

# A Large Cross-Sectional Study of Health Attitudes, Knowledge, Behaviour and Risks in the Post-War Croatian Population (The First Croatian Health Project\*)

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## ABSTRACT

*As the liberation of occupied Croatian territories ended the war in the country in 1995, the Ministry of Health and Croatian Health Insurance Institute have agreed to create the new framework for developing a long-term strategy of public health planning, prevention and intervention. They provided financial resources to develop the First Cro-*

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\* This report is the first summary outcome of the work on the 6<sup>th</sup> Sub-project (»Health Promotion«) of the First Croatian Health Project. *The Heads of the Sub-project were:* Stjepan Turek, M.D., Ph.D., Assist. Prof. Mate Ljubičić, M.D., Ph.D., and Prof. Pavao Rudan, M.D., Ph.D. *Investigators of the projects were:* Nikola Benić, M.D., Mirjana Čubrilo-Turek, M.D., Ph.D., Prof. Andrija Hebrang, M.D., Ph.D., Branka Janićijević, B.S., Ph.D., Prof. Živka Prebeg, M.D., Ph.D., Assist. Prof. Antoinette Rak-Kaić, M.D., Ph.D., Prof. Željko Reiner, M.D., Ph.D., Igor Rudan, M.D., Ph.D., Berislav Skupnjak, M.D., Ph.D., Nina Smolej Narančić, B.S., Ph.D., Prof. Ana Stavljenić-Rukavina, M.D., Ph.D., Lajos Szirovicza, B.M., Ph.D., Prof. Elizabeta Topić, B.S., Ph.D., Danijela Vrhovski-Hebrang, B.S., Ph.D., and Vlasta Žerjavić-Hrabak, M.D., M.S.

*atian Health Project, the rest of the support coming from the World Bank loan and the National Institute of Public Health. A large cross-sectional study was designed aiming to assess health attitudes, knowledge, behaviour and risks in the post-war Croatian population. The large field study was carried out by the Institute for Anthropological Research with technical support from the National Institute of Public Health. The field study was completed between 1995–1997. It included about 10,000 adult volunteers from all 21 Croatian counties. The geographic distribution of the sample covered both coastal and continental areas of Croatia and included rural and urban environments. The specific measurements included antropometry (body mass index and blood pressure). From each examinee a blood sample was collected from which the levels of total plasma cholesterol (TC), triglycerides (TG), HDL-cholesterol (High Density Lipoprotein), LDL-cholesterol (Low Density Lipoprotein), lipoprotein Lp(a), and haemostatic risk factor fibrinogen (F) were determined. The detailed data were collected on the general knowledge and attitudes on health issues, followed by specific investigation of smoking history, alcohol consumption, nutrition habits, physical activity, family history of chronic non-communicable diseases and occupational exposures. From the initial database a targeted sample of 5,840 persons of both sexes, aged 18–65, was created corresponding by age, sex and geographic distribution to the general Croatian population. This paper summarises and discusses the main findings of the project within this representative sample of Croatian population.*

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## Introduction

As the liberation of occupied Croatian territories ended the war in the country in 1995, the Croatian Health Insurance Institute and the Ministry of Health have agreed to create the new framework for developing a long-term strategy of public health planning, prevention and intervention. They provided financial resources to develop the First Croatian Health Project, the rest of the support coming from the World Bank loan and the National Institute of Public Health. A large cross-sectional study was designed aiming to assess health attitudes, knowledge, behaviour and risks in the post-war Croatian population<sup>1</sup>. The experts from the Croatian Ministry of Health and the Croatian Health Insurance Institute designed a large cross-sectional study aiming to assess health attitudes, knowledge, behaviour and risk factors for cardiovascular diseases and stroke in the post-war

Croatian population. The study was set to provide information on those issues to enable targeted health promotion resulting in reduction of the mortality of leading causes of death.

In the year of 1997, a total of 51,964 deaths were recorded in the Republic of Croatia yielding an overall mortality rate of 10.9 per 1000 (calculated on the total population of 4,784,256 from last available census in 1991). The leading causes of death were diseases of the circulatory system (50.3%), and neoplasms (21.3%)<sup>2</sup>. It is apparent that these two causes are responsible for 71.6% of all deaths in the country and that they must be made primary targets of any public health action in the future. Previous reports of the studies carried out in the population of Croatia<sup>3–17</sup> including the important large scale study by Keys<sup>18</sup> pointed to the se-

verity of the problem. The established high prevalence of risk factors in the population suggested the need for preventive measures in order to achieve life style modifications. This potentially includes actions related to cessation of smoking, improvement of regular physical activity, encouragement of safe sexual behaviour, maintenance of desirable weight, as well as blood pressure and plasma lipids control. In this paper we summarise the main findings of the latest, e.g. this post-war cross-sectional study and discuss how the current findings can be used for planning future public health actions to reduce mortality of cardiovascular diseases and neoplasms in Croatia.

### **Examinees and Methods**

The field study was carried out by the team of the Institute for Anthropological Research in Zagreb, with technical support from the National Institute of Public Health. Respective to the projected accrual, the team comprised six to eight persons: medical doctors, nurses, laboratory technicians and interviewers. All of them underwent two-week training on how to complete the questionnaire on health attitudes, habits, behaviours and risks while interviewing the examinees.

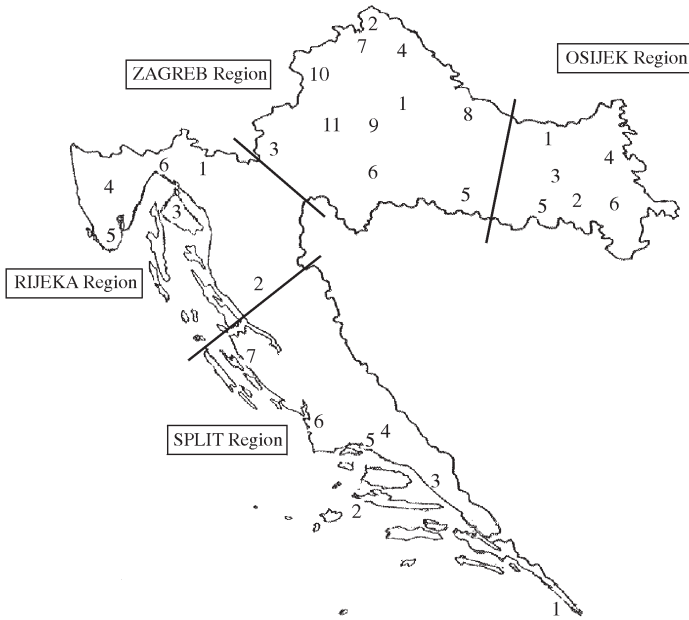
The field study was undertaken between 1995 and 1997 and it included about 10,000 adult volunteers in 30 randomly selected settlements from all 21 Croatian counties. The action was always announced in local media (newspaper, radio and TV) and the appropriate advertising posters, inviting the local people to take part in the study.

From each examinee detailed data were collected on the general knowledge and attitudes on health, and the information on the following cardiovascular risk factors were gathered: smoking behavior and alcohol consumption, nutrition habits, physical activity, family history of

chronic non-communicable diseases and occupational exposures. The specific measurements included body mass index and blood pressure. The blood sample was taken in nearly all cases, and the appropriate informed consent was obtained. Subsequently, total plasma cholesterol (TC), triglycerides (TG), and haemostatic risk factor fibrinogen (F) were determined in the laboratories of local health centres, while HDL-cholesterol (High Density Lipoprotein), LDL-cholesterol (Low Density Lipoprotein), and lipoprotein Lp(a), were determined in the biochemical laboratory of Zagreb University Medical School hospital system. The methods including sample design, quality control and analyses are described in detail in the Final Report of the project<sup>1</sup>.

From the initial database, a targeted sample of 5,840 persons was created corresponding by age, sex and geographic distribution to general Croatian population aged 18–65 to avoid confounding due to non-random selection of the examinees and population stratification. Thus, the results presented in this paper are based on this reduced sample and should be representative of general Croatian population.

The reduction of the initial sample to the targeted representative sample was performed by splitting the examinees along four major geographical regions of the country (Osijek, Zagreb, Rijeka and Split regions) named according to their main cities (Figure 1). A stratified multi-stage design was used providing the selection of the sample with a known probability distribution for variables age and sex. In hierarchical order the stages of geographical selection were: geographic region, county and district. Thus, a total of 5,840 individuals, aged 18 to 65, formed the final sample for this study. Statistical analyses included the basic description, chi-square tests and one-way analyses on variance.



Legend:

OSIJEK Region	ZAGREB Region	RIJEKA Region	SPLIT Region
1 Donji Miholjac	1 Bjelovar	1 Delnice	1 Dubrovnik
2 Đakovo	2 Čakovec	2 Gospić	2 Hvar
3 Našice	3 Karlovac	3 Krk	3 Makarska
4 Osijek	4 Koprivnica	4 Pazin	4 Solin
5 Slavonski Brod	5 Nova Gradiška	5 Pula	5 Split
6 Vinkovci	6 Sisak	6 Rijeka	6 Šibenik
	7 Varaždin		7 Zadar
	8 Virovitica		
	9 Vrbovec		
	10 Zabok		
	11 Zagreb		

Fig. 1. Locations within the four major geographical regions of Croatia in which the field study was conducted.

## Results

(a) *Distributions according to basic characteristics (sex, age, geographic region, migration status, marital status, education, occupation)*

Table 1 presents the distribution of the sample according to sex, age and geographic region of the examinees. The proportions of persons in each subgroup cor-

respond well to the general Croatian population aged 18–65 from the year of 1991.

According to the place of residence, 61.8% of the examined population lived in urban districts, 11.7% in suburban and 26.5% in rural. Due to frequent migrations between different regions of the country that occurred before, during and immediately after the war, the survey

TABLE 1  
SAMPLE DISTRIBUTION ACCORDING TO SEX, AGE AND GEOGRAPHIC REGION

Geographic Region	Sex	Age (year)				Total	
		18–29	30–39	40–49	50–65		
Osijek	Males	n	172	149	123	163	607
		%	2.9	2.6	2.1	2.8	10.4
	Females	n	142	131	107	151	531
		%	2.4	2.2	1.8	2.6	9.1
	Total	n	314	280	230	314	1,138
		%	5.4	4.8	3.9	5.4	19.5
Rijeka	Males	n	95	107	103	123	428
		%	1.6	1.8	1.8	2.1	7.3
	Females	n	98	98	97	133	426
		%	1.7	1.7	1.7	2.3	7.3
	Total	n	193	205	200	256	854
		%	3.3	3.5	3.4	4.4	14.6
Split	Males	n	63	137	139	196	535
		%	1.1	2.3	2.4	3.4	9.2
	Females	n	104	159	138	181	582
		%	1.8	2.7	2.4	3.1	10.0
	Total	n	167	296	277	377	1,117
		%	2.9	5.1	4.7	6.5	19.1
Zagreb	Males	n	188	332	365	443	1,328
		%	3.2	5.7	6.3	7.6	22.7
	Females	n	255	393	324	431	1,403
		%	4.4	6.7	5.5	7.4	24.0
	Total	n	443	725	689	874	2,731
		%	7.6	12.4	11.8	15.0	46.8
Total	Males	n	518	725	730	925	2,898
		%	8.9	12.4	12.5	15.8	49.6
	Females	n	599	781	666	896	2,942
		%	10.3	13.4	11.4	15.3	50.4
	Total	n	1,117	1,506	1,396	1,821	5,840
		%	19.1	25.8	23.9	31.2	100.0

was taken to determine the background and overall distribution of immigrants in the sample. The greatest proportion (46.5%) was recorded in Zagreb region, where the city of Zagreb, the capital of Croatia, was the major immigration centre. However, considerable proportion of immigrants were noted in all three remaining regions: Rijeka (42.7%), Split (41.1%) and Osijek (36.2%). The greatest share of the refugee population (7.7%) was recorded in the Osijek region. Most of the refugees fled to the studied regions

from the Croatian areas of Dubrovnik (37.3%), Knin (21.6%) and Vukovar (12.7%), while additional 11.8% were from Bosnia and Herzegovina.

About 75% of both males and females were married. Additional 18% were not married, and some 7% were divorced or widowed, with no differences by gender or geographic region. About a quarter of the examinees obtained university degrees (26% of males and 21% of females), while additional 56% graduated from high school. Only 4.2% of the examinees

did not complete elementary school. There were no major differences in distribution by education status among the four geographical regions. The majority of the examinees (about 77% in both sexes) were employees in various organisations, factories or services and further 10% were retired.

(b) *Quantitative measurements (body mass index, blood pressure, levels of plasma total cholesterol, triglycerides and fibrinogen)*

A number of quantitative measurements of epidemiologically well-recognised risk factors for cardiovascular diseases were performed in each examinee. They now represent a point to start from when planning future public health activities in reducing the morbidity and mortality from cardiovascular and other chronic non-communicable diseases.

*Body weight for height* is an indicator of energy balance. It represents the gross mass of tissue produced and maintained by the balance between food energy consumed in the diet and energy expended through activity and exercise. Because tall people should weigh more than short people do, body mass index (BMI) calculated as  $\text{weight}/\text{height}^2$  was used to standardise weight for height. The following categories of nutritional status based on BMI ( $\text{kg}/\text{m}^2$ ) were defined<sup>19</sup>: *grades 3 and 2 thinness*: up to 16.99; *grade 1 thinness*: 17.00–18.49; *normal range*: 18.50–24.99; *grade 1 overweight*: 25.00–29.99; *grade 2 overweight*: 30.00–39.99; *grade 3 overweight*: 40.00 or higher. The cutoff points are a statistical approach to defining nutritional status and are not based on the morbidity or mortality experience of the survey population.

Figure 2 presents the distribution of examinees according to BMI values and geographic location. The lowest nutritional categories are represented by only 0.1% of males and 0.2% of females. It can

be noted that as much as 48.1% of males and 34.7% of females were grade 1 overweight and additional 31.1% of males and 15.2% of females were grade 2 and 3 overweight. This difference by sex was statistically significant ( $p < 0.001$ ), while no major differences between geographic regions were noted (with the exception of the unexpectedly high prevalence of grade 2 overweight in Zagreb region) (Figure 2). Furthermore, BMI was positively related with age. The prevalence of grade 1 overweight was 19.8% in the youngest examined age-group (18–29 years) and 49.8% in the oldest (50–65 years). The prevalence of grade 2 and 3 overweight was 4.5% in the age-group of 18–29 years and 29.4% in the oldest group (50–65 years).

The values of *blood pressure*, a well-recognised risk for cardiovascular diseases (especially stroke), were slightly higher in males than in females. A half of the males aged 18–65 had systolic blood pressure over 130 mmHg and diastolic over 83 mmHg. In females, corresponding median values were 125 mmHg and 80 mmHg. Cumulative frequency distributions of systolic and diastolic blood pressure by geographic region are shown in

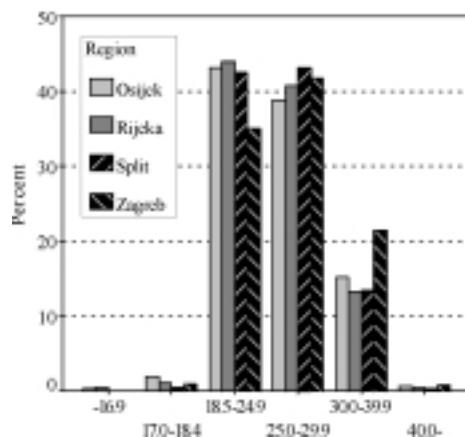


Fig. 2: Distribution of the examinees by BMI ( $\text{kg}/\text{m}^2$ ) and geographic region.

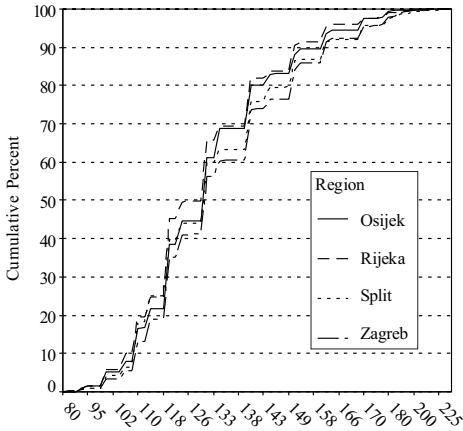


Fig. 3. Cumulative frequency distribution of systolic blood pressure (mmHg) by geographic region.

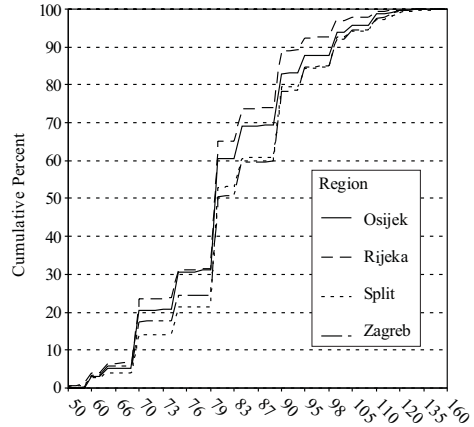


Fig. 4. Cumulative frequency distribution of diastolic blood pressure (mmHg) by geographic region.

Figures 3 and 4, with no major differences across the regions. Median of systolic blood pressure has increased from 120 mmHg in the youngest (18–29) to 140 mmHg in the oldest (50–65) age-group. Median of diastolic blood pressure increased from 80 to 90 mmHg, respectively.

If we define the cutoff points for hypertension at 140 mm Hg (18.6 kPa) for systolic and 90 mm Hg (12.0 kPa) for diastolic blood pressure, then 27.7% of the sample were hypertensive. Significantly greater prevalence ( $p < 0.001$ ) was recorded in males (31.9%) in comparison to females (23.6%). The prevalence of hypertension differed among regions ( $p < 0.001$ ). It was lower in the Rijeka (20.6%) and Osijek regions (23.8%) than in the Split (29.2%) and Zagreb regions (30.9%).

Among the well established risk factors for cardiovascular diseases and stroke, total plasma cholesterol (TC), triglycerides (TG), lipoprotein Lp(a), and fibrinogen (F) were examined. For each studied parameter, the distribution was presented at selected raw percentiles by sex, age and region.

Table 2 presents percentile distributions of total plasma cholesterol according to sex, geographic region and age. It was noted that males had higher TC values than females and that the values increased with age.

Table 3 presents percentile distributions of triglyceride levels. The TG levels were also higher in males than in females and the value increased with age.

Distributions of HDL- and LDL-cholesterol values are presented in Tables 4 and 5. The mean HDL-cholesterol level was higher in females and in continental populations and no age-related trends were noted. However, mean LDL-cholesterol level was higher in males, no regional differences were recorded and the values increased with age.

Table 6 presents percentile distributions of plasma fibrinogen. Contrary to the findings of TC and TG, the levels of F were higher in females than in males. The distributions in geographic regions showed the highest mean F levels in Rijeka population (3.31 g/L) followed by that

**TABLE 2**  
TOTAL PLASMA CHOLESTEROL LEVELS (mmol/L) BY SEX, REGION AND AGE: NUMBER EXAMINED (N), MEAN, STANDARD DEVIATION (SD) AND SELECTED PERCENTILES

Groups	N	Mean	SD	Percentiles								
				2.5	5	10	25	50	75	90	95	97.5
Sex												
Males	2857	5.81	1.36	3.47	3.80	4.20	4.89	5.73	6.60	7.55	8.20	8.70
Females	2911	5.66	1.29	3.59	3.81	4.20	4.73	5.56	6.40	7.39	7.91	8.46
Region												
Osijek	1119	5.81	1.38	3.60	3.90	4.20	4.80	5.69	6.65	7.58	8.20	8.90
Rijeka	832	5.57	1.22	3.44	3.70	4.10	4.70	5.51	6.36	7.20	7.86	8.22
Split	1105	5.71	1.40	3.56	3.80	4.09	4.70	5.60	6.54	7.53	8.10	8.81
Zagreb	2712	5.77	1.31	3.50	3.81	4.21	4.89	5.70	6.53	7.44	8.10	8.50
Age (yrs)												
18–29	1089	4.75	.96	3.10	3.40	3.67	4.12	4.61	5.30	6.00	6.55	6.96
30–39	1490	5.54	1.21	3.50	3.82	4.20	4.75	5.40	6.19	7.10	7.70	8.30
40–49	1387	5.95	1.23	3.83	4.15	4.45	5.14	5.87	6.70	7.44	8.10	8.49
50–65	1802	6.34	1.31	4.00	4.33	4.80	5.50	6.21	7.10	8.00	8.50	9.20
Total	5768	5.74	1.33	3.51	3.80	4.20	4.80	5.64	6.50	7.44	8.08	8.50

**TABLE 3**  
PLASMA TRIGLYCERIDE LEVELS (mmol/L) BY SEX, REGION AND AGE: NUMBER EXAMINED (N), MEAN, STANDARD DEVIATION (SD) AND SELECTED PERCENTILES

Groups	N	Mean	SD	Percentiles								
				2.5	5	10	25	50	75	90	95	97.5
Sex												
Males	2852	2.13	1.69	0.51	0.62	0.75	1.06	1.66	2.60	3.94	5.32	7.10
Females	2907	1.41	0.94	0.43	0.50	0.60	0.80	1.14	1.71	2.50	3.11	3.80
Region												
Osijek	1118	1.72	1.39	0.49	0.56	0.66	0.90	1.30	2.10	3.14	4.03	5.64
Rijeka	832	1.85	1.23	0.53	0.61	0.72	1.04	1.52	2.28	3.33	4.26	5.32
Split	1101	1.68	1.27	0.50	0.58	0.69	0.90	1.29	2.09	3.05	4.33	5.10
Zagreb	2708	1.79	1.52	0.45	0.52	0.63	0.90	1.33	2.13	3.30	4.45	6.14
Age (yrs)												
18–29	1088	1.18	.92	0.40	0.43	0.51	0.70	0.93	1.38	2.00	2.66	3.60
30–39	1488	1.58	1.27	0.46	0.53	0.62	0.85	1.20	1.90	2.81	3.70	4.83
40–49	1385	2.01	1.61	0.52	0.62	0.74	1.00	1.53	2.38	3.69	5.11	6.91
50–65	1798	2.08	1.47	0.60	0.72	0.86	1.14	1.70	2.54	3.63	4.75	6.18
Total	5759	1.76	1.41	0.48	0.56	0.66	0.90	1.34	2.14	3.26	4.30	5.72

of Zagreb (3.01 g/L), Split (2.80 g/L) and Osijek (2.64 g/L) regions. The values have increased with age.

Distributions of the genetic marker *lipoprotein Lp(a)* for sex, age and regional

groups are presented in Table 7. The mean levels were higher in females than in males, regional differences were not significant and there was an increase with age.



**TABLE 4**  
HDL-CHOLESTEROL LEVELS (mmol /L) BY SEX, REGION AND AGE: NUMBER EXAMINED (N), MEAN, STANDARD DEVIATION (SD) AND SELECTED PERCENTILES

Groups	N	Mean	SD	Percentiles								
				2.5	5	10	25	50	75	90	95	97.5
Sex												
Males	2474	1.08	0.35	0.52	0.60	0.70	0.84	1.03	1.26	1.52	1.70	1.90
Females	2446	1.28	0.37	0.64	0.72	0.85	1.01	1.24	1.50	1.77	1.94	2.08
Region												
Osijek	946	1.23	0.41	0.55	0.63	0.76	0.92	1.20	1.49	1.79	1.96	2.09
Rijeka	658	1.10	0.33	0.57	0.62	0.70	0.88	1.06	1.30	1.54	1.70	1.84
Split	928	1.07	0.36	0.50	0.56	0.66	0.80	1.00	1.30	1.53	1.72	1.89
Zagreb	2388	1.23	0.36	0.62	0.70	0.80	1.00	1.20	1.43	1.70	1.89	2.02
Age (yrs)												
18–29	943	1.21	0.36	0.60	0.70	0.80	0.96	1.19	1.41	1.66	1.86	2.00
30–39	1254	1.16	0.37	0.52	0.60	0.71	0.90	1.12	1.39	1.69	1.81	1.98
40–49	1177	1.16	0.38	0.57	0.61	0.70	0.90	1.11	1.40	1.69	1.87	2.01
50–65	1546	1.19	0.38	0.60	0.68	0.80	0.91	1.14	1.40	1.67	1.88	2.06
Total	4920	1.18	0.37	0.58	0.64	0.74	0.90	1.14	1.40	1.67	1.86	2.00

**TABLE 5**  
LDL-CHOLESTEROL LEVELS (mmol /L) BY SEX, REGION AND AGE: NUMBER EXAMINED (N), MEAN, STANDARD DEVIATION (SD) AND SELECTED PERCENTILES

Groups	N	Mean	SD	Percentiles								
				2.5	5	10	25	50	75	90	95	97.5
Sex												
Males	2452	3.77	1.21	1.57	1.91	2.29	2.94	3.73	4.52	5.31	5.86	6.31
Females	2437	3.75	1.16	1.78	2.12	2.40	2.94	3.64	4.42	5.28	5.80	6.29
Region												
Osijek	939	3.82	1.20	1.93	2.13	2.44	2.95	3.70	4.54	5.40	5.85	6.53
Rijeka	650	3.51	1.02	1.66	1.92	2.25	2.88	3.45	4.11	4.80	5.39	5.93
Split	917	3.90	1.30	1.56	1.93	2.28	2.96	3.85	4.68	5.57	6.11	6.77
Zagreb	2383	3.75	1.16	1.65	2.00	2.35	2.95	3.70	4.46	5.25	5.75	6.26
Age (yrs)												
18–29	936	2.99	.84	1.50	1.74	2.04	2.44	2.91	3.42	4.11	4.56	4.92
30–39	1248	3.70	1.10	1.77	2.10	2.45	2.96	3.61	4.29	5.09	5.67	6.14
40–49	1171	3.87	1.13	1.74	2.14	2.50	3.12	3.85	4.56	5.27	5.83	6.25
50–65	1534	4.20	1.23	1.80	2.20	2.71	3.41	4.15	4.96	5.74	6.27	6.75
Total	4889	3.76	1.18	1.69	2.03	2.36	2.94	3.69	4.47	5.30	5.83	6.30

*(c) Attitudes and knowledge on health-related issues*

Before assessing the health behaviour of Croatian population, an inquiry was

made into the prevalent attitudes and actual knowledge on health-related issues. The large majority of the population (96.7%) is aware of the hazard associated with smoking. Two thirds (65%) of the examinees

**TABLE 6**  
 PLASMA FIBRINOGEN LEVELS (g/L) BY SEX, REGION AND AGE: NUMBER EXAMINED (N),  
 MEAN, STANDARD DEVIATION (SD) AND SELECTED PERCENTILES

Groups	N	Mean	SD	Percentiles								
				2.5	5	10	25	50	75	90	95	97.5
Sex												
Males	2777	2.85	0.86	1.60	1.80	1.93	2.27	2.70	3.30	3.98	4.41	4.86
Females	2816	3.01	0.90	1.70	1.86	2.06	2.40	2.90	3.44	4.13	4.70	5.09
Region												
Osijek	1117	2.64	0.81	1.50	1.64	1.80	2.10	2.47	3.05	3.60	4.20	4.70
Rijeka	704	3.31	0.89	1.96	2.06	2.27	2.69	3.22	3.82	4.41	4.90	5.39
Split	1096	2.80	0.90	1.50	1.60	1.80	2.17	2.65	3.27	4.00	4.57	4.96
Zagreb	2676	3.01	0.85	1.88	2.00	2.12	2.40	2.90	3.40	4.07	4.51	5.02
Age (yrs)												
18–29	1051	2.73	0.79	1.50	1.60	1.85	2.18	2.60	3.20	3.81	4.21	4.60
30–39	1455	2.82	0.83	1.60	1.80	1.95	2.28	2.70	3.23	3.90	4.30	4.80
40–49	1338	2.95	0.88	1.70	1.88	2.01	2.35	2.80	3.38	4.02	4.60	5.20
50–65	1749	3.13	0.94	1.78	1.90	2.10	2.50	3.00	3.60	4.35	4.80	5.50
Total	5593	2.93	0.88	1.62	1.80	2.00	2.30	2.80	3.40	4.05	4.54	5.00

**TABLE 7**  
 LIPOPROTEIN Lp(a) LEVELS (g/L) BY SEX, REGION AND AGE: NUMBER EXAMINED (N), MEAN,  
 STANDARD DEVIATION (SD) AND SELECTED PERCENTILES

Groups	N	Mean	SD	Percentiles								
				2.5	5	10	25	50	75	90	95	97.5
Sex												
Males	2602	0.22	0.27	0.01	0.01	0.01	0.03	0.11	0.29	0.64	0.81	0.96
Females	2597	0.23	0.28	0.01	0.01	0.01	0.04	0.13	0.30	0.68	0.87	0.96
Region												
Osijek	946	0.22	0.27	0.01	0.01	0.01	0.03	0.10	0.25	0.66	0.88	0.98
Rijeka	834	0.22	0.27	0.00	0.01	0.01	0.02	0.12	0.31	0.68	0.84	0.97
Split	1022	0.24	0.27	0.01	0.01	0.01	0.04	0.13	0.34	0.68	0.84	0.94
Zagreb	2397	0.23	0.27	0.01	0.01	0.01	0.03	0.12	0.29	0.65	0.83	0.97
Age (yrs)												
18–29	988	0.21	0.25	0.01	0.01	0.01	0.03	0.11	0.27	0.61	0.77	0.92
30–39	1307	0.21	0.26	0.00	0.01	0.01	0.03	0.11	0.27	0.60	0.79	0.95
40–49	1230	0.23	0.28	0.00	0.01	0.01	0.03	0.11	0.29	0.65	0.89	1.00
50–65	1674	0.25	0.28	0.01	0.01	0.01	0.04	0.14	0.34	0.72	0.86	0.97
Total	5199	0.23	0.27	0.01	0.01	0.01	0.03	0.12	0.29	0.66	0.84	0.96

believe that physical activity is »very beneficial«, and another third (34.1%) regard it »beneficial«, while only 0.9% is unaware of the benefit. Three fourths (76.2%) of the

examinees would like to spend more spare time doing some form of physical exercise.

The attitudes and knowledge on the risks associated with *nutrition* were also

tested. The great majority of the examinees (94.4%) recognise that cooked food is less harmful than baked or fried one, and that it is healthy to include fish into the meal at least once a week. About 86.1% of the examinees believe black bread is healthier than white. Some 80.7% are aware that salt intake should not be excessive and that oil should be preferred to grease or butter when preparing the food.

Among the epidemiologically recognised risk factors for *cardiovascular diseases*, we found that most of the population is aware about the risk of elevated total cholesterol and triglyceride levels (70.8%), followed by smoking (66.3%), obesity (65.4%), hypertension (62.7%), psychological stress (60.1%), heredity (54.3%) and low physical activity (53.1%). Generally, the awareness of these risk factors could be significantly increased.

Knowledge and attitudes on the *AIDS epidemic* were also tested. The overall level of information was more satisfactory compared to the cardiovascular diseases, as 90.5% realised that the disease is preventable, 90.9% that it is communicable, 95.2% knew that it is sexually transmitted, 93.6% by infected needles and 92.8% by blood. However, only 79.5% realised that the use of condom decreases risk, just 61.3% that anyone could become infected, and only 50% that the disease was incurable. The main source of information was the television (77.6%) and the newspaper (72%), while the minority heard about it from the radio, friends, popular brochures or medical personnel.

Among the other health attitudes, it was interesting to assess the level of tolerance towards AIDS patients, which was done by analysing the answers to the following several inquiries. When questioned if the colleagues at work should be informed that a person working with them is infected, 83.7% of the examinees agree-

ed. Two thirds of the sample (66.8%) would not allow their children to socialise with infected person, and similar proportion (65.7%) believes that all people should be tested on AIDS. Although 56% of the sample is »not worried« about contracting AIDS, 53.8% do not use condom for protection from sexually transmitted diseases. Generally, these figures show that despite the good level of information about the disease, the examinees are quite intolerant towards the diseased persons.

An interesting item for further potential educational actions was screening for knowledge on the »healthy lifestyle« that the examinees obtained from their general practitioner's (GP) advising. Among all the examinees, 30.4% stated that their GP has provided them with plenty of information regarding a »healthy lifestyle« and its benefits. Additional 42.7% have heard from their physicians something about it, but would like to know more. Finally, 26.9% have not received any information regarding that issue from their GP. The population of the Zagreb and Rijeka regions, and examinees from the older age groups were most satisfied with their GP.

#### (d) *Health behaviour: smoking and alcohol consumption*

There were some differences between males and females regarding their smoking habits: 34.1% males and 26.6% females are regular smokers, while additional 6.6% males and 10.1% females smoke occasionally. Regular smokers were most frequent in Osijek region (34.1%) and the least frequent in Zagreb region (28.7%,  $p < 0.001$ ).

Most of the smokers smoke cigarettes (98.6%). Cigars are smoked by 0.9% and pipe by 0.5% of the examinees. Smoking intensity, however, was significantly greater in males ( $p < 0.001$ ). About 40% of male smokers and 12.5% of female smokers smoke more than 20 cigarettes

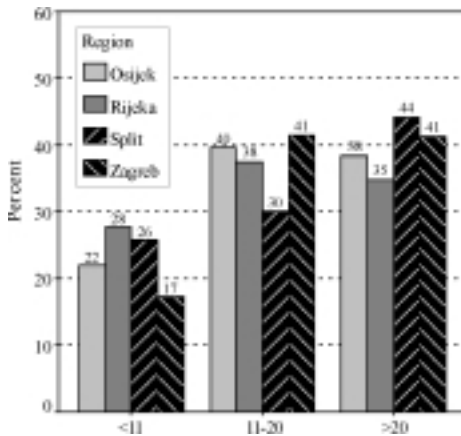


Fig. 5. Smoking intensity (number of cigarettes consumed daily) by geographic region in males.

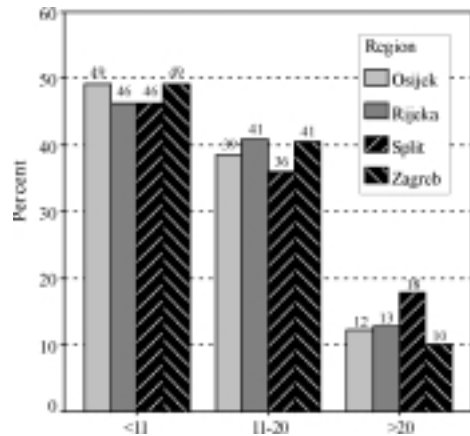


Fig. 6. Smoking intensity (number of cigarettes consumed daily) by geographic region in females.

daily. Figures 5 and 6 illustrate smoking intensity according to geographic region for males and females separately. The Split region has the highest proportions of smokers who smoke more than 20 cigarettes daily in both sexes (44.2% of males and 17.8% of females).

The pattern of smoking intensity according to age showed that in males about 76% of the younger smokers (up to 30 years of age) consumed less than 20 cigarettes daily. In the age groups 31–50, the proportion of those who smoked more than 20 cigarettes daily increased up to 51% and in the oldest age group (older than 50) it decreased to 35.3%. Therefore, the majority of younger male smokers were »moderate« smokers, while most of middle aged smokers were »heavy« smokers, turning to »light« smokers at older age.

In females, who generally smoked less intensively than males, the youngest and the oldest age-groups tended to consume significantly smaller number of cigarettes than the middle-aged female smokers. That indicated that the intensity of smoking in females increased significantly in their 30's, peaking in 40's and decreased in older age. The majority of smokers

started smoking between 16 and 20 years of age (65.1% of males and 62.6% of females), while 14.6% of males and 6% of females all started smoking before the age of 15. All together 74.4% of examinees started smoking in young age, before the age of 20.

Among non-smokers there were former smokers, who represented 54.6% of currently non-smoking males and 28.5% of the females ( $p < 0.001$ ). The finding of former smoking representing greater problem in males was supported by the fact that more males (65.4%) than females (41.2%) formerly smoked longer than 10 years. To conclude, smoking still represents greater problem in males regarding both duration and intensity. This problem exists in spite of the fact that the large majority of the population (over 96.7%) believes that smoking represents a serious health hazard.

Figure 7 shows the prevalence of alcohol consumption (beer, wine and liquor) in the total sample. The important regional differences have been observed. Beer was consumed more than twice a week by 28.5% of the population in Osijek region vs. 16.8% in Split region and liquors by

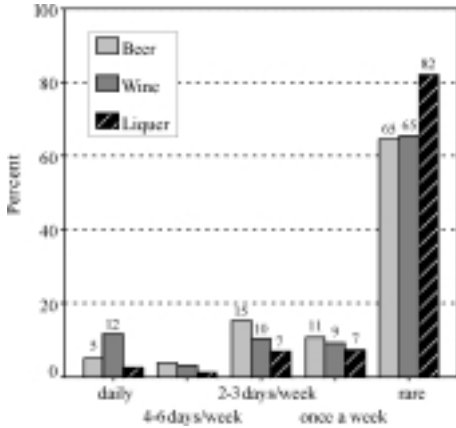


Fig. 7. The prevalence of beer, wine and liquor consumption.

13.9% of the population in Osijek region vs. 10.2% in Zagreb region. The most significant geographic difference was found for wine consumption: 46% of the population from Split region drink wine more than four times a week vs. 12.9%, 6.8% and 3.2% in Rijeka, Zagreb and Osijek regions, respectively. All these data probably largely underestimate the problem of

alcohol consumption in the country, as alcoholics were unlikely to self-select themselves for this cross-sectional study.

(e) Health behaviour: nutrition habits

Nutrition habits were examined through the information on regular daily meals, source of food, foods consumed and attitudes regarding nutrition using the one-week recall technique.

The number of regular daily meals did not differ between the sexes or among the age groups and geographical regions. About 55.8% of the population has three regular daily meals, additional 27.9% has two daily meals, while 9.1% regularly consumes meals four times each day. The main meal of the day is lunch (in 83.9%). Meals are mostly consumed at home. The source of food differed among the regions. Continental populations consume self-produced food more often than the coastal populations: 14.6% in Osijek region, 10.7% in Zagreb region, 5.4% in Rijeka region and 3.5% in Split region.

Figures 8 and 9 illustrate the consumption frequency of dried meat, meat (veal, beef, lamb and pork jointly), poultry,

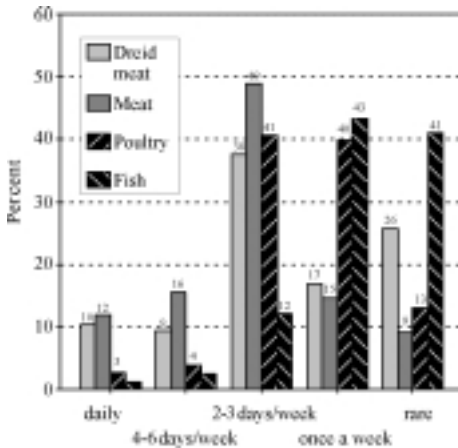


Fig. 8. The frequency of consumption of selected foods as days per week (dried meat, meat, poultry and fish).

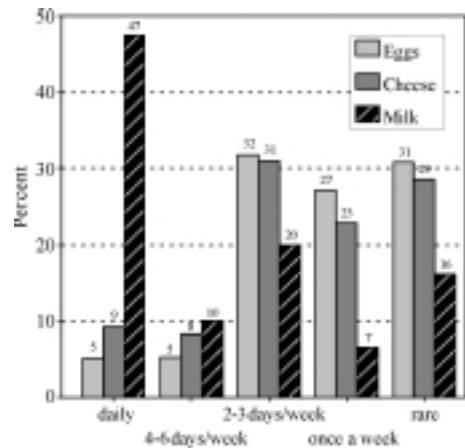


Fig. 9. The frequency of consumption of selected foods as days per week (eggs, cheese and milk).

fish, eggs, cheese, and milk in the total sample. The regional differences related to the consumption of dried meat (consumed »very rarely« by 31.4% of the population in Split region vs. 21.5% in Osijek region), poultry (consumed more than twice a week by 60.5% of the population in Osijek region vs. 37% in the Split and Rijeka regions), and fish (consumed more than twice a week by 44.7% of the population in Split region vs. 21.4% in Rijeka, 6.1% in Zagreb, and 3.9% in Osijek region). Cheese was consumed more frequently in two coastal regions (more than twice a week in 64.6% of the population in Split and 62.3% in Rijeka regions vs. 41.7% in Zagreb and 38.8% in Osijek region). Similar regional pattern was also observed in regular daily consumption of milk, while no differences in meat (beef, lamb, pork) and egg intake were noted.

The consumption frequency of citrus, other fruit, fresh vegetables (mostly salads and carrots), boiled potatoes and other boiled vegetables (mostly spinach

and cabbage) is shown in Figure 10. Geographical differences were noted in intake of potatoes and citrus which were more frequently consumed in the two coastal than in the two continental populations.

The study has also shown that bread is an essential compound of the nutrition. It is consumed daily in the quantity of up to 1/4kg by 51.8% of the examinees, and from 1/4 to 1/2kg by additional 36.9% of the examinees. More than half a kilogram of bread daily is consumed by 13.3% of the population in Osijek region, 13.8% in Rijeka, 14% in Split and 8.6% in Zagreb region.

Rice was consumed once a week or very rarely in all regions (range: 83.6%–87.3%), while about 85.5% of the population had pasta at least once a week. Pasta is especially preferred in the Split region (more than twice a week in 58.2% of the examinees).

Figure 11 illustrates the consumption frequency of sugar, candies and non-alcoholic beverages in the total sample. There were regional differences in consumption

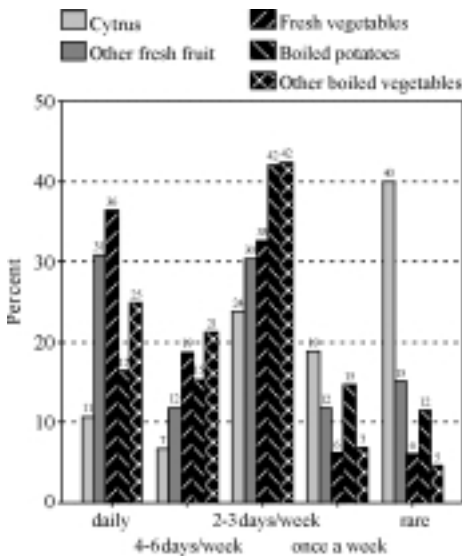


Fig. 10. The frequency of consumption of selected foods as days per week (citrus, other fruit, fresh vegetables, boiled potatoes, other boiled vegetables).

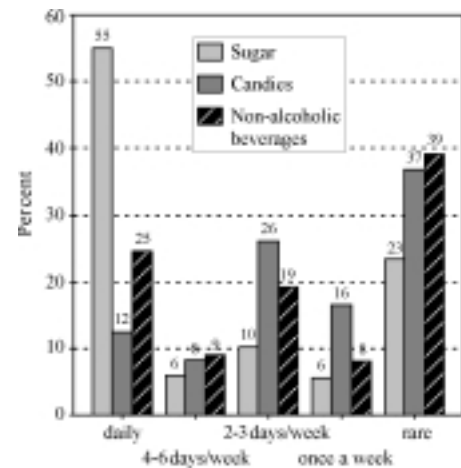


Fig. 11. The frequency of consumption of selected foods as days per week (sugar, candies, non-alcoholic beverages).

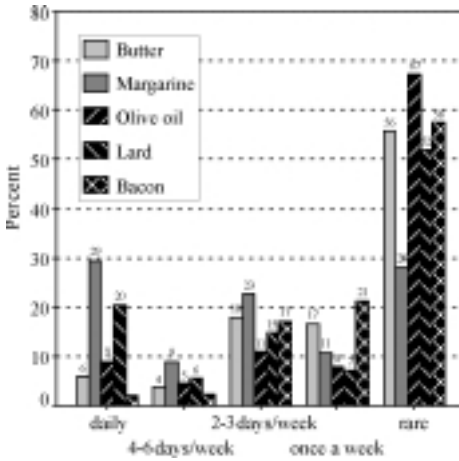


Fig. 12. The frequency of consumption of selected foods as days per week (butter; margarine, olive oil, lard, bacon).

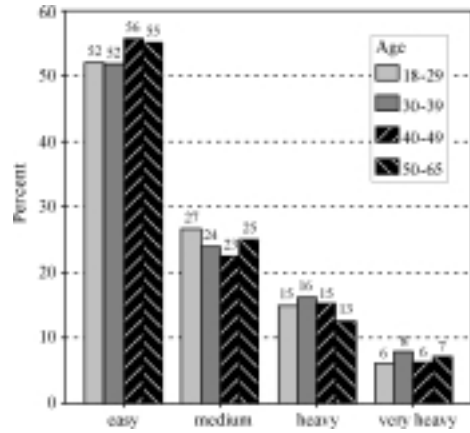


Fig. 13. Physical effort at work by age.

of sugar and beverages. Sugar was more frequently consumed in the Rijeka region (daily by 60.9% of the population vs. 52.4% to 55.3% in other three regions). The similar pattern was seen for non-alcoholic beverages (consumed more than twice a week by 63.5% of the population in Osijek region vs. 42.1% in Split region).

*Black coffee* is very commonly consumed in all parts of the country, and the range of the proportion of examinees by region who have it daily is 71.8% to 74.9%. Interestingly, it was consumed either daily or not at all, and there were practically no »medium« categories.

Figure 12 shows the consumption frequency of *butter, margarine, olive oil, lard and bacon*. Margarine was more frequently consumed than butter, especially in coastal regions. In Rijeka region 34.6% of examinees were having margarine daily in comparison to 22.3% in Osijek region. Olive oil was also consumed far more frequently in the coastal regions (more than twice a week by 73.8% population in Split region vs. only 3.4% in

Osijek region). Lard and bacon are favoured in continental regions: 78.5% and 66.6% of the examinees from Split and Rijeka regions consume lard »very rarely« vs. 33.4% and 44.6% of the examinees from Zagreb and Osijek regions. Similarly, bacon was consumed »very rarely« by 61.6%–69.4% of the two coastal populations vs. 49.9%–54.5% of the two continental populations.

(f) *Health behaviour: physical activity*

The patterns of physical activity were examined using information on occupational and spare time activities using the one-week recall technique. Intensity of physical exertion during physical activity was graded into four categories (light, medium, heavy and very heavy) that were offered to the examinees together with examples of physical activities for each category.

Physical effort during *work* was found to be slightly different among sexes. Most of the male examinees defined their working intensity as »light« (42.3%) and there was a descending trend across »medium«

and »heavy« categories towards the »very heavy« work (10.7%). Similar trend was observed in females, but 66% described their activity at work as »light« and only 3% as »very heavy«. The youngest and the oldest age groups less frequently described their working activity as »light« in comparison to middle age groups (44% vs. 56%).

The pattern of physical activity *at home* differed by gender: females were more involved in light and medium activities (6–7 hours per week), while males were more likely to perform heavy or very heavy activity (7–9 hours per week). The average duration of activity at home was increasing with age in all intensity categories.

*Leisure* physical activities were performed at different duration and intensity between the sexes. In each of the four intensity categories, males were physically active about one hour longer than females (4–5 hours vs. 3–4 hours per week). Males were also more engaged in heavy and very heavy leisure activities than females (4–5 hours vs. 2–4 hours per week). The duration of physical activity in leisure time was shorter in the middle age groups.

*Active sports training* was reported by 17.1% males and only 4.3% females. Males were exercising on the average 3.3 times weekly spending at the training about 6.2 hours a week, while females did it 3.1 times weekly spending 4.8 hours. The portion of persons active in sports training was highest in the Rijeka region (17%) and lowest in the Zagreb region (8.5%). It markedly decreased with age, from 20.8% (in those younger than 30 years) to 4.2% (for older than 50 years).

The *sleeping habits* were similar in both sexes and all geographic regions. The average sleep duration at night was 7 hours over the week and 7.9 hours over the weekend. The average sleeping time was decreasing with age: over the week,

it was 7.2 hours in 18–29 years age group and 7 hours in 50–65 years age group, and those differences were even greater during the weekend.

#### (g) *Family history of chronic non-communicable diseases*

The family history on the presence of five most common diseases (hypertension, coronary heart disease, stroke, neoplasms and diabetes) in the first and second degree relatives was obtained for each examinee. This was done bearing in mind the prospect of this cross-sectional study becoming a large longitudinal one over the coming years. In such case, this information would allow the incidence estimates for various subgroups to be corrected for the genetic background, which is neglected in most of the large prospective studies. The family history of hypertension was the most frequent in first-degree relatives (in 23.6% of males and 29.8% of females), followed by neoplasms (16% males and 19.7% females), myocardial infarction (13.3% males and 16.1% females), stroke (11.1% of males and 11.7% of females), and diabetes (10.2% in males and 11.9% in females). Generally, the corresponding frequencies of family histories in second-degree relatives were lower, which could be expected due to understandable recall bias.

## Discussion

This study, performed within the First Croatian Health Project, aims to create the new framework for developing a long-term strategy of public health planning, prevention and intervention in Croatia in the post-war period. Based on the targeted sample of 5,840 persons corresponding by sex, age and county of residence to the general Croatian population, it provides a reliable insight into health attitudes, knowledge, behaviour and risks of the current Croatian population. As



stated by Sans<sup>20</sup>, the all-causes and the cardiovascular mortality is generally increasing in Central and Eastern European countries which is an alarming trend. Bearing in mind that roughly half of all Croats presently die of diseases of the circulatory system (50.3%), and additional 20% of neoplasms, these are two main targets to reevaluate and fight in the coming years, and the results of this study should provide the guidance for public health intervention strategy and population subgroups where such intervention is most needed.

After this study, the problems to address are quite clear:

(a) As many as 79.2% of males and 49.9% of females are *overweight* or severely overweight. This is of concern because hypertension, diabetes, high cholesterol levels, cardiovascular diseases and some types of cancer are all associated to obesity<sup>21</sup>. This high obesity rate in Croats is most probably related to diet and physical activity patterns that affect nutritional status of the population.

(b) About 32% of adult males and 24% of adult females are *hypertensive* (criterion: systolic blood pressure greater than 140 mmHg and diastolic blood pressure greater than 90 mmHg). According to other reports<sup>22–24</sup>, these are rather high values, especially in males and in the Zagreb and Split regions. Hypertension is thought to be the leading cause of mortality from stroke, coronary heart disease and early-stage renal disease. An average reduction of 12 mmHg in systolic blood pressure in the population over the period of 4 years is thought to lower the morbidity of coronary heart disease by 21%, of stroke by 37% and of all-cause mortality by 13%<sup>23,24</sup>.

(c) The population distribution by the levels of *total plasma cholesterol*, *triglycerides* and *fibrinogen* shows that the proportion of the examinees falling into the

risk group is quite larger than in some well-studied western populations<sup>25,26</sup>. According to the accepted reference values, large portion of the population falls within the risk group: 63% have elevated cholesterol level (8.4% HDL-cholesterol and 42% LDL-cholesterol), 38% have elevated triglyceride level, 20% elevated fibrinogen level, and 24% have elevated lipoprotein Lp(a) level. This is of great concern, as it is recognised that reduction in total plasma cholesterol of 1% is considered to produce 2–3% reduction in the risk of cardiovascular events. Similarly, an increase in triglyceride levels by 1 mmol/L leads to a 76% increase in cardiovascular disease risk in women and 31% in men<sup>25</sup>.

(d) As many as 30% to 50% of the population are unaware of the basic risk factors for cardiovascular diseases, such as hypertension, blood fat levels, smoking, obesity and low level of habitual physical activity. In addition, more information should be coming from the health system, especially the general practitioners (GP), as it seems that currently the main source of information are TV and newspaper, while only 30% have learned about the risks from their GP and are satisfied with the obtained information.

(e) Prevalence of smokers is very high: 34% of males and 27% of females are regular smokers, additional 7% of males and 10% of females smoke occasionally, and among the current non-smokers the large proportion are actually former smokers in both sexes. It is of great concern that about 74% of the population started smoking in young age, before the age of 20. The harmful effects of smoking on health are well recognised<sup>27</sup>, and this problem requires a large public health action to reduce this hazard, especially in diverting young smokers from smoking and encouraging the middle-age smokers, who smoke most intensively, to quit that habit.

(f) The excessive alcohol drinking has large influence on the overall morbidity and mortality<sup>28</sup>. One of the problems in Croatia is that in some parts of the country excessive drinking of wine is regarded socially acceptable. In addition, as mentioned before, all the data from this study probably largely underestimate the problem of alcoholism in the country, as alcoholics were unlikely to self-select themselves for this cross-sectional study.

(g) Although there is much debate on what type of nutrition is healthy or not, and the views are frequently and radically changing<sup>29</sup>, we can conclude that Croatian population is generally very well informed about these trends. The problems are more in the excessive energy intake and the large number of meals than in their composition. This, combined with low physical activity, leads to the high prevalence of obesity. The cause of concern, unlikely to be changed dramatically by public health actions due to culturologically and agriculturally influenced nutrition patterns in some parts of the country, is frequent intake of dried meat, lard and bacon in continental parts.

(h) There is relatively low level of habitual physical activity and no »fitness culture« exists in Croatia yet, as in many other western countries. However, the associations of light, moderate and vigorous physical activity with longevity have been well-documented<sup>30</sup>. Although the number and size of different fitness facilities in Croatia is increasing, as well as the willingness of the population to take part in organised recreational physical activity, we have a long way to go to improve health status by introducing »fitness culture«. This goal will require more than public health action to achieve.

Finally, we emphasise that these presented findings are just the starting point for the design of health promotion activities planned for the following phases of

the Health Promotion Project. The continuous implementation of differently targeted programmes will be monitored and the data will be generated systematically. Periodic reports are planned to follow in order to evaluate the expected contribution of the project to the promotion of healthy lifestyles and improvement of health of the population of the Republic of Croatia.

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County of Sisak-Moslavina, Health Center »DZ Sisak«; County of Split-Dalmatia, Health Centers »DZ Split«, »DZ Hvar«, »DZ Solin« and »DZ Makarska«; County of Šibenik-Knin, Health Center »DZ Šibenik«; County of Varaždin, Health Center »DZ Varaždin«; County of Virovitica-Podravina, Health Center »DZ Virovitica«; County of Vukovar-Srijem, Health Center »DZ Vinkovci«; County of Zadar, Health Center »DZ Zadar«; County of Zagreb, Health Center »DZ Vrbovec«; and the City of Zagreb, Health Centers »DZ Peščenica« and »DZ Zagreb-HŽP«. The professionals from following Croatian medical institutions were involved in the study: Institute of Clinical Chemistry, Clinical Hospital »Mercur«, University Medical School, Zagreb; Institute of Clinical Laboratory Diagnosis, Zagreb University Hospital Center, Zagreb; Clinical Institute of Chemistry, Clinical Hospital »Sestre Milosrdnice«, University Medical School, Zagreb; Institute of Clinical Chemistry, Univer-

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## **EPIDEMIOLOŠKO ISTRAŽIVANJE ZNANJA, PONAŠANJA I STAVOVA PREMA ZDRAVLJU I ZDRAVSTVENIM RIZICIMA U POSLIJERATNOJ POPULACIJI HRVATSKE: PRVI HRVATSKI PROJEKT ZDRAVLJA**

### **SAŽETAK**

Nakon oslobođanja okupiranih područja Republike Hrvatske i završetka rata 1995. godine, prepoznata je potreba za stvaranje pretpostavki za razvitak dugoročne strategije planiranja, prevencije i intervencije u području javnoga zdravstva. Izdvojena su nužna sredstva za provođenje Prvog hrvatskog projekta zdravstva. Ministarstvo zdravstva Republike Hrvatske i Hrvatski zavod za zdravstveno osiguranje osmislili su epidemiološku studiju velikih razmjera s ciljem procjene zdravstvenih stavova, prosvijećenosti, ponašanja i rizika u poslijeratnoj populaciji Republike Hrvatske. Terensko istraživanje proveo je Institut za antropologiju uz tehničku podršku Hrvatskog zavoda za javno zdravstvo. U razdoblju između 1995. i 1997. godine prikupljeni su podaci od preko 10.000 ispitanika iz svih županija. Specifična mjerenja uključila su antropometriju (indeks tjelesne mase i krvni tlak) i uzorak krvi iz kojega su određene vrijednosti ukupnog kolesterola plazme (TC), triglicerida (TG), HDL i LDL-kolesterola, lipoproteina Lp(a) i fibrinogena (F). Provedeno je temeljito ispitivanje zdravstvene prosvijećenosti i zdravstvenih stavova, nakon čega su utvrđeni i pušački status, konzumiranje alkohola, prehrambene navike, tjelesna aktivnost, obiteljska anamneza čestih bolesti te izloženost rizicima na radnom mjestu. Iz izvorne je baze podataka izdvojen ciljani uzorak od 5.840 osoba, koji po dobi, spolu i zemljopisnoj raspodjeli odgovara općoj populaciji Republike Hrvatske. Ovaj rad daje pregled i raspravu glavnih rezultata projekta.