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Socioeconomic inequalities and non-communicable diseases in Serbia: national health survey

Socijalno-ekonomske nejednakosti i hronične nezarazne bolesti u Srbiji: nacionalno istraživanje zdravlja

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Abstract

Background/Aim. Non-communicable diseases (NCDs) are a major public health challenge worldwide. Although they are preventable, NCDs are the major global causes of morbidity and mortality, absenteeism, disability and premature death. The aim of this study was to examine socioeconomic inequalities in the prevalence of non-communicable diseases in Serbia. **Methods.** Data from the 2013 National Health Survey of the population of Serbia was used in this study. There were 13,765 adults interviewed, aged $\geq$ 20 years. We used multivariate logistic regression analyses with demographic and socioeconomic determinants of health as independent variables and prevalence of non-communicable diseases as a dependent variable. The minimum level of significance was $p < 0.05$. **Results.** Hypertension was the most prevalent NCDs (36.1%). The prevalence of multimorbidity was 47.1%. Multivariate logistic regression analysis showed that gender, age, place of residence, employment status and education were associated with the presence of NCDs. The odds ratio (OR) for age was 1.074 [95% confidence interval (CI) : 1.070–1.077). Women were at a higher risk of NCDs by 58.9% when compared to men (OR = 1.589; 95% 95% CI : 1.467–1.726). Respondents who lived in the rural areas were at a higher risk for NCDs by 14.1% compared to those

who lived in urban areas (OR = 1.141; 95% CI : 1.047–1.244). Odds ratio for unemployment was 1.227 (95% CI: 1.118–1.346). Respondents with primary education were at a higher risk for chronic diseases by 47.1% (OR = 1.471; 95% CI : 1.281–1.687) while those with secondary school were at a higher risk by 27.7% (OR = 1.277; 95% CI : 1.142–1.428) compared to respondents who had higher education. When it comes to Wealth Index, univariate logistic regression analysis showed that respondents who belonged to the poor and middle classes were at a higher risk for NCDs (OR = 2.031; 95% CI : 1.819–2.267; OR = 1.473; 95% CI : 1.343–1.615) compared to respondents who belonged to the rich class. Multivariate logistic regression analysis did not show statistically significant correlations between the Wealth index and NCDs. **Conclusion.** Socioeconomic inequalities in health status are the major challenge and should be a target of national health policy in Serbia, not only because they represent social injustice but also because solving the health problems of underprivileged groups of the population can influence improvement of health status of the population as a whole.

Key words:
chronic disease; prevalence; risk factors; sociological factors; economics; serbia.

Apstrakt

Uvod/Cilj. Opterećenje društva nezaraznim bolestima predstavlja veliki javno-zdravstveni izazov širom sveta. Iako preventabilne, nezarazne bolesti su danas vodeći uzroci obolevanja, apsentizma, invalidnosti i prevremenog umiranja. Cilj ovog rada bio je da ispita socijalno-ekonomske nejednakosti u prevalenci nezaraznih bolesti u Srbiji. **Metode.** U studiji su korišćeni podaci nacionalnog istraživanja zdra-

vlja stanovnika Republike Srbije koje je obavljeno 2013. godine. Broj anketiranih osoba starijih od 20 godina bio je 13 765. Povezanost demografskih i socijalno-ekonomskih determinanti zdravlja (nezavisnih varijabli) i prisustva nezaraznih bolesti (zavisne varijable) ispitivana je bivarijantnom i multivarijantnom logističkom regresijom. Statistički značajnim smatrale su se vrednosti $p < 0.05$. **Rezultati.** Hipertenzija je najučestalija nezarazna bolest (36.1%). Prevalencija multimorbiditeta bila je 47.1%. Multivarijantna

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logistička regresija pokazala je da su pol, godine starosti, tip naselja, radni status i obrazovanje povezani sa prisustvom nezaraznih bolesti. Unakrsni odnos (OR) za godine starosti bio je 1.074 [95% interval poverenja (IP) : 1.070–1.077). Kod žena je uočen veći rizik od oboljevanja od nezaraznih bolesti (58.9%) u odnosu na muškarce (OR = 1.589; 95% IP : 1.467–1.726). Ispitanici koji žive na selu su za 14.1% bili pod većim rizikom od oboljevanja od nezaraznih bolesti u odnosu na one koji žive u gradu (OR = 1.141; 95% IP: 1.047–1.244). Unakrsni odnos za nezaposlene bio je 1.227 (95% IP : 1.118–1.346). Ispitanici sa osnovnim obrazovanjem su za 47.1% bili pod većim rizikom od oboljevanja od hronične bolesti (OR = 1.471; 95% IP : 1.281–1.687), dok su oni sa srednjom školom bili pod većim rizikom za 27.7% (OR = 1.277; 95% IP : 1.142–1.428) u odnosu na ispitanike koji imaju visoko obrazovanje. Kada je u pitanju Indeks bla-gostanja, univarijantna logistička regresija pokazala je da is-pitanici koji pripadaju siromašnoj i srednjoj klasi su pod veći rizikom od oboljevanja (OR = 2.031, 95% IP : 1.819–2.267; OR = 1.473, 95% IP : 1.343-1.615) u poređenju sa onima koji pripadaju bogatoj klasi. Multivarijantna logistička regre-sija nije pokazala statistički značajnu povezanost između In-deksa blagostanja i nezaraznih bolesti. **Zaključak:** Socijalno-ekonomske nejednakosti u zdravlju veliki su izazov za zdrav-stvenu politiku, ne samo zato što predstavljaju socijalnu ne-pravdu nego i zbog toga što se rešavanjem zdravstvenih pro-blema neprivilegovanih grupa stanovništva može uticati na poboljšanje zdravstvenog stanja stanovništva u celini.

Ključne reči:
hronična bolest; prevalenca; faktori rizika; socijalni faktori; ekonomski faktori; srbija.

Introduction

Non-communicable diseases (NCDs) are a major public health challenge worldwide [1]. Although they are preventable, NCDs (mainly cardiovascular diseases, neoplasms, chronic respiratory diseases and diabetes) are the major global causes of morbidity and mortality, absenteeism, disability and premature death [2]. According to the World Health Organization (WHO) report, more than 36 million people die from NCDs annually which is about 63% of the 57 million global deaths [3]. About 16 million people die prematurely, before the age of 70, during the most productive period of life. The prevalence and impact of NCDs continues to rise, especially in countries with low and middle income that already participate in premature deaths with 86% [4]. NCDs have serious socioeconomic consequences, ranging from increasing individual and household impoverishment to high cost of healthcare which hinder social and economic development [5]. The rapidly growing number of NCDs is under the influence of many factors including population aging, negative effects of globalization, rapid and unplanned urbanization and unhealthy behaviours [6].

Individual characteristics and socioeconomic status are important determinants of health inequalities [7]. The impact of these determinants on the morbidity has been studied in many countries, and the results showed clear correlations between socioeconomic determinants and health status of respondents [1, 8, 9]. In all countries, there are significant differences in health between socioeconomic groups. People with lower socioeconomic status (SES) are associated with higher prevalence of chronic diseases and injuries, unhealthy behaviors such as smoking, inadequate diet, alcohol use, and lack of physical exercise [10–12]. People with lower level of education, lower occupational class, or lower income live shorter in good health, have higher rates of mortality and die at younger age [10, 13]. There is substantial evidence that those with lower socioeconomic status are at increased risk of adverse health outcomes, including cardiovascular disease, neoplasms and mental health problems [14– 17].

The presence of diseases and their symptoms are indicators of health status of the population. In health research, self-reporting of diseases is widely used. Information on the prevalence of NCDs in the population is most commonly obtained through questionnaires [3].

The aim of this study was to examine socioeconomic inequalities in the prevalence of NCDs in Serbia, using the data from the 2013 National Health Survey.

Methods

Study population and sample

This study used the data from the 2013 National Health Surveys for Serbia. The study was designed as a cross-sectional study on a representative probability sample of the population aged 15 years and above. The survey was conducted in accordance with the methodology and instruments of the European Health Interview Survey wave 2 (EHIS-wave 2). It was implemented by the Ministry of Health of the Republic of Serbia.

The sample consisted of all households listed by all enumeration areas of Census 2013. The mechanism used to generate a random sample of households and respondents is a combination of two sampling techniques: stratification and multi-stage sampling. Two-stage stratified sample of the population of the Republic of Serbia was selected in order to obtain a statistically reliable estimation of indicators which affect the health of the population at the national level and at the levels of four geographical regions of Serbia (Vojvodina, Belgrade, Šumadija, Western Serbia and South-Eastern Serbia) [18].

Of the total number of 10,089 households contacted, 6,500 of them agreed to participate in the survey, so that the response rate of households was 64.4%. Of the total number of 16,474 registered household members aged 15 years and more, 14,623 of them agreed to be interviewed, giving a response rate of 88.9%. For the purposes of this study, we analyzed data related to respondents aged 20 years and older (13,765 interviewed respondents).

Instruments

Data on demographic and socioeconomic characteristics of the respondents and their own health assessment was ob-

tained through a face-to-face interview carried out at home, while information about the wealth level of the household was obtained by means of a household questionnaire. The questions were validated instruments and based on the standard questionnaires from similar types of surveys. Ethical Standards in this study are in compliance with the international ethical standards (the World Medical Association Declaration of Helsinki) and the specific legislation of our country.

As independent variables, we used demographic characteristics (age, gender, type of settlement and marital status) and socioeconomic status (education, employment status and Wealth index). The age of participants was categorized into eight age groups ($\leq$ 24 years, 25–34 years, 35–44 years, 45–54 years, 55–64 years, 65–74 years, 75–84 years and 85 years or more). Gender is coded as male and female, place of residence as urban and rural while the marital status was categorized as married/living with a partner and not married, divorced/widowed. Education was defined as high level (university degree), medium level (three of four years of secondary school), or low level (no education, incomplete primary school, or primary school). Employment status was categorized as employed and unemployed (including economically inactive people: pensioners, people attending some form of education, housewives who are inactive due to family reasons, people who are ill, unable to work or elderly and other inactive categories). The Wealth Index was based on household assets and housing characteristics, such as (the number of bedrooms per household member, materials used in the construction of a 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, car and access to the Internet). According to the Wealth Index, households were divided into five equal-sized groups (quintiles): the poorest (Q1), poorer (Q2), middle (Q3), richer (Q4) and the richest (Q5). For the purposes of this paper, the respondents were classified into three socioeconomic categories: poor class, middle class and rich class.

Self-reported diagnosis of NCDs was taken as a dependent variable. The respondents were asked: "Did you have some of the following diseases or conditions in the last twelve months: hypertension, deformity of lower spine or other chronic back problems, hyperlipidemia, neck deformity or another chronic problem with cervical spine, coronary heart disease or angina pectoris, arthrosis, allergies (excluding allergic asthma), diabetes and depression?" Of the total seventeen NCDs reported in the National Health Survey, we considered nine to be major NCDs. All diseases were coded as dummy variables (yes/no). Multimorbidity was used to refer to those who had two or more morbidities.

Statistical analysis

All data of interest were presented and analyzed by adequate mathematical-statistical methods appropriate for the data type. The χ^2 test was used to compare proportions between the groups. The *t*-test was used to compare continuous variables between the groups. The relations between the

presence of NCDs, as a dependent variable and a set of independent variables was examined by univariate and multivariate logistic regression. Univariate logistic regression models were used to examine the associations between potential factors and the presence of NCDs. The variables that were statistically significant ($p < 0.05$) were further examined in multivariable logistic regression. The unadjusted odds ratios (ORs) with their corresponding 95% confidence intervals (95% CI) were also obtained. All statistical calculations were performed using the commercial, standard software package SPSS, version 18.0. [The Statistical Package for Social Sciences software (SPSS Inc, version 18.0, Chicago, IL)].

Results

The study included 13,765 respondents, where 46% were men and 54% were women. The demographic and socioeconomic characteristics of the sample of respondents are presented in Table 1. The mean age of the respondents was 51.78 (SD = 17.467); there were 20.9% in the 55–64 age group. The majority of respondents resided in urban areas (56.4%), 65.4% of them were married or lived with a partner, 54.2% had a middle level of education, 67.2% were unemployed (and belonged to the middle class (60.1%) according to the Wealth Index.

In the present study, 60% reported at least one of nine analyzed chronic diseases. Table 2 shows the prevalence of NCDs by demographic and socioeconomic variables. The most prevalent self-reported NCDs across the sample were hypertension (36.1%) followed by deformity of the lower spine or other chronic problems with the back (21.5%) and hyperlipidemia (14.7%). Allergy (8.9%) and depression (7.2%) were the least reported NCDs in the study sample. All diseases were more prevalent among women than among men. Significant differences by age were found for all diseases. The difference in mean values of years of life between respondents with chronic diseases and respondents without them is statistically significant (t = -69,635, $p < 0.0005$). The respondents with a chronic disease were 59.45, (SD = 14.94) years on average and those without chronic diseases were on average at the age of 41.26 (SD = 15.01) years.

Two fifths (40%) of the respondents reported that they did not have any NCDs, while 12.9% had one NCDs. More than two NCDs was reported by 47.1% of the respondents (Table 3). The median number of diseases among persons with multimorbidity was 3, ranging from 2 to 10. The number of NCDs differed significantly by gender, age groups, marital status, education, employment status and Wealth index ($p < 0.005$). The number of NCDs did not differ significantly by type of settlement ($p = 0.412$). Women, elderly people, those with low educational level, unemployed, inactive and respondents who belonged to the poor class were sensitive to multimorbidity.

Results of the univariate and multivariate logistic regression analysis are presented in Table 4. Univariate logistic regression analysis showed that the prevalence of NCDs differed significantly across gender, age, marital status, education, place of residence, employment status, education and the Wealth Index. Multivariate logistic regression analysis showed that gender, age, place of residence, employment

status and education can be associated with the presence of NCDs. The prevalence of NCDs increased with age. Number of chronic diseases was positively correlated with age (r = 0.557; p < 0.0005). The OR for age was 1.074 (95% CI : 1.070–1.077), which means that each year the risk of a chronic disease was increasing by 7.4%. Women were under the increased risk of a chronic disease by 58.9% compared to men (OR = 1.589; 95% CI : 1.467 to 1.726). Respondents who lived in rural areas were under the higher risk of chronic non-communicable diseases by 14.1% compared to those who lived in urban areas (OR = 1.141; 95% CI : 1.047–1.244). Odds ratio for unemployment was 1.227 (95% CI : 1.118–1.346). Unemployed and inactive people were under the increased risk of a chronic disease by 22.7% in relation to the employed. (OR = 1.227; 95% CI: 1.118–1.346). The prevalence of a chronic diseasewas inversely proportional to the level of education. Respondents with primary education were under the higher risk for NCDs by 47.1% (OR = 1.471; 95% CI : 1.281–1.687) while those with secondary school were under the higher risk by 27.7% of (OR = 1.277, 95% CI : 1.142–1.428) compared to the respondents who had higher education. When it comes to the Wealth index, univariate logistic regression analysis showed that the respondents who belonged to the poor and middle class were in a higher risk for NCDs (OR = 2.031; 95% CI : 1.819–2.267; OR = 1.473;

95% CI : 1.343–1.615) compared to the respondents who belonged to the rich class. Multivariate logistic regression analysis did not show a statistically significant impact of the Wealth Index on the prevalence of NCDs.

Discussion

The results showed that there were significant differences in the prevalence of NCDs, depending on the demographic and socioeconomic variables.

This study presented a high prevalence of NCDs. Similar results were found in a population survey conducted in eight countries in Europe where 55.1% of the adult population had at least one chronic disease [19]. National Population Health Survey in Canada found that more than a half of adults aged 25 years and over had a chronic condition [20].

The prevalence of multimorbidity was 47.1% which is similar to that found in the other studies (Banglades – 53.7%, Germany – 58.6%, Sweden – 55%) [21–23]. Opposite to our data some studies found a smaller proportion of multimorbidity (Canada – 24%, South Africa – 22.5%) [24, 25]. Many studies reported variable prevalence of multimorbidity, which is likely due to a sample type, source of data, data collection method, observed age groups, diagnoses that were considered and study population [26].

Table 1

Demographic and socioeconomic characteristics of study population

Variables	Men		Women		All	
	n	%	n	%	n	%
Total	6,328	46.0	7,437	54.0	13765	100
Men age (years), mean ± SD	51.02 ± 17.236		52.43 ± 17.636		51.78 ± 17.467	
Age (years)						
20–24	412	6.5	452	6.1	864	6.3
25–34	937	14.8	1,024	13.8	1,961	14.2
35–44	1,068	16.9	1,123	15.1	2,191	15.9
45–54	1,055	16.7	1,273	17.1	2,328	16.9
55–64	1,328	21.0	1,553	20.9	2,881	20.9
65–74	875	13.8	1,080	14.5	1,955	14.2
75–84	589	9.3	796	10.7	1,385	10.1
≥ 85	64	1.0	136	1.8	200	1.5
Marital status						
married or living with a partner	4,384	69.3	4,617	62.1	9,001	65.4
not married, divorced, widowed	1,944	30.7	2,820	37.9	4,764	34.6
Emplyment status						
employed	2,570	40.6	1,951	26.2	4,521	32.8
unemployed	3,758	59.4	5,486	73.8	9,244	67.2
Type of settlement						
urban	2,497	55.3	4,263	57.3	7,760	56.4
rural	2,831	44.7	3,174	42.7	6,005	43.7
Education						
low	1,368	21.6	2,644	35.6	4,012	29.1
middle	3,846	60.8	3,611	48.6	7,457	54.2
high	1,114	17.6	1,182	15.9	2,296	16.7
Wealth Index						
poor class	1,440	22.8	1,658	22.3	3,098	22.5
middle class	3,785	59.8	4,482	60.3	8,267	60.1
rich class	1,103	17.4	1,297	17.4	2,400	17.4

SD – standard deviation.

Table 2

Prevalence of self reported non-communicable diseases (NCDs)

Variables	Coronary heart disease or Angina pectoris	Hypertension	Arthrosis	Deformity of lower spine	Neck deformity	Diabetes	Allergies	Depression	Hyperlipidemia
Total	1687 (12.3)	4965 (36.1)	1518 (11.0)	2954 (21.5)	1906 (13.8)	1129 (9.1)	1230 (8.9)	989 (7.2)	2030 (14.7)
Gender									
Men	635 (37.6)	1977 (39.8)	416 (27.3)	1065 (36.1)	547 (28.7)	535 (43.5)	396 (32.2)	310 (31.3)	761 (37.5)
Women	1052 (62.4)	2988 (60.2)	1102 (72.6)	1889 (63.9)	1359 (71.3)	694 (56.5)	834 (67.8)	679 (68.7)	1269 (62.5)
Age (years)									
20–24	2 (0.1)	14 (0.3)	3 (0.2)	28 (0.9)	11 (0.6)	6 (0.5)	63 (5.1)	9 (0.9)	8 (0.4)
25–34	26 (1.5)	89 (1.8)	16 (1.1)	113 (3.8)	53 (2.8)	25 (2.0)	157 (12.8)	48 (4.9)	38 (1.9)
35–44	48 (2.8)	309 (6.2)	68 (4.5)	309 (10.5)	175 (9.2)	54 (4.4)	186 (15.1)	106 (10.7)	177 (8.7)
45–54	165 (9.8)	741 (14.9)	169 (11.1)	463 (15.7)	331 (17.4)	144 (11.7)	206 (16.7)	174 (17.6)	372 (18.3)
55–64	434 (25.7)	1508 (30.4)	418 (27.5)	801 (27.1)	555 (29.1)	361 (29.4)	289 (23.5)	273 (27.6)	684 (33.7)
65–74	506 (30.0)	1256 (25.3)	418 (27.5)	640 (21.7)	406 (21.3)	368 (29.9)	191 (15.5)	221 (22.3)	473 (23.3)
75–84	452 (26.8)	929 (18.7)	368 (24.2)	509 (17.2)	317 (16.6)	257 (20.9)	121 (9.8)	141 (14.3)	258 (12.7)
≥85	54 (3.2)	119 (2.4)	58 (3.8)	91 (3.1)	58 (3.0)	14 (1.1)	17 (1.4)	17 (1.7)	20 (1.0)
Marital status									
married or living with a partner	1047 (62.1)	3291 (66.3)	928 (61.1)	1932 (65.4)	1234 (64.7)	801 (65.2)	759 (61.7)	585 (59.2)	1428 (70.3)
not married, divorced, widowed	640 (37.9)	1674 (33.7)	590 (38.9)	1022 (34.6)	672 (35.3)	428 (34.8)	471 (38.3)	404 (40.8)	602 (29.7)
Type of settlement									
urban	928 (55.0)	2722 (54.8)	770 (50.7)	1604 (54.3)	1045 (54.8)	673 (54.8)	795 (64.6)	518 (52.4)	1193 (58.8)
rural	759 (45.0)	2243 (45.2)	748 (49.3)	1350 (45.7)	861 (45.2)	556 (45.2)	435 (35.4)	471 (47.6)	837 (41.2)
Education									
low	866 (51.3)	2130 (42.9)	804 (53.0)	1273 (43.1)	812 (42.6)	538 (43.8)	348 (28.3)	424 (42.9)	734 (36.2)
middle	637 (37.8)	2195 (44.2)	565 (37.2)	1325 (44.9)	866 (45.4)	528 (43.0)	634 (51.5)	479 (48.4)	979 (48.2)
high	187 (10.9)	640 (12.9)	149 (9.8)	356 (12.1)	228 (12.0)	163 (13.3)	248 (20.2)	86 (8.7)	317 (15.6)
Emplyment status									
employed	156 (9.2)	883 (17.8)	149 (9.8)	593 (20.1)	373 (19.6)	156 (12.7)	374 (30.4)	137 (13.9)	433 (21.3)
unemployed	1531 (90.8)	4082 (82.2)	1369 (90.2)	2361 (79.9)	1533 (80.4)	1073 (87.3)	856 (69.6)	852 (86.1)	1597 (78.7)
Wealth Index									
poor class	504 (29.9)	1339 (27.0)	467 (30.8)	768 (26.0)	461 (24.2)	340 (27.7)	207 (16.8)	300 (30.3)	408 (20.1)
middle class	1006 (59.6)	3007 (60.6)	898 (59.2)	1787 (60.5)	1178 (61.8)	729 (59.3)	771 (62.7)	588 (59.5)	1304 (64.2)
rich class	177 (10.5)	619 (12.5)	153 (10.1)	399 (13.5)	267 (14.0)	160 (13.0)	252 (20.5)	101 (10.2)	318 (15.7)

Table 3

Associations between the number of non-communicable diseases (NCDs) and demographic and socioeconomic characteristics

Variables	Number of NCDs			
	0	1	≥ 2	p
Total number	5,505 (40)	1,786 (13)	6,474 (47.0)	
Gender				
men	2,879 (45.5)	872 (13.8)	2,577 (40.7)	< 0.0005
women	2,626 (35.5)	914 (12.3)	3,897 (52.4)	
Age (years)				
20–24	735 (85.1)	94 (10.9)	35 (4.1)	
25–34	1,495 (76.2)	286 (14.6)	180 (9.2)	
35–44	1,301 (59.4)	353 (16.1)	537 (24.5)	
45–54	920 (39.5)	370 (15.9)	1,038 (44.6)	< 0.0005
55–64	652 (22.6)	344 (11.9)	1,885 (65.4)	
65–74	248 (12.7)	201 (10.3)	1,506 (77.0)	
75–84	130 (9.4)	113 (8.2)	1,142 (82.5)	
≥ 85	24 (12.0)	25 (12.5)	151 (75.5)	
Marital status				
married or living with a partner	3,472 (38.6)	1,208 (13.4)	4,321 (48.0)	< 0.0005
not married, divorced, widowed	2,033 (42.7)	578 (12.1)	2,153 (45.2)	
Type of settlement				
urban	3,117 (40.2)	1,027 (13.2)	3,616 (46.6)	0.412
rural	2,388 (39.8)	759 (12.6)	2,858 (47.6)	
Education				
low	940 (23.4)	446 (11.1)	2,626 (65.6)	
middle	3,485 (46.7)	999 (13.4)	2,973 (39.9)	< 0.0005
high	1,080 (47.0)	341 (14.9)	875 (38.1)	
Emplyment status				
employed	2,583 (57.1)	671 (14.8)	1,267 (28.0)	< 0.0005
unemployed	2,922 (31.6)	1,115 (12.1)	5,207 (56.3)	
Wealth Index				
poor class	1,033 (33.8)	395 (12.8)	1,670 (53.9)	
middle class	3,298 (39.9)	1,047 (12.7)	3,922 (47.4)	< 0.0005
rich class	1,174 (48.9)	344 (14.3)	882 (36.8)	

Data are present as number (%) of study population; $*\chi^2$ test.

Table 4

Odds ratios (OR) and 95% confidence intervals (CI) for the presence of non-communicable diseases (NCDs) depending on demographics and socioeconomic characteristics

Variables	n (%)	Binary logistic regression (OR) (95% CI)		p
		Univariate	Multivariate	
Age	13,765 (100)	1.077 (1.074–1.080)	1.074 (1.070–1.077)	< 0.0005
Gender				
men	6,328 (46.0)	1.00	1.00	
women	7,437 (54.0)	1.556 (1.452–1.667)	1.589 (1.467–1.726)	< 0.0005
Marital status				
has a partner	4,764 (34.6)	1.00	1.00	
has no partner	9,001 (65.4)	0.872 (0.812–0.937)	1.001 (0.914–1.096	0.985
Type of settlement				
urban	7,760 (56.4)	1.00	1.00	
rural	6,005 (43.6)	1.046 (0.977–1.212)	1.141 (1.047–1.244)	0.003
Emplyment status				
employed	9,244 (67.2)	1.00	1.00	
unemployed	4,521 (32.8)	3.722 (3.457–4.008)	1.227 (1.118–1.346)	< 0.0005
Education				
high	2,296 (29.1)	1.00	1.00	
low	4,012 (29.1)	3.062 (2.774–3.418	1.471 (1.281–1.687)	< 0.0005
middle	7,457 (54.2)	1.046 (0.952–1.150)	1.277 (1.142–1.428)	< 0.0005
Wealth Index				
rich class	2,400 (17.4)	1.00	1.00	
poor class	3,098 (22.5)	2.031 (1.819–2.267)	0.993 (0.844–1.167	0.929
middle class	8,267 (60.1)	1.473 (1.343–1.615)	1.074 (0.955–1.207)	0.235

Low SES means greater prevalence of almost all diseases. Systematic reviews by Sommer et al. [27] showed that low SES increased the risk of cardiovascular diseases, lung and gastric cancer, type 2 diabetes and chronic obstructive pulmonary disease, etc. The famous Whitehall study [28] conducted among state officials in the UK showed that socioeconomic inequalities were reflected in various diseases such as heart diseases, some forms of malignant diseases, chronic lung disease, gastrointestinal disease, depression, suicide and back pain. Socioeconomic inequalities in NCDs were associated with the unequal distribution of behavioural risk factors, particularly smoking, alcohol use, an unhealthy diet and a sedentary lifestyle [29].

Similar to other studies, increasing age, being female, having low educational level, being unemployed, inactive and belonging to the poor class were characteristics associated with presence of chronic diseases [21, 25, 30].

Demographic characteristics of the respondents such as gender and age are important predictors of health. There is a positive correlation between them and the morbidity. Our analysis revealed that the prevalence of NCDs was increasing with age. In other words, morbidity prevalence increased with age [31]. Most NCDs were found to be prevalent among women compared to men [32, 33]. These findings repeated in many studies focusing on poorer health of women and the elderly [34–37], indicating that special attention should be focused on the care of these vulnerable groups, as they were more likely to develop morbidity.

Education is a very important socioeconomic determinant of health. Men and women with lower levels of education had higher morbidity rates and premature mortality from all causes than their higher-educated counterparts [33]. People with higher levels of education were more likely to be employed, to have a higher social status and more stable income and they have more skills to cope with and overcome everyday life difficulties which could negatively affect their health[37].

In this study we found that unemployed people had poorer health status compared to those who were employed. This could be explained by the fact that a large part of the unemployed were economically inactive, the largest number of them being pensioners who were more frequently physically inactive and more often suffered from hypertension. The second large group of economically inactive persons were housewives. It is generally assumed that female workers had better health than full-time housewives [35].

The studies in several countries showed that the unemployed and their families had poorer health and were under the significantly higher risk of premature death than the employed [36]. The health consequences of unemployment were associated with both psychological and financial consequences of unemployment, such as the inability to satisfy everyday needs, insecurity and lack of self-esteem. The unemployed used health services to a lesser extent, and rarely visited a doctor of general medicine/occupational medicine and got hospital treatment [37].

In the current study, univariate logistic regression analysis showed that the respondents who belonged to the poor and middle class were in a higher risk for NCDs compared to the respondents who belonged to the rich class.

Multivariate logistic regression analysis did not show a statistically significant impact of the Wealth Index on the prevalence of NCDs. We found that many NCDs were mostly concentrated among the poor and middle class, and were inversely associated with decreasing wealth level. Our findings were in accordance with previous reports about the presence of angina, arthritis, asthma, depression, gastritis and migraine. However, cancer, allergy and diabetes mellitus were slightly more concentrated among wealthy individuals [30]. This results could be explained by the fact that people who lived in poverty may experience material deprivation and high stress levels, which may lead to constrained choices and a higher likelihood of engaging in risky health behaviours, increasing the risk of disease, following disease onset and reduced access to healthcare hindered opportunities to prevent complications [38].

Unmarried, divorced or widowed people had higher values of the morbidity index and often assessed their health worse than those who were married [39].

Strengths and limitations

The main strength of this study is the large sample which is representative of the adult population of the Republic of Serbia (aged $\geq$ 20 years). However, this study has several limitations. First, the cross-sectional design of the study makes it difficult to judge causal relations. This limitation can be overcome with the use of longitudinal data, which might better explain the changes in socioeconomic status and their impact on NCDs. Another limitation of the study is the problem of the accuracy of self-reports for chronic diseases, which may be subject to bias. Differences in prevalence rates between self-reported diagnoses and standardized measure may vary. The accuracy of self-reports for NCDs depends on different factors such as knowledge of the health problem, consequences on everyday life, willingness to report the problem and frequency of visits to healthcare services. According to the current literature, individuals with lower socioeconomic status tend to under-report symptoms which might result in an underestimation of the presence of NCDs.

Regardless of the above mentioned shortcomings of the methodical approach and a lack of a better, but much more expensive study design, this study, if repeated with the same methodical approach in a period of several years, could make us able to estimate the trends of diseases and their relationships to health determinants. That is why it is important to promote the repetition of similar studies on the health of the population in Serbia.

Conclusion

The elderly, females, those with lower levels of education and unemployed people have a greater prevalence of chronic diseases. Socioeconomic inequalities in health are the major challenge for health policy, not only because they represent social injustice but also because solving the health problems of underprivileged groups of the population can influence the improvement of the health status of the population as a whole.

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