Prevalence of Chronic Diseases According to Socioeconomic Status Measured by Wealth Index: Health Survey in Serbia

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Aim To examine socioeconomic inequalities in the prevalence of chronic diseases in Serbia, using the data from 2006 national health survey.

Method A stratified sample of 7673 households was selected and 14 522 household members older than 20 years were interviewed (response rate 80.5%). Wealth index was used as a measure of socioeconomic status. Standardized morbidity prevalence ratios were computed using the poorest category as reference. Odds ratios for the prevalence of the selected chronic diseases and their 95% confidence intervals were calculated by multivariate logistic analysis adjusted for age, education, smoking status, and body mass index.

Results Hypertension was the most prevalent disease in all socioeconomic categories; standardized morbidity prevalence ratios were higher in richer men (151.3 in the richest) and lower in richer women (86.1 in the richest). Rheumatism/arthritis was the second most prevalent disease in both sexes, with the highest prevalence in the poorest group; the pattern remained the same after standardization (standardized morbidity prevalence ratio in the richest: 86.4 in men and 74.0 in women). The prevalence of hyperlipidemia was associated with wealth index in both men and women and was highest in the richest group; the pattern remained the same after standardization (standardized morbidity prevalence ratio in the richest: 275.9 in men and 138.4 in women). Logistic regression models showed that higher wealth index was associated with higher prevalence of hypertension, hyperlipidemia, and allergy, while lower wealth index was associated with higher prevalence of rheumatism/arthritis.

Conclusion There were considerable socioeconomic inequalities in the prevalence of chronic diseases in Serbia. These results indicate an opportunity to reduce inequalities and show a need for further investigation on the determinants of chronic diseases.

The reduction of socioeconomic inequalities in health is an important public health challenge (1). The association between socioeconomic status and health was firmly established by large population-based studies, which consistently found that people with a worse socioeconomic status had worse health than those with a better socioeconomic status. Many of these studies used mortality measures and generic measures, such as general perception of health (2). Recently, the research has refocused on morbidity and disease-specific measures (1,3-6). Although studies focusing on specific diseases have mostly found that lower socioeconomic groups more often suffer from ill health, for some specific diseases the opposite has been found, ie, that there is higher breast cancer mortality in women with higher education (7). Studies that focused on disease-specific measures also revealed some variations between countries (3,7).

Most studies exploring health inequalities were conducted in western countries, but recently some studies have been conducted in eastern European, Baltic, and other developing countries (6,8-11). However, such studies rarely included the countries in southeastern Europe. At the same time, the results in middle-income transitional countries were different than in developed countries (12,13).

During the last decade of the 20th century, the health status of Serbian population was negatively affected by numerous factors, such as long-lasting economic crisis, war in the surrounding countries and Serbia, and economic and diplomatic sanctions. However, in the last several years, Serbia has faced economic growth; in 2006, gross domestic product per capita amounted to €3354, with 5.7% growth. Also, Serbia's literacy rate of 99.4% in the population aged 15-24 is similar to that of other southeastern European countries. Gini index in 2006 was 28, which is not far from the neighboring countries, with Bosnia

and Herzegovina and Slovenia having slightly lower (27 and 26, respectively) and Macedonia, Bulgaria, and Croatia slightly higher values (29, 33, and 36, respectively) (14). The total health expenditure on health in 2006 was 8.1% of gross domestic product (15). The public health sector is financed through a system of compulsory social health insurance, paid by salary contributions of employed citizens. Although some health indicators have shown improvement, research on the socioeconomic variations is rare.

The specific challenges of descriptive research in this field should be to document health inequalities for populations, settlements, and periods not yet covered by previous studies (1). The aim of our study was to describe inequalities in the prevalence of some common chronic diseases in Serbia, using the data from 2006 health survey.

Methods

Population and sampling

The health survey of the population of Serbia was carried out in 2006. The sample was designed to provide estimates for each of the 6 regions of Serbia (Vojvodina, Belgrade, West, Central, East, and South-East Serbia). A stratified, two-stage random sampling approach was used for the selection of the survey sample.

The 2002 Serbian Population Census framework was used for the selection of clusters. Census enumeration areas (approximately 100 households) were defined as primary sampling units and were selected from each of the sampling domains by using systematic probability proportional to size sampling procedures, based on the estimated sizes of the enumeration areas from the 2002 Population Census. The first stage of sampling was completed by selecting the required number of enumeration areas from each of the 6 regions, from urban and rural areas separately.

A total of 675 census enumeration areas within each region with probability proportional to size were selected during the first stage. Since the sample frame (2002 Census) was not up to date, household lists in all the selected enumeration areas were updated prior to selection of households. Households were selected using a simple random sampling without replacement. The number of households selected in each selected enumeration area was 10, plus 3 backup households. Backup households were interviewed only if some of the first 10 households were not found. If a household refused to be interviewed, a backup household was not contacted.

A sample of 7673 of a total of 2 521 190 households registered in Serbia (16) was selected. The household response rate was 86.5%. All members of the chosen households older than 20 years were included. Of 15 563 adults older than 20 years in the selected households, 14 522 were interviewed, which yielded a response rate of 93.3%. The overall response rate for households and for household members was 80.5%. All respondents were informed about the purpose of the study and agreed to participate. The Review Board of the Ministry of Health of Serbia and the Institute of Public Health of Serbia approved the study.

Data

Data on socioeconomic status, presence of chronic diseases, and smoking habit were collected by a questionnaire. Also, measurements of blood pressure, as well as height and weight, were obtained. Body mass index (BMI) was calculated from height and weight measurements.

Measures

As a measure of socioeconomic status, Demographic and Health Survey wealth index, was used (17). Generated with a statistical procedure known as principal components analysis,

the wealth index places individual households on a continuous scale of relative wealth. Assets included in computing wealth index were the number of bedrooms per household member, material used for the construction of the floor, roof, and walls, type of drinking water source and sanitation facilities, fuel used for heating, color TV set, mobile phone, refrigerator, washing machine, dish washer, personal computer, air conditioning, central heating, and car. Each household asset was assigned a weight, or factor score, generated through factor analysis. The resulting asset scores were standardized in relation to a standard normal distribution with a mean of zero and a standard deviation of one. These standardized scores were summed by household and individuals were ranked according to the total score of the household. The sample was then divided into population quintiles – five groups with the same number of individuals in each. The cut-off points in the wealth index for the quintiles were calculated by obtaining a weighted frequency distribution of households, the weight being the product of the number of *de jure* members of the household and the sampling weight of the household. Thus, the distribution represents the national household population, where each member was given the wealth index score of his or her household. The persons were then ordered by the score and the distribution was divided at the points that form the five 20-percent sections. Then, the household score was recoded into the quintile variable, so that each member of a household also received that household's quintile category.

Data on the presence of chronic diseases were collected by using a list on which the respondents specified the diseases they had. The list included tuberculosis, myocardial infarction, stroke, hypertension, chronic bronchitis, bronchial asthma, cancer, diabetes, hyperlipidemia, migraine, anxiety/depression, kidney disease, ulcer, gall bladder diseases, rheuma-

tism/arthritis, osteoporosis, allergy, cataract, and anemia.

Statistical analysis

Prevalence of the selected chronic diseases was determined separately for men and women. Standardized morbidity prevalence ratios were calculated through indirect standardization using the poorest quintile as reference.

Odds ratios (OR) for the prevalence of the selected chronic diseases and their 95% confidence intervals (CI) were computed by multivariate logistic analysis. Regression models were computed separately for men and women, with the poorest quintile as reference. Multivariate logistic models were adjusted for age, education, smoking status, and body mass index. Age was included as continuous variable. Education level was entered as "elementary," "secondary," and "university." Smoking status was categorized as "never smoker," "former smoker," and "current smoker." BMI was computed based on measured height and weight, using Quetelet formula, and categorized in three levels as follows: under 20, 20-25, and above 25.

Sample weights were used in all statistical analyses in order to provide estimates representative for the population of Serbia (excluding Kosovo).

Statistical package STATISTICA (StatSoft, Inc., Tulsa, OK, USA) was used for data analysis. Differences were considered statistically significant at $P < 0.05$.

Results

Sociodemographic factors and wealth index

The percentage of the poorest was highest in the oldest age group and showed a gradient across age groups in men and women alike. Similarly, the percentage of the poorest was highest among those with elementary education and decreased with the level of education – it was the lowest in the group of respondents with a university degree. The pattern was similar in men and women.

The distribution of wealth index according to BMI and smoking status differed in men and women. Among men with BMI<20, there was the highest proportion of respondents from the poorest group and the lowest proportion of respondents from the richest group. In contrast, among women with BMI<20, there was the highest proportion of respondents from the richest group.

Table 1. Distribution of the participants' age, education, body mass index (BMI), and smoking status according to wealth index

Characteristic	Wealth index									
	men (n = 6892)					women (n = 7630)				
	poorest	2nd	middle	4th	richest	poorest	2nd	middle	4th	richest
Age group (years):										
20-29	19.1	21.7	21.6	20.8	16.9	13.1	20.0	21.4	23.6	21.9
30-39	19.5	21.8	19.9	21.3	17.5	15.4	19.9	21.2	21.5	21.9
40-49	20.9	23.4	20.3	19.3	16.1	13.5	22.1	22.0	22.7	19.7
50-59	20.3	23.0	21.9	19.5	16.1	16.7	20.6	24.9	18.5	19.3
60-69	29.0	21.9	23.0	14.7	11.4	29.0	20.3	21.4	15.9	13.4
70+	36.6	24.9	20.7	11.0	6.8	32.7	22.6	21.0	12.6	11.1
Education:										
elementary	47.0	27.8	16.7	6.2	2.3	36.7	26.3	21.6	10.8	4.6
secondary	14.8	22.3	24.3	23.1	15.5	7.9	18.7	24.3	25.9	23.1
university	5.7	11.7	21.2	25.7	35.7	3.3	8.9	13.6	25.0	49.2
BMI:										
<20	30.2	22.9	20.0	15.2	11.7	18.4	19.6	19.7	20.6	21.8
20-25	21.7	22.8	21.3	18.9	15.3	19.6	21.6	23.3	18.4	17.0
>25	21.1	24.8	23.1	18.3	12.7	23.0	22.1	26.1	17.2	11.5
Smoking status:										
never-smoker	26.4	22.4	21.2	17.0	13.0	23.4	21.7	22.7	17.0	15.1
former smoker	21.4	21.1	22.9	17.2	17.3	8.7	20.9	22.5	21.0	26.9
current smoker	24.0	24.7	20.0	18.3	13.0	13.8	18.9	20.1	24.2	23.0

Among male current smokers, there was the highest proportion of the poorest respondents, while among female current smokers there was the highest proportion of the richest respondents. However, the highest proportion of female former smokers also belonged to the richest group, while the highest proportion of female never-smokers women belonged to the poorest group (Table 1).

Wealth index and the prevalence of chronic diseases

The morbidity prevalence of selected chronic diseases and standardized morbidity prevalence ratios according to wealth index were computed separately for men and women (Tables 2 and 3). Hypertension was the most prevalent disease in respondents in all wealth groups, especially in women (35.1% vs 25.3% in men). The distribution of hypertension across wealth groups was approximately constant in men, while in women the highest proportion was found among the poorest respondents (40.9%). However, standardized morbidity prevalence ratios were higher among richer men (125.6 in 4th quintile and 151.3 in the richest group) and lower among richer women (86.1 in the richest group).

Rheumatism/arthritis was the second most prevalent disease in both sexes, with higher prevalence in women. In both sexes, the prevalence was highest in the poorest group (20.9% in men vs 33.9% in women) and the pattern remained the same after standardization (86.4 standardized morbidity prevalence ratio in richest men group and 74.0 in richest women group).

The prevalence of hyperlipidemia was associated with wealth index in both sexes, with the highest prevalence in the richest respondents. It remained the same after standardization (275.9 standardized morbidity prevalence ratio in richest men group and 138.4 in richest women group).

Gall bladder and chronic kidney diseases were both more prevalent in women than in men. The prevalence of both gall bladder disease and kidney disease decreased with wealth index in women and remained the same after standardization (standardized morbidity prevalence ratio in the richest group: 84.6 for gall bladder disease and 66.0 for chronic kidney disease). In men, the prevalence was higher among the poorest than among the richest respondents, however, the association could not be proven.

Table 2. Morbidity prevalence (%) and standardized morbidity prevalence ratio (reference category. "poorest") for selected diseases according to wealth index in male respondents (n = 6892)*

Disease	Wealth index					Overall
	poorest	2nd	middle	4th	richest	
Tuberculosis	1.3 (100)	1.1 (91.6)	0.7 (60.2)	0.7 (76.4)	1.0 (117.5)	1.0
Myocardial infarction	4.8 (100)	4.3 (88.8)	4.5 (98.0)	4.1 (116.6)	4.1 (147.9)	4.4
Stroke	3.5 (100)	2.1 (63.8)	3.1 (95.6)	2.5 (111.4)	1.5 (85.6)	2.6
Hypertension	24.9 (100)	27.5 (110.5)	25.6 (106.6)	24.3 (125.6)	23.7 (151.3)	25.3
Chronic bronchitis	5.5 (100)	4.6 (78.2)	4.1 (72.4)	4.1 (83.5)	3.3 (82.2)	4.4
Bronchial asthma	3.9 (100)	3.0 (72.7)	3.3 (83.4)	2.4 (78.9)	1.8 (76.2)	3.0
Cancer	0.8 (100)	0.9 (113.0)	0.9 (101.7)	1.2 (195.3)	1.5 (313.9)	1.0
Diabetes	6.1 (100)	6.2 (99.2)	7.1 (116.4)	5.7 (114.0)	5.9 (145.9)	6.2
Hyperlipidemia	6.4 (100)	7.7 (115.1)	9.0 (136.8)	12.1 (209.7)	13.3 275.9)	9.4
Migraine	3.9 (100)	2.6 (62.8)	3.4 (86.5)	2.8 (76.9)	2.7 (87.8)	3.1
Anxiety/depression	5.0 (100)	3.2 (65.5)	3.7 (76.4)	2.4 (67.8)	1.5 (42.3)	3.3
Kidney disease	7.3 (100)	7.2 (99.8)	5.6 (79.8)	6.5 (113.9)	5.3 (110.5)	6.5
Ulcer	6.5 (100)	7.5 (109.4)	6.9 (105.5)	5.9 (103.6)	7.0 (146.7)	6.8
Gall bladder disease	3.0 (100)	2.5 (80.9)	3.8 (127.8)	2.8 (112.7)	3.4 (172.8)	3.1
Rheumatism/arthritis	20.9 (100)	18.8 (89.1)	17.6 (87.1)	14.6 (90.7)	11.5 (86.4)	17.1
Osteoporosis	2.7 (100)	1.3 (51.0)	1.6 (68.8)	0.8 (44.7)	0.5 (35.7)	1.5
Allergy	3.3 (100)	3.4 (90.2)	3.7 (98.7)	5.3 (145.0)	8.0 (257.6)	4.5
Cataract	2.8 (100)	2.7 (90.7)	2.9 104.6)	1.8 (94.5)	2.1 (142.6)	2.5
Anemia	1.3 (100)	1.3 (9.2)	1.0 (72.1)	0.9 (77.3)	0.8 (83.7)	1.1

Table 3. Morbidity prevalence (%) and standardized morbidity prevalence ratio (reference category: "poorest") for selected diseases according to wealth index in female respondents (n = 7630)

Disease	Wealth index					
	poorest	2nd	middle	4th	richest	Overall
Tuberculosis	0.8 (100)	0.7 (76.1)	0.6 (58.7)	0.9 (109.0)	1.0 (117.5)	0.8
Myocardial infarction	4.6 (100)	4.0 (94.6)	3.1 (70.3)	3.1 (82.9)	2.1 (57.7)	3.4
Stroke	3.9 (100)	2.6 (82.0)	2.1 (64.5)	3.0 (116.6)	1.5 (61.3)	2.7
Hypertension	40.9 (100)	34.8 (93.2)	38.3 (97.5)	32.3 (99.0)	27.6 (86.1)	35.1
Chronic bronchitis	7.4 (100)	6.9 (98.5)	5.3 (70.8)	6.3 (97.6)	6.0 (96.8)	6.4
Bronchial asthma	3.9 (100)	2.7 (71.1)	3.9 (99.8)	4.0 (116.5)	2.9 (85.0)	3.5
Cancer	2.1 (100)	2.5 (112.0)	3.1 (128.7)	2.8 (131.1)	2.4 (112.8)	2.6
Diabetes	8.8 (100)	7.9 (102.5)	9.5 (118.2)	6.0 (90.8)	4.6 (71.8)	7.5
Hyperlipidemia	12.8 (100)	12.1 (101.0)	14.8 (115.3)	14.5 (136.4)	14.6 (138.4)	13.7
Migraine	8.1 (100)	6.9 (78.5)	7.3 (77.1)	8.6 (97.2)	8.3 (92.7)	7.8
Anxiety/depression	7.8 (100)	7.1 (89.9)	6.4 (74.8)	5.1 (67.4)	5.0 (66.3)	6.4
Kidney disease	12.2 (100)	9.7 (80.6)	8.6 (66.9)	8.8 (77.1)	7.4 (66.0)	9.4
Ulcer	5.8 (100)	6.4 (110.6)	5.5 (87.9)	5.3 (99.6)	5.3 (100.9)	5.7
Gall bladder disease	11.2 (100)	10.4 (95.2)	10.8 (91.4)	9.5 (95.2)	8.4 (84.6)	10.1
Rheumatism/arthritis	33.9 (100)	29.2 (93.9)	28.9 (89.0)	25.7 (94.2)	19.6 (74.0)	27.8
Osteoporosis	6.0 (100)	5.1 (95.7)	4.5 (80.9)	4.7 (100.5)	5.8 (127.2)	5.2
Allergy	5.6 (100)	7.8 (121.9)	8.3 (118.0)	9.7 (143.8)	11.9 (177.4)	8.5
Cataract	4.8 (100)	4.1 (99.6)	4.1 (98.3)	3.7 (118.0)	3.8 (124.4)	4.1
Anemia	4.9 (100)	5.3 (96.0)	6.2 (102.9)	7.6 (136.3)	8.6 (150.8)	6.4

Allergy was almost twice more prevalent among women than among men. However, its prevalence was much higher in respondents from the richer groups, and standardized morbidity ratios showed a similar pattern (257.6 standardized morbidity prevalence ratio in richest men group and 177.4 in richest women group).

Osteoporosis and anemia were both more prevalent in women than in men, with different distribution according to wealth index (Tables 2 and 3). In men, but not in women, osteoporosis was more prevalent in the poorest respondents, and the prevalence and standardized morbidity prevalence ratio decreased with the wealth index. The prevalence of anemia increased with wealth index in women but not in men. The pattern remained similar for standardized morbidity prevalence ratios.

Although the prevalence of anxiety was twice more prevalent in women than in men, the distribution according to wealth index was similar; standardized morbidity prevalence ratios decreased with the wealth index (Tables 2 and 3).

Logistic regression models were computed using the poorest group as reference and were adjusted for age, education, smoking status, and BMI as most prevalent risk factors associated with multiple chronic diseases (Tables 4 and 5). After adjustment in the logistic regression model, the prevalence of a few of the selected diseases showed a significant association with wealth index. In both men and women, a significant association was found for hyperlipidemia, rheumatism/arthritis, allergy, and hypertension. For hyperlipidemia and allergy, the ORs increased with the wealth index in both men and women. For rheumatism/arthritis, ORs decreased with the wealth index in men, but only those from the richest group had significantly lower risk compared with the poorest. In women, only respondents from the richest group had significantly higher risk of rheumatism/arthritis, compared with those from the poorest group.

ORs for hypertension were significantly higher in 2nd, 4th, and the richest group in men and middle, 4th, and richest in women, indicating higher risk compared with the poorest group.

Logistic regression models showed a significant association of prevalence of anxiety/depression and osteoporosis with wealth index only in men. There was a lower risk for both anxiety/depression and osteoporosis in

Table 4. Odds ratio estimates (OR) and 95% confidence intervals (CI) for the prevalence of chronic diseases in different wealth index categories (reference category: "poorest") in male respondents (n = 6892)

Disease	poorest	2nd	middle	4th	richest	P*
Tuberculosis	1	1.072 (0.556-2.069)	0.697 (0.323-1.505)	0.763 (0.330-1.764)	1.012 (0.465-2.205)	0.803
Myocardial infarction	1	1.101 (0.768-1.579)	1.073 (0.740-1.556)	1.241 (0.836-1.844)	1.289 (0.863-1.924)	0.720
Stroke	1	0.704 (0.420-1.181)	1.147 (0.718-1.832)	1.219 (0.729-2.038)	0.93 (0.371-1.294)	0.189
Hypertension	1	1.322 (1.101-1.587)	1.184 (0.981-1.427)	1.336 (1.095-1.629)	1.322 (1.080-1.619)	0.012
Chronic bronchitis	1	0.886 (0.631-1.243)	0.792 (0.554-1.132)	0.834 (0.570-1.217)	0.716 (0.478-1.072)	0.517
Bronchial asthma	1	0.937 (0.621-1.415)	0.958 (0.628-1.459)	0.901 (0.562-1.446)	0.575 (0.329-1.004)	0.400
Cancer	1	1.540 (0.693-3.425)	1.329 (0.570-3.099)	2.379 (1.059-5.340)	2.554 (1.138-5.732)	0.117
Diabetes	1	1.073 (0.783-1.470)	1.237 (0.905-1.690)	1.263 (0.900-1.771)	1.316 (0.935-1.853)	0.435
Hyperlipidemia	1	1.165 (0.870-1.562)	1.447 (1.087-1.927)	2.218 (1.672-2.942)	2.717 (2.055-3.592)	<0.001
Migraine	1	0.641 (0.415-0.991)	0.969 (0.651-1.442)	0.832 (0.536-1.292)	0.733 (0.460-1.168)	0.251
Anxiety/depression	1	0.681 (0.460-1.007)	0.815 (0.556-1.194)	0.572 (0.362-0.906)	0.336 (0.190-0.594)	0.002
Kidney disease	1	1.040 (0.781-1.385)	0.798 (0.585-1.089)	1.064 (0.777-1.456)	0.911 (0.654-1.271)	0.420
Ulcer	1	1.418 (1.054-1.909)	1.347 (0.991-1.830)	1.276 (0.915-1.779)	1.527 (1.103-2.113)	0.089
Gall bladder disease	1	0.886 (0.559-1.402)	1.289 (0.840-1.979)	1.110 (0.690-1.786)	1.371 (0.865-2.174)	0.329
Rheumatism/arthritis	1	0.964 (0.793-1.171)	0.892 (0.730-1.090)	0.819 (0.657-1.020)	0.628 (0.496-0.797)	0.002
Osteoporosis	1	0.487 (0.270-0.881)	0.700 (0.406-1.206)	0.406 (0.193-0.851)	0.143 (0.044-0.468)	0.002
Allergy	1	0.969 (0.648-1.450)	1.073 (0.720-1.598)	1.548 (1.057-2.268)	2.404 (1.682-3.435)	<0.001
Cataract	1	1.151 (0.720-1.838)	1.325 (0.828-2.120)	0.920 (0.510-1.659)	1.376 (0.802-2.360)	0.583
Anemia	1	1.264 (0.668-2.390)	0.943 (0.468-1.899)	0.868 (0.397-1.897)	0.821 (0.365-1.844)	0.800

*P for trend based on Wald test.

Table 5. Odds ratio (OR) estimates and 95% confidence interval (CI) for the prevalence of chronic diseases in different wealth index categories in female participants (n = 7630)

Disease	poorest	2nd	middle	4th	richest	P*
Tuberculosis	1	0.939 (0.408-2.163)	0.882 (0.372-2.090)	1.384 (0.616-3.109)	1.530 (0.690-3.391)	0.626
Myocardial infarction	1	1.089 (0.752-1.576)	0.796 (0.534-1.188)	1.058 (0.704-1.592)	0.668 (0.413-1.079)	0.215
Stroke	1	0.914 (0.569-1.469)	0.786 (0.479-1.290)	1.361 (0.849-2.182)	0.848 (0.489-1.471)	0.262
Hypertension	1	1.076 (0.903-1.282)	1.291 (1.084-1.538)	1.236 (1.027-1.488)	1.041 (0.860-1.260)	0.020
Chronic bronchitis	1	0.996 (0.747-1.329)	0.780 (0.576-1.056)	0.955 (0.705-1.293)	0.937 (0.687-1.278)	0.512
Bronchial asthma	1	0.741 (0.487-1.127)	1.091 (0.747-1.595)	1.286 (0.869-1.902)	0.980 (0.638-1.506)	0.155
Cancer	1	1.301 (0.798-2.122)	1.665 (1.047-2.646)	1.610 (0.984-2.634)	1.417 (0.844-2.378)	0.237
Diabetes	1	1.212 (0.919-1.596)	1.456 (1.114-1.903)	1.109 (0.815-1.509)	0.948 (0.681-1.322)	0.031
Hyperlipidemia	1	1.142 (0.913-1.429)	1.365 (1.099-1.696)	1.626 (1.298-2.038)	1.762 (1.402-2.214)	<0.001
Migraine	1	0.845 (0.643-1.109)	0.903 (0.691-1.180)	1.050 (0.802-1.373)	0.988 (0.750-1.302)	0.544
Anxiety/depression	1	0.933 (0.704-1.237)	0.869 (0.653-1.156)	0.745 (0.545-1.017)	0.685 (0.495-0.947)	0.129
Kidney disease	1	0.942 (0.746-1.191)	0.790 (0.620-1.007)	0.887 (0.691-1.140)	0.695 (0.530-0.912)	0.064
Ulcer	1	1.246 (0.921-1.686)	1.018 (0.742-1.396)	1.037 (0.747-1.439)	0.954 (0.680-1.338)	0.491
Gall bladder disease	1	1.111 (0.875-1.412)	1.087 (0.856-1.381)	1.128 (0.873-1.457)	1.075 (0.823-1.404)	0.894
Rheumatism/arthritis	1	1.049 (0.884-1.244)	0.983 (0.828-1.167)	1.042 (0.869-1.249)	0.707 (0.583-0.858)	0.001
Osteoporosis	1	0.915 (0.653-1.282)	0.895 (0.638-1.257)	1.166 (0.826-1.645)	1.364 (0.971-1.916)	0.114
Allergy	1	1.359 (1.022-1.806)	1.427 (1.077-1.890)	1.633 (1.231-2.167)	2.045 (1.550-2.699)	<0.001
Cataract	1	1.266 (0.871-1.840)	1.048 (0.707-1.553)	1.561 (1.043-2.334)	1.640 (1.089-2.470)	0.064
Anemia	1	1.037 (0.751-1.431)	1.270 (0.932-1.730)	1.522 (1.119-2.071)	1.669 (1.229-2.265)	0.002

*P for trend based on Wald test.

men in the richest group. Women from the richest group had significantly lower risk of anxiety/depression than the poorest women (OR = 0.685).

The prevalence of diabetes and anemia showed significant association with wealth index in logistic regression models only for women. The prevalence of anemia was positively associated with wealth index, however, the association was significant only for the 4th and the richest quintile (1.522 and 1.669, re-

spectively), indicating a higher risk of anemia in richer women. For diabetes mellitus, the logistic regression model showed a significant association only for the third quintile, indicating 1.456 higher risk for diabetes in comparison with women in the poorest group.

Interestingly, the inequalities among the socioeconomic groups were highest for hyperlipidemia and allergy in both men and women, with ORs for the richest being 2.717 for men and 1.762 for women for hyperlipidemia and

2.404 for men and 2.045 for women for allergy. These inequalities were larger for men than for women.

Large inequalities (OR>1.5) were also observed for the prevalence of ulcer and cancer for men and for cataract and anemia for women.

Discussion

Our study showed that wealth index was significantly associated with differences in the prevalence of certain diseases and health conditions including hypertension, hyperlipidemia, allergy, and rheumatism/arthritis. Wealth index can thus be a valuable measure of socioeconomic status (18,19), similar to other commonly used measures, such as educational level, income, or occupational class. The association observed in our study was still significantly after standardization for age, education, BMI, and type of settlement. The risk of hypertension, hyperlipidemia, and allergy was higher in the richer and the risk of rheumatism/arthritis was higher in poorer groups in both sexes.

Allergy was positively associated with wealth index in both men and women, which was also observed in other studies. An explanation for this could include older maternal age at birth, presence of central heating in the household, overuse of showers and soaps, and contact with pets (3).

Hyperlipidemia, hypertension, and anemia (for men) were positively associated with the wealth index as well. This could be explained by the fact that such conditions do not have severe symptoms and can be detected only by medical examination (5). While almost all citizens in Serbia are insured through the Health Insurance Fund, health expenditures (transportation costs and co-payments) in public facilities can still be considerably high. Therefore, richer respondents, who can afford med-

ical examinations, are more often diagnosed with a condition (20).

In our study, hyperlipidemia had the highest prevalence in the group of richest respondents. This is in contrast to the US National Health and Nutrition Examination Survey (NHANES) (21), which had found highest levels of cholesterol in the richest group in the period before 1988. Afterwards, there was an inversion of the trend and cholesterol levels were higher among the poor in 1988-1994 period. As Serbia is undergoing serious social changes, it will be interesting to investigate whether future trends will be similar to those observed in the US.

Also, the distribution of hypertension across socioeconomic groups needs further investigation. This is especially required in the light of positive association of blood pressure and socioeconomic status found in the developing countries (13).

Cancer prevalence in men was significantly higher in the two wealthiest groups than in the poorest group. Some studies suggested that higher prevalence of cancer among higher socioeconomic classes could be a consequence of mortality selection. It has been found that fatal cancers are more prevalent among poorer socioeconomic groups, while less fatal cancers are more prevalent among richer groups. This might be explained by greater accessibility of preventive services to richer groups (20), which allows earlier detection of cancer. Earlier detection leads to better survival, which could make cancer more prevalent among wealthier groups (3,22). However, these explanations could not be accepted for women in our study, as the highest standardized morbidity prevalence ratio for cancer was in middle category among women, which requires further investigation.

Rheumatism and arthritis showed an inverse gradient among men and significantly lower risk in the richest than in the poorest

women. Positive gradient is a common finding for these diseases and is related to worse living and working conditions in poorer socioeconomic groups. The more pronounced gradient in men is possibly related to working conditions, as it was less prominent in women. Also, overreporting of arthritis in lower socioeconomic groups could contribute to such findings (23).

Our findings showed an inverse gradient for anxiety/depression, which was more prominent among men. This is in accordance with a study that found that current social circumstances had the strongest influence on the increase in depressive symptoms in eastern European countries, which had recently experienced social change (24).

One of the limitations of this study was the relatively low response rate, since one-fifth of the total sample did not respond. As there is evidence that non-response is higher among persons of lower socioeconomic status and those with poorer health, it could lead to the underestimation of the prevalence of chronic diseases among lower socioeconomic groups (3,25,26). Another limitation of the study was the problem of the accuracy of self-reports for chronic diseases. The accuracy depends on different factors, such as knowledge about the health problem, consequences for the everyday life, willingness to report the problem, and the frequency of visits to health service. Several studies demonstrated that the accuracy of self-reporting was high for some conditions, but only moderate or low for others. Also, the level of underreporting of some conditions differs between socioeconomic groups. Some studies found underreporting in poorer socioeconomic groups for cancer, diabetes, lung disease, and heart disease (27), while arthritis was found to be over-reported (23).

In conclusion, our study showed there are considerable socioeconomic inequalities in the prevalence of chronic diseases in Serbia. Some

of our findings, such as higher prevalence of allergy in richer and rheumatism/arthritis in poorer socioeconomic groups, were similar to the findings in other European countries. On the other hand, higher prevalence of hypertension and hyperlipidemia in richer socioeconomic groups were not found in other countries. These results imply that there is an opportunity to reduce such inequalities. However, further studies on this issue are needed, as well as adequate policies and interventions targeting the inequalities in health (6).

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