



## ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

# The prevalence and factors associated with cervical cancer screening among women in the general population – evidence from the National Health Survey

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## SUMMARY

**Introduction/Objective** Serbia has been burdened with one of the highest cervical cancer incidence and mortality rates in Europe.

The objective of the study was to estimate the prevalence and factors associated with compliance to cervical cancer screening among women in the general population.

**Methods** The study used the data from 2013 National Health Survey of the population of Serbia. Logistic regression analysis was further used to examine demographic and socio-economic factors which affect the disparities in cervical cancer screening practices among the female population.

**Results** Every third woman (35.4%) has never done a Pap test in her lifetime. The highest percentage of respondents did their Pap tests after they were recommended by doctors (52.3%); 45% of women did it on their own initiative, and only 2.7% did it after they had been summoned to participate in an organized screening by their doctor. The multivariate logistic regression analysis revealed that the most important factors in women who had never undergone Pap tests were the following: age (being within the youngest or the oldest age group), rural residence and low level of education, poor socio-economic status, and marital status (have never married).

**Conclusion** Further strategies and interventions for improving cervical cancer incidence and mortality rates should be focused on socially and economically endangered population groups in order to reduce disparities in cervical cancer screening more effectively.

**Keywords:** cervical cancer screening; Pap test; socioeconomic inequalities

## INTRODUCTION

Cervical cancer is one of the most common causes of cancer death in women worldwide [1, 2]. Incidence and mortality rates have decreased in high-resource countries. Nowadays, approximately 87% of cervical cancer deaths occur in developing and low-resource countries due to the lack of awareness within their female populations and certain difficulties in running cervical cancer screening programs (Pap test) [3, 4].

Serbia has been burdened with one of the highest cervical cancer incidence and mortality rates in Europe. According to the Cancer Registry of the Republic of Serbia for 2015, the age-adjusted incidence rate was 18.1 and the mortality rate 6.1 per 100,000 women [5]. Regular screenings are the most effective way to reduce the cervical cancer incidence and mortality rates [6, 7]. Following the recommendations of the European Union Council, almost all European governments have made political decisions to introduce cervical cancer screenings in their health systems. However, the levels of implementation are uneven. The

majority of developed countries use organized screening models recommended by the relevant international professional organization while the others organize periodic screenings. There are considerable variations in screening strategies (i.e. age limit, screening intervals, etc.) and the extents to which they cover the target population [8].

Certain socio-demographic and cultural characteristics have been recognized as barriers to cervical cancer screening, including low income, low education level, marital status, rural residence, lack of knowledge and awareness of the importance of Pap tests, cultural beliefs, traditions, and fear of cancer [9, 10, 11]. The health care providers fail to inform and encourage women to get tested, which is also a common obstacle to the provision of adequate services. The main systemic barriers are the inaccessibility to healthcare services and thus the inaccessibility to Pap test execution facilities [12].

The objective of the study was to estimate the prevalence and factors associated with compliance to cervical cancer screening among women in the general population.

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## METHODS

This study used the data from the 2013 National Health Survey for the population of Serbia (without data from Kosovo and Metohija). This was the third population-based cross-sectional survey conducted by the Ministry of Health of the Republic of Serbia. In this survey, the research tools (methodology, questionnaires, instructions) were harmonized with the instruments of the European Health Survey second wave (EHIS wave 2) taking into account the defined, internationally accepted indicators [13]. The aim was to obtain the results that would be comparable with the results obtained in the EU member countries. The study used a national representative probability sample; two-stage stratified sample with known probability of the sample unit selection at every sampling stage. Three types of questionnaires were used in the survey.

Ethical Standards in Health Research were harmonized with the international World Medical Association Declaration of Helsinki. The study was approved by the Ethics Committee, which covers four major regions in Serbia based in Dr Milan Jovanovic Batut Public Health Institute of Serbia in Belgrade, Institute of Public Health in Novi Sad, Institute of Public Health in Kragujevac, and Institute of Public Health in Niš. All necessary steps were taken, in accordance with the Law on Personal Data Protection (Off. Gazette of RS No 97/08, 104/09) [14], to ensure the protection of privacy and confidentiality of collected information.

The study used only the data on respondents aged 15 and above and their respective households. The final sample for analysis included 7864 women. Demographic characteristics (i.e. age, marital status, settlement type, region) and socioeconomic status (i.e. education, employment, and well-being index) are used as independent variables. The cervical cancer screening practices were taken as dependent variables.

The data of interest were analyzed with the mathematical-statistical methods suitable for the data type.  $\chi^2$  test was applied to examine the differences in the frequencies of categorical variables. Logistic regression analysis was used to examine demographic and socio-economic factors associated with the disparities in cervical cancer screening habits. All results with the probability equal to or less than 5% ( $p \leq 0.05$ ) were considered statistically significant. Statistical analysis was performed in a commercial standard software package IBM SPSS Statistics, Version 19.0 (IBM Corp., Armonk, NY, USA).

## RESULTS

The 62.1% of the respondents had done a Pap test prior to the study; 42.6% of them had

undergone cervical cancer screening in the previous three years (22.7% during 12 months and 13.7% one or two years prior the survey). Every third subject (35.4%) had never had a Pap test.

During the three years prior to the survey, a Pap test had been executed most frequently on women aged 25–34 (68.4%), married women (52.7%), Belgrade residents (57.1%) and other urban dwellers (47.8%), highly educated (66.6%), employed (69.5%), and women belonging to the richest population group (62.8%) (Table 1).

The highest percentage of respondents did the Pap test after it had been recommended by a doctor (52.3%); 45% of subjects did it on their own initiative, and only 2.7% did it after being summoned by medical professionals to attend organized screenings.

The analysis shows that there is a statistically significant correlation between all the observed demographic

**Table 1.** The frequency distributions of the last Pap test based on the demographic and socio-economic characteristics of the respondents

Variables	In the last 12 months	1–2 years ago	2–3 years ago	≥ 3 years ago	Never	No answer	p*
<b>Age</b>							
< 24	15.5	6.1	1.4	1.1	75	0.9	< 0.001
25–34	39.1	21.7	7.6	5.8	25.2	0.6	
35–44	37.7	19.7	8.7	13.1	20	0.8	
45–54	29.3	20.5	9.8	19.7	19.2	1.5	
55–64	21.6	13.5	6.1	29.8	26.7	2.3	
≥ 65	5.7	5.4	3.7	30.5	48.7	6	
<b>Marital status</b>							
single	18.9	9.5	2.7	3.4	64.2	1.3	< 0.001
married	27.4	17.3	8	20.4	25.1	1.8	
widow	9.9	5.6	3.1	29	46.5	5.9	
divorced	27.8	15.8	6.9	25.9	21.8	1.8	
<b>Type of residence</b>							
city	26.7	14.6	6.5	21.9	28.4	1.9	< 0.001
other	17.2	12.4	5.7	16.6	44.8	3.3	
<b>Region</b>							
Vojvodina	22.9	12.9	5.6	21.5	35.4	1.9	< 0.001
Belgrade	33.2	16.9	7	23.8	16.8	2.3	
Šumadija and W. Serbia	18.6	12.8	5.5	16.9	43.6	2.6	
S. and E. Serbia	17.8	12.6	6.6	17.2	42.2	3.6	
<b>Education</b>							
primary school	9.4	6.8	4	20.2	54.5	5.1	< 0.001
high school	27.4	17.4	7.7	20	26.5	1	
university	40.8	19.2	6.6	17.1	15.4	1	
<b>Employment status</b>							
employed	40.5	20.9	8.1	13	16.8	0.7	< 0.001
unemployed	25.5	18.1	6.6	15.3	32.8	1.7	
inactive	13.1	8.4	5	24.6	45.2	3.7	
<b>Financial status</b>							
I (the poorest)	10.7	7.4	4.8	18.7	53.6	4.8	< 0.001
II	17.3	13.6	6.3	20.9	40.3	1.6	
III	22.4	14	7.4	20.5	33	2.7	
IV	28	17.3	5.7	20.1	26.9	2	
V (the wealthiest)	38.7	17.4	6.7	17.6	18.4	1.2	

\* $\chi^2$  test

and socio-economic features and the screening initiatives. Highly educated subjects were most likely to take screening examinations voluntarily (60.6%). For the women with the lowest education level the percentage amounted to 29.1%; these respondents (with elementary or lower education) were significantly more likely to undergo Pap testing after being recommended to do so by a doctor (66.8% to 37.2%). The same pattern is revealed for financial statuses. The wealthy respondents did their Pap tests more frequently on their own initiative (57.1%) than the poorest (30.9%) ones. The opposite correlation was determined for screenings performed at doctors' recommendations. The poorest respondents were most likely to get tested in suchlike manner (64.3%). In terms of employment, the analysis reveals that employed women were most likely to get tested at their own request (50.7%); 43.9% of unemployed and 38.7% of inactive respondents reported the same practice. The respondents from Belgrade (50.3%) and other urban areas (50.1%) were more likely to take the Pap test on their own initiative, while women from rural areas (60.3%) and other regions were more likely to get tested after doctors had recommended them to do so (Table 2).

The multivariable logistic regression analysis shows that the most important factors in women who have never done a Pap test are as follows: age (being within the youngest or the oldest age group), rural residence and low level of education, poor socio-economic status, and marital status (never have married). The respondents with the lowest education level were four times less likely to take a Pap test than those with the highest education level (OR = 4.203). Those who belong to the poor group, based on the index of well-being, did their Pap smear tests 2.8 times less frequently than those who were classified as wealthy (OR = 2.856). Women who have never been married were significantly less likely to get tested than those who have been married (OR = 2.761). The same applies to economically inactive women (OR = 1.632). The youngest subjects, i.e. those who were less than 24 years old, did Pap tests least frequently (OR = 1.816).

## DISCUSSION

Every third women had never had a Pap test in her life. The most important factors in women who had never undergone Pap tests were the following: age (being within the youngest or the oldest age group), rural residence and low level of education, poor socio-economic status, and marital status (have never married).

The results of our study show that 62.1% of the subjects had done a Pap smear at some point in time prior to the survey. Only 42.6% of our respondents had done it during the three years prior to the study. Compared to our results, higher rates of screening were recorded in the national research in Brazil in 2013 on a sample of 31,845 respondents (78.8%) [15]. Similar rates were also recorded by the Cancer Barometer surveys in France; however, they also noted a declining trend from 75.3% in 2006 (n = 3820) to 71.9% in 2010 (n = 3727) [16]. Quite contrary to this,

**Table 2.** Frequency distributions for Pap test initiatives based on the demographic and socio-economic characteristics of the respondents

Variables	Personal initiative	Doctor's recommendation	Summoned to screening (by a doctor)	p*
<b>Age</b>				
< 24	41.1	57.9	1	< 0.001
25–34	46.6	52	1.4	
35–44	52.7	45.1	2.2	
45–54	43.5	53.1	3.4	
55–64	41.7	54.2	4.1	
≥ 65	39.1	56.4	4.5	
<b>Marital status</b>				
single	57.7	41	1.3	< 0.001
married	42.1	54.9	3	
widow	41.9	56	2.1	
divorced	58.2	39.5	2.3	
<b>Type of residence</b>				
city	50.1	47.9	2	< 0.001
other	35.7	60.3	4	
<b>Region</b>				
Vojvodina	46.7	51.9	1.4	< 0.001
Belgrade	50.3	48.9	0.8	
Šumadija and W. Serbia	42	53.8	4.2	
S. and E. Serbia	39	55.9	5.1	
<b>Education</b>				
primary school	29.1	66.8	4.1	< 0.001
high school	43.5	53.9	2.6	
university	60.6	37.2	2.2	
<b>Employment status</b>				
employed	50.7	46.7	2.6	< 0.001
unemployed	43.9	54	2.1	
inactive	38.7	58	3.3	
<b>Financial status</b>				
I (the poorest)	30.9	64.3	4.8	< 0.001
II	35.1	62.1	2.8	
III	43	53.9	3.1	
IV	48.2	49.9	1.9	
V (the wealthiest)	57.1	40.7	2.2	

\* $\chi^2$  test

the data obtained in population-based cross-sectional surveys within Lithuanian Health Behaviour Monitoring that included 4248 women aged 25–60 years revealed a constant increasing trend – from 60% in 2006 to 74.2% in 2014. The likelihood of not being screened for cervical cancer was lower among older than among younger women (OR = 0.70; 95% CI = 0.61–0.82) [17].

Developed countries reported even higher screening rates. For example, 83% of women reported having a Pap smear test performed during the previous three years in the United States [18]. The analysis of a cross-sectional survey from Great Britain indicates that 91% of women aged 40–74 years had had a cervical smear test; 3% of women aged 53–74 years had never undergone cervical screening [19].

Several Latin American countries reported the screening rates that are lower than ours. In all countries in

**Table 3.** The cross ratios (OR) and 95% confidence intervals (CI) for women who have never done the screening, based on the demographic and socio-economic characteristics

Variables	Univariate model		Multivariate model	
	OR (95% CI)	p	OR (95% CI)	p
<b>Age</b>				
< 24	2.899 (2.424–3.468)	< 0.0005	1.816 (1.397–2.362)	< 0.0005
25–34	0.317 (0.268–0.375)	< 0.0005	0.505 (0.406–0.628)	< 0.0005
35–44	0.236 (0.199–0.280)	< 0.0005	0.472 (0.383–0.582)	< 0.0005
45–54	0.226 (0.192–0.267)	< 0.0005	0.401 (0.330–0.488)	< 0.0005
55–64	0.350 (0.303–0.404)	< 0.0005	0.491 (0.417–0.579)	< 0.0005
≥ 65	1		1	
<b>Marital status</b>				
single	1		1	
married	3.603 (3.094–4.196)	< 0.0005	2.761 (2.231–3.416)	< 0.0005
widow	1.183 (0.888–1.576)	0.25	1.347 (0.994–1.826)	0.055
<b>Type of residence</b>				
city	1		1	
other	1.524 (1.334–1.741)	< 0.0005	1.006 (0.849–1.192)	0.945
<b>Education</b>				
primary school	1		1	
high school	2.113 (1.760–2.548)	< 0.0005	1.656 (1.339–2.049)	< 0.0005
university	8.334 (6.575–10.563)	< 0.0005	4.203 (3.164–5.583)	< 0.0005
<b>Employment status</b>				
employed	1		1	
unemployed	5.202 (4.342–6.233)	< 0.0005	1.632 (1.302–2.045)	< 0.0005
inactive	1.989 (1.702–2.324)	< 0.0005	1.249 (1.049–1.487)	0.012
<b>Economic well-being index</b>				
wealthy	1		1	
middle	1.838 (1.557–2.171)	< 0.0005	1.639 (1.339–2.005)	< 0.0005
poor	4.117 (3.272–5.181)	< 0.0005	2.856 (2.121–3.846)	< 0.0005

question, the ratio of a recent Pap smear test was below 55%; for example, 49% (95% CI, 49–50%) in the Dominican Republic, 42% (95% CI, 41–43%) in Bolivia, and 52% (95% CI, 51–53%) in Peru. There have been indications that the percentage of women with Pap test awareness was growing in both Bolivia and Peru, with the level consistently higher in the latter country [20].

The results obtained for the countries in the region vary significantly. In Greece, women aged 40–69 years were recruited for the Pap smear screening program. About 7% of them reported that they had never done a Pap test before they entered the program and 28.8% had not done it during the previous three years [21]. Reportedly, cervical cancer screening rates in Hungary amount to 74%. On the other hand, the screening coverage among women in their reproductive age in Albania is extremely low. It is the lowest detected rate in the region with only 3.2% of women 15–44 years old tested. The organized cervical cancer screening program in Bosnia and Herzegovina has not improved significantly and the country still lacks national cervical cancer registries and Pap test databases. In Bulgaria, there is no national program for cancer prevention. Currently, North Macedonia also lacks the national cancer registry. However, several countries in the region have managed to establish organized cervical cancer screenings that are

functioning relatively well. The others are still in the early or preparatory stages of suchlike screening practices. In countries where cervical screening is performed, plans and strategies have been established for switching to organized screenings in the near future [22].

The results of our analysis show that only 2.7% of women responded to a doctor's call to attend organized screening. The Ministry of Health of the Republic of Serbia appointed a special working group for the prevention of cervical cancer in June 2006 as an official response to high incidence of cervical cancer. The group's task was to establish a national program for the prevention of cervical cancer. The program was adopted in 2008, but the results have still not been satisfactory, primarily because of the low response from the women whose health culture is low. In addition, the implementation of health promotion programs has been insufficient, probably due to disregarding the recommendations from the appointed group, as well as the incompetence in managing suchlike programs.

The current literature on the topic reports that recent medical visits are a significant indicator of recent cervical cancer tests [20]. The results of this study show that the highest ratio of respondents did their Pap test after they had been advised by a doctor to do so (52.3%). Women from Latin America who had recently visited their doctor were 1.47–3.44 times more likely to have a recent Pap smear test than those who had not visited a doctor recently [20]. The probability of having a Pap test in this manner was 48% higher in Bolivia (95% CI, 39–59%), 241% higher in Brazil (95% CI, 182–312%), 98% higher in the Dominican Republic (95% CI, 85–113%), 77% higher in Guatemala (95% CI, 36–125%), and 94% higher in Nicaragua (95% CI, 67–129%). In summary, women were 47–244% more likely to receive a recent Pap smear screening after they had recently visited a doctor than those who had not. These data were adjusted to other socioeconomic covariates. Even the poorest women with the recent medical visit were more likely to get tested than the richest women who had not recently visited a doctor. The relations between a recent visit to a doctor and cervical cancer screening may operate through different pathways. Screening may coincide with prenatal or postnatal care or the treatment of any illness as opposed to seeking preventive care directly [23, 24].

Cervical cancer screening habits in Serbia exhibit significant disparities in women based on socioeconomic and demographic characteristics. The multivariable logistic regression analysis shows that the most important factors in women who have never done a Pap test are the following: age (being within the youngest or the oldest age group), rural residence and low level of education, poor socioeconomic status, and marital status (have never married).

Some studies suggest that the participation in the cervical screening is significantly higher in younger women



who belong to higher social classes, are better educated and financially better off, who live in urban areas and visit their gynecologist on a regular basis. In contrast, women of lower socioeconomic status and education, unemployed and disabled women, and women who do not have a habit of visiting a gynecologist regularly are less likely to enter a screening program [25].

Some previous studies in the field have shown that household income is a significant predictor of cervical cancer screening practices and habits [26]. The current findings from Latin America show that the knowledge about the Pap smears and their importance in cancer prevention increases with age (reaching a plateau in the age group 31–35 years) and with education levels. In Bolivia, women with no formal education were 19% (95% CI, 16–22%) less likely to be familiar with Pap smear tests than those with primary education. The subjects with secondary and higher education were 11% (95% CI, 10–13%) and 15% (95% CI, 14–17%) more likely to be informed, respectively. The results from Ecuador, Nicaragua, Peru, and Trinidad and Tobago show that the probability of cervical cancer screening was significantly higher in the urban than in the rural population. The opposite pattern has been recorded in Bolivia [20]. In Brazil, the screening prominence was higher in the subjects with households in urban regions, with partner cohabitation, with better education and with private health insurance. Also, those who regularly underwent screenings with established protocols had healthier lifestyles, including healthier behavior patterns in terms of cervical cancer prevention [27].

Our results are in accordance with other findings reported for European countries. For example, in Lithuania, the non-attendance to cervical screenings was associated with lower education, being single, and having rare contacts with doctors [17]. The survey conducted in Italy revealed that the age group 55–64 years (OR = 2.11, 95% CI: 1.76–2.53) and divorce (OR = 1.32, 95% CI 1.02–1.71) were important factors [28].

The current literature suggests that participation in cervical screenings of those individuals with lower income can be enhanced with adequate interventions at the primary health care level, where an additional focus should be placed on the members of vulnerable groups. Therefore, it is important to keep monitoring how the current public health policies, like expanding the scope of free cervical cancer examination of women whose households are in the lower 50% of the income bracket, impact the participation rates over time [26].

Our study has several limitations. The main limitation is its cross-sectional design, which does not permit inferences about potential causal relations between the explanatory variables and disorders of interest. In addition, self-reporting is always prone to recall biases in describing past screening experiences or socioeconomic variables. Several factors that may influence the rate of participation in cervical cancer screenings, such as accessibility and availability of screening facilities, were not included in this study. These factors should be examined in the future. The further research in the field is also needed in order to

explore longitudinal trends and identify other potential factors of inequalities in cervical cancer screening. For better understanding and more efficient implementation of public health strategies, focusing on women with low socio-economic status, we need comprehensible studies to be conducted constantly in the future.

## CONCLUSION

Cervical cancer is a preventable disease. When regular screening is properly implemented, early detection and appropriate treatment are possible. In developing countries like Serbia, a great deal more has to be done to improve the screening rates. The measures should focus on increasing the accessibility and availability of cervical cancer screening facilities and services and on decreasing health expenditure. Also, the infrastructure has to be improved. Health care providers must be better educated and equipped.

Educational programs and strategies for raising awareness about cervical cancer, cervical cancer screening and prevention, are crucial steps in deepening and expanding the knowledge of the female population about the issue. As we have shown in this paper, health care service providers have a major impact on the decisions their patients make about their health care and prevention. Their role is crucial in addressing the lack of knowledge, cultural barriers, shame, and fear of pain. Thus, they may have a huge impact on the success of all preventive measures and interventions. Finally, health care system and its health care centers should incorporate cervical cancer screening into their health services at the primary health care level.

The results of this study may be helpful to decision makers, health care providers, and the whole community in designing proper strategies to handle Serbian unfavorable cervical cancer statistics. The findings of this study emphasize the need to explore continuously the reasons why women do not attend regular cervical cancer screenings and to constantly examine the potential ways of supporting and encouraging vulnerable groups to take part in regular screenings. All the strategies and interventions should place an additional emphasis on those population groups that are socially and economically vulnerable and thus most endangered. Only by doing so, we can effectively reduce the current disparities in cervical cancer screenings and diminish the inequalities in the diagnosis stage and treatment, and eventually in survival rates.

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## Учесталост и фактори повезани са скринингом рака грлића материце код жена у општој популацији – докази из Националног истраживања здравља

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**Увод/Циљ** Србија доживљава високу оптерећеност карциномом грлића материце и има једну од највећих стопа инциденције и смртности у Европи.

Циљ студије је процена преваленције и фактора повезаних са коришћењем скрининга на карцином грлића материце у општој популацији жена.

**Метод** Коришћени су подаци из националног Истраживања здравља становништва Србије 2013. Логистичка регресиона анализа је примењена за испитивање повезаности демографских и социо-економских фактора са неједнакостима приликом коришћења скрининга на рак грлића материце.

**Резултати** Свака трећа жена (35,4%) никада није урадила Папаниколау тест током живота. Највећи је проценат испитаница које су Папа тест урадиле по савету лекара (52,3%),

а затим самоиницијативно – 45% жена, док позив лекара у оквиру организованог скрининга наводи свега 2,7% жена. Мултиваријантна логистичка регресија као најзначајније факторе за жене које никада нису урадиле Папа тест издвојила је најмлађу и најстарију добну групу, ванградска насеља, низак ниво образовања, сиромашну класу и жене које никада нису биле у браку/ванбрачној заједници.

**Закључак** Ефективне стратегије и интервенције треба да буду усмерене на социјално и економски угрожене групе како би се ефикасно смањили диспаритети у скринингу карцинома грлића материце.

**Кључне речи:** скрининг на карцином грлића материце; Папа тест; социо-економске неједнакости