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Dietary habits of adolescents in Estonia: equity and social determinants

National Institute for Health Development, Tallinn, Estonia
and
WHO European Office for Investment for Health and
Development, Venice, Italy



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Abstract

The dietary habits of adolescents belonging to families from low socioeconomic groups are believed to be of low quality because of economic restrictions. This case study provides the analysis that has thus far been missing on the dietary habits of adolescents belonging to families from low socioeconomic groups in Estonia. The analysis is based on data from the Health Behavior in School-aged Children survey and involves 4477 pupils aged 11–15 years from general education schools in Estonia from the academic year 2005/2006. The case study concludes that adolescents belonging to families from low socioeconomic groups in Estonia are less likely to eat five portions of fruit and vegetables a day when compared with adolescents belonging to families from higher socioeconomic groups. The best investment at governmental level that would improve the quality of the dietary habits of adolescents belonging to families from low socioeconomic groups in Estonia is to ensure state-subsidized school lunch and fruit for all pupils.

Keywords

ADOLESCENT NUTRITION

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Contents

Acknowledgements	ii
List of contributors	iii
Acronyms and abbreviations	1
List of tables and figures	2
Tables	2
Figures	2
Executive summary	3
1. Introduction	4
2. Methods	7
2.1. Socioeconomic status indicators	7
2.2. Diet quality indicators	8
2.3. Weight status indicator	8
2.4. Statistical analysis	9
3. Results	10
3.1. Distribution of diet quality indicators by age, sex and ethnicity	10
3.2. Distribution of diet quality indicators by socioeconomic determinants.....	12
3.3. Trends in dietary habits	13
3.4. Distribution of overweight and obesity	14
3.5. Trends in overweight and obesity.....	16
4. Discussion	18
4.1. Socioeconomic context and position.....	19
4.2. Differential exposure.....	21
4.3. Differential vulnerability.....	27
4.4. Differential health outcomes	28
4.5. Differential consequences	29
5. Public health priorities and interventions	31
5.1. Ensuring a healthy food environment in schools	31
5.2. Increasing availability of fruit and vegetables	33
5.3. Ensuring appropriate marketing practices	33
5.4. Taxation of unhealthy foods	34
5.5. Addressing the health outcomes of an unhealthy diet.....	34
5.6. Measuring diet quality, food availability and health status	36
6. Strengths and limitations	37
7. Conclusions	38
8. References and bibliography	40
8.1. References	40
8.2. Bibliography.....	45

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Acronyms and abbreviations

BMI	body mass index
CHD	coronary heart disease
CI	confidence interval
CVD	cardiovascular disease
EFCOSUM	European Food Consumption Survey Method
EHIF	Estonian Health Insurance Fund
EU	European Union
FAS	family affluence scale
HBSC	Health Behavior in School-aged Children (survey)
NCD	noncommunicable disease
NIHD	National Institute for Health Development
SPSS	Statistical Package for the Social Sciences

List of tables and figures

Tables

- Table 2.1.** International guidelines for children’s BMI standards
- Table 4.1.** United States price elasticity estimates, by food and beverage category, 1938–2007 (selected years)
- Table 4.2.** Price comparison of selected foods and beverages in Estonian general grocery stores, 2006 and 2011

Figures

- Fig. 1.1.** Overview of obesity-related pathways
- Fig. 3.1.** Fruit, vegetable, milk and fish consumption distribution among adolescents by sex, 2005/2006 academic year
- Fig. 3.2.** Fruit, vegetable and milk consumption distribution among adolescents by age, 2005/2006 academic year
- Fig. 3.3.** Fruit, vegetable and milk consumption distribution among adolescents by place of residence, 2005/2006 academic year
- Fig. 3.4.** Fruit, vegetable, milk and fish consumption distribution among adolescents by number of children in the family, 2005/2006 academic year
- Fig. 3.5.** Fruit and vegetable consumption among adolescents by sex, 2002–2010
- Fig. 3.6.** Sweets and soft drink consumption among adolescents by sex, 2002–2010
- Fig. 3.7.** Weight status distribution among adolescents by sex, 2005/2006 academic year
- Fig. 3.8.** Weight status distribution among adolescents by number of children in family, 2005/2006 academic year
- Fig. 3.9.** Weight status distribution among adolescents by sex, 2002–2010
- Fig. 4.1.** Priority public health conditions analytical framework
- Fig. 4.2.** Food and beverage production companies in Estonia target children and adolescents with advertisements using various multimedia channels, including Internet platforms such as Facebook and YouTube
- Fig. 4.3.** Food and beverage companies in Estonia target children with special online game environments to help build brand loyalty
- Fig. 4.4.** Beverage companies in collaboration with other producers target children with product tie-ins to help sell more products
- Fig. 4.5.** Estonian beverage producers target children with the “Eatertainment” marketing concept to help build brand loyalty
- Fig. 4.6.** Estonian food producers target children with product tie-ins using popular children’s cartoon characters to help sell more products

Executive summary

Introduction. Adolescents belonging to families from low socioeconomic groups are considered to have low-quality diets, due to higher exposure and vulnerability to factors that encourage unhealthy eating choices.

Objective. Investigate the diet quality of adolescents from low socioeconomic groups in Estonia and propose necessary public policy responses.

Methods. The analysis of the socioeconomic determinants of dietary habits of adolescents in Estonia was based on data from the Health Behavior in School-aged Children (HBSC) survey conducted in Estonia in 2005/2006, involving 4477 pupils aged 11–15 years in Estonian general education schools. The associations between diet indicators, overweight and socioeconomic indicators, including the family affluence scale, employment status of parents, place of residence, number of children in the family and family model, were assessed by means of the X^2 -test. Taking into account the results of the diet equity analysis, priority public health measures were ascertained in four dimensions, concerning society, the environment, population group and at the level of the individual.

Results. Adolescents living in rural areas and adolescents belonging to families with three or more children were less likely to eat fruit and vegetables according to recommendations when compared to adolescents in urban areas and belonging to families with one child. Adolescents living in Tallinn and adolescents from families with 1–2 children in Estonia were more likely to be overweight or obese when compared with adolescents living in other towns or rural areas and from families with three or more children, respectively. Results of the equity analysis showed that the availability of healthy eating information and healthy food choices are the main factors ensuring healthy eating habits among adolescents.

Conclusions. The best investment at governmental level that directly benefits the well-being of adolescents is to ensure a state-subsidized and healthy school lunch for all school pupils. The successful school lunch, school fruit and school milk subsidy programmes in Estonia should be continued and expanded to include all students in Estonia. The sales of low quality foods in Estonian schools should be banned and a guideline for food and beverage marketing practices targeted at children and adolescents should be developed to prevent the spread of obesity among adolescents.

1. Introduction

Estonia has undergone major economic, political and social changes in recent decades that have contributed – with varying intensity and duration – to major changes in the dietary habits and health of the population (Ulijaszek & Koziel, 2007). Data on the dietary habits of adolescents have been collected in Estonia since 1993, at 4-year intervals, in the Health Behavior in School-aged Children (HBSC) survey. The increased consumption of fruit and vegetables and decreased consumption of sugar-sweetened beverages (including soft drinks) are signs of improving dietary habits among adolescents (Aasvee & Maser, 2009). However, the increasing prevalence of overweight, including obesity among adolescents in Estonia indicates an alarming trend (Aasvee & Maser, 2009).

In 2010, 26% of adolescents in Estonia and an average of 36% of adolescents among the 41 countries participating in the HBSC survey ate fruit daily (Currie et al., 2012). In the same year, 17.7% of boys and 11.7% of girls in Estonia were overweight; the average prevalence of overweight among the 41 countries participating in the HBSC survey was 17.3% among boys and 11.3% among girls (Currie et al., 2012).

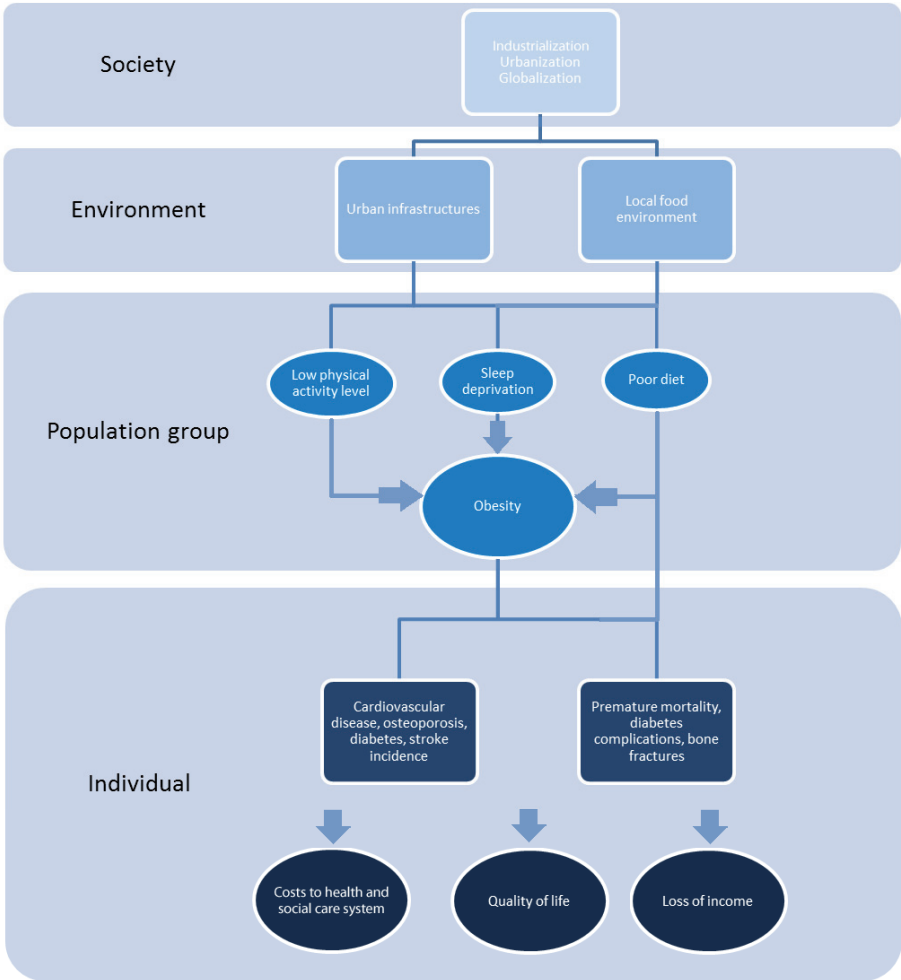
Recommended diet quality indicators to be included in health monitoring programmes in Europe were developed by the European Food Consumption Survey Method (EFCOSUM) working group in 2001. The list of relevant diet quality indicators includes, among others, the consumption of vegetables, fruit and fish (Steingrimsdottir et al., 2002). In 2009, the Estonian Society of Nutritional Science identified that low consumption of milk and substitution with soft drinks is a problem in the dietary habits of adolescents in Estonia and both milk and soft drink consumption are considered to be important indicators of diet quality among adolescents (Vaask et al., 2009). In addition, school lunch consumption is considered an important diet quality indicator among adolescents in Estonia (Estonian Ministry of Justice, 2008). To summarize, the consumption of fruit, vegetables, fish, milk, soft drinks and school lunch among adolescents in Estonia are essential diet quality indicators. A low-quality diet – that is, eating habits that are not consistent with nutritional recommendations – results in many short-term health consequences for adolescents, including lower academic performance, dental caries, overweight, obesity and long-term health consequences (including the higher risk of osteoporosis and cardiovascular disease (CVD) incidence in later life).

Overweight and obesity are considered to be the most serious and widespread health outcomes of a low-quality diet. Being overweight is associated with a higher risk of social and psychological problems, as well as lower self-esteem and quality of life (Aasvee et al., 2007). Obese children demonstrate significantly higher rates of sadness and loneliness, and are more likely to engage in high-risk behaviours such as smoking or consuming alcohol (Strauss, 2000). Obesity has also immediate effects on the health of adolescents,

as indicated by the incidence earlier in life of type 2 diabetes (Mathieson & Koller, 2006). The most significant long-term health consequences of overweight and obesity include hypertension and hyperlipidaemia, coronary heart disease (CHD) and ischaemic stroke (Mathieson & Koller, 2006).

The current epidemic of obesity among children and adolescents is influenced by an environment that promotes low-quality eating choices and discourages physical activity (French, Story & Jeffery, 2001). Environments that promote healthy dietary choices support reversing the trends of overweight and obesity among adolescents, as well as tackling obesity-related morbidity and mortality in adulthood (Kim & Popkin, 2006). Economic determinants, such as the cost of food and income levels – influencing an individual’s ability to afford specific foods – are important determinants of dietary choices (Gibney et al., 2004). Fig. 1.1 helps to further understand the causalities behind the prevalence of obesity, as they relate to society, the environment, population groups and the individual.

Fig. 1.1. Overview of obesity-related pathways



Source: Adapted from Whiting et al., 2010.

Population groups with low socioeconomic status may be more sensitive to changes in food and beverage prices and may not be able to afford to shop for healthy foods (Drewnowski, 2004). There is increasing evidence that people in economically disadvantaged positions are subject to differential exposure to low-quality food and availability of high-quality food, as well as other barriers to adopting healthy behaviours (Blas & Kurup, 2010). People in lower socioeconomic groups lead shorter lives, suffer from different health problems and experience more constraints in terms of using health care services (EHIF, 2009).

The aim of this case study is to investigate the diet quality of adolescents from different socioeconomic groups and to propose policy measures that would support improving the dietary habits of adolescents from lower socioeconomic groups in Estonia. The case study follows the “Equity, social determinants and public health programmes” framework, developed by WHO (Blas & Kurup, 2010).

2. Methods

Analysis of the diet quality of adolescents from different socioeconomic groups in Estonia was based on data from the WHO collaborative cross-national HBSC study. In the HBSC survey, data on 11-, 13- and 15-year-old boys and girls are collected every four years, using a population-based random sampling method. The survey focuses on a wide range of health, education, social and family measures that affect young people's health, including a section on dietary habits. The analysis in this case study is based on the HBSC 2005/2006 data (Aasvee et al., 2007), which included 4477 pupils from the fifth, seventh and ninth year groups (pupils aged 11–15 years) in Estonian general education schools. For trend analysis, data from the HBSC 2001/2002 (Maser, 2004) and 2009/2010 (Aasvee & Minossenko, 2011) surveys in Estonia were also used. The term “adolescents” is used interchangeably to describe the respondents involved in the HBSC survey. All data on food and drink consumption, as well as height and weight estimates are self-reported in the survey. It is important to note that self-reported height and weight data are usually less accurate than measured data and are often underreported.

The pathways between different socioeconomic determinants and dietary habits are complex and often country specific. In the analysis of these pathways and possible differential dietary habits of adolescents in Estonia, the focus was on five different indicators of socioeconomic status: the family affluence scale (FAS), employment status of parents, place of residence, number of children in the family, and family model. These indicators are described in further detail in section 2.1.

2.1. Socioeconomic status indicators

2.1.1. FAS

The HBSC FAS (Currie et al., 2012) measures young people's socioeconomic status. It is based on a set of questions on the material conditions of the households in which they live, including car ownership, bedroom occupancy, holidays and home computers. Young people are classified according to the calculated total score of the items, with the overall score being recorded to give values of low, middle and high family affluence.

2.1.2. Employment status of parents

The employment status of both parents was reported, namely, whether the parent works or not, and if not, then why the parent is not active in the labour market (e.g. retired, unemployed, or on parental leave). Whether or not the non-active parent received any supplementary income (benefits, pension) was not identified. As the majority of the respondents reported that their both parents were working, the other groups were combined to enable meaningful statistics to be attained. Thus, in the statistical analyses, two categories were used: “both parents working” and “other”.

2.1.3. Place of residence

Pupils were asked to give their town or place of residence. The answers were categorized as “Tallinn”, “Other town”, or “Rural area”.

2.1.4. Family model

Pupils were asked to name the adults living under the same roof with them: mother, father, stepmother/father’s life partner, stepfather/mother’s life partner, grandmother, grandfather, other person, or living with a foster family or in an orphanage. For the purpose of the analysis, three groups were formed: pupils living with just one parent; pupils living with two parents (where both were not necessarily their biological parents); and all other options.

2.1.5. Number of children in the family

Information about the number of children living in the same family with the respondent was categorized as follows: families with one child, families with two children, or families with three or more children.

2.2. Diet quality indicators

2.2.1. Lunch consumption

The respondents were categorized as follows: those that consumed lunch on every school day; those that consumed lunch on 1–4 school days, and those that never consumed lunch on school days.

2.2.2. Fruit, vegetables, fish, sweets, milk and soft drink consumption

Pupils were asked about the frequency of having consumed fruit and vegetables, milk, fish, sweets and soft drinks during the previous seven days. The respondents were divided into two categories: those in accordance with national nutritional recommendations and those not in accordance with the recommendations. If fruit, vegetables and milk were consumed at least once a day and fish was consumed at least twice a week, the nutritional recommendations were considered to be met (Vaask et al., 2009).

2.3. Weight status indicator

2.3.1. Body mass index

Body mass index (BMI) was calculated based on self-reported weight (without clothes) and height (without shoes). According to international BMI cut-off points (WHO, 2007), shown in Table 2.1, the students were categorized as underweight, normal weight, overweight or obese.

Table 2.1. International guidelines for children’s BMI standards

Age	Boys			Girls		
	11	13	15	11	13	15
Underweight	≤ 14.29	≤ 15.29	≤ 16.29	≤ 14.19	≤ 15.29	≤ 16.09
Overweight	≥ 19.5	≥ 21.2	≥ 23.0	≥ 20.2	≥ 22.2	≥ 23.8
Obese	≥ 22.9	≥ 25.2	≥ 27.4	≥ 24.2	≥ 26.7	≥ 28.5

2.4. Statistical analysis

Statistical analysis was carried out using version 16 of the Statistical Package for the Social Sciences (SPSS) software. Chi-square (X^2) tests were applied to assess the statistical significance of the associations between diet indicators, overweight and socioeconomic indicators. P-values greater than ($<$) 0.05 were considered to be significant.

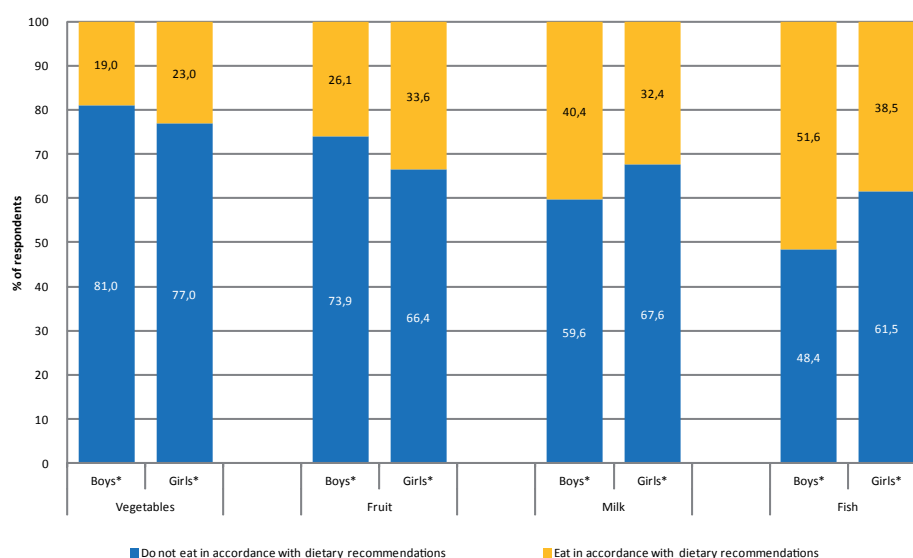
3. Results

3.1. Distribution of diet quality indicators by age, sex and ethnicity

3.1.1. Age and sex

In the 2005/2006 HBSC survey (Aasvee et al., 2007), the sexes were evenly distributed: 2242 of respondents were boys and 2242 were girls. About 32% of respondents (n=1435) were 11 years old, about 33% (n=1480) were 13 years old and about 35% (n=1569) were 15 years old. According to HBSC 2005/2006, more girls ate vegetables (p=0.0012) and fruit (p<0.0001) in accordance with nutritional recommendations than boys (Fig. 3.1). More boys ate fish (p<0.0001) and milk (p<0.0001) in accordance with nutritional recommendations than girls.

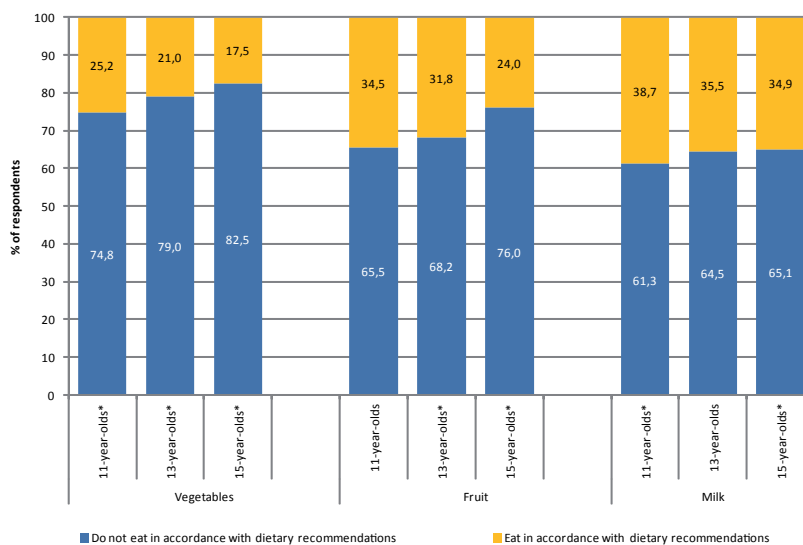
Fig. 3.1. Fruit, vegetable, milk and fish consumption distribution among adolescents by sex, 2005/2006 academic year



*statistically significant (p<0.05) difference in consumption between groups
 Source: Aasvee et al., 2007.

According to the 2005/2006 HBSC survey (Aasvee et al., 2007), more 11-year-olds (p<0.0001, p<0.0001 and p=0.03) and 13-year-olds (p=0.014, p<0.0001 and p=0.05) ate vegetables, fruit and milk in accordance with recommendations than 15-year-olds (Fig. 3.2).

Fig. 3.2. Fruit, vegetable and milk consumption distribution among adolescents by age, 2005/2006 academic year



*statistically significant ($p < 0.05$) difference in consumption between groups
 Source: Aasvee et al., 2007.

The same survey data (HBSC 2005/2006) show that more girls (53%) ate sweets on more than five days of the week compared with boys (49%; $p = 0.007$). More boys (24%) drank soft drinks on more than five days of the week compared with girls (16%; $p < 0.0001$). More 15-year-olds (70%) ate a hot lunch on five days of the week compared with 13-year-olds (66%; $p = 0.008$) and compared with 11-year-olds (63%; $p < 0.0001$).

3.1.2. Ethnicity

In the HBSC 2006 survey (Aasvee et al., 2007), ethnicities were proportionally distributed such that 3407 respondents spoke Estonian at home and 1077 spoke another language at home. More adolescents who spoke another language at home ate vegetables (31%), fruit (39%) and fish (50%) in accordance with nutritional recommendations, compared with adolescents who spoke Estonian at home (for whom the corresponding data were 18% ($p < 0.0001$), 27% ($p < 0.0001$) and 44% ($p < 0.0001$), respectively). Fewer adolescents who spoke another language at home (31%) drank milk in line with nutritional recommendations, compared with adolescents who spoke Estonian at home (38%; $p < 0.0001$).

More adolescents who spoke another language at home consumed sweets (54%) and soft drinks (22%) on more than five days a week, compared with adolescents who spoke Estonian at home (50%; $p < 0.024$, and 18%; $p < 0.001$, respectively). More adolescents who spoke Estonian at home ate a hot lunch on every school day (68%) compared with adolescents who spoke another language at home (62%; $p < 0.0001$).

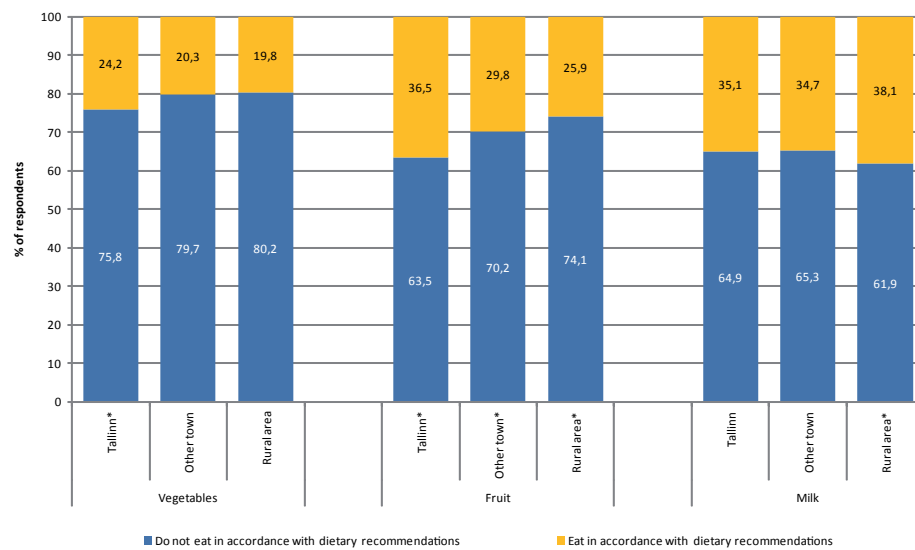
3.2. Distribution of diet quality indicators by socioeconomic determinants

Results of the analysis showed that, among adolescents in Estonia, out of the selected socioeconomic status indicators, two were significantly associated with diet quality: place of residence and number of children in the family. This is explored further in the following subsections.

3.2.1. Place of residence

In the HBSC 2005/2006 survey (Aasvee et al., 2007), residencies were proportionally distributed such that 1058 of respondents lived in Tallinn, 1574 lived in other towns and 1813 lived in rural areas. More adolescents who lived in Tallinn ate vegetables and fruit in accordance with nutritional recommendations, compared with adolescents living in other towns ($p=0.016$ and $p=0.006$, respectively) or rural areas ($p<0.0001$ and $p<0.0001$, respectively) (Fig. 3.3). More adolescents living in rural areas drank milk in accordance with nutritional recommendations, compared with adolescents living in other towns ($p=0.048$).

Fig. 3.3. Fruit, vegetable and milk consumption distribution among adolescents by place of residence, 2005/2006 academic year



*statistically significant ($p<0.05$) difference in consumption between groups
 Source: Aasvee et al., 2007.

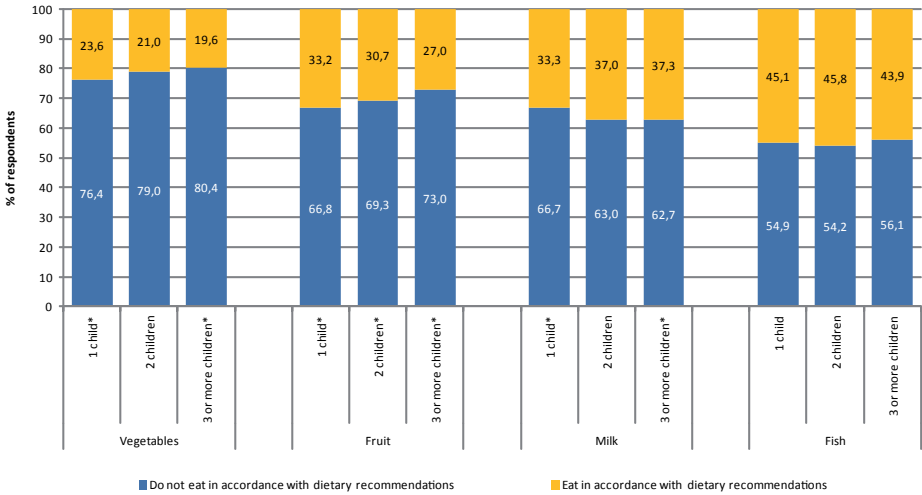
More adolescents living in rural areas (71%) ate a hot lunch on every school day, compared with adolescents living in Tallinn (60%; $p<0.0001$) or other towns in Estonia (66%; $p=0.0029$).

3.2.2. Number of children in the family

In the HBSC 2005/2006 survey, families were proportionally distributed such that 955 respondents belonged to a family with one child, 1898 to a family with two children and 1631 to a family with three or more children. More adolescents who belonged to a family

with one child ate vegetables and fruit in accordance with nutritional recommendations, compared with adolescents belonging to a family with three or more children ($p=0.014$ and $p<0.0001$, respectively) (Fig. 3.4). More adolescents who belonged to families with three or more children drank milk in accordance with nutritional recommendations, compared with adolescents belonging to families with one child ($p=0.045$). In terms of fish consumption, there were no statistically significant differences between the groups involved in the study.

Fig. 3.4. Fruit, vegetable, milk and fish consumption distribution among adolescents by number of children in the family, 2005/2006 academic year



*statistically significant ($p<0.05$) difference in consumption between groups
 Source: Aasvee et al., 2007.

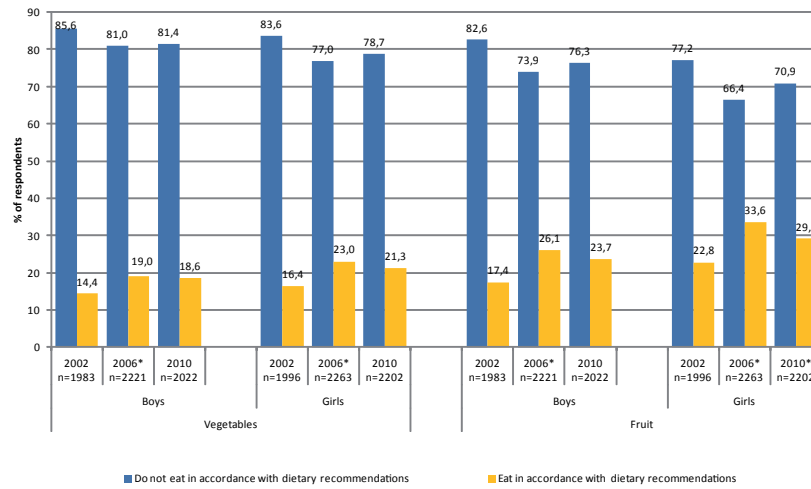
More adolescents who belonged to a family with one child (53%; $p=0.013$) or two children (53%; $p=0.006$) consumed sweets on more than five days of the week, compared with adolescents belonging to a family with three or more children (48%). More adolescents who belonged to a family with one (20%; $p=0.027$) or two children (20%; $p=0.004$) consumed soft drinks on more than five days of the week, compared with adolescents belonging to a family with three or more children (17%).

More adolescents who belonged to a family with two children (67%; $p=0.03$) or three or more children (67%; $p=0.033$) ate a hot lunch on every school day, compared with adolescents belonging to a family with one child (63%).

3.3. Trends in dietary habits

From 2002 to 2006 the average proportion of adolescents who ate fruit and vegetables in accordance with nutritional recommendations increased significantly ($p<0.0001$ for boys and $p<0.0001$ for girls) (Fig. 3.5). In 2010, about 19% of adolescents ate vegetables and about 26% ate fruit according to nutritional recommendations.

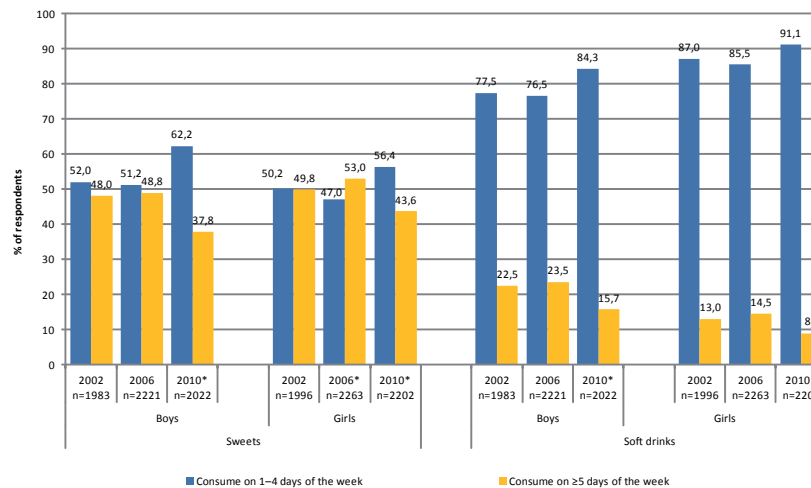
Fig. 3.5. Fruit and vegetable consumption among adolescents by sex, 2002–2010



*statistically significant ($p < 0.05$) change in consumption compared with previous survey year
Sources: Maser, 2004; Aasvee et al., 2007; Aasvee & Minossenko, 2011a, 2011b.

From 2006 to 2010 the proportion of adolescents in Estonia who drank soft drinks and ate sweets on more than five days of the week decreased significantly ($p < 0.0001$ for boys and $p < 0.0001$ for girls) (Fig. 3.6). In 2010, 41% of adolescents ate sweets and 12% drank soft drinks on more than five days of the week.

Fig. 3.6. Sweets and soft drink consumption among adolescents by sex, 2002–2010



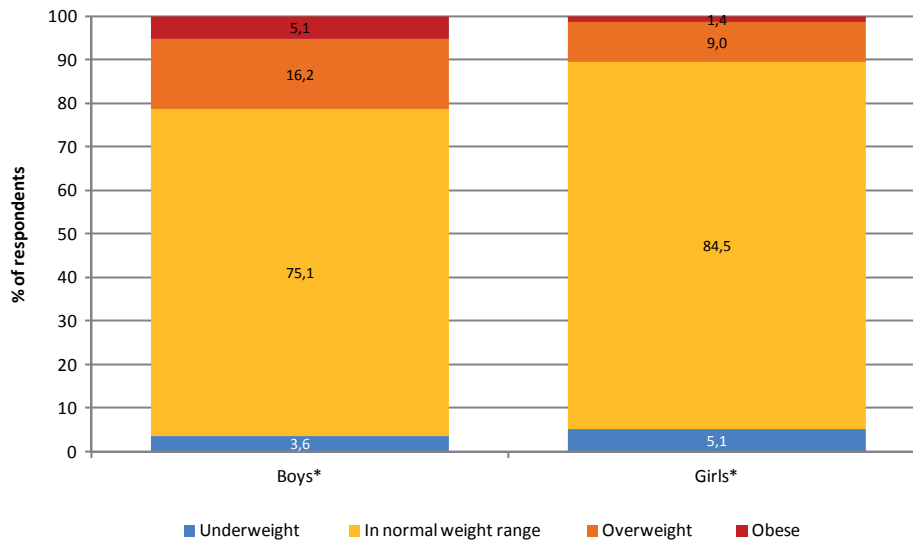
*statistically significant ($p < 0.05$) change in consumption compared with previous survey year
Sources: Maser, 2004; Aasvee et al., 2007; Aasvee & Minossenko, 2011a, 2011b.

3.4. Distribution of overweight and obesity

According to the HBSC survey in 2005/2006 (Aasvee et al., 2007), more boys were overweight and obese compared with girls ($p < 0.0001$ and $p < 0.0001$, respectively)

(Fig. 3.7). More 11-year-olds (17%) were overweight, compared with 13-year-olds (13%; $p=0.004$) and 15-year-olds (9%; $p<0.0001$).

Fig. 3.7. Weight status distribution among adolescents by sex, 2005/2006 academic year

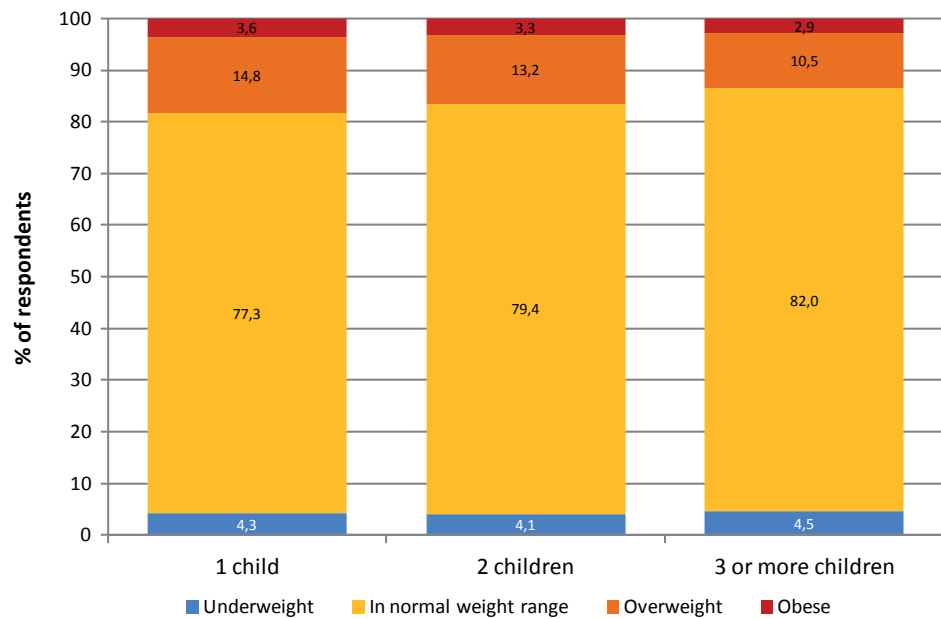


*statistically significant ($p<0.05$) difference between groups
 Source: Aasvee et al., 2007.

According to the HBSC 2005/2006 survey, more adolescents who spoke Estonian at home (4%) were obese compared with adolescents who did not speak Estonian at home (2%; $p=0.032$). More adolescents who lived in Tallinn (15%) were overweight compared with adolescents living in rural areas (12%; $p=0.032$) or other towns (12%; $p=0.017$).

More adolescents who belonged to families with with one child or two children were overweight, compared with adolescents who belonged to families with three or more children ($p=0.002$ and $p=0.023$, respectively) (Fig. 3.8). Moreover, children who belonged to families with three or more children were more likely to be normal weight, compared with adolescents belonging to families with one child ($p=0.004$).

Fig. 3.8. Weight status distribution among adolescents by number of children in family, 2005/2006 academic year

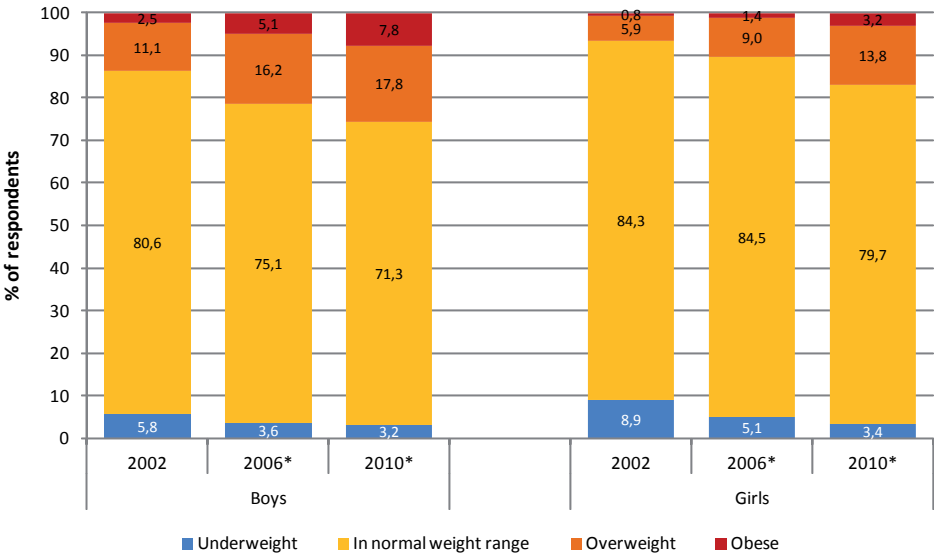


Source: Aasvee et al., 2007.

3.5. Trends in overweight and obesity

From 2002 to 2010 the proportion of adolescents in Estonia who were overweight or obese increased significantly and rapidly ($p < 0.0001$ for boys and $p < 0.0001$ for girls) (Fig. 3.9). In 2010 about 3% of adolescents were underweight, about 76% were normal weight, about 16% were overweight and about 5% were obese.

Fig. 3.9. Weight status distribution among adolescents by sex, 2002–2010



*statistically significant ($p < 0.05$) change compared with the previous survey year (except underweight and normal weight among boys in 2006–2010 and obesity among girls in 2002–2006)

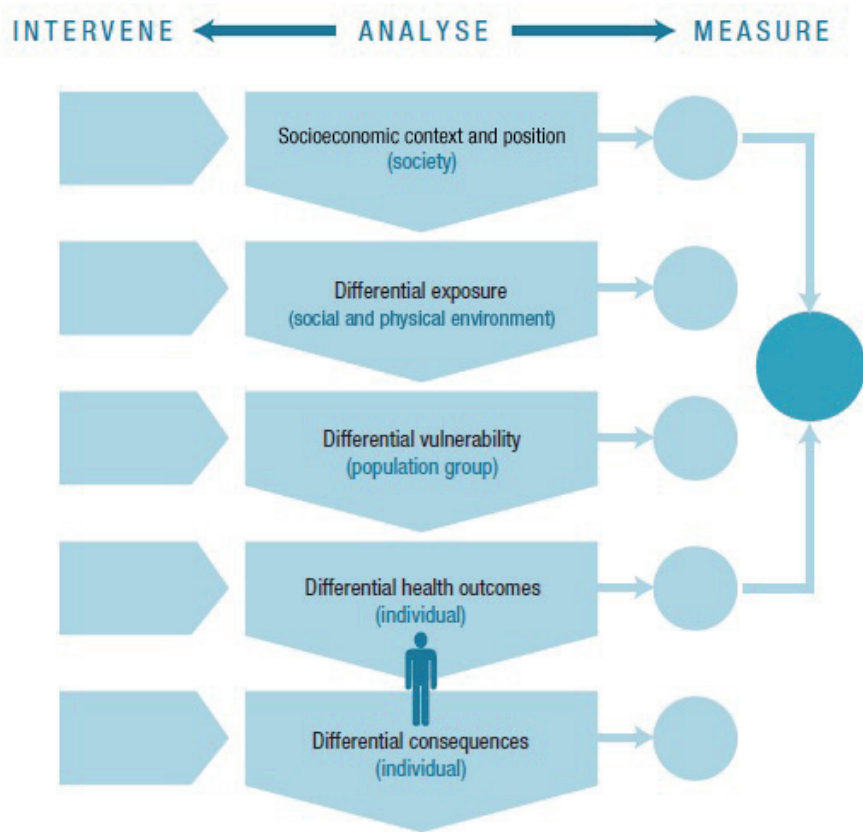
Sources: Maser, 2004; Aasvee et al., 2007; Aasvee & Minossenko, 2011a, 2011b.

4. Discussion

Analysis of the dietary habits of adolescents in different socioeconomic groups in Estonia showed that of the five selected socioeconomic determinants, the place of residence and the number of children in the family was associated with diet quality. The proportion of people whose net income is below minimum wage is higher in rural than in urban areas (14% and 8%, respectively) (Kaljula, Maripuu & Liubsiene, 2009). The average gross salary in 2005 was highest in Tallinn, compared with the national average. The average wage in other regions in Estonia, aside from Harjumaa, was less than the national average. Therefore, residents of rural areas may be considered to be economically more vulnerable. The incidence of poverty among families with children in Estonia is generally notably higher than among families without children (Kaljula, Maripuu & Liubsiene, 2009). The higher the number of children in the family, the higher the poverty level (Kaljula, Maripuu & Liubsiene, 2009). In Estonia, families with three or more children are considered to be economically vulnerable and are eligible for state support.

Paraphrasing the new global agenda for health equity (CSDH, 2008), one could say: “Where systematic differences in dietary habits are judged to be avoidable by reasonable action they are considered to be unfair. It is this that is labelled diet inequity.” To support the diet equity position in the public policy dialogue, it is crucial to map the extent of diet inequities. The WHO “Equity, social determinants and public health programmes” framework recommends four major dimensions for equity analysis – society, environment, population group and individual level – in order to better understand the causalities involved in existing diet inequities (Fig. 4.1) (Blas & Kurup, 2010). The four major dimensions of equity analysis are discussed in the following sections.

Fig. 4.1. Priority public health conditions analytical framework



Source: Blas & Kurup, 2010.

4.1. Socioeconomic context and position

The adoption of free-market economic and democratic systems in Estonia has contributed – with varying intensity and duration – to major changes in lifestyle. The related health consequences are showing increasing similarities to trends in other European countries (Ulijaszek & Koziel, 2007). Estonia has undergone major economic, political and social development that is akin to the changes seen in other countries and populations: mechanization; urbanization; changes in type of work and ways of working, as well as in recreational activities; and changes in the way food is produced, processed and consumed. Increasing foreign direct investment by transnational companies entering the food market – with particular emphasis on processed foods and the fast food sector – encourages the consumption of cheap and energy-dense foods that are high in saturated fat, sugar and salt, as pointed out by Blas & Kurup (2010). Food prices are considered to be the most influential determinants of food choices and eating habits of population groups with low socioeconomic status.

4.1.1. Food prices

The influence of price changes on the purchasing of food products can be evaluated by means of a price elasticity estimate, which refers to the percentage change in the purchased quantity of or demand for a product, occurring with a 1% change in the price of the product (Andreyeva, Long & Brownell, 2010). Research in this area in Estonia is limited; however, results from price elasticity studies conducted in the United States can be seen in Table 4.1. A higher elasticity score suggests greater changes in population purchases as prices shift.

Table 4.1. United States price elasticity estimates, by food and beverage category, 1938–2007 (selected years)

Food and beverage category	Absolute value of mean price elasticity estimate (95% CI)
Soft drinks	0.79 (0.33, 1.24)
Fruit	0.70 (0.41, 0.98)
Milk	0.59 (0.40, 0.79)
Vegetables	0.58 (0.44, 0.71)
Fish	0.50 (0.30, 0.69)
Sweets/sugars	0.34 (0.14, 0.53)

Source: Andreyeva et al., 2010.

These results indicate that in the United States, soft drinks have the highest elasticity score and a 10% price increase could lead to an 8–10% reduction in purchases of these beverages. Fruit can be viewed as moderately elastic, while milk, vegetables, fish and sweets are inelastic to price changes in the United States. In a brief comparison of food and beverage prices in general grocery stores in Estonia, based on data from autumn 2006 and 2011, it is evident that there have been considerable increases in the prices of milk, sweets and selected soft drinks, along with a considerable decrease in the prices of vegetables (Table 4.2).

Table 4.2. Price comparison of selected foods and beverages in Estonian general grocery stores, 2006 and 2011

Food item	Price, €/kg (autumn 2006)	Price, €/kg (autumn 2011)	Change in price, %
Milk (2.5% fat)	0.40	0.63	58
Fresh trout	8.80	7.89	-10
Cabbage	0.42	0.21	-50
Carrot	0.48	0.26	-46
Cucumber (local)	1.45	1.43	-1.3
Tomato (local)	1.58	1.99	26
Confectionery	3.37	5.24	56
Milk chocolate (local)	7.30	10.20	40
Coca-Cola (0.5 litre)	0.59	0.73	24

Source: Estonian Institute of Economic Research, 2011.

The prices of sweets and soft drinks increased and the prices of vegetables decreased in Estonia since 2006. These changes in food prices without an equivalent rise in family incomes may have influenced the dietary habits of adolescents, as non-staple foods with higher prices will have been purchased less frequently. This might explain the significant decrease in consumption of sweets and soft drinks and the significant increase in the consumption of vegetables since 2006 among adolescents in Estonia. This is further supported by the fact that adolescents in Estonia from lower socioeconomic groups consume significantly less sweets and soft drinks compared with adolescents from higher socioeconomic groups. However, adolescents from lower socioeconomic groups consume significantly less fruit and vegetables compared with adolescents from higher socioeconomic groups, which may be caused by other limitations besides food prices, for example by environmental factors.

4.2. Differential exposure

The tendency towards a low-quality diet has also increased, as the environment has become more urbanized, including the increased promotion and availability of processed foods and fast foods with low nutritional quality. People in lower socioeconomic groups may be more exposed to an obesogenic environment as a result of their economic limitations and this may directly affect their dietary intake because of the choices they are able to make. For example, because they have lower income, people may live in more disadvantaged

areas, where housing is cheaper but the local food environment is poor (that is, fewer stores selling affordable fresh fruit and vegetables, and more marketing of foods of low nutritional quality) (Blas & Kurup, 2010). There is increasing evidence that people in low socioeconomic groups are subject to differential exposure to unhealthy food environments, as well as other barriers to adopting healthy behaviours (Blas & Kurup, 2010).

4.2.1. Availability of foods

The dietary choices that adolescents make are influenced by the availability of foods in the settings in which they eat; primarily, in the home and school environments (Shepherd, 1999). Schools are an important environment for shaping healthy dietary habits, since they are able to reach a high number of young people. In Estonia, the national school lunch subsidy programme began in 2002 and it ensures, together with the support of local governments and parents, that all pupils attending state schools in year groups one to nine (pupils aged about 7–16 years) have access to a state-subsidized school lunch on every school day. The school lunch menu is regulated by the state and is required to include a minimum of five servings of vegetables, three servings of fruit and one serving of fish per week, thereby helping to meet nutritional recommendations (Estonian Ministry of Justice, 2008). Estonia has been a member of the European Union (EU) School Milk Programme since 2001, which ensures that all pupils in all year groups (7–19 years old) among the participating schools have access to subsidized milk and dairy products on every school day (PRIA, 2011a). Since 2009, Estonia has also been a member of the EU School Fruit Programme, which ensures that all pupils in year groups one to four (pupils aged 7–11 years) among the participating schools have access to subsidized servings of fruit and vegetables (PRIA, 2011b). However, in addition to the school canteen, many schools in Estonia also have cafés that often carry a wide selection of low-quality foods with high saturated fats, trans fat, salt and sugar contents, (such as pizzas, hamburgers, sweets, cakes, confectionery, potato chips, salty crackers and sugar-sweetened soft drinks), which encourage unhealthy food choices among school students. In 2009, about 30% of schools in Estonia reported to include a café in addition to a state-regulated school canteen (Health Protection Inspectorate, 2010). It is highly likely that the presence of an alternative unregulated food vendor on the school site (in addition to the school canteen) encourages students to choose energy-dense snacks and fast food instead of having a balanced meal in the canteen.

In Estonia, adolescents from low socioeconomic groups (living in rural areas or belonging to families with two or more children) were significantly more likely to eat lunch on every school day, compared with adolescents from high socioeconomic groups (living in urban areas or belonging to families with one child). This implies that the existing school food subsidy programmes that make healthy foods available for all pupils are especially effective in ensuring healthier food choices among adolescents from vulnerable socioeconomic groups. However, adolescents from lower socioeconomic groups consume significantly fewer vegetables compared with adolescents from higher socioeconomic groups, despite the existing school food subsidy programmes. This is most likely caused by poor local food environments (for example, fewer stores selling affordable fresh fruit and vegetables in rural areas, or in more disadvantaged areas within cities). Access to

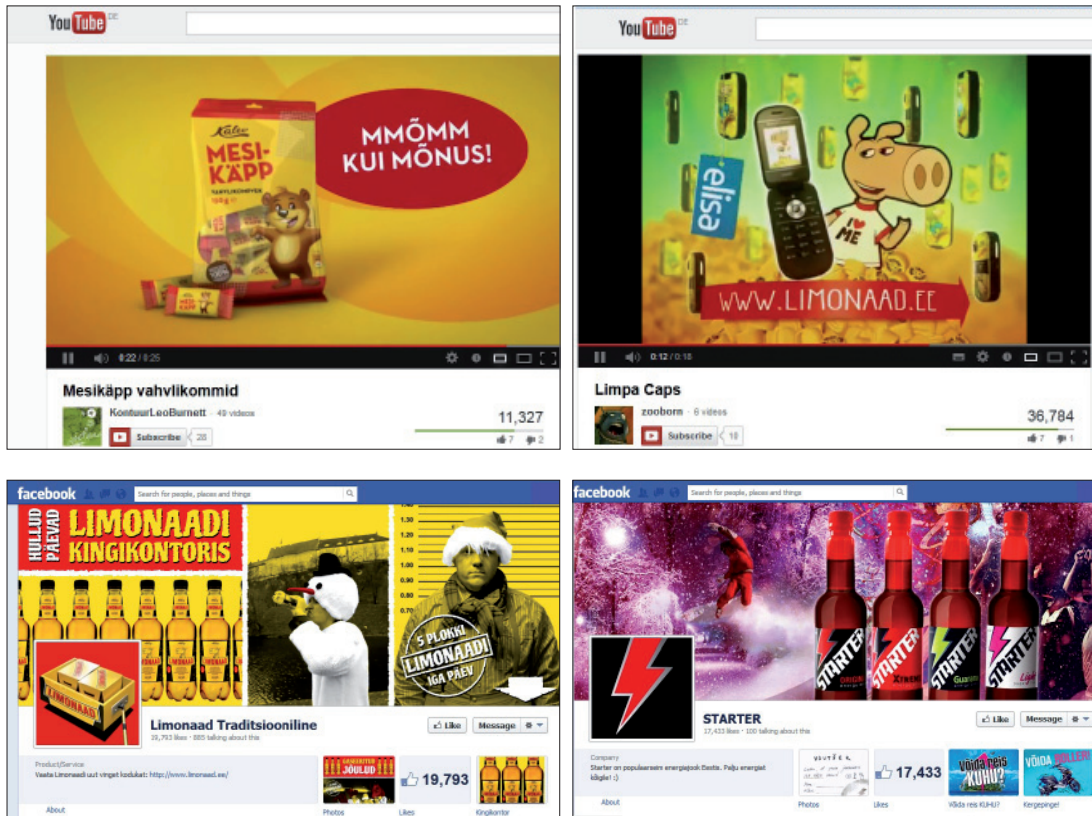
shops and the availability of foods within shops are known to influence food choices.

4.2.2. Marketing practices

As the food market in Estonia has expanded, exposure to advertising of low-quality foods – especially to advertising for fast food or convenience foods that influence viewers' food choices toward high-fat and high-sugar foods – has increased as well. Reviews of evidence on the impact of marketing have found that marketing generates positive beliefs about advertised foods and influences children's food preferences, purchase requests, and consumption (Livingstone & Helsper, 2004; Cairns, Angus & Hastings, 2009). Marketing of processed food, with its “hidden” sugars, salt and excessive saturated fats – especially aimed at children – is contributing to the alarming increase in the prevalence of overweight and obesity among children in Europe (WHO Regional Office for Europe, 2011). Vulnerable socioeconomic groups are more exposed to the marketing of foods and beverages in lower price groups, which may often be fast food or other processed foods of low nutritional quality. There has been a rise in exposure to messages that encourage consumption of foods of low nutritional quality, as food marketing strategies have become more intrusive, targeting online communication channels, including social media platforms, which tend to have an audience of adolescents. In addition, adolescents are more sensitive to persuasive food and beverage marketing techniques (Samuels et al., 2003).

Advertisers and marketers have begun to target the rapidly growing number of children using the Internet with a variety of new interactive techniques integrating advertising and web site content (Montgomery, 2001). Fig. 4.2 shows a few examples of online marketing techniques used by the biggest and longest-standing beverage producer in Estonia (A.Le Coq) and confectionary producer Kalev.

Fig. 4.2. Food and beverage production companies in Estonia target children and adolescents with advertisements using various multimedia channels, including Internet platforms such as Facebook and YouTube



Notes:

TOP LEFT: The YouTube video on the Mesikäpp candy brand by AS Kalev had over 11 000 unique views (18 December 2012), with the top demographic audience group being “Females, 13–17 years” (Kontuur Leo Burnett, 2011).

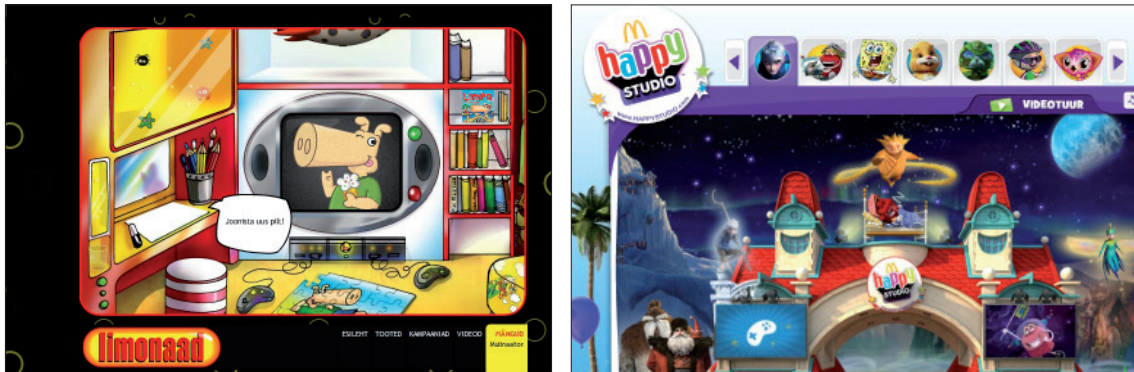
TOP RIGHT: The YouTube video on the Limpa lemonade brand by AS A. Le Coq is a part of the Limpa Caps campaign that invites young viewers to collect lemonade bottle caps to enter a consumer game whereby Limpa mobile phones are offered as prizes. The video had over 36 000 unique views (18 December 2012), with the top demographic audience group being “Females, 13–17 years” (AS A Le Coq, 2008).

BOTTOM LEFT: The Facebook page on the Traditional Lemonade brand by AS A. Le Coq promotes consumer games and had more than 19 000 followers (18 December 2012), with the most popular audience group being 18–24 year-olds (AS A Le Coq, 2012a).

BOTTOM RIGHT: The Facebook page on the Starter energy drink brand from AS Liviko promotes consumer games and had over 17 000 followers (18 December 2012), with the most popular audience group being 18–24 year olds (AS A Le Coq, 2012c).

New technologies and software can collect data about the viewing habits and specific interests of children, without the awareness or consent of either children or their parents. Interactive web sites collect data from children about their interests, habits and preferences, through surveys or quizzes embedded in the games or activities featured on the sites and help build brand loyalty (Samuels et al., 2003). Fig. 4.3 shows some examples of Internet games developed by international fast food producer McDonalds and Estonian beverage producers A. Le Coq.

Fig. 4.3. Food and beverage companies in Estonia target children with special online game environments to help build brand loyalty



Notes:

LEFT: The AS A. Le Coq online “Limpa-land” is targeted at children and offers many online games to help build brand loyalty (AS A Le Coq, 2012b).

RIGHT: The McDonalds online Happy Studio is targeted at children from age 3 years and offers online games that help build brand loyalty (McDonald’s, 2012).

Toys and products with brand logos are being increasingly marketed to preschool children and adolescents to promote brand awareness and loyalty (Samuels et al., 2003). Joint production of products between among media companies, food sellers and toy manufacturers result in children being exposed to a brand in many different places in their day-to-day lives (Kjos, 2002). Fig. 4.4 shows an example of a marketing collaboration between Estonian beverage producer A.Le Coq and cosmetics producer Orto.

Fig. 4.4. Beverage companies in collaboration with other producers target children with product tie-ins to help sell more products

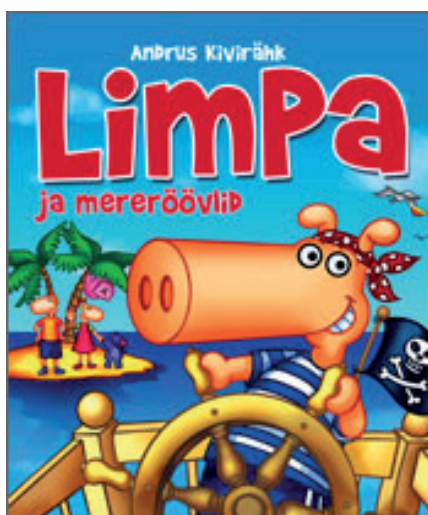


Note:

Estonian cosmetics producer Orto Ltd's body-care line "Pure Limpa" targets children with product tie-ins that include shampoos, shower gels and bath foams with lemonade producer AS A.Le Coq's Limpa character to help sell more products (Orto, 2012).

"Eatertainment" is a marketing concept that is based on food as entertainment, where food products are linked with desired emotional states; for example, McDonalds' campaign slogan: "I'm loving it!" (Samuels et al., 2003). Fig. 4.5 shows how A.Le Coq uses theater plays and story books to help sell their products to children and adolescents.

Fig. 4.5. Estonian beverage producers target children with the "Eatertainment" marketing concept to help build brand loyalty



Notes:

The Estonian lemonade producer AS A.Le Coq targets children with a children's story book (LEFT) and a children's theater play "Limpa and the pirates" (RIGHT), starring their Limpa lemonade brand character, to help build brand loyalty (Varrak, 2012; Ugala Teater, 2012).

Marketing tie-ins with popular movie or TV characters are designed to encourage children to choose – or persuading their parents to buy – foods associated with these characters (Samuels et al., 2003). Fig. 4.6 shows examples from one of the biggest food producers in Estonia, AS Premia Foods, and from A.Le Coq, aiming to attract customers and increase sales.

Fig. 4.6. Estonian food producers target children with product tie-ins using popular children’s cartoon characters to help sell more products



Notes:

Estonian food and beverage producers target children with popular Lotte and Limpa characters on their ice cream packaging (Premia AS), and Angry Birds characters on their Tropic Cola soft drink packaging (AS A. Le Coq), in order to sell more products.

4.3. Differential vulnerability

The same level of exposure to low-quality diet choices may have different effects on different socioeconomic groups, depending on their social, cultural and economic environments and cumulative life-course factors (Blas & Kurup, 2010). Clustering of risk factors in some population groups, such as social exclusion, low income and poor housing conditions may be as important as the individual exposure itself (Blas & Kurup, 2010). Individuals that are educated and knowledgeable about healthy eating are more likely to opt for healthy dietary choices. However, this depends on whether they also have the necessary ability and equipment to apply the knowledge. In addition, time constraints prevent individuals from making healthy diet choices. This may be especially problematic in families with many children.

Adolescents in Estonia living in rural areas and from families with three and more children were more likely not to eat fruit and vegetables in accordance with recommendations, compared with adolescents living in urban areas and from families with one child. This is supported by previous surveys conducted in the Baltic countries, where daily vegetable consumption has been shown to be more common in urban centres than in other areas (Petkeviciene, 2011). These groups may be more vulnerable to a low-quality diet due to a lack of (a) information on healthy diet, (b) time, (c) cooking skills, or (d) the necessary cooking equipment inhibiting the buying and preparation of healthy meals.

4.4. Differential health outcomes

Studies have shown that the daily consumption of fruits and vegetables has a beneficial effect on cholesterol, metabolism and blood pressure and a stimulating effect on the immune system (Kris-Ertherton et al., 2002; Nicolle et al., 2004; Boivin et al., 2009). Students who eat school lunch have been shown to consume less energy from sugar-sweetened beverages than those who do not (Briefel, Wilson & Gleason, 2009). Excess consumption of soft drinks and insufficient milk intake may pose risks in the form of several diseases, such as dental caries, obesity and osteoporosis (Ha et al., 2009). Cross-sectional studies support the fact that children and adolescents who skip meals are more prone to snacking, being less physically active and being overweight and obese (DeJong et al., 2009). Insufficient fruit and vegetable intake is accountable for about 20% of CVD incidence worldwide (World Heart Federation, 2012). A diet that is low in saturated fats, with plenty of fresh fruit and vegetables has been shown to reduce new major cardiac events by 73% (World Heart Federation, 2012). It has been estimated that a universal reduction in dietary intake of sodium – by about 3g of salt per day – would lead to a 50% reduction in the number of people needing treatment for hypertension. The same decrease would lead to a 22% decrease in the number of deaths resulting from strokes and a 16% reduction in the number of deaths from CHD (World Heart Federation, 2012).

The rapid rise of overweight and obesity among adolescents poses a serious public health challenge in Estonia. Since 2002, the prevalence of overweight and obesity among adolescents doubled, reaching 26% among adolescent boys and 17% among adolescent girls by 2010 (Aasvee & Minossenko, 2011). Overweight and obesity at such an age increases the risk of passing the epidemic into adulthood and creating a growing health burden for the next generation. According to the Estonian Health Insurance Fund (EHIF), in 2008 the average life expectancy in Estonia was 74 years, which is currently five years lower than the average life expectancy in the EU (EHIF, 2009). In 2009, 26% of all deaths in Estonia were premature (that is, under the age of 65 years). The main causes of premature deaths in Estonia were CVD (29%) and tumors (24%) (EHIF, 2009). The CVD death rate has decreased during recent years in Estonia. However, according to the EHIF, mortality is still high among the working-age population (EHIF, 2009). Associating risk factors with the population's disease burden shows opportunities for improving the health of the population, if the incidence of the risk factor is successfully reduced, thus reducing its influence on population health. A low-quality diet is a joint risk factor for obesity, CVD and cancer.

Studies on the distribution of overweight and obesity among EU Member States have shown that differences between countries indicate economic development as a factor in the pattern of obesity (Branca, Nikogosian & Lobstein, 2007; Whiting, Unwin & Roglic, 2010). In highly developed countries, low socioeconomic status has been associated with a larger body size, and in moderately and less-developed countries an opposite association has been observed between socioeconomic status and body weight (McClaren, 2007). However, in the case of less developed countries, as incomes increase, the risk of obesity shifts from groups with higher socioeconomic status to those in lower socioeconomic groups.

In Estonia, adolescents who live in Tallinn and adolescents from families with 1–2 children are more likely to be overweight or obese, compared with adolescents from rural areas and from families with three or more children. This may be caused by obesogenic factors that are more prevalent in the urban environment, such as a faster pace of life, a higher level of economic development, sedentary work and recreational activities, and a higher availability of low-quality foods. The economic conditions of urban residents and families with fewer children support the higher consumption of unhealthy non-staple foods. This is supported by similar trends in other developed countries, as obesogenic aspects of globalization have first affected the more wealthy households in urban areas, but this has usually been followed by a spread to lower socioeconomic groups (Song, 2006; Prentice, 2006). In order to prevent the spread of overweight and obesity to more vulnerable socioeconomic groups in Estonia, measures to prevent and counteract obesity among adolescents need to be developed and implemented at national level.

4.5. Differential consequences

According to the EHIF, the primary health care system in Estonia is prepared for preventive activities, but often people only turn to the health system for help when serious health damage has occurred, especially in the case of CVD and malignant tumors (EHIF, 2009). The awareness of the Estonian population is low as regards accessing health specialists in time or in a preventive context in order to solve health problems. People do not habitually visit health care workers for individual health assessments or advice on making healthy life choices. It is believed that the main reason for this is low motivation of patients and health care providers. In 2009, most health information among the population was received verbally from doctors; written materials were received in fewer than 40% of cases (EHIF, 2009). However, 73% of the population reported to be interested in information on healthy lifestyle, diet and disease prevention (EHIF, 2009).

The EHIF data suggest that people in lower socioeconomic groups lead a shorter life, suffer from different health problems and have more constraints in using health care services (EHIF, 2009). Individuals of lower socioeconomic status may have lower levels of health insurance coverage and therefore less access to adequate health care. Furthermore, individuals with lower socioeconomic status may have achieved lower levels of education and often perform jobs without significant health plans and benefits, whereas individuals of higher socioeconomic standing are more likely to be employed in settings that provide health insurance. Socioeconomic and educational factors are also associated with lower health literacy, meaning that individuals in lower socioeconomic groups may have problems obtaining, processing and understanding basic health information (EHIF, 2009).

In conclusion, it is clear that there are differences in the diet of adolescents in Estonia based on socioeconomic determinants. In order to ensure a high-quality diet for adolescents in low socioeconomic groups in Estonia, fruit and vegetables need to be made more available for adolescents in rural areas and among families with three or more children. Healthy

food environments need to be ensured in schools and appropriate marketing practices need to be developed for advertising food and beverages to children. The public health priorities and interventions to help ensure diet equity among adolescents in Estonia are discussed in detail in the following chapter.

5. Public health priorities and interventions

Public health measures that promote healthy eating choices will hopefully support the trends of overweight and obesity among adolescents in Estonia to be reversed and help to prevent the incidence of diet-related diseases in the future. Elements of successful interventions include a combination of policies and population-based programmes, regulation, and concerted action as a part of a coordinated long-term public health strategy (Branca, Nikogosian & Lobstein, 2007). Large-scale modifications of lifestyle require sufficient time for the effects to take place. The effects of the interventions need to be systematically monitored and evaluated.

The following sections deal with public health priorities and interventions that support healthy eating choices among adolescents in lower socioeconomic groups, including ensuring healthy school environments, access to information on healthy eating, availability of fruit and vegetables, and appropriate food marketing practices. Section 5.5 deals with addressing the health outcomes of an unhealthy diet among vulnerable socioeconomic groups.

5.1. Ensuring a healthy food environment in schools

Developing environments and economic measures that promote healthy diet choices will support the trends of overweight and obesity among adolescents to be reversed, as well as obesity-related morbidity and mortality (Kim & Popkin, 2006). Several authors have suggested that economic instruments may be used directly to affect food consumption patterns of populations, and subsidies for foods that promote health is one approach suggested by WHO (Branca, Nikogosian & Lobstein, 2007). Granting subsidies results in behavioural change and sends a strong message about the value of these foods and their impact on health. Research has shown that subsidized healthy meals, as well as fruit and vegetable programmes implemented in schools also decrease the consumption of unhealthy food choices such as sweets and potato crisps among students from lower income groups (Bere et al., 2007). The availability of nutritious meals, fruit, vegetables, milk and water should be ensured in the school environment and the presence of energy-dense foods with high salt, sugar and fat content must be prohibited.

5.1.1. Availability of healthy food choices in schools

Healthy food and eating should be prioritized in the development plans of all schools, since it influences the well-being of children and adolescents, as well as their studying capability and academic performance (Rampersaud, 2009). School health care statistics in Estonia show that the proportion of students eating school lunch is considerably higher (about 90%) among students in year groups one to nine (pupils aged 7–16 years) that are included in the national school lunch subsidy programme, than among students in

year groups 10–12 (pupils aged 16–19 years) (about 65%) that are excluded from the national school lunch subsidy programme (EHIF, 2010). This indicates that subsidies for foods that promote health result in direct positive behavioural changes in the dietary habits among adolescents in Estonia. Furthermore, the school lunch subsidy has been shown to have a strong impact on the dietary habits of adolescents from vulnerable socioeconomic groups. Adolescents from rural areas and children from families with two or more children in Estonia were more likely to eat a hot lunch on every school day. This implies that the state-subsidized and regulated school lunch programme benefits all students included in the programme, and helps to ensure diet equity for economically disadvantaged groups. The best investment at governmental level to directly benefit the well-being of adolescents in lower socioeconomic groups is to ensure a free and healthy school lunch for pupils at state-run schools in all year groups. The results of the analysis from this case study showed that the overall proportion of adolescents who eat fruit and vegetables in accordance with dietary recommendations has increased significantly since the EU School Fruit Programme was implemented in Estonian schools. The successful school lunch, school fruit and school milk subsidy programmes should be continued and expanded to include pupils in all year groups in Estonia.

5.1.2. Prohibition of unhealthy food choices in schools

To ensure a healthy food environment in schools, the availability of low-quality food choices – that is, energy-dense foods of low nutritional quality – should be prohibited in educational environments. A few European countries have already begun regulating the availability of unhealthy food choices in schools. Since 2005, selling soft drinks, chocolates and potato crisps from vending machines is forbidden in schools in France and Great Britain (EPHA, 2007). In 2006, Latvia was the first EU Member State to completely ban the sale of “junk” food in schools and preschools (EPHA, 2006). The ban applies to the sale of foods and drinks that include artificial colours, sweeteners, preservatives and caffeine. It also prohibits the sale of products that include 1.25g/0.5g or more of salt/sodium per 100g of product; namely, potato and corn crisps, salted peanuts and other salty snacks. “Junk” food is replaced by healthier alternatives, such as milk, fruit and nuts (EPHA, 2006). The availability of energy-dense foods of low nutritional quality in the school environment encourages children to reject healthier food choices and impairs overall compliance with nutritional recommendations among adolescents in Estonia. For these reasons, these foods need to be prohibited in schools.

5.1.3. Healthy eating information in schools

In general, school food policies should try to ensure that all nutritional messages in the school environment – direct and indirect, including within the curricula – are consistent and coherent with each other. School curricula should cover various food- and eating-related topics to enable students to acquire the skills necessary for healthy eating habits for life. Information on healthy eating could also be distributed with the support of health care workers in schools and on school health boards.

5.2. Increasing availability of fruit and vegetables

Adolescents living in rural areas or belonging to families with three or more children in Estonia were found to be less likely to eat fruit and vegetables in accordance with nutritional recommendations. A recent survey evaluating the efficiency of the School Fruit Programme in Estonia showed that fruit consumption was more frequent among pupils from schools that were participating in the programme than among those from schools that were not (European Commission, 2012). While the subsidized School Fruit Programme has so far only been implemented among pupils aged 7–10 years, but not among HBSC study participant age groups, its success among younger pupils implies that the programme has potential to increase fruit and vegetable consumption among adolescents from all socioeconomic groups in Estonia if the target group of the programme is expanded. It would be beneficial to examine and develop schemas that increase the availability of high-quality food in rural and remote areas, focusing on regional and remote transport of food and increasing the production of high-quality, locally grown fresh foods that are available to the local community. Estonia has been a member of the EU Food for the Most Deprived programme since 2007, which ensures people belonging to low-income groups – such as single parents, families with at least four children and disabled people – have access to EU-subsidized food aid (PRIA, 2011c). As a similar private sector initiative, the Estonian Food Bank was established in 2010, which helps to ensure that families with economic difficulties – such as families with single parents who are included in the lists of subsistence beneficiaries or belong to aid organizations such as Support Society of Estonian Large Families or the Union of Large Families of Estonia – have access to food aid. In 2010, the Estonian Food Bank distributed about 12 tonnes of food aid to families with economic difficulties (Estonian Food Bank, 2012). Collaboration with the EU Food for the Most Deprived programme and the Estonian Food Bank, facilitating access to food support for people belonging to lower socioeconomic groups could be highly effective in increasing availability of fruit and vegetables among those population groups (single parents, 4-children families, and disabled people).

5.3. Ensuring appropriate marketing practices

Increased exposure to food advertising – especially to commercials for fast food or convenience foods – influences viewers' food choices towards high-fat and high-sugar foods.

Advertising has both immediate and cumulative effects. While immediate effects are relatively easy to demonstrate, long-term exposure is the more likely agent increasing consumption as a consequence of marketing directly to youth (Samuels et al., 2003). Advertising does not only sell specific brands in specific product categories; it also creates viewpoints, values and conceptions about dietary behaviour (Samuels et al., 2003). In order to decrease childrens and adolescents' exposure to messages that encourage consumption of low-quality foods, regulative policy actions should include establishing guidelines for appropriate marketing practices for promotion of foods and beverages

to children and adolescents. Ensuring adequate control of the marketing of foods and beverages to children has been identified as one of the priority measures in the WHO action plan for implementation of the European strategy for the prevention and control of noncommunicable diseases 2012–2016 (WHO Regional Office for Europe, 2011) and in the European charter on counteracting obesity (WHO Regional Office for Europe, 2006a). In order to promote healthier diets among adolescents in Estonia, marketing controls are highly recommended to progressively limit children's and adolescents' exposure to the marketing of low-quality foods with high salt, fat and sugar content, as well as sugar-sweetened beverages.

5.4. Taxation of unhealthy foods

Specific taxation of energy-dense and nutrient-poor, fattening foods have been shown to affect consumption patterns and this approach can be used to improve populations' dietary habits, although care needs to be taken that price changes reduce socioeconomic inequality, rather than increase it (Branca, Nikogosian & Lobstein, 2007). The influence of price changes on the purchasing of food products can be evaluated by means of a price elasticity estimate, which refers to the percentage change in the purchased quantity of or demand for a product, occurring with a 1% change in the price of the product (Andreyeva, Long & Brownell, 2010). Andreyeva et al. (2010) pointed out that in the United States soft drinks have the highest price elasticity estimate and a 10% price increase could lead to an 8–10% reduction in purchases of these beverages; sweets, on the other hand were shown to be inelastic to price changes. This implies that taxation of specific foods may have a restricting effect on the consumption, but this cannot be universally applied to all foods or food components and is dependent on the consumption patterns of the population. Further evidence on the outcomes of targeted food taxation is required, as it is unclear how such policies would actually change peoples' buying habits and the magnitude of any resulting health gain is as yet unknown.

5.5. Addressing the health outcomes of an unhealthy diet

Obesity strongly affects the economic and social development of a population. Overweight and obesity are responsible for up to 6% of health care expenditure in the WHO European Region (WHO Regional Office for Europe, 2006a). In addition, they impose indirect costs (due to loss of life, productivity and income) that are at least two times higher (WHO Regional Office for Europe, 2006a). Adolescents who live in Tallinn and those from families with 1–2 children in Estonia are more likely to be overweight or obese compared with adolescents from rural areas and from families with three or more children. This is supported by similar trends in other developed countries, as obesogenic factors first affect the more wealthy households in urban areas, but this is usually followed by a spread to lower socioeconomic groups (Song, 2006; Prentice, 2006). The obesity epidemic has built up in recent decades as a result of the changing social, economic, cultural and physical environment that triggered dramatic reductions in physical activity and changing dietary

patterns, including increased consumption of energy-dense, nutrient-poor food and beverages in combination with insufficient consumption of fruit and vegetables (WHO Regional Office for Europe, 2006a). A policy framework is needed, linking the main actors, policy tools and settings, to counteract overweight and obesity among adolescents in Estonia. The private sector has the opportunity to play an important role in and take on responsibility for building a healthier environment, as well as for promoting healthy choices in workplaces. The media has an important responsibility to provide information and education, raise awareness and support public health policies in this area. Actions should also be taken at micro and macro levels in various settings, aimed at ensuring a healthy energy balance by stimulating both a healthier diet and physical activity. According to the WHO European action plan for food and nutrition policy 2007–2012 (WHO Regional Office for Europe, 2008) and the European charter on counteracting obesity (WHO, 2006a), the suite of actions functioning as key preventive measures in reversing and preventing obesity among adolescents and reducing the risk of diet-related noncommunicable diseases (NCDs) includes:

- reducing marketing pressure aimed at children;
- ensuring access to and availability of healthier food choices, including fruit and vegetables;
- economic measures that facilitate healthier food choices;
- reducing fat, added sugar and salt content in manufactured products;
- providing healthier foods and nutritional education in schools;
- monitoring and evaluation of, as well as research into diet quality.

In health care, attention should be focused on preventing obesity among adolescents who are already overweight and thus at high risk, and on treating obesity as a disease (WHO Regional Office for Europe, 2006a). Specific actions in this area would include: introducing timely identification and management of overweight and obesity in primary care; providing training for health professionals in the prevention of obesity; and issuing clinical guidance for screening and treatment (WHO Regional Office for Europe, 2006a). Special care should be given to reach out to lower socioeconomic groups, as they might have more problems in obtaining and understanding basic health information (Collins et al., 2002). Inadequate preventative health screenings or delays in diagnostics and treatment may cause higher mortality among individuals of lower socioeconomic status. Stigmatization of or, conversely, praise for obesity should be avoided at any age (WHO Regional Office for Europe, 2006a). Health systems need to be appropriate and effective for all population groups, including disadvantaged people. As stated by Blas & Kurup (2010), equity in health care ideally implies that everyone in need of health care receives it in a form that is beneficial to them, regardless of their social position or other socially determined circumstances.

5.6. Measuring diet quality, food availability and health status

The Estonian Food and Nutrition Database was established by the National Institute for Health Development (NIHD) in 2010 as a tool for national surveillance on nutritional status, food availability and consumption in different age and socioeconomic groups in Estonia (NIHD, 2012b). The aim of the database is to gather and publish food composition and consumption information from population-based surveys conducted in Estonia and to combine national food availability data and related health outcome statistics. It also strives to improve public and private research by enhancing the understanding of the role of nutrition and lifestyle factors in disease development and prevention, as well as to strengthen the evidence base for interventions and policies. The database can be accessed publicly online via the web site of the NIHD (NIHD, 2012a) or directly via the Nutridata web site (NIHD, 2012b).

6. Strengths and limitations

Analysis of the relationships between dietary habits and socioeconomic proxies was based on data from WHO's collaborative, cross-national HBSC survey that has been conducted in Estonia since 1993. A limitation of the analysis in this case study was the absence of reliable socioeconomic indicators of families in Estonia. The main determinant used to establish the socioeconomic status of the family in the HBSC survey is the FAS (Currie et al., 2012). The FAS scale (in HBSC) is composed of four items: number of (1) cars and (2) computers in the family, number of (3) family holidays in the past 12 months and (4) existence of own bedroom (Aasvee & Minossenko, 2011b). The FAS scale was included in the preliminary analysis for the case study; however, it was not significantly connected with any of the selected dietary indicators or weight status. This may be largely due to the fact that the FAS scale is not suitable for the Estonian economic context, or because adolescents from low-income families have been underrepresented in the survey compared with families with higher affluence levels. Therefore, other, more inaccurate indicators that have been used previously in Estonia as proxies for socioeconomic status – such as place of residence and number of children in the family – were used for further analysis in this study. In the future, in order to enable more accurate assessment of socioeconomic status of adolescents and families, it would be beneficial to adjust the FAS scale used in the HBSC survey to comply with the socioeconomic distribution of the population in Estonia. The major complications with using data from the HBSC survey for equity analysis is that behaviours are self-reported, the family affluence questions used are not standardized according to the current nutritional epidemiology tendencies, and it is not possible to weight data for under- or overreporting among adolescents that belong to lower socioeconomic groups. However, the equity analysis approach is relatively innovative and the HBSC study had not yet been adapted to suit the new data analysis needs. Indeed, the HBSC study used has advantages in this context, as it is a unique source of dietary behaviour data and trends among adolescents in the analysed age group in Estonia.

7. Conclusions

The economic, political and social changes in Estonia since the early 2000s have contributed to the improvement of dietary habits among adolescents. However, the majority of adolescents in Estonia still struggle to eat according to nutritional recommendations. About 79% of 11-, 13- and 15-year-olds do not eat vegetables, 70% do not eat fruit, 64% do not drink milk and 55% do not eat fish in accordance with nutritional recommendations. The increasing prevalence of overweight (including obesity) among adolescents poses a serious public health challenge in Estonia.

Overweight and obesity contribute to a large proportion of NCDs, shortening life expectancy and adversely affecting quality of life. Analysis of the dietary habits of adolescents in different socioeconomic groups in Estonia showed that, out of the five selected socioeconomic determinants, the place of residence and the number of children in the family were most associated with diet quality.

The lower consumption of fruit and vegetables among lower socioeconomic groups in Estonia is most likely caused by poor local food environments; that is, there are fewer stores selling affordable fresh fruit and vegetables in rural areas or in more disadvantaged areas within cities. In addition, lower socioeconomic groups are more exposed to the marketing of foods and beverages in lower price groups, which may often be fast food or other processed foods of low nutritional quality. Food subsidy programmes that make healthy meals and food available to pupils in schools have proven to be especially effective in ensuring healthier food choices among adolescents in Estonia.

Public health priorities and interventions that support healthy eating choices among adolescents in lower socioeconomic groups include: ensuring healthy food environments in schools; ensuring availability of fruit and vegetables through existing distribution networks; and developing appropriate marketing practices for food and beverages targeted at children and adolescents.

The obesity epidemic has built up in recent decades as a result of dramatic reductions in physical activity and changing dietary patterns, including increased consumption of energy-dense, nutrient-poor food and beverages in combination with insufficient consumption of fruit and vegetables. A policy framework is needed to link the main actors, policy tools and settings, in order to counteract overweight and obesity among adolescents in Estonia. Specific actions in this area would include: introducing timely identification and management of overweight and obesity in primary care; providing training for health professionals in the prevention of obesity; and issuing clinical guidance for screening and treatment. Special attention should be paid to reaching out to individuals of lower socioeconomic status.

Monitoring and evaluation of and research into diet quality, food availability and health status among the Estonian population should be continued as a supportive measure in reducing diet-related NCDs and aiming to reverse obesity trends among children and adolescents.

8. References and bibliography

8.1. References

- Aasvee K, Maser M (2009). Results of the HBSC (health behavior in school-aged children) studies conducted in the academic years 2001/2002 and 2005/2006 in Estonia. *Estonian Doctor*, 88(6):390–401.
- Aasvee K, Minossenko A (2011a). *Health behavior in school-aged children. Report from the 2009/2010 academic year*. Tallinn, National Institute for Health Development.
- Aasvee K, Minossenko A (2011b). *Health behavior in school-aged children. Tables of the 2005/2006 academic year*. Tallinn, National Institute for Health Development.
- Aasvee K et al. (2007). *Health behavior in school-aged children. Report from the 2005/2006 academic year*. Tallinn, National Institute for Health Development.
- Andreyeva T, Long M, Brownell K (2010). The impact of food prices on consumption: a systematic review of research on the price elasticity of demand for food. *American Journal of Public Health*, 100 (2):216–222.
- AS A Le Coq (2008). Limpa caps [online video]. San Bruno, CA, YouTube (<http://www.youtube.com/watch?v=dX9EdxNA7hE&feature=related>, accessed 18 December 2012).
- AS A Le Coq (2012a). Limonaad traditsiooniline [Traditional lemonade] [web site]. Dublin, Facebook Inc. (<https://www.facebook.com/Limonaad/likes>, accessed 18 December 2012).
- AS A Le Coq (2012b). Limpa-land [web site]. Tartu, AS A Le Coq (<http://www.limonaad.ee/esileht.html>, accessed 18 December 2012).
- AS A Le Coq (2012c). Starter [web site]. Dublin, Facebook Inc. (<https://www.facebook.com/EnergyDrinkStarter>, accessed 18 December 2012).
- Bere E et al. (2007) Free school fruit – sustained effect three years later. *International Journal of Behavioral Nutrition and Physical Activity*, 4:5–6.
- Blas E, Kurup AS (2010). *Equity, social determinants and public health programmes*. Geneva, World Health Organization (http://whqlibdoc.who.int/publications/2010/9789241563970_eng.pdf, accessed 1 November 2012).
- Boivin D et al. (2009). Antiproliferative and antioxidant activities of common vegetables: a comparative study. *Food Chemistry*, 112:374–380.

- Branca F, Nikogosian H, Lobstein T, eds. (2007). *The challenge of obesity in the WHO European Region and the strategies for response*. Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/__data/assets/pdf_file/0010/74746/E90711.pdf, accessed 1 November 2012).
- Briefel RR, Wilson A, Gleason PM (2009). Consumption of low-nutrient, energy-dense foods and beverages at school, home, and other locations among school lunch participants and nonparticipants. *Journal of the American Dietetic Association*, 109 (Suppl. 2):79–90.
- Cairns G, Angus K, Hastings G (2009). *The extent, nature and effects of food promotion to children: a review of the evidence to December 2008*. Geneva, World Health Organization (http://www.who.int/dietphysicalactivity/Evidence_Update_2009.pdf, accessed 23 November 2009).
- Collins K et al. (2002). *Diverse communities, common concerns: assessing health care quality for minority Americans. Findings from the Commonwealth Fund 2001 Health Care Quality Survey*. New York, NY, The Commonwealth Fund.
- CSDH (2008). *Closing the gap in a generation: health equity through action on the social determinants of health. Final report of the Commission on Social Determinants of Health*. Geneva, World Health Organization (http://whqlibdoc.who.int/publications/2008/9789241563703_eng.pdf, accessed 1 November 2012).
- Currie C et al., eds. (2012). *Social determinants of health and well-being among young people. Health behavior in school-aged children (HBSC) study: international report from the 2009/2010 survey*. Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/__data/assets/pdf_file/0007/167281/E96444_part1.pdf, accessed 1 November 2012).
- DeJong CS et al. (2009). Environmental and cognitive correlates of adolescent breakfast consumption. *Preventive Medicine*, 48:372–377.
- Drewnowski A (2004). Obesity and the food environment: dietary energy density and diet costs. *American Journal of Preventive Medicine*, 27:154–162.
- EHIF (2009). *Eesti Haigekassa tervise edendamise ja haiguste ennetamise prioriteetid [The Estonian Health Insurance Fund's priorities in health development and disease prevention]*. Tallinn, Estonian Health Insurance Fund (http://www.haigekassa.ee/uploads/userfiles/enetuse_edenduse_prioriteetid.pdf, accessed 10 September 2012).
- EHIF (2010). *Eesti Haigekassa koolitervishoiu näitajad [Estonian Health Insurance Fund's school health indicator statistics, 2010]* [web site]. Tallinn, Estonian Health Insurance Fund (<http://www.haigekassa.ee/raviasutusele/tervisedendus/kool>, accessed 15 December 2010).

- EPHA (2006). Promotion of healthy food in Latvia's schools [web site]. Brussels, European Public Health Alliance (<http://www.epha.org/a/2350>, accessed 18 March 2011).
- EPHA (2007). Junk food: evolution of the legislation in European countries [web site]. Brussels, European Public Health Alliance (<http://www.epha.org/a/2554>, accessed 18 March 2011).
- Estonian Food Bank (2012). Welcome [web site]. Tallinn, Estonian Food Bank (<http://www.toidupank.ee/?lang=en>, accessed 8 September 2012).
- Estonian Institute of Economic Research (2011). Information on prices [cited June 2011] [web site]. Tallinn, Estonian Institute of Economic Research (<http://www.ki.ee/index.html>, accessed 28 January 2013).
- Estonian Ministry of Justice (2008). Health protection requirements applicable to catering in pre-school child care institutions and schools. *State Gazette*, 7, 81 (<https://www.riigiteataja.ee/akt/12912436>, accessed 5 March 2011).
- European Commission (2012). *Evaluation of the European school fruit scheme in Estonia. Final report*. Luxembourg, European Commission Directorate-General for Agriculture and Rural Development (http://ec.europa.eu/agriculture/evaluation/market-and-income-reports/2012/school-fruit-scheme/fulltext_en.pdf, accessed 1 November 2012).
- French S, Story M, Jeffery R (2001). Environmental influences on eating and physical activity. *Annual Reviews in Public Health*, 22:309–335.
- Gibney MJ et al. (2004). *Public health nutrition*. London, The Nutrition Society and Blackwell.
- Ha E-J et al. (2009). Evaluation of effectiveness of class-based nutrition intervention on changes in soft drink and milk consumption among young adults. *Nutrition Journal*, 8:50.
- Health Protection Inspectorate (2010). *Analysis of school cafeteria menus and diversity of merchandise offered in school cafes in 2009 in Estonia*. Tallinn, Health Protection Inspectorate.
- Kaljula M, Maripuu L, Liubsiene E (2009). *Social inequality and why it matters for the economic and democratic development of Europe and its citizens: post-communist central and eastern Europe in comparative perspective*. Oxford, EUREQUAL (<http://eurequal.politics.ox.ac.uk/papers/eurequal%20desk%20research%20estonia.pdf>, accessed 17 September 2012).
- Kim S, Popkin B (2006). Commentary: understanding the epidemiology of overweight and obesity – a real global public health concern. *International Journal of Epidemiology*, 35(1):60–67.

- Kjos T (2002). Marketers compete fiercely for spending on kids. *Arizona Daily Star*, 15 April: 1.
- Kontuur Leo Burnett (2011). Mesikäpp vahvlikommid [Mesikäpp wafer candy] [online video]. San Bruno, CA, YouTube (<http://www.youtube.com/watch?v=Zc-vpyENKIU>, accessed 18 December 2012).
- Kris-Ertherton PM, et al. (2002). Bioactive compounds in foods: their role in the prevention of cardiovascular disease and cancer. *American Journal of Medicine*, 113(9):71–88.
- Livingstone S, Helsper E (2004). *Advertising foods to children: understanding promotion in the context of children's daily lives*. London, London School of Economics and Political Science Department of Media and Communications (http://194.33.160.59/research/tv/reports/food_ads/appendix2.pdf, accessed 1 November 2012).
- Maser M (2004). *Health behavior in school-aged children. Report from the 2001/2002 academic year*. Tallinn, National Institute for Health Development.
- Mathieson A, Koller T (2006). *WHO/HBSC forum 2006. Addressing the socioeconomic determinants of healthy eating habits and activity levels among adolescents*. Geneva, World Health Organization (http://www.euro.who.int/__data/assets/pdf_file/0005/98231/e89375.pdf, accessed 1 November 2012).
- McClaren L (2007). Socioeconomic status and obesity. *Epidemiologic Reviews*, 29:29–48.
- McDonald's (2012). Happy studio [web site]. London, McDonald's Europe Limited (<http://www.happystudio.com>, accessed 28 January 2013).
- Montgomery KC (2001). Digital kids: the new online children's consumer culture. In: Singer DG, Singer JL, eds. *Handbook of children and the media*. Thousand Oaks, CA, Sage Publications:635–650.
- NIHD (2012a). Health data [web site]. Tallinn, National Institute for Health Development (<http://www.tai.ee/en/health-data/health-statistics-and-health-research-database>, accessed 1 November 2012)
- NIHD (2012b) Toitumise andmekogu [Nutrition databank] [web site]. Tallinn, National Institute for Health Development (<http://www.nutridata.ee/andmekogu/index.action>, accessed 28 January 2013).
- Nicolle C et al. (2004). Health effect of vegetable-based diet: lettuce consumption improves cholesterol metabolism and antioxidant status in the rat. *Clinical Nutrition*, 23(4):605–614.
- Orto (2012). Limpa clean shower gel and bubble bath for kids 300ml [web site]. Tallinn, Orto (http://www.orto.ee/index.php?product_id=188&group_id=54&page=120&action=show_product_details&, accessed 28 January 2013).

- Petkeviciene J (2011). Food habits. In: Prättälä R et al., eds. *Social determinants of health behaviours. Finbalt Health Monitor 1998–2008*. Helsinki, Finnish National Institute for Health and Welfare:48–75.
- Prentice A (2006). The emerging epidemic of obesity in developing countries. *International Journal of Epidemiology*, 35:93–99.
- PRIA (2011a). Koolipiimatoetus [School milk support] [web site]. Tartu, Estonian Agricultural Registers and Information Board (PRIA) (http://www.pria.ee/et/toetused/valdkond/euroopa_liidu_toiduprogrammid/koolipiimatoetus/, accessed 14 August 2011).
- PRIA (2011b). Koolipuuviljatoetus [School fruit support] [web site]. Tartu, Estonian Agricultural Registers and Information Board (PRIA) (http://www.pria.ee/et/toetused/valdkond/euroopa_liidu_toiduprogrammid/koolipuuviljatoetus/, accessed 14 August 2011).
- PRIA (2011c). Toiduabi 2011 [Food aid 2011] [web site]. Tartu, Estonian Agricultural Registers and Information Board (PRIA) (http://www.pria.ee/et/toetused/valdkond/euroopa_liidu_toiduprogrammid/toiduabi/, accessed 17 June 2011).
- Rampersaud GC (2009). Adolescents: update and recommendations for practitioners. *American Journal of Lifestyle Medicine*, 3(2):86–103.
- Samuels S et al. (2003). Food and beverage industry marketing practices aimed at children: developing strategies for preventing obesity and diabetes. Los Angeles, CA, The Californian Endowment (<http://epsl.asu.edu/ceru/Articles/CERU-0311-208-OWI.pdf>, accessed 1 November 2012).
- Shepherd R (1999). Social determinants of food choice. *Proceedings of the Nutrition Society*, 58(4):807–812.
- Song Y (2006). Commentary: varying relation of socioeconomic status with obesity between countries at different stages of development. *International Journal of Epidemiology*, 35:112–113.
- Steingrimsdottir L et al. (2002). Selection of relevant dietary indicators for health. *European Journal of Clinical Nutrition*, 56(Suppl. 2):8–11.
- Strauss R (2000). Childhood obesity and self-esteem. *Pediatrics*, 105(1):15.
- Ugala Teater (2012). Andrus Kivirähk Limpa ja mereröövlid [Andrus Kivirähk Limpa and the pirates] [web site]. Viljandi, Ugala Teater (<http://www.ugala.ee/index.php/repertuaar/pildialbum/lavastused/limpa-ja-mereroeovlid/category/27>, accessed 18 December 2012).

- Ulijaszek S, Koziel S (2007). Nutrition transition and dietary energy availability in eastern Europe after the collapse of communism. *Economics and Human Biology*, 5:359–369.
- Vaask S et al. (2009). *Estonian nutrition recommendations and food-based dietary guidelines for adolescents*. Tallinn, Estonian Society of Nutritional Science and National Institute for Health Development.
- Varrak (2012). LIMPA ja mereröövlid [Limpa and the pirates] [web site]. Tallinn, Varrak (<http://www.varrak.ee/product/714/>, accessed 18 December 2012).
- Whiting D, Unwin N, Roglic G (2010). Diabetes: equity and social determinants. In: Blas E, Kurup AS, eds. *Equity, social determinants and public health programmes*. Geneva, World Health Organization: 77–94 (http://whqlibdoc.who.int/publications/2010/9789241563970_eng.pdf, accessed 1 November 2012).
- WHO (2007). Growth reference 5–19 years [web site]. Geneva, World Health Organization (http://www.who.int/growthref/who2007_bmi_for_age/en/index.html, accessed 1 November 2012).
- WHO Regional Office for Europe (2006a). *European charter on counteracting obesity*. Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/__data/assets/pdf_file/0009/87462/E89567.pdf, accessed 1 November 2012).
- WHO Regional Office for Europe (2008). *European action plan for food and nutrition policy 2007–2012*. Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/__data/assets/pdf_file/0017/74402/E91153.pdf, accessed 1 November 2012).
- WHO Regional Office for Europe (2011). *Action plan for implementation of the European strategy for the prevention and control of noncommunicable diseases 2012–2016*. Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/__data/assets/pdf_file/0003/147729/wd12E_NCDs_111360_revision.pdf, accessed 1 November 2012).
- World Heart Federation (2012). Cardiovascular disease risk factors: diet [web site]. Geneva, World Heart Federation (<http://www.world-heart-federation.org/>, accessed 23 July 2012).

8.2. Bibliography

- Åberg MA et al. (2009). Fish intake of Swedish male adolescents is a predictor of cognitive performance. *Acta Paediatrica/Acta Paediatrica*, 98:555–560.
- Bruss M et al. (2007). Ethnicity and diet of children: development of culturally sensitive measures. *Health Education and Behavior*, 34(5):735–747.

- Celebuski C, Farris E, Burns S (2000). *Nutrition education in public elementary school classrooms*. Washington, DC, United States Department of Education National Center for Education Statistics.
- Coleman G et al. (2011). *What food and nutrition information and training do parents want and how would they like to receive it?* Madison, WI, Wisconsin University of Wisconsin Nutrition Education Program (<http://www.uwex.edu/ces/wnep/specialist/nfl/mmpdfs/1102.pdf#page=3>, accessed 30 May 2011).
- Conklin MT, Lambert LG, Anderson JB (2002). How long does it take students to eat lunch? A summary of three studies. *Journal of Child Nutrition and Management*, 1:1–6.
- Cooke L, Wardle J (2005). Age and gender differences in children's food preferences. *British Journal of Nutrition*, 93:741–746.
- Crespo C et al. (2001). Television watching, energy intake, and obesity in US children: results from the third national health and nutrition examination survey, 1988–1994. *Archives of Pediatric and Adolescent Medicine*, 155(3):360–365.
- Dauchet L et al. (2006). Fruit and vegetable consumption and risk of coronary heart disease: a meta-analysis of cohort studies. *Journal of Nutrition*, 136(10):2588–2593.
- De Lauzon B, Charles MA (2004). Obésité de l'enfant: rôle des facteurs socio-économiques. *Objectif Nutrition*, 73:1–12.
- Dietz WH, Gortmaker SL (1985). Do we fatten our children at the television set? Obesity and television viewing in children and adolescents. *Pediatrics*, 75:807–812.
- EUFIC. The basics 06/2006. Child and adolescent nutrition [web site]. Brussels, European Food Information Council (<http://www.eufic.org/article/en/page/BARCHIVE/expid/basics-child-adolescent-nutrition/>, accessed 10 January 2011).
- Ferro-Luzzi A, James WTP (1997). Diet and health. In: European Parliament. *Nutrition in Europe*. Brussels, European Union Directorate-General for Research STOA (PE Number 166.481):2–38.
- Forshee RA, Storey ML (2003). Total beverage consumption and beverage choices among children and adolescents. *International Journal of Food Science and Nutrition*, 54(4):297–307.
- Frary CD, Johnson RK, Wang MQ (2004). Children and adolescents' choices of foods and beverages high in added sugars are associated with intakes of key nutrients and food groups. *Journal of Adolescent Health*, 34(1):56–63.
- French S (2003). Pricing effects on food choices. *Journal of Nutrition*, 133:8415–8435.

- Gidding SS et al. (2005). Dietary recommendations for children and adolescents. A guide for practitioners: consensus statement from the American Heart Association. *Circulation*, 112:2061–2075.
- Harnack L, Stang J, Story M (1999). Soft drink consumption among US children and adolescents: nutritional consequences. *Journal of the American Dietetic Association*, 99:436–434.
- Kalkwarf HJ, Khoury JC, Lanphear BP (2003). Milk intake during childhood and adolescence, adult bone density, and osteoporotic fractures in US women. *American Journal of Clinical Nutrition*, 77:257–265.
- Kelly B et al. (2011). Television food advertising to children: a global perspective. *American Journal of Public Health*, 100(9):1730–1736.
- Klumbiene J et al. (2004). Sociodemographic and health behaviour factors associated with obesity in adult populations in Estonia, Finland and Lithuania. *European Journal of Public Health*, 14:390–394.
- Kontogianni MD, Yiannakouris N (2009). Diet and bone health – the perspective of dietary pattern analysis. *European Musculoskeletal Review*, 4(1):73–74.
- Kontogianni MD et al. (2009). Association between dietary patterns and indices of bone mass in a sample of Mediterranean women. *Nutrition*, 25(2):165–171.
- Maser M et al. (2009). *Estonian nutrition recommendations for children and adolescents*. Tallinn, Estonian Society of Nutritional Science and National Institute for Health Development.
- Moore LL et al. (2008). Effects of average childhood dairy intake on adolescent bone health. *Journal of Pediatrics*, 153:667–673.
- Niedhammer I et al. (2000). Validity of self-reported weight and height in the French GAZEL cohort. *International Journal of Obesity and Related Metabolic Disorders*, 24(9):1111–1118.
- Nissinen K et al. (2009). Sweets and sugar-sweetened soft drink intake in childhood in relation to adult BMI and overweight. The cardiovascular risk in young Finns study. *Public Health Nutrition*, 12(11):2018–2026.
- Padilla L (2001). *Fruit consumption: dietary health and policy implications. Selected paper presented at AAEA annual meetings, Chicago, IL, 5–8 August*. Milwaukee, WI, Agricultural and Applied Economics Association (<http://ageconsearch.umn.edu/bitstream/20538/1/sp01pa03.pdf>, accessed 1 November 2012).
- Prell H, Berg C, Jonsson L (2002). Why don't adolescents eat fish? Factors influencing fish consumption in school. *Scandinavian Journal of Nutrition*, 46(4):184–191.

- Rolls BJ (1988). Food beliefs and food choices in adolescents. *Medical Journal of Australia*, 148:9–13.
- Shields M (2005). Measured obesity. Overweight Canadian children and adolescents. In: Statistics Canada. *Nutrition: findings from the Canadian community health survey. Issue no. 1*. Ottawa, ON, Statistics Canada (Catalogue No. 82-620-MWE) (http://s3.amazonaws.com/zanran_storage/www.calgaryhealthregion.ca/ContentPages/18451313.pdf, accessed 1 November 2012).
- Sidhu KS (2003). Health benefits and potential risks related to consumption of fish or fish oil. *Regulatory Toxicology and Pharmacology*, 38:336–344.
- Statistics Estonia (2011). Population figure and composition [online database]. Tallinn, StatisticsEstonia(http://pub.stat.ee/px-web.2001/I_Databas/Population/01Population_indicators_and_composition/04Population_figure_and_composition/04Population_figure_and_composition.asp, accessed 1 November 2012).
- TNS EMOR (2006). *Children's expenditure survey*. Tallinn, TNS EMOR.
- TNS EMOR (2011). *Contextual analysis on children's pocket money survey*. Tallinn, TNS EMOR.
- Velde SJ et al. (2011). Dairy intake from adolescence into adulthood is not associated with being overweight and metabolic syndrome in adulthood: the Amsterdam growth and health longitudinal study. *Journal of Human Nutrition and Dietetics*, 24(3):233–244.
- Vereecken CA et al. (2005). The relative influence of individual and contextual socioeconomic status on consumption of fruit and soft drinks among adolescents in Europe. *European Journal of Public Health*, 15:224–232.
- Weaver CM (2000). The growing years and prevention of osteoporosis in later life. *Proceedings of the Nutrition Society*, 59:303–306.
- Whiting SJ et al. (2004). Factors that affect bone mineral accrual in the adolescent growth spurt. *Journal of Nutrition*, 134:696–700.
- WHO Regional Office for Europe (2006b). *Food and nutrition policy for schools. A tool for the development of school nutrition programmes in the European Region*. Copenhagen, WHO Regional Office for Europe (http://www.schoolsforhealth.eu/upload/WHO_tool_development_nutrition_program.pdf, accessed 1 November 2012).
- Wolf AM (1998). What is the economic case for treating obesity? *Obesity Research*, 6(Suppl. 1):2–7.
- Wolf AM, Colditz, GA (1998). Current estimates of the economic cost of obesity in the United States. *Obesity Research*, 6(2):97–106.

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

Member States

Albania
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Georgia
Germany
Greece
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Iceland
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