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Attitudes to healthy eating among a representative sampling of Croatian adults: A comparison with Mediterranean countries

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Abstract
The objectives of this study were to examine the understanding of healthy eating, to assess the perceived need to change eating habits, to identify information sources about healthy eating among Croatian adults and to compare it with other Mediterranean countries. The sample included 1,006 randomly selected Croatian subjects over 15 years of age. The questions were adapted from the Pan-European Survey (1995–1996). A total of 50% of the participants described healthy eating as 'fresh and natural foods', more than one-half believed there is no need to change eating habits (53%) and 'newspapers/magazines' (26%) were identified as the most frequently used sources of information about healthy eating. Older males, either unemployed or retired, of lower educational background and monthly incomes, and the overweight and obese were the subgroups of the Croatian population that pose a real challenge to health nutrition promoters. A comparison with Mediterranean countries showed a higher level of similarity in attitudes with Italians.

Keywords: *Healthy eating, sources of information, attitudes, Croatia, Mediterranean countries*

Introduction

The Institute of European Food Studies investigated attitudes to food, nutrition and health among 15 European Union (EU) member states within nationally representative samplings of adults aged 15 and over (Lapalainnen et al. 1998). The survey findings provided the baseline for the future area of research that should take into account the cultural diversity and geographical variability of the European countries. A majority of EU respondents described healthy eating as specified by many dietary guidelines: less fat, fatty foods or a low-fat diet, more fruit and vegetables, balance and variety. However, older and less-educated subjects were less likely to mention any aspects of healthy eating (Margetts et al. 1997). The most frequently used information

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sources about healthy eating in the EU were: television/radio (29%), magazines and newspapers (27%), health professionals (26%), food packages (22%) and relatives/friends (22%) (de Almeida et al. 1997). A majority of Europeans (70%) stated that they did not need to change their diet as they are healthy enough (Kearney et al. 1997). The results of these studies suggest that in spite of generally accepted dietary guidelines in European countries, the interpretation of healthy eating among certain groups of populations varied. In the mid-1990s (as the war in Croatia ended), the Ministry of Health and the Croatian Health Insurance Institute conducted a large cross-sectional study aiming to assess health attitudes, knowledge, behaviour and risks among the post-war Croatian population (Turek et al. 2001). The results showed that the Croatian population is very well informed as to what type of nutrition is healthy or not, but the problems lie in excessive energy intake, large servings, and physical inactivity. This study also found a high rate of overweight and obese individuals (almost 80% of males and 50% female) within the representative sample. Several years later, the Croatian Ministry of Health and the National Institute of Public Health publicized the 'Croatian Nutrition Policy, A Strategy for Improving Food Quality and Diet' (FAO/WHO 1992; Ministry of Health and National Institute of Public Health 1999). The Policy is focused on permanent expertise-based education, production of healthy foods and promotion of healthy eating aimed at preventing diet-related diseases.

As a candidate for membership in the EU at the beginning of the twenty-first century, Croatia has specific cultural, sociological and economic characteristics. Its geographic location along the Adriatic Sea makes possible the Mediterranean dietary pattern, of which favourable effects on health have been well examined, particularly in cardiovascular disease prevention (Trichopoulou et al. 2003; Bilenko et al. 2005). As pointed out by Turek et al. (2001), the problem of overweight and obese persons already existed among the Croatian population, and throughout Europe (International Obesity Task Force 2002). Thus, the objectives of the present study were to investigate: the understanding of healthy eating; the perceived need to change eating habits; the most frequent information sources about healthy eating according to the socio-demographic and lifestyle characteristics of the nationally representative sampling of Croatian adults; and to compare it with Mediterranean countries.

Participants and methods

Participants

A nationally representative sampling of 1,006 Croats aged 15 and over was randomly selected through double-stage stratification (counties and settlement size) and weighted according to the 2001 National Census (by age, gender and education). Telephone numbers were randomly generated and selected for each stratum. Interviews were conducted by means of the Computer Assisted Telephone Interviewing (CATI) system, which is used for surveys on health behaviour (Albertsen et al. 2004; White et al. 2006). The CATI system includes call management (up to five calls for non-responding numbers) and call backs for unavailable respondents. The selection of respondents in each household was done randomly by the 'last birthday method'. The interviewers were briefed before the survey and supervised during the entire process. This survey was a part of a Daily CATI Omnibus, which means that participants were

interviewed about different topics for various clients in a single interview. All interviews were completed between March and April 2006.

Questionnaire

A pan-European survey was used as the source of the questions and database for the comparison with France, Greece, Portugal, Spain and Italy (Mediterranean European countries) (de Almeida et al., 1997; Kearney et al., 1997; Margetts et al. 1997; Lapalainnen et al. 1998). Although a larger survey on attitudes to food, nutrition and health among the Croatian population was conducted, in this paper the results of three questions are presented: understanding of healthy eating, the perceived need to change diet, and the most frequently used information sources on healthy eating. Participants were asked to describe healthy eating by answering the question 'How would you personally describe healthy eating?', and two probe questions were also used: 'What would it include or exclude?' and 'Anything else?'. It was an open-ended question. Furthermore, participants were asked to select the most appropriate response using a five-point Likert scale to the statement 'I do not need to change my eating habits as they are healthy enough'. The Likert scale ranged from 'strongly agree' (5), 'tend to agree' (4) and 'neither agree, nor disagree' (3) to 'tend to disagree' (2) and 'strongly disagree' (1). The answer 'neither agree, nor disagree' (3) was not included in the pan-EU survey. The most frequently used information sources were assessed by an open-ended question ('What is the most frequent information source about healthy eating for you?') followed by a follow-up question ('Maybe any other sources you can remember?'), whereas the level of trust in different information sources was not examined in this study. At the end of the questionnaire, participants were asked questions related to socio-demographic and health status. The questionnaire was previously piloted on a small group of typical subjects to see whether the questions were applicable and revised accordingly. Validity and reliability were not formally evaluated. This research was approved by the Institutional Review Board.

Statistical analysis

Descriptive statistics (percentage of subjects, mean score) and Pearson chi-square statistics were used to test for significant differences across socio-demographic variables (sex, age, education level, household size, children up to 18 years old, monthly income per household, employment status, marital status) and perceived health status variables (smoking, physical activity, body mass index [BMI] and special diet due to various health and weight problems). Statistical significance was accepted at $P < 0.05$. Participants were defined as smokers if they reported smoking more than one cigarette per day. Physically active respondents were those who claimed they practice vigorous physical activities regularly. BMI (weight [kg]/height [m^2]) was calculated on the basis of self-reported weight and height. Based on criteria specified by World Health Organization (WHO) recommendations, subjects were defined as underweight (<18.49 kg/m^2), normal weight (18.50–24.99 kg/m^2), overweight (25.00–29.99 kg/m^2) and obese (≥ 30 kg/m^2) (WHO 1998). A one-way analysis of variance (ANOVA) and Scheffe's multiple comparison test ($\alpha = 0.05$) were used to examine differences of scores between groups. The mean values of responses for the statement 'I do not need to change my eating habits as they are healthy enough' were also calculated and compared across socio-demographic and health-related variables.

All analyses were calculated using SPSS statistical software (version 13.0, 2004; SPSS Inc., Chicago, IL, USA).

Results

Sample characteristics

Table I shows that 48% ($n=478$) of participants were male and 52% ($n=528$) female. The respondents' mean $\pm$ standard deviation age was 44.6 ± 18.1 years (data not shown). A majority of respondents had between 8 and 12 years of education (76%), while close to one-half had very low monthly incomes (up to €541). Employed participants comprised 40% of the sample and more than one-half reported that they were married (55%). Regarding health status, 54% of female respondents declared themselves as non-smokers and 57% as physically inactive (Table II). On the basis of self-reported weight and height, the BMI was calculated for 97% ($n=980$) of respondents. Among overweight and obese participants, more than one-half were male. The BMI mean $\pm$ standard deviation value of the total sample was 25.6 kg/m^2 $\pm$ 4.85 (data not shown).

Definition of healthy eating

Fifty-six categories of different interpretations of healthy eating were identified and grouped into eight main categories that have already been described elsewhere (Margetts et al. 1997). The results are shown as the percentages of the sample who gave one of the eight most frequently mentioned descriptors, taking into account the distribution by sex, age, education level, household size, children up to 18 years old, monthly income per household, employment status, marital status, smoking, physical activity, BMI and special diet due to various health and weight problems. Overall, 90% of all Croatian respondents mentioned either 'fresh, natural foods' or 'more fruits and vegetables' as concepts of healthy eating (Table III). However, older subjects, housewives and married couples mentioned the 'fresh, natural foods' (50%) concept more frequently than other groups ($P<0.001$). Younger, underweight and normal-weight females ($P<0.01$) more often expressed the 'more fruits and vegetables' concept (40%). About the same percentage of subjects (19%), interpreted healthy eating concepts as either 'less red meat, meat products' or 'less fat, fatty foods, low-fat diet'. Other commonly mentioned concepts were 'nutrient approach' (10%), 'more staples' (7%), 'balance and variety' (7%) and 'less sugar' (3%). 'Balance and variety' was preferred among the youngest, higher-educated individuals (13+years of education) and households with a monthly income over €1,000 ($P<0.001$). Over-weight and obese subjects aged 65 and older, on special diets due to various health problems, presumed 'balance and variety' unimportant in the context of healthy eating ($P<0.05$).

A comparison between data from a Croatian survey and data from Mediterranean countries showed that approximately 50% of the Italian and Croatian respondents mentioned 'fresh, natural foods' (Figure 1). This is a proportion one to three times higher than among participants in France, Spain, Portugal and especially Greece. The same percentage of participants in Croatia and in Italy (10%) mentioned the 'nutrient approach' concept, and a nearly similar percentage mentioned 'less red meat, meat products' (in Croatia 19%, in Italy 17%). Mention of the 'more fruits and vegetables'

Table I. Socio-demographic characteristics of the sampling.

	n	%
Total	1,006	100
Sex		
Male	478	48
Female	528	52
Age		
15–24 years	172	17
25–34 years	159	16
35–44 years	186	18
45–54 years	173	17
55–64 years	148	15
65+ years	169	17
Years of education (duration)		
<8 years	130	13
8 years	237	24
12 years	520	52
13+	118	12
Household size (number)		
1	154	15
2	231	23
3	167	17
4	238	24
5+	217	22
Children up to 18 years old in household (number)		
No children	592	59
1	203	20
2	159	16
3+	52	5
Monthly income per household		
Up to €270	222	22
Between €271 and €541	232	23
Between €542 and €811	182	18
Between €812 and €1,081	140	14
Between €1,082 and €1,487	86	9
Over €1,488	87	9
Employment status		
Employed	407	40
Unemployed	109	11
Housewife	78	8
Still undergoing education	117	12
Retired	287	29
Marital status		
Single	280	28
Married	554	55
Widowed/separated	171	17

concept in Croatia (40%) was higher than in France (17%) and Italy (33%) but lower than in Spain (49%), Portugal (54%) and substantially lower than in Greece (66%). 'Balance and variety' and 'less fat, fatty foods' were mentioned by the Croatian population far behind Mediterranean countries.

Table II. Health status characteristics[a] of the sampling divided by sex.

	n	Male (%)	Female (%)
Smoking[b]			
Smoker	323	50	50
Non-smoker	619	46	54
Physical activity[a]			
Active	476	52	48
Not active	530	43	57
Body mass index[b]			
Underweight (<18.49 kg/m^2)	22	10	91
Underweight and normal weight (≤18.50–24.99 kg/m^2)	467	42	58
Overweight (25.00–29.99 kg/m^2)	349	57	43
Obese (≥30.0 kg/m^2)	142	54	46
Special diet due to various health problems			
On special diet	281	47	53
Not on special diet	725	48	52
Special diet due to weight problems			
On special diet	186	53	47
Not on special diet	821	46	54

[a]Self-reported. [b]Missing data (smoking, 64; BMI, 26).

Perceived need to alter eating habits

Table IV presents the mean scores (based on the five-point Likert scale) and percentages of respondents who selected responses to the statement 'I do not need to change my eating habits as they are healthy enough'. The one-way ANOVA demonstrated that groups with the highest mean score were more likely to agree with the statement. Table IV shows that males (mean score = 3.60; $P < 0.05$), older subjects (65+ years) (mean score = 4.02; $P < 0.05$), subjects with the lowest education level (mean score = 4.14; $P < 0.05$), singles (mean score = 3.85; $P < 0.05$), subjects with the lowest monthly income (mean score = 3.90; $P < 0.05$) and retired subjects (mean score = 4.01; $P < 0.05$) strongly agreed that they do not need to change their eating habits as they are healthy enough. A comparison with Mediterranean countries showed a greater similarity among Croatian and Greek participants who claimed that they strongly agree and tend to agree they do not need to change their eating habits (Croats 53% versus Greeks 58%) (data not shown).

Sources of information

Nineteen categories of the most frequent information sources on healthy eating were registered and grouped according to a previously published survey (de Almeida et al. 1997). Table V provides the percentage of respondents who mentioned the six most frequent information sources on healthy eating used among Croats, distributed by socio-demographic variables and health status variables. 'Newspapers/magazines' (26%) were more frequently used among the youngest subjects still undergoing education, living in households with four members and with monthly incomes between €812 and €1,081, and also among physically active, underweight and normal-weight subjects ($P < 0.001$). 'Television/radio' (23%) was preferred among participants with lower educational levels (8 years), participants with the lowest monthly

Table III. Definitions of healthy eating by socio-demographic and health status characteristics of respondents (percentage mentioning each).

	n	More fruits and vegetables (%)	Fresh, natural foods (%)	Balance and variety (%)	Nutrient approach (%)	Less fat, fatty foods, low-fat diet (%)	Less red meat, meat products (%)	Less sugar (%)	More staples, fibre (%)
Total	1,006	40	50	7	10	19	19	3	7
Sex		***	**	NS	***	NS	**	NS	NS
Male	478	30	55	8	5	18	15	3	6
Female	527	49	46	6	13	19	22	3	8
P value		0.000	0.005	0.24	0.000	0.951	0.005	0.403	0.157
Age		**	***	***	**	**	NS	NS	NS
15–24	172	55	28	13	9	31	20	6	11
25–34	159	39	52	10	7	17	17	4	4
35–44	186	37	56	5	11	15	15	1	8
45–54	173	35	56	5	5	16	19	2	7
55–64	148	36	57	5	12	18	18	3	8
65+	170	40	52	1	14	15	24	2	4
P value		0.002	0.000	0.000	0.001	0.001	0.424	0.095	0.057
Years of education (duration)		NS	NS	***	***	NS	NS	**	***
<8 years	130	44	52	0	21	19	25	0	0
8 years	237	42	43	7	13	14	18	1	12
12 years	520	39	51	6	6	19	18	4	7
13+	118	39	57	14	9	24	18	8	6
P value		0.607	0.065	0.000	0.000	0.125	0.309	0.001	0.000
Household size (number)		**	**	NS	*	NS	*	*	*
1	154	47	48	1	14	14	24	3	3
2	230	30	61	7	7	15	15	3	4
3	167	40	46	6	7	22	19	2	8
4	238	44	42	8	8	22	23	6	10
5+	217	42	52	7	14	20	14	1	9
P value		0.007	0.001	0.062	0.020	0.134	0.025	0.039	0.017

Table III (*Continued*)

	n	More fruits and vegetables (%)	Fresh, natural foods (%)	Balance and variety (%)	Nutrient approach (%)	Less fat, fatty foods, low-fat diet (%)	Less red meat, meat products (%)	Less sugar (%)	More staples, fibre (%)
Children up to 18 y in household (number)		*	NS	*	*	***	NS	NS	NS
No children	592	39	52	5	9	16	19	3	6
1	204	42	44	5	11	28	20	2	10
2	160	38	53	9	8	14	16	4	6
3+	51	59	39	14	21	25	15	0	12
P value		0.036	0.070	0.042	0.018	0.000	0.751	0.319	0.153
Monthly income per household		NS	*	***	NS	***	NS	NS	NS
Up to €270	222	32	57	2	13	10	16	1	8
Between €271 and €541	232	41	56	4	9	17	19	1	3
Between €542 and €811	140	41	47	5	10	19	24	5	8
Between €812 and €1,081	85	44	47	9	5	29	19	4	8
Between €1,082 and €1,487	88	48	44	12	9	26	12	5	14
Over €1,488	57	42	41	21	8	19	19	6	7
P value		0.145	0.011	0.000	0.214	0.000	0.273	0.076	0.072
Employment status		NS	***	***	NS	***	NS	*	**
Employed	407	39	49	8	7	20	19	3	6
Unemployed	109	40	56	7	11	9	14	1	2

Table III (*Continued*)

	n	More fruits and vegetables (%)	Fresh, natural foods (%)	Balance and variety (%)	Nutrient approach (%)	Less fat, fatty foods, low-fat diet (%)	Less red meat, meat products (%)	Less sugar (%)	More staples, fibre (%)
Housewife	79	35	61	0	10	17	17	0	8
Still undergoing education	117	52	28	15	11	32	21	7	15
Retired	287	38	55	2	13	16	20	2	6
P value		0.077	0.000	0.000	0.109	0.000	0.600	0.023	0.001
Marital status		**	***	***	***	*	NS	NS	NS
Single	279	46	42	11	7	23	18	5	8
Married	555	35	56	5	8	16	18	2	7
Widowed/ divorced	170	48	44	2	19	20	25	2	5
P value		0.001	0.000	0.000	0.000	0.031	0.098	0.155	0.432
Smoking		NS	NS	NS	NS	NS	NS	NS	NS
Smoker	322	41	49	7	9	19	21	3	7
Non-smoker	619	38	53	5	9	16	17	3	7
P value		0.274	0.185	0.456	0.907	0.286	0.173	0.572	0.837
Physical activity		*	NS	NS	NS	*	NS	NS	NS
Active	476	44	48	7	10	21	19	4	9
Not active	530	36	52	6	9	16	18	3	6
P value		0.013	0.282	0.414	0.661	0.024	0.740	0.397	0.069
Body mass index		**	NS	*	**	NS	NS	NS	NS
Underweight (<18.49 kg/ m^2)	22	55	41	14	14	23	14	5	14
Normal-weight (18.50–24.99 kg/m^2)	467	43	46	9	11	20	19	4	8

Table III (*Continued*)

	n	More fruits and vegetables (%)	Fresh, natural foods (%)	Balance and variety (%)	Nutrient approach (%)	Less fat, fatty foods, low-fat diet (%)	Less red meat, meat products (%)	Less sugar (%)	More staples, fibre (%)
Overweight (25.00–29.99 kg/m^2)	349	40	54	4	5	19	20	2	7
Obese ($\geq$ 30.0 kg/m^2)	142	28	56	4	13	17	16	1	6
P value		0.007	0.065	0.013	0.009	0.764	0.616	0.352	0.398
Special diet due to various health problems		NS	NS	**	**	NS	***	NS	NS
On special diet	281	43	52	3	14	20	27	3	6
Not on special diet	726	39	49	8	8	18	15	3	7
P value		0.236	0.458	0.008	0.005	0.343	0.000	0.569	0.437
Special diet due to weight problems		NS	NS	NS	NS	NS	NS	NS	NS
On special diet	186	38	50	5	11	22	23	2	7
Not on special diet	821	41	50	7	9	18	18	3	7
P value		0.548	0.883	0.518	0.566	0.156	0.131	0.224	0.737

Pearson chi-square significance level: ***$P<0.001$;**$P<0.01$; *$P<0.05$; NS, not significant. As it was an open question, and definitions need not be mutually exclusive, the percentage can total >100%.

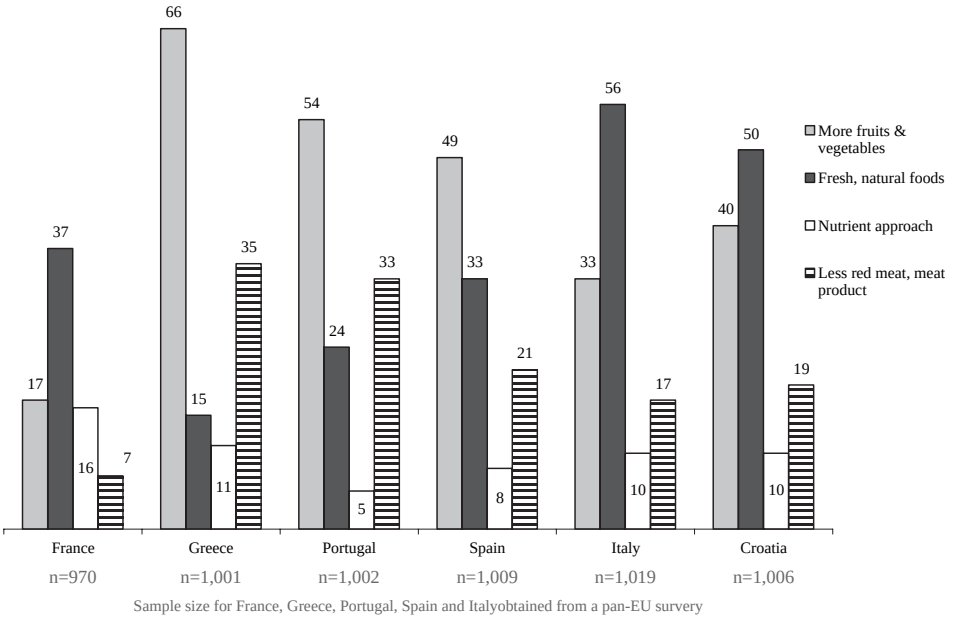

Figure 1. Percentage of subjects defining healthy eating as 'more fruit and vegetables', 'fresh, natural foods', 'nutrient approach' and 'less red meat': a comparison between Croatia and Mediterranean countries. Note: Sample size for France, Greece, Portugal, Spain and Italy obtained from a pan-EU survey (Margetts et al. 1997).

household income (up to €270) and housewives ($P < 0.01$). The least educated, older, retired, and obese participants on special diets mentioned health professionals (9%) more often as information sources about food. Fewer than 5% of the respondents selected cited 'relatives/friends' (4.7%), 'Internet' (4.5%), 'food packages' (1.2%), 'advertising' (1.2%) and 'government agencies' (0.2%) (data not shown).

Croatian participants mentioned 'television/radio' in similar percentages as the subjects in Italy (26%), Spain (26%) and Portugal (27%). 'Books' were mentioned in Croatia by 8% of subjects, which is similar to Italy (9%) (data not shown).

Discussion

We chose the pan-EU surveys as the sources of our questions for several reasons. First, the questions had already been tested in 15 European countries. Second, Croatia, as an EU candidate country, is culturally and geographically diverse and may therefore differ from other EU countries. And last, we were interested in comparing responses in Croatia to responses obtained in the pan-EU survey, particularly responses from Mediterranean European countries, where the 'Mediterranean diet' predominates. With reference to geographic location, Croatia is a Mediterranean as well as continental country, a fact that presents numerous opportunities for dietary intervention. Presently the Mediterranean diet has a sound theoretical and empirical background regarding preventive effects on the development of cardiovascular disease, type 2 diabetes and lower prevalence of excessive weight and obesity. Some authors also suggested that the Mediterranean diet needs to be sustained with regular physical exercise (Contaldo et al. 2003). Although we realize that the results of this study may

Table IV. Mean scores and percentage of respondents who selected responses to the statement 'I do not need to change my eating habits as they are healthy enough', classified by socio-demographic and health status characteristics.

	n	Mean score[a]	Strongly disagree (%)	Tend to disagree (%)	Neither agree, nor disagree (%)	Tend to agree (%)	Strongly agree (%)
Total	1,006	3.54	16	10	21	18	35
Sex[b]							
Male	478	3.60^{A}	12	10	22	17	38
Female	528	3.48^{B}	19	9	20	18	33
Age							
15–24 years	172	3.53^{A}	15	8	22	20	35
25–34 years	159	3.10^{A}	19	16	21	22	21
35–44 years	186	3.32^{A}	16	14	22	22	26
45–54 years	173	3.53^{A}	13	8	30	16	34
55–64 years	148	3.75^{C}	15	9	18	14	42
65+ years	169	4.02^{CD}	16	4	11	12	56
Years of education (duration)							
<8 years	130	4.14^{CD}	19	3	6	3	66
8 years	237	3.74^{C}	11	5	26	23	35
12 years	520	3.34^{A}	17	12	22	19	30
13+	118	3.34^{A}	15	15	20	19	30
Household size (number)							
1	154	3.85^{CD}	19	5	13	6	56
2	231	3.70^{A}	15	8	19	20	36
3	167	3.28^{A}	19	14	17	20	29
4	238	3.32^{A}	15	14	25	19	26
5+	217	3.59^{A}	12	7	25	20	35
Children up to 18 years old in household (number)							
No children	592	3.66^{C}	15	7	20	17	39
1	203	3.42^{A}	16	16	17	16	35
2	159	3.18^{A}	19	14	22	20	24
3+	52	3.66^{A}	6	6	35	22	31
Monthly income per household							
Up to €270	197	3.90^{E}	16	4	15	9	54
Between €271 and €541	232	3.42^{A}	16	9	25	15	34
Between €542 and €811	182	3.60^{A}	11	12	22	28	26
Between €812 and €1,081	140	3.40^{A}	19	8	21	19	34
Between €1,082 and €1,487	86	3.15^{A}	20	15	23	19	22
Over €1,488	87	3.32^{A}	17	13	19	24	27
Employment status							
Employed	407	3.25^{A}	17	15	22	19	27
Unemployed	109	3.54^{A}	18	8	22	13	37
Housewife	78	3.32^{A}	27	6	13	18	37
Still undergoing education	117	3.54^{A}	15	7	20	27	32
Retired	287	4.01^{BD}	11	5	20	14	49
Marital status							
Single	280	3.49^{A}	16	9	20	20	35

Table IV (*Continued*)

	n	Mean score[a]	Strongly disagree (%)	Tend to disagree (%)	Neither agree, nor disagree (%)	Tend to agree (%)	Strongly agree (%)
Married	554	3.53[A]	14	11	23	19	32
Widowed/separated	171	3.66[A]	20	6	16	8	49
Smoking[b]							
Smoker	323	3.46[NS]	17	10	20	20	32
Non-smoker	619	3.55	15	10	21	16	36
Physical activity[b]							
Yes	476	3.50[NS]	16	9	21	19	35
No	530	3.57	16	11	20	17	35
Body mass index							
Underweight (<18.49 kg/m^2)	22	3.21[A]	19	14	19	24	24
Normal-weight (18.50–24.99 kg/m^2)	467	3.48[A]	16	12	18	18	35
Overweight (25.00–29.99 kg/m^2)	349	3.50[A]	15	7	23	21	34
Obese (≥ 30.0 kg/m^2)	142	3.71[A]	13	11	24	9	40
Special diet due to various health problems[b]							
Yes	281	3.85[NS]	13	8	17	13	46
No	726	3.42	16	10	22	19	31
Special diet due to weight problems[b]							
Yes	186	3.59[NS]	16	9	16	18	41
No	821	3.53	15	10	22	18	34

[a]Score calculated from responses based on the Likert scale (strongly disagree = 1, tend to disagree = 2, neither agree, nor disagree = 3, tend to agree = 4, strongly agree = 5); [b]Independent T-Test ($P < 0.05$); ABCD Subgroups sharing the same superscript are not significantly different within ANOVA using Scheffe's multiple comparison test ($\alpha = 0.05$). NS, not significant.

not be fully comparable with the results of the pan-EU survey due of different interview techniques (a face-to-face interview-assisted technique was used in the pan-EU survey versus computer-assisted telephone interviewing in Croatia) and a 10-year time difference (1995–1996 for the Pan-EU survey versus 2006 for the Croatia survey), we believe that these findings may be conducive to the greater popularization of the Mediterranean diet in Croatia. Another limitation of this survey is the self-reported health status nature of data. We did not find as high a rate of overweight and obese participants (male, 28% and female, 22%) as was found by Turek et al. (2001) and in WHO surveys (WHO 1998, 2003). One of the reasons for this discrepancy may be caused by the different research methodologies (we used self-reported data of weight and height while Turek et al. and the WHO surveys performed actual physical measurements). It has been found in previous studies that subjects consistently under-report their true weights by approximately 1 kg. However, correlations between reported and measured weights are typically high, with *r* ranging between 0.96 and 0.99; therefore, the reported weight/height could be adequate for research purposes (Stunkard and Albaum 1981; Kuczmarski et al. 2001). We believe the results of this

Table V. Percentage of respondents using six information sources for healthy eating classified by socio-demographic and health status characteristics.

	n	Newspapers/ magazines (%)	Television/ radio (%)	Do not know/ other (%)	Health professionals (%)	Books (%)	Personal experience (%)
Total	1,006	26	23	17	9	8	5
Sex		**	NS	NS	NS	NS	NS
Male	478	22	26	17	9	8	4
Female	528	30	21	17	8	9	6
P value		0.006	0.123	0.953	0.412	0.637	0.192
Age		***	NS	NS	***	*	***
15–24 years	172	43	21	11	6	2	0
25–34 years	158	24	20	16	9	10	1
35–44 years	186	30	20	20	2	11	3
45–54 years	173	26	24	18	4	9	9
55–64 years	148	22	28	14	14	7	10
65+ years	169	11	28	21	18	11	8
P value		0.000	0.344	0.100	0.000	0.021	0.000
Years of education (duration)		***	**	NS	***	*	***
<8 years	131	10	25	19	23	10	13
8 years	237	25	28	17	9	6	7
12 years	520	30	23	16	6	8	3
13+	118	29	12	15	5	15	3
P value		0.000	0.007	0.766	0.000	0.012	0.000
Household size (number)		***	*	NS	***	NS	***
1	154	11	28	21	14	7	13
2	230	25	26	14	13	10	4
3	167	32	17	16	9	8	4
4	238	34	19	15	4	8	2
5+	217	25	28	19	4	7	6
P value		0.000	0.015	0.188	0.000	0.624	0.000
Children up to 18 years old in household (number)		NS	*	NS	*	NS	NS
No children	592	25	25	15	11	8	6
1	204	29	16	18	5	8	7
2	159	24	26	19	5	6	3
3+	52	29	26	20	4	10	0
P value		0.654	0.042	0.634	0.011	0.800	0.128
Monthly income per household		***	**	NS	**	NS	**
Up to €270	221	14	30	19	15	9	10
Between €271 and €541	232	19	27	19	8	9	8
Between €542 and €811	182	31	27	13	8	6	3
Between €812 and €1,081	141	41	16	15	6	5	2
Between €1,082 and €1,487	86	38	15	14	5	12	1
Over €1,488	88	36	10	11	6	13	2
P value		0.000	0.001	0.133	0.002	0.204	0.002

Table V (*Continued*)

	n	Newspapers/ magazines (%)	Television/ radio (%)	Do not know/ other (%)	Health professionals (%)	Books (%)	Personal experience (%)
Employment status		***	**	*	***	*	***
Employed	406	28	22	16	6	9	3
Unemployed	109	29	28	17	4	11	5
Housewife	78	21	39	17	4	6	13
Still undergoing education	117	44	15	8	7	1	0
Retired	288	17	22	21	16	10	9
P value		0.000	0.002	0.023	0.000	0.024	0.000
Marital status		***	NS	*	NS	**	NS
Single	279	37	22	12	7	3	4
Married	554	25	22	18	8	10	5
Widowed/ separated	171	12	30	20	13	10	8
P value		0.000	0.076	0.038	0.062	0.001	0.102
Smoking		NS	NS	NS	**	NS	NS
Smoker	323	27	25	15	5	10	5
Non-smoker	619	25	23	18	10	8	6
P value		0.426	0.391	0.170	0.007	0.337	0.304
Physical activity		***	NS	***	**	NS	NS
Active	477	32	22	12	6	10	4
Not active	530	21	24	21	11	7	7
P value		0.000	0.438	0.000	0.002	0.152	0.066
Body mass index		***	NS	*	***	NS	**
Underweight (<18.49 kg/m^2)	22	55	18	0	14	0	0
Normal weight (18.50–24.99 kg/m^2)	467	32	22	16	5	8	3
Overweight (25.00–29.99 kg/m^2)	349	20	26	14	9	11	9
Obese (≥ 30.0 kg/m^2)	142	20	25	23	18	5	4
P value		0.000	0.359	0.022	0.000	0.053	0.004
Special diet because due to health problems		NS	**	NS	***	NS	NS
On special diet	281	26	17	19	16	9	5
Not on special diet	726	26	26	16	6	8	5
P value		0.950	0.002	0.218	0.000	0.576	0.979
Special diet due to weight problems		NS	NS	NS	***	*	NS
On special diet	186	21	19	14	17	12	6
Not on special diet	821	27	25	17	7	7	5
P value		0.077	0.100	0.212	0.000	0.020	0.712

Pearson Chi-Square significance level: ***$P<0.001$, **$P<0.01$, *$P<0.05$; NS, Not significant.

research can be useful as a starting point for further research of subjects' perceptions and actual dietary behaviour.

Definition of healthy eating

Over the past 15 years, Croatia has experienced immense political, economical and social change. An increasing number of global food retailers have influenced the dietary patterns of Croatia's population. A recent investigation of food-related lifestyles in 628 Croatian families has found that 59% of the population can be grouped into the two largest segments: 'modern' (32%), focused on a careful process of choosing and purchasing food; and 'traditionalist' (27%), characterized by a lack of clear purchasing motives and cooking methods (Kesić and Piri-Rajh 2003). The 'concerned' segment comprised 11% of population, characterized by consciousness of the organic and ecological origin, information on product labels, foods without additives and the nutritional value of food. In this context, the most frequently mentioned concept of healthy eating ('fresh, natural foods') in this survey was not surprising. 'More fruit and vegetables' as the second best score interpretation in our study was consistent with the EU average (42%), as well as with some non-European countries, such as Japan (Margetts et al. 1997; Akamatsu et al. 2005). The results showed that, as age increases, the likelihood of mentioning 'more fruit and vegetables', 'less fatty foods' and 'balance and variety' decreases. This finding was also reported by other authors (Margetts et al. 1997; Martinez-González et al. 1998). It seems promising that the youngest population (15–24 years old) exhibited a higher frequency of mentioning the three most important nutrition guidelines for healthy eating (more fruit and vegetables, balance and variety, less fatty foods). Among other influences, this is probably influenced by the well-balanced quality of meals offered to university students at student's cafeterias in Croatia, which was proven by the results of a recently published study (Colić Barić et al. 2003). However, the results of our study suggested that generally accepted nutritional guidelines are not recognized by the various subgroups of Croatia's population.

Comparing the findings from this study with those in Mediterranean countries, we found that more similarities related to the interpretation of healthy eating exist between Croatia and Italy ('fresh foods', 'more fruits and vegetables', 'less red meat', 'nutrient approach') than with Spain, Greece, Portugal and France.

It would be interesting to examine attitudes to healthy eating of subjects from 15 to 18 years of age separately. We decided to present the results of the underage population within the category from 15 to 24 years, which is consistent with a number of other pan-EU surveys (de Almeida et al. 1997; Kearney et al. 1997; Margetts et al. 1997; Martinez-González et al. 1998).

Perceived need to change diet

More than one-half of the Croatian participants agreed that they did not need to change their diets (53% strongly agree and tend to agree), which was far behind the majority of Mediterranean countries, but consistent with results of previously published surveys in Ireland (52%) and Ukraine (53%) (Kearney et al. 1997, 2001; Biloukha and Utermohlen 2001). In our sample, younger subjects, females, households with two children and higher monthly incomes were more open to the idea of changing their diets. Positive attitudes to dietary change among females are well

documented in the literature (Brug et al. 1994; Barker et al. 1995). We did not find a significant effect of BMI in our survey, in contrast to the recent study on a representative sample of Irish adults that demonstrated subjects with lower BMI values agreed they do not need to change their diets as they are healthy enough (Hearthy et al. 2007). It was suggested that the positive motivation of the specific subgroups of the population (young males of lower social status and education) is essential to comply with the healthy dietary pattern. Kearney et al. (1997) pointed out that nationality played a greater role in beliefs about dietary change than the socio-demographic characteristic of respondents.

Sources of information

The information sources concerning healthy eating most frequently mentioned by Croats were associated with newspapers/magazines and television/radio, which is consistent with the responses of European citizens (de Almeida et al. 1997). On the other hand, the findings showed a relatively high percentage of respondents who did not know what to mention (17%). Lower than in any Mediterranean countries, a surprisingly small percentage (9%) of respondents mentioned health professionals as information sources about healthy eating. These results may suggest that respondents do not have a habit of making routine visits to health professionals and therefore are less likely to consult them about healthy eating. Food labels were very rarely used as a source of healthy-eating information (1%), which might be due to the fact that consumers do not find labels a trustworthy and useful tool for their needs. Among Croats, the Internet (4.5%) was mentioned in a higher percentage than governmental agencies (0.2%), which suggests that governmental agencies are hardly recognized through the media as a healthy eating information source. Although the level of trust was not examined in this study, we believe that these findings suggest that regulators, nutrition professionals and the food industry should cooperate better and carefully choose appropriate information sources concerning healthy eating for various population groups.

To the best of our knowledge, this is the first study focusing on an understanding of and attitudes to healthy eating among the Croatian population. Although the questions were directed toward individuals, it should be pointed that more than one-half reported being married and have a family, so the responses basically reflect the family dietary pattern. Therefore, the actual sample size may be even larger than 1,006. The results outlined that various socio-demographic and lifestyle characteristics influence these attitudes. Unemployed, retired, older males, dealing with excessive weight problems and those of the lowest educational and social levels were the subgroups of the Croatian population less likely to be associated with any aspect of healthy eating. Furthermore, this study offered evidence that, regardless of certain limitations addressed to self-reported status, physical activity also had some impact on adherence to a healthy diet. A positive outcome reflected in these findings is the acceptance of healthy eating guidelines among the youngest respondents Comparing the data of this survey with data obtained in the previously publicized pan-EU survey, Croatia has more similarities with Italy than with other Mediterranean countries. This was expected, keeping in mind the geographic location of the two countries (Southern Europe along the Adriatic Sea). On the other hand, notable differences about attitudes toward healthy eating also existed between various Mediterranean countries. In

conclusion, taking into account the specific cultural, economic and social aspects of the Croatian population, these findings suggest a real challenge for Croatia's nutrition authorities with regard to the focused promotion of a national nutrition strategy that may lie in the adoption of a Mediterranean diet due to its favourable impact on human health. Further research is necessitated to examine healthy eating perceptions with actual dietary behaviour, specially monitored before and after a targeted nutrition promotion campaign.

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