength, and body composition in obese adolescents. Furthermore, the conduit vessel function was normalized after exercise training. Body weight, BMI, waist girth, and skinfolds did not change. The DEXA measures revealed significant decreases in body fat in the abdominal and trunk regions.

Effects of a school-based *intervention PLAY (Promoting Lifestyle Activity for Youth) were evaluated in a study of Pangrazi* et al. (2003). The intervention aimed at increasing physical activity with a secondary intention of preventing obesity. It was conducted over 12 weeks, among 606 children (mean age=9.8 years) and delivered by school staff that was specially trained. There were three intervention groups and one control group: 1) PLAY (9 schools); 2) PLAY and physical education (PE) (10 schools); 3) PE only (10 schools). The PLAY intervention had three elements: promotion of play behaviour, followed by teacher directed activities and then encouragement of self-directed activity. This was achieved by incorporating 15 minutes of daily activity in the school day and encouraging 30 minutes of out of school play by the end of the intervention. Controls attended schools (n = 6) with no PE provision. At 12-week follow-up, BMI was not significantly different between the intervention and control groups. Girls were significantly more physically active in the PLAY and PE and PE only groups, but not in PLAY only group. Boys showed no significant difference.

Two other school based studies showed no statistically significant differences between children who exercised and those in the control group. Although, in a study by *Mo-suwan et al. (1998)* (n=292, mean age: 4.5 years) after a follow-up of a 30-week exercise programme the prevalence of obesity decreased in both groups of children. Sallis et al. (1993) evaluated multiple effects of a health-related physical education (PE) programme called “Project SPARK” for elementary schoolchildren (n=550, mean age=9.25 years). Also, at the end of follow-up period of 18 months, there was a trend in the children exposed to the PE intervention to have lower levels of body fat, but the differences were not significant.

Family interventions to reduce obesity were conducted by *Epstein and colleagues* in three studies, all evaluating effects of increased physical activity and decreased sedentary behaviour. These interventions were successful, especially for boys, emphasizing the importance of decreasing sedentary behaviour.
In one study (Epstein et al., 1995) among 61 families (children’s mean age=10.1 years) obese children were randomized to treatment groups that targeted increased exercise (1500 calorie expenditure per day), decreased sedentary behaviours (15 hours or less per week), or both (combined group) with 6-month intervention. At 1 year, the “sedentary” group had a greater decrease in percentage overweight than did the “combined” and the “exercise” groups and greater decrease in percentage of body fat.
In the second RCT (Epstein et al., 2000), among 90 families with obese children, (mean age =10.5 years) four intervention groups (high or low increased physical activity, high or low decreased sedentary behaviours) were evaluated. Low and high doses for the “decrease sedentary” or “increase physical activity” groups were 10 or 20h/wk of targeted sedentary behaviours, or the equivalent energy expenditure of 16.1 or 32.2 km per week, respectively. It showed significant decreases in percentage

overweight at 6 and 24 months compared with baseline. However, the differences between the groups were not statistically significant.
In the third study, *Epstein et al. (2001)* observed 67 families with obese children (targeted, mean age=10.4 years) and 89 siblings (non-targeted, mean age=10.1 years). There were two interventions: (1) increasing physical activity (increase); (2) reducing sedentary behaviour and increasing physical activity (combined). The 6-month intensive treatment included 16 weekly meetings, followed by 2 biweekly meetings and two monthly meetings attended by an individual therapist and the family. The physical activity goal was 180 minutes per week of moderate or greater intensity level and decrease of sedentary behaviour to 15h/wk of watching TV. After one year follow-up, boys showed a decrease in BMI for both groups, while girls showed a BMI increase for the "combined" group and a decrease of BMI in the "increase" group. Boys in the "combined" group showed larger reduction in overweight than girls in the "combined" or in the "increase" group.

There was no evidence that the moderate- and high-intensity physical training differed in their effects on body composition. However, both visceral and total-body adiposity were reduced, and cardiovascular fitness was significantly improved especially by high-intensity physical training. It was shown in a study of *Gutin et al. (2002)* among obese adolescents (n=80, age 13-16 years) who were randomly assigned to 1 of 3 experimental groups. The intervention lasted eight months. One group was assigned to biweekly lifestyle education (LSE) classes alone, the second group was assigned to LSE + moderate physical training, and the third group was assigned to LSE + high-intensity.

3.2.3 Behaviour treatments

According to the "Clinical Practice Guidelines for the Management of Overweight and Obesity in Children and Adolescents" (National Health and Medical Research Council, 2003), behaviour change is defined as a component in the vast majority of weight-management programmes for children and adolescents. It is integral to the management of a condition that requires lifestyle changes. Behavioural interventions are based on the use of cognitive strategies, behavioural strategies, education, and motivation.

3.2.3.1 Education

Several studies, all RCTs, evaluated the effects of education in reducing obesity, some were conducted in primary care, and some were school-based. All resulted in at least some success in obesity reduction, increased knowledge and positive changes in lifestyle habits.

A school-based 6-year intervention, called "Health and Nutrition Education programme" was evaluated by *Kafatos et al. (2005)* at the end of the intervention and at 4 years follow-up. At the baseline examination a sample of 284 first grade pupils was included in the intervention and 257 pupils in the control group. There was a beneficial effect of the programme on pupils' BMI evolution, with no significant differences in the prevalence of overweight.

In primary care, delivered by family paediatricians, *Nova et al. (2001)* compared two types of 12 month-interventions (n=185, aged 3-12 years): (1) a routine general information leaflet at first visit and follow-up visits at 6, 12 and 24 months, versus (2) enhanced information about a specific diet, physical activity, active parental commitment, and food diary at first visit, and follow-up at 1, 2.5, 4, 6, 9, 12, 15, 18, 24 month visits. At 1 year follow-up, although both intervention groups showed a reduction in percentage overweight from baseline, the reduction was significantly greater in the "enhanced information" group than in the "routine information" group.

Another study by *Gortmaker et al. (1999)* was part of a large "Planet Health" programme (n=1295, mean age=11.7 years). Students participated in a school-based intervention (health sessions on decreasing TV viewing, decreasing consumption of high fat food, increasing fruit and vegetable intake, and increasing physical activity), delivered by classroom teachers over 2 school years. After 18 months the prevalence of obesity among girls in the intervention schools was reduced. The programme significantly reduced television viewing hours for both boys and girls.

In one school-based study (n=227) *Robinson (1999)* assessed the effects of using a 6-month classroom-based curriculum (18 lessons, 30-50 minutes, taught by the regular trained teachers) on

television viewing, videotape and video game use, and on changes in physical activity, dietary intake, and obesity. At 7 months follow-up, the children (mean age 8.9 years) in the intervention group (n=106) were found to watch significantly less television, play less video games and eat less meals in front of the TV than children in the control group. Children in the intervention group also had statistically significant decreases in body mass index (BMI), triceps skinfold thickness, waist circumference, and waist to hip ratio compared with the control group. There were no statistically significant differences between groups regarding changes in high-fat food intake, moderate-to-vigorous physical activity and cardio respiratory fitness.

Harrell et al (1998) compared a classroom-based intervention with a risk-based intervention among children with at least two risk factors at baseline: low aerobic power and either high serum cholesterol or obesity. Two 8-week interventions (health information twice a week, and physical activity programme three times a week) were given to children (no parent's involvement) by regular teachers: (1) a classroom-based intervention given to all children by regular teachers, and (2) a risk-based intervention only to children with identified risk factors by registered nurses (n=422, mean age=9.0). Both intervention groups had a small reduction in body fat and higher knowledge than the control group, but there were no significant differences in the three groups in changes in BMI.

3.2.3.2 Family-based intervention

In obesity treatment many RCTs were conducted using several different family-based interventions, including both obese children and their parents. Children were of primary school age. There is some evidence that following family-based behaviour change interventions produce statistically significant reduction in BMI: (1) group treatment, (2) individualised treatment, (3) standard family treatment, (4) parent-led treatment (parents as exclusive agents of change), and (5) problem-solving treatments. In some studies children benefit more than their parents in the weight loss process.

In a study by *Goldfield et al. (2001)*, two types of interventions were compared, "group and individualized treatment", and "group only treatment". This RCT included thirty-one families with obese children, randomized into two groups: (1) "mixed treatment" (mean age=9.8 years) with "group and individualized treatment"; (2) "group treatment only", without individualized treatment (mean age=10.3 years). Each group comprised 12 children and 12 parents. Parent and child groups were conducted separately. The 13- session programme included eight weekly meetings, four bi-weekly meetings and one monthly meeting. The session in the "mixed treatment" consisted of 20 min individual session plus 40 min of group therapy, and participants in the "group treatment" received 60 min of group treatment. Both produced a statistically significant reduction in percentage overweight and BMI compared with baseline, at 12 months follow-up. However, there were no significant differences between the groups.

Effects of treatment where parents were the exclusive agents of change were studied in a RTC reported by *Golan et al. (1998a and 1998b).* He compared a 1-year family-based treatment for child obesity with parents as the exclusive agents of change to the conventional approach (children were responsible for their own weight loss). Sixty obese children (20% over ideal weight for age, height and gender) aged 6 ± 11 years (mean= 9.2 years) were included in the study. One hour-long group support/educational sessions were conducted by a clinical dietician: 14 sessions for the parents in the experimental intervention and 30 sessions for the children in the conventional intervention. At 1 year follow-up, children in both groups showed a significant decrease in obesity, although there was a statistically significant greater reduction in the parent-led intervention group.

Epstein and colleagues conducted many studies evaluating family-based behaviour treatment for obesity, all shown to be effective. In 2005 they compared a 24-month standard family-based behavioural treatment programme to an experimental treatment that incorporated reinforcement of children for engaging in alternative eating behaviours (41 overweight 8- to 12-year-old children). The standard behavioural programme targeted reducing energy intake and intake of high-fat, low-nutrient-density foods and increased physical activity through structured aerobic activity programs. The experimental treatment also focused on these components but included reinforcement of behaviours incompatible with eating, or physical non-activity. Both treatments were associated with significant and maintained reductions in z-score of BMI over the 24 months. The experimental group showed a significant greater increase in alternatives to eating, and both groups showed significant increases in physical activity (Epstein et al., 2005).

In another study by *Epstein et al. (2000),* effects of a problem solving treatment compared to standard family-based treatment were observed, with a duration of six months, 16 weekly and two monthly meetings. He compared 67 families with at least one child which is 20% overweight (mean age=10.3 years), randomised in three intervention groups: (1) problem solving taught to parent and child plus standard family-based treatment targeting and reinforcing eating and exercise behaviour change (n=17 families); (2) problem solving taught to child plus standard family-based treatment (n=18 families); (3) standard family-based treatment (n=17 families). Over 24 months follow-up the "standard" group had a larger decrease in BMI than the "parent" and "child" groups, suggesting that problem solving did not add to treatment effectiveness beyond the standard family-based treatment.
Epstein (1996) developed family-based interventions that targeted obese 8-12 year-old children. He completed four 10-year follow-up studies that provide support for two factors that are useful in childhood obesity treatment: (1) direct involvement of at least one parent as an active participant in the weight loss process improves short- and long-term weight regulation, and (2) increased activity is important for maintenance of long-term weight control. Family-based obesity treatment provides interventions for both children and their parents, but children benefit more from treatment than their parents.
Epstein et al. (1994) in a RCT (n=39, mean age=10.2 years), conducted a family-based behavioural weight control programme for obese children and their parents over two years. The experimental group was targeted and reinforced for mastery of diet, exercise, weight loss, and parenting skills. The control group was taught behaviour-change strategies and was provided with non-contingent reinforcement adjusted to the experimental group. Results showed significantly better relative weight change at 6 months and 1 year for children in the experimental group, but these effects were not maintained after 2 years.
Child and parent adherence to specific components of a family-based behaviour weight control approach are independent predictors of long term child and parent change in the percentage of overweight. It was demonstrated by *Wrotniak et al. (2005),* based on study of 110 families recruited for family-based weight control programmes. (Epstein et al., 2000a; Epstein et al., 2000b)

3.2.3.3 Interventions without parental involvement

Behaviour modification programmes with no parental involvement conducted in different settings (primary health care, in-patient or out-patient programmes and summer camps) showed significant reduction in overweight.

In primary care, *Saelens et al. (2002)* evaluated efficiency of a four-month behaviour weight control programme for overweight adolescents. The study included 44 overweight adolescents, BMI above the 89th percentile, mean age 14.2 years, randomly assigned to two interventions: (1) Healthy Habit (HH) and (2) Typical Care (TC) intervention. HH intervention engaged adolescents in a computer programme for overweight adolescents and physician counselling in the paediatric primary care clinic, followed by 4 months of telephone- and mail-based behavioural counselling. Adolescents in TC intervention received single-session physician counselling. The 4-month HH intervention, at a 3-month follow-up, led to a modest decrease in weight status; in contrast TC adolescents had an increase in BMI z-score.

Cognitive behavioural training and the "muscle relaxation training" were compared in a 6-week in-patient rehabilitation programme. *Warschburger et al. (2001)* outlined a 6-week in-patient rehabilitation programme for children and adolescents randomised into two intervention groups: (1) a group participating in "obesity training" (a three part programme which included a cognitive behavioural training programme, a calorie reduced diet and an exercise programme; n=121, mean age=13.8 years); and (2) a group undertaking the "muscle relaxation training" instead of the psychological intervention component with the same diet and exercise programmes (n=76, mean age=13.1 years). In both groups the percentage overweight was significantly reduced over the course of 1 year compared with baseline. Reduction in the prevalence of obesity tended to be higher in the first group than in the second. Differences between the groups were not statistically significant.

Braet et al (1997) compared in a RCT different behaviour modification programmes based on principles of behaviour therapy (cognitive strategies, behaviour strategies, education and motivation). There were four different one-year programmes (summer camp training, advice in a single session, group out-patient, individual out-patient) for obese children (n=205) against a control group (n=54), aged 7-16 (mean age=11.6 years). The only participants who were randomised were those allocated

to the two out-patient programmes: “individual therapy” (n=48) and “group therapy” (n=45). A statistically significant reduction in the mean percentage overweight was found at 6 and 12 months follow-up for both out-patient groups compared with baseline. However, there were no statistically significant differences between the two groups.

3.2.4 Multi-component interventions

In many obesity treatment RCT studies, more than one type of intervention was conducted in individual, family- and school-based settings. Overall, multi-component interventions produced some positive changes in targeted behaviours (increasing physical activity, reducing sedentary behaviours, improving dietary knowledge, and improving eating behaviours) with modest impact on BMI and with unclear evidence of effectiveness of parental involvement.

3.2.4.1 Multi-component interventions – individually based

Three studies were individually based.

A prospective study by *Nemet et al. (2005)* included 24 obese subjects (mean age=10.9 years) in the 3-month combined dietary-behavioural-physical activity intervention (series of 4 lectures given by the physicians and dietician, balanced hypocaloric diet and twice-weekly training programme by professional youth coaches), compared with 22 obese, age- and gender-matched, control subjects. At 3 months and 1 year, there were significant differences in changes in body weight, BMI and body fat percentage in the intervention group (n = 20) versus the control group (n = 20). These results highlight the importance of multidisciplinary programmes for the treatment of childhood obesity and emphasize their encouraging long-term effects. After an initial 10-month residential treatment programme (1500 kcal/day, two hours of physical activity/day, and behaviour therapy sessions) a 5 month post-treatment phone contact was an effective maintenance strategy in obese youngsters.

A study was done by *Deforche et al. (2005)* among 20 obese youngsters (mean age 16.3 ± 2.6 years) randomised into an experimental group (weekly activity diary and biweekly phone calls by therapist) and a control group. In the experimental group, the increase in overweight slowed down, moderate-to-high physical activity increased and playing computer games decreased significantly during the maintenance programme.

In a study by *Schwingshandl et al. (1999),* two intervention groups including 30 obese children (mean age=11.6 years) during twelve weeks were observed: (1) physical training programme twice/wk and dietary advice (four visits) (group A); (2) only dietary advice (group B). After 12 weeks group A had a significantly greater mean change in fat-free mass than the children from group B.

3.2.4.2 Multi-component interventions – parental involvement

Four RCT studies were family-based with parental involvement, mostly done among children on primary school age.

As a part of the Growing Healthy Families study, *Rooney et al. (2005)* determined if wearing a pedometer affects weight, BMI or physical activity among families. Participants were 316 subjects: 87 families with at least one child (age 5-12 years, BMI over 84th percentile) randomised into three treatment groups: (PE) pedometer plus education, (P) pedometer and (C) control group. Participants from PE and P groups were encouraged to wear pedometers and walk 10,000 steps daily for twelve weeks, together with 6 sessions on healthy eating and exercise in PE group. Children’s BMI percentile and physical activity level did not differ significantly between PE/P and C groups at the end of the intervention or at 9-month follow-up, although attitudes about physical activity improved significantly.

The Kiel Obesity Prevention Study (KOPS) by *Müller et al. (2001)* (n=297, age 5-7 years), assessed the impact of a family-based programme on obese children or normal weight children with obese parents. This RCT examined the combined effects of dietary education (fruit and vegetables each day, reduction of high fat food), exercise (being active for at least 1 hour a day) and decreased television viewing. At 1 year there were no significant differences in mean BMI scores between the two groups.

The influence of dietary and exercise interventions was assessed by *Johnson et al. (1997)* for juvenile obesity among 32 participants (8-17 years of age, mean age=11.0 years) randomised into three 14-week intervention groups: (1) nutrition and eating-habit change followed by exercise (NE); (2) exercise followed by nutrition and eating-habit change (EN); and (3) information control (INFO) group. NE and EN were presented in a cognitive/behavioural framework focusing on the development of self-regulation, whereas the INFO group received education on diet and exercise. Parents were involved in all three groups by meetings with their children, planning and recording the progress of their child. NE and EN participants evidenced modest, yet significant, reductions in weight and blood lipids, at a five-year follow-up. In contrast, INFO participants failed to change on any measure. NE displayed uniform weight loss over the period of intervention, and EN did not lose weight until the introduction of the nutrition component.

3.2.4.3 Multi-component interventions – school-based

Most of the multi-component interventions were school-based. One study had a positive effect on BMI and reduced prevalence of obesity. Other studies did not produce significant change in weight related outcomes, but did show significant changes in targeted behaviours and knowledge.

A longitudinal 6-month school-based controlled evaluation study by *Kain et al. (2004)* included 2141 children in intervention and 945 in control schools (mean age =10.6 years). It aimed to change adiposity and physical activity levels. The intervention programme included diet and nutrition intervention (education programme, kiosks, parental involvement) and physical activity intervention (extra 90 min/wk of sports, active recess, extra PE programme). Nutrition education was available for children and parents supported by healthier food kiosks. For obese and overweight children there was a significant drop in BMI z-score in the intervention group, with no effect in the control group.

The intervention programme, entitled “New Moves”, outlined by *Neumark-Sztainer et al. (2003)* included 201 high-school girls (89 girls in the intervention group, mean age=14.9 years; 112 girls in the control group, mean age=15.8 years), with BMI at or above 75th percentile. The intervention addressed socio-environmental, personal and behavioural factors, with physical activity sessions four times per week, nutrition and social support sessions every other week during 16 weeks, followed by an 8-week maintenance component that included weekly lunch meetings in school. At 8-month follow-up, BMI was not significantly different between the intervention and control schools. The only significant outcome was the increased level of physical activity in the intervention group, compared to the control group.

Donnelly et al. (1996) conducted a non-randomised intervention trial with a concurrent control group. This long-term study involved 338 children (8-11 years of age), of which 102 children were part of the intervention school and 236 children of the control school. The intervention consisted of nutritional education (delivered by classroom teachers, 9 different modules/schoolyear), fitness activities (30-40 minutes of physical activity, three times per week), and healthy school food services. At the end of two-year follow-up there were some overall positive changes in the targeted behaviours, without any impact however on the weight of neither the obese nor the normal weight subjects.

One RCT (n=636, mean age=8.4 years), that didn’t show any change in BMI, but had result in a modest behaviour change in terms of a higher vegetable intake in overweight or obese children (and also in normal weight children) was done by *Sahota et al. (2001a and 200b)).* The authors evaluated a one-year multidisciplinary and multiagency programme, designed to influence diet and physical activity, entitled „The Active Programme Promoting Lifestyle in Schools” (APPLES). The programme consisted of teacher training, modification of school meals, and school action plans to promote healthy eating and physical activity (based on the health promoting school concept).

3.2.5 Drug therapy

Anti-obesity drug therapy is not currently indicated for the treatment of children and adolescent obesity and remains investigational today. A number of studies has examined several anti-obesity drugs and has shown to be efficacious and safe in treating obesity in the young population, mainly adolescents. *Godoy-Matos et al. (2005)* and *Berkowitz et al. (2003),* conducted two double-blind placebo-controlled

studies on the efficiency and safety of “Sibutramine” in obese adolescents, both showing a significant weight loss without major adverse events. *Chanoine et al. (2005)* and *Ozkan et al. (2004)* evaluated the anti-obesity drug “Orlistat” among obese adolescents and have shown the product to be effective with no major safety issues , except for the mild to moderate gastrointestinal tract side effects (in 9-50% of the treated subjects).

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PART II
ORGANISATIONAL CONTEXT AND ACTUAL PRACTICE

INTRODUCTION

Part II of this report consists of an overview of the actual organisation of school health care and the current initiatives with respect to the prevention and/or management of overweight and obesity in schoolchildren, taken by the School Health Services in the three participating countries (Croatia, Flanders, Slovenia).

School Health Services are the most appropriate settings to be key-players in the primary prevention, early detection and secondary prevention of overweight and obesity in school aged children in these three countries, as they are also in the other countries of the European region in which a programmatic School Health Care exists.

The link of School Health Services with the school setting guarantees easy access to the population of school aged children. The same schools are also important environments for preventive actions directed to this age group. In addition to this setting- and population-oriented approach, School Health Services have an important role to play in the care of the individual schoolchild. In this context, the regular medical check-ups, as part of the school health programme, are ideal opportunities to detect overweight and obese children in an early stage, and to start actions with regard to further diagnosis, secondary prevention and guidance. Linked to the mandatory education, virtually all school aged children are reached for regular health check-ups. These check-ups include the measurement of height and weight.

The timelines shown in figure 4.1 illustrate the country-specific ages for the different educational levels, with the age of medical check-ups by School Health Services plotted above the timelines of the respective country (i.e. Croatia, Slovenia and Flanders).

A more detailed description of the organisation of the School Health Services in the three countries (including a detailed description of the aims of each contact) is given in chapter 4.
Chapter 5 outlines the actual practice regarding the overweight and obesity management in de School Health Services in Croatia, Slovenia and Flanders.

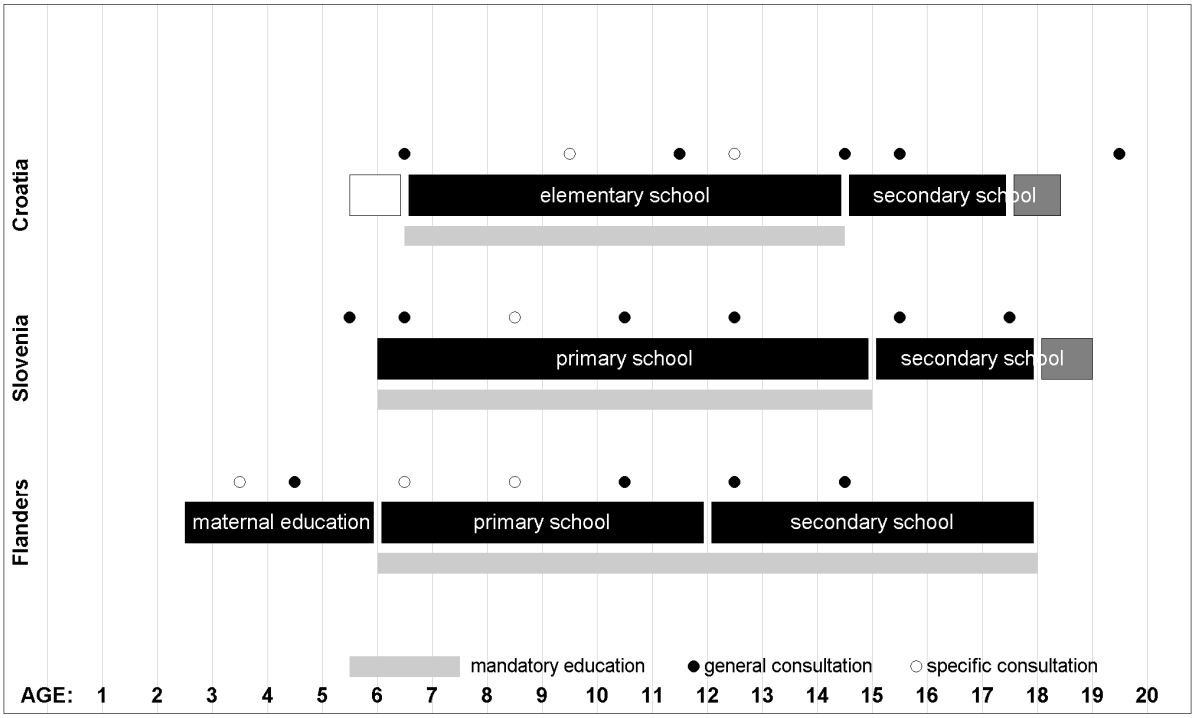

Figure 4.1: Timeline showing typical ages for the different educational levels, and the age of regular medical check-ups in School Health Care. Mandatory school-ages are indicated by light-grey bars. The meaning of general and specific consultations may differ from one country to another. See tables 4.1, 4.2 and 4.4 for details.

In Flanders, school starts at the age of 2.5-3 years (entry is possible 4 times during the school year), and is mandatory from 6 to 18 years of age. There are 7 regular scheduled contacts between the age of 3 and 14 years (see text for details).

In Croatia, school starts at the age of 6.5 years, and is mandatory from 6.5 to 14.5 years. There are 7 regular scheduled contacts between the age of 6.5 and 19.5 years (see text for details).

In Slovenia, school starts at the age of 6 years, and is mandatory from 6 to 15 years. There are 7 regular scheduled contacts between the age of 6 and 19 years (see text for details).

Chapter 4
OUTLINE OF THE LEGAL AND ORGANISATIONAL CONTEXT OF SCHOOL HEALTH CARE

Karel Hoppenbrouwers, Vesna Juresa, Mojca Juricic and Marina Kuzman

4.1 School health services in Flanders

4.1.1 Summary

The Flemish School Health Services (SHS) consist, since the Law of 1964, of the preventive healthcare network, within which the Youth Health Care for schoolchildren (3 to 19 years) has been carried out until a short time ago. For the same target group, but to a large extend separately organised, a support supply was provided for by the Psycho-Medical-Social (PMS) services on the level of psychological and social functioning, learning and studying and the process of study choice. The actual vision on pupil's support, as well as from a social-medical as from psycho-pedagogical point of view, required an integration of both services into one transparent and recognisable structure. With the creation of Centres for Pupils' Counselling (CPC), the Flemish Government tried to comply with this new challenge. Core ideas for the functioning of those new centres are:

- the health and well-being of the pupil is essential;
- the functioning is principally demand-oriented, with exception of the basic programme of preventive healthcare;
- a special attention is paid to risks and to risk groups;
- acting in the neighbourhood of the schools is targeted;
- the guidance is based on interdisciplinary collaboration and networking.

At the occasion of the creation of the Centres for Pupils' Counselling, also the general programme of preventive healthcare for schoolchildren has been actualised. Since September 1st 2000 the Centres for Pupils' Counselling have been operational and, with a trial period of three years, the new functioning has been gradually applied.

4.1.2 Introduction

Youth Health Care in Flanders was the object of thorough reformation. With the aim of optimising the preventive care for schoolchildren and to focus on actual needs, the former School Health Services were replaced by a totally new structure. Although many of the duties and aims of the old organisation can be found in the new Centres for Pupils' Counselling, one can assume that in the future, also as far as Youth Health Care is concerned, the policy will be one of renewal in the field of youth counselling. The latter will be based upon an increasing interdisciplinary collaboration within the own services, and also upon networking with external facilities.

4.1.3 School Health Services (SHS) and Psycho-Medical-Social (PMS) services: The actual school supporting services

The Flemish School Health Services (SHS) consist of a preventive healthcare network in the framework of which the programmatic Youth Health Care was carried out until the year 2000. The health status, growth and development of all school-attending children from 3 to 18 years, were followed in a longitudinal way. It was the continuation of the preventive healthcare for babies and young children delivered by the organisation Child and Family (0 - 3 years).

The compulsory “Medical School Inspection” in Flanders dates officially from 1914; it was primarily established to prevent the spread of contagious diseases through schools. Only in 1964 the "Law on Medical School Inspection" (Belgian Law Gazette, 1964) organised a clear job description and a framework within which the school health care had to be effectuated. Since this Law, which provided for yearly preventive medical examinations of all children during their school carrier, the number of examinations was gradually downgraded by following Laws and Governmental Orders. This evolution of the preventive programme occurred in parallel with a shift of priorities from the prevention of infantile mortality and contagious diseases in the sixties and seventies, towards a greater attention for actual health problems on this moment. One thinks especially of developmental problems and problems concerning unhealthy eating habits, psychosocial problems and risky behaviour (Kerschaver Van, 1989).

In the school health care programme the periodic medical examinations, the additional selective medical examinations, and the supervision of contagious diseases, were compulsory for schools, pupils and parents. Besides this, the School Health Service was responsible for the follow-up of the vaccination-status, the health promotion, the control on safety and hygiene of the school environment, the management of the individual preventive medical files, and monitoring of health through registration of data. The “Law on Medical School Inspection” provided that the periodic medical examinations had to be effectuated in certified centres and by certified teams that where composed of school doctors, social nurses and administrative employees. School Health Services, that where founded and administrated by public instances or non-profit associations, were working under the supervision of and were subsidised by the Flemish Minister of Health.

School Health Services (SHS) were also deemed to collaborate with other support supplying instances, amongst others with the Psycho-Medical-Social (PMS) services. These had at their disposal a fixed PMS-team, that consisted of psychologists/pedagogues, social workers and nurses, with a psychologist or a pedagogue as the person in charge. Equal to SHS, the PMS services organised their support supply via the schools. This supply was situated primarily in the field of the psychological and social functioning, the learning and the studying and the process of study orientation. In contrast to the “Medical School Inspection”, which was to a large extend compulsory, pupils and their parents were free to accept or not the supply of the PMS centres, or to make use of their services. The PMS centres were under the control of the Flemish Minister of Education, who was also responsible for the subsidies.

The organisation of the SHS and PMS was also subject to the sectarianism that characterises the Flemish educational landscape. In the subsidised free (this means catholic) education network and in most schools of the subsidised official education network (on provincial and municipal levels), the SHS and the PMS existed independently from each other. For the “community education” (organised by the Flemish Community), on the contrary, and in a number of municipal schools, there where no separate School Health Services, but they were part of the PMS services which relayed for the youth health care on an external doctor, mostly a family doctor.

4.1.4 From SHS and PMS towards the Centre for Pupils’ Counselling (CPC)

There was more than one objective reason for the abolition of the double structure of these school related services (SHS versus PMS). Until the year 2000 the school health care was especially social-medical oriented (based upon the WHO definition of health as a status of physical, mental and social well-being), while PMS centres gave preference to a psychological-pedagogical approach. The actual vision on preventive health care and pupils guidance, in which the child is approached as a total human being, requires the integration of both models towards one transparent and recognisable structure (one name, one service, one functioning), with a multidisciplinary approach. Such a single structure is not only aiming at improving the contact with the clients (children, parents, teachers and schools), and taking care of actual problems with which children are confronted, but is also a more efficient allocation of the limited sources of the country. Until recently the SHS and PMS accomplished double work in the schools and in many places there was a lack of communication and of exchange of data between the two sources. As a remedy to this situation, the "Decree on Centres for Pupils’ Counselling" (December 1998)(Belgian Law Gazette, 1999) provided the establishment of new centres as a replacement of the actual School Health Services and PMS services.

General framework for the Centres for Pupils' Counselling

The so-called Centres for Pupils' Counselling (CPC) started on September 1st 2000, with a new programme and new targets. The latter are not an added sum of targets and activities of the former School Health Services and PMS services. The aim was an enlargement of scale, with the creation of 73 Centres for Pupils Counselling in Flanders, as a replacement of the existing School Health Services (approximately 150) and PMS services (approximately 300). The support of pupils in the CPC remains, as before, separately organised for the different educational networks (community education, subsidised official education, subsidised free education), but in contrast to the past, they are based on the same principles.

Calculation of the personnel in these new centres is done on the basis of a certain amount of parameters (amongst others, the type of education available in the schools having a contract with the CPC, the proportion of underprivileged children, and the distance between the school and the CPC), which are co-determining the scoop and the intensity of the support. On the basis of the learning year and educational type, every pupil receives a "weighted coefficient" (from 1 to 7), which is an illustration of the scoop of support which has to be provided for the relevant pupil (e.g.: a pupil of the special education requires a more extensive and intensive support than their peers of the general secondary school). On the other hand the charge of the duty is dependent on the proportion of underprivileged pupils in the population and on the distance between school and CPC (activity near the schools is a target). The personnel available for about 11.000 weighted pupils implies one manager, one doctor, two psycho-pedagogic consultants, two social workers, two paramedical workers (preferably nurses) and one administrative collaborator. When the number of "weighted" pupils surpasses the 11.000, the personnel can be fortified with an additional number of co-workers, to be chosen within these or other disciplines.

The mission of the Centres for Pupils' Counselling.

The "Decree on Centres for Pupils' Counselling" gives in an initial section the description of support to pupils: "*A total of integrated and multidisciplinary actions from a preventive, curative or educational point of view towards the pupil. These actions pertain to the support for the development of pupils and take place in collaboration with the parents and the school, who are primarily responsible. If necessary there will be a collaboration with other services, institutions or facilities"* (Belgian Law Gazette, 1999).

The Decree further assigns to the centres general missions: "*To assist in the well-being of the pupils now and in the future. For this aim the basis of all learning is given so that pupils, throughout their school career, acquire and strengthen the competences which form the fundamentals of an active and continuous development of social participation."*

To realise this mission, the support to the pupils by the centre focuses on the four following areas:

1. *"Learning and studying,*
2. *The educational career,*
3. *The preventive healthcare,*
4. *The psychological and social functioning".*

In this sense all actions, undertaken by the medical discipline (doctors and nurses) in the framework of the general mission of the Centres for Pupils' Counselling within these four areas are to be considered as a form of pupils counselling. While the first two areas are directly linked to the educational process, the two latter are standing partly separated from it, and they use the school amongst others as a channel to reach pupils, and thus as a finding place of possible problems and as an instrument of advising or remedying.

Schooldoctors and -nurses will logically focus mainly on topics related to the domain of the preventive health care. However, this does not exclude that the CPC may also refer to them for missions within the other areas of support.
The support to pupils *is principally demand-driven* from pupils, parents and schools. This does not prevent a Centre to formulate itself propositions of support. The government can even oblige Centres to guarantee a supply for specific subgroups of pupils, parents and schools. These pupils, parents and schools are free to accept or not this *assured supply* (the school can only refuse this supply with motivation). Finally, pupils, parents and schools are *obliged* to collaborate with a series of general and

specific medical examinations decided by a *Governmental Order* (Belgian Law Gazette, 2000), prophylactic measures and support concerning problems of compulsory education.
Very crucial in the new concept of the CPC is the multidisciplinary approach. The "de facto" sitting and working together of disciplines from the medical, the paramedical and the "behavioural" sciences (psychology, pedagogy, social science) should bolster substantially the effectiveness and coherence of support programmes. A multidisciplinary approach does not mean that everybody does everything or all together. For the different areas of support one shall have to check what missions require a multidisciplinary activity and which ones will be executed by only one or some disciplines.
Finally, there is the duty to network-formation with relevant other services and organisations, to be contained in protocols of collaboration, in which will be regulated the exchange of data and the procedures for the referral and for follow-up of pupils.

Target group of the CPC

Making part of the target group are all pupils of accepted schools of ordinary or special maternal, lower and secondary education, with the inclusion of the part-time professional secondary education and the accepted formations for the fulfilment of the part-time education duty (Figure 4.2)(Thielemans, 1999).

Education policy concerning health and promotion of health: collaboration with the school

The legislative framework concerning the CPC fixes in a more explicit way than in the past the relation and the collaboration between the Centre and the schools. The school and the Centre agree on joint projects that regulate the collaboration for a period of three years. A Centre has to play a role on two levels in the school. On the one hand, it has to support the schools in the realisation of their internal mission concerning health targets, and the achieving of educational final goals. On the other hand, the Centre is a service external to the school, which uses the school as a finding place to realise its missions concerning preventive health care, the psychological and social functioning of youngsters and their school career.

Strategic and operational aims concerning preventive health care

As far as preventive health care is concerned, initiatives are awaited from the CPC, in conformity with the above mentioned Decree on CPC, to promote, accomplish and preserve the health, growth and development of children and youngsters. This implies that a Centre searches systematically, and in time, for defects on the level of health, growth and development, so that the pupil or the parents can take care of it in time. Therefore, the required preventive medical examinations are organised. Besides this, the Centre is responsible for the vaccination of the pupils and it takes prophylactic measures for pupils and school personnel to restrain the deployment of contagious diseases.
In a *Governmental Order* (17th of March 2000)(Belgian Law Gazette, 2000) these missions are further concretised. This forms the general programme of Youth Health Care for schoolchildren, which all Centres of Pupils' Counselling in Flanders have to comply with. The programme implies on the one hand compulsory activities (compulsory for pupils, parents and schools) and on the other hand an assured supply (the centres are obliged to deliver the supply; schools can only refuse with motivation) and also other missions (Centres can supply it, pupils, parents and schools are free to accept).

The *compulsory support* implies four general consultations and three specific consultations (table 4.1). The general consultations, in the meaning of periodic health examinations, have the aim to establish a general overview of the health, the specific consultations are limited to specific aspects of the health (e.g. growth, vision, hearing, ….) and they generally have a more screening character. In combination with general consultations, the specific consultations allow a longitudinal follow-up of certain aspects of health. Concerning the prophylactic measures, in case of contagious diseases, the same obligation applies towards pupils, parents and personnel. The schooldoctor will base his/her strategy upon a list of contagious diseases with specific guidelines which are joint in annex to the above mentioned Governmental Order (Belgian Law Gazette, 2000).

The *assured supply* implies additional consultations for the pupils of the special education, which was described in the Decree as one of the risk groups, for which special additional support measures had to be provided (weighted coefficient 7). Besides this, vaccinations are part of the assured supplies. The pupils and parents may refuse this supply of vaccination, but contrary to the rest of the assured

supply, the school is obliged to collaborate fully with the organisation of the vaccination policy. Finally, the Centre has the mission to advise the schools in the areas of safety and hygiene.

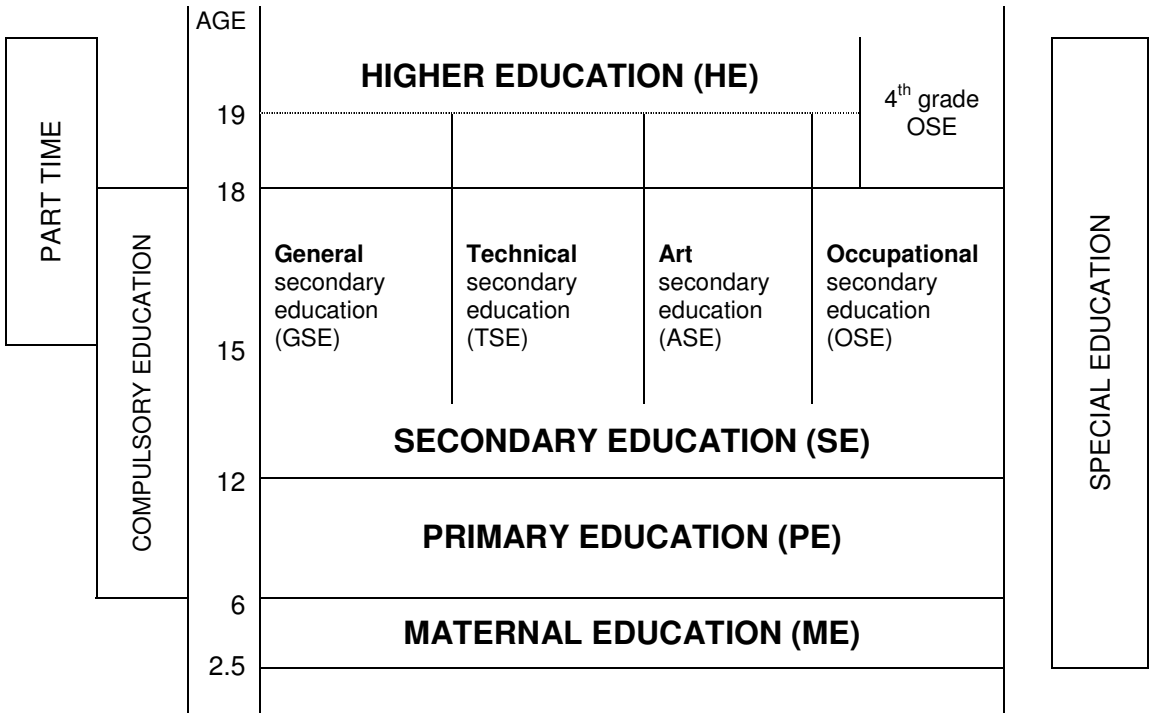

Figure 4.2: Structure of the educational system in Flanders (adapted from Tielemans, 1999)

In a list *of other assignments* is indicated that a Centre can organise additional medical examinations for individual pupils, as a form of follow-up to a consultation on request of the pupils, the school or the parents, or on its own initiative. The Centres care about the custody and the transmission of personal data, and are responsible for the registration of data and the reporting towards the public instances. The computerised registration of health data of large numbers of pupils must allow the follow-up of evolutions, and the evaluation of the programmes of the Centres for Pupils' Counselling in the area of preventive healthcare (process- and outcome-evaluation).

Health education and promotion in the framework of the Centres for Pupils' Counselling

Especially in the area "preventive health care" and "psychological and social functioning" a CPC may be active in health education and promotion. Preventive health care is more than mere improvement of health in the strict sense of the word. The above mentioned *programmatic supply* (compulsory and assured) not only allows to detect factors threatening the individual development (with possibility to individual health promotion), but it is also a tool for risk analysis on the population level. The latter generates themes for education (as well as in the field of health care as in the field of psychological and social functioning) and for the support of subgroups, and allows a more oriented problem and demand guided approach.
The *problem-guided supply* implies those tasks, which are oriented towards specific problems, risks, signals or questions. These are already known, are actively searched for (risk detection and analyses) or spontaneously reported (demand-driven, i.e. on request of pupils, parents, schools, or others).
Health education (individually and collectively) will certainly be part of this problem-guided supply.

Table 4.1: Overview of preventive medical examinations in the framework of the Centres for Pupils' Counselling

	AGEGROUP														
	Maternal			Primary						Secondary					
Grade	1	2	3	1	2	3	4	5	6	1	2	3	4	5	6
Age (years)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Type															
• General		*x*						*x*		*x*		*x*			
• Specific	*x*			*x*		*x*									
Content															
• Information from parents, pupil, school, GP, Child and Family,…	*x*	*x*		*x*		*x*		*x*		*x*		*x*			
• Evaluation of nutritional habits and lifestyle								*x*		*x*		*x*			
• Evaluation of certificates of absence and physical inability (physical fitness)								*x*		*x*		*x*			
• **Age-specific general medical examination**		*x*						*x*		*x*		*x*			
• At least containing the following topics:															
Personal and family history		*x*						*x*		*x*		*x*			
Growth and weight	*x*	*x*		*x*		*x*		*x*		*x*		*x*			
Global development		*x*													
Visual function	*x*	*x*		*x*		*x*		*x*							
Eye positioning	*x*	*x*		*x*											
Colour perception				*x*											
Hearing		*x*						*x*				*x*			
Mouth and teeth		*x*		*x*				*x*		*x*		*x*			
Genitals		*x*						*x*		*x*		*x*			
Sexual maturation								*x*		*x*		*x*			
Posture and locomotoric system								*x*		*x*		*x*			
Vaccination															
Recommended				*x*				*x*		*x*		*x*			
Control status and catch-up	*x*	*x*				*x*									
Continuous activities															
Counselling (for pupils, school staff, parents)	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
Other check-ups (f.e. special education, selective examinations)	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
Follow-up after referral	*x*	*x*		*x*		*x*		*x*		*x*		*x*			

Youthdoctors in the Centres for Pupils' Counselling

Doctors who want to work in CPC must have a diploma in the specific studies of Youth Health Care. It is a full-time postgraduate university (Master in Youth Health Care) formation of two years (after the basic medical education of seven years), which also gives the right to employment in the preventive health care for babies and young children (0 - 3 years).

Youth doctors are preventive doctors in the comprehensive meaning of the word. They take initiatives to increase the health, the growth and the development of youngsters. The youthdoctor has no right to start a treatment, in the framework of the preventive support of a child or a youngster. To this aim, it is referred to the doctor in attendance (GP, paediatrician or others). The youthdoctor receives report of the findings of the doctor in attendance and of the started treatment.

4.1.5 Conclusions

Although a lot of aspects in the new organisation of School Health Care in Flanders need further precising and elaboration, the new structure offers a unique chance to reorganise the counselling of pupils in the broad sense of the term. The preventive Youth Health Care has been regarded in the past (and still now by some people) as a part of the public health care without much affinity to the education, in which system the school is merely used as a channel to reach the youngsters. In reality it is a discipline which evolved in the foregoing decades from a programme of medical examinations, aimed primarily to detect developmental defects, towards a preventive health network, within which the health status, the growth and the development is followed and accompanied in a longitudinal way. Collaboration with other disciplines in favour of a global care for schoolchildren, not only on a physical level, but also from a mental, social and pedagogical point of view, is already for a long period on the waiting list of schooldoctors and nurses. The near future will show whether this requirement within the Centres for Pupils' Counselling will become reality.

4.1.6 References

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Tielemans J. Structuur van het onderwijs, in: Tielemans J, Onderwijs in Vlaanderen. Leuven/Apeldoorn, Garant 1999; 16

4.2 School health services in Croatia

4.2.1 Introduction

In many European countries a network of school health services exists, in which the health of children is regularly checked at school age. These services are not only a very important part of the comprehensive health care system, but having the opportunity to act in schools, they can serve as a bridge between health and educational sector.

School health services in Croatia have been traditionally a well-organized part of the national health system. Although the health sector has undergone many changes over the years, school health services have remained a separate service for children and youth representing a preventive and specific approach for this target population.

4.2.2 Educational system

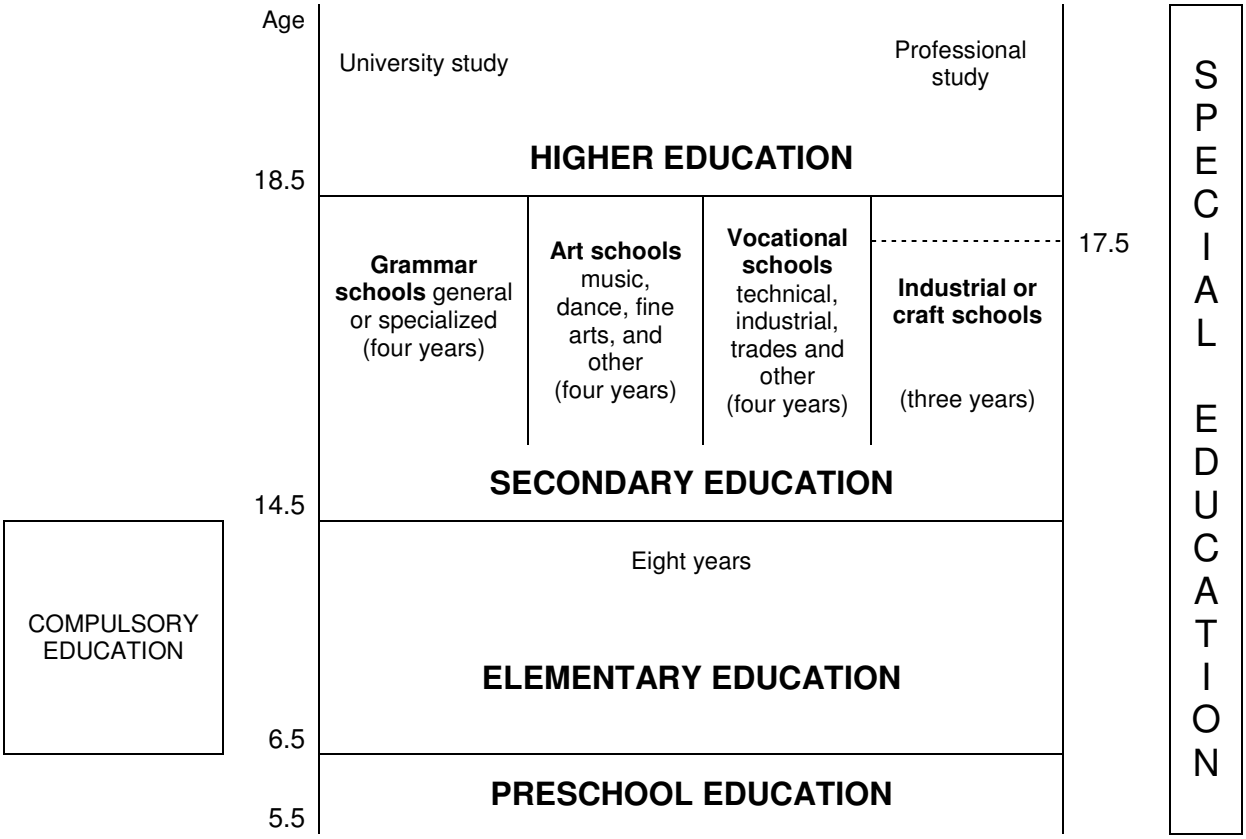

Figure 4.3: Structure of the educational system in Croatia (Adapted from the www.mzos.hr)

Children in Croatia enter the school system at the age of 6.5 years. Primary school lasts eight years and is obligatory for the whole population.
The secondary education lasts three or four years. There are three types of education: (1) grammar schools, which can be general or specialized, lasting four years; (2) vocational and technical schools both lasting four years; and (3) industrial or craft schools, lasting three years. Art schools are additional and do not provide basic secondary education. Higher education is available as a professional or university study. It lasts two to eight years, depending on the programme and the type of study.

4.2.3 Organizational and legal framework

Until 1998, school health services were responsible for a comprehensive (curative and preventive) health care for children and youngsters. Since a thorough reform in 1998, school health services are allowed to act exclusively as preventive health care settings for the school aged children and students of higher education. General practitioners take care of the curative part of the health care for children and youngsters.

With this reform, also an organizational shift has occurred from Community Health Centres to County Institutes of Public Health. At present, school health services are situated in 21 County Institutes of Public Health, with a National Public Health Institute having a central and coordinating role. School health services embrace altogether approximately 155 medical teams, with one school doctor and nurse working in each team. Medical doctors are supposed to pass obligatory training, consisting of a 3-year specialization in school medicine. In Croatia this is a recognized specialization, as it is also the case for family medicine and occupational medicine. A part of the specialization is a postgraduate training, lasting 4 months.
During the school year 2004/05, 113 school health specialists, 24 residents in school medicine (in the process of specialization) and 16 medical doctors with no specialization worked in the school health services.

Schoolchildren and students of higher education represent 15.5 % of the Croatian population (total population 4.437 million). Having about 400.000 pupils in primary schools, 180.000 in secondary and 70.000 in higher (university and professional) education, each team takes care of about 5000 individuals.

Determined by a Law on Health Care (Croatian Official Gazette no 121/03) and a Law on Health Insurance (Croatian Official Gazette no 04/01, 88/02, 149/02, 117/03, 30/04, 117/04), school health services are part of the regular National Health System which activities are paid by a Compulsory Health Insurance, according to the number of school children and students of higher education.

4.2.4 Areas of work

The areas of work embrace a wide range of preventive measures, following an annual programme which is developed and enacted at the national level, according to the Health Care Measure Plan and Programme (Croatian Official Gazette no 30/02) (table 4.2.).

This programme consists of the following main activities:

1. Regular systematic examinations

Primary schools:
- At time of primary school enrolment
- 5th grade
- 8th grade with professional orientation

Secondary schools:
- 1st grade

Higher education
- fresheners

In the school year 2004/05, at primary school enrolment 99% of the children were examined (somewhat less than 100% in previous years). Also, 92% of 5th grade and 99% of 8th grade primary school children (rise in number compared to previous years) and 62% of 1st grade secondary school children (same as previous years) were examined as well (figure 4.4).

Table 4.2: Program of school health services' annual activities, according to the National Plan and programme of the health care measures

Educational level	**Elementary**								**Secondary**				**Higher**
Grade	entry	2	3	4	5	6	7	8	1	2	3	4	1
Age (years)	6	8	9	10	11	12	13	14	15	16	17	18	19
Activity													
General (systematic)	*x*				*x*			*x*	*x*				*x*
Specific			*x*			*x*							
Content													
Personal and family medical history obtained from pupils/students (anamnesis)					*x*			*x*	*x*				*x*
Personal and family history obtained from parents (heteroanamnesis)	*x*												
Age-specific general medical examination	*x*				*x*			*x*	*x*				*x*
Insight into medical documents (incl. dentist)	*x*							*x*					
Psychomotor development	*x*												
Information from teacher					*x*								
Vocational guidance								*x*					
Control examination (when indicated)	*x*		*x*		*x*	*x*		*x*	*x*				*x*
Screening													
Growth and development (weight, height, BMI)	*x*				*x*	*x*		*x*	*x*				*x*
Visual acuity (Snellen)	*x*		*x*		*x*			*x*	*x*				*x*
Colour vision (Ishihara)			*x*										*x*
Anaemia (haemoglobin, feritin)	*x*												
Blood pressure (mm/Hg)					*x*			*x*	*x*				*x*
Proteinuria (urine test strips)	*x*												
Posture/Scoliosis (Adam's forward bend test)	*x*				*x*	*x*		*x*	*x*				*x*
Hearing (audiometry)								*x*	*x*				
Goiter (thyroid examination)	*x*				*x*			*x*	*x*				*x*
Sexual development (Tanner, menarche)					*x*			*x*	*x*				*x*
Behaviour, socialisation and adaptation to school (interview, questionnaire)	*x*				*x*			*x*	*x*				
Risk behaviour (smoking, drinking, drug use, sexual behaviour; interview, questionnaire)					*x*			*x*	*x*				*x*
Mental health (interview, questionnaire)							*x*		*x*				*x*
Hypercholesterolemia (serum cholesterol level, for pupils at risk, based on personal and family history)	*x*							*x*					
Hearing (audiometry on an individual basis, when a history of otitis, hearing disturbance, acoustic trauma)													
Experimental drug use (urine test strips; youth at risk)													
Sexual activity (interview and counseling for sexually active pupils)													
Continuous activities													
Counselling (for pupils, school staff, parents)	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
Other check-ups (sports activities, adapted school program, boarding school, transfer to other school, when requested by other institutions, vocational guidance, prior to vaccination)	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*	*x*
Health education and health promotion													
Hygiene	*x*	*x*	*x*	*x*									
Healthy eating	*x*	*x*	*x*	*x*									
Violence and abuse	*x*	*x*	*x*	*x*									
Puberty, menstrual cycle					*x*	*x*							
Substance abuse					*x*	*x*							
HIV/AIDS and other STD							*x*	*x*					
Healthy development and maturation							*x*	*x*					
Family planning, abortion, contraception, marriage, family, children									*x*	*x*	*x*		
Sexual behaviour, STD									*x*	*x*	*x*		
Self-protection and care for the personal health									*x*	*x*	*x*		
Topics according to needs and indications													*x*
Vaccination	*x*	*x*				*x*	*x*	*x*			*x*		

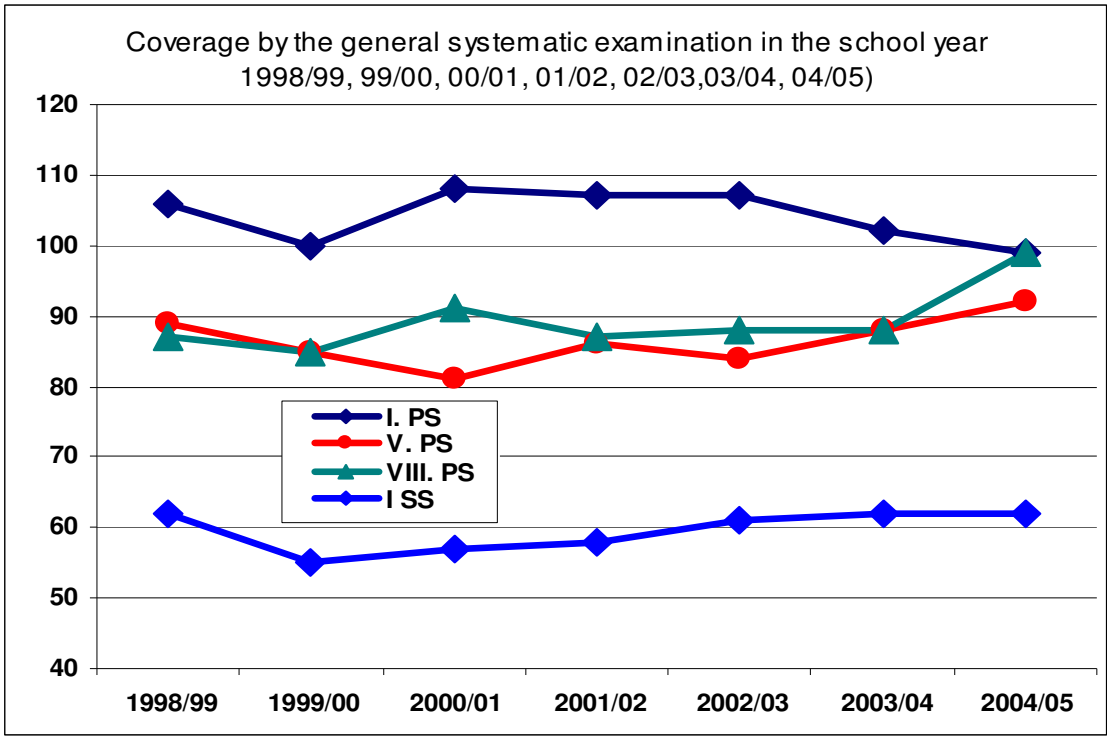

Figure 4.4: Coverage of the general systematic examinations in the period 1998-2005 (*PS:primary schools, SS:secondary schools)*

2. Additional examinations if needed after regular systematic examinations

3. Examinations with specific purpose

- For school and boarding school enrolment
- Before vaccination
- For sport activities enrolment
- Before field trips

4. Screenings of all school children

- Body height and weight - as part of regular systematic examinations and in 3rd and 6th grade of primary school
- Vision - as part of regular systematic examinations and in 3rd grade of primary school
- Color vision - 2nd or 3rd grade of primary school
- Anaemia - primary school enrolment
- Blood pressure - as part of regular systematic examinations
- Proteinuria - primary school enrolment
- Scoliosis - as part of regular systematic examinations and 6th grade of primary school
- Hearing - 6th or 7th grade of primary school
- Sexual development - as part of regular systematic examinations
- Behaviour - in the second part of 1st grade of primary school and as part of regular systematic examinations
- Risk behaviour - as part of regular systematic examinations
- Mental health - 7th grade of primary school and 1st grade of secondary school

5. Screenings of school children at risk (hypercholesterolemia, hearing, psychoactive drugs, and sexual activity)

6. Vaccination - according to the National mandatory vaccination programme

7. Health care for chronically ill children and children with special needs

8. Health education and health promotion

Topics are:

1st-4th grade of primary school:

- Hygiene
- Healthy eating
- Violence and abuse

5th-6th grade of primary school:

- Puberty, menstrual cycle
- Substance abuse

7th-8th grade of primary school:

- HIV/AIDS and other STI
- Healthy development and maturation

1st-3rd grade of high school

- Family planning, abortion, contraception, marriage, family, children
- Sexual behaviour, STI
- Self-protection and care for the personal health

Students in higher education (university or professional):

- Topics according to needs and indications

Methods used are: lecture, group work, forum and other methods

Participants are: pupils, parents and other family members and school staff

Since 1998, health education has been rapidly growing in number of participants and variety of themes. Lecture is still the most frequently used method of health education, and it is doubled in number of participants and themes. Other types of health education as group work, group brainstorming, personal stories, forums and other types such as articles in local newspaper, TV shows, school plays, radio shows or school exhibitions are increasingly applied as methods of health education, but their importance depends on decisions of local communities and human resources. In the school year 2004/05 up to 466,298 people, mainly pupils (391,546) and to a lesser extend students of higher education (15,405) were reached with one or more types of the above mentioned health education strategies (Figure 4.5).

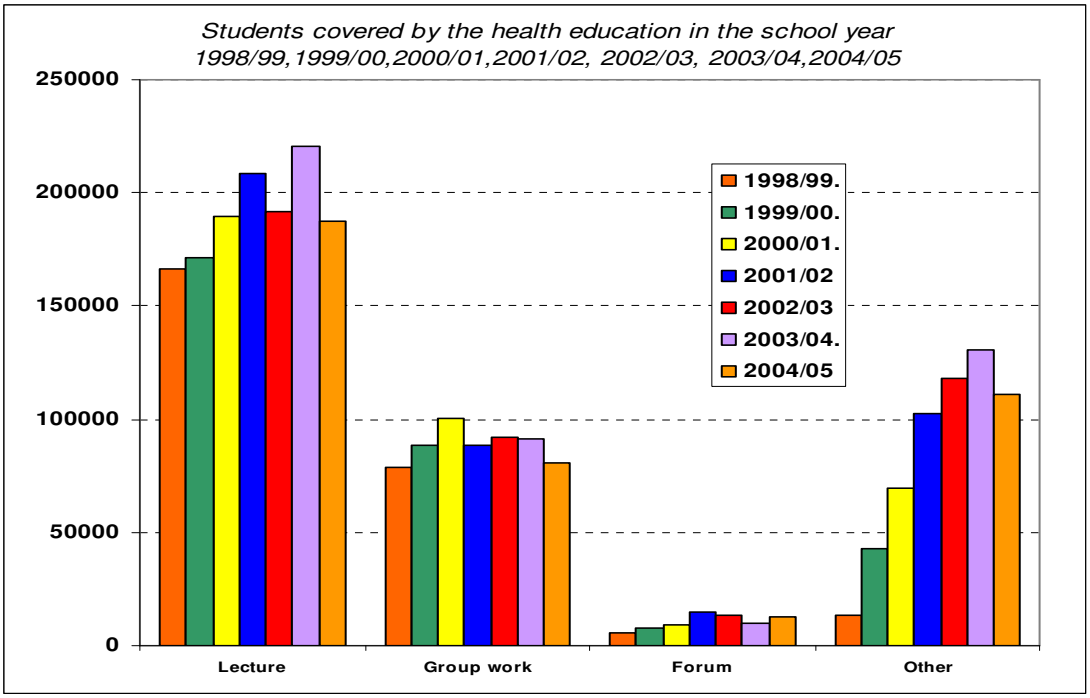

Figure 4.5: School children and students of higher education covered by health education from 1998 to 2005

9. Guidance services

Main topics are the following: learning difficulties, risk behaviour, mental health, reproductive health and chronic illness.

The methods used are: individual guidance and guidance in groups

Participants are: school children and students, parents and other family members and school staff

The number of visits to the counselling service has increased each year reaching the total of 154,162 visits in primary and secondary school (mostly pupils) in the school year 2004/05. Additionally, 14,065 visits were related to students in higher education (university or professional). Chronic illness has been the main reason for visiting counselling service, followed by learning difficulties. Problems related to mental health at primary school age have been the third most frequent reason for a counselling visit, followed by reproductive health in high schools. This last topic even reached in some years the second position in the ranking of the most important reasons for attending a counselling visit (Figure 4.6).

In addition, school doctors are often involved in multidisciplinary projects at the national or local level.

All school health services' activities are done in collaboration with other services and organisations of the educational, social welfare and health sector. The main examples are:

- School professionals, teachers, psychologists, pedagogues, involved in all fields of work
- Clinical psychologists and psychiatrists regarding risk behaviour, mental health, learning difficulties
- Rehabilitation services for learning difficulties and chronic illness
- Gynaecologists in the field of reproductive health
- Family physicians and other medical specialists

School health services serve here as a "bridge" connecting and filling in the gaps in the care for children and youngsters.

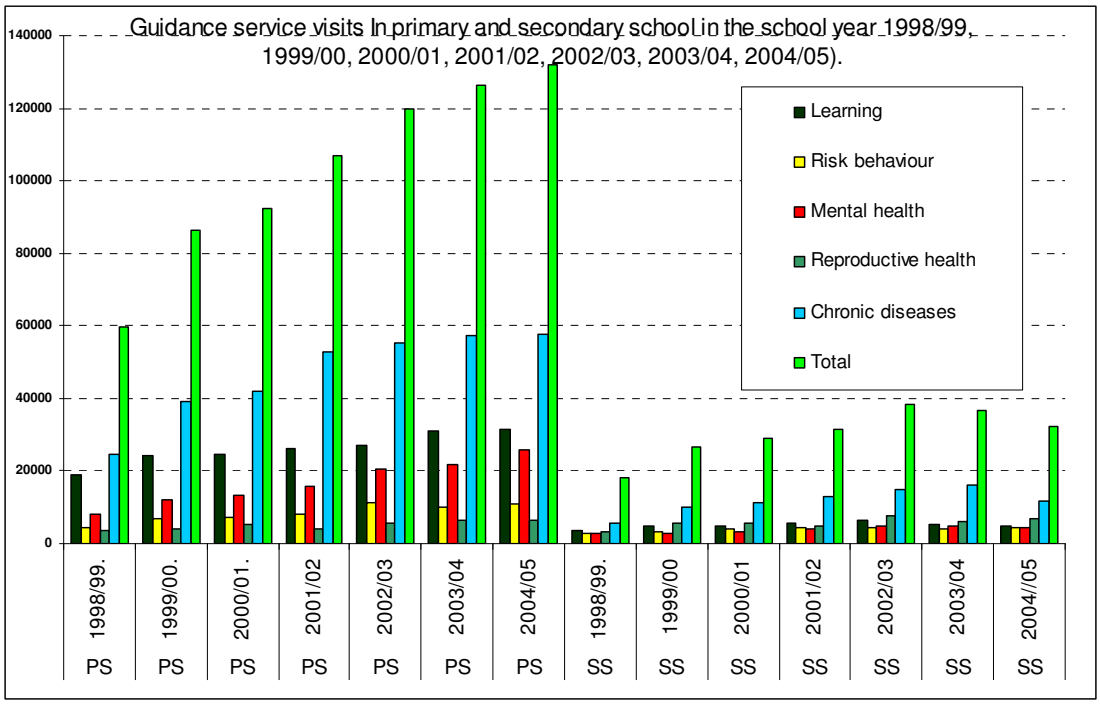

Figure 4.6: Guidance service visits in primary (PS) and secondary school (SS) from 1998 to 2005

4.2.5 School health service's advantages

As separate service for children and youth, the school health services in Croatia have definite advantages:

- The school health service's network reaches the most remote arrears of Croatia and insures that each school child, student and school has a school doctor;
- A unified programme for all school children supported by the health sector, related to school children and students of all education levels;
- Working on primary health care level, in such a way that school children and students of higher education have direct approach to the service;
- School as a setting where children are easily available for health interventions, where it is easy to monitor the epidemiological situation and where health education programmes can be successfully performed;
- Individual, family-, school- and population-based approach;
- Confidentiality, having in mind that school doctors are not a parents' or any adult's physician.

4.2.6 Possibilities for improvement

The school health services in Croatia, as separate service for children and youth, have definite advantages as stated before, but there are still many fields and possibilities for improvement:

- Working conditions should be improved (extensive Health Care Measure Plan and Programme with too many students covered by one team, cc 5000);
- Better support and recognition by the political, medical and educational authorities should be accomplished;
- Cooperation with other parts of the educational and health sector should be improved;
- The possibilities for intervention are considered to be too limited and should be enhanced. Therefore, guideline development is an essential step of progress of school health in the future.

4.2.7 References

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4.3 School health services in Slovenia

4.3.1 Introduction

School Health Services in Slovenia have a long tradition, which started in the year 1909, when the first school doctors took care of schoolchildren in public schools in Ljubljana. First, the service was mostly organized as a preventive health care (screenings, consultations), but in 1920-30s it evolved progressively towards a service for preventive and curative health care for school aged children. Until today the Slovenian School Health Care preserved its holistic, comprehensive character.

However, since recently the School Health Services have been going through many changes, due to important health care reforms (with an increasing involvement of the private sector in replacement of the public sector), and a health insurance reform (changed financing: payment per capita). In addition, the specialization in school medicine was abandoned in 2003. Also the fact that - due to a school reform in the schoolyear 1999/2000 - children are entering school one year earlier than before, has an impact on the organisation and content of the Slovenian school health care in the near future.

4.3.2 Educational system

Basic education is mandatory and funded by the government. Members of ethnic minorities in bilingual areas, have the right to receive education in their mother tongue, which is the case in municipalities with Italian and Hungarian ethnic minorities. Roma are likewise granted special educational rights.

In recent years, approximately 6% of Gross Domestic Product has been spent on education.

The percentage of the population included in education has increased, while the number of pupils in elementary schools and children in pre-school institutions has declined as a result of declining birth rates (table 4.3).

Table 4.3: Pre-school and school children, and students of higher education enrolled in education programmes (trends from the school years 1980/81 to 2003/04)

	1980/81	1985/86	1990/91	1995/96	2000/01	2001/02	2002/03	2003/04
Pre-school education	71,784	75,669	73,631	66,553	63,328	61,803	58,968	54,515
Basic education	217,806	225,789	225,640	193,914	180,874	177,755	175,743	177,535*
(Upper) secondary education	90,874	80,451	92,060	102,079	104,840	103,528	103,538	103,203
Higher vocational education	-	-	-	-	4,760	6,170	8,796	11,099
Higher education**	27,707	29,601	33,565	45,951	68,427	72,320	72,344	70,774

Data for pre-school education, higher vocational education and higher education refer to the beginning of the school year. Data for basic education and (upper) secondary education at the end of school year.
* The beginning of the school year ; ** Excluding candidates for graduation having student status (*absolventi*)

Pre-school education

Pre-school education, offered by pre-school institutions, is not compulsory. It includes children between the ages of 1 and 6. The curriculum is divided in two cycles (from 1 to 3 years and from 3 to 6 years of age).

Basic education

Basic education was recently extended from eight years to nine. This was done gradually. The implementation of the nine-year basic education started in the school year 1999/2000. Children reaching the age of 6 years in a particular calendar year enter the first class in that year.

The nine-year basic education is divided into 3 three-year cycles.

Successful completion of basic education enables pupils to proceed to the education of their choice in secondary school.
Pupils who fulfil the legal compulsory education requirement and successfully complete at least seven classes in the nine-year elementary school can continue their education in a short-term vocational education programme.

(Upper) secondary education

Secondary schools include: (i) vocational and technical schools preparing pupils predominantly for the labour market and (ii) general secondary schools preparing pupils predominantly for further studies.

a. General secondary education

General secondary schools preparing pupils for further studies are called “gymnasia”. Gymnasia programmes are divided into two groups: (i) general, or (ii) professionally oriented (technical gymnasia). They last four years, and end with an external examination called the “matura” examination.

b. Secondary vocational and technical education

Short-term vocational programmes last a year and a half for pupils and apprentices that have completed their basic education, and two and a half years for those without completed basic education. They finish with a final examination.
Pupils who successfully completed elementary school can enrol in 3-year secondary vocational programmes.

Higher vocational education

The first vocational colleges were established in 1996/97. Programmes are mainly practice-oriented and tightly connected with the occupational world. Post-secondary vocational education lasts two years ending with a “diploma” examination.

Higher education

Higher education includes academic university studies and professionally oriented studies.

In 2004, amendments to the Higher Education Act were adopted. The Act provides in a three-level study structure. The first level relates to the undergraduate studies and the second and third to postgraduate studies. The duration of study programmes is limited in years (three to four years) and credit points (180 to 240 credit points). Study programmes must be in line with the EU study programmes. The second level corresponds to the master's studies. It encompasses 60 to 120 credit points and takes one or two years to complete. The third level relates to doctoral studies and lasts three years. Higher education is the responsibility of the Ministry of Higher Education, Science and Technology.

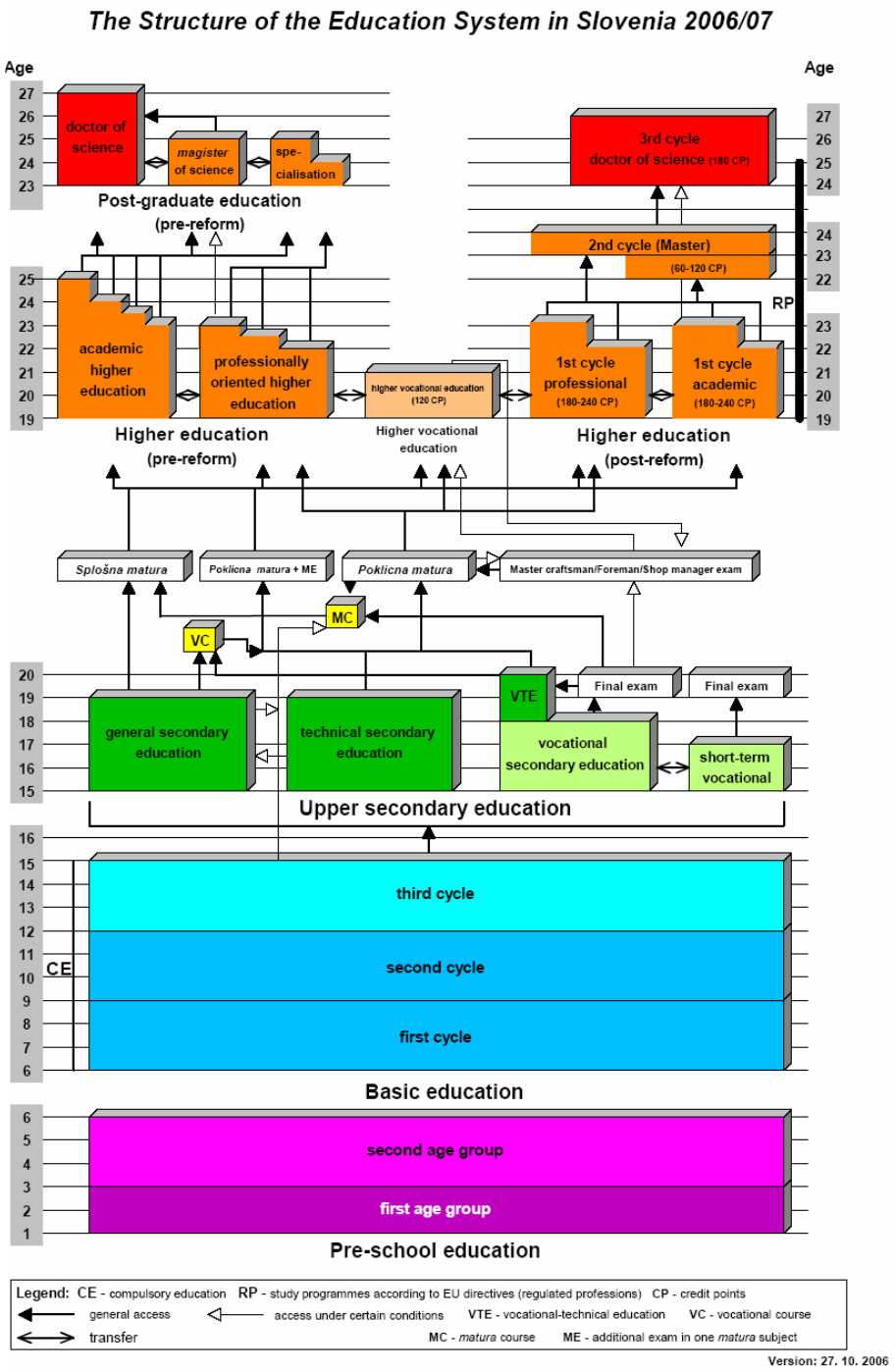

Figure 4.7: The structure of the education system in Slovenia (2006-2007) (source: http://www.mss.gov.si/en/areas_of_work/education_in_Slovenia)

4.3.3 Legal context

The legal context for School Health Services in Slovenia is written in a Law on Health Care and Health Insurance and in " Guidelines for primary prevention on the primary level of health care – Slovenian Official Gazette No 19/98 "(Navodilo za izvajanje preventivnega zdravstvenega varstva na primarni ravni, stran 1253.- UL RS 19/98).

4.3.3.1 Guidelines for primary prevention on the primary level of health care

Health care for School children and youth until the age of 19 years

In order to ensure a high quality health care system for schoolchildren and youth on the primary level, specific services must be organised, as described in the Slovenian legislation. In the Slovenian context "youth" is defined as all the children and adolescents who are in school age, but not attending school. Also these children can be covered by the system of school health services.

The way the public network is involved in this health care for schoolchildren and youth is written in article 5 of the Law of Health care (Slovenian Official Gazette RS no 9/92). The public network is covered by the local or city communities, and its functioning is based on standards for the health care for schoolchildren and youth (by the statistical definition the group of schoolchildren are all persons from the time of school entrance until the age of 19), as it is described in the National programme of health care *"Health for All till 2000"*.

In the last mentioned document the standards are the following:

- The target standard of children per team: 1700 children per team of the school health service (1 team consists of 1 school doctor, 1 nurse with high school degree and 0,5 nurse with a degree of secondary school for nurses);
- The minimal standard of children per team: 2200 schoolchildren per team as defined formerly.

Slovenian schoolchildren and youth have the right to have access to a comprehensive health care, which is fulfilled on a primary level in Public Dispensaries for schoolchildren and youth or in Private Ambulatories. The Public Dispensaries are either part of Health Centres or "private" with a contract to the Institute for Health Insurance, and as such in fact part of the public network.
The so-called school doctors for schoolchildren and youth until the age of 19 years are either specialists in school medicine or paediatricians. Today, only in some cases general practitioners or family doctors, with degree of a (two semester) postgraduate course in health care for mothers, children and schoolchildren, are involved in school health care. This obligation for school doctors to be qualified is strictly stated by article 80 of the Law of Health Care and Health Insurance (Slovenian Official Gazette RS 9/92, 13/93 and 9/96).

The Slovenian programme of School Health Care consists of a number of periodic systematic health checks and a programme of health education initiatives.

A. Systematic check-ups

The check-ups represent the active approach of the health care for schoolchildren and youth, aiming at discovering the health problems and being an opportunity to start counselling of children in need of specific care. During the health checks growth, development and nutritional status are monitored; the general physical and mental health is assessed, as well as negative social factors, negative habits and behaviour problems. An overview of the timing and content of the health checks is presented in table 4.4.

B. A programme of Health education

School health teams are expected to take the necessary preventive actions to reduce the circumstances in schools, in the living environment or related to lifestyles that can be dangerous to children's health
They should, for example, take care of health promoting school meals, promote a safe and healthy school environment and give health education.

Table 4.4: Programme of periodic health checks in School Health Services in Slovenia

	AGEGROUP												
Grade	School entry	Primary									Secondary		
		1	2	3	4	5	6	7	8**	9	1	2	3
Age (in years)	5	6	7	8	9	10	11	12	13	14	15	16	17
Timing of periodic examinations since the school reform	x	x		x		x			x		x		x
Content													
• Information from parents, pupil, school, GP, paediatrician, …	x	x		x		x			x		x		x
• Information with regard to nutritional habits and lifestyle	x	x		x		x			x		x		x
• Age-specific health education	x	x		x		x			x		x		x
Continuous activities													
Counselling (for pupils, school staff, parents)	x	x	x	x	x	x	x	x	x	x	x	x	x
Other check-ups (sports activities, check-ups before summer camps, health camps, adapted school programme, boarding school, transfer to other schools when requested by other institutions, vocational guidance)	x	x	x	x	x	x	x	x	x	x	x	x	x
Age-specific general medical examination													
• At least containing the following topics:													
Personal and family history	x	x		x		x		x			x		x
Growth and weight	x	x		x		x		x			x		x
Global development	x	x		x		x		x					
Visual function	x	x		x		x		x			x		x
Colour perception				x				x					
Hearing	x	x*		x				x*			x*		x*
Mouth and teeth	x	x		x		x		x					
Genitals	x	x				x		x					
Sexual maturation						x		x			x		x
Posture and locomotoric system	x	x		x		x		x			x		x
Thyroid palpation	x	x		x		x		x			x		x
Laboratory (blood and urine)	x							x			x		
Vaccinations	x	x		x									x
Follow-up after referral	x	x		x		x			x		x		x

* if audiometry not done before or for schoolchildren at risk
** due to changes in the educational system, check-ups for the 7th grade are done in the 8th grade

4.3.3.2 Law on health insurance

Rights from obligatory insurance - Rights to health care – 23rd article

By means of an obligatory health insurance the total cost of health care is covered for any insured person. This includes the systematic health check up-for schoolchildren and students, who are regularly registered in schools or universities.

Slovenian Official Gazette RS no 100/2005

4.3.4 Organizational context - Health services for schoolchildren and youth

Health care for schoolchildren and youth is organized in every Health Centre in Slovenia. The department is called “school dispensary” or “dispensary for children and youth” and their staffs consist of teams as described above (paragraph 4.3.3.1).

The provision of medical staff for schoolchildren and young people on the primary level, the extent of work performed and the state of health of schoolchildren and young people is regularly monitored. The monitoring includes children from the time they enter school until they finish regular secondary education. On the basis of reports sent by the providers of health care for schoolchildren and young people to the regional Institutes of Public Health, these Institutes prepare regional annual reports, which they send to the Institute of Public Health of the Republic of Slovenia. The data presented are from reports of outpatient health statistics and reports on periodic medical examinations of schoolchildren (Figure 4.8 and table 4.5).

The data presented for 2003 about the number of medical staff (expressed as equivalents of full-time engagement) in the health care of schoolchildren and young people (1430 hours per year) are from reports of outpatient health statistics – medical staff and working hours (Table 4.5).
In Slovenia, the average rate in the year 2003 was 1211.3 children 0-19 year per physician, calculated on the basis of working hours.

Three-quarters of the curative consultations on the primary level were performed in the health care of children and young people, 17.0 % in general practices, 1.9 % in women’s health care and 4.5 % in emergency services.
Eighty percent of preventive consultations were performed in the health care of school children and young people, 1.3 % in general practices, 7.8 % in women's health care and 11.2 % in the activities of occupational, traffic and sports medicine.

In the school year 2002/2003, the periodic medical examinations within the framework of preventive medicine were performed on 90.1 % of the pupils that are obliged to undergo periodic medical examinations. In the health care of schoolchildren and young people 210,774 preventive health check-ups were performed, 73.1% systematic examinations, 24.7% special-purpose preventive health examinations, 1.8 % other purpose check-ups (f.e. check-up of a group of children before going to summer camp) and only 0.3% counselling with parents, school staff, children and young people (less registered as performed).

Table 4.5: Number of Physicians/doctors and number of Primary and Secondary school children and Freshners, by regions in year 2003 in Slovenia (*)

	PHYSICANS/DOCTORS						
Region	All	Spec.	Resid.	GP	Primary school	Secondary school	School for children with special needs
Pomurska	6.3	5.0	1.3	0.0	10,621	4,935	131
Podravska	14.5	8.8	0.0	5.6	26,928	18,197	356
Koroška	2.7	2.0	0.2	0.5	6,888	3,526	92
Savinjska	15.7	10.5	1.5	3.7	23,649	13,842	280
Zasavska	5.2	3.9	0.1	1.2	3,833	1,793	60
Sp.posavska	2.7	1.7	0.0	1.1	6,283	2,506	70
JV Slovenija	9.6	5.5	0.0	4.1	13,498	7,035	157
Osrednjeslov.	49.7	33.3	1.5	14.9	42,943	29,952	525
Gorenjska	8.7	8.5	0.0	0.2	18,405	9,956	193
Notr.-kraška	2.7	2.3	0.0	0.4	4,429	1,616	51
Goriška	8.4	5.5	0.0	2.9	9,914	5,484	273
Obalno-kraška	8.3	6.4	0.0	1.9	7,820	4,696	70
Slovenija	**134.6**	**93.4**	**4.7**	**36.4**	**1,752,121**	**103,538**	**2258**

* Number of doctors were calculated by the hour obligation: 1430 hours per year; **Spec**., specialists, **Resid**., residents
In : Health Statistical Year Book. Ljubljana: IVZ, 2003

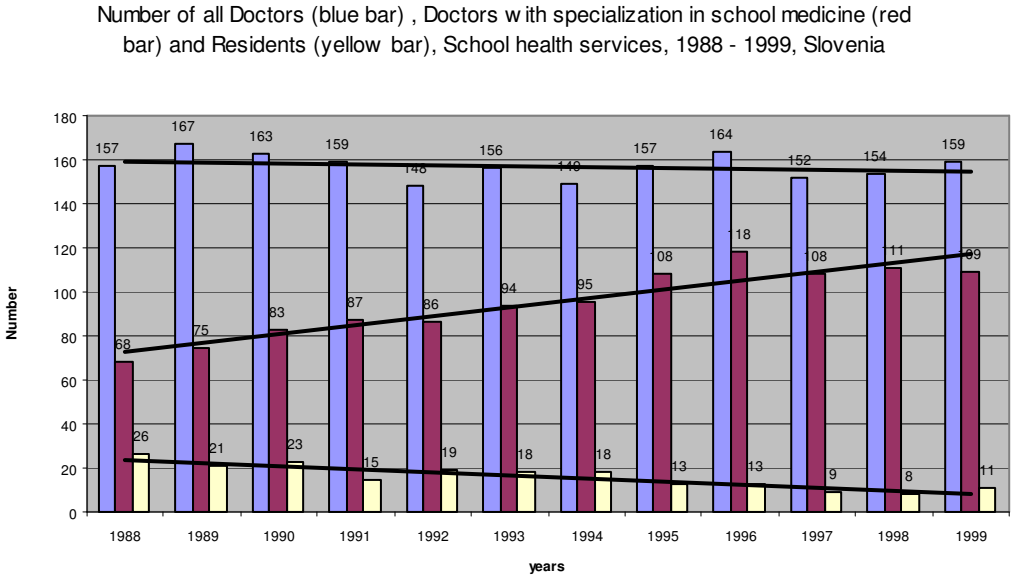

Figure 4.8: Number of doctors, specialists in school medicine, and residents in school health services from 1988 to 1999 (Premic et al., 2001)

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Slovenian Official Gazette RS no 100/2005

Chapter 5
ACTUAL PRACTICE OF OVERWEIGHT AND OBESITY MANAGEMENT IN SCHOOL HEALTH SERVICES

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5.1 Flanders

Katelijne Van Hoeck, Ann Devriendt and Karel Hoppenbrouwers

This paragraph presents an overview of the current practice of overweight and obesity management in the school health services in Flanders. To that aim a survey was conducted in May – June 2006 by means of a questionnaire, which was sent to all school health services in Flanders. Information was collected with regard to: (i) the actual practice during medical check-ups, and (ii) initiatives taken and/or cooperation supported by the school health services. In a second step a selection of school health services was contacted by telephone to collect more detailed information about promising initiatives and projects.

Multiple-choice and open-ended questions were used. Respondents were allowed to mark multiple answers per question.

We received 305 questionnaires, completed mainly by school doctors (43%) or school nurses (56%), and representing about 75% of the Flemish school health services. When needed, a follow-up interview was conducted by telephone.

5.1.1 Actual practice in the medical check-ups

Evaluation of growth and weight status is a mandatory element of each consultation (general and specific) in school health care in Flanders (see table 4.1).

The answer categories for the multiple-choice items were: 1 (always); 2 (often); 3 (sometimes); 4 (rarely); or 5 (never). The answers on the open-ended questions were clustered according to the idea or theme expressed.

Who is measuring weight? (%)

School nurses: 93%
School doctors: 5%
Other: 2%

Is the BMI calculated?

	1	2	3	4	5
BMI calculation (%)	14	14	57	6	4

Missing values: 5%

Who is calculating BMI?

School nurses: 29%
School doctors: 62%
Other: 9%

Is the BMI plotted on the growth chart?

	1	2	3	4	5
BMI plotted on growth chart (%)	17	14	35	17	16

Missing values: 1%

Who is plotting BMI on the growth chart?

School nurses: 33%
School doctors: 66%
Other: 1%

Which indicator is used to evaluate a weight problem?

Indicator	Percentage of questionnaires
BMI	31
Percentage overweight	8
Discrepancy of centiles	31
Clinical appraisal	27
Other	3

What are the criteria used to define overweight?

Criteria	Percentage of questionnaires
BMI related definitions	58
Growth curve related definitions	13
Percentage overweight related definitions	6
Clinical appraisal	18
Unclear defined	6
Anamnesis	2
School doctor decides	10

Many different BMI-criteria are used to define overweight. To these BMI-criteria the school doctor adds his appraisal of several clinical features and the interpretation of the growth charts.

Do you discriminate between overweight and obesity?

	1	2	3	4	5
Discriminate overweight/obesity (%)	33	29	10	24	4

Should, in your opinion, screening for overweight and obesity be a part of the school health care programme? (%)

Yes: 96%
No: 0%
Missing: 4%

Why is the school health service suited for early detection of overweight and/or obesity?

Reasons	Percentage of questionnaires
Organisational context is suitable	47
Factors related to prognosis of overweight/obesity	26
Certain conditions should be taken into consideration	16
Because of high prevalence	5
It is a question of policy	4

The organisational context is suitable:
- It is part of the preventive duty of school health services
- School health care is free of charge and easy accessible
- School health care has the necessary expertise
- School health services offer longitudinal care during the entire school career
- Overweight/obesity is not seen as an illness by parents

Factors related to the prognosis of overweight/obesity
- Early detection and early care results in better prognosis
- Overweight/obesity is related to important health risks, and has a considerable impact on the mental health

Certain conditions should be taken into consideration
- Guidelines should be practical and feasible
- Early detection is feasible, but guidance is too time consuming
- It should be included in the job description of all team members
- Multiple contacts with overweight/obese children are needed

Because of high prevalence
- Prevalence of overweight/obesity is increasing
- Early detection and guidance would result in decreasing prevalence

It is a question of policy
- In general, parents and children should be sensitized
- General recommendations with regard to healthy nutrition and increased physical activity

Which difficulties do you encounter with regard to detection and counselling of overweight and/or obesity?

(n=number of times an idea was expressed)

It is a very time consuming activity (n=188)
- Questioning eating habits and physical activity
- Questioning the well-being
- The problem needs to be followed-up

The results of treatment are disappointing (n=31)
- There are no long-term results
- Results are not in proportion with the efforts made
- Changing habits is very difficult

The assignment of the team members with regard to this part of the school health programme is not clear (n=25)
- Not enough expertise/training
- No recognition by other partners in the health care system
- The expectations are too high/not realistic
- There is no concertation with other team members in the school health service

Difficulties in working with parents and pupils (n=195)
- Difficult to motivate
- Angry reactions and refusal to accept diagnosis and/or guidance
- Lack of cooperation
- Difficulties to engage parents of small children
- Referral is not taken seriously
- Difficult communication

Difficulties related to the emotional and social impact of the problem (n=27)

- The problem is very delicate
- Parents and children are very sensitive to negative reactions
- Follow-up contacts at school are stigmatizing
- There are risks of developing anorexia/bulimia

Difficulties with regard to the referral process (n=33)

Structural difficulties related to the organisation of the school health care programme (n=29)

Material shortcomings (n=8)

School-related difficulties (n=17)

Society-related difficulties (n=13)

Difficulties related to differences in family culture (n=16)

5.1.2 Initiatives taken and cooperation supported by school health services

A number of school health services have developed a standard scenario for overweight and obesity management. These scenarios give guidance for detection and follow-up, or contain questionnaires for the assessment of diet, physical activity, and well-being.

The **questionnaires** are generally completed just before the medical exam (in the waiting-room) by pupils of the 5th (10 years), 7th (13 years) and 9th grade (15 years). The questionnaires are used as a starting point for the subsequent talk with the school doctor or nurse. Using this approach, most school health services consider it possible to assess these aspects (briefly), as well as the motivation to change habits (when needed), within a 2 to 5 minutes time frame (exceptionally up to 15 minutes). It is clear that the thoroughness of this assessment depends on the number of pupils to examine during the day, as well as on the presence of other problems to be discussed or examined.

Some scenarios include a **waiting-room programme** that promotes a healthy life style in general and a healthy diet and physical activity pattern in particular. The success of these activities depends largely on the cooperation of the accompanying teacher. A number of centres also use leaflets or handouts with key messages to support the message.

Centres that systematically planned **follow-up consultation** with pupils or parents had to postpone this due to lack of time. The number of overweight/obese pupils is too high to maintain such a programme in the current Flemish school health context. The periodical examinations (specific or general) are however considered as excellent opportunities for primary or secondary prevention, tailored to the pupil's specific needs, but a systematic use of this 'opportunity' is severely limited by the (un)available time (even when follow-up is not yet taken into consideration).
A respondent mentioned that she started to make an inventory of relevant local health care workers and facilities (for specialized care, sports, fitness centres as well as possibilities for their reimbursement), and brought these people together to set up a common management plan. This process has only recently started, and is in an immature phase, but it is nevertheless an interesting and promising approach.

Within schools, health promotion is well established, but is generally limited to individual actions. More recently, these specific actions are being embedded in a common structural health promoting policy. The school health services and other external partners (a.o. local health council) are consulted on a regular basis along with internal partners (staff, pupils, parents) to define priorities and initiate activities (for more information, see paragraph 9.2.1.2: Primary prevention: health promotion).

To reach a number of specific target populations, sometimes **specific activities** are initiated.

An example of such an activity is the organization of afternoon sessions for mothers in schools with a large number of immigrant children. The pupils' mothers are invited to participate in a programme focused on a specific topic (a.o. a healthy diet, school homework policy), and guided by school and the school health staff.
Another specific target group are children in special education. These pupils are often surrounded by a school staff, consisting of teachers and therapists (a.o. psychologist, physiotherapist), which offers opportunities in setting up specific programmes, e.g. an overweight management plan tailored to their needs and abilities. Screening for overweight and helping to define the programme in collaboration with the school staff is in that case a relevant task for the school health service.

Initiatives with respect to overweight and obesity have an obvious **connection with curative health care**. Although school health care is a major player in detection and referral to specialized care, this process is often slow and rarely successful. **Some centres have their own initiatives** with regard to overweight and obesity. In each case, these initiatives include diet, physical activity and well-being. The approach is often multidisciplinary (note that the school health staff includes not only school doctors and nurses, but also psychologists, pedagogues, and social workers). Some initiatives are focused on individual children, while others consist of group sessions. Both strategies are considered as very time consuming.

According to the involved health care workers, parental involvement might be desirable.
A small number of centres were able to participate in an (experimental) **parental training programme**. The group sessions, directed by a psychologist and a dietician, were very effective, but also very time consuming.

It is the centres' experience that each initiative of primary or secondary prevention, without the (perceived) need for treatment, or without **motivation**, is doomed to fail. On the contrary, successful initiatives are often the result of an appropriate answer to real (perceived) needs (pupil, parent and school). As the amount of available time is limited, it is considered desirable to assess needs and motivation first, before acting (and – if necessary - address the lack of motivation first). In secondary education, the motivation of the pupil him/herself is the main determinant of success. A stimulating environment (home, friends and school) can improve the motivation, but is not a prerequisite for success. Pupils in primary school depend more on the context (home, school), and it is therefore more effective to integrate these environments in the treatment programme.

During the telephone interviews it was repeatedly stressed that a successful behavioural change depends on the use of **small, well-defined steps with a clear purpose** in the approach of pupils, parents or schools!
The nature of each step should depend on what the pupil/parent/school considers a 'reachable target'. It might even be desirable to restart a certain step and to subdivide it in even smaller steps. This approach avoids unnecessary withdrawal from the programme. Positive reinforcement can be generated by 'naming' even small behavioural changes, efforts and/or health benefits. The general opinion is that although small steps might appear negligible, they are important to take and to encourage. Even when real treatment or referral is not an option, checking on motivation 'to change a habit in the healthy direction' is worthwhile. When motivation is present, outlining together one 'reachable target' can always be a concrete and hopeful start of the 'remodelling' of the behaviour of the child.

5.2 Croatia

Nina Perkovic, Ivana Pavic Simetin and Marina Kuzman

The organizational system of school health services in Croatia, as well as the annual plan and programme of the preventive activities were presented. The organization went through major changes several years ago, and the activities have been adapted in accordance to new laws and by-laws. The main objective of this chapter is to investigate the specific practice regarding the overweight and obesity among schoolchildren, being the responsibility of the school doctors. To that aim a survey was developed.

5.2.1 General outcome of a survey on the actual practice for early detection and treatment of overweight/obese children in the Croatian School Health Services

The anonymous questionnaire was sent out to all school doctors working in school health services in Croatia. Hundred and four (104) completed questionnaires were received, representing a response rate of 61%. The survey inventoried the actual practice and methods used in the early detection of the children's overweight and obesity, the growth charts used for follow-up, the most common questions asked, the diagnostic procedures performed and the measures taken. The most common educational and health promoting programmes were listed and the needs for further training inventoried.

The actual practice in the management of child obesity is in general appropriate and consistent, regardless of years of practice of the professionals. Some points need to be emphasized: (i) it was encouraging to see that restrictive diets were not often recommended; (ii) school doctors felt that their influence at the school regulations (as school kitchen and physical activity lessons) is very weak; and (iii) they felt not being able to have sufficient influence on the school politics or preventive programmes in the community.

In the daily practice of the school health services, insufficient time is left for specific activities, such as counselling, parental involvement and regular follow-up meetings, especially if group work is preferred. The compulsory activities, such as vaccination and systematic examinations, are time-consuming and limit the hours available for a more comprehensive and balanced approach.

5.2.2 Detailed results of the survey

Overweight/obesity is screened regularly by school doctors through obligatory **systematic examinations**, and during certain **screenings**.

Most of them use **multiple methods to assess overweight** (always/often): 81.3% uses clinical impression, 94.9% uses weight-for-height charts (overweight cut-off at 90th percentile, Prebeg). Less than 10% uses skin fold (8.2%), waist-hip ratio (6.1%) and BMI value (23%).

With regard to the **assessment of the family history** most school doctors always/often ask about overweight family members (96.9%), cardiovascular diseases (89.9%), hypertension (93.9%), diabetes mellitus type II (83.5%) and eating disorders (83.5%). Less frequently they explore about dyslipidemia (64.6%) and gallbladder disease (41.1%).

In **environmental contributing factors'** assessment 94.9% always/often ask about general dietary habits, typical daily food intake (93.9%), about physical activity (96.9%), unstructured physical activity or free play (94.8%) and sedentary behaviour (88.8%). Questions about meal content and frequency are asked more by doctors working longer in practice (p=0,020, Chi-square and Kruskal-Wallis test used).
Altogether, 69.8% of school doctors inquire always/often about the **psychological and emotional status** of overweight children. Two topics are more frequently assessed by doctors being longer in

practice: “readiness to make changes in order to manage weight” (p=0,032), and “family dynamics” (p=0,005).

In the **systematic check-ups** the majority of school doctors regularly execute a general somatic examination (85%), search for striae (92%) and testicular retention (86%), whereas all school doctors examine blood pressure. Other examination methods are used less frequently.

With regard to the **treatment**, the majority of school doctors make recommendations on healthy diet (98%), physical activity (98%), less sedentary behaviour (91%) and low-intake diet (70%), invite children for control examinations (78%), and ask for family involvement (74%). The organisation of therapeutic groups and referral to other specialists is common practice for less than one third of the responders. The proportion of school doctors who recommend laboratory tests varies form 53% for glucose to 6% for insulin level.

In most schools, **health education** for pupils is organised by 76% of the school doctors, **health promotion** by 65%, and other activities by less than one third of the responders. Doctors working more years in practice are more engaged in family involvement ($p < 0.01$), in parents’ health education, and in school diet interventions ($p < 0.05$).

The association between **physicians’ years of practice in school health service** and their disease management practice was examined. A statistically significant difference (Chi-square and Kruskal-Wallis test used, $p<0.05$) was observed for only few items (marked with*), generally more often done by doctors working more years in practice.

The answer categories for the multiple-choice items were 1 (always); 2 (often); 3 (sometimes); 4 (rarely); or 5 (never).

Measurement of height and weight at systematic examination (%)

	1	2	3	4	5
School enrolment	100				
5th grade	100				
8th grade	98				2
1st grade secondary	89	1		1	9
1st year university	61		1		38

Screenings (%)

	1	2	3	4	5
3th grade (vision/color)	17	3	10	10	60
6th grade (posture)	58	3	12	8	19

Criteria used for overweight/obesity assessement (%)

		1	2	3	4	5
BW/BH/gender	(Prebeg 90c)	90	5			5
BW/age/gender	(Prebeg 85c)	6	1	6	6	82
	(Prebeg 90c)	46	14	2	1	37
	(Prebeg 95c)	26	3	8	3	60

Procedures used for overweight/obesity assessment (%)

	1	2	3	4	5
General assessment	72	10	8	3	7
Skin fold	5	3	12	7	73
Waist/hip ratio	4	2	8	11	75

Common questions asked (%)

	1	2	3	4	5
Diet	72	22	4		2
Food previous day	18	25	24	8	2
Diary on diet	12	10	34	15	29
Common dietary habits	72	22	1		4
Frequency of eating specific food*	59	25	5	2	9
Meal frequency and setting*	72	19	2		7
Physical activity	92	5	1	1	1
Sport clubs	83	8	4	1	4
Recreation	77	18	2	1	2
Common activities	52	24	10	7	7
At least one hour of physical activity daily	35	29	15	8	14
Sedentary behaviour	64	25	10	1	
TV	64	27	5	3	1
Computer	64	26	5	4	1
Co-morbidity	61	32	6	1	

Common observations (%)

	1	2	3	4	5
Slow growth	45	30	18	4	3
Slow sexual development	45	32	18	4	1
Oligo/amenorrhoe	37	32	20	8	3
Headache	14	20	35	20	11
Abdominal pain	14	15	29	30	12
Hip/knee pain	15	22	25	21	17
Breathing disturbances/sleep	8	21	15	30	26
Daily somnolence	6	18	25	25	26

Psychological and emotional assessment (%)

	1	2	3	4	5
General assessment	27	43	27	3	
Teasing	40	40	16	2	2
Low self-esteem	41	39	11	8	1
Symptoms of depression	30	35	24	9	2
Bullying	15	27	35	17	6
Eating disorders	61	26	10	3	
Child's concern	52	39	6	2	1
Parental concern	37	46	12	5	
Child readiness to act*	61	31	7	1	
Family dynamics*	39	36	18	4	3

Family medical history (%)

	1	2	3	4	5
General history	67	27	4	2	
Obesity	85	11	3	1	
CV diseases	65	25	9	1	
Hypertension	7	3	21	5	1
Dyslipidemia	35	30	20	12	3
Eating disorders	52	32	10	4	2
Gallbladder disease	13	27	28	20	12
Diabetes mellitus type 2	57	26	13	4	
Other endocrine disorders	38	28	25	5	4

Procedures/recommendations for the overweight/obese child (%)

	1	2	3	4	5
Healthy diet	95	3	2		
Low-intake diet	47	23	14	9	7
Physical activity	91	7	2		
Sedentary behaviour	65	26	8	1	
Family involvement*	38	36	17	6	3
Control examination	39	39	17	4	1
Therapeutic groups	3	5	17	21	54
Referrals to endocrinologist	12	20	61	5	2
Family physician	3	23	28	27	19
Psychologist/psychiatrist	2	12	52	23	11
Ophthalmologist	3	5	22	35	35
Laboratory (general)	16	23	30	18	13
Lipidogram	20	18	23	8	31
Cholesterol	17	8	23	11	41
Glucose	37	16	18	7	22
OGTT	9	9	23	12	47
Thyroid hormones	12	15	31	18	24
Hepatogram	15	10	21	17	37
Insulin	2	4	6	9	79
HbA1	6	7		10	77
Cortisol	2	5	9	10	74

Frequency of control visits

1-2 times in one school term	68%
Once a month	12%
Other	20%

Health promotion or primary prevention programmes for overweight/obesity

	Mean score
Health promotion	3.8
Health education for students	4.2
Health education for parents*	2.9
Health education for school staff	2.7
Intervention in the school diet*	2.6
Intervention in the school sport programme	2.5
Support the comprehensive school politics	2.7

Scores: 1= no, in no one school; 5=yes, in the most of schools

Needs for education

	Mean score
Healthy diet/habits	4.1
Sedentary behaviour	4.1
Parental involvement/family interventions	4.2
Primary prevention in community	3.8
Health promotion in schools	4.1
Implementation of the guidelines	4.6

Scores: 1=no, not at all; 5=yes, very much

5.2.3 References

Prebeg Z. Growth of school children in Croatia in the last decade of the second millennium. Lijec Vjesn. 2002;124(1-2):3-9

5.3 Slovenia

Nives Letnar Zbogar and Mojca Juricic

In Slovenia, School Health Services are organized on a primary level in the public health network as part of Regional Health Centres or in the private sector included in a public health care network (more information in § 4.3 "School health services in Slovenia").

5.3.1 Periodical medical examinations in Slovenia

5.3.1.1 As described, in § 4.3.3 "Legal context", the height and weight of schoolchildren are measured on the occasion of every systematic check-up, and based on these measurements the BMI can be calculated.

5.3.1.2 Assessment of overweight and obesity:

A.1. Systematic check-up of fresheners:	Screening: height, weight, BMI
A.2. Systematic check-up in 1st grade of Primary school:	Screening: height, weight, BMI
A.3. Systematic check-up in 3rd grade of Primary school:	Screening: height, weight, BMI
A.4. Systematic check-up in 5th grade of Primary school:	Screening: height, weight, BMI
A.5. Systematic check-up in 7th(8th)* grade of Primary school:	Screening: height, weight, BMI
A.6. Systematic check-up in 1st grade of Secondary school:	Screening: height, weight, BMI
A.7. Systematic check-up in 3rd grade of Secondary school:	Screening: height, weight, BMI

* Since a recent school reform, the systematic check-up originally scheduled in the 7th grade is moved to the 8th grade of the primary school (cfr. Table 4.4)

5.3.2 A survey on the current practice in the Slovenian school health care

The current preventive practice in Slovenian School Health Services, as far as the early detection and treatment of overweight and obesity in schoolchildren is concerned, is described on the basis of the results of a questionnaire, which was sent out to all doctors involved in preventive medical examinations of schoolchildren in Slovenia.

In June 2005 the questionnaires were sent to 123 active members of the *Society of School doctors* and to 54 Health Centres- department for Schoolchildren or Department for Schoolchildren and Youth. Until October 2005, 61 (45.5%) questionnaires were collected (6 of them were filled in incompletely). Therefore, in December 2005 another 26 questionnaires were sent to 17 doctors, resulting in 11 completed questionnaires. Altogether 72 questionnaires were collected, representing a response rate of 53.7 %.
According to the calculations in the *Health Statistic Yearbook 2004 (published by the Institute of Public Health of the Republic of Slovenia)* there are 134 doctors in Slovenia who perform medical examinations of schoolchildren.

The main results of the survey are summarised here below.

Number of respondents by city of work

City	No	City	No	City	No
Ajdovščina	1	Lenart	1	Radeče	1
Brežice	1	Lendava	2	Radlje ob Dravi	1
Celje	3	Litija	2	Ribnica	1
Črnomelj	1	Ljubljana	8	Sevnica	1
Domžale	1	Ljutomer	2	Sežana	1
Gornja Radgona	1	Logatec	1	Slovenj Gradec	1
Grosuplje	1	Maribor	5	Sodražica	1
Hrastnik	1	Medvode	1	Šentjur	1
Idrija	1	Murska Sobota	1	Škofja Loka	1
Ilirska Bistrica	1	Nova Gorica	2	Trbovlje	3
Izola	1	Novo Mesto	3	Trebnje	1
Jesenice	1	Orehova vas*	1	Tržič	1
Kamnik	1	Ormož	1	Velenje	2
Kočevje	1	Portorož	1	Vuzenica	1
Koper	1	Postojna	1	Žalec	1
Kranj	1	Ptuj	4		
				Total	**72**

Education of doctors (n=72)

- 13 (18%) finished postgraduate courses in protecting children, women and youth
- 1 resident in school medicine
- 58 (80.5%) are trained as specialists:
    - School doctors: 37 (63.8%)
    - Paediatricians: 15 (25.8%)
    - School doctors and paediatricians: 4 (6.8%)
    - General medicine-GP: 2 (3.4%)

School Health Care is part of different settings

- 65 (90.2%) doctors work in Health centres
    - 45 (69.2%) in school outpatient clinics
    - 15 (21.2%) in preschool and school outpatient clinics
    - 2 in preschool outpatient clinics
    - 2 in preschool, school and general/family outpatient clinics
    - 1 in family/GP outpatient clinic

- 7 (9.7%) work in private clinics/ambulatory

Other members in the school health team

- 52 (72.2%) teams have a nurse with vocational school education and a nurse with college education
- 9 (12.5%) teams have a nurse with college education
- 9 (12.5%) teams have a nurse with vocational school education
- In 2 (2.7%) the respective information was lacking

Location where medical examinations are being performed

- 52 (72.2%) in Health centres or private clinics/ambulatories
- 11 (16.7%) in Health centres or schools
- 3 (4.1%) in Health centres or Health stations
- 3 (4.1%) in Health stations
- 3 (4.1%) in Health centres, at elementary school or in a Health station

Except for one, all doctors examine children before they go to elementary school (fresheners, medical examination at school entrance). According to the answers in the questionnaire 90-100% of the target group is examined.

The percentage of elementary school children who passed a systematic medical examination

- 1st grade (91-100%)
- 3rd grade (89-100%)
- 5th grade (95-100%
- 7th grade (94.3-100%)
- 8th grade (93-100%)

The percentage of doctors who perform systematic medical examinations in secondary schools

- 19 doctors (26.3%) do not perform medical examinations at secondary school level
- 49 doctors (68 %) perform medical examinations in the 1st and 3rd year of the secondary school
- 1 doctor performs medical examinations also in the 1st year of high school and/or university
- For 3 school doctors information was lacking

The percentage of secondary schoolchildren who passed a systematic medical examination

- 1st year (87.8-100%) (a lack in information for 5 doctors)
- 3rd year (88-100%) (a lack in information for 5 doctors)

The percentage of school doctors who also perform systematic medical examinations of university students (University Health Care is separately organised)

- 63 (87.5%) doctors do not perform student medical examinations
- 2 (2.7%) doctors in 1st and 3rd year
- 5 (6.9%) doctors in 1st year
- A lack in information for 2 doctors

Use of the growth chart (weight, height) in the file to assess weight status

All doctors use the schoolchildren's medical file, with growth charts for height and weight.

- 53 (73.6%) doctors use charts
- 18 (25 %) doctors do not use charts
- A lack in information for 1 doctor

Assessment of body mass

Charts, standards	Frequency	Percent
BMI	11	33.3%
BMI, KKS	1	3.0%
BMI, Nelson	1	3.0%
Nomograms from Paediatric clinic	1	3.0%
Clinical assessment, BMI	1	3.0%
Growth charts from Paediatric clinical department of endocrinology	1	3.0%
NCHS	3	6.0%
Nelson	7	21.2%
Other normative	1	3.0%
Denver test for children age 5-6 years	1	3.0%
Somatogram by D. Kunze	1	3.0%
WHO charts, table	1	3.0%
Unknown	4	12.1%
Total	33	100.0%

5.3.3 References

Health Statistic Yearbook 2004 (Published by the Institute of Public Health of the Republic Slovenia)

PART III
A GUIDELINE FOR THE PREVENTION OF OVERWEIGHT AND OBESITY IN SCHOOL HEALTH CARE

INTRODUCTION

According to the methodology of guideline development, as it was outlined and is being applied by the Flemish Society for Youth Health Care, a guideline for the prevention of overweight and obesity in school health care was developed. To that aim a systematic literature review regarding primary prevention, early detection and secondary prevention of overweight and obesity in schoolchildren was performed first (step 3 of the developmental process; see methodology in annexe). Based on this review the most successful strategies for primary and secondary prevention were summarized, and a science-based methodology for early detection was outlined (Part I: Literature Review).

In order to keep guard of the practical feasibility of the newly developed guideline, the organisational context of the school health care in the three participating countries, and their actual practice regarding overweight and obesity, has been described in detail (step 4 of the developmental process)(Part II: Organisational context and actual practice).

In this part III the guideline itself is presented, including generic recommendations regarding primary prevention (chapter 6), early detection (chapter 7) and possible interventions (chapter 8).
The implementation of the guideline itself consists of some generic aspects (i.e. measurement procedures and a strategy of in-dept assessment of children with a BMI above the cut-off value for overweight), followed by a detailed description of country-specific implementation procedures (chapter 9).

Chapter 6
PRIMARY PREVENTION

Nives Letnar Zbogar and Mojca Juricic

These recommendations are intended to help school health personnel and policymakers at the local and national level to meet national health objectives and educational goals, by implementing a school-based education and health policy for obesity prevention, especially by means of programmes targeting nutrition and physical education. These school-based programmes should be part of a broader and comprehensive approach, including environmental and behavioural aspects.

To ensure a healthy future for our children, school-based nutrition and physical activity education programmes must become a national priority. However, schools cannot achieve this goal on their own force, since the cultural environment has a large influence on food-related beliefs, values, and practices. Families, food stores, restaurants, the food industry, religious institutions, community centres, government programmes, and the mass media must also support the principles of the Dietary Guidelines.
By adopting these recommendations, schools can help guarantee that all school-aged children and youngsters obtain their full educational potential and good health.

This report can also be useful to schoolchildren, to parents, and to personnel in local and state health departments, in community-based health and nutrition programmes, in paediatric clinics, and in training institutions for teachers and public health professionals.

Effective programmes for obesity prevention encourage both healthy eating and physical activity. Changes in diet and physical activity need to be incorporated into new behavioural patterns, and constant reminders or rewards should be incorporated for sustainability. To reach these objectives, the following not limitative list of recommendations should be taken into consideration in a guideline.

6.1 Healthy Diet

- Drink water
- Provide meals and snacks at regular times (3-5 meals per day), and avoid snacks in between meals;
- Do not skip meals (breakfast included);
- Encourage children to listen to internal hunger clues and to eat to appetite;
- Enable easy and affordable access to healthy food;
- Decrease dietary fat consumption, limit food high in fat such as crisps, chips and pastries, limit fried food (including deep fried food);
- Limit food high in sugar such as sweets and chocolate, decrease soft drinks or replace them with low sugar beverages;
- Promote the consumption of low energy food (such as fruit and vegetables);
- Include fruit or vegetables in each meal;
- Include bread, pasta, cereals, rice or potatoes in every meal (as part of the meal);
- Use natural food if possible, but when buying it manufactured or packaged, choose food with low energy density;
- Reduce fat, sugar, and salt in manufactured products;
- Eat off small plates, avoid large portions (never super size);
- Never eat out of the hand, only eat when sitting down;
- Avoid eating while doing other activities such as watching TV or doing homework;
- Do not offer food as a reward to a child;
- Avoid classifying food as good or bad;

- Reduce commercial pressure on people, particularly on children, to consume popular products with high energy density.

6.2 Increased physical activity

- Children should be encouraged to be physically active for a minimum of 60 minutes per day, including every day activities;
- Limit the time spent watching TV or playing computer games, video, play-station (e.g. sedentary behaviour);
- Increase physical activity, (join a gym, walk to the school, walk instead of taking the bus, use stairs instead of escalators or lifts);
- Go for walks in parks and playgrounds, go swimming, cycling, rollerblading;
- Participate in team activities such as football, dancing, youth movements;
- Attend physical education lessons/outdoor education;
- Promote cycling and walking by better urban design and transport policies;
- Create opportunities in local environments for people to be more physically active in their leisure time.

6.3 General, support

- Encourage health services to give advice on diet and physical activity and promote exclusive breast feeding for babies;
- Encourage educational resorts (daycare centres, preschools, schools) to support and maintain health programmes in order to prevent overweight and obesity in child and adolescent period;
- Introduce measures to improve the quality of food in schools;
- Make health promoting food easy available and affordable (e.g., increase availability of fruits and vegetables);
- Apply a higher tax on high energetic density food with a low nutritional value (e.g. soft drinks, confectionery, and snack food);
- Label food and standardise nutritional signposts (e.g. logos for nutritious food);
- Provide restaurants and fast food establishments with incentives that offer and promote healthy food and reasonable portion sizes;
- Promote outdoor activities for children, and include this already in local urban planning (traffic, architecture…). Support local efforts to increase the availability of physical activity resources (e.g., playgrounds, walking trails), and promote zones that require neighbourhood sidewalks;
- Take speed reducing and/or traffic calming measures. Make pavements wide enough to allow children to play. Improve safety of and access to parks and other recreational areas;
- Stimulate the involvement of the food industry and advertisers;
- Educate adolescents, future mothers and health care workers on maternal nutrition and weight gain during pregnancy;
- Counteract media messages that promote unhealthy behaviour, particularly those targeting children and their families. Ban or restrict television advertising for children.

A permanent change of the environment is the best way to ensure sustained changes. The following generations are therefore the true target of obesity prevention. Lifestyle changes should be started in childhood and sustained throughout life. The involvement and support of the family is a key factor to success in lifestyle changes during child- and adolescenthood.

6.4 School setting

The most promising interventions in primary prevention of overweight and obesity are situated in the school setting. **Schools are an ideal setting for nutritional education** for several reasons:

- Schools reach almost all children and adolescents;

- Schools have the opportunity to establish a healthy eating pattern. A lot of pupils eat one or two major meals in school;
- Schools can promote and provide life skills to help children resist social pressure. Eating is a social behaviour that is influenced by social pressure. School-based programmes can directly address peer pressure that discourages physical activity, healthy eating and can reinforce healthy eating habits;
- Schools have skilled personnel. After appropriate training, teachers can use their educational skills, and food service personnel can contribute their expertise to nutrition education programmes.

Obesity is also linked to a lack of exercise. **School based programmes can increase physical activity patterns** (through the school curriculum, after school activities, activities during leisure time). It is no longer disputed that the integration of exercise into normal day-to-day activities during childhood is the best way to ensure that a sufficient amount of daily exercise is maintained in adulthood.
Young persons also need nutritional education to help them developing a lifelong healthy eating pattern, according to the current recommendations and to bypass the influence of television advertisements for low-nutritive food. School-based nutrition programmes can be an important part of the school curriculum and school environment. Children are more likely to receive a strong, consistent message when healthy eating is promoted through a comprehensive school health programme. This provides children with the necessary knowledge, attitudes, and skills required to make positive health decisions. In **school health programmes** the following recommendations should be endorsed:

- Each school must have a School Health Plan, made up and maintained by the school;
- Interventions for primary prevention of overweight must be long-term, permanent or repeated within a reasonable timeframe;
- There should be a strong link between health promotion activities at school and at home;
- Nutritional and physical education programmes should be part of different topics in the school curriculum. Health promotion should be integrated in the curriculum so that booster interventions are provided. School health cards should make the parents aware of their children's weight problem;
- Improve and increase physical education classes, and increase weekly PE hours;
- Increase opportunities for engaging in fun and non-competitive activities suitable for children with diverse interests and physical abilities in PE classes, after school, and during leisure time at school;
- Enhance active modes of transport to and from school;
- Allow safe physical activity in the school environment;
- Impose standards for healthy school meals;
- Reduce or eliminate vending machines and other sources of unhealthy snacks and sweetened beverages and replace them with a selection of healthy alternatives;
- Make fruits and vegetables available and affordable. Increase the cost of less healthy alternatives, thus minimizing the effect on food service revenues;
- Reduce access to fast food and fast food establishments – both on and off campus;
- Involve food service directors, students, parents, and teachers in the development and implementation of a healthy eating policy.

By adopting these recommendations, schools can help to ensure that all school aged children and adolescents obtain their full educational potential and good health.

6.5 The role of the School Health Service (school doctors, school nurses, and other members of the team)

A multi-sector approach is very important and necessary. The school doctor, and his team, is just one of the professionals taking care of children and adolescents, but may be the most important one.

The school doctor has the knowledge and a possibility to:
- Survey the weight status and nutrition of a child;
- Give advice on dietary intake or physical activity (individually or in group);

- Have regular contact with the child, parent and school;
- Treat children or refer them to specialized care;
- Be an advocate of the child's health/wellbeing and create an appropriate environment in school;
- Give good health education.

The school health service takes care of individual children as well as the population of schoolchildren, and therefore both individual and population-based approaches should be used.

Primary prevention is essentially based on a population- and multidisciplinary approach. To accomplish this task, the school doctor has to collaborate with many medical and non medical experts. He/she is often the link with other institutes (school, local community, government, ..) and people (children, parents, teachers, school directors, PE teachers, psychologists, social workers, architects, urbanism, clinics, paediatricians, family doctors, school meals providers, …).

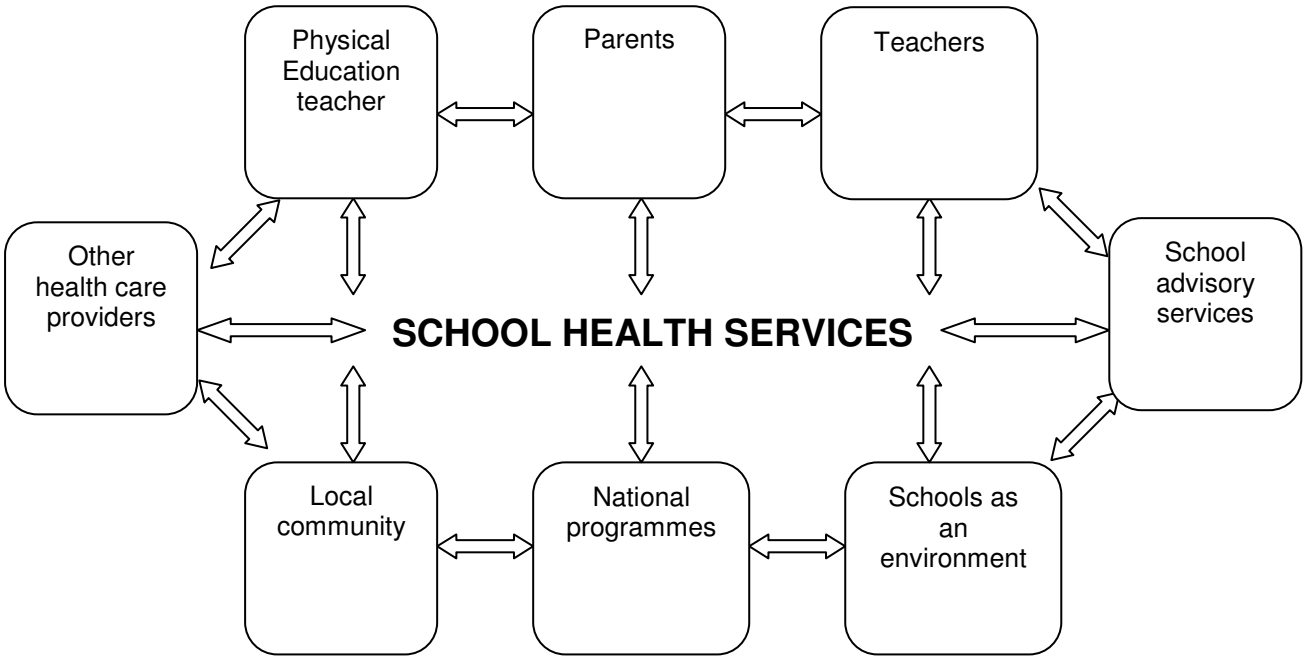

Figure 6.1: Scheme of the multidisciplinary collaboration of the school health team in school health

The individual approach is typically present during systematic health checks or health visits due to illness, and during counselling for children and parents (when they ask for advice or when they are at risk/or overweight and should be warned). The school doctor is in a good position to give advice, which should be tailored to each individual's needs.

The school doctor has to advocate good health (well-being) and contribute to an improvement of the environmental conditions for optimal growth and development of the child. Overweight and obesity are an important part of the (well-being) health status, and it is often becoming a personal and medical problem. The school doctor should address the community with the following key messages:

- Obesity in children is becoming more common;
- Obesity is due to an imbalance between energy intake and energy expenditure;
- Most of the children are not obese because of an underlying medical problem but as a result of their lifestyle;
- An obese child tends to become an obese adult;
- Obesity is a health concern in itself and it also increases the risk of other serious health problems, such as high blood pressure, diabetes and psychological distress;

- Obesity in children may be prevented and treated by encouraging a well balanced and healthy diet and physical activity;
- Dieting is not recommended for children;
- There is evidence that drug treatment is effective in treating obesity in children, but it is strongly advised against;
- Lifestyle change involves making small gradual changes in behaviour;
- Family and societal support is necessary in order to make preventive and curative measures more successful.

The school doctor is also active at the local and national level. Key messages in this context could be:

Key messages for the local community are:

- Obesity in children is becoming more common;
- Children must be physically active, which is also a message for architects and urbanists;
- Importance of safe roads and safe playgrounds should be stressed;
- Importance of good school meal services should be stressed;
- Importance and facilitation of good “fast food” providers in the school district should be stressed;
- Promote and advertise healthy food for schoolchildren at any occasion (concerts, sports events…).

Key messages for national authorities (Health insurances, Ministry of Health, Ministry of the Environment and Environmental planning...)

- Obesity in children is becoming more common;
- Obesity is connected with co-morbidity;
- Messages about positive outcome of healthy life style should be stimulated in the media;
- Advertising focused on children should be health promoting;
- Interventions for primary prevention are important.

Chapter 7
EARLY DETECTION

Mathieu Roelants and Karel Hoppenbrouwers

The initial selection of children with overweight or obesity is based on the Body Mass Index. The criterion (BMI cut-off) can either be a local or international chart or a table with appropriate cut-off limits (e.g. IOTF) for overweight/obesity. While a table of reference values is more simple to use, a chart has the advantage that is gives more detailed information (f.e. where is the child exactly positioned?), and allows for monitoring progress of the BMI as measured on subsequent occasions.

The following steps must me taken to direct the selection process:

- Measure and record height and weight on each possible occasion (use a correct, standardised and reproducible measuring technique);
- Calculate the BMI as weight (kilograms) / (height x height) (meters^2); or enter height and weight in an electronic medical file system for automatic calculation;
- Plot the BMI on an appropriate BMI-for-age chart, or use a reference table:
    - ✓ children below the threshold (percentile of age specific cut-off) for overweight
      → "not overweight"
    - ✓ children above the threshold for overweight, but below the threshold for obesity
      → "overweight" ("at risk")
    - ✓ children above the threshold for obesity
      → obese

Based on the outcome of this simple procedure, children are thus classified as "not overweight", "overweight" ("at risk"), or "obese".

Further procedures are explained in the flowchart shown in figure 7.1.

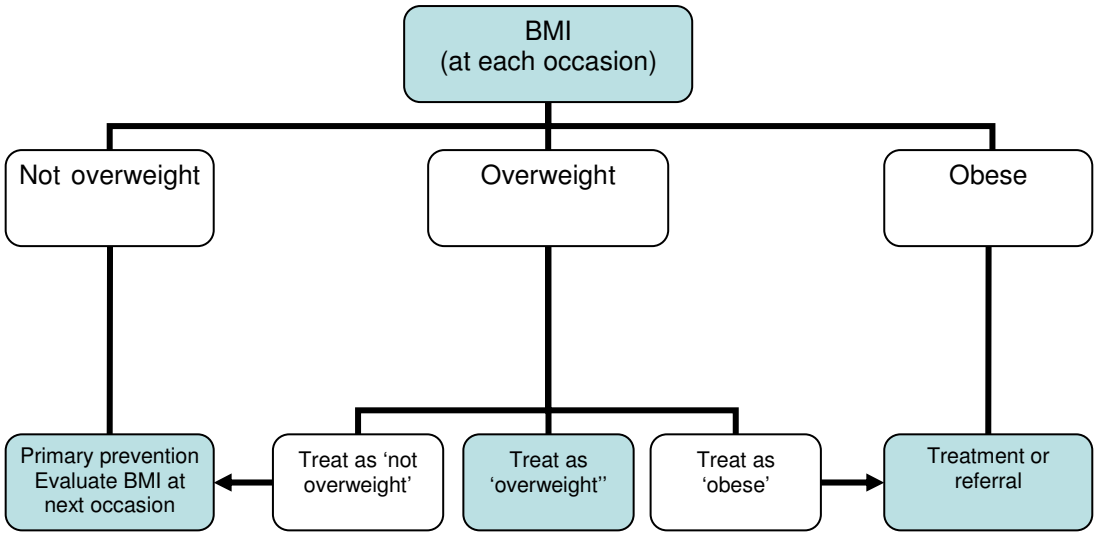

Figure 7.1: Generic flowchart for early detection of overweight and obesity in School Health Care.

Not overweight children are not subjected to any specific approach, but they are eligible for **primary prevention**, and should be screened again on the next occasion.

Obese children should be referred for **treatment**, or included in a treatment programme in school health care. The choice for referral or treatment in school health care, as well as the nature of the actions taken may depend on the outcome of further assessment (other indicators of weight status; assessment of other risk factors).

Overweight children can be **treated as** the "**not overweight"** group (primary prevention, with follow-up of the BMI on the next occasion), **as** "**obese**" (referral or treatment), **or enter a specific programme** for this risk group. This choice will generally depend on further assessment of the child (other indicators of weight status; assessment of other risk factors). Specific programmes for overweight children can consist of general advice on lifestyle; include a specific treatment programme; or a more intensive follow up.

Remarks:

- 'Further assessment' might include an assessment of risk factors, a clinical exam, or alternative methods to evaluate weight status.
- The choice for 'treatment' or 'referral' of obese children depends on the organisational context of school health care. This choice might also differ from one obese subject to another based on the severity or degree of obesity, the presence of risk factors, the outcome of other assessment procedures, and the level of motivation of the child and its parents to change relevant lifestyles.

The weight status of all subjects is evaluated again on the occasion of a next contact. For not overweight children the whole detection procedure is repeated during this contact. For children that were found to be overweight or obese on a previous occasion, this is an opportunity to evaluate progress of the eventual treatment.

The early detection of underweight is not included in the above mentioned flowchart, but it can easily be assessed simultaneously with overweight on the basis of BMI calculation and growth chart, resulting in three possible categories: "not underweight", "underweight" or "extremely underweight".

Chapter 8
INTERVENTIONS

Ivana Pavic Simetin, Nina Perkovic and Marina Kuzman

The preconditions for effective interventions have been discussed in detail in the literature review with regard to secondary prevention (chapter 3). Interventions should preferably start in early childhood, supported by the child's and family's readiness to make changes, and sustained on the long term.

In this chapter, the main goals of interventions are emphasized and a number of potentially successful interventions are listed, with indication of their applicability in school health services.

8.1 Goals of interventions

8.1.1 Primary goal

Healthy eating and physical activity (not achievement of ideal body weight).

- Dietary goal: reduce *calorie intake through healthy eating*

  Recommended approaches:
  - Food Guide Pyramid
  - "Stoplight diet"
  - Very low energy diets are never indicated for children

- Physical activity and sedentary behaviour goal: *increasing activity level*

  Recommended approaches:
  - Moderate physical activity at least 60 minutes every day, including daily activities
  - Vigorous physical activity at least 30 minutes on most days
  - Incorporation of activity into usual daily routine (e.g. walking to school)
  - Reduction of inactivity-limitation due to television and playing computer games to less than 2 hours per day or the equivalent of 14 hours/week

8.1.2 Secondary goal

BMI below the overweight cut off value.

Approaches:
1. Weight maintenance: this is an acceptable goal for all overweight children and most obese children.
2. Weight loss: the recommendations are not clear, but according to the US Expert Committee the recommendations are as follows (to be decided per country according to feasibility):
   - For children older than 7 years: overweight with no acute secondary complications and all obese children
   - For children aged 2-7 years, obese with secondary complications
   - Not more than 0,5 kg per month

8.2 Possible interventions

Components of successful interventions are:

- Start in childhood, rather than defer until adolescence or adulthood;
- Willingness of child and family to make changes;
- Assessment of diet and physical activity history;
- Education of families about the medical complications of obesity;
- Involvement of the entire family;
- Promotion of long-term changes in behaviour instead of rapid weight loss;
- Small and gradual behaviour change goals;
- Changes in the family environment;
- Physician's empathy and encouragement.

The general recommendations for interventions listed below are based on RCT interventions, which are successful in reducing obesity. The interventions are assessed for applicability in school health services. The references refer to the reference list of chapter 3 (paragraph 3.3).

8.2.1 Dietary interventions

There is some evidence that the following interventions, which are targeting dietary changes, might help to reduce obesity:

✓ *Decreasing sugar sweetened beverages consumption, and increasing noncaloric beverages instead*

An effective 25-week intervention of home deliveries of noncaloric beverages in replacement of sugar sweetened beverages (*Ebbeling et al., 2006).*
Not applicable in school health services.

An educational school-based one year intervention programme to reduce the consumption of carbonated drinks did not change the BMI, but reduced self-reported consumption of soft drinks (1-year follow up) (*James et al., 2004).*
Applicable in school health services.

✓ *Moderately energy-restricted diet with normal fat content*

An individual-based 9-month treatment for extremely obese children in a clinical setting. The application of a moderately energy-restricted diet (1750 kcal) with normal fat content (31%), was compared with a higher protein content of the diet which did not confer any benefit (*Rolland-Cachera et al., 2004)*.
Not applicable in school health services.

✓ *Increasing fruit and vegetable intake*

A family-based comprehensive behaviour intervention for families at risk for childhood obesity (obese parents and non obese children), parent-focus six-month intensive treatment, increasing fruit and vegetable intake (at least two servings of fruits and three servings of vegetable per day) compared with a decreasing high-fat/high-sugar group (no more than 10 servings of high-fat/high-sugar per week) (*Epstein et al., 2001).*
Applicable in school health services.

✓ *Ad libitum reduced-glycemic load diet*

Individual 6-month dietary treatment counselling sessions-intervention compared an ad libitum (not energy restricted) reduced-glycemic load diet (food with low to moderate glycemic index, 45-50% energy from carbohydrates and 30-35% from fat) with an energy restricted, reduced-fat diet (*Ebbeling et al., 2003).*
Applicable in school health services.

8.2.2 Physical activity and sedentary behaviour interventions

There is limited evidence that the following interventions, restricted only to increasing physical activity and decreasing sedentary behaviour, might help to reduce obesity:

✓ *Decreasing sedentary behaviour and/or increasing physical activity*

A six-month family-based behavioural treatment intervention was effective in reducing BMI more in boys than in girls, with a greater effect on decreasing the sedentary behaviour *(Epstein et al., 2001, 2000, 1995)*.
Components of treatment are:

- Increase of exercise to 1500 calorie expenditure per week, and decrease of sedentary behaviour to 15 hours or less per week (1995).
- Decrease of sedentary behaviour (10 or 20h/wk) or increase of physical activity (the equivalent energy expenditure of 16.1 or 32.2km/wk)(2000).
- Physical activity of 180 minutes per week of moderate or greater intensity level, and sedentary behaviour of maximum of 15h/wk of watching TV (2001).

Applicable in school health services.

✓ *Moderate- and high-intensity physical training*

Both visceral and total-body adiposity were reduced after eight months of physical training 5d/wk. There was no difference in effect of moderate- and high-intensity physical training *(Gutin B et al., 2002)*.
Advisory role of school health services.

No change in BMI/obesity but nevertheless positive impact on targeted behaviour or other measurements is observed in the following interventions:

- School-based 12-week intervention PLAY (Promoting Lifestyle Activity for Youth), only resulted in a change in the level of physical activity among girls *(Pangrazi et al., 2003)*.

- Health-related physical education during 18 months (*Sallis JF et al., 1993*) and a 30-week exercise programme, showed a positive effect on body fat *(Mo-suwan et al., 1998)*.

- A school-based fitness programme significantly improved the cardiovascular fitness level, the fasting insulin level and body consumption in obese children *(Carrel et al., 2005)*.

- An individually based circuit training (CT) improved the functional capacity, the muscular strength and body composition in obese adolescents, and the conduit vessel function was normalized *(Watts et al., 2004)*.

Advisory role of school health services.

8.2.3 Education

There is evidence that interventions based on education can be effective in reducing the BMI and improving the relevant knowledge:

✓ *Routine general information and/or enhanced information about a specific diet and physical activity*

Two types of 12-month interventions: (i) a routine general information leaflet at first visit and follow-up visits at 6, 12 and 24 months, and (ii) enhanced information about a specific diet, physical activity, active parental commitment, and food diary at first visit, and follow-up at 1, 2.5, 4, 6, 9, 12, 15, 18, 24-month visits were effective in terms of reduction of the percentage

overweight. The reduction was significantly greater in the "enhanced information" group than in the "routine information" group *(Nova et al., 2001).*
Applicable in school health services.

✓ *Classroom-based curriculum to reduce sedentary behaviour*

A six-month classroom based curriculum (18 lessons, 30-50 minutes, taught by the regular trained teachers) to reduce television, videotape, and video game use resulted in a significant decrease in BMI and positive change in the targeted behaviour *(Robinson, 1999*).
Applicable in school health services.

✓ *School-based health education*

The intervention "Planet Health" (health sessions aiming at decreasing TV viewing, decreasing consumption of high fat food, increasing fruit and vegetable intake, and increasing physical activity), delivered by classroom teachers over 2 school years, reduced the prevalence of obesity among, and television viewing hours for, both boys and girls *(Gortmaker et al., 1999).*
Applicable in school health services.

✓ *School-based health and nutrition education*

A school-based 6-year intervention "Health and Nutrition Education programme" was evaluated by *Kafatos et al. (2005)* with no significant differences in the prevalence of overweight.
Applicable in school health services.

✓ *Classroom-based and risk-based intervention on health information and a physical activity programme*

Two 8-week interventions (health information twice a week, and physical activity programme three times a week) were given to children (no parent's involvement): (1) classroom-based intervention given to all children by regular teachers and (2) risk-based intervention only to children with identified risk factors by registered nurses. Both interventions resulted in higher knowledge, but there were no significant changes in BMI, neither in both intervention groups, nor in the control group *(Harrell et al., 1998).*
Applicable in school health services.

8.2.4 Behavioural intervention

A) FAMILY-BASED BEHAVIOURAL INTERVENTION

There is some evidence that the following family-based behavioural change interventions produce a statistically significant reduction in BMI, with two observations:

- In the interventions provided for both children and parents, children benefit more in the weight loss process *(Epstein, 1996).*
- Child and parent adherence to specific components of a family-based behaviour weight control treatment are independent predictors of the long-term child and parent percentage overweight change *(Wrotniak et al., 2005.)*

✓ *Group and individualised treatment, parents and children separately*

The 13-session programme included eight weekly meetings, four bi-weekly meetings and one monthly meeting. The session in the mixed treatment consisted of 20 minutes of an individual session plus 40 minutes of group therapy. Participants in the group treatment received 60 minutes of group treatment (*Goldfield GS et al 2001).*
Applicable in school health services, with knowledge in behaviour therapy.

- ✓ *Standard family treatment taught to child and parent*

  Six-month (16 weekly meetings and two monthly meetings) problem solving sessions taught to parent and child/or child, and a standard family-based treatment, suggested that problem solving did not add to treatment effectiveness beyond the standard family-based treatment *(Epstein et al., 2000).*
  Applicable in school health services, with knowledge in behaviour therapy.

- ✓ *Support and educational group sessions*

  Two 1-year interventions (1 hour support/educational group sessions conducted by a clinical dietician): 14 sessions with parents as the exclusive agents of change and 30 sessions with children only, showed a decrease in obesity with a greater reduction in the parent-led group (*Golan et al., 1998).*
  Applicable in school health services.

  A family based 2-year intervention showed a change at one year, but this was not maintained at two years *(Epstein et al., 1994).*

  Problem-solving treatments did not add to treatment effectiveness beyond the standard treatment *(Epstein et al., 2000).*

B) BEHAVIOURAL INTERVENTION WITH NO PARENTAL INVOLVEMENT

The following programmes showed some reduction in obesity:

- ✓ *Computer, telephone and mail-based behavioural counselling programme*

  Four months of a computer-, telephone- and mail-based behavioural counselling programme led to modest reduction in weight status, while a single-session physician counselling showed no change *(Saelens et al., 2002).*
  Applicable in school health services.

- ✓ *Group and individual treatment based on cognitive behaviour therapy*

  One-year behaviour outpatient modification programmes, in group and individually, based on principles of behaviour therapy (cognitive strategies, behaviour strategies, education and motivation) showed reduction in overweight with no differences between the two groups *(Braet et al., 1997).*
  Applicable in school health services, with knowledge in cognitive behaviour therapy.

- ✓ *"Muscle relaxation training" with a calorie reduced diet and exercise programmes*

  Two six-week in-patient interventions: (i) "obesity training" (cognitive behavioural training programme, a calorie reduced diet and an exercise programme), and (ii) "muscle relaxation training" instead of the psychological intervention component with the same diet and exercise programme showed reduction in overweight over the course of 1 year with no difference between groups *(Warschburger et al., 2001).*
  Not applicable in school health services.

8.2.5 Multi-component interventions

Multi-component interventions produce some positive changes in targeted behaviours (increasing physical activity, reducing sedentary behaviours, improving dietary knowledge, improving eating behaviours) with modest impact on BMI and with unclear evidence of effectiveness of parental involvement.

A) MULTI-COMPONENT INTERVENTIONS – INDIVIDUALLY BASED

✓ *Dietary-behavioural-physical activity intervention*

A three-month combined dietary-behavioural-physical activity intervention (series of 4 lectures by the physicians and dietician, balanced hypocaloric diet and a twice-weekly training programme by professional youth coaches) showed reduction in obesity after a 1-year follow-up *(Nemet et al., 2005).*
Applicable in school health services, in cooperation with coach/physical education teacher.

✓ *Physical training programme and dietary education*

A twelve-week group intervention, including a physical training programme (twice/wk) and dietary education (four visits), had a significantly greater mean change in fat-free mass than only dietary advice *(Schwingshandl et al., 1999).*
Applicable in school health services, in cooperation with coach/physical education teacher.

✓ *Residential treatment programme*

A programme consisting of a diet of 1500 kcal/day, two hours of physical activity/day, and behaviour therapy sessions *(Deforche et al., 2005).*
Not applicable in school health services.

✓ *Post-treatment phone contact as effective maintenance strategy*

After an initial 10-month residential treatment programme, a 5-month post-treatment phone contact was an effective maintenance strategy in obese youngsters *(Deforche et al., 2005).*
Applicable in school health services.

B) MULTI-COMPONENT INTERVENTIONS – WITH PARENTAL INVOLVEMENT

The evidence of effectiveness of parental involvement remains unclear.

✓ *Dietary and exercise interventions*

A 14-week intervention on “education with regard to diet and exercise (cognitive/behavioural framework) followed by exercise”, or “exercise followed by education” was successful, without weight reduction until the introduction of a nutrition component. Parents were involved in the meetings with their children, the planning and recording progress *(Johnson et al., 1997).*
Applicable in school health services, with knowledge in cognitive/behaviour therapy and in cooperation with coach/physical education teacher.

No change in BMI/obesity is observed in the following interventions:

Combined dietary education, exercise and decrease in television viewing for one year showed no difference in BMI *(Muller et al., 2001)*.

Wearing pedometers and encouraging walking 10,000 steps daily for twelve weeks, and 6 sessions on healthy eating and exercise did not reduce obesity, but improved attitudes about physical activity *(Rooney et al., 2005)*.

C) MULTI-COMPONENT INTERVENTIONS – SCHOOL-BASED

✓ *Nutrition and physical activity intervention*

A six-month programme that included diet and nutrition interventions (education programme, kiosks, parental involvement) and a physical activity intervention (extra 90 min/wk of sports, active recess, extra PE programme), delivered by trained school teachers showed a significant drop in BMI z-score for obese and overweight children *(Kain et al., 2004).*
Applicable in school health services.

No change in BMI/obesity but with some positive impact on targeted behaviour or other measurements is observed in the following interventions:

The intervention "New Moves", directed to adolescent girls, with physical activity, nutrition and social support sessions for a total of 24 weeks and a follow-up at 8 months, showed no change in BMI with progression in physical activity *(Neumark-Sztainer et al., 2003).*

A two-year intervention composed of nutrition education (delivered by classroom teachers, 9 modules/year), fitness activities (30-40 minutes of activity, three times per week), and healthy school food service, showed some positive changes in targeted behaviours, but with no impact on obesity for obese subjects *(Donnelly et al., 1996).*

The 1-year programme „The Active Programme Promoting Lifestyle in Schools" (APPLES) consisted of teacher training, modification of school meals, and school action plans to promote healthy eating and physical activity (based on health promoting school concept), and showed no change in BMI, with modest behaviour change only in higher vegetable intake in overweight or obese children *(Sahota et al., 2001).*

Two 8-week interventions (health information twice a week, and a physical activity programme three times a week) given as classroom-based interventions to all children by regular teachers, and as risk-based intervention only to children with identified risk factors by registered nurses, showed a small reduction in body fat and higher knowledge, but there were no differences in the changes in BMI *(Harrell et al., 1998).*

8.2.6 Drug therapy

Drug therapy is not currently indicated as treatment of child and adolescent obesity.

Some studies showed some promising results with regard to the therapeutic use of "Sibutramin" and "Orlistat" in obese adolescents:

Sibutramine significantly induced weight loss with no adverse events *(Godoy-Matos et al., 2005; Berkowitz et al., 2003).*

Orlistat was effective in reducing weight with no major safety issues, with exception of mild to moderate gastrointestinal tract side effects (9-50%) *(Chanoine et al., 2005, and Ozkan et al., 2004).*

8.2.7 References

See chapter 3, paragraph 3.3: references.

Chapter 9
IMPLEMENTATION

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In order to facilitate the implementation of the recommendations with regard to the prevention, detection and guidance of overweight and obesity in school aged children, in this chapter the practical aspects of the guideline are described in detail.

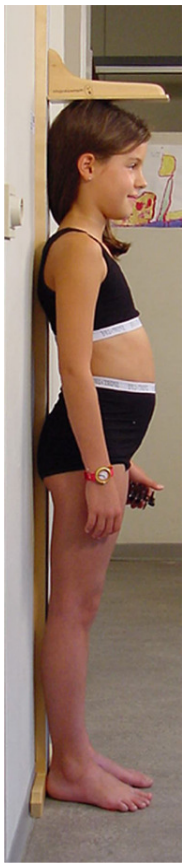
Some procedures and instruments are applicable to all European School Health Services, irrespective of the organisational context and school health programme of a specific country. In paragraph 9.1 the generic procedures are outlined, i.e.: (1) standardized measurement of height and weight; (2) body mass index, and the way to use it in the early detection of overweight and obese schoolchildren; and (3) indicators and risk factors to support the clinical appraisal of the attendant.

In a second paragraph (9.2) the country specific implementation procedures are described for Flanders, Croatia and Slovenia, respectively.

9.1 Generic implementation procedures

9.1.1 Standardized measurement of height and weight

Height

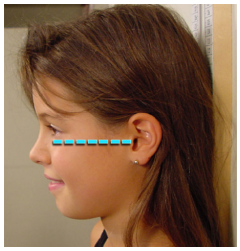


Measure children barefoot and in light clothing: remove shoes, socks and bulky clothing (no pullover, shirt or coat). Cloths have no impact on the height of a child, but they can mask an unsuitable posture, and therefore disturb the measurement.
Undo the hair: remove any pins and braids from the hair that could affect the measurement.
Let the child stand centrally with its back against the stadiometer. Heals, buttocks, and shoulder blades and back of the head should touch the wall or stadiometer, the arms hanging loosely besides the body.
The feet are flat on the ground and the heals should touch (1), with the feet in an approximately 45 degree angle. In young and uncooperative children assistance may be required to ensure that the feet are flat.
Let the child breath normally, and make sure it stands upright
Bring the head in the Frankfort plane, and lower the headboard. Ensure good contact with the head. Do not exert upwards pressure on the head. Read height at eye level to the last completed millimetre.

(1) in case of genu valga, the heals may stand slightly apart, such that one knee is not bend before the other.
(2) in case of a severe difference in length of both legs, use a small board of known thickness for the shorter leg, such that the basin is horizontal. Record the thickness of the board as well.

➔ heals, calves, buttocks, and shoulders touch the wall; arms hanging loosely beside the body; the child is barefoot

During measurement, the **Frankfurt Plane** should be perpendicular to the stadiometer (Horizontal for the measurement of height).

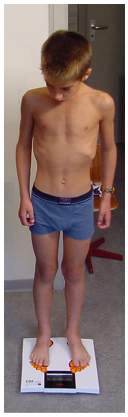


The Frankfurt plane is the imaginary line passing through the inferior margin of the orbita and the upper margin of the ear canal.

Height should be read at eye level to avoid **parallax error**

Weight

Children are weighted in light clothing (underwear, t-shirt only) with a person scale (bathroom or column scale; digital or analogue). Make sure the child stands independently in the middle of the scale (do not hold or touch the child; it should not lean to the wall).



Rounding
Height and weight should not be rounded! Record height until the last completed millimetre. Record weight as indicated by the scale (electronic display) or record the last completed marking from an analogue scale.

Material, Height: The stadiometer should have a range of 75 cm to 125 cm, with a precision of 1 millimetre. The headboard must be large enough (min. 5 cm) to ensure that it rests on the highest part of the head; and must be able to move freely up and down, without turning over. Fix the stadiometer vertically to a wall without plinth, and on a solid floor (no carpet).
Weight: Scales are with a digital display, sliding weights, or with a large dial that has a sufficiently high precision and accuracy. The minimal range is 5 kg to ≥ 120 kg for weighing young children and adults, and the precision should be at least 100 grams. Normally all flat scales (with digital display) and column scales (digital or mechanical with sliding weights or large dial) are suitable.

9.1.2 Body Mass Index (BMI)

1. Calculate BMI as weight (in kilogram) divided by squared height (meter x meter). The BMI is expressed in kg/m^2.
2. Classify a child as “not overweight”, “overweight”, or “obese”, based on the BMI.
3. Use local BMI charts with appropriate cut-off values for overweight/obesity (see figure 9.3 for Flemish BMI charts). When these charts are not available for the target population, charts from another country can be used. A large number of European countries have these available. The use of a BMI chart has the advantage that: (1) the evolution of the BMI in time is visualized; (2) underweight can be detected on the same chart; and (3) large changes in BMI (could be an indication for eating disorders) are visible as well. Alternatively, IOFT reference values can be used as a table or as a chart (table 9.1 and figure 9.1).

Table 9.1: International cut-off points* for body mass index for overweight and obesity by sex between 2 and 18 years (adapted from Cole *et al., 2000)*

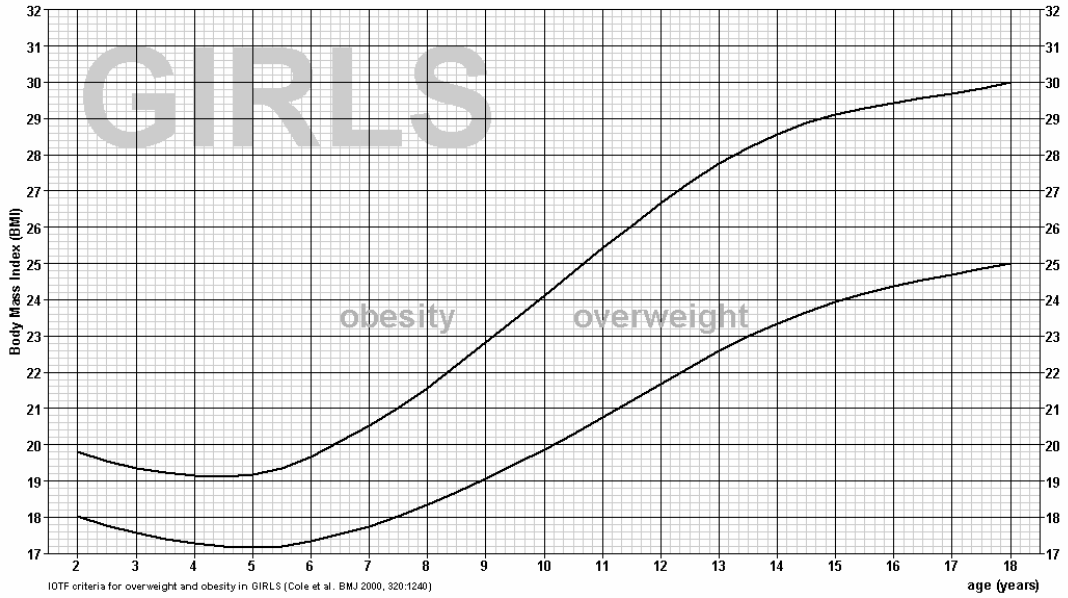
Age (years)	BOYS		Age (years)	GIRLS	
	Overweight	Obesity		Overweight	Obesity
2	18.41	20.09	2	18.02	19.81
2.5	18.13	19.80	2.5	17.76	19.55
3	17.89	19.57	3	17.56	19.36
3.5	17.69	19.39	3.5	17.40	19.23
4	17.55	19.29	4	17.28	19.15
4.5	17.47	19.26	4.5	17.19	19.12
5	17.42	19.30	5	17.15	19.17
5.5	17.45	19.47	5.5	17.20	19.34
6	17.55	19.78	6	17.34	19.65
6.5	17.71	20.23	6.5	17.53	20.08
7	17.92	20.63	7	17.75	20.51
7.5	18.16	21.09	7.5	18.03	21.01
8	18.44	21.60	8	18.35	21.57
8.5	18.76	22.17	8.5	18.69	22.18
9	19.10	22.77	9	19.07	22.81
9.5	19.46	23.39	9.5	19.45	23.46
10	19.84	24.00	10	19.86	24.11
10.5	20.20	24.57	10.5	20.29	24.77
11	20.55	25.10	11	20.74	25.42
11.5	20.89	25.58	11.5	21.20	26.05
12	21.22	26.02	12	21.68	26.67
12.5	21.56	26.43	12.5	22.14	27.24
13	21.91	26.84	13	22.58	27.76
13.5	22.27	27.25	13.5	22.98	28.20
14	22.62	27.63	14	23.34	28.57
14.5	22.96	27.98	14.5	23.66	28.87
15	23.29	28.30	15	23.94	29.11
15.5	23.60	28.60	15.5	24.17	29.29
16	23.90	28.88	16	24.37	29.43
16.5	24.19	29.14	16.5	24.54	29.56
17	24.46	29.41	17	24.70	29.69
17.5	24.73	29.70	17.5	24.85	29.84
18+	25	30	18+	25	30

* These cut off points represent the lower limit for overweight respectively obesity.

For epidemiological purposes, using the mid-age reference values (in grey) provides unbiased estimates of the prevalence. However, for an individual child the error might become substantial. With increasing precision, the following approaches can be used:

1. Compare the BMI against the typical value for the child’s calendar age (the mid-age reference value from table 9.1; marked in grey). An alternative table, showing only these values could be constructed;
2. Compare the BMI of the child to the reference values at the tabulated age that is closest to that of the child (e.g. round the age up to 0.5 years);

3. Plot the child's BMI on the appropriate chart in figure 9.1, or just locate the BMI on this chart;
4. Compare the BMI to the interpolated reference value at the exact age of the child (only suitable for a software implementation).



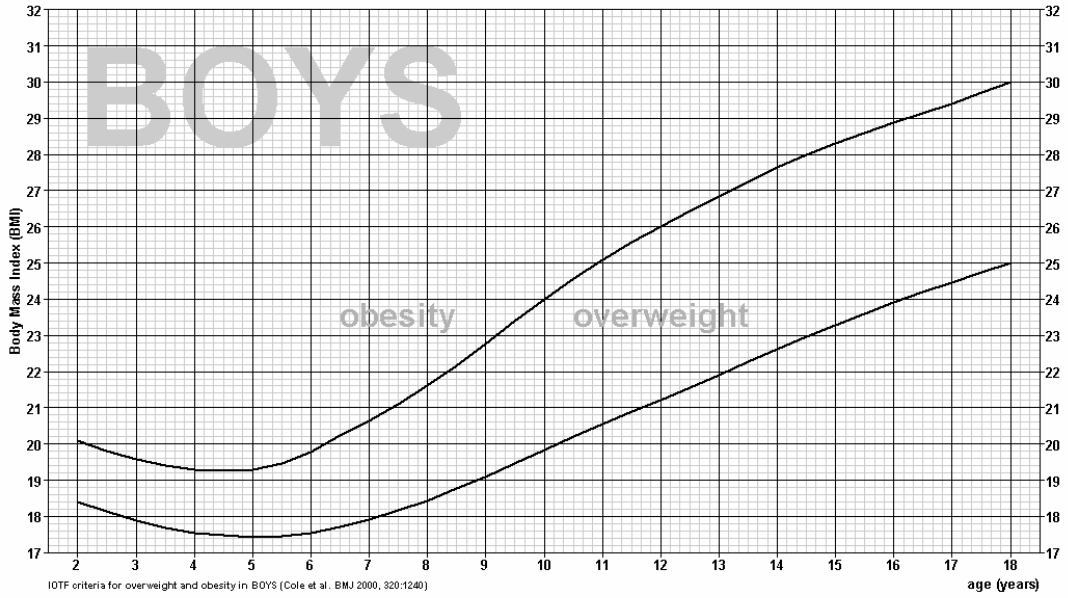


Figure 9.1: BMI reference curve representing IOTF criteria for overweight and obesity; Girls (upper panel) and Boys (lower panel); 2-18 years of age

9.1.3 Clinical assessment

A clinical exam is essential: (i) to detect possible primary causes of overweight/obesity; and (ii) to evaluate the presence of risk factors for secondary complications. In case overweight is a secondary complication of another condition or disease, a different approach in the management of obesity may be preferable. When secondary complications are present, or if there is a severe risk for secondary complications, more stringent actions towards lowering the body weight may be needed. Table 9.2 provides guidance for the detection of possible primary causes and (risks for) secondary complications during a clinical examination.

Table 9.2: Indicators for an in-depth assessment of risk factors, primary causes and secondary complications of overweight or obesity in childhood

FINDINGS	POTENTIAL CONDITIONS (underlying causes or secondary complication)
History	
Developmental delay	Genetic disorders, Endocrine disorders
Poor liner growth	Hypothyroidism, Cushing's syndrome, Prader-Willi syndrome
Night-time snoring, breathing difficulties, or daytime somnolence	Obstructive sleep apnoea, Obesity hypoventilation syndrome
Oligomenorrhea, amenorrhea, striae and hirsutism	Polycystic ovary disease
Social/psychological history	
*Tobacco use - at least 1 cig. in the last month	
*Signs of depression¥	Mood disorders
Signs of eating disorders	Bulimia nervosa, Binge-eating disorder
Family history	
*Obesity	
*Non insulin-dependent diabetes mellitus (NIDDM)	
*Cardiovascular disease	
*Hypertension	
*Dyslipidemia	
*Gall bladder diseases	
Physical examination	
Height, weight, BMI (short stature)	Genetic disorders, Endocrine disorders
Blood pressure	Hypertension
Dysmorphic features	Genetic disorders, including Prader-Willi syndrome
*Acanthosis nigricans	NIDDM, Insulin resistance*
Hirsutism	Cushing's syndrome, Polycystic ovary disease
*Violaceous striae	Cushing's syndrome
Undescended testicle	Prader-Willi syndrome
Thyromegaly, dry and yellowish skin	Hypothyroidism
Hepatomegaly	Hepatic steatosis
Limited hip range of motion	Slipped capital femoral epiphysis

*: The presence of complications marked with * in this table are considered mild. In the absence of all other conditions, these complications are indications for treatment in primary health care (School Health Services). No referral to specialized services is needed.
¥: For the assessment of "signs of depression" the Centers of Epidemiological Studies Depression Scale (CES-D) scale can be used (Radloff, 1977). For more information on this scale, see Annexe 2 to this report.

9.1.4 References

Cole T, Bellizzi M, Flegal K and Dietz W. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ 2000;320:1240-1243*

Radloff LS. A self-report depressions scale for research in the general population. *Appl Pshychol Meas* 1977;1:385-401

9.2 Country specific implementation procedures

9.2.1 The Flemish strategy

Katelijne Van Hoeck, Ann Devriendt, Mathieu Roelants and Karel Hoppenbrouwers

9.2.1.1 Introduction

This guideline is aimed at supporting school doctors and school nurses, and their multidisciplinary teams, in the prevention, early detection and guidance of overweight and obesity in children and adolescents.

The actual draft of Flemish guideline on “the prevention of overweight and obesity in childhood and adolescence”, to be submitted for approval by the Flemish Health Administration by the end of the year 2007, consists of recommendations on primary prevention (health promotion), early detection (screening for overweight and obesity on the occasion of periodic check-ups) and secondary prevention.
Guidelines on primary and secondary prevention will be worked out in detail after concertation with the Flemish Administrations of Health and Education.

9.2.1.2 Primary prevention: health promotion

As described in chapter 4 (paragraph 4.1), in Flanders health promotion is one of the operational aims of the school health service.
Especially in the areas of "preventive health care" and "psychological and social functioning” a school health service may be active in health education and promotion. Preventive health care is more than mere improvement of health in the strict sense of the word. The *programmatic supply* (including the medical check-ups) not only allows to detect factors threatening the individual development (with possibilities to individual health promotion), but it is also a tool for risk analysis on the population level. The latter generates themes for health promotion (as well as in the field of health care as in the field of psychological and social functioning), and allows a more oriented problem- and demand-guided approach.

In a recent Declaration of Intention, issued in January 2006 and signed by the ministers of Health, Education, Sports and Agriculture, the Flemish Government agreed on contributing to the health promotion of school aged children. As a result of this engagement of the Government, the minister of Education developed a strategic plan with regard to health policy in primary and secondary education, in which the strategic and operational objectives of the health promotion at school for the coming years are outlined in detail. The main objective of this strategic plan is to stimulate and support schools to develop their own comprehensive and tailored school health policy. The prioritary health topic of action selected by the minister for the first coming years is the prevention of overweight and obesity.
School Health Services are considered as important partners in this strategic plan, and are expected to support schools in developing specifically tailored school health policies.
The implementation of this strategic plan starts in September 2007. A website, with stimulating examples of good practice, has been developed as a supporting tool for schools and school health services (www.gezondopschool.be).

9.2.1.3 Early detection: strategy of screening for overweight and obesity during regular health check-ups

On the occasion of each health check, weight and height have to be measured according to the guideline (paragraph 9.1). The BMI-value is calculated (generally this is automated, by the electronic medical file system), and plotted on the BMI-curve (manual or electronic file).

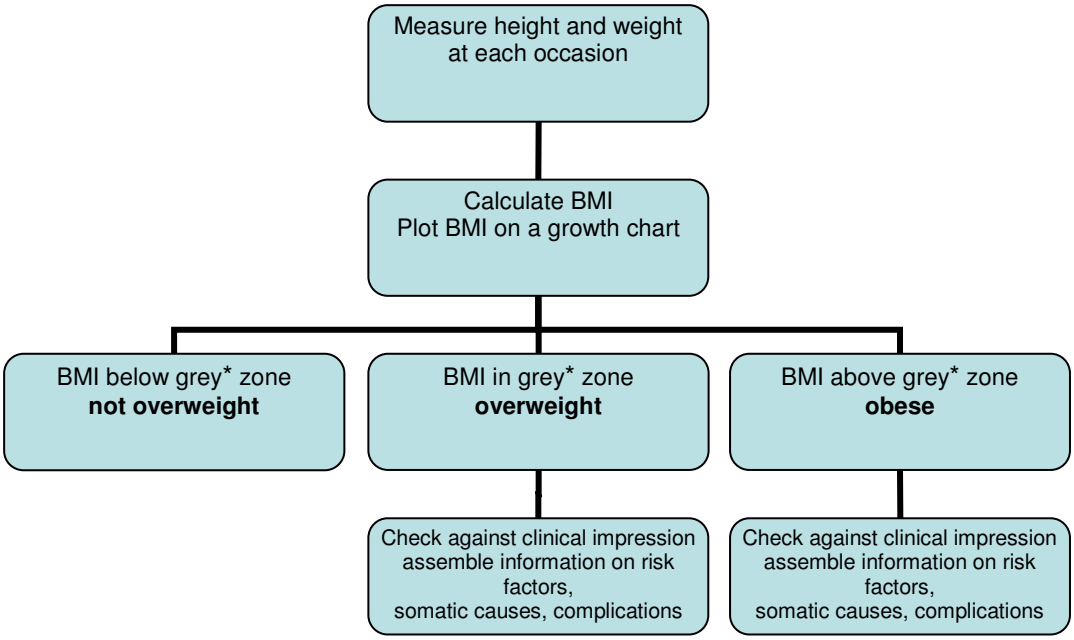


Figure 9.2: Schematic representation of early detection in Flanders (guideline, draft 03/2007). *Grey zone refers to the overweight/obesity threshold (see part I, chapter 1).

A) Weight, height and BMI

Weight and height should be measured according to the guideline (with emphasis on the equipment used, on clothing and on the position of the child).
Measurements in school ("specific consults"), should be done in a comparable manner to measurements in the school health centre. It is advised to measure weight and height in school while wearing sportswear, as this gives only a minimal overhead in weight.

B) BMI

A (subjective) clinical impression is not sufficient to categorize children as normal, overweight or obese. International recommendations involve the use of BMI charts for objective assessment. Height and weight should be measured at each consult. The BMI is calculated (by hand or electronic medical file) or read from a nomogram. Using a standardized measuring technique, the BMI is a relatively reliable measure for body fat.

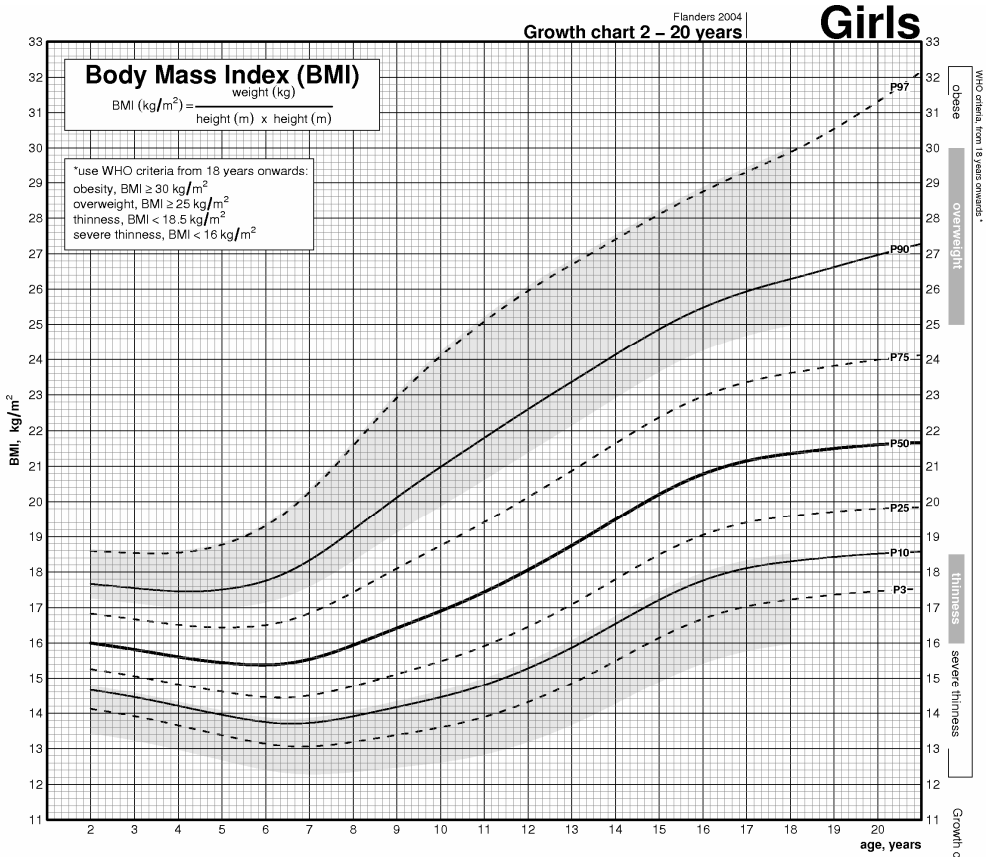
Reference charts from the Flemisch Growth Survey 2001-2006 should be used to plot the BMI (paper chart or electronic), in order to visualize the evolution over time (figure 9.3).

C) Criteria for overweight/obesity

In the Flemish Growth Charts 2004, the grey area corresponds with overweight. A BMI below this grey area indicates that the child is "not overweight"; a BMI above this area indicates that the child is obese.

D) Clinical impression

The term "clinical impression" refers to the general impression that one has of the child. With respect to overweight and obesity, this depends largely on the expertise of the examiner. It can however be improved by considering the following aspects:



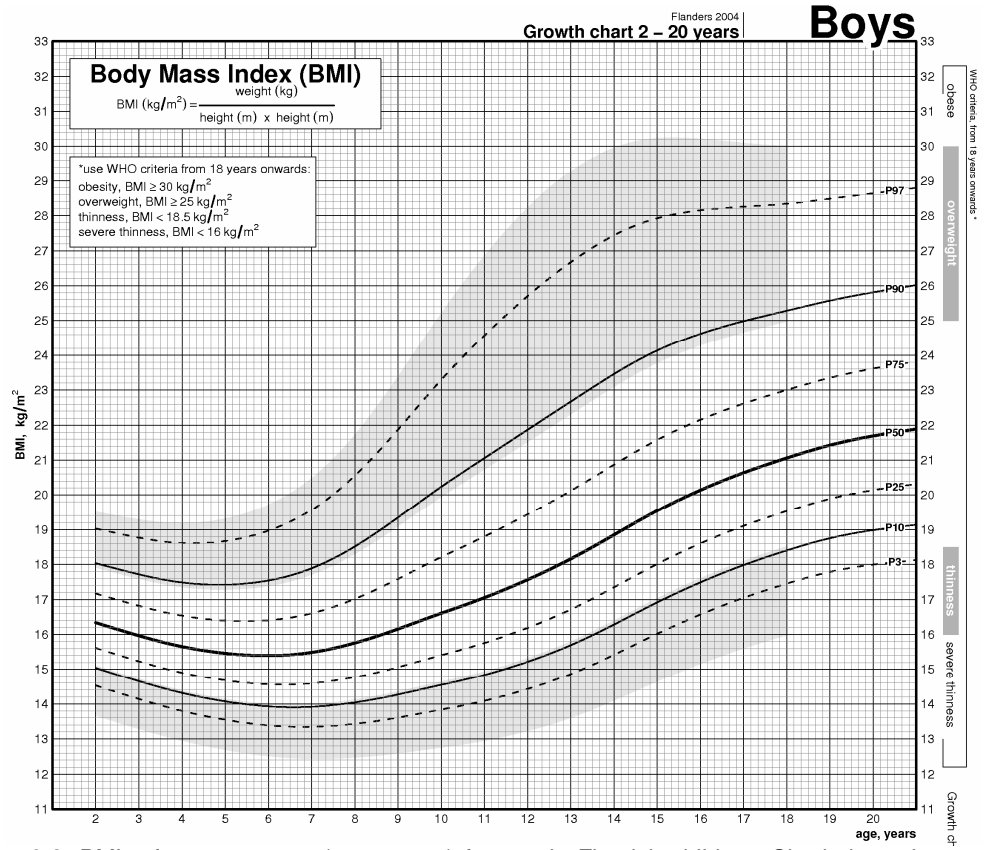


Figure 9.3: BMI reference curves (2-20 years) for use in Flemish children. Shaded area's represent criteria for overweight/obesity and underweight, based on Flemish reference data. These charts can be obtained free of charge from www.vub.ac.be/groeicurven.

- Look at the *constitution* of the subject, especially the presence of muscles and body proportions. A muscular or firm constitution, or relatively short legs, can result in a higher BMI without being overweight. This constitution is mainly prevalent in the Mediterranean area, Central Africa, Central and South America. On the other hand, the clear presence of adipose tissue around the abdomen or trunk in a child with relatively long legs can result in "overweight" with a low BMI, which is for example more prevalent in children from Asian origin;

- Children with a *delayed growth spurt*, but in whom the development of pubertal adipose tissue has already started can have a (temporarily) higher BMI.

In children before the age of 9 years, BMI criteria appear more severe compared to the percentage overweight, resulting in more children being labelled overweight.

A correct interpretation of the height and weight curve is an additional argument to make a correct decision about the adiposity status of a child. Keep in mind that for the same BMI, the difference in height and weight percentiles is much larger in smaller than in taller children.

E) Risk factors

A personal and family history of additional risk factors can elaborate the risk of an undesirable evolution or the development of complications.

In addition to risk factors listed in table 9.2, the following anamnestic information must be collected to complete the "clinical eye" and to make a correct decision:

- One or both parents are obese;
- A sedentary lifestyle of the child;
- Overweight as a teenager (>13 year);
- A notable increase in BMI since the last measurement;
- Socially deprived environment (more vulnerable children);
- Dysmaturity, especially when a quick catch-up in weight occurred.

F) Somatic and medication induced causes

Check on the basis of table 9.2, whether a somatic cause may have induced overweight or obesity in the child.

G) Complications

In this age group, somatic complications are generally limited or absent. On the contrary, social and emotional consequences of obesity are often present, even at young age. It is important to assess emotional well-being of the child. A short assessment might include the following topics:

- Well-being in the classroom;
- Having friends, other social abilities;
- Activities during free time;
- Activities outside school;
- Satisfaction with time table;
- Plans for the future;
- Self-image.

9.2.1.4 Secondary prevention

The actual organisation, and available staff, in the Flemish school health services importantly limit their capacity to offer the appropriate guidance to all overweight and/or obese schoolchildren (as diagnosed according to the above mentioned criteria).

To overcome this problem, the publication of a Flemish guideline on early detection of overweight and obese children should initiate a formal deliberation with the Flemish Administrations of Health and Education and all other relevant partners, aiming at defining clearly the duties of school health services with regard to the secondary prevention of overweight and obesity in childhood and adolescence.
It is generally agreed that school health services should take the lead in and/or be important partners with regard to initiatives in this area. To achieve that aim, however, the operational capacity of the school health services needs to be increased first.

Awaiting the outcome of this deliberation, the following basic recommendations may help school health services in outlining the most effective strategies of secondary prevention:

1. Any offer or initiative should correspond to a real need;
2. The motivation of the child and/or its parents should be assessed before starting any intervention or guidance. For children younger than 12 years, the parents' motivation is essential;
3. The intervention should aim at taking small steps of behavioural change;
4. The steps should be as concrete as possible, and preferably chosen by the child and/or its parents;
5. Be positive and empower success. Experiences of success strengthen the motivation and self-esteem;
6. Any member of the school health team has his role to play in the process;
7. Look for partners in your local network;
8. Time is money. Evaluate the effectiveness and efficiency of your actions.

9.2.1.5 Criteria for referral

The criteria for referral largely depend on the capacity of school health services to offer a counselling programme for overweight and/or obese children. The more obese the child, the higher the risk of complications related to the obesity problem and of underlying medical causes originating or worsening the weight problem, the more a referral to the curative health care (GP, paediatrician, or specialised centre) will be indicated.
In the actual guideline no strict criteria for referral are defined. It is the school doctor's responsibility to decide on the need for referral on an individual basis, taking into consideration all relevant parameters as described in paragraph 9.2.1.3 (Early detection).

9.2.2 The Croatian strategy

Nina Perkovic, Ivana Pavic Simetin, Marina Kuzman and Verna Juresa

9.2.2.1 Introduction

The standardisation and constant improvement of the quality of the work is recognised as a necessity on the behalf of school health care, as well as on the behalf of the whole medical society. The primary aim of the guideline is to support school doctors and school nurses in the School health services in Croatia in their everyday work with overweight and obese children and adolescents. Additionally, the guideline will serve to other health care professionals, as well as to a wide range of other professionals working with school children, namely professionals from educational and welfare sectors. Furthermore, many statements and ideas elaborated and well documented in the guideline could be used as the ground for the policy development.
The need for guideline development is acknowledged in the Action plan on overweight/obesity prevention for the period from 2007 till 2011, currently under development by The Ministry of Health and Social Welfare in Croatia.

9.2.2.2 Primary prevention: health promotion

Since 1998, School health services in Croatia are responsible exclusively for preventive and specific health care measures of school children and students in higher education (as described in chapter 4, paragraph 4.2). The official biennially launched document on the health care system activities, the so-called *Health Care Measure Plan and Programme*, indicates that school health services have a responsibility for a broader range of activities than just within the health sector and traditional health care. School health services have evolved and adjust their activities to the new tasks and needs of the population, by developing and implementing a comprehensive health promoting approach, acknowledging schools as the setting for health promotion. The following roles and activities of school health services are emphasized within this framework. They:

- are advocating health of children and their families;
- are providing evidence-based information and are playing a leading role in research and innovation with regard to health in childhood and adolescence;
- are mainstreaming obesity prevention across different sectors;
- are taking preventive activities (counselling, health education, intersectoral projects) aimed not only to children and their families, but also to schools and the community.

9.2.2.3 Early detection: strategy of screening for overweight and obesity during regular check-ups

On the occasion of each health check, weight and height have to be measured according to the guideline (paragraph 9.1). The BMI-value is calculated (or automated, by the electronic medical file system), and plotted on the BMI-curve (manual or electronic file).

Based on the cut-off values of the age and sex specific national BMI curves and clinical appraisal identify children who are:

- underweight
- healthy weight
- overweight
- obese

In the absence of national BMI reference charts, the international reference data for overweight and obesity should be used (see paragraph 1.1.2). When the national BMI reference charts will be developed and published, they will become an integral part of the document.

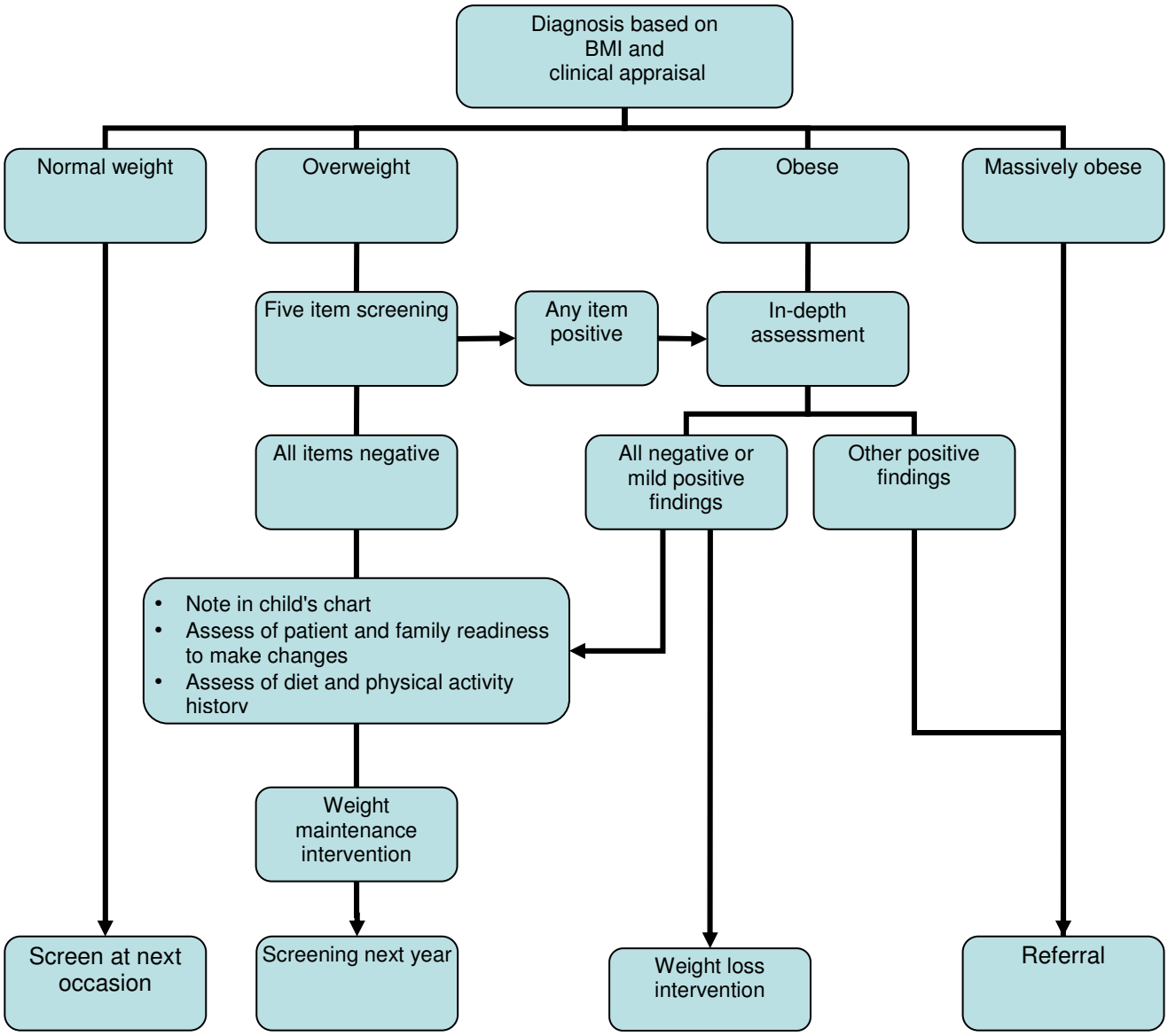


Figure 9.4: Early detection of overweight and obesity in Croatian schoolchildren

Assessment and procedures

I. Children of normal weight

Screen at the next physical examination.

Frequency of screening:

	Minimum programme	**Extended programme**
Primary school	Enrolment (6.5-7.5 years) 5th grade (10.5-11.5 years) 8th grade (13.5-14.5 years)	Enrolment (6.5-7.5 years) 3th grade (8.5-9.5. years) nurse only 5th grade (10.5-11.5 years) 6th grade (11.5-12.5 years) nurse only 8th grade (13.5-14.5 years)
Secondary School	1st grade (14.5.-15.5 years)	1st grade (14.5.-15.5 years)

In a try-out period of two years, both programmes will be evaluated, and according to the results with regard to the application of the guideline, decisions will be made on the optimal measurement frequency.

II. Overweight children

Follow a five-item screening procedure

A. Family history (parents, grandparents, blood related aunts or uncles)

- Obesity
- Non-insulin depended diabetes mellitus
- Cardiovascular diseases (at age ≤ 55 years)
- Hypertension
- Dyslipidemia (parents)
- Gall bladder diseases

B. Blood pressure

Evaluation

Elevated blood pressure in children is defined as systolic and/or diastolic pressure persistently above the 95th percentile, using blood pressure standards based on sex, age, and height for children ≥1 year of age and adolescents.
If blood pressure at rest equals or exceeds the 95th percentile on three separate occasions, the diagnosis of hypertension should be made.
If hypertension is severe (often above the 99th percentile) or if there is a strong suspicion of secondary hypertension, referral to a specialist in hypertension should be made.
Until national curves will be available, use cut-off values for hypertension of 140/90 mmHg.

Measurement

The measurement should be performed with a mercury sphygmomanometer or a calibrated aneroid device with the child sitting and his/her right arm resting on a solid supporting surface at heart level. It is important to consider the cuff size when measuring blood pressure in children and adolescents. Choosing a cuff that is too small will result in a false elevation of the blood pressure reading. An appropriate size cuff (cuff width 40% of mid-arm circumference) will be a cuff bladder that covers 80% to 100% of the arm circumference and approximately two thirds of the length of the upper arm. The lines printed on the cuff by the manufacturer facilitate the correct choice of a cuff. The recommendations of the American Heart Association (Williamset al., 2002) for the measurement of blood pressure should be followed, including inflation of the cuff to a pressure of 20 to 30 mm Hg above systolic blood pressure and cuff deflation at 2 to 3 mm Hg/s. The onset of the fifth Korotkoff phase has been suggested as being representative of diastolic blood pressure in children.

C. Total cholesterol

Only for children with a positive family history. Control measurements at next physical examinations should only be done in children with high cholesterol and without any improvement in overweight.

Parameter

High total cholesterol (≥5.2 mmol/L, or 200 mg/dL) (National Cholesterol Education Programme, 1991)

Measurement

Total cholesterol levels can be measured at any time of the day in non fasting patients because levels of total cholesterol do not vary appreciably with eating.

D. Large increment in BMI

An increase of two BMI points over the previous year.
This should be preferably based on an exact measurement or on a history of large increase in the past year.

E. Concern about weight

Indication that he or she is personally concerned about the current weight status, or expresses any emotional or psychological manifestation thought to be related to overweight or perception of overweight.
The Rosenberg Self-Esteem Scale (Rosenberg, 1965) can be used to evaluate the emotional/psychological impact of the overweight.

Rosenberg Self-Esteem Scale

Below is a list of statements dealing with your general feelings about yourself.

Mark one box for each line to indicate if you agree or disagree.

		Strongly agree	Agree	Disagree	Strongly disagree
a)	On the whole, I am satisfied with myself	☐	☐	☐	☐
b)	At times I think I am no good at all	☐	☐	☐	☐
c)	I feel that I have a number of good qualities	☐	☐	☐	☐
d)	I am able to do things as well as most other people	☐	☐	☐	☐
e)	I feel I do not have much to be proud of	☐	☐	☐	☐
f)	I certainly feel useless at times	☐	☐	☐	☐
g)	I feel that I'm a person of worth, at least on an equal plane with others	☐	☐	☐	☐
h)	I wish I could have more respect for myself	☐	☐	☐	☐
i)	All in all, I am inclined to feel that I am a failure	☐	☐	☐	☐
j)	I take a positive attitude toward myself	☐	☐	☐	☐
		1	2	3	4

Procedure after screening:

If all five items are negative:

- Note in child's medical record
- Weight maintenance is recommended
- Make an appointment for health check next year

If at least one in five items is positive:

- Same procedure as for obese children

III. Obese children

Obtain in-depth assessment as described in tables 9.2 and 9.3

Table 9.3: Tests for in-depth assessment of risk factors related to overweight or obesity in childhood

TESTS	POTENTIAL CONDITIONS (underlying causes or secondary complication)
Fasting blood insulin	Insulin resistance*
OGTT	
Lipoprotein analysis	Dyslipidemias*
Optic disc	Pseudotumor cerebri

*: The presence of complications marked with * in this table are considered mild. In the absence of all other conditions, these complications are indications for treatment in primary health care (School Health Services). No referral to specialized services is needed.

Procedures after in-depth assessment

- Specific findings should lead to additional diagnostic tests as indicated;
- The presence of any of these conditions (except conditions marked with* in tables 9.2 and 9.3) warrants referral to appropriate secondary care service specialists (obesity specialist, endocrinologist, geneticist, psychiatrist or psychologist).
- The presence of mild complications (marked with* in tables 9.2 and 9.3) and the absence of all other conditions are indications for treatment in primary health care (School Health Services).

9.2.2.4 Criteria for referral

Indications for referral to a secondary care service specialist (obesity specialist, endocrinologist, geneticist, psychiatrist or psychologist) for additional evaluation and treatment are:

- Massive obesity without complications (definition for massive obesity still does not exist for children);
- Underlying medical causes according to in-depth assessment;
- Secondary complications according to in-depth assessment.

9.2.2.5 References

National Cholesterol Education Programme. Report of the expert panel on blood cholesterol levels in children and adolescents. Washington DC: US Government Printin Ofice, 1991.(No.91-2732.)

Rosenberg, M. Society and the adolescent self-image. Princeton, NJ: Princeton University Press. 1965.

Williams CL, Hayman LL, Daniels SR, Robinson TN, Steinberger J, Paridon S, Bazzarre T AHA Statement, Cardiovascular Health in Childhood: A Statement for Health Professionals From the Committee on Atherosclerosis, Hypertension, and Obesity in the Young (AHOY) of the Council on Cardiovascular Disease in the Young, American Heart Association. *Circulation* 2002;106:143-160

9.2.3 The Slovenian strategy

Mojca Juricic and Nives Letnar Zbogar

9.2.3.1 Introduction

Overweight/obesity and underweight are severe threats to the healthy development of schoolchildren and youth. Prevention and early detection are important components of the health examinations in school health care. This guideline is aimed at supporting school doctors and school nurses in the prevention, early detection and secondary prevention of overweight and obesity in schoolchildren and youth.

9.2.3.2 Primary prevention

Primary prevention in Slovenian School Health Services consists of health education initiatives and interventions, which are performed during the periodic health examinations in health centres. In addition, school health care providers communicate with the school staff with regard to health issues, and organise health promotion for schoolchildren.
Recently a National Plan for Nutritional Policy and a National plan for Physical Activity were adopted in Slovenia, in which the health sector has to play an important role. During the implementation of both plans in the near future, new activities will be included into this guideline.

9.2.3.3 Early detection

During periodical health examinations, weight and height are measured, and BMI is calculated. In addition, the same measurements can be done at each contact, including curative visits to the school health services in between the regular health checks.

For the assessment of overweight and obese schoolchildren, many different approaches are being used in Slovenia, as we described in chapter 5 (paragraph 5.3). Recently, the measurement of schoolchildren and youth has started in order to develop national representative growth charts. Until that time, it is advised to use the international reference data for overweight and obesity (see paragraph 1.1.2). When national BMI reference charts become available, they will be an integral part of this document.

The diagram in figure 9.5 shows the proposed strategy for early detection of overweight and obesity in Slovenian schoolchildren. Children are first classified based on the BMI. In a second step, there is a preventive check up with in-depth examination of the risk factors listed in table 9.2. Special attention is given to:

- Personal and familial anamnesis, blood pressure, laboratory testing of blood (glucose, total serum cholesterol) and urine;
- Anthropometry: weight gain in a short period, disproportional height and weight centiles (two centile bands or more);
- Physical consequences of overweight (clinical or anamnesis);
- Clinical signs of diseases related to overweight and obesity.

9.2.3.4 Secondary prevention

Since School Health Care in Slovenia is organized as a comprehensive (preventive and curative) service on the primary level for schoolchildren and youth, the treatment of overweight and obesity is also a task of School health services.

When a child is recognized as at risk for overweight, or when it is in fact overweight or obese, it is invited to a “post-systematic” or “intentional” check up, where an in-depth examination is performed with additional laboratory tests (for example serum cholesterol). On that occasion individual health

education and counselling is also provided. Further examinations for follow-up are curative on the secondary level.

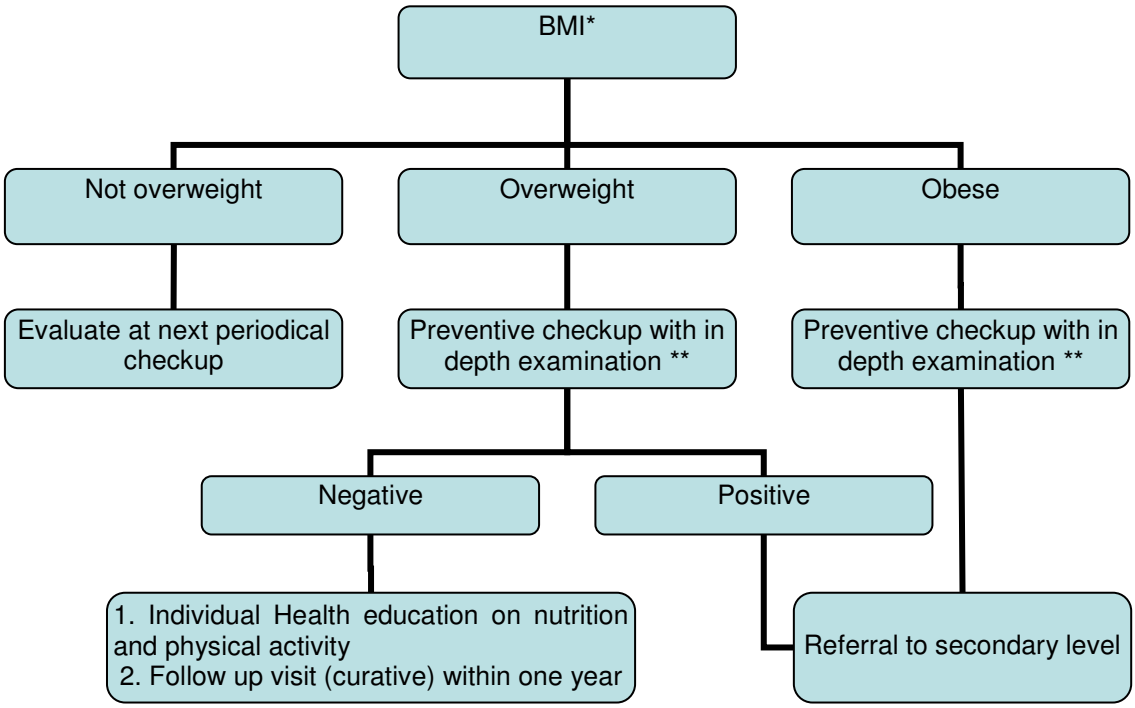


Figure 9.5: Early detection of overweight and obesity in Slovenian schoolchildren. * IOTF criteria until national Slovene charts become available. ** See text for details.

The algorithm for referral of obese schoolchildren to the secondary level (hospital or hospital outpatient clinics) is described in figure 9.5 and will be included in the guideline when adopted by the Permanent Task Force for School Medicine (Extended Scientific Collegium for Paediatrics).

In Slovenia there is also a Centre for Children and Youth that is specialized in the treatment of obese children, paid by the health insurance.

9.2.3.5 Notice

Due to a recent reform of the school system, schoolchildren enter primary school one year earlier then before, and as a consequence, primary school lasts nine years. There is now also a proposal for a revised program of systematic health examinations, but this was not yet approved at time of the publication of this report (31 May 2007).

9.2.3.6 References

Avbelj M, Saje Hribar N, Seher Zupančič M, et al. Prevalenca čezmerne prehranjenosti in debelosti med pet let starimi otroki in 15 oziroma 16 let starimi mladostnicami in mladostniki v Sloveniji. Zdrav Vest 2005;74:753-9

National Nutritional Health Policy 2005-2010: http://www.uradni-list.si/1/objava.jsp?urlid=200539&stevilka=1392

National Physical Activity Plan http://www.mz.gov.si/fileadmin/mz.gov.si/pageuploads/aktualno/aktualno_2007_dokumenti/STRATEGIJAgibanja.doc

CONCLUSIONS

In almost all countries of the European region a preventive health care programme exists aiming at evaluating, protecting and promoting the health, growth and development of children and adolescents. Although the structure and content of these preventive programmes vary considerably between countries, they all have a number of periodic health check-ups (screenings), preventive actions and guidance initiatives in common. Decisions about the content of these programmes were partly based on local health priorities, and depend largely on the organisation and accessibility of the primary health care in a country and on the extend to which preventive care is included in it. School health care programmes are almost completely financed by public (governmental) funding, which increasingly has lead to questions about the cost-benefit of these programmes and the degree of scientific evidence on which they are based.

Guidelines on school health care aim at increasing the effectiveness, efficiency and quality of the preventive health care as it is delivered to school aged children and adolescents. They should contribute to a better health, growth and development of children, on an individual as well as on a population level.

After being informed about the essentials of the guidelines, parents and children should have a clearer idea about what to expect from the school health service, and become more conscious of their own and their children's health.

School health care professionals should feel themselves supported by guidelines, since it makes the available scientific evidence apparent, increases the coherence, uniformity and comparability of their work, is potentially time-saving, and can be used as a reference for good preventive practice in case of allegations of supposed professional mistakes.
The development of evidence-based guidelines should also help school health services to be a stronger player in the collaboration with relevant partners in the health care for children and youngsters.

With the development of guidelines in school health care the authorities should have a better guarantee for an optimal spending of public money for the sake of the health of the childhood population. Guidelines should lead to a qualitatively better school health care practice, also resulting in data regarding a number of indicators of the health of the young population.

With the development of this "Guideline on the Prevention of Overweight and Obesity in Childhood" representatives of school health care in three European countries (i.e. Croatia, Flanders and Slovenia) for the first time used the same methodology in order to elaborate common evidence-based recommendations for school health services in their countries. On top of these common recommendations, some specific advices were added in accordance with the organisation of health care and school health care in the respective countries.
A spin-off of this guideline, developed according to the Flemish methodology, should be a better comparability between the participating countries with regard to the respective health indicators in childhood.

We hope that this first guideline may be a starting point for the development of European guidelines on school health care, guaranteeing comparably high-quality preventive health care for all children and adolescents living in countries of the European region, irrespective of their nationality and/or ethnic origin.

The European Union for School and University Health and Medicine offers a platform to the realization of this aim, with the collaboration of its member organisations.

ANNEXE 1
METHODOLOGY OF GUIDELINE DEVELOPMENT

Development of a guideline on the prevention of overweight and obesity in childhood: a stepwise methodology

The Flemish methodology and experience regarding guideline development was used for the development of this guideline on the prevention of overweight and obesity in childhood. This methodology consists of a plan for the development and implementation of guidelines in School Health Care, including the following steps:

1. Formulation of the subject for which guidelines ought to be developed by highest priority;

2. The appointment of a co-worker for outlining and writing the consecutive drafts of the guideline, and installation of a study group of field workers in School Health Care for commenting on the content and feasibility of the proposed guideline;

3. Systematic review of the scientific literature related to the chosen subject;

4. Preparation of an outline of the actual practice in School Health Care related to the chosen subject;

5. Preparation of a first draft of guideline based on steps 3 and 4, and discussion of this document within the study group;

6. Submission of the “study group-approved” version of guideline to a panel of scientific experts aimed at obtaining a broad scientific consensus with respect to the content of the proposed guideline, and incorporation of their comments into an new version of guideline;

7. Submission of the “expert-approved” version to an Advisory Board consisting, amongst others, of representatives of the management of School Health Services and of relevant (related to the specific matter of the guideline) Associations of health professionals, aimed at obtaining a broad consensus with respect to the practical and financial feasibility of the proposed guideline, and incorporation of their comments in a final “Advisory Board-approved” version of the guideline;

8. Preparation of a protocol of collaboration between School Health Services and other health services and/or professionals, outlining a strategy for the follow-up (further diagnosis and/or therapy) of children after their referral by the School Health Service;

9. Dissemination of the guideline to the authorities and the target professional group;

10. Preparation of a strategy for implementation and evaluation of the guideline.

ANNEXE 2
THE CENTER OF EPIDEMIOLOGICAL STUDIES DEPRESSION SCALE (CES-D) – 6 ITEMS SCALE

During the LAST 7 DAYS, how often ……

Mark one box for each line.

		Rarely or never	Some-times	Several times	Most of the times
a)	have you lost your appetite, you did not want to eat	☐	☐	☐	☐
b)	have you had difficulty in concentrating on what you want to do	☐	☐	☐	☐
c)	have you felt depressed	☐	☐	☐	☐
d)	have you felt that you had to put great effort and pressure to do the things you had to do	☐	☐	☐	☐
e)	have you felt sad	☐	☐	☐	☐
f)	couldn't you do your work (at home, at work, at school)	☐	☐	☐	☐

Reference:

Radloff, LS. A self-report depression scale for research in the general population. *Appl Psychol Meas* 1977;1:385-401