

DIETARY SURVEY IN HUNGARY, 2009. PART I. MACRONUTRIENTS, ALCOHOL, CAFFEINE, FIBRE

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In 2009 Hungarian Food Safety Office (HFSO) performed a countrywide representative dietary survey to obtain food consumption data for quantitative food safety risk assessment utilizable in the field of public health nutrition as well. The consumption of foodstuffs, daily energy- and nutrient intakes, nutritional habits and dietary supplement usage of Hungarian population was assessed. The complex system has included three-day dietary record and a food consumption frequency questionnaire. Some anthropometric parameters were also self-recorded. According to the body mass index, a considerable proportion of both the 31–60 years old males (69%) and females (46%) were overweight or obese. The energy intake of the Hungarian adult population is slightly exceeds the recommendation. The intake of proteins is satisfactory in general. The average intake of total fats is very high (36.1–38.9 energy percent), and the fatty acid composition – mostly the ratio of n-6/n-3 fatty acids – is unfavourable, but the fatty acid pattern regarding saturated- (SFA), mono- (MUFA) and polyunsaturated (PUFA) fatty acid ratio shows favourable tendency. The proportion of complex carbohydrates within the intake of energy providing macronutrients is far lower than the optimal level, but it is a positive finding that added sugar intake is below the utmost recommendation. The average daily cholesterol intake is high (males: 469 mg, females: 335 mg), whilst the dietary fibre intake is lower than the recommended. The article provides data on alcohol, caffeine and fibre consumption, too.

Keywords: nutrition survey, food consumption, nutrient intake, energy intake, fatty acid pattern, cholesterol intake, risk assessment

There were three nationwide representative nutritional surveys in Hungary between 1985 and 2003 (BÍRÓ, 1992; BÍRÓ et al., 1996; RODLER et al., 2005; BÍRÓ et al., 2007; ZAJKÁS et al., 2007). The main objectives of these were to assess and to follow up the nutritional habits and nutritional status (daily energy- and nutrient intake, nutritional biomarkers and anthropometric parameters) of the population. It has become a significant tendency worldwide in the last decade to obtain utilizable data from dietary surveys, useful for the field of research other than nutrition as well. Food consumption data of a population could be the base of the research of food contaminants exposure and are utmost importance for scientific risk assessment.

Hungarian Food Safety Office (HFSO) has initiated and co-ordinated a representative dietary survey in 2009, which supplies valuable data both for nutrition science and food safety risk assessment. This article gives a review of the methods of the survey, and the daily energy- and macronutrient intake of the adult population. A subsequent article will show the daily intakes of micronutrients (macro- and microelements, vitamins), some data of the proportion of people taking dietary supplements and of subjects with food allergy, and the proportion of subjects with possibly inadequate nutrient intakes on group level.

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1. Materials and methods

1.1. Preparation of the study

The dietary assessment was executed using specially designed questionnaire system to obtain detailed nutritional data of the individuals. The 3 days dietary record method had been chosen with other supplementary information gathering as follows.

1.1.1. Dietary record questionnaire. Dietary assessment was performed using a food-intake diary kept for three non-consecutive days (two weekdays and one weekend day). It was complemented with detailed filling guidance, a common household measuring table and a previously filled in sample day as an example. The estimated quantity (with help of a pictured food-book, see below) and the quantity of all foods and drinks consumed were recorded by the subjects, as well as the date, time and place of eating.

1.1.2. Pictured food book. A guide-book with colour photos of typical dishes has been prepared. The pictures show small, medium and large food portions on the plates of same shape and size. The photos also show cutlery of regular size to picture the appropriate portion size of food consumed.

1.1.3. Targeted questionnaire on frequency of food consumption, food allergy and dietary supplements. A brief ten-item food list – containing quantity (small, medium, large) and frequency (daily, weekly, monthly, rarely or never) categories – has been compiled to get additional information about the consumption of special or rarely consumed foodstuffs. There were questions on existence of food allergy or intolerance and the type of causative foodstuffs, and the dietary supplements taking habits.

1.1.4. Anthropometric parameters. Self-reported body weight and height data were recorded on general information sheets.

1.1.5. Data security. All data of the subjects were treated anonymously using the special coding system of Hungarian Central Statistical Office (HCSO) representing individual identification and the place of residence (county) code of the persons. The gender, age and socioeconomic variables were attached separately to the identification code.

1.2. Sampling

The dietary survey initiated and co-ordinated by HFSO was conducted from February 2009 till the end of June 2009. The survey was organised jointly to the yearly National Household Budget Survey (HBS) of HCSO. Subjects of HBS selected randomly by the relevant experts of HCSO conforming to age, gender and residence were recruited into the dietary survey. Representativeness of the study was assured by the sampling procedure of HCSO; 19 counties of Hungary and Budapest as regions, as well as age and gender have served as strata.

1.3. Collecting and processing of data

Skilled interviewers of HCSO visited the recruited people at their home. The interviewers had received special training on collecting food consumption information before the start of

the survey. They handed out the questionnaires and the guidance after a detailed explanation of filling in, fixed the date of collection and the completed sheets were collected later by the same persons. Although there was no way to effectuate a face-to-face interview with dietician, the last meeting was a good opportunity for the interviewer to confirm the completeness of questionnaires and to inspect the most important items from a checklist according to the study protocol.

1.4. Data recording, calculating daily energy- and nutrient intake

The data processing and evaluation of the results were carried out by skilled dieticians who have recorded the food items into NutriComp Diet (Étrend) software (BIRÓ et al., 1999; RODLER et al., 2005) specially adapted for the survey. It contains wide scale of foodstuffs, traditional Hungarian and well-known international recipes, and also recipes used widespread in mass catering sector. After a thorough verification procedure, daily energy- and nutrient intake was calculated using weighted average of the three days (BIRÓ, 2005). Alcohol intakes were calculated as amounts of absolute alcohol; caffeine intakes were counted as the sum coming from all of the caffeine containing foodstuffs and drinks. Recipes were disaggregated into raw materials, and even into macro- and micronutrients using the recipe composition database of the software.

1.5. Determining possibly under- and over-reporting subjects

To check the subjects for misreporting of food intake, the ratio of reported energy intake (EI) and estimated basal metabolic rate (BMR) according to SCHOFIELD and co-workers (1985) was used as proposed by GOLDBERG and co-workers (1991). Records with an EI:BMR ratio lower than 1.1 or higher than 2.7 were excluded from further analysis due to the high probability of under- or over-reporting of dietary intake, respectively.

1.6. Statistical analysis

Database was maintained in MS-Access 2003. Statistical analysis was carried out by SPSS for Windows 11.0 package. Results were expressed as mean, standard deviation (SD) and percent values of the appropriate variables.

2. Results and discussion

The response rate was satisfactory high, above 80%. Data of 4992 person (age range: 0–101 years) have got into the main database. This article shows only the results of the adult inhabitants for the sake of comparison of former Hungarian surveys. The 3982 adults (1723 male and 2259 female) have filled in the nutritional questionnaire, and according to the criteria 3077 (77.3%) had valid, reliable results without the possible under- and over-reporters (21.8% and 0.9%, respectively). Table 1 shows the distribution of age and gender of subjects of the final evaluation. Age groups were formed according to the categories of national nutrient recommendations (ANTAL, 2005).

Table 1. Distribution of subjects with valid questionnaire by age and gender

Age group	Male	Female	Altogether
19–30 y	278 51.5%	262 48.5%	540 17.5%
31–60 y	812 45.3%	980 54.7%	1792 58.2%
>60 y	270 36.2%	475 63.8%	745 24.2%
Total	1360 44.2%	1717 55.8%	3077 100%

2.1. Anthropometric parameters

Body mass index (BMI) was calculated from the body weight and height of the subjects (Table 2). The average values of BMI have ranged from 22.5 kg m⁻² (women of 19–30 year) to 26.7 kg m⁻² (men over 60 years).

Table 2. Average BMI (kg m⁻²) values (mean ±SD)

Age group	Male	Female	Altogether
19–30 y	24.5±3.9	22.5±3.9	23.5±4.1
n	278	262	540
31–60 y	27.2±4.3	25.4±4.8	26.2±4.7
n	812	980	1792
>60 y	27.3±4.2	27.1±4.8	27.2±4.6
n	270	475	745
Total	26.7±4.4	25.5±4.9	26.0±4.7
n	1360	1717	3077

BMI values were categorised according to WHO (2000) recommendations to obtain information about the degree of overweight and obesity on group level. According to this scale 48.8% and 20.1% of the 31–60 years old males were overweight (BMI 25–29.9 kg m⁻²) and obese (BMI ≥30 kg m⁻²), respectively, moreover above 60 years their degree of obesity was 23.7%. In the case of females of 31–60 year the proportions of overweight and obesity were lower than males' (29.5% and 16.1%), however, above 60 years the situation became much worse: overweight and obesity of females were 40.4% and 25.9%, respectively (Fig. 1.)

2.2. Energy, macronutrients, alcohol and caffeine

Average daily energy and macronutrient intakes are shown in the following tables.

The average daily energy intake was the highest in the 19–30 years old group in the case of both genders (males: 12476 kJ, female: 9126 kJ). Age, gender, body weight and physical activity have to be considered to evaluate energy intake differences of the groups. It is observable that energy intake for all of the groups is slightly higher – in variable degree – than that of the requirement in the case of light work (Table 3).

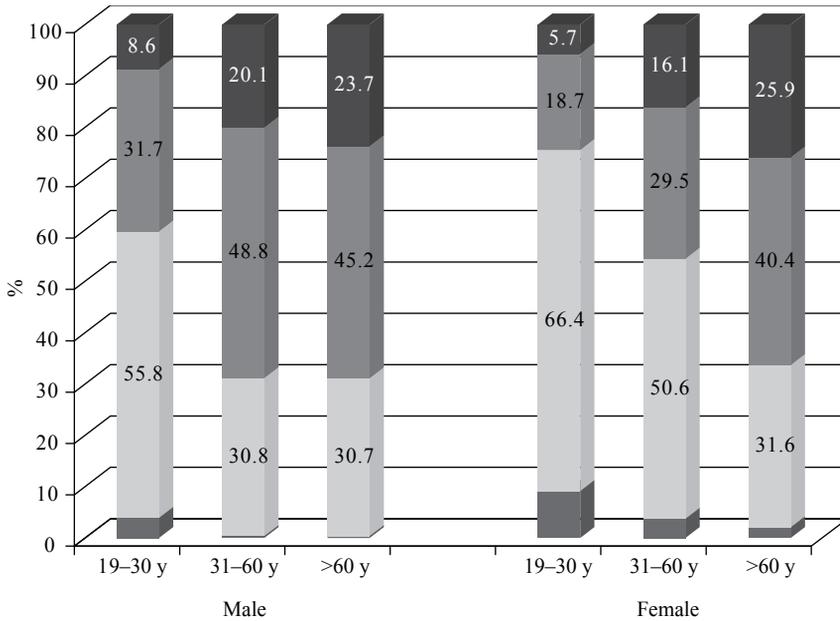


Fig. 1. Percentage of BMI (kg m^{-2}) by age and gender. BMI: ■: <18.5; □: 18.5–24.9; ▒: 25–29.9; ■: ≥ 30

The average daily protein intake was between 75 g and 112 g (nearly with 60/40% animal/vegetable protein ratio), which is equal to 14.7–15.1 energy percent (%en), slightly higher than the recommended 12–14 %en (WHO, 1985; WHO EUROPE, 2004; ANTAL, 2005) (Table 6).

The average total fat intake varied between 84–124 g/person/day (with predominance of animal fat) regarding all of the groups of males and females (Table 3). These intakes are equal to 36.1–38.9 fat energy percent, which are much higher than the utmost recommended 30 %en. The fatty acid composition of the fats shows favourable tendency, since the energy percents from saturated- (SFA), mono- (MUFA) and polyunsaturated (PUFA) fatty acid were 11.1 %en, 11.8 %en and 9.4 %en, respectively, which means 0.9 g/g PUFA/SFA ratio in toto (Table 6). On the other hand, the n-6/n-3 fatty acid ratio is alarmingly high (27.7–30.1 g/g) – considering the recommended 5–10 value – which draws attention to the structural disproportionateness of fats consumed (Table 4).

The average daily intake of total carbohydrate was between 244 g and 344 g, which meant 44.2 %en (31–60 years old males) and 48.4 %en (19–30 year old females) of carbohydrate. Despite the slow increasing tendency observable in the last two decades, these values are remarkably under both national (ANTAL, 2005) and international (WHO, 2003) recommendations (around 55–65 %en). It is a positive finding, that added sugar was under 10 energy percent in the case of all groups (range of 6.4–8.9 %en) (Table 6).

The reported alcohol intake was 14.5 g and 7.3 g/day/person in the case of males (consumer/all responder: 634/1360, 46.6%) and females (consumer/all responder: 325/1717, 18.9%), respectively (Table 3).

Table 3. Average daily energy- and macronutrient intake (mean \pm SD)

Average intake	Energy (kJ)	Energy (kcal)	Protein (g)	Animal protein (g)	Vegetable protein (g)	Total fat (g)	Animal fat (g)	Vegetable oil (g)
Male								
19–30 y	12476.3	2984.8	112.1	67.0	45.0	124.4	73.2	51.2
n=278	\pm 2807.9	\pm 671.8	\pm 27.9	\pm 21.0	\pm 11.7	\pm 34.2	\pm 27.8	\pm 17.5
31–60 y	12273.5	2936.2	109.2	65.3	43.9	126.9	77.7	49.2
n=812	\pm 2633.3	\pm 630.0	\pm 26.6	\pm 20.8	\pm 10.9	\pm 35.1	\pm 31.1	\pm 17.7
>60 y	10489.7	2509.5	91.6	54.0	37.6	107.1	66.0	41.2
n=270	\pm 2372.8	\pm 567.7	\pm 21.7	\pm 16.8	\pm 9.8	\pm 33.1	\pm 29.8	\pm 15.5
Male total	11960.8	2861.4	106.3	63.4	42.9	122.5	74.5	48.0
n=1360	\pm 2720.7	\pm 650.9	\pm 27.0	\pm 20.7	\pm 11.2	\pm 35.3	\pm 30.5	\pm 17.6
Female								
19–30 y	9126.2	2183.3	80.7	47.5	33.2	87.7	47.0	40.7
n=262	\pm 1897.6	\pm 454.0	\pm 17.7	\pm 14.1	\pm 8.3	\pm 24.2	\pm 17.3	\pm 14.2
31–60 y	9005.9	2154.5	80.5	47.4	33.1	88.1	49.0	39.1
n=980	\pm 1779.3	\pm 425.7	\pm 17.2	\pm 14.1	\pm 7.8	\pm 22.7	\pm 18.2	\pm 13.3
>60 y	8627.3	2063.9	75.4	43.5	31.8	84.2	48.0	36.1
n=475	\pm 1734.0	\pm 414.8	\pm 16.9	\pm 13.6	\pm 7.7	\pm 23.9	\pm 20.1	\pm 12.7
Female total	8919.5	2133.9	79.1	46.3	32.8	86.9	48.4	38.5
n=1717	\pm 1794.1	\pm 429.2	\pm 17.3	\pm 14.1	\pm 7.9	\pm 23.3	\pm 18.7	\pm 13.4
Altogether								
19–30 y	10850.9	2595.9	96.9	57.6	39.3	106.6	60.5	46.1
n=540	\pm 2933.3	\pm 701.7	\pm 28.3	\pm 20.4	\pm 11.8	\pm 35.0	\pm 26.7	\pm 16.8
31–60 y	10486.5	2508.7	93.5	55.5	38.0	105.7	62.0	43.7
n=1792	\pm 2741.9	\pm 655.9	\pm 26.2	\pm 19.6	\pm 10.8	\pm 34.8	\pm 28.7	\pm 16.3
>60 y	9302.3	2225.4	81.3	47.3	33.9	92.5	54.5	38.0
n=745	\pm 2180.3	\pm 521.6	\pm 20.3	\pm 15.6	\pm 9.0	\pm 29.7	\pm 25.6	\pm 14.0
Total	10263.7	2455.4	91.1	53.9	37.2	102.6	59.9	42.7
n=3077	\pm 2710.7	\pm 648.5	\pm 25.9	\pm 19.3	\pm 10.7	\pm 34.2	\pm 27.8	\pm 16.1

2.3. Other nutrients: cholesterol, dietary fibre and caffeine

The average daily cholesterol intake both in the case of males (469 mg) and females (335 mg) was higher than the uppermost recommended 300 mg/day (Table 5).

Recommendations for the dietary fibre are on wide scale (25–35 g/day). The average daily intake of males was on the lower bound (25.0 g), while that of females was far below (20.8 g) the recommended value.

Table 4. Average daily fatty acid and cholesterol intake, PUFA/SFA ratio (mean \pm SD)

Average intake	SFA (g)	MUFA (g)	PUFA (g)	UFA (g)	n-3 (g)	n-6 (g)	n-6/n-3	PUFA/ SFA	Cholesterol (mg)
Male									
19–30 y	37.5	39.8	30.0	69.8	1.2	29.1	29.0	0.8	504.5
n=278	\pm 12.0	\pm 13.1	\pm 9.2	\pm 19.7	\pm 0.7	\pm 9.1	\pm 11.0	\pm 0.3	\pm 180.7
31–60 y	37.6	41.4	30.4	71.8	1.2	29.5	30.1	0.9	529.5
n=812	\pm 12.4	\pm 14.0	\pm 9.3	\pm 20.0	\pm 0.7	\pm 9.1	\pm 11.8	\pm 0.3	\pm 194.5
>60 y	31.7	35.1	25.5	60.6	1.0	24.6	28.2	0.9	430.4
n=270	\pm 11.5	\pm 13.4	\pm 8.1	\pm 18.7	\pm 0.7	\pm 7.9	\pm 11.3	\pm 0.3	\pm 180.4
Male total	34.3	36.9	27.5	64.4	1.1	26.7	29.1	0.9	468.5
n=1360	\pm 12.9	\pm 14.7	\pm 10.0	\pm 22.2	\pm 0.7	\pm 9.8	\pm 11.2	\pm 0.3	\pm 201.5
Female									
19–30 y	26.2	26.8	22.8	49.5	0.9	22.1	28.5	0.9	331.7
n=262	\pm 8.4	\pm 8.7	\pm 7.7	\pm 14.7	\pm 0.5	\pm 7.6	\pm 11.4	\pm 0.3	\pm 120.8
31–60 y	25.9	27.1	22.7	49.8	0.9	22.0	29.0	0.9	356.8
n=980	\pm 8.0	\pm 8.6	\pm 6.8	\pm 13.4	\pm 0.5	\pm 6.7	\pm 11.2	\pm 0.3	\pm 129.7
>60 y	25.0	26.3	21.2	47.5	0.9	20.4	27.7	0.9	327.3
n=475	\pm 8.3	\pm 9.6	\pm 6.5	\pm 14.0	\pm 0.6	\pm 6.3	\pm 10.8	\pm 0.3	\pm 122.4
Female total	25.1	26.0	21.8	47.7	0.9	21.1	28.6	0.9	335.4
n=1717	\pm 8.3	\pm 9.1	\pm 7.4	\pm 14.8	\pm 0.5	\pm 7.2	\pm 11.0	\pm 0.3	\pm 127.6
Altogether									
19–30 y	32.0	33.5	26.5	60.0	1.0	25.7	28.8	0.9	420.7
n=540	\pm 11.8	\pm 12.9	\pm 9.3	\pm 20.1	\pm 0.6	\pm 9.1	\pm 11.2	\pm 0.3	\pm 177.0
31–60 y	31.2	33.6	26.2	59.8	1.0	25.4	29.5	0.9	435.1
n=1792	\pm 11.8	\pm 13.4	\pm 8.9	\pm 20.0	\pm 0.6	\pm 8.7	\pm 11.5	\pm 0.3	\pm 183.6
>60 y	27.5	29.5	22.7	52.2	0.9	22.0	27.9	0.9	364.6
n=745	\pm 10.1	\pm 11.9	\pm 7.4	\pm 17.1	\pm 0.7	\pm 7.2	\pm 10.9	\pm 0.3	\pm 154.2
Total	29.2	30.9	24.3	55.2	0.9	23.6	28.8	0.9	395.0
n=3077	\pm 11.6	\pm 13.1	\pm 9.1	\pm 20.2	\pm 0.6	\pm 8.9	\pm 11.1	\pm 0.3	\pm 177.6

SFA: Saturated fatty acids; MUFA: monounsaturated fatty acids; PUFA: polyunsaturated fatty acids; UFA: unsaturated fatty acids, total

The average daily caffeine intake for males (consumer/responder: 1245/1360, 91.5%) and females (consumer/responder: 1601/1717, 93.2%) were 121.7 mg and 123.1 mg/day.

Table 5. Average daily intake of carbohydrate, sugar, alcohol, dietary fibre and caffeine (mean \pm SD)

Average intake	Total carbohydrate (g)	Added sugar (g)	Alcohol ^a (g)	Dietary fibre (g)	Caffeine ^b (mg)
Male					
19–30 y	344.2	63.5	9.3	25.5	100.3
n=278	± 86.0	± 42.1	± 8.3	± 7.3	± 91.9
31–60 y	321.8	49.0	15.1	25.5	129.4
n=812	± 77.9	± 34.4	± 18.0	± 6.9	± 95.7
>60 y	276.8	39.9	16.1	23.1	120.1
n=270	± 64.2	± 24.6	± 15.5	± 6.7	± 82.3
Male total	317.5	50.2	14.5	25.0	121.7
n=1360	± 80.2	± 35.3	± 16.5	± 7.0	± 93.0
Female					
19–30 y	262.5	49.3	5.9	20.7	102.8
n=262	± 61.6	± 28.0	± 7.4	± 6.1	± 88.8
31–60 y	253.7	43.9	7.0	21.0	128.8
n=980	± 56.9	± 26.7	± 14.0	± 5.3	± 104.9
>60 y	244.8	41.2	8.5	20.6	122.2
n=475	± 52.4	± 23.9	± 14.3	± 5.5	± 89.6
Female total	252.6	44.0	7.3	20.8	123.1
n=1717	± 56.7	± 26.2	± 13.5	± 5.5	± 99.0
Altogether					
19–30 y	304.6	56.6	8.4	23.1	101.5
n=540	± 85.5	± 36.6	± 8.2	± 7.2	± 90.3
31–60 y	284.6	46.2	12.5	23.0	129.1
n=1792	± 75.3	± 30.5	± 17.2	± 6.5	± 100.9
>60 y	256.4	40.7	13.0	21.5	121.4
n=745	± 59.0	± 24.1	± 15.5	± 6.1	± 86.9
Total	281.3	46.7	12.0	22.7	122.5
n=3077	± 75.3	± 30.7	± 15.9	± 6.6	± 96.4

^an of total consumers: 959^bn of total consumers: 2846

Table 6. Energy percent (%en) of macronutrients, fatty acids and alcohol (mean \pm SD)

Average intake	Protein	Total fat	SFA	MUFA	PUFA	UFA	Carbo- hydrate	Added sugar	Alcohol
Male									
19–30 y	15.1	37.6	11.3	12.0	9.1	21.1	46.4	8.4	2.2
n=278	\pm 2.0	\pm 5.2	\pm 2.3	\pm 2.4	\pm 2.0	\pm 3.2	\pm 5.5	\pm 5.1	\pm 2.1
31–60 y	15.0	38.9	11.5	12.7	9.4	22.0	44.2	6.6	3.6
n=812	\pm 2.0	\pm 5.6	\pm 2.5	\pm 2.8	\pm 2.1	\pm 3.4	\pm 5.9	\pm 4.2	\pm 4.4
>60 y	14.8	38.2	11.3	12.4	9.2	21.7	44.6	6.4	4.4
n=270	\pm 1.9	\pm 5.7	\pm 2.5	\pm 3.0	\pm 2.1	\pm 3.4	\pm 5.9	\pm 3.7	\pm 4.5
Male total	15.0	38.5	11.4	12.5	9.3	21.8	44.7	7.0	3.6
n=1360	\pm 2.0	\pm 5.5	\pm 2.4	\pm 2.8	\pm 2.1	\pm 3.4	\pm 5.9	\pm 4.4	\pm 4.2
Female									
19–30 y	15.0	36.1	10.8	11.0	9.4	20.4	48.4	8.9	1.9
n=262	\pm 2.0	\pm 5.4	\pm 2.3	\pm 2.4	\pm 2.4	\pm 3.6	\pm 5.7	\pm 4.4	\pm 2.4
31–60 y	15.1	36.9	10.8	11.3	9.6	20.8	47.4	8.1	2.2
n=980	\pm 2.0	\pm 5.0	\pm 2.2	\pm 2.3	\pm 2.2	\pm 3.3	\pm 5.4	\pm 4.2	\pm 3.9
>60 y	14.7	36.6	10.9	11.4	9.3	20.6	47.9	8.0	2.9
n=475	\pm 1.9	\pm 5.6	\pm 2.4	\pm 2.7	\pm 2.1	\pm 3.5	\pm 5.9	\pm 4.2	\pm 5.7
Female total	15.0	36.7	10.8	11.3	9.4	20.7	47.7	8.2	2.4
n=1717	\pm 2.0	\pm 5.3	\pm 2.3	\pm 2.5	\pm 2.2	\pm 3.4	\pm 5.6	\pm 4.3	\pm 4.4
Altogether									
19–30 y	15.1	36.9	11.0	11.5	9.3	20.8	47.4	8.7	2.1
n=540	\pm 2.0	\pm 5.3	\pm 2.3	\pm 2.4	\pm 2.2	\pm 3.4	\pm 5.7	\pm 4.8	\pm 2.2
31–60 y	15.0	37.8	11.1	11.9	9.5	21.4	45.9	7.4	3.1
n=1792	\pm 2.0	\pm 5.4	\pm 2.4	\pm 2.6	\pm 2.1	\pm 3.4	\pm 5.9	\pm 4.3	\pm 4.3
>60 y	14.7	37.2	11.0	11.8	9.2	21.0	46.7	7.4	3.8
n=745	\pm 1.9	\pm 5.7	\pm 2.4	\pm 2.9	\pm 2.1	\pm 3.5	\pm 6.1	\pm 4.1	\pm 5.1
Total	15.0	37.5	11.1	11.8	9.4	21.2	46.4	7.6	3.2
n=3077	\pm 2.0	\pm 5.5	\pm 2.4	\pm 2.7	\pm 2.2	\pm 3.4	\pm 5.9	\pm 4.4	\pm 4.3

For legends see Table 4

3. Conclusions

This is the fourth countrywide nutrition survey in Hungary in the past 25 years. To overview the tendencies of the findings, a comparative analysis is necessary. Nevertheless, the well-known fact that most of the deviations characteristic to the western-like nutritional habits, exist in Hungary, too, is obvious on the base of the current results.

The energy intake of the Hungarian adult population slightly exceeds the recommendation. The average intake of total fats (with greater proportion of animal fat) is henceforward very high, and their fatty acid composition is predominantly unfavourable. The high intake of total fats with the increased amount of cholesterol is significant nutritional risk factor. The proportion of complex carbohydrates within the intake of energy provider macronutrients is lower than the optimal level yet, but a positive finding, that added sugar intake is below the outmost recommendation.

Limitations of the study were that the food consumption does not represent all of the seasons; the weight and height of subjects were not measured but self-reported (with an obvious uncertainty of calculated BMIs). There was no possibility to conduct face-to-face interview by dieticians and there were no additional laboratory examinations of nutritional biomarkers.

Amongst the strength of the study it could be emphasized that a nationwide representative population had been surveyed, for three seasons. The response rate was outstandingly high. Due to the study protocol the results are fairly comparable to the findings of the former ones which provide the possibility of long-scale evaluation and comparison.

This is the first nutrition study in Hungary designed mainly for food consumption data gathering for food safety risk assessment purpose and it proved to be competent and suitable for assessing the daily nutrient intake and analysing the nutrition status of the population as well.

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