National Reports

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11.1 Austria¹

Data on energy and nutrient intake in Austria were obtained from the Austrian Study on Nutritional Status that has been conducted on a regular basis since 1991. It includes several representative substudies focusing on different population groups or special aspects such as physical activity and fluid intake. Follow-up studies in 2007/2008 provided information about long-term trends of food and nutrient intake. The results of these surveys were published in March 2009 in the Austrian Nutrition Report 2008. An overview of the collectives and methods of the partial surveys can be seen in table 11.1. Slight differences from the respective data in the main report may arise from the use of diverging age groups in the present overview.

Prevalence of Overweight and Other Health Indicators

Overweight is a common health issue in Austria. Thus, in 19% of schoolchildren aged 6 to 15 years, body weight exceeds the recommended ranges according to Kromeyer-Hauschild et al. [2001]. Eight percent are obese. In high school students, prevalence is slightly lower (6%), but reaches 16% in adolescents. Overweight becomes more frequent with increasing age: 31% of 18- to 64-year-olds are overweight and 11% obese. As many as 40% of the elderly aged between 65 and 100 years have a body mass index (BMI) above the reference level. However, in this latter group, 10% are underweight. 26% of pregnant women are overweight or obese (see table 11.2).

A trend of increasing overweight can be observed across all age groups and for both genders. The number of obese male adults has doubled since 2003 (from 6 to 13%). Men and boys of all ages are more often overweight than women and girls. The previously observed West-to-East upward gradient is still apparent.

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Table 11.1. Studies and methods used for the assessment of nutritional status of the Austrian population (sample size is shown)

	Nutrition surveys	Anthropometry	Biochemical analyses	Eating behavior
Schoolchildren (6–15 years)	780 ^a	984 ^c	–	–
High school attendants (14–19 years)*	208 ^b	398 ^d	–	–
Apprentices (14–19 years)*	1,990 ^b	2,823 ^d	143*	–
Adults (18–65 years)	2,123 ^b	2,310 ^d	133*	823
Adults (18–65 years)	459 ^e	–	–	–
Adults (18–65 years)	288 ^f	–	–	–
Adults (18–65 years)	719 ^g	–	–	–
Adults (>55 years)	423 ^a	816 ^c	102 ^h	–
Pregnant women	426 ^b	479 ^d	133*	–

* Viennese sample (does not represent all of Austria).

^a 3-day food protocol (estimate of food intake).

^b 24-hour recall.

^c Measured data of body height and weight.

^d Self-reported body height and weight (pooled data from the Adults' subsamples 18–65 years).

^e 1-day-protocol of fluid intake (ÖSES.aqa07).

^f Questionnaire for the assessment of nutrient intake from supplements (ÖSES.nem07).

^g Questionnaire for the assessment of physical activity (ÖSES.pal07).

^h Sample from the Burgenland (does not represent all of Austria).

The analysis of plasma lipid profiles in a sample of 102 elderly aged >70 years from the eastern region of Austria (Burgenland) of Burgenland showed that most values were within the reference levels with the exception of total cholesterol in men and 70- to 75-year-old women as well as LDL cholesterol.

Hypertension is another common health risk. The Austrian Health Survey based on personal interviews revealed that 21.3% of Austrians over 15 years have a high blood pressure and as expected, prevalence increases with age. As for overweight, occurrence is higher in the eastern than in the western regions [Klimont et al., 2007].

Table 11.2. Body weight distribution in the Austrian **elderly** and **pregnant women**

	BMI categories according to WHO 2003 (prevalence in %)			
	underweight	normal weight	overweight	obesity
Elderly ^{a,c}			overweight	
Men	7	54	40	
Women	12	48	40	
65–74 years	9	51	40	
75–84 years	10	57	33	
>84 years	18	51	31	
Pregnant women ^b	8	66	16	10
<25 years	15	62	16	7
25–35 years	6	67	16	11
>35 years	9	64	17	10

^a Calculated from measured data.

^b Calculated from self-reported data.

^c Categories for subjects aged >65 years according to National Research Council [NRC, 1989]: underweight: BMI <24 kg/m², normal weight BMI 24–29 kg/m², overweight BMI >29 kg/m².

Frequently associated with overweight, diabetes mellitus affects 5.9% of Austrians. Again, the prevalence rises with the age of the subjects, reaching 18.6 and 22.6% in men and women over 75 years, respectively [Klimont et al., 2007]. Physical activity contributes significantly to health and the prevention and elimination of overweight. Using the International Physical Activity Questionnaire (IPAQ) on a sample of 719 Austrian adults, an average physical activity level (PAL) of 1.64 was found. Men reached a mean PAL of 1.71, women of 1.57. Especially young women showed lower levels and thus are at a higher risk for diseases associated with a sedentary lifestyle. A PAL of 1.7, as recommended by the World Health Organization, was achieved by 53% of the participating men, but only 23% of the women.

Energy and Nutrient Intake

In all age groups but women aged >84 years, mean energy intake of Austrians was below the recommended level based on a moderate PAL [D-A-CH, 2000]. However, with regard to the low PAL found in adults and the high prevalence of overweight, energy intake must be considered sufficient or even excessive.

This can also be said of protein intake which was within or slightly above the recommended levels in all groups. Thus, in schoolchildren it accounted for 14–15% of total energy intake (E%), 14–16%E in adolescents, 15 and 17%E in adult women and men, respectively, and 15%E in elderly of both genders. Recommended levels for

Table 11.3. Mean daily intake of **PUFA** in Austrians by gender and age

	Schoolchildren (6–15 years)		Younger adults 18–64 years		Elderly >64 years		D-A-CH, 2000
	m	f	m	f	m	f	
LA (n–6-FA), E%	5.4	5.6	7	7	7	6	2.5
ALA (n–3-FA), E%	0.5	0.5	0.6	0.6	0.6	0.6	0.5
AA (n–6), mg	159	132	276	216	196	179	–
EPA (n–3), mg	35	28	90	71	62	62	–
DHA (n–6), mg	98	82	190	180	135	157	–

LA = Linoleic acid; ALA = α -linolenic acid; AA = arachidonic acid; EPA = eicosapentaenoic acid; DHA = docosahexaenoic acid.

carbohydrate intake ($\geq 50\%$ E) were only achieved by schoolchildren, in whom they supplied 50–51 and 51–52%E for boys and girls, respectively. In all other groups, carbohydrate intake was too low (46–48%E in adolescents, 46 and 43%E in adult women and men, 46 and 41%E in elderly women and men, respectively). The contribution of added sugar was generally rather high with highest levels found in children (16–18%E). In elderly, sucrose consumption was higher in women and in the eldest group of men. While values also encompass natural sources of monosaccharides like fruit, a high consumption of isolated sugar can nevertheless be assumed from the rather low intake of fruit in Austrian children. Dietary fiber intake was below the recommended levels as well.

In turn, fat intake was too high. Only in schoolchildren was it within the national D-A-CH recommendations for all age subgroups (up to 35%E), supplying 33–35%E. In the other age groups, it was $\geq 37\%$ E with the highest level reached by men >84 years (43%E). Fat quality was not optimal either, with saturated fatty acids providing more than the allotted 10%E (from 14%E in schoolchildren and adult men to 20%E in male adolescents). Intake of polyunsaturated (5–8%E) and monounsaturated fatty acids (11–14%E) did not reach the levels recommended for cardiovascular health and therefore higher intake should be encouraged. Furthermore, while D-A-CH reference values were reached for both fatty acid classes, this was largely accounted for by n–6 fatty acids (mainly LA) that exceeded the recommendation of 2.5 E%, while n–3 fatty acids (ALA) were consumed to a lesser extent (table 11.3). Elderly men between 65 and 84 years showed the highest alcohol consumption compared to the other age groups. Cholesterol intake exceeded the allotted level in male adolescents and adults as well as elderly of both genders. It was highest in men >84 years (433 mg).

Table 11.4. Overview of **critical micronutrients** in the Austrian population

Critical in:	Micronutrients
Whole population	folate equivalents, vitamin D, calcium, too high intake of sodium
School children (6–15 years)	vitamin A, vitamin B ₁ , vitamin B ₂ ^a , vitamin B ₆ ^b , iodine, iron, magnesium ^a , potassium ^{b†} , zinc ^{*†}
Women before menopause	iron
Pregnant women	vitamin B ₁ [*] , vitamin B ₂ [*] , vitamin B ₆ , iodine, zinc [*]
Elderly (55–84 years)	vitamin A [†] , vitamin B ₁ ^{†c} , vitamin B ₆ ^{*†} , magnesium

* Marginal; † female population only; † male population only.

^a 10–15 years only; ^b 13–15 years only; ^c 75–84 years only

Vitamins

Vitamin D and folate equivalents must be considered the most critical vitamins in Austrians. Considering the sun intensity in Austria, the low vitamin D intake is probably insufficient to assure an optimal status particularly during wintertime. Folate equivalent intake was below the recommended 400 µg/day in all age groups. With the important role of folate in fetal development, this is of particular concern in women of child-bearing age, but also in elderly in whom folate deficiency has been associated with cognitive deterioration [Moretti et al., 2004].

Overall, intake of the other vitamins was satisfying in adults. The average diet of Austrian children aged >10 years did not provide the estimated average requirements of vitamin E. Suboptimal supplies were also observed for vitamin A, thiamine, riboflavin and vitamin B₆ for both genders in the older age groups. Vitamin E intake was also suboptimal in adolescents. Adolescents (apprentices) showed a low intake of β-carotene and a suboptimal supply of vitamin C, suggesting a modest consumption of fruit and vegetables, also supported by the rather low potassium intake of female apprentices. In elderly, intake of vitamin A, thiamine, riboflavin and vitamin B₆ did not meet the recommendations in some age groups (men or women; table 11.4).

Minerals

Across all age groups, calcium intake was below the, albeit high, D-A-CH recommendations. In adolescent girls and adult premenopausal women, iron intakes were too low to meet the higher requirements due to menstrual blood loss. Magnesium intake was below the recommended levels in children >10 years, in adolescents, adult women <25 years and elderly of all age groups and both genders. The intake should

thus be improved to assure an optimal supply. A tendency to low zinc intakes was apparent in men between 75 and 84 years. However, intake of other minerals was satisfying in adult and elderly Austrians, but too low in children aged >10 years. Intake of iodine, a critical nutrient in Alpine regions, did not reach the national recommendation despite a certain improvement since the last report. Use of iodized salt was assumed for the calculation of the intake levels.

Trends in Nutrition

Compared to the previous report, intakes of energy declined in all age groups, while macronutrients showed no major changes. In schoolchildren, cholesterol intake was lower, as were intakes of many vitamins and minerals, particularly in the older age subgroups. In adults, a slight increase was seen for dietary fiber intake, slight decreases for the intake of total fat, saturated fatty acids and cholesterol. Intake of vitamin E improved, but decreases occurred for most other vitamins. This was particularly the case for vitamin D and folate equivalents. Declines were also observed for calcium and iron in particular and, to a lesser degree, for magnesium, zinc and, in men, for potassium. Elderly showed lower intakes of dietary fiber, but higher ones of cholesterol and alcohol. Intake of most vitamins and minerals was also lower with the exception of vitamin C, E and iodine. Thus, despite some favorable trends, average nutrition of Austrian adults leaves room for improvement.

A survey on supplement use in 282 Austrian adults shows that supplements can contribute significantly to nutrient supply. They were regularly consumed by 39% of the participants and, in the case of vitamin A, D, folic acid and niacin, provided on average 100% of the daily recommendation. Although the upper level of tolerable intake was not exceeded in any of the subjects, a tighter control might be advisable, at least for micronutrients with a narrow safety margin. Another point is the gratuitous supplementation of micronutrients already contained in sufficient amounts in the diet as exemplified by vitamin C being the most commonly supplemented nutrient.

Nutritional Status of Some Austrian Population Groups

Nutritional status analyses performed in a subsample of vocational school attendants confirmed the low intake of folate, β -carotene, vitamin D and vitamin E as well as riboflavin. Deficiencies were also found for vitamin B₁, B₆ and B₁₂. Status of calcium, zinc and, for the female subjects, iron was also suboptimal. In turn, only 91% of male adolescents showed a sufficient magnesium status in contrast to 99% of their female counterparts (fig. 11.1).

Analysis of plasma levels of vitamin B₆, B₁₂ and folate in a subsample of 102 elderly (45 men and 57 women) from the eastern region of Austria (Burgenland) showed a high prevalence of inadequate status for vitamin B₆ (29% marginal, 24% markedly inadequate) and for B₁₂ (32% inadequate) and a lower one for folate (10% inadequate)

Fig. 11.1. Mineral status of Austrian **adolescent** vocational school attendants (n = 143; 14–19 years). Results are given as percentage of analyzed subjects with adequate, deficient, or markedly deficient status. Calcium and magnesium were determined in urine, using an ion-selective electrode; iron and zinc in serum using photometry and atomic absorption spectrometry, respectively.

(see fig. 11.2). Interestingly, intake was much more insufficient for the latter than for vitamin B₆, and even above the recommended level for vitamin B₁₂, implying that status not always correlates with intake.

Focus on Pregnant Women

Mean energy intake of Austrian pregnant women was below the recommended level. However, considering the BMI distribution of the sample and the average gestational weight gain, energy supply appears sufficient. Intake of protein and fat was slightly above the recommended levels (16 and 36%E, respectively), with saturated fatty acids accounting on average for 16%E in all age groups. Intake of PUFA was within the recommended range, but in light of the role of n-3 fatty acids for fetal development, intake of these latter should be optimized. Carbohydrate intake was lower than recommended (47%E), and consumption of starchy fiber-rich foods should be encouraged considering the already high sucrose and low dietary fiber consumption.

Mean intake of vitamin D and folate was below the recommendations (table 11.5), and especially the latter must be considered a risk nutrient in pregnant women. The

Fig. 11.2. Status of vitamins B₆, B₁₂ and folate in **elderly** from the eastern region of Austria (Burgenland) (Eastern Austria) (n = 102; 45 men, mean age 75 ± 4; 57 women, mean age 76 ± 4). Percentage of subjects with adequate and inadequate status by age and gender. Status was evaluated through content in the erythrocytes by RIA and photometrically [Fabian et al., 2009].

Table 11.5. Critical micronutrients in Austrian pregnant women: mean daily intake

	Total	<25 years	25–35 years	>35 years	D-A-CH
Vitamin D, µg	2.5	2.1	2.6	3.3	10
Thiamine, mg	1.1	1.1	1.1	1.3	1.2
Riboflavin, mg	1.4	1.3	1.5	1.6	1.5
Vitamin B ₆ , mg	1.5	1.4	1.5	1.7	1.9
Folate ¹ , µg	234	209	232	270	600
Calcium, mg	919	798	919	1,078	1000
Magnesium, mg	322	273	321	374	310
Iron, mg	12.6	11.3	12.5	15.0	30
Iodine, µg	186	176	184	213	230

¹ Folate equivalent (= 1 µg food folate = 0.5 µg folic acid (PGA) = 0.6 µg folic acid taken with meals).

D-A-CH recommendations were not met for thiamine and vitamin B₆ as well as for riboflavin in women <25 years. Iron and, for younger women, calcium were the main critical minerals. Especially younger women showed magnesium and iodine intakes below the higher levels recommended during pregnancy.

Blood analyses in a Viennese sample of 113 pregnant women showed a high prevalence of vitamin B₆, folate and iron deficiency. Vitamin D levels were also low in many women albeit to a lesser degree. Zinc status was also suboptimal despite a mean intake within the recommended range.

11.2 Belgium²

Introduction

Worldwide non-communicable diseases (NCD) such as cardiovascular diseases (CVD), cancer, diabetes and obesity have been increasingly jeopardizing overall public health. In Belgium, deaths attributable to NCD make 88.7% of all deaths whereas in Europe this is 76.6% [WHO, 2004]. In Belgium, the largest contributors to these deaths were malignant neoplasms and CVD, respectively 30.8 and 43.1% [WHO,

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Table 11.6. Studies from Belgium included in the ENHR 2009

Survey	Study population	Age	n	Year(s) of the study	Supplied nutrition and health indicators
<i>National level</i>					
Food Consumption Survey ¹ (FCS)	Adolescents and adults	>15 years	3,249	2004	Health indicators (<i>self-reported anthropometry, self-reported BMI</i>) Nutrition indicators (<i>energy and nutrient intake</i>)
Health Interview Survey ² (HIS)	Belgian population	All ages	12,945	2004	Health indicators (<i>smoking, alcohol consumption, measured BMI and measured anthropometry</i>)
<i>Regional level: Flanders</i>					
Flemish Growth Study ³ (FGS)	Children and adolescents	0–20 years	18,000	2002–2004	Health indicators (<i>measured anthropometry and measured BMI</i>)
¹ De Vriese et al., 2006. ² Bayingana et al., 2006. ³ Roelants et al., 2009.					

2004]. In addition, NCD attribute 86.8% to the total loss of disability-adjusted life years in Belgium, which is similar to the prevalence seen in Europe, 85.7%. The associated burden of NCD is consequently high in Belgium. As a large amount of these disability-adjusted life years are lost due to nutrition or unhealthy lifestyle [Murray and Lopez, 1996], nutritional information provides policymakers the opportunity to develop focused and efficient strategies for preventive actions. However, out of the first *European Nutrition and Health Report 2004* (ENHR 2004) appeared that Belgium was one of the few countries where no such up-to-date national epidemiologic data were available [Elmadfa et al., 2004].

The Belgian government acknowledged this need and a first National Food Consumption Survey (FCS) was organized in 2004. It was conducted, amongst other reasons, to obtain more recent data regarding nutrient and energy intake of the Belgian population (>15 years old) at the individual level and to enable the identification of subgroups at risk within the Belgian population. The FCS together with the Health Interview Survey (HIS) were the two national surveys that provided national data on the nutrition and health indicators identified within the current *European Nutrition and Health Report 2009* (ENHR 2009). In addition to these national surveys, published research provided information on health indicators for children and adolescents of high quality at regional level, i.e. Flanders [Roelants et al., 2009]. In

table 11.6 an overview is given of the studies that were reported in the ENHR 2009. This national report will focus specifically on the methodology of each study that was included for Belgium, since the main nutrition and health indicators are reported in the main part of the ENHR 2009.

Methodology of Surveys in Belgium

Methodology of the Belgian Food Consumption Survey (FCS)

The FCS provided nutrient intake and self-reported anthropometry and BMI for the Belgian population in the ENHR 2009 [De Vriese et al., 2006]. The FCS started in 2004 and the first results were presented in 2006. The overall study design of the FCS was mainly based on the recommendations of the European Food Consumption Survey Method group [Brussaard et al., 2002a, 2002b]. Dietary intake was assessed by a repeated non-consecutive 24-hour recall. An adapted Belgian version of EPIC soft was used to process the data [Slimani and Valsta, 2002]. The fieldwork was spread over 1 year and the 24-hour recalls were distributed equally over the 7 days of the week [De Vriese et al., 2005], in order to take into account the effect of the week day and the different season. To obtain an estimate of the habitual dietary intake at group level, the software package C-side was used [Dodd, 1996; Iowa State University, 1996]. The main food composition database used in the FCS was the NUBEL brands databank [2005] which was updated in April 2005. Since this databank was not supplying all the information needed for each food, additional information was retrieved from other sources, in particular the Belgian Food Composition Table of the Institut Paul Lambin (IPL), the Dutch NEVO-table and the British table of McCance and Widdowson's [De Vriese et al., 2006]. Underreporters were identified based on the cut-offs of Goldberg [Goldberg et al., 1991; Black, 2000]. Using these cut-offs, 20% of the population were identified as underreporters. The number of underreporters was higher among females (26%) than among males (14%) [De Vriese et al., 2006]. When using the cut-off value of Goldberg for group means, 15% were underreporting their energy intake. When compared between the different regions, it was found that underreporting was higher in Wallonia and Brussels (17%) than in Flanders (14%) [De Vriese et al., 2006].

The target population of the FCS was all individuals aged 15 years or older registered in the National Population Register in Belgium. People who are not incorporated in this register such as homeless people, people living in institutions or prisons, etc. were therefore automatically excluded from the survey. The sample was stratified (probability proportionate to size) per region, province and community and the households were used as sample unit. The sample was also stratified according to predefined age groups (15–18, 19–59, 60–74, >75 years) and gender. In total, a sample of 3,249 people (1,623 females and 1,626 males) of all inhabitants of Belgium was selected [De Vriese et al., 2006]. The participation rate was 42% [De Vriese et al.,

2005]. Differences in the sample size were addressed by using weighing factors when analyzing the results [De Vriese et al., 2005].

Methodology of the Belgian Health Interview Survey

The HIS provided the health indicators (smoking, alcohol consumption, measured BMI and anthropometry) for the Belgian population in the ENHR 2009 [Bayingana et al., 2006]. The HIS started in 2004 and results were presented in 2006. The objective of this survey was, amongst others, to estimate the prevalence and distribution of health indicators and to identify health problems among the Belgian population. The target population was the Belgian population registered in the National Register of Belgium and therefore homeless, illegal people, persons who were staying in an institution (except for homes for the elderly) or were part of a religious movement, or were in prison were excluded from the survey. The sample was stratified per region, province and community. The participants were selected probability proportionate to size. The sampling method was adapted so that 1,250 additional individuals of 65 years and older were considered. In total, 12,945 persons (of which 3,515 older than 65 years) took part in this study, of which 4,513 interviews were in Flanders, 4,992 interviews were in Wallonia and 3,440 interviews were in Brussels. The results provided a representative sample of the population. Out of all the households contacted, 61.4% agreed to participate in the questionnaire.

Methodology of the Flemish Growth Study

The Flemish Growth Study (FGS) was the first large-scale growth survey in Belgium [Roelants et al., 2009]. It is however only representative for Flanders, the northern region in Belgium. The study aimed characterization of Flemish growth curves. The results of this study provided the health indicators (BMI from measured data and measured anthropometry) of children and adolescents for Flanders in the ENHR 2009. An initial cross-sectional sample of 18,050 subjects aged 0–25 years was selected and measured between September 2002 and June 2004. The following groups were excluded from analysis: (i) children of non-Belgian origin (having no parent of Belgian or north western European origin (France, Luxembourg, Germany, The Netherlands, Austria, the UK, Denmark, Sweden or Norway)), (ii) children with known growth disorders, severe chronic diseases or children that were on medication that might affect growth, and (iii) children with an uncertain origin or health status. In addition, children that were born earlier than 37 weeks of gestational age were excluded as well from the analysis; but low birth weight was not an exclusion criterion. After adapting these criteria to the total sample, 15,989 subjects (7,859 boys and 8,130 girls) were included in the analysis. The subjects were recruited in different settings according to age as shown in table 11.7.

Table 11.7. Settings per age category for the Flemish Growth Study

Subjects	Time period	Setting
0–3 years old	September 2002–July 2004	49 well-baby clinics 25 accredited day-care centers
2.5–20 years old	January 2002–June 2004	59 school health services
17–25 years old	2002–2004	Student health center of the VUB (freshmen students) Centre for occupational medicine (young employees)

Discussion

Belgium is a Federal State comprising three regions, i.e. the Flemish region (Flanders), the Walloon region (Wallonia) and the Brussels-capital region. In view of this complex structure, there is a need to report the results regarding the nutrition and health indicators specifically for each of these regions. A more detailed national report including the results from analysis by region and for different educational levels are reported elsewhere (<http://www.univie.ac.at/enhr>).

Two out of the three studies included in the current ENHR 2009 were conducted at national level; the other one provided only information at regional level. In general, up-to-date and high-quality information on health and nutrition indicators were available. However, it should be noted that data for certain age groups (especially young children and adolescents) and for certain regions were lacking. In addition, not all requested indicators could be provided on a national level nor was the formulation of these indicators as requested by the ENHR 2009. Based on the present data, there is a need for the Belgian government to develop national policies and interventions tailored for certain population groups (age, educational level, etc.) and for the different regions. Moreover, the government needs to address the identified needs by (i) collecting data on nutrition and health indicators that are lacking for specific age groups on a national level, and (ii) streamlining these indicators with European recommendations in order to facilitate comparison between European countries. Addressing these needs would contribute to a better evaluation of the health of the Belgian population and consequently to a more evidence-based and effective development of national policies.

11.3 Czech Republic³

6th Nationwide Anthropological Survey

The anthropometric data of children presented in the ENHR 2009 are based on the 6th Nationwide Anthropological Survey 2001, Czech Republic. Data on 18,584 children (9,541 boys and 9,043 girls) under 6 years of age and 40,525 schoolchildren and adolescents (18,605 boys and 21,920 girls) were collected with the participation of pediatricians, nursery teachers, biology and physical education teachers from elementary and secondary schools, staff of the district public health service and regional public health service. The age of investigated children varied from 0 to 18 years. The basic anthropometrical method of Martin and Saller [1957] was used for the investigation. Waist circumference was measured at the umbilicus level with the measuring tape being placed in a horizontal plane around the trunk. The measurement was taken at the front side of the body with an accuracy of 0.5 cm.

The Czech Republic has undergone rapid political, social, and economic transformation since the late 1980s. While obesity rates among children and adolescents in the Czech Republic have been previously relatively low, this has changed in recent years. Across the past 50 years, body weight, BMI for age, and adiposity rebound (the time when a child reaches the lowest BMI before their BMI gradually begins to increase until adulthood) have occurred earlier. The most dramatic changes have been observed among school-aged children, where BMI values have increased at the 50th, 90th, and 97th percentiles. In contrast, adolescent girls appear to be thinner than in the past. Our findings suggest that the secular trend of increased height, accelerated growth, and earlier maturation is responsible for Czech children experiencing adiposity rebound at earlier ages compared to the past [Vignerová et al., 2008].

Using the IOTF reference standards, the prevalence of obesity among Czech children in 2001 thus exceeded the expected 3% among 4- to 10-year-old boys and girls. In addition, only 0.8% of 15- to 18-year-old adolescent girls were identified as obese in 2001 based on the IOTF reference values. The prevalence of overweight exceeded the expected 10% among 4- 15-year-old boys only. In girls the prevalence of overweight was smaller than 10% in all age categories.

Although the prevalence of child overweight is clearly increasing among Czech children in certain age categories, it is important to note that the rates of overweight and obesity among 4- to 18-year-old children remain relatively low (13% in 2001) compared to 32% in the USA and 19% in Europe for children in the same age category [Lobstein et al., 2004].

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Table 11.8. Infant feeding in the Czech Republic at discharge from maternity hospital (% of infants)

	Year				
	2004	2005	2006	2007	2008
Total breastfeeding	96.1	96.1	96.1	95.9	96.1
Exclusive breastfeeding	90.6	90.3	89.5	88.6	88.1
Partially breastfeeding	5.6	5.8	6.5	7.3	8.0
Non-breastfeeding	2.8	2.9	2.9	2.9	2.9

Table 11.9. Long-term breastfeeding in the Czech Republic (% of infants)

	Year						
	2000	2001	2002	2003	2004	2005	2006
Total breastfeeding							
6 weeks	69.2	73.5	74.9	76.5	76.9	78.4	79.3
3 months	47.9	53.6	56.7	59.2	59.8	62.2	64.2
6 months	23.8	28.4	31.7	35.1	35.8	38.3	40.9
Exclusive breastfeeding							
6 weeks	41.8	47.0	48.1	49.0	48.8	51.0	50.5
3 months	26.1	31.8	34.2	35.8	35.9	39.0	39.4
6 months	10.5	14.5	16.7	18.6	18.6	21.4	22.8

Infant Feeding in the Czech Republic

Data on infant feeding at discharge from maternity hospitals are based on the Report on the Newborn which is referred to the National Institute of Health Information and Statistics of the Czech Republic in Prague by the staff of neonatological departments. Newborns with parenteral feeding were excluded from this survey [Mydlilová et al., 2008, 2009] (table 11.8).

Data on long-term breastfeeding were obtained from the Annual Report on Activities of Pediatricians-Practitioners provided by every outpatient office of pediatrician-practitioner.

Data were obtained at regular preventive examinations at one year of child age. The sample of children evaluated in the period of 2000–2006 comprised 648,625 children [Mydlilová et al., 2006] (table 11.9).

Fig. 11.3. Lipid intakes.

Nutrition Practices of the Czech Children before and at Early School Age

The nutrition and anthropometric data of 1,655 Czech children aged of 4–7 years and 1,137 Czech children aged 7–10 years were obtained in 2007. Individually, 48-hour food consumption data were gathered. Intake of over 30 nutrients from food was evaluated by the Nutridan Program. For the estimation of daily recommended intake of nutrients and other alimentary components tables of German, Austrian and Swiss Nutrition Societies (D-A-CH) reference values for nutrient intake were used [D-A-CH, 2002].

The nutrition status in monitored children (evaluated by means of BMI) corresponded to a reference file of Czech children. The file consisted of 4.6% pre-schoolchildren (P-SC) and 5.6% schoolchildren (SC) being obese. A higher (>90 percentile) daily energetic intake could be observed with 8.9% P-SC and 10.9% SC. On average, the energy intake nevertheless amounted to 98% of the reference values. The proportion of the macronutrients fat, protein and carbohydrates in the total energy intake was in P-SC 30, 14 and 56%E, and in the schoolchildren these proportions were 32.2, 14.5 and 53.4%E of energy. The daily intake of proteins was higher than the reference values (183, resp. 123% of recommended intake in P-SC and SC). Fig. 11.3 shows the lipid intakes in proportions of individual components – saturated fatty acids (SFA), monounsaturated (MUFA) and polyunsaturated fatty acids (PUFA). The oversupply of saturated fatty acids as well as a shortage of polyunsaturated fatty acids was evident in both groups of children.

Above all, the excessive consumption of sodium (Na) is evident with both groups of children. The iodine (I) intake corresponded to 76 and 75% of the recommended nutrition dose only. A low consumption of vitamin D has been found in both groups (46 and 55% of the recommended intake). A higher vitamin B₁₂ intake (557 and 515% of recommended intake) showed a fair consumption of the animal food component and further that intake of vitamin C (620 and 560% of recommended intake) represents a very good supply of the plant food component (fig. 11.4).

Fig. 11.4. Mineral and the trace element intakes.

Czech Post-MONICA Study

The nutrition and anthropometric data for the Czech population were obtained as a substudy of the Czech Post-MONICA Study in 2000/2001, which involved a representative 1% population random sample aged 25–64 years (stratified by age, sex, and community size). A total of 1,627 males and 1,693 females were examined (response rate 63.8 and 64.8%, respectively).

The nutrient intake data were obtained in 1,046 males and 1,094 females using individual 24-hour dietary recalls and food tables for the Czech Republic. Anthropometric data were calculated for the same individuals [Cífková et al., 2004a, 2004b; Cífková and Škodová, 2004].

Longitudinal Follow-Up (15 Years) Study of the Trend of Nutrition of the 1% Random Sample of Population of a District of Central Bohemia

The trend of nutrition in a 1% random sample of population of one district of Central Bohemia was ascertained. Three surveys in 1992, 2000 and 2007 were compared. Dietary recalls of 804 persons (390 males, 412 females, age 25–64 years) were analyzed. The first survey was performed in 1990, the second in 2000 and the last one in 2007. Waist-hip ratio (WHR), calculated BMI, analyzed intake of energy, protein, fats, saccharides, vitamin C, fiber and cholesterol were measured.

BMI and intake of cholesterol increased continually from 1992 in both groups ($p < 0.0001$). WHR increased in females from 1992 to 2007 ($p < 0.001$), in males it increased only from 1992 to 2000 ($p < 0.001$), now stagnates.

Intake of energy increased in 1992–2000 ($p < 0.01$), in 2000–2007 it decreased in both groups ($p < 0.001$). Decreased intake of fat in both groups and decreased

Table 11.10. BMI (% of males, n = 996) [National CINDY Health Monitor Report, 2002]

BMI	Age group				Total
	25–34	35–44	45–54	55–64	
<19.9	2	1	0	1	1
20.0–24.9	52	44	28	19	37
25.0–29.9	39	48	59	64	52
>30.0	6	7	13	16	10

Table 11.11. BMI (% of females, n = 1,007) [National CINDY Health Monitor Report, 2002]

BMI	Age group				Total
	25–34	35–44	45–54	55–64	
<19.9	23	14	6	4	12
20.0–24.9	61	58	48	26	49
25.0–29.9	12	23	32	41	26
>30.0	4	5	14	30	13

intake of carbohydrates in males ($p < 0.001$) were found. Intake of protein equal in both groups. Vitamin C increased between 1992 and 2000, from 2000 it decreased ($p < 0.01$). Intake of fibers increased from 1992 to 2000, and decreased from 2000 to 2007 it decreased ($p < 0.01$).

CINDI Health Monitor

Self-reported data were gained at the national level as a representative sample of the adult population ($n = 2,003$) by questionnaire of CINDI Health Monitor in 2002. BMI was calculated from self-reporting data of respondent's body height and weight (tables 11.10, 11.11).

Biological Monitoring Project in the Czech Republic

The project of biological monitoring in the Czech Republic includes the monitoring of toxic substances (lead, cadmium, mercury) and selected essential trace elements (copper, selenium, zinc) in body fluids of the Czech population.

Biological monitoring is in routine operation since 1994. In the first period (1996–2003), altogether 3,245 adults and 3,075 children were involved. The second period

Table 11.12. Trace elements in blood and urine of the adult population (2005, 2007) [National Institute of Public Health, 2006, 2008]

		2005	2007	2005	2007
		blood, g/l (median)		urine, µg/g creatinine (median)	
Copper	men	870	850	5.2	26.3
	women	1,020	1,000		
Zinc		6,490	6,505	275	348
Selenium		111	106	12	7

Table 11.13. Trace elements in blood and urine of children (2006) [National Institute of Public Health, 2007]

	Blood, µg/l (median)	Urine, µg/g creatinine (median)
Copper	1,040	27.8
Zinc	5,205	450
Selenium	108	12

was started in 2005. Until now, 821 adults (18–59 years) and 400 children (8–10 years) were monitored. Blood and urine samples were collected from March till June. A questionnaire is focused on age, weight, height, individual lifestyle (smoking habit in adults, passive smoking exposure, fish consumption, frequency of dietary supplement use, professional exposure, etc.) (tables 11.12, 11.13).

Nutrition Survey in the Homeless Population

This study was undertaken to define the prevalence of protein-energy malnutrition and main cardiovascular risk factors in the homeless population in Prague. Data of the homeless population was obtained from two cross-sectional studies carried out in 2003 (201 homeless, 174 males and 27 females, mean age males 42 ± 11 , females 40 ± 9).

Mean BMI values were within the normal range, with only 3% of the men and 7% of the women below 18.5 kg/m^2 . Wasted muscle mass was found in only 0.6% men. Decreased body fat (below 10%) was described in 5% men. Serum protein levels were within normal limits. Lymphocytopenia was reported in 2% of the men. Results of the

Table 11.14. Comparison of prevalence of the cardiovascular risk factors among the homeless and the general Czech population (%) [Kubisová et al., 2008]

Cardiovascular risk factors	Homeless population		General population		p value
	men n = 162	women n = 24	men n = 1,408	women n = 543	
BMI ≥ 25 kg/m ²	41	33	75	60	<0.001
Abdominal obesity, men (WC >102 cm)	6		31		<0.001
Abdominal obesity, women (WC >88 cm)		21		31	n.s.
Total cholesterol ≥ 5 mmol/l	33	38	80	72	<0.001
Triacylglycerols ≥ 1.7 mmol/l	15	0	48	23	<0.001
Active smokers	93	83	38	35	<0.001

p values hold after the adjustment for age and sex. Abdominal obesity was evaluated for each sex separately because of different cut-off points. In this case, p values are age-adjusted only.

CAGE questionnaire gave a strong indication of alcoholism in 12% and alcoholism in 16% of the participants [Kubisová et al., 2008].

Mean values of BMI, waist circumference (WC), total cholesterol (TC) and triacylglycerols (TAG) in homeless men and women were within normal limits. Compared with the majority of the Czech population, the homeless had significantly lower mean levels of TC and TAG and lower BMI and WC values; the incidence of smoking among the homeless was significantly higher [Cífková et al., 2004a, 2004b; Cífková and Škodová, 2004; Kubisová et al., 2008] (table 11.14).

11.4 Denmark⁴

Data Sources

This report is mainly based on three sources: The Danish National Survey of Dietary Habits and Physical Activity, The National Health Interview Survey 1987–2005, and

⁴ Trolle E, Fagt S, Biloft-Jensen A, Mathiessen J, Groth MV; Technical University of Denmark, Denmark. E-Mail eltr@food.dtu.dk

The Public Health Report of Denmark 2007 which compiles data from several other sources.

The Danish National Survey of Dietary Habits and Physical Activity

The National Food Institute conducts the dietary surveys in Denmark, since 2000, in collaboration with interviewers from The Danish National Centre of Social Research.

The first national dietary survey was conducted among adults in 1985, based on the dietary history method. In 1995 the method was changed to 7-day food records and since 2000 physical activity was included and data collected each year until 2008.

The dietary surveys are cross-sectional, representative, based on random samples from the central population register. The method combines face-to-face interviews at the participants' home, with self-administered food and physical activity records for seven consecutive days.

The interview gives information about age, gender, height, weight, employment status, occupational status, education, family status, smoking habits, health status and attitudes to and knowledge about food and physical activity.

The food records are precoded, including open-ended answering possibilities, and structured according to the common Danish meal pattern. For quantification, food photo series, household measurements and standard units are used. The participants get personal and written instructions in completing the records and receive a booklet, optional for registering foods eaten out of home.

In the precoded records, participants register physical activity at work, school or child care and in leisure time (a modified version of the International Physical Activity Questionnaire (IPAQ)). The first results on physical activity among adults will be published in 2009.

At the National Food Institute the food and physical activity records are scanned, and food and nutrient intakes estimated by the General Intake Estimation System (GIES) and the Danish Food Composition Tables.

Participants

In 1995, in total 3,098 (1–80 years), in 2000–2002 4,120 (4–75 years), and in 2003–2006 3,247 (4–75 years) participants were included. The response rate was 66% in 1995, 53% in 2000–2002 and 52% in 2003–2006 (preliminary). The decreasing response rate is a general tendency, also seen in other surveys. The National Food Institute has taken several initiatives to counteract further decrease in response rate.

The National Health Interview Survey 1987–2005

The surveys on health and morbidity are carried out by The National Institute of Public Health among adult Danes selected representatively. The survey program makes it possible to follow the populations' health status through a lifespan. Surveys

have been conducted in 1987, 1994, 2000, and 2005. The 2005 survey was based on a sample of 21,832 Danish citizens (>16 years). Data was collected through a personal interview in the respondent's home combined with a self-administered questionnaire after the interview. In total, 14,566 interviews (66.7%) were obtained, while 11,238 (51.5% of the sample) returned the self-administered questionnaire [Ekholm et al., 2006].

Diet

The macronutrient and food intake of children 4–14 years as well as for adolescents and adults 15–75 years are based on data from the National Dietary survey 1995, 2000–2002 and 2003–2006 [Fagt et al., 2008]. The food intake, the macronutrient content and the micronutrient content of the Danish diet 2000–2002 according to age groups and gender were published in 2005 [Lyhne et al., 2005].

Food Intake

Sugar-Sweetened Beverages and Confectionary

The main sources of added sugar in the diet were sugar-sweetened beverages and confectionary, cakes and similar. The content of added sugar in the diet of children decreased from 2000–2002 to 2003–2006, but for 60% the diet still contained too much sugar compared to the Nordic Nutrition Recommendations [NNR, 2004]. Children with the highest amount of added sugar in their diet ($\geq 15\%$ E) drank 4 times as much soft drinks and fruit syrup as the group of children whose diet contained the recommended level ($\leq 10\%$ E added sugar) [cited and modified after Fagt et al., 2008].

Fruit and Vegetables

The recommended intake of fruit and vegetables in Denmark is 600 g/day (children 4–10 years: 300–500 g/day). The average intake of fruit and vegetables increased from 1995 to 2003–2006, but the intake of vegetables stagnated between 2000–2002 and 2003–2006. The mean intake in 2003–2006 among adults was 398 g/day, and among children 353 g/day. Especially the adolescents (11–24 years) had low intake. 16% of adults and 33% of children met the 6-a-day recommendation, whereas only 5% between 11 and 14 years met the recommendation [cited and modified after Fagt et al., 2008].

Other Foods

Intake of fish did not change considerably from 1995 to 2003–2006. The mean intake in 2000–2002 was only 12 g/day among children and 19 g/day among adults. Three out of 4 children and adults consumed too little fish compared with the Danish dietary guidelines (30–40 g/day) [Astrup et al., 2005].

Table 11.15. Development in intake of energy, macronutrients and energy distribution, and ratio between energy intake and basal metabolic rate (EI/BMR_{est}), average for children (4–14 years) [modified from Fagt et al., 2008]

	Male			Female			All		
	1995	2000/ 2002	2003– 2006	1995	2000/ 2002	2003– 2006	1995	2000/ 2002	2003– 2006
n	483	428	329	500	395	340	983	823	669
Energy, MJ	9.6	9.3	8.9	8.6	8.1	7.7	9.1	8.7	8.3
EI/BMR_{est}	1.87	1.78	1.65	1.85	1.72	1.58	1.86	1.76	1.62
$EI/BMR_{est} < 1.1$, %	2	8	13	3	11	19	2	9	16
Fat, %E ¹	35	33	34	35	33	33	35	33	34
Carbohydrate, total, %E ¹	52	53	53	52	54	54	52	53	54
Added sugar, %E ¹	14	13	11	14	13	12	14	13	12
Dietary fiber, g/10 MJ	20	20	21	20	20	22	20	20	21
Alcohol, %E	0	0	0	0	0	0	0 ²	0 ²	0 ²

Atwater's energy factors used for energy intake, energy distribution.

¹ Excluding alcohol.

² Less than 0.5%.

The mean intake of meat and meat products in 2000–2002 was 87 g/day for children and 109 g/day for adults (138 g for men and 81 g for women). In addition, the mean intake of poultry was 19 g/day for children and 25 g/day for adults. In 2003–2006 the intake was on the same level. The Danish dietary guidelines have no recommendation on meat, but compared to an amount of 100 g/day (10 MJ), recognized as appropriate, the intake is too high especially for men.

The whole grain intake based on data from the dietary survey 2000–2004 showed a mean intake approximately half the recommended amount, and only 6% of the population had a dietary whole grain density of 75 g/10 MJ. The typical content (median) was 30 g/10 MJ/day [Mejborn et al., 2008].

Energy and Macronutrients

Results in table 11.15 show a decrease in energy intake among children aged 4–14 years, which probably is due to an increasing degree of underreporting. Excluding data of the underreporters ($EI/BMR < 1.1$) shows a decrease of energy intake per day of 0.4 MJ, corresponding to approximately 4% reduction from 1995 to 2003–2006. Table 11.16 shows decrease in energy intake among adults. After exclusion of underreporters the decrease in daily energy intake is 0.7 MJ for men and 0.5 MJ for women.

Table 11.16. Development in intake of energy, macronutrients and energy distribution, and ratio between energy intake and basal metabolic rate (EI/BMR_{est}), average for adults (15–75 years) [modified from Fagt et al., 2008]

	Male			Female			All		
	1995	2000/ 2002	2003– 2006	1995	2000/ 2002	2003– 2006	1995	2000/ 2002	2003– 2006
n	849	1,526	1,184	897	1,771	1,394	1,746	3,297	2,578
Energy, MJ	11.7	10.8	10.5	8.8	8.4	7.9	10.2	9.5	9.1
EI/BMR _{est}	1.54	1.42	1.38	1.52	1.43	1.34	1.53	1.42	1.36
EI/BMR _{est} <1.1, %	13	21	24	16	22	29	14	22	26
Fat, %E ¹	37	33	34	37	31	32	37	32	33
Fat, %E ²	39	35	36	38	33	34	39	34	35
Carbohydrate, total, %E ²	45	50	50	47	53	53	46	51	52
Added sugar, %E ²	9	9	9	9	10	9	9	10	9
Dietary fiber, g/10 MJ	20	20	21	21	23	25	20	21	23
Alcohol, %E	6	7	7	4	5	5	5	6	6
Alcohol, g/day	24	25	24	11	13	12	17	18	17

Atwater's energy factors used for energy intake, energy distribution.

¹ Including alcohol.

² Excluding alcohol.

The decrease of total fat in the diet of both children and adults observed from 1995 to 2000–2002 was not seen between 2000–2002 and 2003–2006. The mean fat content of children's diet in 2003–2006 is 34%E and in adults' 35%E (excl. alcohol), and still too high compared to NNR 2004 (30%E on population level).

The sugar content in children's diet decreased between 2000–2002 and 2003–2006 which is very positive. However, on average, children still consume 20% more added sugar than recommended.

In 2000–2002 the mean alcohol intake of men was 25 g/day and for women 13 g/day. Analyses [Bøgh-Sørensen et al., 2009] show that 26% of men and 18% of women consumed more alcohol than recommended from the National Board of Health (21 units/week or 3 units/day for men and 14 units/week or 2 units/day for women (1 unit = 12 g)) during the week registration. 56% of men and 38% of women had an energy intake from alcohol above the NNR 2004 of max. 5%E. Only 8% of men and 15% of women consumed no alcohol during the week of registration. According to The National Health Interview Survey 1987–2005 [Ekholm et al., 2006], 14.3% of the

adults have consumed more than recommended by the National Board of Health. 29.5% of women and 15% of men consumed no alcohol during the week before answering the questionnaire. This inconsistency in results reflects difficulties in measuring alcohol intake and use of different methods (prospective records and retrospective questionnaires).

The mean intake of dietary fiber for both children and adults was around 21 g/10 MJ. Only 10% of men and 17% of women met the NNR 2004 for dietary fiber (30 g/10 MJ).

Differences in Diet According to Gender

Comparison of boys' and girls' diets only shows differences in the mean daily energy intake, which is 1.2 MJ higher for boys than for girls. Additionally, 40% of boys but only 32% of girls have a diet containing max. 10%E from added sugar.

Among adults, differences in diet between men and women are more pronounced. The mean daily energy intake is 2.6 MJ higher for men than for women. The diet of women contains less fat (2%E-point), less alcohol (2.3%E-point), and more dietary fiber (4 g/10 MJ). The diet of women appears healthier than the diet of men, although the diet of women has tendency to contain more added sugar.

Micronutrients

Micronutrient intakes are estimated based on the dietary survey 2000–2002 without taking the use of supplements into account [Lyhne et al., 2005]. The content of micronutrients in the average diet is generally sufficient assessed from NNR 2004. For the vitamins A, riboflavin, niacin and B₁₂ and the minerals calcium, phosphorus and iodine the content is abundant. The content is on an acceptable level for the vitamins E, thiamine, B₆, folate and C and the minerals magnesium, zinc, selenium and potassium. The content of vitamin D is too low in all age groups, and the iron content is insufficient for many women in fertile age.

Supplements

Data from the dietary survey 2000–2004 (4–75 years) show that 54% of males and 60% of females were users of dietary supplements. The lowest percentage of users was found in the age group of 15–24 years, where 39% of males and 44% of females were users.

Physical Activity

Data from the European Youth Heart Study [Ekelund et al., 2004, cited by Pedersen and Saltin, 2005] showed that all the Danish children 9 years of age adhered to the recommendation of a minimum of 60 minutes moderate to vigorous intensity physical activity each day, but this was the case for only 50–75% of adolescents 15 years of age. The National Health Interview Survey on Children from 2005 showed that 78% of the children 6–15 years of age attended sports activity of at least 2 hours a week (outside school) and 65% of the children have active transportation to school at least 4 times a week [Johansen et al., 2009].

In total, 27% of adults stated being moderately or intensively physically active for at least 4 hours a week in their leisure time, while 13% indicated being physically inactive. Almost twice as many men as women were moderately or intensively physically active, while the proportion of physically inactive people was the same among men and women. Since 1987, there has been a marked rise in the proportion with a moderate or intensive level of physical activity during their leisure time.

In total, 59% of adults practiced sport, collectively or in some self-organized form. Just below three quarters of those in active employment spent less than 15 minutes of their daily transport time walking or cycling, while slightly more than 10% spent half an hour or more. Most of those in active employment (39%) have sedentary jobs [cited and modified from Kjølner et al., 2007].

Smoking

The proportion of smokers has fallen steadily in recent decades – for men to 31% in 2006 and for women to 25%. In 2005, more than 50% among male and 40% of female smokers were heavy smokers. There is a clear educational gradient in the smoking pattern: the higher the level of education, the fewer daily smokers and heavy smokers [cited and modified from Kjølner et al., 2007]. Data from the national dietary survey 2002–2002 indicated that smoking is more likely among young women than among young men.

Overweight and Obesity

Measured data of weight and height are not available on national representative level. Self-reported data in the dietary survey showed that mean BMI increased significantly between 1995 and 2000–2002 for both boys and girls of all age groups (4–6, 7–10, 11–14 and 15–18 years). Prevalence of overweight increased between survey years for boys and girls for all age groups, although statistical significance was not reached. When all children and adolescents (4–18 years) were analyzed, the prevalence of overweight rose significantly from 10.9 to 14.4% between 1995 and 2000–2002, whereas the increase in the prevalence of obesity (2.3 vs. 2.4%) did not reach significance [Matthiessen et al., 2008].

The National Health Interview Survey 1987–2005 [Ekholm et al., 2006], based on self-reported data, showed that 41% among men and 26% among women were overweight, with 12 and 11%, respectively, being obese. Session data, too, showed a marked increase in the prevalence of obesity. Data from the national dietary survey 2000–2002 showed that 39% among men 19–65 years and 22% among women 19–65 years were overweight, with 11 and 10%, respectively, being obese.

Life Expectancy and Lifestyle-Related Disorders

Life expectancy continues to rise and in 2006 was 75.9 years of age for men and 80.4 for women, but Danish men ranked 18th among 20 OECD countries and Danish women ranked last.

Fig. 11.5. CVD-caused deaths (at age <65 years) in the Estonian population (1992–2007).

Mortality is increasing for several lifestyle-related disorders. That applies to lung cancer, chronic obstructive pulmonary disease, cirrhosis of the liver among men and diabetes. For bowel cancer and breast cancer, mortality has been more or less constant, while mortality from heart diseases and stroke has generally declined. More than 300,000 adults state having a long-standing cardiovascular illness.

The number of new cancer cases rose to just below 33,000 in 2001. Approximately 216,000 adults (4%) were living with a cancer diagnosis. The strongly age-related incidence is part of the explanation for the continued increase in the number of cancer cases.

Approximately 25,000 people have type 1 diabetes and an estimated 200,000 have type 2 diabetes in Denmark. A further 200,000 are presumed to have the illness without knowing it.

Around 500,000 Danes are estimated to have osteoporosis.

However, the majority (79%) of adults rate their health to be really good or good [cited and modified from Kjølner et al., 2007].

Social Inequality

In Denmark virtually all manifestations of illness and all risk factors are unevenly distributed in social terms. A number of examples of social differences in relation to life expectancy and mortality, health and morbidity, lifestyle and health habits, living conditions and use of the health services are described [cited and modified from Kjølner et al., 2007]. For instance, education was shown to be related to healthier eating pattern [Groth et al., 2003] and in addition education is shown to be the dimension most consistently associated with BMI and obesity, and the gender-specific pattern showed a stronger social gradient for women, but not for men [Groth et al., 2009].

Table 11.17. Availability of ENHR 2009 indicators from nationally representative surveys in Estonia

Age group	Body mass index	Nutrient intake	Dietary supplements	Alcohol consumption	Smoking
Children (4–14)	–	–	–	–	–
Adolescents (15–18)	(1) HB 2002–2008 (2) EHIS 2006	–	–	(1) HB 2002–2008 (2) EHIS 2006	(1) HB 2002–2008 (2) EHIS 2006
Adults (19–64)	BNS 1997 HB 2002–2008 EHIS 2006	(1) BNS 1997	(1) BNS 1997	BNS 1997 HB 2002–2008 (3) EHIS 2006	BNS1997 HB 2002–2008 (3) EHIS 2006
Elderly (65+)	(1) EHIS 2006	–	–	(1) EHIS 2006	(1) EHIS 2006

HB 2002–2008 – Health Behavior among the Estonian Adult Population Survey 02/04/06/08.

BNS 1997 – Baltic Nutrition Survey 1997.

EHIS 2006 – Estonian Health Interview Survey 2006.

11.5 Estonia⁵

Cardiovascular diseases (CVD) are the main reason for early loss of work capacity and death (at age <65) in Estonia. Estonia is leading in CVD-caused deaths in Europe and the whole world. Each year, at least 250 men and 80 women out of every 100,000 inhabitants die of CVD before the age of 65. During Estonia's re-independence period in 1992–1994, premature deaths caused by CVD increased substantially. In recent years mortality has decreased to the same level as it was at the beginning of the 1990s, but a stable and constant decrease has still not been reached (fig. 11.5). The main factors in reducing CVD are: regular physical activity, balanced nutrition, abstinence from smoking, control of blood pressure and cholesterol level, valuing of health and psychosocial factors [National Institute for Health Development, 2005].

Cancer is a prevalent disease in Estonia, holding the second place among causes of death. In 2005, 20% out of all death cases were caused by cancer. There are almost 3,500 malignant tumor deaths in Estonia every year and the mortality index has not decreased during the last decade [World Health Organization Cancer Mortality Database, 2005]. Men's cancer death coefficients in Estonia are one of the highest on a European scale [Bray et al., 2002; Ferlay et al., 2004]. Cancer prevention depends mostly on lifestyle and environment including balanced nutrition [National Institute for Health Development, 2007].

In this report, data originates from three nationally representative surveys conducted in Estonia (table 11.17). Data about nutritional indicators among adults are

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available from the Baltic Nutrition Survey (BNS) conducted in 1997. Nationally representative nutritional data are not available for children, adolescents or the elderly. There are no nationally representative data available about nutritional biomarkers among the Estonian population.

Data about diet-related health indicators such as anthropometric measures, alcohol consumption and smoking are available from two nationally representative surveys. The Estonian Health Interview Survey (EHIS) was conducted in 2006 and provides data for adolescents, adults and the elderly. Health Behavior among the Estonian Adult Population Survey (HB) has been conducted since 1990 after every 2 years and provides data for adolescents and adults. However, data for this report were chosen from the last four HB survey years – 2002, 2004, 2006 and 2008.

The BNS was conducted in 1997 by the World Health Organization [Pomerleau et al., 2000]. The survey was done with a simple random sample of 3,000 people aged 19–64. The sample was drawn from the National Population Register and stratified by age. The questionnaire was discussed and agreed within all Baltic countries. All subjects were interviewed once, using the 24-hour recall method.

24-hour recall was done in the first part of the interview. Common sets of household measures were used for assessing food portion sizes, as well as a standard book with photographs and drawings of commonly consumed foods. The second part of the interview was a questionnaire with questions about socioeconomic status and health behavior.

Data were collected in July and August 1997. The response rate was 67.3%; 2,108 people altogether participated in the survey.

Nutrient intake was calculated from 24-hour recalls using Micro-Nutrica Nutritional Analysis program (Estonian version 2, 1997, Food Processing Institute, Tallinn University of Technology).

The Health Behavior among the Estonian Adult Population Survey (HB) has been conducted since 1990 with a 2-year interval in cooperation with the Finnish National Health Institute (Helsinki). The research is done within the joint 'FinBalt Health Monitor' project. The survey sample is drawn from the National Population Register. The survey is conducted with a questionnaire sent by mail. The questionnaire includes a module on dietary habits that composes of a food frequency and preference questionnaire.

In 2002, the HB survey was conducted by the Estonian Centre for Health Education and Promotion [Kasmel et al., 2003]. The survey was done with a simple random sample of 2,000 residents of Estonia aged 16–64. The sample was stratified by place of residence, age and sex. The response rate was 67% with a final number of completed eligible questionnaires that were used for data entry being 1,338.

In 2004, the HB survey was conducted by the National Institute for Health Development [Rahu et al., 2005]. The survey was done with a simple random sample of 5,000 residents of Estonia aged 16–64. The questionnaires were mailed during the time period between April and June 2004. The response rate was 63.4% with a

final number of completed eligible questionnaires that were used for data entry being 3,074.

In 2006, the HB survey was conducted by the National Institute for Health Development [Tekkel et al., 2007]. The survey was done with a simple random sample of 5,000 residents of Estonia aged 16–64. The questionnaires were mailed during the time period between March and May 2006. The response rate was 59.2% with a final number of completed eligible questionnaires that were used for data entry being 2,867.

In 2008, the HB survey was conducted by the National Institute for Health Development [Tekkel et al., 2009]. The survey was done with a simple random sample of 5,000 residents of Estonia aged 16–64. The questionnaires were mailed during the time period between March and May 2008. The response rate was 62.2% with a final number of completed eligible questionnaires that were used for data entry being 3,004.

The EHIS was conducted for the second time in 2006 by the National Institute for Health Development [Oja et al., 2008]. The survey was conducted as a paper-assisted personal interview. The survey was done with a systematic stratified sample of 11,023 permanent residents of Estonia aged 15–84. The sample was drawn from the National Population Registry and stratified by region, age and sex group. Data was collected in a 1-year period, October 2006–2007. The response rate was 60.2%, with 6,494 being the total number of completed eligible questionnaires that were used for data entry. The interview questionnaire consisted of 22 modules, including separate modules on smoking, use of alcohol, eating habits and physical activity. The eating habits module composed of a limited food frequency and preference questionnaire.

Adolescents

There are no nationally representative data available about nutrient intake among adolescents in Estonia (table 11.17).

Prevalence of overweight (including obesity) among male adolescents aged 16–18 has been on the rise. In 2002, prevalence of overweight (including obesity) was 6.7% and by 2008 it was 19.8%. Prevalence of overweight (including obesity) is lower among female adolescents in the same age group, in 2002 there was no prevalence and by 2008 it was 8.9%. Prevalence of underweight among female adolescents aged 16–18 was 14.9% in 2008.

The proportion of current smokers among male adolescents aged 16–18 was 50% in 2002, by 2008 it was 32.2%. The proportion of current smokers among female adolescents in the same age group was 37% in 2002 and by 2008 it was 23.1%. The average number of cigarettes smoked daily among boys was 8.5 and 6.4 among girls in 2008 (fig. 11.6).

In 2002, the share of abstainers among male adolescents aged 16–18 was 12.9% and by 2008 it was 13.5% (table 11.18). Among female adolescents in the same age group the share of abstainers was 15.2% in 2002 and by 2008 it was 11.4%.

Fig. 11.6. Average number of cigarettes smoked daily among adolescents (current smokers) aged **16–18 years** in Estonia (2004–2008).

Table 11.18. Abstainers among adolescents **aged 16–18** in Estonia, % (2002–2008) [source: HB 02/04/06/08]

	2002	2004	2006	2008
Men	n = 62	n = 186	n = 158	n = 178
Total	12.9	12.9	11.4	13.5
Women	n = 66	n = 200	n = 202	n = 210
Total	15.2	13.0	11.9	11.4

Abstainer – never drinks and no drinking during the last 12 months.

Adults

In 1997, average energy intake among male adults was normal up to the age of 34 years, but then showed a decrease under the recommended energy intake. Among female adults the average energy intake was lower than the recommendation in all age groups. Among both male and female adults the average proportion of protein in total energy intake was in a normal range. The proportion of carbohydrates in total energy intake was lower than the national recommendation [RDI, 2006] for both male and female adults in all age groups, with men's intake of carbohydrates being lower than women's. The intake of dietary fiber was also lower than the recommended minimal daily amount of 25 g for both men and women. The average daily intake of dietary fiber was 16.2 g for women and 20.7 g for men.

The proportion of fat and SFA in total energy intake was constantly higher than the maximum recommendation of 30% and 10%, respectively, for both male and female adults in all age groups with the average proportion of energy from fat being ~36%E. However, the average intake of cholesterol was within recommended limits for women. For men, the intake of cholesterol (348 mg/day) was slightly higher than

Fig. 11.7. Consumption of dietary supplements at least once a week among adults (19–64 years) in Estonia, % (1997).

the recommended 300 mg/day. For men, the proportion of alcohol in total energy intake was higher than the recommended maximum limit of 5%.

The average daily intake of vitamin C was relatively constant up to the age of 50 years, but showed a considerable decrease for male and female adults >50 years of age. The intake of vitamin D for male and female adults in all age groups was remarkably low compared to the recommended minimal daily intake of 7.5 µg [Vaask et al., 2006]. For men, the average daily intake of vitamin D was 3.6 µg and for women 2.8 µg. The average daily intake of vitamin E was insufficient for both sexes in all age groups, except for men aged 19–34.

The average daily intake of sodium exceeded the national recommendation for both male and female adults. Intake of sodium was higher among men. Average calcium intakes were lower than the recommended 800 mg/day for men and for women. For men, the average intake of calcium was 717 mg/day and for women 590 mg/day. For women aged 19–34, the average intake of iron was lower than the recommended 15 mg/day.

The proportion of women using dietary supplements at least once a week decreased with age. For men the opposite trend applied (fig. 11.7).

The prevalence of normal weight among male adults in Estonia decreased from 2002 to 2008. In 2002, the proportion of men belonging to the normal weight category was 53.5%, by 2008 the proportion was 40.9% (table 11.19). Simultaneously, the proportion of men belonging to the overweight and obese category has been on the rise. In 2002, the proportion of overweight and obese men was 33.1 and 12.1%, respectively. By 2008, these proportions had risen to 40.5 and 18.1%, respectively. The prevalence of obesity among female adults in Estonia slowly rose from 2002 to 2008. In 2002, the proportion of obese women was 14.5%, by 2008 it was 19.5%.

In 2008, the prevalence of overweight and obesity among male and female adults increased with age. The prevalence of overweight (including obesity) among men was 58.5%, it was highest among men over 50 years old, with the proportion being 70.3%. The prevalence of overweight (including obesity) was lower among women, 46.5%, among women over 50 years, the proportion was 72.2%. The prevalence of underweight was 8.8% among women aged 19–34.

Table 11.19. BMI distribution among adults (**19–64 years**) in Estonia, % (2002–2008), self-reported data [source: HB 02/04/06/08]

	2002	2004	2006	2008
Men	n = 529	n = 1,299	n = 1,112	n = 1,162
Underweight	1.3	2.1	1.2	0.6
Normal weight	53.5	52.2	46.8	40.9
Overweight	33.1	32.0	37.7	40.5
Obese	12.1	13.7	14.4	18.1
Women	n = 1,520	n = 1,734	n = 1,706	n = 1,597
Underweight	6.3	4.5	5.1	4.1
Normal weight	53.3	54.9	52.8	49.5
Overweight	25.9	25.7	25.7	27.0
Obese	14.5	14.9	16.4	19.5

Underweight: <18.49 kg/m²; normal weight: 18.5–24.99 kg/m²; overweight: 25–29.99 kg/m²; obese: >30 kg/m².

The proportion of current smokers has decreased among male and female adults in Estonia. In 2002, 57.4% of men were smokers, by 2008, 47% were smokers. Among women, in 2002, 26.4% were smokers and by 2008, 25.4% were smokers. The only group that has had an increase in smoking were women aged over 50 years, in 2002 15.9% were smokers and by 2008 20.2% were smokers.

In 2008, the average number of cigarettes smoked daily among adult women was 9.3 (fig. 11.8). Among adult men, the average number of daily cigarettes was 16.6. Among both men and women, the number of daily cigarettes increased with age.

In 2008, the share of heavy drinkers among male adults was 1.3% (table 11.21). Among female adults the share of heavy drinkers was 0.1%. In 2002, the share of abstainers among adult men was 3.8% and by 2008 it was 7% (table 11.20). Among female adults, the share of abstainers was 7.4% in 2002 and by 2008 it was 7.6%.

Elderly

There are no nationally representative data available about nutrient intake among elderly (65+ years) in Estonia.

In 2006, prevalence of overweight (including obesity) among elderly men was 58.5% and among elderly women 68.3%. Obesity is more prevalent among elderly women than elderly men in Estonia.

Fig. 11.8. Average number of cigarettes smoked daily among adults (19–64 years, current smokers) in Estonia (2008).

Table 11.20. Abstainers among adults (19–64 years) in Estonia, % (2002–2008) [source: HB 02/04/06/08]

	2002	2004	2006	2008
Men	n = 503	n = 1,194	n = 1,017	n = 1,182
19–34	2.7	4.8	5.9	6.8
35–49	4.2	7.2	3.1	6.1
50+	4.6	6.0	7.7	8.3
Total	3.8	5.9	5.6	7.0
Women	n = 731	n = 1,553	n = 1,549	n = 1,628
19–34	6.8	4.2	5.8	7.0
35–49	6.3	4.9	6.9	5.5
50+	9.1	13.3	9.5	10.4
Total	7.4	7.5	7.4	7.6

Abstainer – never drinks and no drinking during the last 12 months.

In 2006, proportion of current smokers among elderly men was 65.4% and the average number of cigarettes smoked daily was 13.1. Among women, the proportion of current smokers was 10.8% and the average number of cigarettes smoked daily was 10.9.

The share of abstainers among elderly men was 8.8% and 32.2% among elderly women in 2006 (table 11.22).

To summarize, there is no nationally representative data about the nutrient intake of children or adolescents to give an overview of their dietary status. Prevalence of overweight (including obesity) among male adolescents aged 16–18 has been on the

Table 11.21. Heavy drinkers among adults (**19–64 years**) in Estonia, % (2002–2008) [source: HB 02/04/06/08]

	2002	2004	2006	2008
Men	n = 503	n = 1,194	n = 1,017	n = 1,144
19–34	1.6	2.4	1.7	1.7
35–49	1.8	2.1	3.1	1.8
50+	0.7	0.6	0.3	0.3
Total	1.4	1.8	1.7	1.3
Women	n = 731	n = 1,553	n = 1,549	n = 1,576
19–34	0	0	0.4	0
35–49	0.4	0	0.6	0.2
50+	0.4	0	1.2	0
Total	0.3	0	0.7	0.1

Heavy drinker – >5 units of alcohol per day. 1 alcohol unit = 8–12g of absolute alcohol (1 shot of vodka = 1 glass of wine = 10.5-liter bottle of beer).

Table 11.22. Abstainers and heavy drinkers among elderly (**65+ years**) in Estonia, % (2006) [source: EHIS 2006]

	Abstainers	Heavy drinkers
Men	n = 1,063	
65–70	7.2	1.8
70–75	9.2	1.1
75+	9.8	0.4
Total	8.8	1.0
Women	n = 1,097	
65–70	22.1	0
70–75	31.4	0
75+	39.9	0.2
Total	32.2	0.1

Heavy drinker – >5 units of alcohol per day. 1 alcohol unit = 8–12 g of absolute alcohol (1 shot of vodka = 1 glass of wine = 1 0.5-liter bottle of beer).

Abstainer – never drinks.

rise during the last 6 years. The proportion of underweight female adolescents aged 16–18 has been relatively high for the last 6 years (14.9% in 2008). The proportion of current smokers among male and female adolescents aged 16–18 has been declining. The share of abstainers among female adolescents aged 16–18 has been declining.

Main nutritional problems among adults in 1997 included a high proportion of fat and SFA in total energy and a rather low carbohydrate intake. The intake of dietary fiber was low. For men, the proportion of alcohol in total energy intake was higher than the recommended amount. The intake of vitamin D was remarkably low for both male and female adults. The intake of vitamin E was insufficient and the intake of sodium was high. Calcium intakes were low for women, for women aged 19–34 the intake of iron was low.

Recent surveys show that the prevalence of overweight (including obesity) is on the rise among adult men in Estonia. The prevalence of obesity among female adults has been slowly rising for the past six years. The prevalence of overweight (including obesity) increases with age. In 2008, the prevalence of underweight was highest among women aged 19–34. The proportion of current smokers has decreased among male and female adults during the last six years. The share of abstainers among adult men has been on the rise. The proportion of heavy drinkers among adult men and women has not had a stable decline.

There are no nationally representative data about the nutrient intake of elderly to give an overview of their dietary status. In 2006, obesity was more prevalent among elderly women than elderly men in Estonia. The proportion of current smokers was very high among elderly men. Share of abstainers was higher among elderly women.

11.6 Finland⁶

Finland has a long tradition in actively supporting public nutrition in order to affect public health. For instance, free lunch has been offered to schoolchildren for over 60 years, and nutrition counseling has been a part of action at the maternity clinics free for all pregnant women in Finland. Many actions have been introduced to eliminate nutritional deficiencies: iodizing of salt and adding vitamins A and D to margarine began in the 1940s, adding selenium to multiple nutrient inorganic fertilizers began in 1985, and the latest fortification of liquid milk products and fat spreads with vitamin D was revised in 2003.

Food supply data has been collected systematically in Finland since the 1950s (Food Balance Sheets, Ministry of Agriculture and Forestry). According to these sheets the Finnish diet has changed remarkably during the past decades. The supply of potatoes and fats has decreased, while the supply of vegetables has tripled since

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Fig. 11.9. Observed and risk factor-predicted reduction in CVD mortality in 36- to 64-year-old Finnish men. Figure adopted from Vartiainen et al. [2008].

the 1970s, being almost 70 kg per capita per year in 2007. Vegetable margarines and butter/oil mixtures have mostly replaced butter and low-fat and skimmed milk have replaced fatty milks. According to the latest publication, in the year 2007, skimmed milk accounted for one third of the total milk supply, being about 50 l per capita per year, with increase of 3.6% from the previous year. In the 1980s the supply of butter was about 12 kg per capita per year as compared to 2.6 kg in 2007. Fruit juices and juices with added sugar have also become more popular and supply of soft and alcohol drinks has increased. The meat that Finns eat most is pork. Pork supply amounts to almost 35 kg per capita, while beef and poultry meat supply were 18.7 and 17.6 kg per capita in 2007, respectively. The favorable trends in food intake are reflected to the intake of fats and salt. The intake of total fat has decreased from about 38% of energy (%E) to 31–32%E and the proportion of saturated fat from 20 to 12–13%E during 1980–2007. Trans-fatty acids are not the problem in Finnish diet, the daily intake of trans-fatty acids was <1 g in all age groups. The small amount of trans-fatty acids in Finland is due to the fact that the Finnish margarine industry adopted interesterification as the hardening method for vegetable oils already in the 1990s, and this method does not produce trans-fatty acids. There has been about a 40% decrease in the intake of salt during the past 30 years being now 6.0 g/day in women and 8.3 g/day in men [Paturi et al., 2008]. These trends have favorably affected cardiovascular risk factors, and for instance cardiovascular mortality has decreased by 80% in the middle-aged population since the 1970s (fig. 11.9) [Vartiainen et al., 2008].

There are still many challenges in spite of these great achievements. In 2008, several national publications about nutrient intake and health indicators were published

in Finland. The following chapters present collected information of these reports in infants, children, adolescents, adults and in the elderly Finnish population.

Infants and Children Under 7 Years of Age

A large population-based Type 1 Diabetes Prediction and Prevention (DIPP) Nutrition Study started in 1996–97. The aim of the study is to evaluate longitudinally the dietary factors in relation to the development of diabetic autoantibodies and clinical type 1 diabetes. Information on food consumption and food supplement usage was collected from children living in the regions of Tampere and northern Ostrobothnia. Table 11.23 offers information on the nutrition of 1- to 6-year-old Finnish children [Kyttälä et al., 2008] assessed as a part of DIPP Study. The information on food consumption was collected from 2,535 children between the years 2003–2005 using food diaries. The report by Kyttälä et al. describes differences in food consumption and nutrient intake between different sociodemographic groups, and between children cared at home and those in day care outside the family home. Food diary data was entered and processed using Finessi software, an application developed at the National Public Health Institute, Finland.

Based on the infant feeding records of 5,993 DIPP Nutrition Study children, the duration of breastfeeding does not currently meet the internationally recommended levels [Kyttälä et al., 2008]. The mean duration of exclusive breastfeeding was 1.4 months, while partial breastfeeding was continued, on average, up to the age of 7 months. Low educational level, young maternal age and smoking were associated with a shorter duration of breastfeeding. 1-year-old children were given industrial baby food frequently.

In 2005 the Ministry of Social Affairs and Health carried out a nationwide survey of breastfeeding and complementary feeding among the Finnish children under 1 year of age [Hasunen and Ryyänänen, 2006]. The survey was a follow-on to the surveys carried out in 1995 and 2000. Altogether 74 primary healthcare centers with over 10,500 children participated. Nearly all newborn babies were breastfed. At the age of 1 month, 87% of babies were breastfed, at the age of 2 months 76% and at the age of 6 months 60%. 36% of the children were receiving breast milk in addition to complementary feeding at the age of 11 months. There was a clear progress in exclusive breastfeeding at the age of 1–5 months compared to the situation in year 2000 [Hasunen and Ryyänänen, 2006].

According to DIPP Nutrition Study, a quarter of the children studied had been on a special diet before the age of 3 years. The prevalence of food allergies was highest at the age of 1 year (14%), falling to 6% by the age of 6 years. The most common allergens were milk, wheat, barley, rye, fish and eggs [Kyttälä et al., 2008].

Consumption of fresh vegetables, fruit and berries was low, along with the consumption of fish and use of fat spreads. The intake of sucrose and saturated fatty acids among 2- to 6-year-old children was higher than the levels suggested by the Finnish Nutrition Recommendations, whilst the intake of polyunsaturated fatty acids

Table 11.23. Mean daily intake of energy and nutrients (mean $\pm$ SD) in Finnish children aged **1, 4 and 6 years** [source: Kyttälä P et al. 2008]

Nutrient	1 year old ¹		4 years old		6 years old	
	girls (n = 198)	boys (n = 257)	girls (n = 247)	boys (n = 307)	girls (n = 349)	boys (n = 364)
Energy, MJ	3.6 $\pm$ 0.6	3.9 $\pm$ 0.7	5.5 $\pm$ 1.0	5.8 $\pm$ 1.1	6.0 $\pm$ 1.1	6.7 $\pm$ 1.2
Protein, %E	16	15	15	15	15	16
Carbohydrates, %E	55	55	53	53	53	53
Total, g	90 $\pm$ 29	99 $\pm$ 29	170 $\pm$ 30	180 $\pm$ 36	185 $\pm$ 37	206 $\pm$ 39
Sucrose, g	11.7 $\pm$ 8.0	3.0 $\pm$ 9.4	43.6 $\pm$ 16.0	46.9 $\pm$ 18.0	43.6 $\pm$ 16.0	46.9 $\pm$ 18.0
Dietary fiber, g	8.3 $\pm$ 3.2	8.8 $\pm$ 3.2	9.4 $\pm$ 3.0	9.6 $\pm$ 3.2	10.3 $\pm$ 3.3	11.4 $\pm$ 3.7
Fat, %E	29	29	31	31	31	31
SFA, %E	11.8	11.5	13.7	13.7	13.8	13.5
MUFA, %E	10.5	10.4	10.6	10.6	10.7	10.8
PUFA, %E	5.1	5.1	4.0	4.0	4.1	4.2
Trans-fatty acids, g	0.2 $\pm$ 0.1	0.3 $\pm$ 0.2	0.7 $\pm$ 0.3	0.7 $\pm$ 0.4	0.8 $\pm$ 0.3	0.8 $\pm$ 0.4
%E	0.3	0.2	0.5	0.5	0.5	0.5
n-3 fatty acids, g	0.9 $\pm$ 0.4	1.0 $\pm$ 0.5	1.3 $\pm$ 0.6	1.4 $\pm$ 0.6	1.4 $\pm$ 0.5	1.7 $\pm$ 0.7
%E	1.0	1.0	0.9	0.9	0.9	0.9
Vitamin A, μ g	317 $\pm$ 243	313 $\pm$ 286	536 $\pm$ 527	606 $\pm$ 706	591 $\pm$ 628	676 $\pm$ 689
Vitamin D, μ g	12.2 $\pm$ 4.6	12.2 $\pm$ 4.6	6.1 $\pm$ 4.1	5.9 $\pm$ 3.6	5.5 $\pm$ 3.2	6.3 $\pm$ 3.5
Vitamin E, mg	3.8 $\pm$ 1.4	4.1 $\pm$ 1.7	5.1 $\pm$ 2.8	5.3 $\pm$ 2.5	5.5 $\pm$ 2.3	6.1 $\pm$ 2.5
Thiamine, mg	0.68 $\pm$ 0.17	0.74 $\pm$ 0.19	0.95 $\pm$ 0.54	1.00 $\pm$ 0.57	1.01 $\pm$ 0.56	1.13 $\pm$ 0.65
Riboflavin, mg	1.29 $\pm$ 0.37	1.34 $\pm$ 0.41	1.73 $\pm$ 0.62	1.81 $\pm$ 0.74	1.81 $\pm$ 0.69	2.06 $\pm$ 0.81
Niacin, mg	12.0 $\pm$ 2.5	12.8 $\pm$ 3.3	18.4 $\pm$ 5.9	19.5 $\pm$ 6.1	19.5 $\pm$ 5.9	22.2 $\pm$ 6.5
Vitamin B ₆ , mg	0.98 $\pm$ 0.27	1.04 $\pm$ 0.29	1.47 $\pm$ 0.68	1.51 $\pm$ 0.58	1.47 $\pm$ 0.58	1.64 $\pm$ 0.63
Folate, μ g	107 $\pm$ 28	114 $\pm$ 31	132 $\pm$ 49	135 $\pm$ 52	144 $\pm$ 51	166 $\pm$ 61
Cobalamin, μ g	2.7 $\pm$ 1.1	2.8 $\pm$ 1.2	4.2 $\pm$ 2.1	4.6 $\pm$ 2.6	4.5 $\pm$ 2.4	5.3 $\pm$ 2.8
Ascorbic acid, mg	75 $\pm$ 31	80 $\pm$ 34	61 $\pm$ 41	60 $\pm$ 41	61 $\pm$ 36	72 $\pm$ 49
Sodium, g	0.73 $\pm$ 0.37	0.74 $\pm$ 0.45	1.84 $\pm$ 0.47	2.01 $\pm$ 0.52	2.03 $\pm$ 0.56	2.29 $\pm$ 0.51
Calcium, mg	696 $\pm$ 267	670 $\pm$ 293	930 $\pm$ 255	983 $\pm$ 306	991 $\pm$ 286	1,103 $\pm$ 302
Magnesium, mg	157 $\pm$ 37	168 $\pm$ 42	199 $\pm$ 41	211 $\pm$ 52	216 $\pm$ 50	246 $\pm$ 67
Iron, mg	6.2 $\pm$ 2.8	6.6 $\pm$ 2.3	7.0 $\pm$ 2.7	8.0 $\pm$ 3.6	7.7 $\pm$ 3.3	8.6 $\pm$ 2.8
Zinc, mg	5.7 $\pm$ 1.4	6.3 $\pm$ 1.6	7.2 $\pm$ 2.0	8.0 $\pm$ 2.7	8.2 $\pm$ 3.1	9.1 $\pm$ 2.8
Iodine, μ g	121 $\pm$ 39	123 $\pm$ 44	183 $\pm$ 47	196 $\pm$ 57	197 $\pm$ 55	223 $\pm$ 53
Selenium, μ g	23.2 $\pm$ 6.6	24.5 $\pm$ 8.2	35.3 $\pm$ 9.5	39.2 $\pm$ 12.1	39.1 $\pm$ 11.4	44.5 $\pm$ 12.9

¹ Breast fed 1-year-old children are not included.

%E = % of total energy; SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids.

was below the recommended level. The majority of the children in that age group had inadequate intake of vitamin D. The intakes of vitamin E and iron were also below the recommendations. Use of supplements, apart from vitamin D, was uncommon among the children of this study [Kyttälä et al., 2008].

Adolescents

The report of nutrition and wellbeing of secondary school pupils was published in 2008 [Hoppu et al., 2008]. The objective of that study was to evaluate the eating habits, especially eating at school, in 7th and 8th grade school pupils (mean age 13.8 years). The study included 48-hour dietary interviews of 300 pupils. The dietary interview method was the same as in the National FINDIET Survey [Paturi et al., 2008].

Table 11.24 presents energy and nutrient intake of the study subjects. 40% of the girls and 28% of the boys consumed fresh vegetables daily. The proportion of energy derived from sucrose was higher and the intake of fiber, vitamin D, vitamin A and folate were below the recommendations. Around 20% of the daily energy intake was derived from the school lunch, compared to the recommended level of 33%. Approximately 25% of the girls and 33% of the boys reported eating all parts of the school lunch, which in addition to the main course included salad, bread and milk. In this study population, 20% of the boys and 28% of the girls reported using supplements, of which multivitamin tablets were the most common [Hoppu et al., 2008].

Adults and Elderly

The National FINDIET Surveys conducted by the National Public Health Institute of Finland have followed the dietary habits and nutrient intake of the adult Finnish population since 1982. The FINDIET Survey is a part of the National FINRISK Study that monitors chronic disease risk factors in Finland every fifth year. The first surveys were conducted in eastern Finland in the North Karelia and Kuopio provinces aiming to evaluate the effectiveness of the North Karelia Project. Later the surveys were also carried out in other parts of Finland. The basic study design has been the same during the follow-up period of 35 years [Peltonen et al., 2008; Paturi et al., 2008].

The latest FINRISK Study was conducted in 2007. The sample size was 11,953 persons aged 25–74 years, the response rate being 67%. The sample was a random sample from the Finnish Population Information System, stratified according to sex, 10-year age groups, and six geographical areas. From the participants in the FINRISK 2007, 33% were invited to participate in the FINDIET 2007 Survey. The 48-hour dietary recall data was collected by dietary interviewers. Every second interviewee was also asked to fill in a 3-day food record twice during the following year. A picture book of food portions was used to estimate portion sizes. The final number of the FINDIET 2007 Survey participants was 2,039 [Peltonen et al., 2008; Paturi et al., 2008].

Table 11.25 presents the daily intake of energy and nutrients of the study participants separately in two age groups aged 25–64 and 65–74 years. There were no major differences in the nutrient intake between the adults at working age and the older age

Table 11.24. Mean daily intake of energy and nutrients (mean $\pm$ SD) of Finnish **7th and 8th grade** secondary school **pupils** [source: Hoppu et al., 2008]

Nutrient	Girls (n = 170)	Boys (n = 136)	Recommendation ¹
Age, years	13.8	13.8	
Energy, MJ	6.7 $\pm$ 2.0	8.3 $\pm$ 2.3	9.5/10.8 MJ
Protein, %E	16.0 $\pm$ 3.0	16.7 $\pm$ 3.2	10–20%E
Carbohydrates, %E	54.1 $\pm$ 7.1	53.2 $\pm$ 7.0	50–60%E
Sucrose, %E	12.3 $\pm$ 6.4	13.0 $\pm$ 6.4	$\leq$ 10%E
Dietary fiber, g	16.6 $\pm$ 7.6	16.9 $\pm$ 7.7	3 g/MJ
Fat, %E	29.8 $\pm$ 6.9	30.0 $\pm$ 6.5	25–35%E
SFA, %E	11.5 $\pm$ 3.5	11.8 $\pm$ 3.4	10%E (incl. trans-fatty acids)
MUFA, %E	10.9 $\pm$ 3.0	10.9 $\pm$ 2.6	10–15%E
PUFA, %E	5.3 $\pm$ 1.7	5.2 $\pm$ 1.5	5–10%E
Trans-fatty acids, g %E	0.68 $\pm$ 0.44 0.37 $\pm$ 0.18	0.81 $\pm$ 0.40 0.36 $\pm$ 0.13	<1%E
n–3 fatty acids, g %E	2.1 $\pm$ 0.97 1.1 $\pm$ 0.44	2.5 $\pm$ 1.2 1.1 $\pm$ 0.38	1%E
Vitamin A, μ g	537 $\pm$ 472	524 $\pm$ 370	700/900 μ g
Vitamin D, μ g	5.0 $\pm$ 2.8	6.6 $\pm$ 3.8	7.5 μ g
Vitamin E, mg	7.1 $\pm$ 2.7	8.1 $\pm$ 3.1	8/10 mg
Thiamine, mg	1.1 $\pm$ 0.43	1.3 $\pm$ 0.58	1.2/1.5 mg
Riboflavin, mg	1.7 $\pm$ 0.67	2.2 $\pm$ 0.89	1.3/1.7 mg
Niacin, mg	22 $\pm$ 6.7	28 $\pm$ 10	15/20 mg
Vitamin B ₆ , mg	1.6 $\pm$ 0.59	2.1 $\pm$ 1.3	1.3/1.6 mg
Folate, μ g	190 $\pm$ 73	203 $\pm$ 69	300 μ g
Cobalamin, μ g	3.9 $\pm$ 2.4	5.3 $\pm$ 2.7	2 μ g
Ascorbic acid, mg	93 $\pm$ 60	87 $\pm$ 59	75 mg
Sodium, g	2.2 $\pm$ 0.70	2.8 $\pm$ 0.86	2.4/2.8 g
Calcium, mg	1,032 $\pm$ 428	1,273 $\pm$ 553	900 mg
Magnesium, mg	278 $\pm$ 89	325 $\pm$ 99	280/350 mg
Iron, mg	8.9 $\pm$ 3.1	10.4 $\pm$ 3.3	15/11 mg
Zinc, mg	9.4 $\pm$ 3.0	12.0 $\pm$ 3.8	9/12 mg
Iodine, μ g	190 $\pm$ 67	248 $\pm$ 86	150 μ g
Selenium, μ g)	51 $\pm$ 16	67 $\pm$ 21	40/50 μ g

¹ National recommendation for girls/boys [Finnish Nutrition Recommendations, 2005, Finnish Nutrition Recommendations for School Nutrition, 2008].

%E = % of total energy; SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = poly-unsaturated fatty acids.

Table 11.25. Mean daily intake of energy and nutrients (mean $\pm$ SD) of Finnish adults aged **25–64 and 65–74 years** [source: Paturi et al., 2008]

Nutrient	Women 25–64 years (n = 846)	Men 25–64 years (n = 730)	Women 65–74 years (n = 234)	Men 65–74 years (n = 229)	Recommendation ¹
Age, years	45.2	46.2	68.9	68.9	
Energy, MJ	6.8 $\pm$ 2.0	9.2 $\pm$ 3.0	5.9 $\pm$ 1.7	7.7 $\pm$ 2.3	8.1–10.7/10.4–13.8 MJ
Protein, %E	17.2 $\pm$ 4.1	16.8 $\pm$ 3.7	17.6 $\pm$ 3.4	17.4 $\pm$ 3.8	10–20%E
Carbohydrates, %E	50.2 $\pm$ 8.3	47.1 $\pm$ 8.8	51.2 $\pm$ 8.0	49.7 $\pm$ 8.9	50–60%E
Sucrose, %E	10.5 $\pm$ 5.1	9.7 $\pm$ 5.9	9.3 $\pm$ 5.1	9.3 $\pm$ 5.6	$\leq$ 10%E
Dietary fiber, g	16.6 $\pm$ 7.6	16.9 $\pm$ 7.7	21.0 $\pm$ 9.0	24.0 $\pm$ 10.0	3 g/MJ
Fat, %E	31.2 $\pm$ 7.4	33.1 $\pm$ 7.9	30.4 $\pm$ 7.3	31.4 $\pm$ 7.9	25–35%E
SFA, %E	12.0 $\pm$ 3.9	12.9 $\pm$ 4.1	11.4 $\pm$ 3.9	12.0 $\pm$ 4.5	10%E (incl. trans-fatty acids)
MUFA, %E	10.9 $\pm$ 3.2	12.0 $\pm$ 3.9	10.4 $\pm$ 3.2	11.1 $\pm$ 3.5	10–15 E
PUFA, %E	5.7 $\pm$ 2.2	5.9 $\pm$ 2.2	5.6 $\pm$ 1.9	5.7 $\pm$ 2.0	5–10%E
Trans-fatty acids, g %E	0.7 $\pm$ 0.5 0.4 $\pm$ 0.2	1.0 $\pm$ 0.6 0.4 $\pm$ 0.2	0.6 $\pm$ 0.5 0.4 $\pm$ 0.2	0.8 $\pm$ 0.5 0.4 $\pm$ 0.2	<1%E
n–3 fatty acids, g %E	2.2 $\pm$ 1.2 1.2 $\pm$ 0.5	3.1 $\pm$ 1.8 1.2 $\pm$ 0.6	2.7 $\pm$ 1.7 1.2 $\pm$ 0.5	2.1 $\pm$ 1.1 1.2 $\pm$ 0.6	1%E
Vitamin A, μ g	690 $\pm$ 692	963 $\pm$ 1,397	770 $\pm$ 1,150	836 $\pm$ 1097	700/900 μ g
Vitamin D, μ g	5.2 $\pm$ 4.2	7.1 $\pm$ 5.7	6.5 $\pm$ 4.6	9.0 $\pm$ 8.2	7.5 μ g
Vitamin E, mg	8.1 $\pm$ 3.7	10.3 $\pm$ 4.8	7.3 $\pm$ 3.2	8.7 $\pm$ 3.9	8/10 mg
Thiamine, mg	1.1 $\pm$ 0.4	1.5 $\pm$ 0.6	1.0 $\pm$ 0.4	1.3 $\pm$ 0.5	1.1/1.5 mg
Riboflavin, mg	1.6 $\pm$ 0.6	2.1 $\pm$ 0.9	1.5 $\pm$ 0.6	1.8 $\pm$ 0.8	1.3/1.7 mg
Niacin, mg	26 $\pm$ 8	35 $\pm$ 12	23 $\pm$ 7	30 $\pm$ 11	15/20 mg
Vitamin B ₆ , mg	1.7 $\pm$ 0.6	2.1 $\pm$ 0.9	1.5 $\pm$ 0.7	2.0 $\pm$ 1.2	1.2/1.6 mg
Folate, μ g	226 $\pm$ 88	270 $\pm$ 120	210 $\pm$ 96	234 $\pm$ 102	300 μ g
Cobalamin, μ g	4.5 $\pm$ 3.4	6.6 $\pm$ 6.5	5.2 $\pm$ 4.8	6.5 $\pm$ 6.0	2 μ g
Ascorbic acid, mg	118 $\pm$ 82	98 $\pm$ 88	97 $\pm$ 68	92 $\pm$ 72	75 mg
Sodium, g	2.4 $\pm$ 0.8	3.3 $\pm$ 1.2	2.3 $\pm$ 0.7	3.1 $\pm$ 1.3	2.4/2.8 g
Calcium, mg	1,007 $\pm$ 450	1,202 $\pm$ 592	900 $\pm$ 426	1,032 $\pm$ 521	800 mg
Magnesium, mg	340 $\pm$ 102	428 $\pm$ 134	313 $\pm$ 95	379 $\pm$ 115	280/350 mg
Iron, mg	10.3 $\pm$ 3.4	13.6 $\pm$ 5.7	9.9 $\pm$ 3.6	12.6 $\pm$ 5.6	15/9 mg
Zinc, mg	10.0 $\pm$ 3.3	13.6 $\pm$ 4.8	9.4 $\pm$ 2.9	12.3 $\pm$ 4.3	7/9 mg
Iodine, μ g	194 $\pm$ 121	253 $\pm$ 220	182 $\pm$ 62	226 $\pm$ 94	150 μ g
Selenium, μ g	54 $\pm$ 19	73 $\pm$ 27	49 $\pm$ 17	66 $\pm$ 26	40/50 μ g

¹ National recommendation for 18–60 years old women and men [Valtion ravitsemusneuvottelukunta, 2005].

%E = % of total energy; SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids.

group. The total intake of energy from fat was 33% in men and 31% in women. As in adolescents, the intake of vitamin D and folate were below the recommendations.

Although salt intake has decreased in the last decades, it is still higher than recommended. Among the whole sample, 33% of men and 52% of women used supplements. The use of supplements was poorly targeted; those who took supplements had already a higher intake of vitamins and minerals from foods as compared to those who did not use supplements. According to this survey, the dietary habits of the adult Finnish population have headed in a positive direction overall. The most important issues researchers of the FINDIET 2007 Survey highlighted were quality of fat, high intake of salt, and intake of folate and vitamin D, which did not meet recommendations. The authors concluded that a diet comprised of more whole grains, fish, vegetables, fruit, and berries, and less of foods containing high levels of sucrose and saturated fats would also help to increase the intake fiber and cut down the intake of sucrose [Paturi et al., 2008].

Use of alcohol has increased considerably in Finland over the last four decades, and the consumed amount has about quadrupled since the early 1960s. The alcohol consumption is unevenly distributed [Mustonen et al., 1999]. A small part of the population does not drink at all, a large part drinks, but most of them moderately, and only a small part excessively. Over the past three decades the distribution of alcohol consumption has only slightly evened out. The top 10% of males and females drink the most, accounting for about 40–50% of all alcohol consumed by the population. According to the latest statistics, the overall alcohol consumption per inhabitant in 2008 was approximately 10.4 liters and decreased for the first time since 1970s [Valvira, 2009].

Vitamin D fortification in Finland

Fortification of fluid milks and margarines with vitamin D was made mandatory in Finland in 2003–2004. The researchers from the Turku University Central Hospital investigated the effect of fortification on dietary intake and on blood levels of 25-hydroxyvitamin D (25-OHD₃), the inactive storage form of the vitamin, in Finnish 4-year-old children [Pirainen et al., 2007]. They found that average vitamin D intake was higher in the group studied after the introduction of fortification than in the children before mandatory fortification (4.5 vs. 2.1 µg/day). Two other Finnish studies examined the impact of vitamin D fortification on serum 25-OHD₃ concentrations among 12- to 15-year-old females [Lehtonen-Veromaa et al., 2008] and 18- to 21-year-old males [Välimäki et al., 2007]. Both studies concluded that fortification of milk products slightly but insufficiently improved the poor vitamin D status of young Finnish adolescents during winter. Among 18- to 28-year-old men, Laaksi et al. [2006] found that the mean serum 25-OHD₃ concentrations during the winter-time increased by 50% after implementation of the vitamin D fortification of dairy products and the prevalence of vitamin D insufficiency (<40 nmol/l) decreased from 78% in January 2003 to 35% in January 2004. Lamberg-Allardt et al. [2006] evaluated the effect of expanded fortification by comparing vitamin D intake and status in the

Finnish population in 2002 to the situation in 2004, one year after the fortification had started. The subjects studied were 4 to 76 years of age and 70% of them were female (n = 630). They found that fortification improved vitamin D status, as in 2004 21% had inadequate (<50 nmol/l), 37% had adequate, and 42% had optimal vitamin D status, whereas in 2002 the corresponding distribution was 38, 38 and 24%, respectively. They concluded that a diet based on the current dietary guidelines is sufficient to provide enough vitamin D, but if the consumption of vitaminized milk products is <500 g/day and fish intake fewer than twice a week, the use of supplements should be encouraged at least during the winter season.

Health Indicators and Status in Finnish Population

According to the FINRISK 2007 Study, serum total cholesterol levels have declined since 1972. There was a leveling-off period between 1997 and 2002, but in the past 5 years serum cholesterol concentrations have again declined by about 5% now being 5.39 mmol/l in 30- to 59-year-old men and 5.18 mmol/l in women. Blood pressure has declined since 1972, but the decline seems to have leveled off during the past 5 years. Possible reasons for that are increases in obesity level and alcohol consumption. The prevalence of smoking among men has declined for decades, and this has now been shown also for women. Mean BMI and the prevalence of obesity have increased both in men and women in recent decades. In 2007, mean BMI was 27.2 kg/m² in men and 26.5 kg/m² in women. The prevalence of obesity (BMI ≥30 kg/m²) among men and women was 21% in 2007. There has been also a steady increase in the waist circumference both in men and women. In contrast, favorable changes in self-reported health status, leisure-time physical activity, physical fitness and quality of life in the general population have been observed [Peltonen et al., 2008].

Conclusions

According to the FINDIET 2007 Survey, the dietary habits of the adult Finnish population have headed in a positive direction overall [Paturi et al., 2008]. In 2008, the total alcohol consumption per inhabitant decreased for the first time since the 1970s [Valvira, 2009]. Despite these positive findings there is still room for improvement. The intake of saturated fat is still more than recommended, and there is a need to increase intake of folate and vitamin D, which are below the recommendations.

Vitamin D is synthesized in the body on exposure to sunlight and only small amounts can be obtained from food. However, studies have shown that sunshine levels in northern countries are so weak during the winter months that the body makes no vitamin D at all, leading some researchers to estimate that 30–50% of the population in such countries have insufficient or deficient levels of the vitamin [Holick and Chen, 2008]. Results of published Finnish studies show that at the population level, national fortification safely improved vitamin D levels [Laaksi et al., 2006; Lamberg-Allardt et al., 2006; Piirainen et al., 2007; Välimäki et al., 2007; Lehtonen-Veromaa et al., 2008]. There is increasing evidence that vitamin D may be protective against

several other diseases besides those related to bone health. Therefore, new innovative and feasible ways of improving vitamin D nutrition among those who are not consuming enough milk products and fish are urged also in Finland.

More attention should also be paid to the constantly growing obesity problem in Finland. It is the fundamental question in public healthcare how to decrease prevalence of obesity and type 2 diabetes in Finland. The Development Program for the Prevention and Care of Diabetes (DEHKO 2000–2010) is Finland's national diabetes program (http://www.diabetes.fi/sivu.php?artikkeli_id=831). It aims to prevent type 2 diabetes and diabetes-related complications, to improve the quality of diabetes care, and to support the self-care of people with diabetes. Such a program has been adopted as a model for creating and implementing national programs in some other European countries. It is evident that at the population level, excess energy intake will be the most important dietary challenge during the following years also in Finland.

11.7 France⁷

Adherence to Nutritional Guidelines in France: The French Nutrition and Health Survey 2006–2007

Background

As most industrialized countries, France is affected by increasing prevalence of overweight and obesity [Charles et al., 2008] and obesity-related diseases. In 2005, over 155,000 people died from cancer and 149,000 from cardiovascular diseases (CVD) [Belot et al., 2008]. In 2001, the French Ministry of Health implemented the National Nutrition and Health Program (PNNS) [Hercberg et al., 2008]. Its main objective is to improve the state of health of the population by acting on nutrition. The PNNS is based on nine priority health objectives which focus on food consumption (increase consumption of fruits and vegetables, calcium, etc.), nutritional status (reduce average adult LDL cholesterol levels, average adult systolic blood pressure and the prevalence of overweight and obesity among adults and stabilize the increase of childhood overweight prevalence) and physical activity (increase daily physical activity). Besides, ten specific nutritional objectives focus on special population groups (elderly, children, pregnant and lactating women, and socially disadvantaged people).

Prior to the establishment of the PNNS, existing data on French population nutritional status were rarely comparable: they usually came from specific surveys (clinical trials, longitudinal studies, etc.) or one-time studies. Moreover, these surveys were often regional and used heterogeneous data collection methods. Therefore, in

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the framework of the PNNS, a national monitoring system has been implemented in order to evaluate the nutritional status of the population living in France. The French Institute for Public Health Surveillance (InVS), in partnership with the Conservatoire National des Arts et Métiers (CNAM) and the University of Paris 13, have created a Surveillance and Nutritional Epidemiology Unit (USEN) which is intended to (1) conduct the monitoring of nutritional status of the population, (2) evaluate the effectiveness of adopted measures with regard to the PNNS objectives, and (3) support the standardization of data collection methods. The monitoring system primarily focuses on a large general population study, the National Nutrition and Health Survey (ENNS), first carried out in 2006/2007 and planned to be repeated. The surveillance plan is completed by other studies carried out in specific populations: infants <1 year old, populations receiving food aid, elderly persons living in institutions.

The French Nutrition and Health Survey 2006/2007 (ENNS)

The ENNS included a food consumption survey and a health examination realized in a health center of the French National Health Insurance System (CNAM-TS) or at home. Methods have been described elsewhere [Castetbon et al., 2009]. Briefly, ENNS was based on a three-degree sampling plan: selection of 190 geographical zones on the whole French continental territory, random selection of households, and finally random selection of one adult or child. Food intake was assessed by trained dietitians using three 24-hour recalls, randomly distributed within a period of 2 weeks. Sociodemographic and behavioral characteristics were collected through a face-to-face questionnaire and health examinations were carried out by trained physicians, nurses or dietitians. Physical activity level was assessed using the International Physical Activity Questionnaire (IPAQ) (15–74 years) and questionnaires adapted to the age (3–15 years). Weight and height were measured in children. In adults, the health examination included anthropometry (weight, height, waist and hip circumferences) and blood pressure measurements. A venous blood sample was drawn. Among subjects who were contacted and eligible, 62.3% accepted to participate in the survey (adults 59.7%, children 67.9%). Analyses were carried out on 3,115 adults 18–74 years and 1,675 children 3–17 years with at least two 24-hour recalls. In addition, 96.7% of children were measured for weight and height. Among adults, 77.5% underwent anthropometry measurements and for 67.5%, a blood sample was drawn.

Food intake (in g) proportions of adherence to nutritional guidelines disseminated through the PNNS since 2001 were assessed. In adults, food consumption was described in 2,734 subjects after exclusion of diet underreporting subjects (12.2%), using the method and the equations proposed by Black [2000] and Schofield [1985]. Probabilities of inclusion and potential participation bias have been taken into account by calibration on age, diploma, whether household includes or not at least 1 child and period of collection data, using French census data. Analyses were carried out using STATA® V.10 (Stata Corp., College Station, Tex., USA).

Table 11.26. Proportion of inadequate nutrient intake according to the PNNS objectives in children aged **3–17 years**. French Nutrition and Health Survey (ENNS) 2006–2007

Nutrient intake	Boys		Girls	
	%	CI ₉₅	%	CI ₉₅
Total carbohydrate, % $\leq 50\%$ EI	55.9	51.5–60.3	57.9	53.5–62.3
Complex carbohydrate, % $< 27.5\%$ EI	66.4	62.1–70.7	73.8	69.9–77.6
Simple sugar, % $\geq 12.5\%$ EI	58.5	54.2–62.8	54.5	50.2–58.9
Total fat, % $\geq 35\%$ EI	55.1	50.7–59.5	57.5	53.1–61.8
Saturated fatty acids, % $\geq 35\%$ total lipids	89.8	86.7–92.9	90.0	87.3–92.7
Calcium, % $< 2/3$ RDA	22.6	18.9–26.3	35.3	31.1–39.5

EI = Energy intake without alcohol, RDA = recommended dietary allowance.

Nutritional Status of Children

In children, food consumption was characterized by rather high lipid intake, especially saturated fatty acids (table 11.26): 90.0% of children were above the recommendation regarding SFA intake. Children food consumption was also characterized by low fruit and vegetable intake (table 11.27): 79.6% consumed < 5 daily servings of fruits and vegetables, and 57.6% were ‘low consumers’ (< 3.5 servings of fruits and vegetables). Low fruit and vegetable consumption was associated with low education level of parents, occupation status and household income. Some food groups, like sweetened foods (35.8% of children consumed > 125 ml of sweetened beverages daily), will probably deserve more attention during the years to come.

Nutritional Status of Adults

In adults, food consumption was characterized by an insufficient carbohydrate intake (particularly complex carbohydrates) and high fat intake, especially saturated fat intake (table 11.28). Intake of fiber was low: 86.2% of adults consuming less than the recommended 25 g/day. Regarding bread, cereal, legume and potato consumption (table 11.29), 42.3% of adults consumed < 3 servings a day which could contribute to explain the low intake of complex carbohydrates and fiber. In women, the low intake of calcium (31.6% of women did not reach the recommendation) was related to low intake of dairy products (56.3% of women consumed < 2.5 servings a day). Seafood intakes were also insufficient: 70.1% of adults consume < 2 weekly servings. Food consumption was also characterized by rather low fruit and vegetable intake: 56.2% of adults consumed < 5 daily servings recommended and 34.1% < 3.5 daily servings. However, some food consumption characteristics are positive such as mean salt

Table 11.27. Proportion of inadequate nutrient intake according to the PNNS dietary recommendations in children aged **3–17 years**. French Nutrition and Health Survey (ENNS) 2006–2007

Nutrient intake	Boys		Girls	
	%	CI ₉₅	%	CI ₉₅
Fruits and vegetables, % <400 g/day	79.0	75.8–82.2	80.2	76.7–83.7
Dairy products ²				
% <2.5 servings/day	41.4	37.0–45.7	52.3	47.9–56.7
% >3.5 servings/day	11.5	9.1–14.0	7.3	5.2–9.5
Meat, poultry, seafood and eggs				
% <1 serving/day	19.1	15.5–22.8	30.9	26.8–35.0
% >2 servings/day	32.1	28.0–36.2	23.5	19.5–27.4
% seafood <2 servings/week	69.6	65.4–73.8	74.1	70.2–77.9
Bread, cereals, legumes, potatoes				
% <3 servings/day	57.3	53.0–61.6	72.2	68.4–76.1
% ≥6 servings/day	3.8	2.2–5.3	0.6	0.0–1.3
Home-added fat (butter, oils, margarine), % ≥16%EI	3.6	1.5–5.6	3.8	2.3–5.3
Sweetened beverage, % >125 ml/day	38.7	34.4–43.1	32.7	28.4–36.9
Salt ³ , ≥8 g/day	26.4	22.8–30.0	13.9	11.0–16.8

¹ Including 100% juices, processed fruits and vegetables, excluding legumes, beans, starchy food and potatoes.

² Excluding desserts with high contents of sugar and fat.

³ Including salt added when cooking and during meals.

Table 11.28. Proportion of inadequate nutrient intake according to the PNNS objectives in adults aged **18–74 years**. French Nutrition and Health Survey (ENNS) 2006–2007

Nutrient intake	Men		Women	
	%	CI ₉₅	%	CI ₉₅
Total carbohydrate, % ≤50%EI	71.9	68.0–75.7	75.3	72.5–78.0
Complex carbohydrate, % <27.5%EI	55.9	51.7–60.0	72.2	69.4–75.0
Simple sugar, % ≥12.5%EI	25.9	22.1–29.6	25.1	22.2–28.1
Total dietary fiber, % ≤25g/day	80.7	77.6–83.8	91.6	90.1–93.2
Total fat, % ≥35%EI	64.3	60.3–68.2	62.3	59.2–65.4
Saturated fatty acids, % ≥35% total lipids	83.0	79.8–86.2	80.0	77.5–82.4
Calcium, % <2/3 RDA	15.4	12.3–18.4	31.6	28.6–34.5

EI = Energy intake without alcohol, RDA = recommended dietary allowance.

Table 11.29. Proportion of inadequate food intake according to the PNNS dietary recommendations in French adults aged **18–74 years**. French Nutrition and Health Survey (ENNS) 2006–2007

Nutrient intake	Men		Women	
	%	CI ₉₅	%	CI ₉₅
Fruits and vegetables ¹ , % <400 g/day	56.3	52.3–60.4	56.1	53.0–59.1
Dairy products ²				
% <2.5 servings/day	43.9	39.8–48.0	56.3	53.2–59.4
% >3.5 servings/day ³	20.9	18.7–23.0	8.5	6.9–10.0
Meat, poultry, seafood and eggs				
% <1 serving/day	19.7	16.3–23.2	37.1	34.1–40.2
% >2 servings/day	29.1	25.4–32.8	9.3	7.5–11.1
% seafood < 2 servings/week	72.0	68.5–75.5	67.5	64.8–70.5
Bread, cereals, legumes, potatoes				
% <3 servings/day	24.3	20.7–28.0	60.0	57.0–63.0
% ≥6 servings/day	15.6	12.5–18.6	2.0	1.1–3.0
Home added fat (butter, oils, margarine)				
% ≥16%EI	13.0	10.2–15.9	18.1	15.8–20.5
Sweetened beverage, % >250 ml/day	15.1	11.7–18.6	7.7	5.5–9.9
Alcoholic beverage				
% consumers	86.8	83.6–90.0	72.7	69.7–75.6
% consumers ⁴ ≥20 g/day (women) and 30 g/day (men)	23.0	19.2–26.8	8.4	6.6–10.3
Salt ⁵ , ≥8 g/day	70.2	66.3–74.1	30.2	27.4–32.9

¹ Including 100% juices, processed fruits and vegetables, excluding legumes, beans, starchy food and potatoes.

² Excluding desserts with high contents of sugar and fat.

³ % <2.5 or >4.5 servings/day in 55–t o 74-year-old adults.

⁴ Non-consumers excluded.

⁵ Including salt added when cooking and during meals.

intake in the general population (50.1% of adults consuming <8 g/day) and especially in women (30.2% of them consuming >8 g/day).

Conclusion

The French nutritional situation would appear to be intermediate between a protective Mediterranean diet in southern Europe and a northern European diet, with positive elements and less favorable ones. In French adults, the prevalence of overweight and obesity is low compared to that in the UK and eastern European countries [Vernay et al., 2009]. A stabilization of the prevalence of overweight and obesity has

been observed in 7- to 9-year-old children between 2000 and 2007 [Salanave et al., 2009]. Lifestyle, culinary habits and healthy attitudes in general, mainly depending on socioeconomic status, appear to play a major role in the prevalence of obesity [Pettinger et al., 2004]. Therefore, it is of importance to pursue a public health plan such as PNNS and a continuous monitoring system on nutrition.

11.8 Germany⁸

Introduction

Two national surveys were conducted in Germany to assess current data on energy and nutrient intake as well as other health-related aspects of the German population. The German Health Interview and Examination Survey for Children and Adolescents is specialized in children and adolescents aged 0–17 years and the German National Nutrition Survey II (NVS II) provides comprehensive data about adults aged 14–80 years. The essential characteristics of each survey will be presented in the subsequent sections.

The German Health Interview and Examination Survey for Children and Adolescents

The German Health Interview and Examination Survey for Children and Adolescents (KiGGS) is a nationwide, representative survey which was conducted by the Robert Koch Institute, Berlin. The aim was to collect comprehensive data about the health status of children and adolescents in Germany aged 0–17 years [Kamtsarius et al., 2007].

Altogether 17,641 children and adolescents, among them 8,656 girls and 8,985 boys, were medically examined and interviewed together with their parents from May 2003 to May 2006 at 167 study locations. The participants were randomly selected from the official registers of local resident' registration offices. The participation rate was 66.6%. The survey was financed by the Federal Ministry of Health (BMG) and the Federal Ministry of Education and Research (BMBF) [Kamtsarius et al., 2007].

The examination program was adapted according to age groups and consisted of a questionnaire filled in by parents and additionally questionnaires for children (11 years and older), physical examinations and tests, a computer-assisted personal interview as well as a collection of blood and urine samples [Hölling et al., 2007].

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The core survey was completed by three other modules which investigated specific topics using subsamples and focus on mental health, motor fitness and physical activity as well as environmental exposures [Kurth et al., 2002].

In a further module of KiGGS the dietary behavior of a randomized subsample of children and adolescents of 6- to 17-year-olds was assessed between January and December 2006. The study, named EsKiMo (Eating Study as a KiGGS Module), was performed by the Robert Koch Institute together with the Division of Nutrition and Consumer Education at the University of Paderborn. It was funded by the Federal Ministry of Food, Agriculture and Consumer Protection. Parents of participants <12 years were asked to conduct a 3-day dietary record. Participants of ≥ 12 years were personally interviewed about their eating behavior during the last 4 weeks using DISHES (Dietary Interview Software for Health Examination Studies). Furthermore, they were asked to fill in a food frequency questionnaire which was already used in the core module. Additional data were collected for sociodemographic background, leisure-time activities, supplement use, meals at school, body weight and height of all participants [Mensink et al., 2007a].

The German Nutrient Database version II.3 (BLS II.3) was used for data analysis of energy and nutrient intake. To analyze food consumption data as detailed as possible further data regarding fortification of vitamins and minerals were needed. Therefore, nutrient facts of special food groups (e.g. confectionary, dairy products, breakfast cereals and fast food) were collected and a new database filled with 1,225 food items was built [Mensink et al., 2007b].

The German National Nutrition Survey II

NVS II is a nationwide representative study. The Federal Ministry for Food, Agriculture and Consumer Protection commissioned the Max Rubner Institute for this purpose aiming at providing current, reliable and representative data of food consumption of the German population for nutrition policymaking. The first National Nutrition Survey was carried out 20 years ago and at that time only the western part of Germany was considered. Furthermore, major changes have occurred in the German society with respect to food availability, nutritional habits as well as diversification of working conditions, leisure-time activities and consumer behavior since the first survey was carried out.

The objectives of the NVS II were: (1) to collect current representative data on food consumption, energy and nutrient intake as well as nutritional behavior of the German population; (2) to improve existing dietary assessment methods; (3) to provide a revised version of the German Nutrient Database (BLS), and (4) to implement a National Nutrition Monitoring in Germany.

About 20,000 German-speaking women and men between 14 and 80 years of age living in private households were interviewed between November 2005 and January 2007. Interviews were conducted in 500 nationwide sample points, which were selected

considering the proportion of the population living in each Federal State. The participants were randomly chosen by age and sex with the aid of the local register offices of these 500 municipalities. To cover seasonal variations, the study was divided into four survey waves.

Several methods were applied to obtain a comprehensive description of food consumption and nutritional behavior. A Computer-Assisted Personal Interview (CAPI) and a questionnaire were applied to obtain data about sociodemographic variables, nutritional and buying behavior as well as health aspects (e.g. smoking behavior, physical activity, diseases).

Food and beverage consumption data were collected by use of a dietary history interview. The DISHES program (Diet Interview Software for Health Examination Studies), developed by the Robert Koch Institute in Berlin [Mensink et al., 1998, 2001], was updated and adapted for the purpose of the NVS II. With this method, frequency of the meals as well as kind and amount of foods and beverages consumed over the last 4 weeks were obtained.

In the following weeks after conducting the dietary history interviews the participants were twice asked about their nutrition by phone using 24-hour recalls ($n = 13,926$). For this purpose the program EPIC-SOFT was used. EPIC-SOFT was developed within the scope of the cohort study 'European Prospective Investigation into Cancer and Nutrition' (EPIC) [Slimani et al., 1999, 2000].

A subsample of the participants ($n = 1,021$) completed a 4-day dietary weighing record twice. The participants weighed all foods they ate and drank during the protocol time. The dietary weighing records allow determining precise consumption quantities to define up-to-date portion sizes.

Body weight and body height of 14,331 participants could be measured. Participants were weighed wearing light clothes and without shoes. A calibrated scale (Seca Vogel & Halke, Hamburg, Germany) with a precision of 0.1 kg was used. Accounting for the clothes, 1 kg was subtracted from the measurement. Body height was measured at upright standing participants without shoes using a portable Harpenden Stadiometer (Holtain Ltd, Crymych, UK) with a precision of 0.1 cm.

The energy and nutrient intake was calculated by linking food and beverage consumption data with the German Nutrient Database (BLS). Food items especially needed for the analysis of the NVS II were reviewed and updated or newly incorporated in the BLS. Therefore, fortified and energy-reduced food items were incorporated, recipes were reviewed for fat and salt contents and names were adapted. For analysis of energy and nutrient intake out of the dietary history interviews, a preliminary version of the BLS II.4 was used [Max Rubner Institute, 2008b].

Data were weighted with regard to the data of the official representative statistics for different aspects like gender, age, region, employment, school education and month of interview to correct for selection bias [Max Rubner Institute, 2008a].

From the total number of subjects approached ($n = 46,587$) 19,329 women and men agreed to participate. This corresponds to a response rate of 42%.

Table 11.30. Prevalence of underweight, normal weight, overweight and obesity according to socioeconomic status, 6,117 men 18–80 years (weighted data)

		Underweight	Normal weight	Overweight	Obesity
Lower	n	7	96	126	89
	%	2.6	37.0	36.4	24.0
	CI	1.4–4.3	32.3–41.3	31.7–40.6	20.1–27.9
Lower middle	n	5	209	350	228
	%	1.0	29.8	43.8	25.3
	CI	0.5–1.8	26.8–32.6	40.3–46.8	22.5–28.0
Middle	n	14	506	834	389
	%	0.7	30.7	47.2	21.4
	CI	0.4–1.2	28.5–32.7	44.6–49.3	19.5–23.2
Upper middle	n	10	607	812	365
	%	0.6	34.2	45.0	20.3
	CI	0.3–1.0	31.7–36.4	42.2–47.3	18.3–22.2
Upper	n	6	525	722	217
	%	0.5	37.6	48.9	13.1
	CI	0.2–1.1	34.3–40.5	45.3–51.8	11.1–15.2

Selected Results from the German National Nutrition Survey II

Anthropometric Measurements According to Socioeconomic Status

Within the NVS II education, occupation of the main earner and household income were used to define socioeconomic status (SES) [Max Rubner Institute, 2008c].

In Germany, 66.0% of men and 50.6% of women are overweight or obese and even every fifth German citizen is obese (20.5% of men and 21.2% of women) [Max Rubner Institute, 2008a].

The prevalence of overweight and obesity among 6,117 men and 6,790 women (18 to 80 years) according to SES is shown in tables 11.30 and 11.31. The two lower socio-economic groups show the highest proportion of obesity for men (24.0 and 25.3%, respectively) and women (35.3 and 28.0%, respectively). With increasing SES, obesity strongly decreases, reaching levels in the upper SES group of 13.1% in men and 10.0% in women. Regression analysis shows a significant reduction of BMI with increasing SES in men and women ($p < 0.001$).

Table 11.31. Prevalence of underweight, normal weight, overweight and obesity according to socioeconomic status, 6,790 **women 18–80 years** (weighted data)

		Underweight	Normal weight	Overweight	Obesity
Lower	n	11	155	196	204
	%	2.0	29.4	33.3	35.3
	CI	1.1–3.3	25.8–32.8	29.5–36.8	31.4–38.8
Lower middle	n	18	338	334	299
	%	1.7	37.7	32.6	28.0
	CI	1.0–2.6	34.5–40.5	29.6–35.4	25.2–30.7
Middle	n	29	924	663	477
	%	1.4	44.6	31.9	22.1
	CI	0.9–2.0	42.2–46.7	29.7–33.9	20.2–23.9
Upper middle	n	50	1219	626	335
	%	2.4	56.5	26.9	14.2
	CI	1.8–3.2	53.6–58.8	24.6–29.0	12.6–15.9
Upper	n	23	800	264	125
	%	2.3	67.0	20.6	10.0
	CI	1.4–3.6	62.8–70.3	17.7–23.6	7.9–12.3

Energy and Nutrient Intake

The following results are based on 15,371 participants from whom dietary history data are available. In contrast, results presented in the chapter *Energy and Nutrient Intake* relate to 15,162 participants between 15 and 80 years of age, because data of the NVS II was recalculated according to the *European Nutrition and Health Report 2009* age groups to enable comparisons between the different European countries.

The median energy intake of adolescents, adults and elderly corresponds to the guiding value for energy intake valid for low physical activity of the German, Austrian and Swiss (D-A-CH) reference values for nutrient intake [D-A-CH, 2000]. The percentage of energy intake from fat is still too high for both women and men (women 35% and men 36%). In general, the median intake of most of the vitamins and minerals corresponds to the reference values or is above. However, intake levels of folate and vitamin D are below the recommendations for all age groups. In addition, the median intake of calcium of elderly women and men as well as female adolescents is clearly below the recommended intake level. In contrast, the median calcium intake of male adolescents corresponds to the recommendations. Adult men even exceed

the recommended intake of calcium, whereas the median intake of calcium of adult women corresponds to the recommendations. There are no differences in the median iron intake for women of all age groups. But the recommended intake level of iron for women up to the age of 50 is higher in comparison to that for older women (15 and 10 mg/day). Therefore, women up to the age of 50 are below the recommended iron intake whereas elderly women reach the recommendations. The median iron intake of men is above the recommended intake in all age groups.

Intake of Dietary Supplements

In the NVS II, 27.6% of the participants reported taking dietary supplements. This represents 4,261 people, 1,696 men (24.2%) and 2,565 women (30.9%). At ages between 25 and 80 years, women take supplements more frequently than men, whereas male adolescents between 14 and 18 years of age take supplements more frequently than female adolescents. In general, dietary supplements are taken more often with increasing age. Elderly men and women (65+ years) take the highest amount of dietary supplements (30.2% for men and 43.2% for women) [Max Rubner Institute, 2008a]. In Germany, the intake of dietary supplements shows a relation to SES. There is an increase of the intake of dietary supplements from middle SES to the upper SES group in women and men, respectively (30.1–33.7% for women and 18.8–28.4% for men) [Max Rubner Institute, 2008c].

Summary

NVS II provides current information on food consumption, energy and nutrient intake as well as on lifestyle and eating behavior of the German population. In total, 19,329 women and men aged 14 to 80 years participated in the study. Women and men with lower SES show a higher percentage of obesity in comparison to the other groups. In general, the intake of most of the vitamins and minerals of the German population corresponds or is above the German reference values, but critical nutrients are folate and vitamin D for all age groups as well as calcium and iron for some age groups.

11.9 Greece⁹

Preamble

The present report summarizes current evidence on the dietary intake and health status of the Greek population with the aim to supplement the data presented for Greece in the European Nutrition and Health Report 2004 (<http://www.univie.ac.at/enhr>) [Elmadfa et al., 2004]. A single study examining dietary intake and health among representative samples of the population has not yet been undertaken. Information can

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be derived from the nationally representative household budget survey data available in the DAFNE databank (<http://www.nut.uoa.gr/dafnesoftware/>), from studies undertaken in localized settings and limited population samples and from larger studies usually within the context of Greek participation in multicenter international projects.

The information presented in this report is based on studies: (a) published in PubMed from 2004 to 2009, (b) generally involving >200 participants and (c) referring to apparently healthy individuals. Several studies were retrieved and reported to the ENHR 2009 Coordinators, who made the final selection. The report is largely based on these selected studies, which are presented collectively, but grouped according to the age groups they refer to as these were defined in the European Nutrition and Health Report 2009.

The reader is reminded that evidence from these sources should be considered with caution, as the choice of study groups and measurement methods may differ between studies. Furthermore, the present document consists of the concise version of a more comprehensive Greek national report, available online (www.univie.ac.at/enhr).

Children 1–7 Years Old

According to the *Growth, Exercise and Nutrition Epidemiological* – GENESIS study, conducted in 2003–2004 among 2,374 children 1 to 5 years old, the mean energy intake (EI) was 17% higher than the estimated energy requirements of the total population [Institute of Medicine, 2005]. Overweight and ‘at risk of being overweight’ children, when compared to normal-weight ones, reported significantly higher EI overall. When compared with the estimated average requirements, 22 and 20% of children reported inadequate vitamin E and folate intake, respectively. Light to vigorous physical activity was limited among the very young children [Manios et al., 2008].

Children and Adolescents 10–15 Years Old

In their longitudinal study *among peri-adolescent Greek schoolchildren*, Koutedakis et al. [2005] reported age of being significantly positively associated with EI (both genders) and negatively associated with physical activity (boys). In the Physical Activity, Nutrition and Allergies in Children Examined in Athens (PANACEA) study survey of 700 children aged 10 to 12 years, Priftis et al. [2007] reported that 16% of boys and 17% of girls had very low physical activity. The average hours/day of ‘watching TV or playing video games’ was 2.3 for boys and 2.1 for girls.

In the study of Hassapidou et al. [2006], among 502 adolescents aged 11 to 14 years, overweight adolescents reported greater negative energy balance, lower energy and macronutrient intakes per kilogram of body weight and lower iron and niacin intakes compared to non-overweight adolescents. Papandreou et al. [2006], in their study among 6- to 15-year-old children, noted that boys generally had higher intakes of dietary fat, sugar, fiber, folate and vitamin B₁₂ than girls. According to their 2006 study in 276 randomly selected children, 8 to 12 years old, Hassapidou et al. [2009] reported that the prevalence of overweight and obesity was higher among boys than girls. Furthermore, overweight and obesity rates were significantly lower, whereas

Table 11.32. Dietary intake, BMI (mean $\pm$ SD) and distribution of smoking habits among males in Greece

	Name of the study				
	Students of Crete University ¹	ATTICA study ²	EPIC study (adults) (unpubl. EPIC results)	National survey on prevalence of obesity and abdominal fat distribution ³	EPIC study (elderly) (unpubl. EPIC results)
Year of data collection	1989–2001	2001–2002	1994–1999	2003	1994–1999
n	500	1,514	8,365	8,234	2,508
Age, years	22 $\pm$ 2	46 $\pm$ 13	47.2 $\pm$ 9.8	44.9 $\pm$ 25	69.7 $\pm$ 3.5
Dietary data					
Energy, kcal	2,493 $\pm$ 992	2,596 $\pm$ 337	2,490.8 $\pm$ 726.6		2,018.2 $\pm$ 600.6
Protein, %E	14.2 $\pm$ 4	15	14.1 $\pm$ 1.7		14.1 $\pm$ 1.7
Carbohydrates, %E	44.8 $\pm$ 9.7	36	37.9 $\pm$ 5.9		39.8 $\pm$ 6.0
Fat, %E	40.2 $\pm$ 8.5	46	45.0 $\pm$ 5.5		43.9 $\pm$ 5.4
SFA, %E	12.9 $\pm$ 3.8	11	12.7 $\pm$ 2.5		12.1 $\pm$ 2.6
MUFA, %E	17.1 $\pm$ 5.6	23	21.9 $\pm$ 4.0		21 $\pm$ 4.2
PUFA, %E	5.1 $\pm$ 2.7	7	6.4 $\pm$ 2.6		6.7 $\pm$ 3.1
Alcohol, %E			5.3 $\pm$ 5.9		4.5 $\pm$ 5.7
Cholesterol, mg	300.3 $\pm$ 221.6		282.9 $\pm$ 116.2		214.8 $\pm$ 96.4
Anthropometry and lifestyle choices					
BMI	24.5 $\pm$ 3.1	27.4 $\pm$ 4	28.2 $\pm$ 3.8	27.3 $\pm$ 4.8	28.2 $\pm$ 4.0
Smoking habits, %					
Non-smokers	61	34	19 to <42 years: 24 42 to <65 years: 24		31
Former smokers	7	15	19 to <42 years: 18 42 to <65 years: 33		46
Current smokers	32	51	19 to <42 years: 58 42 to <65 years: 43		23

SFA = Saturated; MUFA = monounsaturated; PUFA = polyunsaturated fatty acids.

¹ Mammas et al., 2004.

² Pitsavos et al., 2003; Panagiotakos et al., 2006; Arvaniti et al., 2006.

³ Kapantais et al., 2006.

energy, carbohydrate intakes and exercise were significantly higher among immigrant children compared to Greek ones.

Adolescents 15–19 Years Old

The VYRONAS cross-sectional survey of 2004–2005, among 2008 volunteers aged 12–17 years, reported that age was positively associated with the risk of being overweight or obese in both genders and obesity was more prevalent among adolescent boys than girls in all age groups [Kosti et al., 2007].

In the study of Tzotzas et al. [2008], among 14,456 Greeks aged 13 to 19 years, the prevalence of overweight and obesity was higher among males, but abdominal obesity was higher among females (21.7% for females, 13.5% for males). In agreement with previous findings, the prevalence of obesity, overweight and abdominal obesity were significantly lower among immigrant male adolescents than Greek ones.

Adults and Elderly

Unpublished results on nutrient intakes and lifestyle characteristics from the Greek EPIC study are jointly presented with results from the study among university students in Crete, the National Survey on Prevalence of Obesity and Abdominal Fat Distribution and the ATTICA study (tables 11.32, 11.33). The latter used the EPIC food frequency questionnaire for dietary data collection increasing thus the feasibility of comparisons. Furthermore, in the Greek EPIC cohort the prevalence of hypertension (measured twice on a single occasion and age-adjusted to the adult Greek population of 2001) was for men 40.2% and for women 38.9%; increased with age and was higher in rural areas and among individuals of lower education [Psaltopoulou et al., 2004]. In a subsample of the EPIC study, men had lower levels of total and HDL cholesterol but higher total/HDL cholesterol ratio (5.42), compared to women (4.58) [Benetou et al., 2000]. In the ATTICA study, 46% of male and 40% of female participants were hypercholesterolemic and 8% of males and 6% of females reported history of diabetes mellitus [Pitsavos, 2003].

Kapantais et al. [2006], based on self-reported nationwide data from 1,734 Greeks 20 to 70 years old, reported a higher prevalence of obesity and overweight among men, and abdominal obesity among women and in particular those >50 years. Among women, the prevalence of overweight and obesity increased with age.

Pregnancy and Breastfeeding

In their 2003 study of 200 pregnant women, Petrakos et al. [2006] concluded that total micronutrient intake was generally adequate, except for vitamin E and zinc. Nevertheless, diet alone was insufficient for the recommended intakes of folic acid, magnesium and iron.

Bakoula et al. [2007] in their 2000 study of 4,310 mothers reported that the full breastfeeding initiation rate was 23% and any breastfeeding initiation rate was 85%. A month postpartum, these percentages were 61 and 79% respectively.

Table 11.33. Dietary intake, BMI (mean $\pm$ SD) and distribution of smoking habits among females in Greece

	Name of the study				
	Students of Crete University ¹	ATTICA study ²	EPIC study (adults) (unpubl. EPIC results)	National survey on prevalence of obesity and abdominal fat distribution ³	EPIC study (elderly) (unpubl. EPIC results)
Year of data collection	1989–2001	2001–2002	1994–1999	2003	1994–1999
n	451	1,528	12,034	9,107	3,600
Age, years	22 $\pm$ 2	45 $\pm$ 13	48.5 $\pm$ 10	41.5 $\pm$ 11	69.3 $\pm$ 3.3
Dietary data					
Energy, kcal	1675 $\pm$ 673	2059 $\pm$ 300	1972.4 $\pm$ 581.4		1620.1 $\pm$ 491.7
Protein, %E	14.1 $\pm$ 4.8	14	14.39 $\pm$ 1.65		14.39 $\pm$ 1.75
Carbohydrates %E	46.7 $\pm$ 11.2	38	39.5 $\pm$ 5.4		41.8 $\pm$ 5.6
Fat, %E	39.4 $\pm$ 10.1	47	47.2 $\pm$ 4.7		45.3 $\pm$ 5.0
SFA, %E	12.9 $\pm$ 4.4	13	13.2 $\pm$ 2.6		12.3 $\pm$ 2.5
MUFA, %E	16.9 $\pm$ 6.6	23	22.9 $\pm$ 4.1		21.7 $\pm$ 4.4
PUFA, %E	4.5 $\pm$ 2.4	6	6.9 $\pm$ 2.9		7.0 $\pm$ 3.3
Alcohol, %E			1.24 $\pm$ 2.18		0.94 $\pm$ 2.05
Cholesterol, mg	205.3 $\pm$ 158.1		227.6 $\pm$ 92.3		173.4 $\pm$ 76.1
Anthropometry and lifestyle choices					
BMI, kg/m ²	22.7 $\pm$ 3.2	25.3 $\pm$ 5	28.6 $\pm$ 5.3	25.7 $\pm$ 5.2	30.6 $\pm$ 4.9
Smoking habits, %					
Non-smokers	64	54	19 to <42 years: 49 42 to <65 years: 79		95
Former smokers	6	7	19 to <42 years: 9 42 to <65 years: 6		3
Current smokers	30	39	19 to <42 years: 42 42 to <65 years: 15		2

SFA = Saturated; MUFA = monounsaturated; PUFA = polyunsaturated fatty acids.

¹ Mammas et al., 2004.

² Pitsavos et al., 2003; Panagiotakos et al., 2006; Arvaniti et al., 2006.

³ Kapantais et al., 2006.

Pechlivani et al. [2005] in their study of 1,603 mothers in Athens reported that 96.1% of women initiated breastfeeding. Exclusive breastfeeding was initiated in 19.1%, predominant breastfeeding in 7.2% and complementary breastfeeding in 69.8% of the cases.

Theofilogiannakou et al. [2006] in their study of 312 women reported that 90% of newborns were given breast milk substitutes one or more times within the first 2 days postpartum, while exclusive breastfeeding on the last day of hospital stay reached 85%. Breastfeeding was practiced by 55% and exclusive breastfeeding by 35% of women 40 days postpartum and 16 and 12% respectively at 6 months.

Ladomenou et al. [2007], in their study of 1,049 mothers in Heraklion, reported overall breastfeeding rates of 60.7, 35.3, 16.7 and 4.5%, at months 1, 3, 6 and 12, respectively, including 24.6, 17.2, 10.2 and 3.5% of exclusive breastfeeding at the same time points [Ladomenou, 2007].

Conclusion

In general, all research groups in Greece agree that contemporary food choices gradually deviate from the traditional Mediterranean ones. The health status of the Greek population is generally adequate, but the previously reported Greeks' advantage tends to obliterate, because of the smoking and obesity epidemics, the abandoning of regular physical activity, the inadequate control of hypertension and diabetes and the gradual depart from traditional food choices.

Within this context, in 1999 the Supreme Health Council formulated dietary guidelines for Greek adults [Ministry of Health and Welfare, 1999]; in 2005, the Ministry of Health and Social Solidarity established the 2nd National Breastfeeding Committee, and previously in 2002, the National Nutrition Policy Committee was established with the following priorities: (1) reduce childhood obesity; (2) increase the consumption of pulses and vegetables; (3) reduce meat and increase fish consumption; (4) increase consumers' awareness on food safety and quality, and (5) improve mass catering services, with the application of food quality principles.

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11.10 Hungary¹⁰

National Dietary Surveys in Hungary

During the last 20 years three national dietary surveys of adult population have been performed in Hungary. The 1st Hungarian Representative Nutrition Survey (HRNS)

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[Bíró, 1992] was carried out in 1985–1988 and the 2nd Hungarian Nutrition Survey (HNS) [Bíró, 1996] in 1992–1994. Methods and results were published in the ENHR 2004 [Elmadfa et al., 2004]. The 3rd Hungarian Nutrition Survey (HNS) was performed in 2003–2004 [Rodler et al., 2005; Bíró et al., 2007; Zajkás et al., 2007]. Data collection of this study was done in November/December 2003, analysis and evaluation of data were carried out in 2004. Of the interviewed 5,071 people, 1,362 sent back the completed 3-day dietary record of which 1,179 could be evaluated.

Besides there was a national representative survey on nutrition and lifestyle of secondary school students (National Representative Survey in Secondary Schools (NRSecS); $n = 6,347$; 15 to 18 years old) in 1997–2000 [Antal et al., 2003]. Apart from these studies a representative survey in metropolitan primary and secondary schools was carried out in 2005/2006 (Representative Survey in Metropolitan Primary and Secondary Schools (RSMPS); $n = 1,930$ 7 to 14 years old and $n = 1,273$ 15 to 19 years old) [Péter et al., 2007; Bíró et al., 2007].

Two additional smaller surveys were performed, one to collect data on nutrition, lifestyle, serum vitamin D level and bone density in adolescents (Vitamin D status of Adolescents (VDSA); $n = 326$ students, 11 to 14 years old) in 2002/2003 [Antal et al., 2006]. In the other survey, cardiovascular risk factors were measured in 264 medical university students (Cardiovascular Risk Factors in University Students (CVRFUS); mean age 21.4 ± 2.6 years) in 2003 [Antal et al., 2006].

The above-mentioned surveys were carried out, analyzed, evaluated and published by the National Institute for Food and Nutrition Science (NIFNS), Hungary. The methods of the surveys are summarized in table 11.34.

Energy and Nutrient Intake

Children, Adolescents. The energy intake of 11- to 14-year-old boys was close to the recommended value, but it was insufficient in girls [Bíró et al., 2007]. The carbohydrate energy % (%E) was less, but the saccharose, fat and protein E%, and the cholesterol intake were higher than the Hungarian RDI. The dietary fiber intake was below the recommended value. The intake of vitamin A, D, riboflavin and folate was also insufficient, while sodium intake was 2.5 times higher, and the intake of phosphorus was higher by 25% (girls) and by 30% (boys) than the Hungarian RDI (for more detailed data, see chapter 7 in the main part of the ENHR 2009).

In the VDSA study it was revealed that the vitamin D intake of adolescents was far below the RDI. In addition, 33.3% of boys and 43.2% of girls had a calcium intake below 70% of RDI. Moreover, the bone density was insufficient in 12.9% of boys and 10.4% of girls.

Adults. Compared to the results of the two earlier nutrition surveys, the energy intake and the total fat %E in the 3rd HNS was smaller than in the two previous ones [Rodler et al., 2005] and much less than the estimated value of the food balance sheet (FBS) 2003 [Central Statistics Office, 2005]. There were only small differences in the %E of macronutrients, but %E of the added sugar and the SFA was much less in the

Table 11.34. Overview of the Hungarian nutrition surveys

Survey	Age group	Method	Year	Reference
1st HRNS	14+	24-hour recall	1985–1988	Bíró, 1992
2nd HNS	18+	3-day dietary record	1992–1994	Bíró et al., 1996
3rd HNS	18+	3-day dietary record	2003–2004	Rodler et al., 2005
NRSecS	14–18	FFQ	1997–2000	Antal et al., 2003
RSMPSS	7–14 and 15–19	3-day dietary record ¹	2005–2006	Bíró et al., 2007, Péter et al., 2007
VDSA	11–14	3-day dietary record	2002–2003	Antal et al., 2006
CVRFUS	Mean age 21.3 ± 2.6	–	2003	Antal et al., 2006

¹ Only in 11- to 14- and 15- to 19-year-old children.

Fig. 11.10. Trend in PUFA %E in the 3rd Hungarian Nutrition Survey.

3rd HNS than previously. The %E of PUFA was higher in the 3rd HNS. These results are confirmed by the FBS data – the purchase of vegetable oils has increased by 3 times during the last 20 years, and the buying of animal fats has decreased by 40% (fig. 11.10–11.12). The n–3 fatty acid intake was very low, 1.1 and 1.0 g/day in men and women, respectively.

The cholesterol intake was much less than in the earlier studies, but still it was 50 and 10% higher than the recommended value in case of men and women (fig. 11.13). The alcohol E% was low 3.8, and 2.1 in case of men and women, respectively.

Fig. 11.11. Fat and vegetable oil supply in Hungary between 1980 and 2006 based on the FBS. Data are kg/capita/year.

Fig. 11.12. Trend in added sugar %E in the 3rd Hungarian Nutrition Survey.

There was a favorable trend in the intakes of vitamin A, thiamine, vitamin B₆, B₁₂, and niacin, as well as biotin was sufficient in both gender, together with adequate vitamin E intake of men. However, the intake of vitamins B₂, C, D and folate of men and women did not meet the Hungarian recommendation, besides vitamin E intake of women was insufficient as well.

Magnesium intake was adequate in both sexes, and iron, zinc and copper intakes also met the RDI in case of men, but did not in women. In contrast, there was an insufficient calcium and an excessive phosphorus and sodium intake in both sexes.

Fig. 11.13. Trend in cholesterol intake in the 3rd Hungarian Nutrition Survey. Data are mg/day.

Fig. 11.14. Trend in sodium intake in the 3rd Hungarian Nutrition Survey. Data are g/day.

The sodium intake, however, showed a decreasing trend (fig. 11.14) (for more detailed data, see chapter 7 in the main report).

In addition, in the 3rd HNS the average amount of foods ($n = 77$ types) consumed daily was also evaluated. The most important foods and drinks are summarized in table 11.35.

Nutritional Biomarkers

Biomarkers were checked only in two of the above-mentioned surveys. In the CVRFUS study, elevated total cholesterol levels were detected in 16.6% of men and 30.1% of women, and increased LDL-C levels in 9.2% of men and 7.6% of women,

Table 11.35. Food consumption according to the 3rd Hungarian Nutrition Survey, 2003–2004. Some examples of 77 foods, drinks evaluated in the survey

	Men (n = 470)	Women (n = 702)
White bread, g/day	135.5 ± 86.1	86.1 ± 61.0
Whole grain bread, g/day	6.7 ± 26.1	5.3 ± 19.8
Milk, milk drinks, ml/day	206.2 ± 209.4	180.2 ± 158.6
Meat products, g/day	89.6 ± 65.0	47.4 ± 39.3
Pig meat, g/day	61.5 ± 51.4	46.6 ± 41.3
Animal fat, g/day	15.6 ± 22.4	10.1 ± 13.2
Vegetable oil, g/day	38.7 ± 16.5	33.8 ± 14.3
Fresh and deep-frozen vegetables, g/day	122.0 ± 72.9	123.9 ± 143.5
Fresh and deep frozen fruits, g/day	151.9 ± 148.7	185.2 ± 149.1
Confectionary products, g/day	18.2 ± 34.1	19.0 ± 30.6

and low level of HDL-C in 10.2% of men, and 1.1% of women (table 11.36). These results indicate an increased cardiovascular risk in this group of young adults [Antal et al., 2006].

In the VDSA study, serum vitamin D level after winter was <40 nmol/l in 13 and 27% of boys and girls, respectively. No vitamin D insufficiency was observed after summer, and 24% of boys, and 21% of girls even had serum 25(OH)D higher than the upper limit of reference range.

Dietary Supplements

The use was investigated only in children and adolescents [Antal et al., 2003; Péter et al., 2007], but not in adults. Overall, 34% of 11- to 14-year-old boys and 37.2% of girls consumed vitamin products. In the secondary school students, 40.7% of boys and 41.1% of girls consumed vitamin products. Among the 11- to 14-year-old population, mineral products were taken by 6.4% of boys and 7.3% of girls, and combined mineral/vitamin products were consumed by 21.1% of boys and 16.6 of girls, respectively.

Anthropometric Data

Children, Adolescents. In Hungary, all 5-year-old children together with the students in the 1st, 3rd, 5th and 7th grade are measured in the framework of annual school health examination. The collected and evaluated data are sent online to the Central Statistics Office. Based on these datasets, the prevalence of obesity is increasing year by year in all age groups.

Table 11.36. Cardiovascular risk factors in Hungarian University students, Budapest (2003)

	Males (n = 78), %	Females (n = 186), %
<i>Total cholesterol, mmol/l</i>		
Average	4.6 ± 0.88	4.75 ± 0.84
<5.2	74.4	69.9
5.2–6.2	10.5	24.2
>6.2	5.1	5.9
<i>LDL-C, mmol/l</i>		
Average	2.61 ± 0.70	2.46 ± 0.64
<3.4	89.7	92.5
3.4–4.1	5.4	6.5
>4.1	3.8	1.1
<i>HDL-C, mmol/l</i>		
Average	1.29 ± 0.25	1.54 ± 0.30
>1	89.8	98.9
<1	10.2	1.1
<i>Triacylglycerol, mmol/l</i>		
Average	0.88 ± 0.44	0.87 ± 0.38
≤1.7	94.9	95.2
>1.7	5.1	4.8

According to the RSMPS study, the prevalence of overweight (according to the Cole criteria) in 7- to 14-year-old boys and girls was 18.1 and 19.6%, while the rate of obesity was 7.4 and 6.3%, respectively. In the same study, 15.8% of 15- to 19-year-old boys and 7.9% of girls were overweight, and 4.1% of boys and 2.9% of girls were obese (fig. 11.15).

Adults. In the 3rd HNS, body weight and height were self-reported. The average BMI of men was $26.4 \pm 4.0 \text{ kg/m}^2$, and it was $25.6 \pm 4.7 \text{ kg/m}^2$ in women. The proportion of underweight in men and women was 0.4, and 3.0%, of normal weight 40.7, and 47.5%, of overweight 41.8, and 31.3%, and of obesity 17.1, and 18.2%, respectively. It means that almost two thirds of men and half of the women are at increased risk because of overweight (table 11.37). In the CVRFUS study, anthropometric data were measured. The rate of overweight was 27% in men and 11.3% in women, and

Fig. 11.15. Prevalence of overweight and obesity among primary (n = 1,930) and secondary (n = 1,273) schoolchildren in 2005/2006. Body weight and height were measured and prevalences were calculated according to the Cole criteria.

19.2 and 6.5% of men and women had >90 and >80 cm waist circumference, respectively (table 11.38).

Alcohol (Ethanol) Intake

In the 3rd HNS, alcohol intake was 12.5 ± 12.1 g/day, but the FBS data in the same year showed 30.4 g/day availability. In the National Health Survey of the Population (OLEF), 2003 [Boros, 2005], the proportion of heavy drinkers was 17.7% in men and 2.5% in women.

Data Available from Other Databases

Food Balance Sheets (FBS)

According to the FBS data there was a decreasing trend in the supply of meat (mostly pork and beef, but not chicken), milk and milk products, flour and rice, sugar and honey between 1980 and 2006, while the supply of total fat, potatoes, and vegetables increased in the same time. Within the fat balance, the supply of vegetable oil has increased by 300%, and the supply of animal fats has decreased by 40% in the period above.

Household Budget Survey (HBS)

The results are similar, but the availability of rice and fish has moderately increased, and the availability of alcoholic beverages has increased, after a small decrease.

Table 11.37. Body mass indices (BMI) in the 3rd National Nutrition Survey, 2003–2004

BMI				
	Total	18–34 years	35–59 years	≥60 years
Men	26.39 ± 4.01	26.77 ± 3.89	27.55 ± 3.92	26.39 ± 4.01
Women	25.58 ± 4.69	26.07 ± 4.61	26.98 ± 4.10	25.58 ± 4.69

Body height and body weight were self-reported.

Table 11.38. Anthropometric parameters in Hungarian university students, 2003

	Men (n = 78)	Women (n = 186)
BMI, kg/m ²	23.4 ± 3.18	21.37 ± 2.84
BMI <18.50, %	3	11.3
18.50–24.99, %	69.2	77.4
25.00–29.99, %	24.4	9.1
≥30.00, %	2.6	2.2
Waist circumference, cm	83.56 ± 8.60	69.40 ± 6.14

Body height, body weight and waist circumference were measured

Health Indicators

Morbidity data in Hungary show that trachea/bronchus/lung cancer has the highest prevalence; it is followed by female breast cancer, colon cancer, and then rectum/anus tumors. The high prevalence of trachea/bronchus/lung cancer is obviously related to the high proportion of smoking, and the other cancers mentioned can be partly connected to the high rate of obesity.

Mortality. The Hungarian total mortality showed a decreasing trend between 1990 and 2007. Half of the total mortality was caused by cardiovascular diseases (decreasing trend), and 24.6% were caused by neoplasms (stagnant trend) in 2006 (table 11.39).

Smoking. In the NRSecS study, 30 and 25% of 15 to 16 years and 41 and 35% of 17 to 18 years boys and girls were smokers [Antal et al., 2003]. In the OLEF study the proportion of smokers in adults is high, and the rate of men and women smoking >20 cigarettes/day was rather high too (table 11.40) [Boros, 2005].

Breastfeeding. The proportion of breastfed babies at 0–3 months of age is 63.0%, and at 4–5 months of age 43.8% [Central Statistics Office, 2009]. It can be the result of the health promotion, and the activity of midwives.

Table 11.39. Death rates standardized for the age structure of the European population by selected main groups of causes of death (deaths per 100,000 population) in 2007 [source: Hungarian Central Statistics Office, 2008]

Total	1,322.0
Malignant neoplasms	325.7
CVD (I100–I99)	661.8
Cerebrovascular disease	144.4
(Chronic) liver disease (K70–K76)	55.7

Table 11.40. Rate of smoking and proportion of heavy smokers in Hungarian adults in 2003

	Never smoked		Recent smoker		Gave up smoking	
	male	female	male	female	male	female
<i>Smoking rate, %</i>						
18–34 years	41.4	52	43.10	32.5	9.2	10.4
35–64 years	30.9	52.3	39.00	28.50	27.3	15.7
65+ years	34.2	86.6	15.90	5.30	49.6	7.6
Total	35	59.8	36.90	24.6	24.5	12.4
<i>Smoking >20 cigarettes/day, %</i>		male	female			
18–34 years		24.30	13.9			
35–64 years		26.9	11.0			
65+ years		6.9	2.5			
Total		23.0	10.0			

In 2008, there was a representative study on breastfeeding in Budapest and in three other towns. 400 mothers were asked by interviewers [Szabó and Zagyva, 2009]. This survey revealed that 75% of the 3-month-old babies and 60% of 6-month-old babies were breastfed.

Physical Activity. In a representative sample of 11,000 primary school students (10 to 15 years), two thirds of the children did no sports [Kiss, 2003]. Similarly, in the RSMPS study, only half of the primary school students and one fifth of the secondary school students were regularly physically active. In addition, only 23% of the secondary school students participated in extracurricular sports. The situation was even

worse in adults. Based on the Eurobarometer database, 60% of the adult population had never done any sports. Similarly, the average time spent walking and/or exercising was 14 minutes/day for men and 8 minutes/day for women in 2002.

Food and Nutrition Policies

The First Hungarian Food and Nutrition Policy (FNP) was elaborated and published in 2004. This FNP was worked out on the directives of WHO Regional Office for Europe: The First Action Plan for Food and Nutrition Policy, 2001.

The First FNP [Zajkás, 2004] contained an analysis of actual dietary risk factors in the Hungarian population – high energy, total fat, saturated fatty acids, cholesterol, sugar, sodium, but insufficient intake of some micronutrients (vitamin E, potassium, calcium, and in case of women iron and zinc). There were similar problems in the nutrition of children too. The FNP targeted the main objectives (decrease the risk of chronic diet-related diseases, and decrease of mortality caused by these diseases within 5–10 years) and indicated the strategies to realize objectives of FNP, besides outlined the Hungarian Dietary Guidelines, as well.

A new, revised draft of FNP 2nd Action Plan was elaborated by the experts of the National Institute for Food and Nutrition Science at the beginning of this year, but further consultations with professionals of other institutes, ministries, the food industry and catering, and civil organizations are necessary to compile the final version.

11.11 Ireland¹¹

Introduction

In the past 20 years, attitudes and approaches to food in Ireland have altered dramatically. In Ireland, several national publications regarding nutrient intake and health indicators in children, adolescents, adults and the elderly have been published which has created a clearer picture which illustrates the significant changes in our dietary and lifestyle habits. Irish Universities Nutrition Alliance (IUNA) is made up of four academic nutrition units from University College Cork, University of Ulster and University College Dublin. Since 1990, IUNA has completed a number of comprehensive national dietary surveys, focusing on adults (The North South Ireland Food Consumption Survey), children (The National Children's Food Survey) and teenagers (The National Teen's Food Survey) which are presented in this report.

Results from the SLÁN survey are also presented in this report. SLÁN is a national survey of the lifestyle, attitudes and nutrition of people living in Ireland.

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To date, surveys have been carried out in 1998, 2002 and 2007. SLÁN 2007 is the largest survey to date. A scientifically representative random sample of over 10,000 people aged 18+ were interviewed in their own homes, by experienced researchers from the Economic and Social Research Institute (ESRI). The survey covers general health, behaviors relating to health (e.g. exercise, nutrition) and the use of certain health services. The food frequency data was analyzed using a specially designed computer program called FFQ_Software, Version 1.0, developed by Juzer Lotya of the National Nutrition Surveillance Centre, School of Public Health and Population Science, University College, Dublin. The program converts the dietary information provided to food quantities and subsequently to food nutrient values, based on data from the Food Standards Agency (2002) and from McCance and Widdowson's Food Composition Tables (1997). In addition, over 1,200 people who participated in the survey also participated in a detailed medical examination.

Dietary Habits

Adults. The North/South Ireland Food Consumption Survey included a sample of 1,379 adults between the ages of 18 and 64 years, including 662 men and 717 women and excluding pregnant and lactating mothers, from all over the island of Ireland. The participants were randomly selected using the electoral register as the sampling frame. The response rate was 63%. The survey sample was representative of the population of the island of Ireland with respect to age, sex, geographical location (urban/rural), marital status, social class and socioeconomic group. Data collection took place between 1997 and 1999 and was seasonally balanced. Food intake was determined using a 7-day estimated food record. Self-administered questionnaires were used to collect information on employment status, social and demographic variables, lifestyle factors, habitual physical activity levels, attitudes, health status, medication, supplement use and dieting habits. Researchers also carried out anthropometric measurements.

The mean daily intakes of fat in men and women (37% of food energy) exceeded current recommendations for fat (for a maximum intake of 35% of food energy) and the mean daily intakes of carbohydrate (46%) were lower than current recommendations for CHO (for a minimum intake of 50% of food energy). When compared to existing recommendations, protein intake in adults was found to be more than adequate.

The mean daily intake of dietary fiber in the total sample was 20.2 g and on average, men consumed larger quantities of fiber (23.2 g) than women (17.4 g). Expressed as non-starch polysaccharide (NSP), i.e. dietary fiber excluding lignin and resistant starch, the mean daily intake in the total sample was 14.8 g (16.7 g in men and 13.0 g in women). Women aged 18 to 35 years had the lowest mean daily dietary fiber intake (16.1 g).

Intakes were adequate in the population for most vitamins. However, a significant prevalence of inadequate intakes was observed for vitamin A (20% of men

and 17% of women) and riboflavin (13% of men and 20% of women). The proportions of men (16%) and women (11%) with mean daily vitamin E intakes less than the lowest threshold intake indicate that the prevalence of vitamin E inadequacy may be significant. A substantial proportion of the population had low vitamin D intakes and was largely dependent on sunlight to maintain adequate vitamin D status.

Only 2% of women aged 18 to 35 years and 5% of women aged 36 to 50 years achieved the recommended folate intake of 600 mg/day for women of reproductive years for the prevention of neural tube defects. All of the women who met the recommendation were using folate containing supplements. A significant prevalence of intakes below the average requirement (AR) was observed for iron, calcium, zinc and copper, particularly in women. 48% of women aged 18 to 50 years (whose iron requirements are high due to menstrual losses) had inadequate iron intakes, exposing them to increased risk of depletion of iron stores and iron deficiency anemia. Calcium intakes were below the AR in 23% of women. Approximately 33% of men and 32% of women were current smokers.

Children. The National Children's Food Survey investigated habitual food and drink consumption, health and lifestyle characteristics and assessed body weight status in children from the Republic of Ireland. This was a cross-sectional study that was carried out between March 2003 and March 2004. Children aged 5 to 12 years (293 boys, 301 girls) were selected from 28 primary schools throughout the Republic of Ireland from a database of primary schools obtained from the Department of Education and Science. All schools in the database that contained at least 8 students in each of the eight classes ($n = 1,194$ schools) were classified according to size, gender served, disadvantaged/not disadvantaged and location (urban or rural). A 7-day weighed food diary was used to collect food and beverage intake data. The researcher made four visits to the respondent and his/her parent/guardian during the 7-day period: a training visit to show how to keep the food diary and how to use the weighing scales; a second visit 24–36 hours into the recording period to review the diary, check for completeness and clarify details regarding specific food descriptors and quantities; a third visit 4 or 5 days into the recording period to check the previous 2 or 3 days and to encourage completion, and a final visit 1 or 2 days after the recording period to check the last days and to collect the diary.

The average intake of energy was 7.0 MJ/day. The current recommendation for dietary fat in Irish children is that it should be less than 35% of their overall energy intake. In Irish 5- to 12-year-old children, fat intakes are high, with 40% of children not meeting the fat recommendation and having diets that are >35% of daily energy coming from fat. One fifth of calories (18%) and fat (21%) in 5- to 12-year-olds diets comes from cakes, biscuits, savory snacks, chocolate and confectionary.

Dietary fiber intakes were low with 61% of children consuming less than the minimum requirement of 'age of child + 5 g/day'. The Food Standards Agency of Ireland (2005) recommendations for daily salt intake are 3 g/day for 4- to 6-year-olds, 5 g/

day for 7- to 10-year-olds and 6 g/day for 11- to 14-year-olds. However, Irish children are currently taking in 4.6, 5.3 and 5.9 g daily from food alone (5–6, 7–10 and 11–12 years, respectively). The average vitamin D intakes were very low at 2.3 µg/day. There was no effect of age, sex or season on vitamin D intake and the main determinant of intake was nutritional supplement use. 18% of children took supplements containing vitamin D and the average intake in these children was 5.6 µg/day. This was almost 4 times higher than the intake of 1.5 µg in those who did not use supplements.

Teenagers. The National Teens' Food Survey investigated habitual food and drink consumption, health and lifestyle characteristics and assessed body weight status in 441 teenagers, from the Republic of Ireland. This was a cross-sectional study that was carried out between September 2005 and September 2006. Teenagers aged 13 to 17 years (224 males, 217 females) were selected from 32 secondary schools throughout the Republic of Ireland. Schools were selected from a database of secondary schools available from the Department of Education and Science and were classified into secondary (56%), vocational (31%) or comprehensive/community schools (13%). Schools were further classified according to gender served, whether disadvantaged or not disadvantaged and location (urban or rural). A 7-day semi-weighed food diary was used to collect food and beverage intake data.

The average intake of energy was 8.3 MJ/day. The current recommendation for dietary fat in Irish teenagers is that it should be less than 35% of their overall energy intake. Irish teenagers obtained 36% of their energy from fat. The findings show that 42% of teenage girls and 23% of teenage boys are not getting enough calcium in their diet. Furthermore, Irish teenagers are consuming a higher energy and fat intake from biscuits, confectionary and snacks than from milk, cheese or yoghurt.

Elderly. The Irish population is ageing. In 1996, 11.4% of the population was over 65 years and this figure is expected to rise to 14.1% by 2011 [Central Statistics Office 1997]. There is an important relationship between nutritional status, diet and health status of the population. The Third National Survey of Lifestyle, Attitudes and Nutrition (SLÁN) was conducted in 2007, following previous surveys in 1998 and 2002. The 2007 SLÁN survey involved a nationally representative sample of 10,364 respondents (62% response rate), of whom 9,223 (89%) completed a standard Willett Food Frequency Questionnaire adapted for use in the Irish population. This survey also included males and females over the age of 65 years. The food frequency questionnaire was completed by 742 females (median age 74 years) and 580 males (median age 72 years).

The median daily energy intake for females was 7.5 MJ and for males 7.9 MJ. The percentage contribution to daily food energy intake from protein and fat was above the recommended guidelines for both men and women and was below that recommended for carbohydrates. In SLAN 2007, 19% of food energy was derived from protein for females and males, 33 and 34% from fat for females and males, respectively and 50 and 49% for carbohydrates for females and males, respectively.

11.12 Italy¹²

Dietary Profile

The present national report aims to provide information on food- and nutrition-related issues by presenting tendency analyses and recent Italian dietary trends in order to widen the current nutritional scenario of our country. Moreover, some of the most sensitive issues are examined, such as child obesity as well as alcohol consumption and smoking habits among young individuals and elderly. A section dedicated to breastfeeding is also included because of its generally known importance for child health and prevention among the population. This report also deals with specific topics so far studied in limited geographical areas or in special groups of people.

Some focused studies are included here to represent the background information which may lead to wider and detailed studies in larger areas or population groups.

The total dietary intake variability was estimated from the nationwide dietary survey data [Turrini et al., 2001] collected during the 1990s (7-day-weighted food records; 0–94 age range; response rate was 48%; improper reporters were deleted; Italian food composition table [Carnovale and Marletta, 1997] using a combination of cluster and correspondence analyses). Three different quantitative diets were identified and tagged as ‘min diet’, ‘mid diet’ and ‘max diet’ [SAS, 1990]. Total proteins, total lipids and their fractions, and ‘carbohydrates + alcohol’ accounted for the same percentage contribution to the per-capita daily energy intake in all reported diet choices. The three diet boundaries were linked to the energy intakes, e.g. all nutrient intakes were proportional to the total energy intakes (fig. 11.16).

The contingency analysis performed on the dietary choices highlighted a tendency to adopt a ‘min diet’ profile among females, children, elderly individuals and under-weight adults; on the contrary, a tendency to choose mid or max diet profiles was found among males and obese people; an almost balanced frequency for adults and normal weight individuals was registered, while the most divergent group was represented by adolescents showing min and max diet choices both at observed frequencies higher than the expected ones.

The estimated average per-capita daily energy intake during the three last decades falls within the range estimated in the ‘90s (fig. 11.17). Overall, energy intake showed decreasing values over time [Saba et al., 1990; Turrini et al., 2001; Leclercq et al., 2009]. Such decreasing values occur in spite of an increasing availability of food supplies together with an average annual rate of available energy of 0.62%, this latter value being due to an average annual protein and fat supply increase of 0.94 and 2.5%, respectively [FAO, 2007b].

The sociodemographic structure of the population, particularly the age class distribution, the workforce sector of employment [ISTAT, 2009a], and the sedentary

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Fig. 11.16. Energy and nutrient average daily intakes in Italy. Relative % difference of overall profiles in the three groups – Min Diet, Mid Diet and Max Diet vs. total sample profile (*source: INN-CA Study 1994–1996, INRAN, Rome, Italy*).

lifestyle [ISTAT, 2009a], showed a decreasing energy requirement trend (ageing) as well as a reduction of the energy expenditure, both for work and physical activities. The average annual growth rates of 3+ year-old people by physical activity levels are shown in table 11.41.

The observed decrease of young age groups (0–24) (negative growth rates) and the increase of the number of 25+ aged people (positive growth rates) made the overall population *ageing index* to vary from 62.5 to 142.2 through 25 years (1982–2007) [ISTAT, 2009a].

The workforce has moved from agriculture and industry to other activities.

Physical activity – sport or everyday activities – shows only a moderate to slightly increase of people percentage, while the number of people practicing sport occasionally was reduced. The overall percentage of individuals not doing any kind of physical activity remained almost constant over 7 years (2001–2007), even though it should be noted that a decrease of women's percentage was observed during that period [ISTAT, 2009b].

Fig. 11.17. Italian nationwide dietary surveys about daily energy intake (MJ) vs. dietary boundaries (1994–96). *Source:* INRAN nationwide individual food consumption survey: INN Study 1980–1984, INN-CA Study 1994–1996, INRAN-SCAI 2005–2006, Rome, Italy [Saba et al., 1990; Turrini et al., 2001; Leclercq et al., 2009].

Regarding the national average energy requirement, it is progressively decreasing considering the age-gender distribution of the population and the levels of sport/physical activity observed (fig. 11.18) [D’Amicis, 2008]. This could likely have determined the observed trend in the prevalence of overweight and obesity, increasing +2.8 and +2.6% in the period 1994–2007, respectively. These two similar values are actually related to different starting points: in 1994 the overweight value was 32.8%, while the obesity value accounted for 7.3% of the total population, increasing to 35.6 and 9.9%, respectively, in 2007 [ISTAT, 2009b].

Comprehensively, data indicated a decreased physical activity on a daily basis probably because of the more frequent sedentary jobs beside which a limited increase of a regular exercise versus the occasional one was observed (table 11.41). This is probably affecting the overall population energy requirement (fig. 11.18) steadily increasing the share overweight and obese in the population.

The overall picture of energy and nutrient intakes, the percentage contribution of proteins, fats, carbohydrates and alcohol to the mean daily energy intake, and the mean of the individual ‘actual intake/recommended intake’ ratios (I%RDA) – calculated considering a sedentary activity – were assessed.

Generally, almost all the energy and nutrient intakes provided more than the recommended dietary allowance, even though the inferior extreme of the mean minus the standard deviation was below 100% in all cases, except for total proteins,

Table 11.41. Average growth rate percent of 3+ year-old people by physical activity levels; Italy, 2001–2007.
Source: ISTAT, Multi-purpose survey – daily life in 2007 [ISTAT, 2009b]

Years	Sport		Physical activities	Sedentary lifestyle	Not specified	Total
	regular exercise	occasional exercise				
Males						
2001	23.1	13.2	28.8	34.2	0.7	100.0
2002	23.9	12.4	27.9	35.1	0.6	100.0
2003	25.1	12.3	26.9	35.1	0.6	100.0
2005	25.2	12.9	26.4	34.7	0.8	100.0
2006	24.4	12.7	26.1	36.0	0.9	100.0
2007	24.8	11.9	28.1	34.5	0.7	100.0
Females						
2001	15.3	8.0	29.9	46.1	0.6	100.0
2002	15.7	7.6	29.3	46.9	0.6	100.0
2003	16.3	7.9	28.1	47.0	0.7	100.0
2005	16.9	7.9	29.8	44.5	0.8	100.0
2006	16.8	8.1	28.4	45.9	0.8	100.0
2007	16.7	7.4	31.0	44.2	0.6	100.0
Males and females						
2001	19.1	10.6	29.4	40.3	0.6	100.0
2002	19.7	9.9	28.6	41.2	0.6	100.0
2003	20.6	10.1	27.5	41.2	0.6	100.0
2005	20.9	10.3	28.2	39.8	0.8	100.0
2006	20.5	10.3	27.3	41.1	0.8	100.0
2007	20.6	9.6	29.6	39.5	0.7	100.0

phosphorus, zinc, and vitamin B₆. The maximum level of sodium intake was exceeded by all groups except for the children records.

The free (added) sugar threshold (10% of the total energy) was exceeded by all population groups and even if the first ten main sources of energy (65.3% in total) in the Italian average diet – *bread and pizza* (19.2%) followed by *olive oil* (8.3%), *pasta* (7.7%), *sweets* (7.5%), *cheese* (6.4%), *milk* (3.5%), *meat* (3.5%), *first course* (3.2%), *fruit*

Fig. 11.18. Energy daily requirement (kcal) of the Italian population, 1961–2001. Source: ISTAT data elaborated by INRAN [D'Amicis, 2008].

(3.2%) and *wine and sparkling wine* (2.9%) – include several sources of carbohydrates, the recommended daily allowance was not achieved. Females generally showed lower nutrient intakes, except for lipids and soluble carbohydrates in adolescents, and sodium levels in elderly. Many nutrient intakes had values below the recommended ones also among males, such as fiber and magnesium, while starch and available carbohydrates were below 100% for all groups.

Focus on Specific Issues

Child Obesity. The study *OKkio alla salute* is the most recent survey measuring anthropometric variables among 8-year-old children [CNESPS, 2008]. The prevalence of overweight and obesity values in this population group [Cole et al., 2000] is reported in the main report.

A comparison of these survey data with the results of the previous survey carried out in 2000–2001 [Bevilacqua et al., 2003] showed a decreasing trend of Tuscany percentages, both for overweight and obesity values (overweight 22.0 vs. 22.7%; obesity 7.0 vs. 9.0%). Although the extension of the present and past studies did not completely correspond, the most different overweight values were observed in Emilia-Romagna (20.0 vs. 25.9%), while for obesity the Calabria percentage appeared quite increased (16.0 vs. 27.3%); other values did not show significant differences.

These data are also consistent with the overweight and obesity percentages estimated for children aged 7 to 9 within the INRAN-SCAI 2005–2006 study; this is quite evident especially in relation to the obesity rate at a national level, being 12.2% [Leclercq et al., 2009].

Breastfeeding. The percentage of women breastfeeding their children remained around the 81.1% of the total women in labor in 2004–2005, almost the same value observed in 1999–2000. The duration of the lactating period increased from 6.2 months in 1999–2000 to 7.3 [ISTAT, 2006].

The percentage of breastfeeding women was lower in the insular regions (74.2%) compared to the North-East areas (86.1%). The lactating period was shorter in the Islands, as only 26.6% of women breastfed for longer than 6 months, while 36.8% breastfed over 7 months in North-East zones. A similar distribution was registered for predominant or exclusive breastfeeding (53.5 vs. 73.8% in Islands and North-East regions, respectively).

Higher education levels seemed to promote breastfeeding (86.4 vs. 76.1%) as well as its predominant or exclusive use (71.2 vs. 53.2%).

Cesarean sections were associated with a lower percentage of lactating women (75.9 vs. 83.9%), while geographical differences were observed in relation to breastfeeding start immediately after the delivery: 38.3% in the South and 59.9% in the North.

When women breastfed their first child they were more likely to also breastfeed the new baby (92.1 vs. 32.7%), preferring their own milk as the exclusive or predominant feeding (74.3%).

Alcohol. Data collected during 9 years (1998–2008) [ISTAT, 2009c] showed that there were no significant changes in alcohol consumption among Italians (70% of 14+ year-old people consumed alcohol in the previous year), except for young women, aged 18 to 19 and 20 to 24, showing an increase in consumption (53.7–58.0% and 58.4–63.6%, respectively).

In 2008, the proportion of adolescents aged 11 to 15 showing an increase of drinking behavior was quite worrying (19.7%); similarly, the percentage of young individuals, aged 14 to 17, consuming alcohol at least once during the previous year was definitely increasing over the same period (12.6–18.7%), showing a different trend in relation to the gender: 9.7–14.4% and 15.2–22.7%, for females and males, respectively.

When at least one of the parents consumed alcohol consumption excessively, a proportion of 22.7% of young individuals, aged 11 to 17, showed a similar drinking behavior too, while such a proportion decreased to 15.0% if parents did not drink or consumed alcohol moderately.

People aged 20 to 24 represented a proportion of 16.0% showing at least one unhealthy drinking, in particular high daily consumption in general (2.2%), during the meals (29.7%), or getting drunk (14.9%).

Beside this dangerous behavior, the *binge drinking* phenomenon (>6 glasses at once) was also observed: in 2008, 7.3% of 11+ year-old people severely exceeded in alcohol consumption in a single occasion; in addition, people aged 20 to 24 and 25 to 29 widely represented the phenomenon (14.9 and 14.0%, respectively), the percentage value in men being higher than in women (12.1 vs. 2.8%). The *binge drinking* habit was mainly observed in northern Italy, especially north-eastern men (15.5%).

Geographical differences were quite marked as north-eastern regions accounted for 73.2% of 11+ aged individuals drinking alcohol at least once a last year, Veneto being even higher (74.5%), while Trentino-Alto Adige and Friuli-Venezia Giulia were just below the area rate: 71.3 and 72.0% respectively.

In 2008, the general trend showed that 55.0% of 14+ year-old people used to drink wine, while beer was preferred by 46.3%. Among these results, wine represented an everyday drink in 37.3% of men vs. 14.2% of women in relation to daily alcohol consumption.

Concerning alcohol quantities, a consumption of 3 units/day was observed among 13.4% of men aged 55 to 64 versus 2 units in 3.2% of women, the percentages being even higher when education levels were lower.

Elderly Italians usually drink wine during meals and this is considered a less unhealthy habit even when their consumption exceeds 1 unit of alcohol, the threshold for 65-years-old subjects.

The most recent data [ISTAT, 2009c] have substantially confirmed the long-term trend evidenced since 2007 [ISTAT, 2008]. The most important signal is the decreasing percentage of 14- to 17-year-old drinkers (defined as people drinking alcohol at least once during meals in the last year): 18.7% in 2008 versus 20.5% in 2006. Overall, less 14+ aged people drink every day (28.3% in 1998 vs. 33.5% in 2008) and more people drink occasionally (37.0% in 1998 and 41.7% in 2008).

Smoking. In 2007 the percentage of 14+ year-old smokers (cigarette, cigar, pipe) was 28.2%, higher than the results in 2006 (22.7%). 22.5% gave up smoking (22.8% in 2006), and the 53.2% declared they no longer smoked (52.6% in 2006) [ISTAT, 2009b].

A quite significant percentage of Italians already started smoking habits around 18 to 19 years of age (23.1%), smoking up to 10 cigarettes/day, but the percentage of smokers, as well as the daily cigarette number, increased to around 20 to 24 years (29.0%). The main age classes are 25 to 34 years (39.3%) and 35 to 44 years (25.0%) for men and women, respectively.

Smokers are slightly predominant in big towns and their peripheries as compared with the rest of Italy (24.2 and 23.8%). In southern and insular regions, people smoke 13.9 and 14.5 cigarettes/day, respectively, while in north-eastern regions smoking decreases to 12.2 cigarettes/day. Cigarettes are definitely preferred to cigars or pipes (98.3%) and data showed that 42.8% of the Italians smoked 11–20 cigarettes/day, this percentage being different according to gender: 48.6% in men, with a number of 14.8 cigarettes/day, and 33.7% in women smoking a mean of 11.1 cigarettes/day.

The global trend is a slight but constant reduction of smokers: 22.1% in 2007 versus 23.7% in 2001, and the opposite trend of ex-smokers: 22.5% in 2007 versus 20.2% in 2001.

Research Team and Acknowledgements

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11.13 Latvia¹³

Dietary Habits

A nationwide survey about nutrition and lifestyle in the Baltic Republic was carried out in the summer of 1997 [Pomerleau et al., 1999], using a cross-sectional survey and a 24-hour recall of dietary intake questionnaire. The samples included 2,308 adult persons, 46.4% male and 53.6% female, between the age of 16 and 65, the area of residence being 68.8% urban and 33.4% rural.

The average daily energy intake in all age groups was 2,583 kcal/day in men and 1,791 kcal/day in women.

The dietary fat intake was 42.7%E on average in men and 41.1%E in women, which was higher than the recommended range (table 11.42). In men, the highest fat consumption was in the age group 19 to 34 years, 44.2%E, in women respondents the age group >50 years showed the lower fat consumption – 39.8%E.

The dietary carbohydrate proportion in total energy intake was 42.4%E on average in men and 44.6%E in women.

The dietary protein intake was 13.7%E on average. Alcohol intake amounted to 1.2%E in men and 0.5%E in women.

The average vitamin and mineral intakes in both sexes and in all age groups were lower than recommended. Vitamin C intake was low in men 64 ± 63 mg (mean $\pm$ SD), and in women 70 ± 65 mg.

Mean daily intakes of minerals (excluding supplements) in women and men were generally close to the recommended daily intakes. Mean iron level in men was about 45% higher than recommended in all age groups.

The mean consumption of vegetables (excluding potatoes) and fruits was low in men (268 g/day) and in women as well (265 g/day), and decreased with ageing. In the age group older than 50 years, the mean intakes of vegetables (excluding potatoes) and fruits were 237 g/day in men and 233 g/day in women, which is less than 60% of the WHO recommendation of at least 400 g of vegetables and fruits per day.

Body Mass Index

Adults. Based on measurements [Pomerleau et al., 1999] and analyzing BMI, 33% of women aged 19 to 65 years were overweight (BMI >25 kg/m²) and 17.4% were obese

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Table 11.42. BMI groups by sex and age (%) based on self-reported weight and height [Pudule et al., 2003, 2005, 2007]

Parameters	Men						Women					
	age groups					total	age groups					total
	15–24	25–34	35–44	45–54	55–64		15–24	25–34	35–44	45–54	55–64	
Underweight												
2006	4.5	–	0.7	–	0.8	1.2	17.8	5.9	1.2	1.2	1.0	5.3
2004	8.8	–	0.7	0.8	–	2.6	18.4	6.3	3.8	0.5	0.9	4.5
2002	5.5	1.1	0.5	–	–	1.6	13.4	2.8	–	0.9	–	3.4
Normal												
2006	82.8	56.8	52.1	37.6	38.9	54.1	73.0	68.0	57.1	30.6	24.8	49.1
2004	80.8	59.3	49.7	39.4	37.7	55.5	75.7	67.6	52.4	36.4	25.2	50.7
2002	84.9	60.9	48.4	48.9	42.5	58.6	81.5	71.3	60.4	37.7	24.4	54.9
Overweight												
2006	11.9	36.7	32.6	35.0	45.8	32.3	8.6	18.3	25.2	43.4	38.6	27.5
2004	8.8	34.1	31.5	40.9	44.2	30.1	2.9	17	26.4	33.5	37.6	23.9
2002	9.0	29.9	40.2	38.1	39.2	30.3	3.7	19.4	30.2	37.3	35.1	25.2
Obesity												
2006	0.7	6.5	14.6	27.4	14.5	12.3	0.6	7.8	16.6	24.9	35.7	18.1
2004	1.6	6.7	18.1	18.9	18.1	11.9	2.9	9.1	17.3	29.6	36.2	19.5
2002	0.5	8.2	10.9	12.9	18.3	9.5	1.4	6.5	9.5	24.1	40.4	16.5

(BMI >30 kg/m²); 41% of men were overweight and 9.5% were obese. 2.7% of women and 0.9% of men were classified as underweight (BMI <18.50 kg/m²).

Self-reported data from the Latvian population (table 11.42) showed that 32.3% of men and 27.5% of women were overweight and 12.3% of men and 18.1% of women were obese at age 15 to 64 years in 2006 [Pudule et al., 2007].

Children. Based on self-reported data, 6.7% of adolescents (age 11, 13, 15 years old) were overweight and 0.9% were obese in 2005/2006 [Gobina et al., 2007]. Based on measured data from the Sports Medicine State agency, 12.4% of boys and 11.7% of girls were overweight or obese in the period 2004–2006 and 13.9% of girls and 9% of boys at age 7 to 17 were underweight.

Data from the Sports Medicine State Agency by age and gender from the period 2004–2008 are represented in tables 11.43 and 11.44 [Lide, 2009].

Table 11.43. Overweight and obesity (%) among **boys**, 2004–2008 [Lide, 2009]

Age	n	IsoBMI <16.1 kg/m ²	IsoBMI <18.5 kg/m ²	Normal	IsoBMI >25 kg/m ²	IsoBMI >30 kg/m ²
7	508	1.2	6.7	77	11	4.1
8	572	0.9	6.5	79.5	11	2.1
9	588	1.2	7.8	77.9	10.5	2.6
10	669	1	6.7	78.3	11.5	2.4
11	567	1.9	7.1	82.5	6.5	1.9
12	457	1.3	9	78.1	9.4	2.2
13	353	1.1	10.2	77.3	9.6	1.7
14	423	1.9	9	78.5	8.3	2.4
15	327	1.8	8.3	81.7	6.4	1.8
16	304	0.7	7.2	81.9	8.6	1.6
17	119	3.4	5.9	84	5	1.7
Total	4434	3.2	10.7	73.5	10.4	2

Table 11.44. Overweight and obesity (%) among **girls** (2004–2008) based on measurements [Lide, 2009]

Age	n	IsoBMI <16.1 kg/m ²	IsoBMI <18.5 kg/m ²	Normal	IsoBMI >25 kg/m ²	IsoBMI >30 kg/m ²
7	466	3	9.7	74.9	9.9	2.6
8	550	4	10.2	71.6	11.3	2.9
9	554	1.8	7.6	76.4	11.9	2.3
10	594	2.5	11.1	72.4	10.6	3.4
11	456	3.1	13.8	70.6	11.2	1.3
12	372	4.6	15.3	67.7	10.5	1.9
13	328	4.9	10.7	73.8	8.8	1.8
14	360	3.1	10.3	75.3	9.7	1.7
15	281	4.6	11.7	74	9.3	0.4
16	275	2.2	9.8	78.5	9.1	0.4
17	128	1.6	9.4	80.5	7.8	0.8
Total	5141	1.3	7.7	79.3	9.3	2.4

BMI Classification according to Cole et al. [2000, 2007].

Table 11.45. Smoking trends among adult men and women: 1998–2006 (%)

	1998		2000		2002		2004		2006	
	men	women	men	women	men	women	men	women	men	women
Daily smokers	51.3	19.2	51.3	18.2	51.1	19.2	47.3	17.8	46.6	18.2
Occasional smokers	6.0	4.9	4.9	5.2	4.4	6.4	5.7	5.9	4.0	5.5
Quitter: 1–12 months	2.4	1.6	2.9	1.7	2.5	1.9	3.1	1.6	3.4	1.9
Quitter: ≥1 year	10.4	3.7	10.7	4.5	11.4	4.0	13.4	4.4	12.8	7.5
Non-smokers	23.8	64.9	26.4	67.5	27.7	66.9	29.6	69.5	29.3	64.0
Incomplete information	6.1	5.7	3.8	2.9	2.9	1.6	0.9	0.8	4.0	2.9

According to a statement from the 2nd International Congress on Physical Activity and Public Health (Amsterdam, April 13–16, 2008), there is no need to spend money on studies to assess the level of overweight and obesity; the problem exists. There is a need to conduct studies on which kind of intervention can help to motivate people and how to increase physical activity in the population. The authors of this report would like to add that we cannot forget those with underweight, and weight control has to cover public concern for those with underweight as well as overweight.

Smoking

Adults. The results from the 2006 FinBalt Health Monitoring Survey (see table 11.45) showed that 46.6% of men and 18.2% of women at age 15 to 64 were daily smokers [Pudule et al., 2007]. The percentage of daily smokers did not decrease in the period 1998–2002 (51% of men and 19% of women), but slowly decreased in the period between 2004 and 2006 (47% in men and 18% in women).

Children. The proportion of Latvian adolescents who smoke regularly (see table 11.46) increased, especially among girls the years 1991–2006 [Gobiņa et al., 2006]. 30% of boys and 23% of girls smoked regularly at the age of 15 in 2006.

Physical Activity

Adults. For substantial health benefits, adults should do at least 150 minutes of moderate-intense aerobic physical activity a week [Donnelly et al., 2009]. Women are less active compared to men. The level of physical activity is more than insufficient for both genders [Pudule et al., 2003, 2005, 2007] (see table 11.47).

Table 11.46. Smoking trends among adolescent men and women: 1998–2006 (%)

Years	Men			Women		
	11 years	13 years	15 years	11 years	13 years	15 years
1991	4.8	9.3	18.5	1	1.3	5.3
1994	1.5	12.4	32.7	0.6	2.6	13.3
1998	3.1	15.1	36.4	0.3	6.9	18.8
2002	1.8	16.4	28.9	0.5	5.9	21.1
2006	2.7	11.2	29.9	1.1	10	22.7

Children. Physical fitness can be measured more accurately than physical activity [Suni et al., 1996]. The Sports Medicine State Agency (SMVA) measured physical fitness of 2,188 school-aged children and adolescents in 2008 using a set of EUROFIT tests. 75.2% of children and adolescents at age 7 to 17 years showed unsatisfactory results at cardiorespiratory fitness (under the 40th percentile); 67.9% of participants showed muscular endurance, and in 60.1% the muscular strength was unsatisfactory; flexibility was unsatisfactory in 61.7% of children and adolescents [Sports Medicine State Agency report to the Latvian Parliament, 2009].

11.14 Lithuania¹⁴

Since regaining independence in 1990, Lithuania has been undergoing substantial political, economic, and social changes. These changes have influenced people's lifestyles and health. The most remarkable changes have occurred in nutrition habits. Food globalization, aggressive advertising, and changes in food prices have had an impact on the diet of Lithuanians.

Nutrition plays a major role in the development of chronic non-communicable diseases that are widespread in Lithuania. Cardiovascular mortality in the country is considerably higher than in the old EU member states (744.9/100,000 among men and 419.6/100,000 among women in 2007). The incidence and mortality of some cancers related to diet are also high. In 2007, the incidence of all cancers among men was 578.1/100,000 and among women 399.6/100,000. Cancer mortality in the same year was 305.6/100,000 among men and 133.3/100,000 among women. Type 2 diabetes is a growing health problem in Lithuania.

In 2003, the Lithuanian government approved the National Food and Nutrition Strategy and Action Plan for 2003–2010. Monitoring of diet and nutritional status of

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Table 11.47. Leisure-time physical activity of at least 30 min 4–6 times a week or more by sex and age (%)

Year	Men						Women					
	age groups					total	age groups					total
	15–24	25–34	35–44	45–54	55–64		15–24	25–34	35–44	45–54	55–64	
2006	29.4	17.3	20.6	18.6	17.6	20.8	18.2	12.3	14.2	13.3	14.2	14.5
2004	34.2	16.8	19	18.3	27.1	23.9	16.2	14.1	10.4	13.2	19.4	14.7
2002	34.4	18.9	20.5	23.8	15.8	23.3	15.8	12.2	12.8	10.5	15.4	13.4

the Lithuanian population is one of the goals of the strategy. Some studies on food consumption and nutrient intake as well as nutrition status carried out in Lithuania are reviewed in the report.

National Nutrition Survey

National Nutrition surveys were conducted in 1997, 2002, and 2007. The aim of the surveys was to measure average food and nutrient intake in adults. For every survey, a national, random sample of 3,000 inhabitants aged 19 to 65 was taken from the National Population Register. Response rates were 72.7, 64.4, and 64.5% respectively. For dietary assessment, the participants were interviewed at home using the 24-hour recall method. Height and weight of the respondents were measured. In 2007, the Lithuanian Food Database was used for the nutrient intake calculation.

According to the data of the 2007 survey, Lithuanian diet was characterized by high fat content. The proportion of fat in total energy intake was 44.9% in men and 41.9% in women. Also, the proportion of saturated fatty acids (SFA) was too high in both men and women (13.5% of total energy and 12.9% of total energy, respectively), indicating a high consumption of fatty milk and meat products. Consequently, the content of cholesterol in the diet was higher than recommended (477.9 mg in men and 318.8 mg in women). The proportion of polyunsaturated fatty acids (PUFA) corresponded with the requirements (8.8% of total energy). Vegetable oil was mostly used for cooking. The intake of carbohydrates was below the recommended level. Carbohydrates constituted only 38.9% of total energy in men and 42.9% in women. In contrast, the proportion of mono- and disaccharides was higher than recommended (10.8% of total energy in men and 14% of total energy in women). The intake of dietary fiber was higher than the recommended level in men (20.9 g) rather than in women (15.6 g). Supply of protein was slightly higher than the recommendation (16.6% of total energy).

Concerning most vitamins and minerals, the average supply was sufficient. The sodium intake was too high, especially in men (4.3 vs. 2.8 g/day in women) and might

contribute to the high prevalence of hypertension in the country. The content of calcium was too low in the diet of both men and women (812.3 and 673.9 mg/day, respectively). The mean daily intake of iron in women (9.9 mg/day) as well as the intake of iodine in men (67.3 µg/day) and women (48 µg/day) was below the recommended level. The content of folate was too low in the diet of men (343.5 µg/day) and particularly of women (237.9 µg/day). The supply of vitamin D was insufficient in the diet of women (3.9 µg/day). Because of low calcium and vitamin D intake, a large proportion of Lithuanian women are at high risk of osteoporosis.

The prevalence of obesity (BMI ≥ 30 kg/m²) was 11.3% among men and 15.2% among women. The proportion of overweight persons (BMI ≥ 25 kg/m²) was 59.8 and 46.1%, respectively.

CINDI Program

The Countrywide Integrated Non-Communicable Disease (CINDI) program aims to reduce mortality and morbidity from non-communicable chronic diseases by reducing common risk factors. In 1987, 1993, 1999, and 2007, CINDI cross-sectional random sample surveys were carried out in five regions of Lithuania. Almost 8,000 men and women aged 25 to 64 participated in the surveys. 24-hour recalls and food frequency questionnaires were used for dietary assessment. Height, weight, waist circumference, and level of serum lipids were measured.

Over the period of 20 years, the diet of Lithuanians has shown some positive trends. The intake of animal fat decreased. In 1987, the majority of the population (91%) spread butter on bread. In 2007, only 30% of the respondents stated that they used butter. Animal fat (lard and butter) was replaced by vegetable oil in cooking. The proportion of respondents using fresh vegetables at least on 3 days in a week increased, especially among women. However, the intake of fat, especially saturated fat and cholesterol, is still too high.

Since 1987, the prevalence of hypercholesterolemia (>5 mmol/l) decreased from 85 to 52% in men and from 83 to 51% in women. In 2007, the mean value of total cholesterol was 5.4 mmol/l in men and 5.1 mmol/l in women. The proportion of men with a high level of low density lipoprotein cholesterol (>3 mmol/l) decreased from 88 to 53%, the same proportion of women from 86 to 48%. The most remarkable decrease in the prevalence of lipids disorders was observed in the youngest age group (25 to 34 years). The prevalence of overweight (BMI ≥ 25 kg/m²) decreased among both men and women.

Health Behavior Survey among Lithuanian Adult Population

Since 1994, Lithuania – together with Finland, Estonia, and Latvia – has been participating in the international FinBalt Health Monitor project. The aim of this study is to assess health behavior, including nutrition habits, of different sociodemographic groups and to monitor time trends in health behavior. In 1994–2008, eight cross-sectional surveys were conducted among the population aged 20 to 64. An independent

national random sample of 3,000 inhabitants of Lithuania was drawn from the National Population Register for every survey. The data were collected through mailed questionnaires covering sociodemographic characteristics, health behaviors, and self-reported height and weight. Food frequency questionnaires were used for assessment of nutrition habits. The response rate varied from 59.2 to 74.4%. Altogether, 15,161 respondents participated in the surveys.

Over a period of 14 years, the diet of Lithuanians has shown some positive trends. The usage of vegetable oil for cooking increased considerably from 31% in 1994 to 85% in 2008 among men, and from 48 to 94% among women. The intake of animal fat decreased. In 1994, 71% of men and 66% of women reported the usage of butter on bread. In the year 2008, the proportion of men spreading butter on bread was 34%, the proportion of women 36%. The consumption of high-fat milk decreased over the observational period. The survey data show that it was consumed by 35% of men and 28% of women, while in the year 1994 almost a half of the respondents (47%) reported whole milk consumption. The frequency of fresh vegetables and fruits consumption increased. In 1996, 18% of men and 25% of women consumed fresh vegetables on at least 3 days during the week before questioning while in the year 2008 this proportion was 63% in men and 68% in women. In 2008, fresh fruits and berries were eaten at least 3 days a week by 38% of men and 54% of women. Highly educated people and those living in urban areas had a healthier diet compared to persons with lower education and the rural population.

In 2008, the prevalence of obesity ($\text{BMI} \geq 30 \text{ kg/m}^2$) calculated using self-reported data was 16.9% among men and 19.7% among women. The proportion of overweight persons ($\text{BMI} \geq 25 \text{ kg/m}^2$) was 61.4 and 46.1%, respectively. Since 1994, both indicators have increased in men and have not changed in women. Overweight was inversely related to educational achievement in women.

Health Behavior Survey in School-Aged Children

The Health Behavior Survey in Lithuanian school-aged children collects information about some nutrition habits and self-reported weight and height. This study is carried out within the international HBSC study. Lithuania joined this project in 1994. Four surveys in 4-year intervals were conducted (the latest survey in 2006). The target population is schoolchildren 11, 13, and 15 years of age. Clustered sampling design was used. The sampling unit was the class. About 6,000 children were selected for every study. Response rate was about 95%. The food frequency questionnaire was used for assessment of nutrition habits. Self-reported weight and height were used for calculation of BMI. Age- and gender-specific BMI international cut-off points recommended by the International Obesity Task Force [Cole et al., 2000] were used to calculate the prevalence of overweight and obesity.

In 2006, the proportion of children eating breakfast every day was the highest among 11-year-old girls (70%) and boys (68%). It decreased among teenagers, especially among girls (to 51%). Daily fruit and vegetable consumption was more often

reported by girls than boys. The proportion of girls consuming vegetables daily was 27%, that of boys 22%. Fruits were eaten daily by 26% of girls and 21% of boys. The rates declined with age. The proportion of girls drinking coke or other soft drinks every day was 13%, that of boys 16%.

The prevalence of overweight and obesity was one of the lowest among all countries participating in the HBSC survey. Only 4.5% of girls and 10.5% of boys were overweight. The proportion of obese girls was 0.5–0.7% and the proportion of obese boys 0.8–1.3%. The highest prevalence of overweight was in 11-year-old children.

Childhood Obesity Surveillance

In 2008, Lithuania joined the WHO European Childhood obesity surveillance initiative. A cross-sectional survey was conducted in 156 randomly selected Lithuanian schools. Weight and height of 4,902 first-grade schoolchildren aged 7 to 8 years were measured, using electronic scales. BMI international cut-off points [Cole et al., 2000] were used for evaluation of body weight. The proportion of overweight children was 11.6%, the prevalence of obesity 5.7%. No differences were found between girls and boys. The proportion of underweight boys was 6.7% and that of girls 10.2%.

Anthropometry of Children and Adolescents

In 2000–2002, more than 9,000 schoolchildren, 7 to 18 years old, participated in a cross-sectional survey that was carried out in the five largest cities of Lithuania: Vilnius (the capital), Kaunas, Klaipeda, Siauliai, and Panevezys. The prevalence of overweight was estimated using BMI international cut-off points [Cole et al., 2000]. Compared to older adolescents, the prevalence of overweight was lower among younger schoolchildren. The proportion of overweight girls varied from 1.5 to 10.5%, that of boys from 2.6 to 9.9%. The prevalence of obesity varied from 0 to 2.9% in girls and from 0 to 4.4% in boys. Overweight was more common among older boys if compared with older girls.

Conclusions

In Lithuania, the majority of dietary surveys were carried out in the adult population. Dietary habits, nutrient content of diet, data on height and weight, as well as the trends of those indicators over the past decade are available at a national level. Since 1990, the nutritional habits of the Lithuanian adult population have changed considerably. The diet of Lithuanians tends to get closer to the recommendations of healthy nutrition because of a decrease in animal fat consumption and an increase in vegetable fat as well as vegetable and fruit consumption. However, high intake of fat, especially saturated, as well as sugars, low consumption of vegetables and fruits still are the main problems of Lithuanian diet. Consequently, the prevalence of overweight and lipid disorders is high in Lithuanian population. Unhealthy diet, high prevalence of diet related as well as other risk factors (smoking, low physical activity) might be responsible for high morbidity and mortality from cardiovascular diseases, cancers, and other chronic non-communicable diseases in the country.

The dietary data on children and adolescents as well as the elderly are very limited. Data are not available for macronutrients, micronutrients, and energy intake. The prevalence of overweight and obesity among children and adolescents is not very high in Lithuania; however, the rates are increasing, especially among young children.

In 2005, dietary guidelines for the Lithuanian population were issued by the Ministry of Health. Those guidelines are focused on the limitation of the consumption of fat, especially animal fat, free sugars, and salt; promotion of vegetables, fruits, and whole grain products consumption; balanced energy intake and increase of physical activity in order to decrease the prevalence of obesity. The promotion of healthy nutrition through the life cycle as well as ensuring healthy and sustainable food supply for all population groups are very important for successful implementation of the Lithuanian Food and Nutrition Strategy and Action Plan for 2003–2010.

11.15 Norway¹⁵

Dietary Surveys in Norway

National dietary surveys in Norway were carried out among adults (16 to 79 years of age) in 1997 and among children and adolescents (4, 9 and 13 years of age) in 2000–2001. Moreover, national dietary surveys were conducted among 6-month-olds in 2006 and among 12-month and 2-year-olds in 2007. The national dietary surveys were carried out in collaboration between the Norwegian Directorate of Health, the Norwegian Food Safety Authority and the University of Oslo, Department of Nutrition. A new national dietary survey among adults is planned for 2009/2010.

Children 4 Years and at 4th and 8th Grade of School (9 and 13 Years)

Subjects

Four-year-olds were recruited to participate in the national dietary survey through child health centers. Statistics Norway established a sample of 11 urban and 22 rural municipalities. Child health centers in these municipalities were invited to participate. A total of 38 child health centers from 9 urban and 18 rural municipalities decided to participate in the study. The child health centers included in the analysis were 25 from rural and 13 from urban municipalities. Invitation letters were sent to 746 4-year-olds; of these, 126 children did not meet at the health control at the child health center. Information about the survey was given to 511 parents of 4-year-olds, whereof 394 completed the survey. Three children were excluded, 2 because they were

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ill during recording and 1 because the diaries were not filled in correctly. The final sample consisted of 391 4-year-olds, which represents a participation rate of 52%.

For 4th and 8th graders, a random, nationally representative sample of 106 schools (53 primary and 53 secondary schools) from 53 municipalities was drawn by Statistics Norway to participate in the national dietary survey. Nine schools refused to participate, and seven randomly chosen schools in the same municipality were included. One school completed their recording too late to be included in the survey. In total, 103 of 106 schools and 1,835 of 2,214 invited students responded, which represents a participation rate of 83%. A total of 20 students were excluded, 14 because they only recorded 3 days and 6 because they were 3rd graders. The final sample consisted of 1,815 children, 810 in the 4th grade (9 years old) and 1,005 in the 8th grade (13 years old), with a participation rate of 81 and 84% for the 4th and 8th grade, respectively.

The regional ethical committee approved the study, and informed consent was obtained from the parents [Øverby et al., 2003].

Design

Data collection among the 4-year-olds was carried out from August to the first week of December 2001. The child health centers included an invitation letter to the present survey in the invitation for the general health control at 4 years of age. Parents who wanted their child to participate returned a short questionnaire and a signed informed consent at the child health center when they came for health control, and they met a nutritionist for instructions on how the diet should be recorded for 4 days. The parents of the participants were phoned by a nutritionist on the second day of their recording period, to encourage and answer questions. Participating parents could call the nutritionists at any time with questions [Øverby et al., 2003].

Data collection among students in the 4th and 8th grades was carried out from September to the first week of December 2000. The students received an invitation letter and a short frequency questionnaire at school approximately 2 weeks before food recording started. Children and parents returned the questionnaire and the informed consent to the University of Oslo. A nutritionist visited each school and gave oral and written instructions to the pupils on how the diet should be recorded. The participants received four food diaries, a booklet regarding portion sizes and written instructions [Øverby et al., 2003].

Food Diary

The parents of the 4-year-olds and students in the 4th grade recorded the participating child's entire food intake for 4 consecutive days. Participants in the 8th grade recorded their diet for 4 consecutive days themselves. The participants recorded their entire food intake in an 18-page precoded food diary. The 4-day period consisted of 3 weekdays and 1 weekend day.

The diary had lists of 277 drinks, food items and dishes grouped together according to a typical Norwegian diet. Each food group was supplemented with open-ended

alternatives. The design of the precoded food diary was similar to a cross-table, with food listed on the left and time span on top. Food amounts were presented in pre-defined household units (e.g. beverage is recorded in glasses, bread in slices) or as portions estimated from photographs. Along with the diary, each participant received a photographic booklet which embodied 13 color photograph series, each with four different portion sizes ranging from small to large. The participants indicated an eating event by filling in how many units they had eaten of each food item in the correct time span. The day was divided into five time spans (from 06:00 to 10:00 h, from 10:00 to 14:00 h, etc.) [Øverby et al., 2003]. The photographic booklet has been evaluated and the results are published elsewhere [Lillegaard et al., 2005]. The food diary has also been validated among 9- and 13-year-olds [Lillegaard et al., 2007; Andersen et al., 2005; Lillegaard and Andersen, 2005].

Calculations of Dietary Intake

Data were entered by scanning, using the Teleform program (6.0) (Datascan, Oslo, Norway). Daily intakes of foods, energy and nutrients were computed using a food database and software system developed at the Department of Nutrition, University of Oslo. The database is mainly based on the official food composition table, and is continuously supplemented with data on new food items and nutrients. Corrections for losses in cooking are done when calculating nutrient contents [Øverby et al., 2003].

Short Questionnaire

A short questionnaire containing questions about height, weight, physical activity, time spent watching television (TV)/using a personal computer (PC), and parents' education were filled in. Data on weight and height were given by 74% of the 4-year-olds and 664 (74%) and 825 (82%) of the 4th and 8th graders included in the survey, respectively [Øverby et al., 2003].

Adults (16–79 Years)

The second national dietary survey among adults (Norkost 2) was carried out in 1997, based on a self-administered quantitative food frequency questionnaire (QFFQ). Distribution and collection of the dietary questionnaires were coordinated with Statistics Norway's Omnibus Survey performed during March, June, September and November of 1997 [Johansson and Solvoll, 1997].

Subjects

A nationwide, representative and randomly selected sample of 2,500 Norwegians aged 16 to 79 years of age was drawn to participate in each Omnibus survey. A random half of each Omnibus sample (some 1,250 subjects in each period) was drawn to participate in the dietary survey. The distribution of subjects in different groups of socioeconomic status and location of residence was similar in Norkost 2 compared with the general population. However, the amount of subjects with higher level of education

was somewhat overrepresented and the amount of subjects with shorter duration of schooling and the amount of subjects living in cities was somewhat underrepresented, compared with the general population.

Of the original 5,000 subjects drawn to participate in the survey, 40 had died or emigrated and were excluded from the sample. Of the reminding 4,960 subjects, a total of 2,803 returned their QFFQ. The completed forms were checked before optical mark reading. Double marks for frequency, as well as portion size, were corrected to the highest alternative of adjacent marks or to the mean of the two marks. A total of 131 forms were rejected, mainly because (a) the whole questionnaire or at least two pages were blank, (b) the questionnaire was impossible to read, or (c) identification was insufficient. Rejected forms were included in non-respondents and information from 2,672 questionnaires (54%) was used in our analysis. There were only small differences between respondents and the total random sample regarding sex, age group, regions of Norway and education level.

For each round of the Omnibus survey, the Norwegian Data Inspectorate was notified according to standard procedures [Johansson and Solvoll, 1997].

Design

The QFFQ was mailed to the subjects together with information letters about the Omnibus and Norkost 2 surveys. Based on experiences from the Norkost 1 survey respondents were offered to participate in a lottery of four cheques for USD 150–700. After 1–3 weeks the QFFQ was collected by personnel from Statistics Norway during a visit in the home of each subject in connection with the Omnibus survey. The last round of the Omnibus survey was mainly carried out by interviewing by phone. In these cases the subjects received a return envelope with their questionnaire, to return their QFFQ by mail. Non-respondents received one reminder by mail after 4 weeks.

The questionnaire included a short written instruction and the subjects received no further guidance. On average it took about 1 hour to complete the QFFQ [Johansson and Solvoll, 1997].

Questionnaire

A self-administered, optical mark readable QFFQ was used in the survey. The questionnaire was designed to cover the whole diet and included about 180 food items grouped according to a Norwegian meal pattern. The QFFQ was phrased to obtain information about the 'usual' food intake during the last year. The frequency of consumption was given per day, per week or per month depending on the food item. The portion sizes were units such as slices, glasses, cups, pieces, deciliters and spoons. The portion sizes of the different food items were converted to weights on the basis of standard portions estimated from previous Norwegian dietary studies.

Questions about weight, height, physical activity, smoking habits, meal patterns and attitudes towards diet and body weight were included. Statistics Norway provided

information about the subject's level of education and several other demographic and geographical variables from their registers.

The questionnaire asked about the frequency use of and portion size of 7 kinds of dietary supplements (cod liver oil, cod liver oil capsules, fish oil capsules, multivitamin/mineral mixtures, vitamin C, vitamin E and iron supplements). Use of cod liver oil has traditionally been recommended during the dark period of the year. Thus, for cod liver oil and cod liver oil capsules, the questionnaire differentiated between the whole year and use during winter only. Reported frequency for use during winter was divided by a factor of 2 [Johansson et al., 1997].

Calculations of Dietary Intake

Software systems for optical mark reading were developed in collaboration with the Norwegian Government Computer Centre. The daily intake of energy and nutrients was computed using a food composition database [AKF, 1995] and software developed at the Institute for Nutrition Research (now Department of Nutrition) at the University of Oslo. Calculations of fatty acids were based on analytical data from a composition of margarine program in 1997 [Johansson and Solvoll, 1997].

Intake of Selected Nutrients and Food Groups in Norway

Intake of Fruit and Vegetables among Norwegian Children and Adolescents

The intake of fruit and vegetables was on average 225–250 g/day among the 4-year-olds, 4th and 8th graders participating in the national dietary survey among children and adolescents in Norway (2000). The survey further showed a positive association between fruit and vegetable consumption and the intake of dietary fiber, vitamins and minerals, especially vitamin C. A negative association was found between fruit and vegetable consumption and the intake of added sugar and saturated fatty acids.

The amount of fruit and vegetable consumption increased with age, as well as the percentage of children fulfilling the recommended intake of 500 g/day which was 5, 11 and 19% respectively. Hence, the data showed that Norwegian children and adolescents consume less than half the amount of fruit and vegetables recommended by the government [Andersen et al., 2004].

Intake of Sugar among Norwegian Children and Adolescents

The national dietary survey of children and adolescents (2000) showed an increased intake of energy from added sugar from 4-year-old children to students in the 8th grade ($p < 0.001$). On average, 4-year-olds and students in the 4th and 8th grades had a mean added sugar intake of 55, 80 and 95 g/day respectively, accounting for 15.1, 16.8 and 18.4% of energy intake [Øverby et al., 2003].

The intakes of all nutrients, except α -tocopherol among 4-year-olds and vitamin C among 4-year-olds and 4th grades, decreased with increasing content of added sugar

Table 11.48. Intake of cod liver oil (CLO) and cod liver oil capsules (CLC) among Norwegian children measured in percentage (%) of times per week or day

Age group	Toddlers 2 years		Children 4 years		Children 9 years		Adolescents 13 years	
Subjects, n	1,674		391		810		1,005	
Product	CLO	CLC	CLO	CLC	CLO	CLC	CLO	CLC
Do not use	62	–	73	99	81	94	92	90
1–2 times/week	7 ^a	–	7	1	4	1	3	3
3–4 times/week	–	–	4	0	4	2	1	2
5–6 times/week	11 ^b	–	7	0	5	1	2	2
Every day	20	–	9	0	6	2	2	3
>1 times/day	0	–	0	0	n.a.	n.a.	n.a.	n.a.

n.a. = No data available.

^a 1–3 times/week. ^b 4–6 times/week.

in the diet. Among 4-year-olds with low added sugar intake, a higher percentage of mothers had long education (61%). Moreover, high consumers of added sugar had 30–40% lower intake of fruit and vegetables than did low consumers [Øverby et al., 2003].

A negative association was observed between consumption of added sugar and BMI among girls in the 8th grade ($p = 0.0013$), whereas a positive association was observed among 4-year-old boys ($p = 0.055$) [Øverby et al., 2003].

Intake of Cod Liver Oil and Vitamin D among Norwegians

Cod liver oil is recommended as a supplement for toddlers in Norway (0–2 years) because of its contribution of vitamin D. Groups of the Norwegian population are partly deficient in vitamin D during the dark period of the year. Increased intake of fatty fish or supplementation of cod liver oil is therefore recommended during winter months for the whole population. Table 11.48 shows the intake of cod liver oil among children in Norway (2000–2007).

Data from 2007 showed that 38% of the 2-year-olds use cod liver oil as a supplement. The frequency of users declined as the children get older. 27% of the 4-year-olds reported the use of cod liver oil in comparison to 8% of the 13-year-olds. Cod liver oil consumers tended to change their supplement to cod liver oil capsules when they get older as 1% of the 4-year-olds and 10% of the 13-year-olds reported the use of cod liver oil capsules.

Table 11.49. Average vitamin D intake among Norwegian children measured with and without supplements¹ and with the intake of cod liver oil supplements (CLO) only

Age group measurements	Subjects n	Vitamin D intake without supplements µg/day (SD)	Vitamin D intake including CLO µg/day (SD)	Vitamin D intake with all supplements µg/day (SD)
Toddlers 2 years	1674	2.8 (1.8)	6.1 (5.4)	7.6 (6.1)
Children 4 years	391	2.6 (1.9)	4.9 (4.5)	6.9 (5.4)
Children 9 years	810	2.8 (2.3)	4.3 (4.1)	5.7 (5.0)
Adolescents 13 years	1 005	2.5 (2.7)	3.4 (3.9)	4.2 (5.0)

¹ Supplements of vitamin D including cod liver oil, other fish oils, all multivitamin and mineral supplements.

The influence of cod liver oil and other supplements on children's average vitamin D intake in Norway is shown in table 11.49. In Norway the daily recommended intake of vitamin D is 7.5 µg among 2- to 60-year-olds [Nordic Nutrition Recommendations, 2004]. The average intake of vitamin D without including supplementation was not sufficient among Norwegian 2-, 4-, 9- and 13-year-olds, the average intake without supplementation was 2.8, 2.6, 2.8 and 2.5 µg/day respectively in the different age groups. Cod liver oil was the main contributor to vitamin D intake from supplements in all age groups shown. The 2-year-olds had the largest proportion of cod liver oil consumers, and were the only age group that meets the nutrition recommendations when supplements are included.

11.16 Poland¹⁶

The data from Poland on energy and nutrient intake was prepared with the use of two main sources of information. The first one – 'Food consumption and anthropometric survey 2000' – was based on data collected from randomly selected individuals reflecting the demographic characteristics of the whole population. The second survey – 'Social stratification in food consumption' – focused on low-income consumers. In both cases the data was collected with the use of 24-hour recall method. To assure the best practice of the interviews, a photographic album of food products and dishes was used to help respondents give a precise description of the amount of food consumed. Additional data concerning the nutritional and health status were introduced in the

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report from the National Multicenter Health Survey [WOBASZ, 2003–2005] and Health Behaviour in School-Aged Children [HBSC, 2006] WHO collaborative study.

Polish Food Consumption and Anthropometric Survey 2000

Methodology

The institution responsible for the 'Food consumption and anthropometric survey project' carried out in Poland in 2000 with the FAO's financial support was the National Food and Nutrition Institute (IŻŻ). In cooperation with the Polish Central Statistical Office, a sample of 1,362 households was selected [Szponar et al., 2003]. Out of 4,310 members of these households, 4,200 people took part in 24-hour recalls on individual food consumption and anthropometric measurements. Due to administrative mistakes, inadequate age of individuals (under the age of 1) and overestimation of intake levels, ultimately 4,134 individual diets were analyzed and the nutritional status of 4,153 persons based on anthropometric measurements was assessed. The information gathered included data on the location and time of meal eaten (also purchased and consumed away from home), meal composition and its recipe.

Survey Results

The randomly collected data showed that the diet composition of a considerable part of the Polish population was highly unsatisfactory in many aspects, but mainly due to the fact that it was imbalanced [Szponar et al., 2003]. In the light of this study the average energy content of diet was calculated at 2,427 kcal (10.15 MJ). The reported daily energy intake of surveyed individuals was either complied with (1- to 9-year-old children and women 16 and older) or exceeded national recommendations. The highest energy value characterized the diets of 19- to 25-year-old males, and on average it was 3,657 kcal (15.30 MJ). According to the data the daily energy intake of 20% of men in this age group surpassed 4,495 kcal. Overall the average level of energy content in the male population diets reached 2,919 kcal (12.21 MJ) and more than 70% of the surveyed men had a higher than recommended energy value of diet. In the female subpopulation the average daily energy intake was 2,003 kcal (8.38 MJ). In the majority of the sample a high percent of energy from fat (36–37% adult males, 33–35% adult females) was reported.

The daily protein content of individual diets was also assessed as relatively high, especially of older boys and adult males. It was shown that in all studied age groups the daily protein intake was higher in the case of males (average 60 g/day), while protein deficiencies most frequently occurred in diets of 15+ girls. Additionally the study demonstrated that in the adult female subpopulation protein intake depended on the place of living and it was on average 3 g/day higher among women living in urban households. In general, dietary protein was predominantly (two thirds) of animal origin in the surveyed Polish population.

The average daily fat intake was 100 g/person (121 g/male and 80 g/female) and reached its highest level in the group of young men. Fat content of studied diets was estimated as too high (with the exception of 1- to 9-year-olds), especially in youth and adult male subpopulations. The fatty acid composition of the diets was disadvantageous due to too high share of saturated fats providing 12% of energy on average. Polyunsaturated fats provided above 5% of energy, the average P:S ratio was 0.53. The recorded average daily cholesterol level in the diets of males was 489 mg, compared to 395 mg in diets of females.

In contrast, data on carbohydrate content of individual diets indicated that in many age groups it was quite low, especially in adolescent boys. Statistically higher levels of total carbohydrates and dietary fiber were noted in diets of individuals living in rural areas. Data also proved that a relatively low percentage of energy was derived from carbohydrates (for example in adult males less than 50%). Dietary fiber intake was assessed as low, on average 22.4 g/person, slightly higher in the case of males.

The food consumption survey carried out in 2000 by IŻŻ was also an important source of information on the content of minerals (sodium, potassium, calcium, phosphorus, magnesium, iron, zinc, copper, and manganese) and vitamins (A, E, B₁, B₂, B₆, Niacin and C). Szponar et al. [2003] concluded that in the case of most minerals and vitamins the reported intake was not conform with recommendations. Excessive intake of vitamin A, sodium, potassium and phosphorus was frequently found while too low levels of niacin, calcium, zinc, copper as well as thiamine and iron (in female population) were also reported. Additionally, a very high variability of vitamin C intake was noticed.

Special attention should be drawn to excessive sodium intake which was shown in 99% of reported diets. The average content of sodium in daily diet was 4,170 mg in the sample, slightly higher in males (5,183 mg), and the highest in men aged 19–25 (6,472 mg). It was also noticed that the dietary sodium intake was lower in the urban population compared to consumers living in rural areas (4,119 and 4,252 mg, respectively).

The assessment of the nutritional status of a representative sample of children and adults was also conducted in the 2000 Polish study. In the case of the children's sample, which comprised 1,216 individuals (609 boys and 607 girls), the National Research Institute of Mother and Child percentile charts of body weight to height were applied. About 75% of the children had adequate body weight (table 11.50). Overweight was identified in 8% of the surveyed boys and 7.2% of girls, while obesity in 4.6% in both groups. Underweight was recorded in 14% of girls and 12% of boys, however declined with age, accounting for only 6–7% in older children.

The presented results are similar to data collected during the WHO Health Behaviour in School-Aged Children (HBSC) study, conducted in Poland in 2005–2006 with the use of the questionnaire method among 2,287 adolescents. According to HBSC calculations based on self-reports, 11% of 15-year-olds were overweight and obese [Oblacińska, 2006]. Statistically a larger number of boys were overweight (12.9%) in comparison to girls (8.7%). Underweight concerned 4.4% of 15-year-olds

Table 11.50. The share (%) of undernutrition and excess weight in studied population samples, according to gender [source: Szponar et al., 2003]

	Boys	Girls	Males	Females
Underweight	11.8	14.2	1.0	3.3
Body weight adequate to height ^a	75.5	74.0	42.3	48.2
Overweight ^b	8.0	7.2	41.0	28.7
Obesity	4.6	4.6	15.7	19.9

^a In case of children: slimness, body weight adequate to height and overweight tendency.

^b 90–97th percentile.

and was more common among girls (5.0%) than boys (3.7%). In 2005, ‘Keep Fit’, a nationwide educational program, was launched and aimed at promoting balanced diet principles and physical activity among secondary school students [Halicka et al., 2008].

In reference to table 11.50, the WOBASZ adult sample, consisting of 2,825 people, including 1,255 men, measurements showed that in general 56.7% of men and 48.6% of women were overweight or obese. The male population was characterized by higher risk of overweight (41% compared to 29%), however more women were obese. It must be emphasized that in the light of earlier representative nationwide surveys and the POL-MONICA project, the frequency of overweight and obesity in both male and female populations in Poland had increased markedly in the 1990s.

Another source of information on the nutritional and health status of the Polish population based on individual data was the WOBASZ survey which was conducted by five Polish research institutions in the years 2003–2005 and coordinated by the Institute of Cardiology in Warsaw. For the purpose of the research, a sample of 13,545 adults (20 to 74 years old) was randomly selected and individual interviews were carried out. Food frequency questionnaires and a 24-hour recall method were utilized as basic tools for evaluating intake [Rywik et al., 2005].

Nutritional data from 6,806 adults (including 3,215 males) showed that the average energy content of daily diet was 2,473 kcal in males and 1,681 kcal in females [Waśkiewicz et al., 2005]. Fats were the source of 37% of energy of diet in the case of males and 35% in females. Anthropometric measurements showed that the prevalence of overweight among 20- to 74-year-old men in Poland was higher comparing to the female subpopulation and reached 40% (almost 28% among women), while the percentage of obese persons was similar for both genders and amounted to 22% (table 11.51) [Biela et al., 2005]. BMI calculations were made with the use of data from 13,408 individuals, including 6,320 men and 7,088 women.

Table 11.51. BMI groups in WOBASZ study (%) [source: Biela et al., 2005]

	Males	Females
Body weight adequate to height BMI <25	38.4	49.7
Overweight $25 \leq \text{BMI} < 30$	40.4	27.9
Obesity $30 \leq \text{BMI}$	21.2	22.4

Low-Income Consumers Study

Methodology

Food consumption survey and nutritional evaluation of the daily diet of low-income consumers in Poland was a part of a project entitled 'Social stratification in food consumption in Poland and Belgium' carried out at University of Gent and Warsaw University of Life Sciences during the period 2004–2006 in the frame of bilateral scientific and technological cooperation with Flanders.

The Polish research based on interviews with 215 low-income respondents, was conducted in a medium-size city of central Poland (38,000 inhabitants) during the first quarter of 2005. In order to select the target group of consumers, the city was chosen taking into consideration high indices of unemployment and decreasing standard of living due to economic transition. The sample selection factor was the monthly income per person which varied depending on household size. For a single person, the income limit was set at 1,100 PLN per month (1 EUR = ca. 4 PLN) and for the households with 2 or more persons the limit was 800 PLN/person. The studied group of low-income consumers consisted mainly of adults ≤ 50 years of age (32% of 18 to 35 year olds, 47% of 36 to 50 year olds) with a medium (54%), vocational or elementary (22%) level of education and one fourth of the group with a higher/university degree. In the sample, 83% were women and 17% were men and they lived mostly (58%) in 3- to 4-person households [Rejman, 2007].

Survey Results

The economical factors, especially household's income and the cost of food, are the decisive factors determining the access to food products and possibility of purchase for low-income consumers, implying a greater tendency to consume unbalanced diets resulting in undernutrition (micronutrient deficiency) or overnutrition (overweight and obesity). An increasing number of studies show that the poor in affluent societies do not suffer from dramatic energy deficiencies, in fact high-energy density of the diet and food poverty are more common showing that overweight and obesity are the socioeconomic issue.

The average daily diet of the low-income respondent consisted of 1,944 kcal, coming from 66 g protein, 73 g fat and 269 g carbohydrates. High standard deviation noticed for most of the nutrients and energy value of the diet indicated big differences among the consumers. Energy intake on average was below the recommendation (82%), however the share of total fat and saturated fat in energy supply exceeded the WHO recommendations (it was 31.9 and 12.2%, respectively). The average daily diet showed deficiency of minerals: copper (48% of RDA), calcium (71%), iron (79%), zinc (84%), potassium (82%) and vitamins: thiamine (72%), niacin (76%), riboflavin (85%) and vitamin B₆ (85%), while the intake of sodium exceeded the recommendation 6 times.

The only two consumers' features significantly influencing nutrients and energy intake were BMI and gender (intakes were not linked to age, education level and the number of persons living in the respondent household). Between the group of underweight and normal BMI consumers and the overweight individuals, significant differences occurred in the case of: energy, protein, fat, SFA, MUFA, PUFA, sodium, vitamin E, vitamin B₆, and dietary fiber intakes. Gender influenced the nutritional value of the diet to a higher degree than BMI. Differences between men and women did not occur only in the case of three vitamins A, C, and B₁₂ as well as with respect to the share of protein and fat in daily energy structure.

The study also showed that the most important factors determining food choice and everyday nutrition were: preferences and habits, economical factors and convenience of preparing meals. This order suggests that presumably the food consumption choice of low-income consumers will evolve to worsening of the diet implicating the changes which are observed in more affluent countries. For this population group it is essential to improve their knowledge on food, nutrition and health linkages with the aim to create proper food choice and behavior.

Health Status of Polish Population

The most important change in health, concerning all Poles, is a significant decline of morbidity and mortality from cardiovascular diseases [Zatoński, 2008]. In 2002 these rates were 192/100,000 (men) and 58/100,000 (women). Life expectancy at birth in 2002 for Polish women was 78.8 years, and 70.3 years for men. Vascular diseases are still the major cause of death of Polish men and second (after cancer) in women. In terms of risk factors, 53% of the difference in life expectancy between EU15 countries in men and 35% in women aged 35 to 64 results from tobacco-related mortality. In 2002, smoking prevalence in Poland was one of the highest in Europe (46% of men aged 20 to 64 and 31% in women aged 20 to 64). In 1995, Poland introduced a comprehensive tobacco control program, followed by a significant decline in smoking prevalence in men and young women. According to the WOBASZ study, 42% of men and 1 out of 4 Polish women smoked regularly. The average number of smoked cigarettes reached

18 (men) and 14 (women). Some 46% of men and 67% of women never smoked and 80% declared that they want to quit smoking [Polakowska et al., 2005].

Conclusions

The nutritional and health status of the Polish population is determined by dietary habits strongly influenced by market transformation. Due to changes in consumer habits and low level of physical activity, the prevalence of overweight and obesity is increasing. The diet of Polish consumers, including low-income population, in general is improperly balanced. In the case of minerals' consumption, excessive daily intake of sodium can be seen as a big challenge for public health nutrition.

The most important change in health status is the decrease of morbidity and mortality ratios from cardiovascular diseases. The prevalence of another cause of premature mortality – smoking – is one of the highest in Europe, however in men and young adult women it is showing a decline.

The Polish population of 38.8 million is strongly differentiated by social, demographical and regional factors. This implies the need to conduct further research and monitoring of food intake in different subpopulation groups as well as to implement education and information programs aimed at changing food consumption patterns.

11.17 Portugal¹⁷

Introduction

The present report compiles the most relevant data published between 2000 and 2008 which were not included in the ENHR 2009 main text.

Household Food and Nutrient Availability

Following the household food and beverages availability data computed under the DAFNE project, the household availability of energy, nutrient and other food components retrieved from the 2000 Portuguese Household Budget Survey (HBS) are shown in table 11.52 [Rodrigues, 2007].

Two diet-quality scores (compliance with the WHO population dietary goals and adherence to the Mediterranean food pattern) were computed in order to compare Portuguese regions [Rodrigues et al., 2007] (table 11.53).

Food and Nutrient Intake

In the absence of a National Dietary Survey (the only one was carried out in 1980), the food and nutrient intake information was retrieved from several different studies

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Table 11.52. Household energy, nutrient and other food component availability (per person/day) in Portugal, 2000 [source: Rodrigues, 2007]

Energy, kcal	2,249
Protein, %E	16
Lipid, %E	34
Carbohydrates, %E	47
Alcohol, %E	3
MUFA, %E	13
PUFA, %E	8
SFA, %E	9
Cholesterol, mg	196
Sugars, %E	16
Fiber, g	20
Sodium, mg	6,573
From food/beverages, mg	2,638
From table/cooking salt, mg	3,935

that have been conducted in the context of particular scientific research but mostly in restricted geographical areas and rarely at the national level.

Children and Adolescents. In the ENHR 2009 main text, data on children's food intake was retrieved from Moreira et al. [2005] and the EpiTeen Study [Ramos, 2008]. Moreira et al. [2007] evaluated the diet of 4,845 children (6 to 12 years old) using a 24-hour recall and compared groups according to BMI distribution (non-overweight vs. overweight; table 11.54). The Health Behaviour in School-Aged Children Study [Matos et al., 2006] evaluated a national representative sample of 4,877 children (11 to 16 years old) by asking participants how much fruit, vegetables, soft drinks and sugar products they usually eat (table 11.55).

Adults and Elderly. In the main text of the ENHR 2009, data on this subject comes from the EPI Porto study [Lopes et al., 2006], a study on the health and nutrition situation in the city of Porto that evaluated 18- to 92-year-old subjects from 1999 to 2003 using a validated semiquantitative food frequency questionnaire. The whole report of this study can be found at <http://higiene.med.up.pt/consumoalimentarporto/home>.

Nutritional Status

Children and Adolescents. Self-reported weight and height data collected within the National Health Survey 2005/2006 [INE/INSA, 2008] allowed the computation of

Table 11.53. Diet-quality scores (based on per person per day household availability) by Portuguese region in 2000 [source: Rodrigues et al., 2007]

Household diet quality	North	Center	Lisbon area	Alentejo	Algarve	Azores	Madeira	Portugal
MAI ¹ (median)	2.26	2.34	1.77	2.37	2.21	1.67	2.79	2.09
% families with								
Low ≤2	42.0	41.6	57.3	38.6	43.7	62.0	28.5	47.1
Intermediate 2–4	39.1	38.8	32.0	41.2	37.9	30.9	43.2	36.6
High ≥4	18.8	19.7	10.7	20.1	18.4	7.1	28.3	16.2
HDIr ² (median)	4.00	4.00	4.00	4.00	4.00	4.00	5.00	4.00
% families with								
Low ≤4	61.3	56.6	65.6	57.2	63.8	66.1	42.0	61.4
Intermediate 5–6	33.2	36.5	31.5	37.1	30.5	30.4	48.3	33.6
High ≥7	5.5	6.9	2.9	5.7	5.7	3.5	9.8	4.9

¹ Mediterranean Adequacy Index proposed by Alberti-Fidanza et al. [1999], evaluating adherence to Mediterranean food pattern (may vary from 0 to positive infinite and the reference value of good adherence is ≥4).

² Healthy Diet Indicator revised from the one proposed by Huijbregts et al. [1997], evaluating compliance with WHO population goals (may vary from 1 to 11, the higher the score the better the compliance).

Table 11.54. Nutrient intake in Portuguese children (6–12 years old) by gender and presence of overweight [source: Moreira et al., 2007]

	Girls		Boys	
	overweight		overweight	
	no	yes	no	yes
Energy, kcal	2,316 ± 699	2,325 ± 802	2,525 ± 938	2,518 ± 825
Total fat, %E	35.3 ± 6.7	35.4 ± 6.9	35.1 ± 6.9	35.3 ± 6.8
SFA, %E	12.8 ± 3.4	12.8 ± 3.1	12.7 ± 3.3	12.8 ± 3.6
MUFA, %E	14.6 ± 3.5	14.7 ± 3.6	14.6 ± 3.5	14.7 ± 3.4
PUFA, %E	5.0 ± 1.7	5.0 ± 1.6	4.9 ± 1.7	5.0 ± 1.7
Proteins, %E	16.6 ± 3.7	17.0 ± 3.8	16.6 ± 3.8	16.9 ± 4.0
Carbohydrates, %E	49.2 ± 7.8	48.7 ± 8.1	49.4 ± 8.0	48.8 ± 8.0
Sugars, %E	22.1 ± 7.0	22.4 ± 7.3	22.7 ± 7.2	22.3 ± 7.4
Fiber, g	18.1 ± 8.7	17.7 ± 7.9	19.4 ± 10.6	18.5 ± 8.3
Calcium, mg	1,065 ± 450	1,053 ± 447	1,129 ± 506	1,144 ± 633

Table 11.55. Food intake in Portuguese children (% eating at least one portion/day) by gender and age [source: Matos et al., 2006]

	Gender		Age, years			
	boys	girls	11	13	15	16
Fruit	49.7	47.6	51.9	45.4	38.2	34.1
Vegetables	22.0	28.2	29.7	27.5	23.7	17.2
Soft drinks	31.3	23.8	25.9	25.4	27.4	34.1
Chocolates/cakes/sweets	22.0	23.9	23.0	23.7	22.8	21.9

BMI distribution among Portuguese children and adolescents (table 11.56). Several other studies have also reported data on the BMI of Portuguese children and adolescents (table 11.57). Biochemical data for Portuguese children is very scarce. Pedrosa et al. [2008] have evaluated 61 children in order to identify cardiovascular disease risk (table 11.58).

Adults and Elderly. Self-reported weight and height data collected for the last National Health Survey of 2005/2006 [INE/INSA, 2008] allowed the computation of the Body Mass Index group's proportion among Portuguese adults and elderly (table 11.59). Some other studies have also reported data on the body mass index of Portuguese adults and elderly (table 11.60). Adults' biochemical data for adults is shown in the ENHR 2009 main text [source: Instituto de Alimentação Becel, 2001].

Length of Breastfeeding

To complement data on breastfeeding which is included in the ENHR 2009 main text, two additional tables are included. Length of breastfeeding within the NHS 2005/2006 [INE/INSA, 2008] by women (aged 15+ years) with children <5 years old in 2006 is shown in tables 11.61 and 11.62.

Conclusion

Portugal still lacks nutrition-related data collected at the national level and therefore most information is supplied by Household Budget Surveys and Food Balance Sheets. This is a strong limitation to identify associations between food intake, nutritional and health status and undermines national policies in this field.

Table 11.56. BMI of Portuguese children and adolescents by age groups (using the IOTF criteria)

Age group years	Underweight, % (BMI <18.5 kg/m ²)			Normal range, % (BMI ≥18.5 and <25 kg/m ²)			Overweight % (BMI ≥25 and <30 kg/m ²)			Obese,% (BMI ≥30 kg/m ²)		
	total	men	women	total	men	women	total	men	women	total	men	women
6–9	9.70	10.32	9.09	49.01	50.07	47.99	24.30	25.03	23.60	16.99	14.58	19.32
10–14	7.45	7.75	7.13	65.03	61.49	68.70	20.85	24.40	17.19	6.66	6.36	6.98
15–17	5.62	4.52	6.68	76.21	72.22	80.02	15.30	18.91	11.84	2.87	4.35	1.46

Source: Data computed on purpose for this report by the Portuguese National Statistics Institute (INE) from the database of the National Health Survey 2005/2006. INE, INSA.

Table 11.57. BMI of Portuguese children and adolescents by age groups (all studies using the Cole criteria, with the exception of Ramos e Barros 2007 who have used the IOTF criteria)

Age years	n and method of data collection	Place and year of data collection	Overweight, %			Obesity, %			Reference
			total	female	male	total	female	male	
3–6	2,400 measured	Coimbra (2001)	16.9	20.4	13.6	6.7	6.9	6.5	Rito, 2004
6–10	1,225 measured	Sintra (2004)	23.0	–	–	12.6	–	–	Ferreira and Marques-Vidal, 2008
6–10	2,384 measured	Madeira (2004/2005)	19.2	22.6	16.1	11.1	10.7	11.4	Sousa et al., 2006
6–12	4,845 measured	National (2002/2003)	–	20.9	18.5	–	11.9	10.3	Moreira et al., 2007
7–9	905 measured	Aveiro (2006)	20.0	21.4	18.6	8.1	9.6	6.6	Pedrosa et al., 2006
7–9	3,044 measured	National (2002/2003)	–	24.1	22.2	–	–	–	Moreira et al., 2005
10–15	819 measured	Porto	–	23.8	30.9	–	–	–	Ribeiro et al., 2006
11	1,176 self-reported	National (2003)	–	17.7	26.5	–	2.2	6.2	Yngve et al., 2007
13	2,161 measured	Porto	–	18.8	20.8	–	5.7	6.6	Ramos and Barros, 2007
11–16	7,400 self-reported	National (2005/2006)	15.2	14.9	15.6	2.8	2.7	2.8	Matos et al., 2006
10–18	3,013 measured	Lisbon and region (2000/2002)	–	19.7	17.4	–	4.7	5.3	Marques-Vidal et al., 2008

Table 11.58. Biochemical markers of Portuguese children (7–9 years old) [source: Pedrosa et al., 2008]

Biochemical markers	Mean $\pm$ SD
Total cholesterol, mg/dl	167.4 $\pm$ 26.9
LDL, mg/dl	105.6 $\pm$ 23.7
HDL, mg/dl	50.4 $\pm$ 9.9
Triglycerides, mg/dl	71.7 $\pm$ 39.5

11.18 Romania¹⁸

Demographics

Romania's population was 21.58 million inhabitants in 2006 (51.3% females). People aged 0–14 years made up 15.4%, while those aged ≥ 65 years made up 14.7% of the total population. A decline in *fertility* (from 1.5 to 1.3 births per woman), a decline in *birth rate* (from 11.4 to 10.2/1,000 inhabitants), and an increase in the *death rate* (from 11.6 to 12.0/1,000) also occurred between 1992 and 2006 [NIS, 2006].

Life Expectancy

The average life expectancy in Romania increased from 71.25 years in 2000 to 72.7 years in 2006 (69.2 years for men and 76.2 years for women), 6 years below the EU average (78.5 years in 2005) and 7 years below the average for the EU countries prior to May 2004 (79.7 years in 2005) [Vladescu et al., 2008].

Infant, Child, and Maternal Mortality

Infant and maternal mortalities are among the highest in the European Region despite a large decline in maternal mortality since 1990. The *infant death rate* decreased from 26.9 (in 1990) to 13.9 infant deaths per 1,000 live births (in 2006) respectively [NIS, 2006]. The *mortality rate under 5 years of age* decreased from 34.3 per 1,000 live births (in 1990) to 16.5 per 1,000 live births (in 2006). Moreover, *maternal mortality rates* also decreased dramatically from 83.6 per 100,000 live births in 1990 to 32.8 and 15.5 in 2000 and 2006 respectively.

Health Status and Main Causes of Death

During the past decades, the morbidity and mortality patterns have changed, an increased prevalence of chronic diseases being observed. Lately, in 2006, the main causes of death [WHO Regional Office for Europe, 2007] were cardiovascular diseases

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Table 11.59. BMI of Portuguese adults and elderly by gender and age groups (computed from self-reported height and weight)

Age group	Underweight, % (BMI <18.5 kg/m ²)			Overweight, % (BMI ≥25 kg/m ² <30 kg/m ²)			Obese, % (BMI ≥30 kg/m ²)		
	total	men	women	total	men	women	total	men	women
Total	2.22	0.99	3.34	35.72	40.64	31.22	15.20	14.33	16.00
18–24	5.55	3.17	8.09	15.36	17.93	12.62	3.88	4.23	3.51
25–34	3.39	0.99	5.82	30.71	39.36	21.94	8.61	7.88	9.35
35–44	1.33	0.24	2.40	36.18	43.67	28.86	12.84	12.81	12.87
45–54	0.76	0.08	1.40	41.68	45.94	37.64	21.00	21.69	20.35
55–64	0.98	0.46	1.46	44.15	45.65	42.82	23.21	21.81	24.46
65–74	1.02	0.59	1.37	43.45	46.25	41.18	21.87	19.55	23.73
75–84	2.65	2.38	2.82	39.37	45.33	35.47	16.84	13.43	19.08
85+	7.12	6.48	7.43	25.58	35.16	21.03	14.11	16.35	13.04

Source: Data computed on purpose for this report by the Portuguese National Statistics Institute (INE) from the database of the National Health Survey 2005/2006. INE, INSA.

Table 11.60. BMI of Portuguese adults and elderly by age groups

Age years	n and method of data collection	Place and year of data collection	Overweight, %			Obesity, %			Reference
			total	female	male	total	female	male	
18–64	8,116 measured	National (2003/2005)	39.4	34.4	45.2	14.2	13.4	15.0	Carmo et al., 2008
18–65	9,991 self-reported	Azores (2004)	–	35.5	45.8	–	18.8	16.0	Santos et al., 2008
65+	307 self-reported	National (2004)	44.0	41.8	45.7	18.6	19.4	17.9	Afonso, 2008

(62.1%), cancer (17.6%), digestive diseases (5.5%), accidents, injuries, and poisoning (4.9%), and respiratory diseases (4.9%).

Cardiovascular Diseases. Ischemic heart disease is the single biggest killer in Romania, responsible for about 20% of all yearly deaths during the 2000–2006 period.

Table 11.61. Portugal, length of breastfeeding (of children <5 years old in 2006)

Length of breastfeed	n = 657,888	%
≤1 week	52,152	7.9
≤1 month	91,058	13.8
≤2 months	87,012	13.2
≤3 months	112,968	17.2
≤6 or more months	257,623	39.2
Did not breastfeed	57,075	8.7

Source: Computed on purpose for this report from the 4th INS (2005/2006) data-base.

Cancer. Cancer accounted for 16% of all deaths in Romania, which is much less than the Eur-A¹⁹ average (28%) (referring to WHO epidemiological subregions). The prevalence of localizations varied, with no particular pattern related to age or gender. At least until 2006, the general standard death rates due to *malignant tumors* presented a slow, constant increase with time. Among cancer-related deaths, mortality from cervical cancer is twice as high in Romania than the EU average; however, mortality from trachea/bronchus/lung cancers and breast cancer is below the EU average [Vladescu et al., 2008].

Digestive Tract Diseases. During the past decades, mortality from *diseases of the digestive tract* increased and decreased successively. Over 70% of the deaths from digestive diseases in Romania are caused by *chronic liver disease and cirrhosis*, the Eur-B+C²⁰ and Eur-A²¹ average rates being about 60 and 40% respectively [WHO Regional Office for Europe, 2005].

Food Intake, Feeding Habits, and Nutritional Status

Infants. Data about feeding practices and nutritional status concerning infants and children were essentially derived from an extensive project [Stanescu et al., 2005] that started in April 2004 and conducted by the *Alfred Rusescu Institute for Mother and Child Care* in Bucharest, with technical and financial support from UNICEF (United Nations International Children's Emergency Fund). Cross-sectional and retrospective studies were performed and a main consideration was given to *surveys, questionnaires, body measurements, and laboratory analysis data* collected during past periods, which involved: a national representative sample of 83,000 children aged under 5 [NPNS

¹⁹ WHO epidemiological subregions

²⁰ WHO epidemiological subregions

²¹ WHO epidemiological subregions

Table 11.62. Portugal, length of breastfeeding (of children <5 years old in 2006) by mothers' age groups

Age group years	n	Length of breastfeeding					
		≤1 week	≤1 month	≤2 months	≤3 months	≤6 or more months	Did not breastfed
15–19	10,013	14.8	27.5	2.6	13.5	38.1	3.6
20–24	82,300	9.6	12.1	21.8	15.0	28.7	12.8
25–29	171,854	8.2	12.3	15.8	17.4	36.2	10.0
30–34	228,447	8.1	14.0	10.0	18.6	43.1	6.1
35–39	113,869	5.0	15.1	11.5	16.8	43.1	8.5
40–44	44,393	8.7	14.2	11.1	16.6	40.9	8.5
45–49	6,807	5.5	23.8	11.6	6.6	30.2	22.2
50–54	205	40.6	18.8	–	–	40.7	–

Source: Computed on purpose for this report from the 4th INS (2005/2006) database.

Project, 1993–2003]; a sample of 2,120 pupils aged 7 to 8 (2002–2003); a pilot survey on the iodine deficiency in 1,387 pregnant women (2003–2004), and a reproductive health survey (2004).

Overall, 88.0–92.2% of the surveyed children were breastfed for various periods of time and only 7.7–12.0% of them were never breastfed. These data rank Romania among the countries with good breastfeeding practices. The average age of exclusively breastfed children (with no other solid or liquid foods) was 3.9 months, with a median of 3.2 months. Data collected in 2004 indicate that only 16% of infants aged between 0 and 5 months were exclusively breastfed.

The average age for introducing bottle-feeding was 4.2 months, irrespective of gender, area of residence, or maternal educational level. At the age of 3 months, 50% of infants began to be fed on the bottle while 36.8% of infants received complementary feeding and at 4 months their share increased to 70.9%. Fruit puree was the first complementary food given to infants by most families (65%), followed by vegetables (17.8%), and cereals.

Children. Anemia is more frequent in *children under 5 years* of age, especially in rural areas, where two thirds of the children between 1 and 2 years of age have a hemoglobinemia <11 g/dl. Thus, in infants, the average level of 10.5 g/dl blood hemoglobin was lower in 2004 than the lowest mean (of 11 g/dl) recorded in the 2000–2003 period [Stanescu et al., 2005].

Anemia is also frequent in schoolchildren. Between 2002 and 2004, its mean prevalence increased up to 23.4%, and even higher in rural areas.

The low weight-for-height indicator (under -2 SD) had an overall prevalence of 4.4% in children under 5 years, with values above 5% in rural areas. Low weight-for-height was also recorded in about 5% of children aged 6 to 7 years, with a maximum of 7.7% in girls aged 7 and 6.1% in children aged 6 years living in urban areas [Stanescu et al., 2005]. On average, the prevalence of low weight-for-age was 5.5% in children under 5, a value above the reference sample. The prevalence of high weight-for-height was systematically higher than in the reference population for all age groups (4.2% of children aged under 5 are overweight).

The prevalence of low height-for-age of children under 5 years of age is above the reference values, ranging between 5 and 10%, with lower values in 2004. The persistence of a mild height deficiency, close to the reference values, was also reported in children aged 6 to 7 [Stanescu et al., 2005].

Adults and Elderly. Between 2000 and 2008, several cross-sectional nutritional and health status surveys were carried out by the Institute of Public Health Cluj-Napoca in various regions of Romania and with national representative samples. The methods used were the 24-hour recall for *dietary intake*, and 24-hour recall and 7-day estimated record for *food intake*. In 2003 and 2008, two national studies were conducted in 614 and 473 adults of both genders [Vlad et al., 2003, 2008]. In a 2006 study, the daily food and nutrient intake in 641 adults (315 men and 326 women) from 10 counties of the Transylvania area was also assessed [Zapirtan, 2006]. In all studies, the subjects were grouped by age (20 to 45, 45 to 62, and >60 or 62 years of age). Data from subjects recruited from regions all over Romania, aged 55 to 85 and living in their own households, were also reported and analyzed in the EU *Ageing Nutrition Project* [Stehle and Volkert, 2006].

In these studies, the average energy intake was below the recommended level in all adults (2,772 kcal/day in men and 2,391 kcal/day in women). Due to lower energetic needs at older ages, the energetic deficit decreases from 15% in young adults to 6% in the elderly. The relative share of protein in total energy intake was similar in men and women (18 and 17%E, respectively), with no significant differences between age groups defined by the WHO [2003]. The mean proportion of carbohydrates in total energy intake was low both in men (45%E) and women (48%E). The proportion of fat in total energy intake was high, far above the maximum level of 30%E recommended by *Eurodiet* [2000], with 36% in men and 37%E in women, respectively. Dietary fat intake was high, especially in women. The average cholesterol intake was very high in all subjects (and particularly in the elderly), being 520 mg/day in women and >640 mg/day in men.

Mean calcium and magnesium intake was lower than the population reference intake of *Eurodiet* [2000] in both genders. The average magnesium intake in men (303.32 mg/day) was up to the recommendations, decreasing slightly in elderly, while in women it was 263.46 mg/day, representing 89.94% of the RDA.

Iron intake was above the recommendation of the Scientific Committee for Food. On average, the intake was relatively high in both genders (21.04 mg Fe/day in men and 18.09 mg Fe/day in women). In elderly only, where the needs are lower, the intake was higher than the RDA by 45%.

In both genders, vitamin A intake exceeds the recommendation of SCF, with the exception of elderly men, where it was close to the recommendations. The average intake in all adults was 2 mg/day. Vitamin B₁ intake covered the recommendations, with mean values of 1.74 mg/day in men and 1.45 mg/day in women. The mean intake of vitamin B₂ was above the recommended level by more than 50%, having a mean value of 3.66 mg/day in men and 3.16 mg/day in women. All subjects had a vitamin C intake higher than the recommended level, 76 mg/day in men and 75 mg/day in women, representing 159% of the RDA and decreasing with age.

The anthropometric and nutritional status data show that the average height was 1.73 m in adult men and 1.62 m in women, while in elderly it was lower than the EU average, ranging between 1.64–1.71 m in men and 1.57–1.60 m in women. In adults, the highest percentage of overweight (43%) was found in men, while only 35% was found in women. BMI showed that the percentage of obesity was rather high in both genders, almost 25% in women and above 19% in men, declining with age. Systolic and diastolic blood pressures were higher than the normal values (140/90 mm Hg) in both genders in about 15% of the subjects for *systolic* and in 6% for *diastolic pressure*.

Serum lipid values >800 mg/dl in 18% of the men and in 11% of the women are related to an increased cardiovascular risk. A high cholesterolemia (>240 mg/dl) – present in 32% of men and 26% of women – was also associated with a high cholesterol intake. About 16% of men and 11% of women had an HDL cholesterol level below the protective limit of 40 mg/dl. Referring to the elderly, 64% of men and 43% of women had healthy cholesterol levels with high HDL cholesterol levels. Hypertriglyceridemia (>150 mg/dl) was found in 40% of the men and in 26% of the women.

Serum levels lower than the reference values were found for Ca (23 and 29%), Mg (27 and 32%), and Fe (22 and 27%) in men and women, respectively. Low hemoglobin values were found in 24% of the men and in 21% of the women. Although only 4.4% of the investigated subjects declared themselves as suffering from diabetes, 9.6% of the men and 11.0% of the women were found with blood sugar levels above 120 mg/dl. Other nutritional disorders were also self-reported: hypertension (15.0%), dyslipidemia (8.5%), and gastrointestinal diseases (5.3% of the cases).

The 2000–2008 average food intake assessments showed that the common Romanian diet contains too much fat and fatty meat [Vlad, 2003, 2008; Zapirtan, 2006]. The meat consumption rate was consistent with the experts' recommendations, but red meat and especially meat products are consumed at a higher rate than necessary. Conversely, extremely low fish consumption was recorded: 61% of the surveyed subjects seldom eat fish, 31% eat fish only once per week, while only about 8% of the subjects eat fish several times per week, as recommended.

The alcohol consumption is moderate in our studied samples, with the exception of 8–9% of men and 5–6% of women who drink it daily. In elderly, drinking beer or wine is not popular, but 11% of men and 3% of women still drink wine daily. During the past 5 years, cross-sectional studies on representative samples reported a high prevalence of tobacco current use (mainly cigarette smoking), generally between 33.0

Table 11.63. Prevalence (%) of current tobacco use in representative samples of the general population of Romania (2003–2007)

Study	1. Smoking and public health age 14–60 (2003)	2. Prevalence of drug use age 15–64 (2005)	3. Knowledge, attitude, and practices age 15–59 (2007)	4. Romania GYTS age 13–15 (2003)
Males, %	40.0	48.7	33.0	27.7
Females, %	19.5	25.3	27.1	20.1
Total, %	29.6	36.5	30.0	23.8
n	1,209	3,500	2,434	4,129

and 48.7% in men and 19.5 and 27.1% in women (table 11.63), with variations related to age [CHPS 2007; Romanian National Antidrug Agency, 2005].

Using interviewer-administered questionnaires, peak values of smoking prevalence (up to 61% in men and 42% in women) were mostly noticed in young and middle-aged adults (between 25 and 44 years of age). In schoolchildren aged 13 to 15, at least *one use* of a tobacco product during the past 30 days was reported by 28% of the boys and 20% of the girls, while *daily use* was mentioned by 6.9% of the boys and 5.9% of the girls [CDC, 2004]. Response rates varied between 58 and 87%. Several campaigns and programs for discouraging smoking and encouraging the cessation resulted in a mild lowering of the tobacco consumption prevalence in adults lately.

Nutritional failure leading to different forms of nutrition-related chronic diseases therefore is a major public health concern. Developing and implementing intervention programs towards healthy behavior is urgently needed. The data presented in this report could be useful in formulating such nutrition intervention for Romania.

11.19 Slovenia²²

Introduction

In Slovenia, the Ministry of Health [2005] introduced the National nutritional policy program 2005–2010 to emphasize the importance of the public sector in the implementation of national food nutrition policy and healthy lifestyle. The National Institute of Public Health of the Republic of Slovenia is a major research center for epidemiology, prevention of disease and promotion of health in Slovenia. It provides national surveys covering areas such as, socioeconomic conditions, dietary habits, physical activ-

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Table 11.64. Mean daily intake of energy, macronutrients and dietary fiber among Slovenian adults [Koch, 1997]

Nutrients	Average	Women	Men
Energy, MJ/day	11.4	10.7	12.1
Protein, %E	13	13	13
Fat, %E	44	45	44
SFA, %E	15	15	15
MUFA, %E	13	13	13
PUFA, %E	4	4	4
Carbohydrates			
Total, %E	39	40	38
Sucrose, %E	20	20	20
Dietary fiber, g/day	20	20	20
Dietary fiber, g/MJ	1.7	1.6	1.8
Alcohol, %E	3	1.5	4

ity and health. Food consumption surveys are also part of projects conducted at the Biotechnical Faculty and the Medical Faculty, University of Ljubljana. Also, the WHO countrywide integrated noncommunicable disease intervention (CINDI) and other programmes make important information available.

In the next sections, some highlights of the studies conducted in Slovenia over the past decade will be presented.

Dietary Habits Adults

The first large national survey on dietary habits, with a representative sample of 2,185 subjects in Slovenia, was conducted in 1997 by Koch [1997]. The nutritional habits of adults, aged 18 to 65, in Slovenia were assessed using food frequency questionnaire and the 24-hour recall method: frequency and time of daily meals, nutrition and energy intake of average daily consumed food, frequency of daily consumed food (milk and dairy products, fruits, vegetables, meat, cereals and drinks), smoking habits and physical activity regarding to sociodemographic variables were recorded.

The most important finding of this survey was higher energy intake compared to the recommended values (table 11.64), which together with inadequate physical activity leads to disproportionate energy balance and weight gain. The average daily energy intake was 12.1 MJ for men and 10.7 MJ for women. The dietary protein content was 13%E, with a surprisingly high fat content of 44%E, which consequently

Table 11.65. BMI among Slovenian adults [Koch, 1997]

BMI	Male, %	Female, %
<20	1.2	13.4
20–25	43.1	51.8
25–27	25.8	12.0
>27	29.9	22.8

Table 11.66. Mean daily intake of energy, macronutrients and dietary fiber among Slovenian adolescents [Fidler Mis, 2005]

	Female	Male
n	1,214	1,010
Age, years	15.6	15.7
Energy, MJ	9.7	12.7
Protein, %E	14	15
Carbohydrates		
Total, %E	57	57
Sucrose, %E	13	11
Dietary fiber, g	27	33
Fat, %E	29	28
SFA, %E	13	13
MUFA, %E	10	10
PUFA, %E	6	5

reduced carbohydrate content (39%E). On average, alcohol provided 4 and 1.5%E for men and women, respectively. The average portion of saturated fatty acids was 15%E, which is considerably higher than recommended. In contrast, the intake of average dietary fiber was 20 g/day, corresponding to 1.6 and 1.8 g/MJ for men and women, respectively, significantly insufficient compared to the recommended values.

A major percentage of investigated subjects had normal BMI (between 20 and 25), 43% for women and 52% for men (table 11.65). 26% of the male and 12% of the female subjects had BMI between 25 and 27. Moreover, 30% of the male subjects had BMI higher than 27, compared to 23% of the female subjects [Koch, 1997].

Table 11.67. BMI among Slovenian adolescents [Fidler Mis, 2005]

BMI ¹	Male	Female
<18.5	4.1	10
18.5–25	77.3	73.6
25–30	18.6	16.4
>30	4.1	3.5

¹ Extrapolated BMI at age 18 years

Covering the period from 2007 to 2008, a second nationwide survey on dietary habits with 1,123 participants was conducted by The National Institute of Public Health of the Republic of Slovenia, using a similar method as Koch [1997]. In May 2009, the preliminary results on fat content and BMI were presented. These findings showed that dietary fat intake dropped from 44%E in 1997 to 39%E in 2008. On average, 42% of female and 60% of male participants, aged 19 to 65, were overweight or obese with a BMI >25. Full details are provided in table 11.68.

Dietary Habits Adolescents

In adolescent subjects in Slovenia, the most important dietary habits survey covered the period from 2003 to 2005 using a food frequency questionnaire [Fidler Mis, 2005; Štimec et al., 2007]. A representative sample of 2,813 people, aged 14 to 17 years (representing 10% of the population), were asked to complete a questionnaire on body weight, height, physical activity and other lifestyle factors. 2,224 persons (1,214 female, 1,010 male) responded to the questionnaire (participation rate 83.6%).

The average energy intake was 9.7 and 12.7 MJ for female and male subjects, respectively. The distribution of energy between protein (14–15%E), carbohydrates (57%E) and fat (28–29%E) was in accordance to the recommendations (table 11.66). In addition, average dietary fiber intake was 27 and 33 g/day, corresponding to 2.8 and 3.3 g/MJ for female and male subjects, respectively. BMI values are presented in table 11.67 [Fidler Mis, 2005].

General Comments

Data on food consumption patterns in Slovenia are still scarcely available. Some master theses studies are reported, unfortunately with limited representation of the population and limited targets of study. The general trend in the data described above is in fact similar as the general trend observed in the whole of the European Union. Because of application of slightly different methodologies, it is hard to compare both studies reported [Koch, 1997; Gabrijelčič Blenkuš et al., 2009]. Nevertheless, the

Table 11.68. BMI among Slovenian adults [Gabrijelčič Blenkuš, 2009]

BMI	Male (19–65 years)	Female (19–65 years)	Male (>65 years)	Female (>65 years)
<18.5 kg/m ²	1	3	0	0
18.5–25 kg/m ²	38.6	54.8	50	14.3
25–30 kg/m ²	41.8	30	37.5	57.1
>30 kg/m ²	18.7	12.3	12.5	28.6

results indicate that it is necessary to thoroughly standardize the procedures used in order to generate data that can be compared.

Recently, more efforts were conducted to obtain data on food consumption behavior with appropriate research methodology. Unfortunately, the results have not yet been published. An extended review was published [Ostan et al., 2009] that elucidates the deeper reasons of food choice and feeding behavior and indicates that the observed pattern is based on a complex genetic drive. The existence of this drive is one of the reasons why studies on nutritional behavior and food consumption are so difficult to conduct and interpret.

11.20 Spain²³

The Catalan Nutrition Survey was realized in 2002–2003 (ENCAT 2002–2003) [Serra-Majem et al., 2007a; Ribas-Barba et al., 2007] on behalf of the Health Department of the Catalan Government. Catalonia, located in northeastern Spain, has a population of more than 7 million inhabitants.

Study Methodology

Sample: The study included a representative sample of 2,160 individuals aged 10 to 80. The sample was stratified according to household size and randomized into subgroups, with Catalan municipalities being the primary sample units and individuals within these municipalities comprising the final sample units. Samples were selected by considering the proportion of the number of inhabitants and the specific weight of each municipality in the sample and were obtained from the census registers of the selected municipalities [Serra-Majem et al., 2007a; Ribas-Barba et al., 2007]. The response rate was 65%.

²³ Serra-Majem L, Román-Viñas B, Ribas-Barba L; Nutrition Research Foundation, Barcelona, Spain. E-Mail fin@pcb.ub.es

Methods: Data were collected at the individual's home via personal interviews carried out by dietitians who had previously undergone a rigorous selection and training process. All subjects were administered a general questionnaire compiling information about socioeconomic variables (profession, educational level, etc.) as well as the following: food habits, chronic disease control, smoking, physical activity, and opinions and knowledge about nutrition. Furthermore, several anthropometric measurements were taken under standardized conditions [Serra-Majem et al., 2007a; Ribas-Barba et al., 2007].

The dietary assessment method consisted of combining two 24-hour recalls and a food frequency questionnaire. All individuals completed one 24-hour recall, and 62% of the sample completed a second 24-hour recall 8–30 days later, conducted on a different weekday from the first interview. Interviews were conducted on all days of the week. In order to estimate volumes and portion sizes, the household measures found in the subjects' own homes were used. In subjects with disabilities or memory defects the primary caretaker was interviewed. Children <13 years were assisted by a parent. Food data coding was carried out by the interviewers [Serra-Majem et al., 2007a; Ribas-Barba et al., 2007]. The food frequency questionnaire was qualitative and included 80 food items.

Analysis: To convert food into nutrients, the Spanish tables developed by CESNID were applied. Data were adjusted for intraindividual variability using the method originally described by Beaton et al. [1983]. Underreporters were evaluated according to the Goldberg method [Goldberg et al., 1991]. In order to evaluate inadequate or deficient energy and nutrient intakes, the updated version of the Spanish recommended nutrient intake (RNI) values were used. They included energy and 14 nutrients, of which the recommendation for folate in females aged 13 to 49 was doubled, resulting in a value of 400 µg/day. The results are shown according to age group and gender.

Statistical analysis was carried out using the program SPSS v12. Food consumption was analyzed by age group and gender. Student's t test was used to compare means between two groups, and one-way analysis of variance was used for comparison between more than two groups. For non-parametric variables the Mann-Whitney and Kruskal-Wallis tests were conducted. The χ^2 statistics were used for comparison of proportions.

Risk of Inadequate Intakes

Nutritional intake adequacy in the Catalan population was assessed by applying the probabilistic approach method. Table 11.69 shows the risk of inadequate nutrient intakes by gender and age group in ENCAT 2002–2003. Vitamins A, D and E in males and females; zinc, magnesium, and riboflavin in males and iron and folate in females were the micronutrients with higher risk of inadequate intakes among the Spanish population. Certain population groups showed greater levels of nutrient intake inadequacy for given micronutrients. For instance, iron, magnesium and vitamin C were

Table 11.69. Risk of inadequate nutrient intake in Spain by gender and age groups (%) [ENCAT 2002–2003]

Age group	Iron	Zinc	Magne- sium	Thiamine	Riboflavin	Niacin	Vitamin B ₆	Folate	Vitamin B ₁₂	Vitamin C	Vitamin A	Vitamin D	Vitamin E
Male													
10–17 years	16.7	70.0	47.5	0.1	7.5	3.3	9.2	1.1	0.0	19.3	92.1	99.6	46.8
18–24 years	8.4	69.2	39.4	1.8	20.4	5.9	13.4	11.2	0.2	5.9	89.7	97.6	51.0
25–44 years	0.6	79.4	27.6	4.3	25.0	3.4	5.9	5.7	0.0	5.5	92.7	95.5	47.3
45–64 years	0.1	91.7	21.4	2.6	14.0	0.6	1.6	0.4	0.0	1.7	89.2	99.9	37.9
65–75 years	1.4	97.4	40.2	7.1	15.1	6.2	18.4	4.4	0.0	2.7	97.1	100.0	65.5
Total	3.1	83.1	31.0	3.5	18.4	3.3	7.6	4.3	0.0	5.5	92.0	97.9	47.6
Female													
10–17 years	84.0	91.0	33.8	0.1	4.7	3.8	14.4	60.7	0.1	22.4	85.2	99.8	65.9
18–24 years	89.5	94.9	48.1	0.3	7.2	4.1	7.0	96.6	0.9	7.7	86.7	99.9	66.2
25–44 years	89.4	95.6	45.6	1.3	12.3	1.4	7.0	91.1	0.3	0.7	87.2	98.3	67.1
45–64 years	30.6	97.7	25.4	1.4	3.5	0.7	4.1	28.5	0.3	0.6	70.6	100.0	60.8
65–75 years	11.5	99.7	32.6	2.4	1.6	0.0	12.5	5.1	0.8	0.5	98.7	100.0	79.9
Total	59.9	96.5	37.5	1.3	6.9	1.5	7.6	58.3	0.5	3.0	84.5	99.3	67.4

nutrients with higher levels of inadequate intake among males aged 10 to 17. Females aged 10 to 17 had a higher prevalence of inadequate intakes in vitamin B₆ and vitamin C. The prevalence of inadequacy for folate was high in females of childbearing age (from 10 to 44). The elderly showed high levels of inadequacy for certain micronutrients such as thiamine and vitamin B₆.

Three points should be borne in mind when evaluating these results. First of all, the fact that the analysis included the entire sample without excluding underreporters, whose food underreporting contributed to the underestimation of mean energy and nutrient intakes and thus to increased percentages of inadequate intake. In ENCAT

2002–2003, 41% of individuals were underreporters, according to the Goldberg method. Additionally, this analysis did not take into account vitamin-mineral supplement intake, which, despite the fact that in Catalonia the consumption (8.3%) is not as high as in other countries, their consumption would also have contributed to an increase of certain nutrient values [Serra-Majem et al., 2002b]. Finally, it should also be kept in mind that fortified foods have not totally been considered. The consumption of these foods is relatively ‘modern’ and the food composition tables used had scarce information on their composition. All this can contribute to results that overestimate low intakes of certain nutrients and thus, the ‘problem’, in reality, is smaller in dimension.

Overweight and Obesity

There is evidence that overweight and obesity have related socioeconomic components. In order to analyze the influence of socioeconomic determinants on overweight and obesity prevalence based on BMI and waist circumference (WC), the following variables were used and rearranged according to the following categories [Aranceta et al., 2001; García-Álvarez et al., 2007]: (1) socioeconomic level (SEL): occupation of the subject with low, medium and high classifications; (2) educational level of the subject (ELS) (a) *low*: primary school incomplete or illiterate (<6 years at school); (b) *medium*: primary school completed, secondary school or further education (6–12 years of education); (c) *high*: high school, college or university degree (>12 years of education), and (3) population of residence size (<10,000 inhabitants; 10,000–100,000 inhabitants, and >100,000 inhabitants). With respect to SEL, significant differences were observed only in females. An inverse association was observed in this group for BMI overweight and WC obesity (table 11.70). ELS showed an inverse relationship with BMI overweight and obesity prevalence, but with differences among ELS groups only being significant in females; this inverse relationship was also observed between ELS and male and female WC obesity (note the high male and female WC obesity rates in the lowest ELS group, 34.3 and 69.5% respectively) (table 11.70). Regarding the size of the population of residence, the significant difference observed was in female WC obesity.

Adherence to the Mediterranean Diet

Although a Mediterranean country, Spain has been undergoing a continuous and progressive globalization in its dietary pattern, being of a similar magnitude to other countries in the region. To evaluate the quality of the Catalan diet, an index of adherence to the Mediterranean Diet (MD) was created for the study, which has been explained elsewhere [Serra-Majem et al. 2007c]. This new variable was recoded as 0 to <50 indicating poor adherence; 50 to <75 indicating good adherence, and 75 to 100, indicating excellent adherence to the Mediterranean Diet. The results showed that 48% of the Catalan population had a poor MD adherence score (being higher among females, with 52% showing good adherence versus 46% among males). Only 3% of the sample had the highest score (excellent) and the prevalence increased with age (fig. 11.19). In individuals aged 65 to 80, adhesion to the MD was classified as good in

Table 11.70. Overweight and obesity prevalence (BMI and WC) in Spanish population by gender and socioeconomic and demographic characteristics (ENCAT 2002–2003)

	BMI overweight ^a		BMI overweight ^a		WC obesity ^c	
	males %	females %	males %	females %	males %	females %
<i>Overall prevalence</i>	43.7	30.1	16.6	15.2	24.4	31.1
<i>Socioeconomic level</i>						
Low	44.0	33.3	16.5	19.9	25.8	39.0
Medium	45.0	28.2	16.4	11.2	21.5	26.0
High	42.6	25.2	16.5	11.2	26.3	19.3
Differences	ns	s	ns	s	ns	s
<i>Education level of subject</i>						
Low	50.5	45.5	21.2	36.6	34.3	69.5
Medium	43.9	32.5	17.6	15.7	25.7	34.1
High	41.6	20.5	13.6	5.7	19.0	11.6
Differences	ns	s	ns	s	s	s
<i>Population size (inhabitants)</i>						
<10,000	46.6	27.8	16.7	18.0	26.2	38.6
10,000–100,000	44.6	33.6	15.7	15.1	24.2	32.1
>100,000	41.8	28.8	17.1	13.8	23.7	26.8
Differences	ns	ns	ns	ns	ns	s

BMI = body mass index; WC = waist circumference.

^a BMI ≥ 25 to <30 kg/m²; ^b BMI ≥ 30 kg/m²; ^c WC ≥ 102 cm for males and ≥ 88 cm for females.

s = χ^2 test significant differences, ns = χ^2 test significant differences.

around 70% of the sample. On the other hand, less than 30% of individuals younger than age 24 had a good score. Referring to the effect that socioeconomic level had on MD adherence, no clear differences were seen between high and low socioeconomic levels. The high number of individuals with poor adherence to a MD pattern, especially amongst the youngest age groups, shows the urgency for developing nutritional education campaigns that educate and incite the population to adopt and maintain dietary patterns that are as close as possible to the traditional MD. Apart from interventions to improve knowledge about the benefits of the MD on health and the relationship between healthy habits and the quality of life, it is also necessary to develop

Fig. 11.19. Adherence to the Mediterranean diet pattern according to age group.

tools to motivate and provide the means for the population to adopt such healthy patterns. Otherwise the numerous benefits associated to the MD will not be reflected in the health of individuals comprising future generations of the Spanish population.

11.21 Sweden²⁴

Introduction

In Sweden the National Food Administration is responsible for the nutrition recommendations, food-based dietary guidelines and also conducts food consumption surveys. The Swedish National Public Health Institute is responsible for monitoring and coordinating the implementation of the national public health policy, e.g. through national surveys covering areas such as living conditions, physical and mental health, socioeconomic conditions, dietary habits, and physical activity.

Dietary Habits

Adults

The second nationwide food consumption survey, Riksmaten 1997–98 [Becker and Pearson, 2002], was a follow-up of the previous survey (Hulk) carried out in 1989

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Table 11.71. Mean daily intake of energy, macronutrients and dietary fiber among Swedish adults 18–74 years in 1997–1998

	Women n = 626	Men n = 589	NNR 2004 ^a
Energy, MJ/day	7.8	9.9	–
Protein, %E	16	15.5	10–20
Fat, %E	34	34	25–35
SFA, %E	14.2	14.6	~10 ^b
MUFA, %E	12.3	12.6	10–15
PUFA, %E	4.7	4.6	5–10
Carbohydrates ^c , %E	47.5	46	50–60
Sucrose, %E	9.0	8.5	≤10 ^d
Dietary fiber, g/day	16.4	18.1	25–35
g/MJ	2.1	1.8	~3
Alcohol, %E	2.9	3.8	≤5
Alcohol, g/day	7.6	12.7	

^a Nordic Nutrition Recommendations. ^b Including trans-fatty acids. ^c Excluding dietary fiber.

^d As added sugars.

[Becker, 1994], using similar design and methods. In Riksmaten a representative sample of 2,000 subjects aged 18 to 74 years were asked to fill in a precoded 7-day record book and a questionnaire with information on body weight, height, education, occupation, physical activity, smoking habits and other lifestyle factors. About 1,200 persons completed the study with a participation rate of approximately 60%. Participation was lower in larger cities and surrounding areas than in rural areas and lower among young as well as older households.

The dietary fat content was on average 34%E, which was in the close to the upper bound of the recommended range (table 11.71). The differences among sex and age groups were generally small. The proportion of saturated fatty acids was 14%E, and together with about 1%E trans-fatty acids [Hulshof et al., 1999] intake is considerably higher than the recommended level of about 10%E. Carbohydrates provided on average 47 and 46%E among women and men, respectively. The proportion of sucrose in the diet was higher among women than among men. The average intake of dietary fiber was 17–18 g/day, corresponding to 1.8 g/MJ among men and 2.0 g/MJ among women, well below the recommended level of about 3 g/MJ. Alcohol provided on average 4 and 3%E among men and women, respectively.

The average daily energy intake was 7.8 MJ/day in women and 9.9 MJ/day in men. An evaluation of underreporting using the Goldberg technique showed that around 20% of the subjects reported an energy intake below cut-off. Underreporters had a somewhat lower fat proportion and somewhat higher carbohydrate proportion compared to acceptable reporters.

The average intakes of vitamins and minerals were generally close to or above the recommended daily intakes (RI). The intake of vitamin D was lower than recommended for older persons, while the intake of folate corresponds to about 75% of the RI. The intake of iron among women in reproductive ages was only two thirds of the RI. The iron intake has decreased due to the termination of iron fortification of flour in 1995. The selenium intake was about 75% of the RI. The intake of sodium (excl. salt added at the table) was 2.8 and 3.6 g/day among women and men respectively. This corresponds to 7 and 9 g salt per day, respectively, or about 9 g/10 MJ. Intake was higher compared to recommended intakes.

Pronounced age differences in dietary habits were seen. Older people ate more of 'traditional' foods like potatoes, root vegetables, fish, offal and blood dishes, porridge and sweet bakery products, while young people eat and drink more of 'modern' foods, e.g. pasta, rice, pizza, sweets, nuts and snacks, and soft drinks. Older people also ate more fruit and vegetables. Women ate more fruit and vegetables than men did. There were generally small differences in the nutrient composition of the diet between men and women.

Low education was among men associated with a lower consumption of fruit and vegetables and a higher intake of fat spreads. Men with short education consumed a diet with higher fat content compared to high-educated men (35 and 33%E, respectively). No such difference was observed for women. High education was linked to a higher alcohol intake in both sexes.

Smokers, especially men, had poorer dietary habits than non-smokers, with e.g. a lower consumption of fruit and vegetables. Among men smoking was associated with a higher fat content of the diet.

Children

A national food survey was carried out in 2003 comprising 4-year-old children and grade 2 and grade 5 schoolchildren. The method was an open-ended and estimated food diary over 4 consecutive days. All days were evenly represented in the survey. The food diary was filled in by the children or with the help of parents or carer. Portion sizes and amounts of all food and drink consumed by the children were estimated with the help of a picture book. It was also noted when and where food was eaten as well as the fat content, mode of preparation, certain additives and brand name. Intake of supplements and level of physical activity were also recorded. In addition, an optically readable questionnaire contained questions about weight, height, parents' education and profession, ethnic background and regional residence.

Table 11.72. Intake of energy, macronutrients (as %E) and dietary fiber (per MJ) for 4-year-old children and in 2nd and 5th grade

	4 years n = 590	Grade 2 n = 889	Grade 5 n = 1,016	All	NNR 2004
Energy, MJ/day	6.3	7.6	7.4		
Protein, %E	14	15	16	15	10–20
Fat, %E	32	31	32	32	25–35
SFA, %E	14	14	14	14	10 ^a
Trans-fatty acids, %E	0.9	1.0	1.0	0.9	
MUFA, %E	11	11	12	11	10–15
PUFA, %E	3.7	3.6	3.7	3.7	5–10
n–3 fatty acids, %E	0.7	0.6	0.7	0.7	1
n–6 fatty acids, %E	3.0	2.9	3.0	2.9	4
Carbohydrates ^b , %E	54	53	53	53	50–60
Monosaccharides, %E	8.0	6	6	6	
Disaccharides, %E	21	19	18	19	
Sucrose, %E	14	13	12	13	≤10 ^c
Fiber, g/MJ	1.8	1.8	1.7	1.8	

^a Including trans-fatty acids. ^b Excluding dietary fiber. ^c As added sugars.

Four-year-old children were randomly sampled from a stratified sample of municipalities representative for Sweden. Schoolchildren were sampled on the basis of school classes. The survey took place during spring and autumn 2003. The sample size of 4-year-old children was 924 of which 590 fulfilled the survey. 1,209 children in grade 2 were sampled of which 889 fulfilled the survey and 1,290 children in grade 5 were sampled of which 1,016 fulfilled the survey. 4-year-old children dropped out due to time constraints or that day-care institutions did not want to participate. Schoolchildren dropped out because it was too difficult, they forgot or did not have time.

The average intake of energy was 6.3 MJ/day (1,500 kcal), 7.6 MJ (1,820 kcal) and 7.4 MJ (1,760 kcal) for 4-year-old children, grade 2 and grade 5 children, respectively (table 11.72). The reported average energy intake for 4-year-old children was 108% of the calculated reference value for that age and the average reference value for grade 2 children was 81%. For grade 5 children, the reported average energy intake was 76 and 86% respectively of the calculated reference value for a moderate and for a low physical activity level.

Table 11.73. BMI, overweight and obesity among adults in 2007

	19–64 years		65–84 years	
	women	men	women	men
Height, cm	166.3	180.0	162.9	176.2
Weight, kg	68.3	84.1	69.4	81.4
BMI	24.7	26.0	26.2	26.2
BMI ≥ 25 , %	24.8	43.5	34.9	51.1
BMI ≥ 30 , %	12.7	12.1	18.0	10.4

The children's diet had a satisfactory distribution of energy between protein (14–16 energy percent, %E), fat (31–32%E) and carbohydrates (53–54%E) but the quality of fat and carbohydrates were not (table 11.72). Generally, children consumed too much added sugars (13–15%E), saturated fatty acids (14%E) but not enough of polyunsaturated fatty acids (3.6–3.7%E) and dietary fiber (1.8 g/MJ). Trans-fatty acids contributed to 0.9%E.

Intake of vitamin D was low compared to recommended intakes. Sodium intake corresponded to 5–7 g salt per day, and was close to the intake of adults when expressed per 10 MJ (8.1–9.4 g/10 MJ). Children received most of the salt from meals with meat and meat products.

The fruit and vegetable intake was on average 225, 239 and 193 g/day for 4-year-old children, grade 2 and grade 5, respectively. This is about half of the recommended amount of 400 g/day fruit and vegetables for children aged 4 to 10 years. The children ate fish 1–2 times per week and sausages 2–3 times per week.

Approximately 25% of the consumed daily energy originated from foodstuffs like soft drinks, sweets, crisps, ice cream, desserts, and cakes and biscuits. The children consumed on average 100–200 g of sweets per week distributed on 3–5 occasions. 13% of the children ate sweets daily. The children ate buns, cakes and biscuits 3–5 times per week. 4-year-old children ate ice cream 2–3 times per week and schoolchildren 1–2 times per week. The children drank on average 200 ml soft drinks every day but 10% of the schoolchildren drank daily 500 ml or more. Altogether, these foods provide the largest sources of added sugars, fat, saturated fatty acids and trans-fatty acids.

No large differences were seen in food choice or nutrient intake between children from different socioeconomic groups. Children from parents with a university education consumed more fruits and vegetables and had a diet with a slightly higher nutrient density. Children from parents with a non-Swedish background ate more fruits and vegetables but drank less milk.

Table 11.74. Mean height, weight, BMI, and proportion of overweight and obesity among children in different age groups, 2003 [source: from Enghardt Barbieri et al., 2006]

	4 years (4.2 years)		Grade 2 (8.6 years)		Grade 5 (11.7 years)	
	girls	boys	girls	boys	girls	boys
Height, cm (SD)	106 (5.6)	106 (4.7)	135 (6.8)	135 (6.2)	152 (8.2)	151 (7.6)
Weight, kg (SD)	18 (2.4)	18 (2.7)	31 (6.2)	32 (5.7)	42 (9.0)	42 (8.7)
BMI (SD)	16 (1.8)	16 (1.7)	17 (2.5)	17 (2.2)	18 (2.8)	18 (2.6)
IsoBMI ≥ 25 , %	18	19	20	19	17	15
IsoBMI ≥ 30 , %	2	4	3	3	1	2

Overweight and Obesity

Adults

The proportion of overweight increased in all socioeconomic groups from the beginning of the 1980s. The trend has leveled off somewhat after year 2000 and a decrease has been seen among well-educated adults. Social differences are seen for both sexes. Data on self-reported weight and height among Swedish adults in 2007 are given in table 11.73. A higher proportion of overweight/obesity was seen among women with short education, with no differences among men.

Children

Overweight and obesity increased among children aged 10 years during 1970–2000 (National Institute of Public Health, Sweden) and among adolescents (16 to 19 years) during 1988–2000/1 [Statistics Sweden, 2007]. The trend seems to have leveled off after year 2000. There are no time trends for younger children.

Between 17 and 23% of the children participating in the national food consumption survey 2003 were classified as overweight (IsoBMI >25), of which 1–4% were obese (IsoBMI >30) (see table 11.74).

Smoking

Smoking has declined in all socioeconomic groups and both sexes since the beginning of the 1980s. For men, the decline has been more rapid than for women. For women, the proportion of smokers started to decline considerably later than for men. Data on smoking habits for 2007 are shown in figure 11.20. Daily smoking was more common among women than men 16 to 29 and 45 to 64 years, among men and women with short education, and among men and women born in other European countries (except Nordic) compared to Swedish-born.

Fig. 11.20. Smoking habits among Swedish adults (16–84 years). Data from 2007.

Alcohol Habits

Data from food consumption surveys indicate that alcohol intake increased among adults during 1990s. In the national public health survey alcohol habits were assessed using the AUDIT test. Risk consumption was assessed based on how often alcohol is consumed, how many glasses on a normal occasion, and how often a fairly large amount drunk on one and the same occasion. In addition, those who have been drunk 2–3 times a month or more are included in the risk consumption group. Results from 2007 show that the majority of the adult population has acceptable alcohol habits, or never or seldom drinks alcohol (abstainers) (fig. 11.21). However, about 10% of women and 17% of men were characterized as ‘heavy drinkers’, i.e. frequent alcohol use and/or intoxication. A larger proportion of young women and men (16 to 29 years) have risky alcohol habits compared to older age groups.

General Comments

Certain improvements in the dietary pattern in the Swedish population have occurred since the late 1980s, including an increased intake of fruit and vegetables and an improved fat quality among adults. However, the proportion of saturated fat is still above recommended levels and intake of polyunsaturated below, especially among children. Intake of refined (added) sugars is high among children, while intake of dietary fibers is in general low. Intake of trans-fatty acids has decreased during the last decade [Becker et al., 2008]. Factors like smoking and low education are associated with poorer dietary habits, especially among men, while a certain equalization seems to have occurred among women in this respect.

Fig. 11.21. Alcohol habits among Swedish adults (16–84 years). Data from 2007.

Desirable dietary changes include increased consumption of fruit, berries, vegetables, whole grain cereals, and fish. Lower-fat alternatives of meat and dairy products should be prioritized, while high-fat and sugary foods like bakery products, soft drinks and sweets should be consumed in moderation. Soft or fluid edible fats should replace solid, hard fats to a larger degree.

The nutrient intake of children is similar to that of adults and therefore the food based dietary recommendations aimed at adults are also largely valid for children: especially to reduce intake of soft drinks, sweets, crisps, cakes and biscuits and increase intake of fruits and vegetables and fish.

An adequate physical activity in the population is equally important to facilitate weight balance. While smoking has decreased in most age groups the trend among young girls should be addressed. Problematic alcohol habits are also more common in teenagers and young adults.

11.22 The Netherlands²⁵

Methods and Results of National Surveys on Nutrition and Health: The Netherlands

Dutch National Food Consumption Surveys

Collection of periodic data on food consumption and nutritional status of the Dutch population has been carried out in 1987/1988, 1992 and 1997/1998. Due to

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the changing policy needs, sociodemographic developments, trends in food habits as well as developments in research methods the need for a new method for food and nutrition surveys has arisen. Since 2003, the Dutch National Food Consumption Surveys (DNFCS) have been redesigned into a modular system, consisting of a core module for the Dutch population and other modules for specific groups within the population, such as ethnic groups and young children. The new method was piloted among young adults in 2003 and young children as a specific group were surveyed (2005/2006). From 2007 onwards the DNFCS core survey is ongoing, obtaining data on the food consumption of men and women in The Netherlands, aged 7 to 69 years. General information on the DNFCS and its specific surveys, including the objectives, methods, planning and main results as well as detailed information on the food consumption surveys conducted from 2003 onwards are available (www.rivm.nl/vcp_en).

Survey Methodology

Nutrient and energy intake in this ENHR 2009 report was calculated for the three most recent food consumption surveys in The Netherlands, DNFCS-3 (1997–1998), DNFCS-young adults (2003) and DNFCS-young children (2005–2006). A brief overview of these studies is given in table 11.75.

For a correct evaluation of nutrient intake with regard to nutrition standards, habitual intake was calculated. Habitual intake is estimated from the actual intake on two independent days, using the ISU method [Nusser et al., 1996]. Median intake is compared with adequate intake (AI) or recommended dietary allowances (RDA) for a qualitative evaluation of intake or with EAR, if available, for prevalence of inadequate intakes.

Nutrition Indicators

In this chapter, the main nutritional issues in The Netherlands will be discussed based on the two most recent food consumption surveys [Ocké et al., 2005, 2008]. If available, information on the food sources of the specific nutrients is given.

Vitamins and Minerals

When comparing intake of nutrients from foods with nutritional guidelines (table 11.76) intake of most vitamins and minerals were adequate in young children, except for vitamin D (children 2–6 years) and folate in children of 4–6 years. For these vitamins no statement could be given on prevalence of inadequate intakes, because the median intake was below AI (adequate intake). A low vitamin D and folate intake in Europe was also reported in the first ENHR 2004 [Elmadfa et al., 2004] and in the current ENHR 2009 report. Vitamin D intake in European children was generally low and folate intake was low in most children.

Table 11.75. Dutch National Food Consumption Surveys (DNFCS) reported in ENHR 2009

Survey	DNFCS-3	DNFCS-young adults	DNFCS-young children
Reference	[Hulshof and van Staveren, 1991]	[Ocké et al., 2005]	[Ocké et al., 2008]
Year of data collection	1997–1998	2003	2005–2006
Age group	1+ years	19–30 years	2–6 years
Sampling frame	Households in consumer's panel	Individuals in consumer's panel	Individuals in consumer's panel
Sampling method	Stratified random	Stratified random	Stratified random
Number	5,958	750	1,279
Response rate	71%	42%	78%
Dietary assessment method	2-day diet record (consecutive days) + FFQ	2-24 h diet recall by trained dietitians (non-consecutive days) + general questionnaire	Two 1-day diet records (non-consecutive days), + general questionnaire
Dietary assessment software	–	EPIC-Soft [Slimani et al., 2000]	Data entry with EPIC-Soft by dietitian [Slimani et al., 2000]
Exclusions based on misreporting	None	None	None
Food composition database	NEVO 1996 [Stichting NEVO, 1996]	NEVO 2001 [Stichting NEVO, 2001]	NEVO 2006 [Stichting NEVO, 2006]
Dietary supplement database	none	NES 2004 [Buurma-Rethans et al., 2008]	NES 2006 [Buurma-Rethans et al., 2008]
Software to estimate habitual intake	–	ISU method [Nusser et al., 1996]	ISU method [Nusser et al., 1996]

Because for vitamin E the Dutch guidelines were set in 1989 [Voedingsraad, 1992], the more recent American EAR (estimated average requirement) was used to estimate a prevalence of inadequate intake, which varied between 16% for 2- to 3-year-old boys to 26% for 4- to 6-year-old girls. Also for iron, if the EAR was used, 1–2% of young children had an inadequate intake.

For young adult men in The Netherlands, intake of most vitamins and minerals was adequate, except for folate and vitamin E. 35% of young men had an inadequate folate intake when compared with the EAR of 200 µg/day. In women, 85% had an inadequate intake, median folate intake in women was 154 µg/day. In chapter 7 of this report it is shown that folate recommendations were not met by adults in many countries. For comparison of vitamin E intake, US guidelines were used. Vitamin E intake

Table 11.76. Nutritional guidelines: AI (adequate intake), RDA (recommended dietary allowances) or EAR (estimated average requirement)

	Folate ¹ µg/day	Vitamin D ² µg/day	Vitamin E ³ mg/day	Calcium ² mg/day	Iron ⁴ mg/day
Children 2–3 years	85 (AI)	5–10 (AI)	5 (EAR)	500 (AI)	3 (EAR)
Children 4–6 years	150 (AI)	2.5–5 (AI)	6 (EAR)	700 (AI)	4.1 (EAR)
Adults 19–30 years	200 (EAR)	2.5–5 (AI)	12 (EAR)	1,000 (AI)	6 (men) 8.1 (women) (EAR)

¹ Health Council of the Netherlands, 2003. ² Health Council of the Netherlands, 2000. ³ IOM, 2000.

⁴ IOM, 2001.

was inadequate in 35% of young men and 73% of young women. Calcium intake was slightly below AI for women: median intake was 960 mg/day while the AI is 1,000 mg/day. Also, iron intake was inadequate for 23% of the young women. Most important sources of iron were cereal products and meat products. Calcium was mostly provided by dairy products and folate by cereals, vegetables and milk products.

Role of Supplements

In total, 43% of the children used a kind of dietary supplement on at least one of both recording days. The use in 2- to 3-year-olds (62%) was twice as high as in 4- to 6-year-olds (30%). Vitamin D supplements were the most used in 2- to 3-year-olds, and 1 out of 5 children used multivitamins/mineral supplements. In The Netherlands, supplementation with vitamin D containing supplements is advised for children until the age of 4. However, only 3 in 5 children received a supplement containing vitamin D [Ocké, 2008].

The contribution of supplements to nutrient intake in children varied from 0 to 24% and was highest for vitamin D (24%) and folic acid (12%). Dietary supplement use increased the mean habitual micronutrient intake. Median habitual intake of vitamin D was still below AI for 2- to 6-year-old children and intake of folate was still low for the 4- to 6-year-old children when nutrient intake from dietary supplements was included.

Intake of zinc and folic acid exceeded UL in some children when looked at intake from food and dietary supplements. Fortified foods were also an important source of nutrients, especially for vitamin B₆ (19%) and vitamin C (29%). In young adults, 27% used dietary supplements on one or both survey days. Mean calcium intake increased in female supplement users, reaching a total intake above the recommended 1,000 mg/day [Ocké et al., 2005].

Macronutrients

The diet of children is adequate in terms of the proportions of total fat, carbohydrates and protein. Over half of the men and women 19 to 30 years of age had a food pattern with less than 35%E fat. The fatty acid composition of the diet of young children as well as the young adults was unfavorable. Intake of saturated fatty acids was higher than recommended (10%E) in a majority of the 4- to 6-year-old children (85% of boys and 92% of girls) and intake of fish fatty acids (based on fish consumption) was low. Among the young adults intake of saturated fatty acids was above recommendations in both men and women, only 11% of men and 6% of women met the recommendation (<10%E). The main sources of saturated fatty acids were dairy products, meat products, fat and cakes for both the children and the young adults.

Almost two thirds of the women and half of the men had a trans-fatty acid intake above the recommended maximum of 1%E. This was also seen in the 4- to 6-year-old children (10%). The main sources were dairy products (including cheese) and cakes in children and snacks (cakes, pies and salty biscuits) and dairy products in young adults. In addition, as was the case for many European children, fiber intake was low in most of the Dutch children, median intake was below AI. Cereal products, fruits, nuts and olives, and potatoes and other tubers were the most important fiber sources for these children. In line with the low fiber intake, bread, potatoes and fruit intake was below recommended amounts (table 11.77).

Vegetables and Fruit

In children, intake of vegetables and fruit was low. Only 1 in 4 children met the fruit recommendations, while none of the 4- to 6-year-olds, and 1 in 5 2- to 3-year-olds met the vegetable recommendations. Also at the older ages the recommendation was not met by many persons; less than 10% of young adults met the dietary recommendations for vegetables and fruit. None of the women met the recommended daily vegetable intake of 150 g.

Energy Balance

Obesity is an increasing problem around the world; in The Netherlands the problem is also increasing. In 2007, 14–30% of female adults in The Netherlands were overweight or obese and 18–48% of the males [CBS Statline, 2007]. The recent survey on young children indicated that 1 in 7 children of 2 to 6 years was overweight or obese [Ocké, 2008].

Discussion

The studies among the young children and young adults have shown that the intake of most micronutrients were adequate. However, in The Netherlands the intake of folate is low [Health Council of The Netherlands, 2008]. In children also intake of vitamin D

Table 11.77. Food-based dietary guidelines in The Netherlands [Voedingscentrum, 2009]

Food group	Children 1–3 years	Children 4–8 years	Men 19–50 years	Women 19–50 years
Bread, number of slices (g)	2–3 (70–105)	3–4 (105–140)	7 (245)	6 (210)
Potatoes (or rice, pasta or legumes), g	50–100	100–150	250	200
Vegetables, g	50–100	100–150	200	200
Fruits, g	150	150	200	200
Dairy products, ml	300	400	450	450
Cheese, g	10	10	30	30
Meat (products), fish, chicken, egg or other meat replacement products, g	50–60	60–80	100–125	100–125
Low-fat spread, g	10–15	15–20	35	30
Cooking fat, g	15	15	15	15
Drinks (including milk), liters	0.75	1	1.5–5	1.5–2

from food is low. This intake is not sufficiently compensated by dietary supplements, as many young children do not receive the advised vitamin D supplementation.

Dutch young women do not meet the iron intake recommendations. The implications of this low iron intake should be further investigated. Furthermore, intake of vitamin E was below recommendations in both children and adults in The Netherlands. US guidelines were used for evaluation of vitamin E intake because the Dutch dietary reference intakes for vitamin E were set in 1989 [Voedingsraad, 1992]. Therefore, the Health Council advises an assessment of the Dutch micronutrient dietary reference values to values applied in the USA, Australia and New Zealand. From this assessment it was concluded that the vitamin E intake of young adults is in order. It is however advised to investigate the low intake of vitamin E in children [Health Council of The Netherlands, 2009].

Intake of trans-fatty acids has improved in The Netherlands, but intake of saturated fatty acids is still too high and should be reduced. These results are in line with previous DNFCS among the whole population [Hulshof and van Staveren, 1991] and the results for other European populations in chapter 7 of the present report. This is also the case for the low consumption of fruit and vegetables in both children and adults.

Obesity is an increasing problem in The Netherlands, already at younger ages. Attention should be given to maintaining a good energy balance.

Methodologically, to get a full insight into nutrient intake it is important to include intake from dietary supplements and fortified foods. Furthermore, it is important to estimate the habitual intake distribution to evaluate nutrient adequacy.

Conclusion

Thus, these studies showed that the fatty acid composition of the diet is not optimal in the diet of young children and young adults in The Netherlands, although the trans-fatty acid intake has improved during the last decades. Also, the vegetable and fruit consumption is far from the recommendations. Policy measures need to focus on achieving optimal body weight, increasing intakes of vegetables, fruit, fish and fiber, and improving the fatty acid composition.

11.23 United Kingdom²⁶

In 2008 The Scientific Advisory Committee on Nutrition (SACN) published a report summarizing the findings from all previous National Diet and Nutrition Surveys in Britain (SACN, 2008; and see: www.sacn.gov.uk/pdfs/nutritional_health_of_the_population_final_oct_08.pdf). The only specific survey conducted since the last EU Monitoring Report was the Low-Income Diet and Nutrition Survey; details are described further below.

In addition to the specific nutritional survey there continue to be annual health surveys that include some aspects of nutrition, the annual compilation of food and expenditure data, and the annual feeding (breast) survey. In addition, there are ad-hoc surveys of consumer attitudes.

Low-Income Diet and Nutrition Survey

Sample Selection

The aim of the survey was to select the bottom 15% of the population based on material deprivation. In order to identify and recruit this sample, a material deprivation screening questionnaire was developed and covered whether subjects were in receipt of benefits, household composition, car ownership and employment status.

The sample was selected using a five-stage clustered design:

- 528 wards were selected, with deprived wards oversampled relative to other wards. Scotland, Wales and Northern Ireland were oversampled relative to England, with the final dataset weighted to take this into account.

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- A fixed sample of addresses was selected in each ward, according to the level of deprivation. The final issued sample consisted of 25,818 addresses.
- A doorstep screening questionnaire was used to establish eligibility for inclusion in the survey, based on markers of deprivation. It also included questions that were used to assess non-response bias.
- At each address, one household was selected.
- In eligible households with two or more residents, two respondents were then randomly selected. If children were present, one adult and one child were selected; otherwise two adults were selected.

As well as oversampling wards in Scotland, Wales and Northern Ireland and in more deprived areas, there was differential non-response to the survey (e.g. by age, sex, country/region). In order to ensure that the correct population proportions were used in the analysis, the final dataset was weighted. All results are based on these weighted data so that the reported findings reflect the demographic characteristics of the UK low-income population as a whole. The overall response rate for fully productive individuals was 55% (59% for Scotland and Northern Ireland, 55% for Wales, and 52% for England), giving a sample size of 3,728 fully productive individuals. Of these, 73% were visited by a nurse and a blood sample was obtained from 46% of fully productive individuals. Response rates for blood samples were lower for children, with blood samples obtained from 18% of boys and 22% of girls who were fully productive.

Survey Components

The key stages of the survey, which were administered by trained interviewers and nurses, were as follows:

- A face-to-face interview and self-completion questionnaire.
- Four 24-hour recalls of diet on random days (including at least 1 weekend day) within a 10-day period.
- Physical measurements. These differed by age group but included, where appropriate, height, weight, waist and hip circumferences, demi-span, mid-upper arm circumference and blood pressure.
- Blood sample collection (in respondents aged 8 years and over) to measure indices of nutritional status.

Information collected in the interview and self-completion questionnaire included, where appropriate: food shopping habits (e.g. main type of shop used, distance to shop); access to food storage and cooking facilities; usual food preparation methods; cooking skills; access to food at school and to free food; eating habits, including use of dietary supplements; general health and dental health, including use of prescribed medicines; weight change; drinking and smoking; physical activity; education; income; attitudes and barriers to healthy eating; and food security and coping strategies.

Further details and results are available (<http://www.food.gov.uk/science/dietarysurveys/lidnsbranch>).

Health Survey for England

The Health Survey for England provides annual data about the nation's health; to estimate the proportion of the population with specific health conditions; to estimate the prevalence of risk factors associated with those conditions; to assess the frequency with which combinations of risk factors occur; to examine differences between population subgroups; to monitor targets in the health strategy; and from 1995 to measure the height of children at different ages, replacing the national study of health and growth. The Health Survey for England contains a 'core' which is repeated each year and each survey year has one or more modules on subjects of special interest. The 'core' includes: questions on general health and psychosocial indicators; smoking; alcohol; demographic and socioeconomic indicators; questions about use of health services and prescribed medicines – the focus for these may vary from year to year to suit the modular content of the survey; blood pressure; and measurements of height, weight and blood pressure. Over recent years the survey has also included questions about diet and physical activity.

From 1994 onwards the survey has been carried out by the Joint Survey Unit of the National Centre of Social Research and the Department of Epidemiology and Public Health at University College London. The HSE 2007 included a general population sample of adults and children, representative of the whole population at both national and regional level, and a boost sample of children aged 2 to 15. For the general population sample, 7,200 addresses were randomly selected in 720 postcode sectors, issued over 12 months from January to December 2007. Interviews were held in 4,200 households with 6,882 adults aged 16 or over, and 1,727 children from the general population. The boost sample resulted in an additional 5,777 children aged 2 to 15 being interviewed, giving a total child sample of 7,504. Among the general population sample, 4 998 adults and 1,233 children had a nurse visit. Response to the survey can be calculated in two ways: at a household level and at an individual level. Interviews were carried out at 66% of sampled eligible households in the general population (after removing vacant addresses, etc.), and at 75% of known eligible boost sample households. Within the general population sample, interviews were obtained with 88% of adults and 95% of (sampled) children in 'cooperating' households (where at least one person was interviewed). Assuming that households where the number of adults and children was not known, the individual response rate for the general population sample, based on all eligible households, was estimated to be 58% among adults and 65% among (sampled) children.

Diet and activity were assessed by questionnaire. For Diet the general form of questions was 'How often on average do you eat...' With options of: 6 or more times a week, 3–5 times a week, 1–2 times a week, <1 once a week, rarely or never. There were further questions on the types of foods eaten (such as what type of bread), and what kind of fruit, salad, etc, were eaten yesterday, and for fruits and vegetables how much was eaten. For physical activity, parents were asked how long their child spent doing various activities (including sitting).

Fig. 11.22. Trends in obesity from 1993 to 2007 for adults and children based on Health Survey for England (%).

Further details and copies of all reports are available from The NHS Information Centre (<http://www.ic.nhs.uk/>); for surveys prior to 2005 see to the Department of Health (<http://www.dh.gov.uk/en/Publicationsandstatistics/PublishedSurvey/HealthSurveyForEngland/Healthsurveyresults/index.htm>). Trends in levels of obesity are presented in figure 11.22.

Main Findings from HSE 2007 for England

Obesity

- In 2007, 24% of adults (aged 16 or over) in England were classified as obese (BMI 30 kg/m² or over); an overall increase from 15% in 1993.
- Men and women were equally likely to be obese, however men were more likely than women (41 compared to 32%) to be overweight (BMI 25 to <30 kg/m²).
- 37% of adults had a raised waist circumference in 2007 compared to 23% in 1993. Women were more likely than men (41 and 33% respectively) to have a raised waist circumference (>88 cm in women, >102 cm in men).
- Using both BMI and waist circumference to assess risk of health problems, for men: 19% were estimated to be at increased risk; 13% at high risk and 21% at very high risk. Equivalent figures for women were: 15% at increased risk; 16% at high risk and 23% at very high risk.
- In 2007, 17% of boys aged 2 to 15, and 16% of girls were classed as obese, an increase from 11 and 12% respectively in 1995. Indications suggest that the trend in obesity may be flattening out and the next couple of years' data will be important in confirming whether this is a continuing pattern.
- Boys were slightly more likely than girls to be overweight or obese (31% compared to 30%).

Physical Activity

- Overall, physical activity has increased among both men and women since 1997, with 40% of men and 28% of women meeting the recommended levels in 2006 (at least 30 minutes of at least moderate intensity activity at least 5 times a week) compared with 32% and 21% respectively in 1997.
- In 2007, approximately one third of adults had not heard of the government guidelines for physical activity (34% of men and 29% of women).
- When asked how much physical activity adults thought people their age should do, 16% of men and 9% of women specified a level equivalent to the Chief Medical Officer's minimum recommended target. A further 25% of men and 23% of women specified a level of physical activity greater than the minimum recommendations, while most adults (69% of men and 68% of women) either underestimated how much physical activity adults should do or did not know.
- Over two thirds of adults (66% of men and 69% of women) said they would like to do more physical activity.
- Among men, the most common reason given which stopped them doing more physical activity was work commitments (45%), followed by lack of leisure time (38%). Women were most likely to report a lack of leisure time (37%), with work commitments almost as frequently mentioned (34%).
- In 2007, boys aged 2 to 15 were more likely than girls to meet the recommended levels of physical activity with 72% of boys and 63% of girls reporting taking part in 60 minutes or more of physical activity on each of the 7 days in the previous week.
- During the 2007/08 academic year, 90% of pupils took part in at least 2 hours of high-quality physical education (PE) and sport at school a week, a gradual increase since 2003/04 when the figure was 62%.
- Only a small proportion of children aged 11 to 15 said they thought they should be doing physical activity at the level of the current minimum recommendation (10%). A further 8% of boys and 3% of girls overestimated the minimum recommendation.
- Girls were more likely than boys to want to do more physical activity, 74% of girls aged 11–15 compared to 61% of boys.

Diet

- In 2007, 27% of men and 31% of women consumed five or more portions of fruits and vegetables a day, up from 22 and 25% respectively in 2001.
- Women were more likely than men to know the recommended number of portions per day (78% of women compared to 62% of men).
- Among children aged 5–15, in 2007, 21% of both boys and girls consumed five or more portions of fruit and vegetables a day, up from 11% of both boys and girls in 2001.
- 63% of boys and 73% of girls knew that five portions of fruit and vegetables a day was the recommendation.

Fig. 11.23. Regional variation in rates of obesity in children (%) (based on National Child Measurement Program) and adults (based on Health Survey for England).

Health Literacy and Health Improvement

Over half of England's adult population has literacy skills below Level 2 – the level of skills needed to discuss a condition interactively with a doctor or specialist. Only 25% were able to calculate BMI with a formula or estimate food groups needed for a balanced diet. UK research has indicated that low health literacy has been associated with poorer health outcomes where each incremental increase towards higher health literacy is associated with a greater likelihood of: eating at least five portions of fruits and vegetables a day; being a non-smoker [von Wagner et al., 2007].

National Child Measurement Program

In addition to the HSE, every 6- and 11-year-old child in England is measured annually (see for report <http://www.ncmp.ic.nhs.uk>). The report presents the prevalence of underweight, healthy weight, overweight and obese children, in Reception (aged 4 to 5 years) and Year 6 (aged 10 to 11 years), measured in the school year 2007/08. Where possible, comparisons have also been made with the 2006/07 NCMP results. Figure 11.23 presents the results from the NCMP compared with the HSE 2007 for adults, broken down by regions.

Summary Findings

- 973,073 valid measurements were received for children, in England, in Reception and Year 6 – about 88% of those eligible.
- In Reception, almost 1 in 4 of the children measured was either overweight or obese. In Year 6, this rate was nearly 1 in 3.
- The percentage of children who are obese is almost twice as high in Year 6 than in Reception.

- The percentage of children who are overweight is only slightly higher in Year 6 than in Reception.
- The overall percentage of children who are underweight is similar for both years.
- The prevalence of underweight, overweight and obese children by NCMP year in England for 2006/07 and 2007/08 does not differ significantly.
- Obesity prevalence is significantly higher than the national average in the North East, West Midlands and London SHAs for both age groups as well as North West SHA for Reception children and Yorkshire and Humber SHA for Year 6 children.
- Obesity prevalence is significantly below the national average in the South East Coast, South Central, South West and East Midlands SHAs for children in both school years, as well as for Year 6 children in the East of England SHA.
- As in the 2006/07 NCMP findings, a strong positive relationship exists between deprivation and obesity prevalence for children in Reception and Year 6.
- Obesity prevalence is significantly higher in urban areas than in rural areas, as was the case in NCMP 2006/07

Local and Regional Health Profiles

Based largely on the HSE (similar surveys are also undertaken in Scotland and Wales) there are reports now that are produced as part of an annual Health Profile for England (and separately Scotland and Wales) that includes estimates broken down by regions. The UK health observatories (<http://www.apho.org.uk>) compile an annual health profile for each city/local area that allows further disaggregation of data by local wards. It is thus now possible to disaggregate key indicators at national, regional and local levels, that reveals considerable heterogeneity in measures within the UK.

There have been significant improvements in the health of the population over the last 10 years, an improvement almost wholly shared by disadvantaged groups and areas, as measured by life expectancy and infant mortality [Department of Health, 2008].

Average life expectancy for all groups in England has increased significantly – for males by an extra 3.1 years and for females by an extra 2.1 years – between 1995–1997 and 2005–2007.

For disadvantaged areas (the spearhead group of 70 local authority areas with the worst health and deprivation indicators) there has been an increase in life expectancy of only very slightly less than for the whole population – 2.9 years for men and 1.9 for females.

Infant mortality rates have fallen to an historic low level over the last 10 years – having fallen from 5.6 infant deaths per 1,000 live births in 1995–1997 to 4.7 per 1,000 in 2005–2007 for all those in England with a valid socioeconomic group, with rates in the routine and manual (target) group having fallen from 6.3 to 5.4 per 1,000 live births over the same period.

Note: All web addresses were correct at the time of preparing this report in June 2009.