

# Inequalities in cervical cancer screening in Eastern Europe: perspectives from Bulgaria and Romania

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## Abstract

**Objectives:** The incidence of cervical cancer in Eastern Europe has been on the rise, in contrast to the reduction in incidence in most countries of Western Europe. The objectives of the paper are to delineate the inequalities in cervical cancer screening in Romania and Bulgaria and identify explanations for these inequalities.

**Methods:** Representative samples of women – 1 099 in Bulgaria and 1 053 in Romania, were interviewed through a structured questionnaire.

**Results:** We found multiple dimensions of inequalities in cervical cancer prevalence and prevention, including disparities in comparison to other countries, disparities due to socioeconomic status, education, residency and ethnicity, as well as differential barriers faced by women in access to screening and in relationships with providers. We identified mediators of the effects of socio-economic status on screening history.

**Conclusions:** The study concludes that the effect of SES on screening is mediated mainly by the structural barriers in accessing the healthcare system, as well as women's perceptions of the multiple costs of the smear. These conclusions are relevant to the development of national screening programs and health promotion in the two countries.

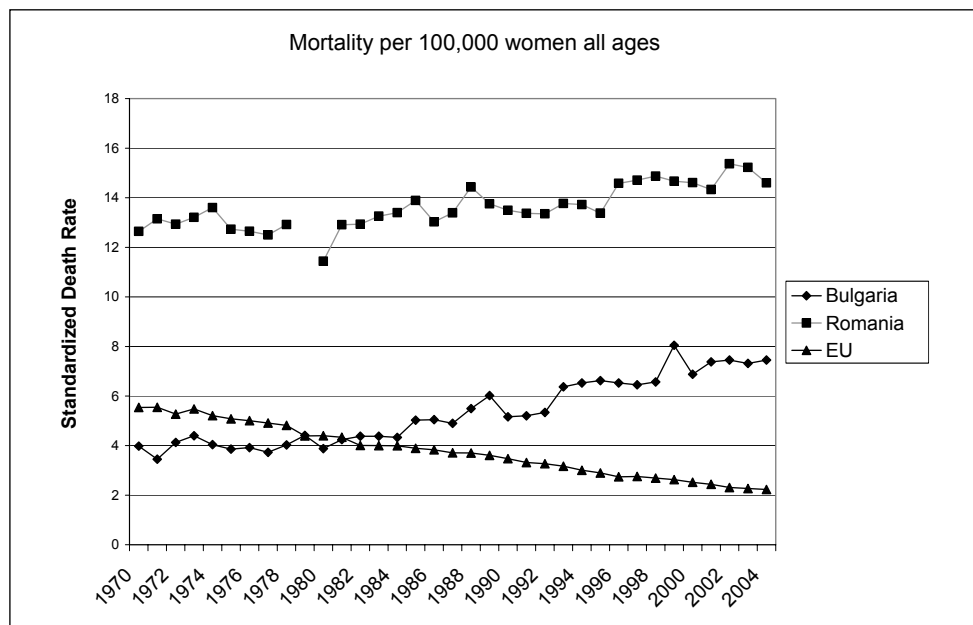
**Keywords:** Cervical cancer screening – Inequalities – Eastern Europe.

## Introduction

Cervical cancer is a serious public health problem, being one of the most prevalent cancers among women worldwide, along with breast cancer. However, 80% of all new cervical cancer cases diagnosed annually are in developing countries where prevention programs are unavailable or limited<sup>1</sup>. Cervical cancer is the first type of cancer for which systematic screening programs have been developed using the Papanicolaou smear (Pap). The goal of screening is the early detection and treatment of asymptomatic pre-cancerous lesions, preventing progression to cancer.

In countries where screening programs have been available since as early as 1950–1960 cervical cancer incidence and mortality rates have fallen to low levels. Cervical cancer mortality rates (per 100 000 women) in 2004 were 1.4 in Finland; 2.6 in Sweden; and 2.7 in the United Kingdom<sup>2</sup>. In the United States for the same year the rate was 2.4 per 100 000 of all races, with significant racial and ethnic disparities<sup>3</sup>. In comparison, in Bulgaria the mortality rate for 2004 was 7.45 and for Romania it was 14.6. The literature also illustrates disparities in morbidity, mortality, survival, access to clinical trials, stage of diagnosis and definitely in access to screening<sup>4–8</sup>. These are demonstrated along several domains, between and within countries<sup>9,10</sup>, most often associated with race/ethnicity, socioeconomic position, age and immigrant status. It is undeniable, that, “the social inequities that exist among the cervical cancer continuum are astounding”<sup>6</sup>.

Bulgaria and Romania, as other Eastern European countries, have faced major changes in the patterns of mortality and morbidity since the transition from communism to market economy and democracy that was paralleled by a dramatic



**Figure 1.** Mortality from cancer of the cervix in Bulgaria, Romania and the EU. Data are from the WHO Health for All Database up to 2004, which is the last year for which data are available for all countries. Bulgaria and Romania joined the EU in 2007.

deterioration in public health<sup>11–13</sup>. This has included a consistent rise in incidence and mortality of cervical cancer in the two countries, which is in contrast with the decreasing rates of the disease in other European countries<sup>5</sup>, as well as with the rates in the past (Fig. 1)

In Bulgaria, mortality from cervical cancer has steadily increased from the late 1980's to 2004, from 4.0 per 100 000 to 7.5 per 100 000, which is 3 times the European Union rate<sup>2, 14</sup>. The incidence of cervical cancer in Bulgaria has been on the rise during the past two decades, rising from 14.6 per 100 000 in 1980 to 26.9 in 2004<sup>2, 14, 15</sup>. The latest data available from WHO for Romania are for 2006 and indicate a mortality rate of 14.72 per 100 000 women, which is the highest mortality rate in Europe, a position held for the past 20 years. This rate is nearly 7 times higher than the average of European Union countries<sup>2, 16</sup> (Fig. 1). Incidence rates for 2004 are 29.9 per 100 000 and they are again the highest rates in Europe<sup>2</sup>.

One of the most striking consequences of the transitional period in the Bulgarian healthcare system was the disintegration of the previously existing cervical cancer screening program, which offered routine cytological testing for women from the 1970's until 1989. About 1.5 million women were screened annually until 1989, after which there was a progressive drop, with only 205 081 screening tests reported in 1996<sup>17</sup>. This high screening coverage corresponded with low mortality rates of 3.88 per 100 000 in 1980 (Fig. 1).

To address this issue, the National Strategy for Oncological Screening in Bulgaria (2001–2006), was commissioned by the Ministry of Health and approved by Parliament in 2000, but was never fully implemented; current screening remains oppor-

tunistic and thus coverage remains low<sup>18</sup>. A systematic national screening program has never been implemented in Romania, neither before nor after the political changes in 1989. A cervical screening program was introduced by the Romanian Ministry of Health in 1972, targeting women who worked in factories and public institutions. Since the medical personnel went personally to the factories to take the Pap smears, this also provided them with the opportunity to identify and register unwanted pregnancies. For this reason, Romanian women were reluctant to take part in cervical screening and screening rates were low<sup>19</sup>. Later, there were several attempts by the Ministry of Health and Family to develop a coherent strategy to reduce mortality from cervical cancer, but the outcomes have been unsatisfactory due to lack of implementation at the national and local levels, chronic financial deficits, and poor management<sup>19</sup>.

The above circumstances, as well as the absence of definitive data on screening coverage, motivated us to conduct the current study with the aim of assessing the situation in Bulgaria and Romania. One of the aims of the study was to identify the socio-demographic and economic differences in screening history. Existing discussions in this area focus on the extent to which disparities in screening uptake are a reflection of individual circumstances and personal characteristics, or of structural limitations. Studies have considered different determinants of screening and screening disparities<sup>20, 21</sup>, including the relative contribution of cognitive explanations, which are a reflection of the personal agency and voluntary choices to engage in the behavior of screening, on the one hand and psychosocial and structural explanations, having to do with social and material resources and barriers, on the other hand.

Potential barriers to regular screening behavior can relate to characteristics and structure of the healthcare system and to the doctor-patient relationship. Psychosocial factors, such as perceived stress and social support, can also foster inequalities in screening<sup>22</sup>. People with overwhelming daily demands, or with limited social support, will have less possibility of engaging in cervical screening.

There are several cognitive determinants that may also be involved in decisions regarding screening uptake<sup>8,22</sup>. Of those that have been used in predicting health-related behaviors<sup>23–26</sup>, for the purposes of this analysis we focus on one's beliefs related to health and illness and one's attitudes towards the specific screening test.

We believe that the question of what are the explanations for the socio-economic disparities in cervical screening is particularly important in the current situation in Eastern Europe, since the issue of locating responsibility for cervical cancer prevention has been brought into relief in the context of healthcare reform<sup>18,27,28</sup>.

## Methods

Data were collected from women through face-to-face structured interviews by a network of trained interviewers in Bulgaria and Romania. The nationally representative sample of women 20–65 years of age from Bulgaria was 1 099 women and from Romania it was 1 053 women, with a response rate of 88 % in Bulgaria and 90 % in Romania. The sample characteristics are presented in Table 1.

A structured questionnaire was developed, informed by the integrated theoretical model, and existing methodologies in the field<sup>8,23,26,29</sup>. Reliability statistics (Chronbach  $\alpha$ ) for the scales are included in Table 4 and Table 5. The structured questionnaire contained sections which are relevant for this paper.

Demographic characteristics: included age, education, marital status, ethnicity, religion, and place of residence. We created a variable for socioeconomic status (SES) in 3 categories ranging from good, medium, to low SES based on self-assessed financial situation.

Self-rated health was assessed through a 5 point scale<sup>30</sup>. Past screening history: The question asked: "Have you ever had a cervical smear?" The possible answers were yes, no, I don't know. Screening history is the main dependent variable used in the following analyses as a dichotomous variable (yes, no). Women who had had a cervical smear were also asked when was their last smear (less than 6 months ago, over 6 months ago, over a year ago, over 3 years ago, over 5 years ago).

Perceived barriers to cervical screening: Based on the literature<sup>29</sup> and inductively from qualitative interviews conducted

**Table 1.** Sample characteristics in Bulgaria and Romania.

	Bulgaria	Romania
<b>N</b>	1099	1053
<b>Mean Age</b>	49.2	40.95
<b>Education</b>		
Up to 8 <sup>th</sup> grade	26.7 %	29 %
High School	50.6 %	47.2 %
University	22.8 %	23.8 %
<b>Marital Status</b>		
Married	75 %	74.1 %
Single	13.7 %	13.7 %
Divorced	4.9 %	4.8 %
Widowed	6.4 %	7.6 %
<b>Financial situation</b>		
Low	38.9 %	19.4 %
Medium	40.9 %	70 %
High	20.1 %	10.7 %
<b>Ethnicity</b>		
Bulgarian	80.4 %	–
Romanian	–	87.5 %
Turkish	10.3 %	–
Roma	8.3 %	5.5 %
Hungarian	–	1.1 %

as part of our study<sup>19,31</sup>, sixteen items were used to identify potential barriers to screening. The items assessed, on a 5-point scale, the extent to which certain problems are important for women when seeking care, including systemic, social and personal barriers.

Psychosocial constructs: A 6-item perceived stress scale was used, which rated on a 5-point scale the extent to which the women felt nervous, restless, and needing to make an effort<sup>32</sup>. They are coded 1 = none of the time to 5 = all of the time. A brief social support scale was used containing 4 items on a 5 point scale<sup>32</sup>. They are coded 1 = none of the time to 5 = all of the time.

Cognitive constructs: According to the Health Belief Model<sup>33</sup> human action is strongly influenced by perceived personal susceptibility to, perceived severity of a disease; and by perceived benefits and perceived "costs" of a preventive health action ("costs" included fear of the test, distress and discomfort, embarrassment, painfulness, inconvenience). The constructs from the Health Belief Model assessed beliefs about screening through a 21-item scale specific to cervical cancer screening, which included sub-scales of perceived susceptibility to cervical cancer, perceived severity of cervical cancer, "costs" of cervical smears and benefits of smears<sup>26</sup>. They are coded from 1 = definitely yes to 5 = definitely no.

**Table 2.** Sociodemographic determinants of women's screening history in Bulgaria.

SMEAR TEST	AGE			
	Age between 20 / 29	Age between 30 / 49	Age between 50 / 65	
Yes	27.2	51.4	49.6	
No/DK	72.8	48.6	50.4	
$\chi^2 = 40.03$ (df = 2, p < 0.001)				
	MARITAL STATUS			
	Married/cohabitation	Single	Divorced	Widowed
Yes	50.4	25.3	46.3	37.1
No/DK	49.6	74.7	53.7	62.9
$\chi^2 = 34.33$ (df = 3, p < 0.001)				
	NATIONALITY/ETHNIC GROUP			
	Bulgarian	Turkish	Roma	
Yes	50.9	29.2	8.8	
No/DK	48.1	70.8	91.2	
$\chi^2 = 76.48$ (df = 3, p < 0.001)				
	SIZE OF RESIDENCE			
	Up to 5,000	Up to 50,000	Up to 500,000	Over 500,000
Yes	32.4	45.0	54.5	60.7
No/DK	67.6	55.0	45.5	39.3
$\chi^2 = 50.45$ (df = 3, p < 0.001)				
	EDUCATION			
	Primary	Middle school	High school	College and higher
Yes	14.9	30.7	46.9	67.2
No/DK	85.1	69.3	53.1	32.8
$\chi^2 = 100.95$ (df = 3, p < 0.001)				
	FINANCIAL SITUATION			
	High	In between	Low	
Yes	60.2	49.4	34.7	
No/DK	39.8	50.6	65.3	
$\chi^2 = 42.15$ (df = 2, p < 0.001)				

According to the Theory of Planned Behavior<sup>24</sup>, one's behavior is best predicted by one's intentions to engage in this behavior. This intention is shaped by one's attitudes toward the screening behavior, one's perceived behavioral control of that behavior and subjective norms. From the Theory of Planned Behavior we used the construct of attitudes toward screening. The attitudes were assessed through a semantic differential containing 5 items, asking the extent to which women thought a smear test is important, beneficial, wise, safe and good<sup>26</sup>. They are coded 1 = extremely important to

5 = not at all important. The systemic barriers, psychosocial and cognitive constructs are used as mediators in the following analyses.

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) by conducting descriptive statistics, ANOVA for comparison of means, and Chi-square for comparison of proportions. Scale scores were calculated for those subjects who had responded to all the items in the scale. To examine the best predictors of screening history, logistic regression analysis was conducted.

**Table 3.** Sociodemographic determinants of women's screening history in Romania.

SMEAR TEST	AGE			
	Age between 20 / 29	Age between 30 / 49	Age between 50 / 65	
Yes	11.0	23.7	22.9	
No/DK	89.0	76.3	77.1	
$\chi^2 = 18.8$ (df = 2, p < 0.001)				
	MARITAL STATUS			
	Married/cohabitation	Single	Divorced	Widowed
Yes	22.2	9.2	32.0	13.8
No/DK	77.8	90.8	68.0	86.3
$\chi^2 = 19.06$ (df = 3, p < 0.001)				
	NATIONALITY/ETHNIC GROUP			
	Romanian	Hungarian	Roma	Other
Yes	21.2	24.1	5.2	6.3
No/DK	78.8	75.9	94.8	93.8
$\chi^2 = 11.19$ (df = 3, p < 0.01)				
	AREA OF RESIDENCE			
	Urban		Rural	
Yes	24.5		14.6	
No/DK	75.5		85.4	
$\chi^2 = 15.88$ (df = 1, p < 0.001)				
	EDUCATION			
	Primary	Middle School	High School	College and higher
Yes	9.4	11.1	23.3	28.8
No/DK	90.6	88.9	76.7	71.3
$\chi^2 = 26.61$ (df = 3, p < 0.001)				
	FINANCIAL SITUATION			
	High	In between	Low	
Yes	33.3	20.2	13.9	
No/DK	66.7	79.8	86.1	
$\chi^2 = 16.66$ (df = 2, p < 0.01)				

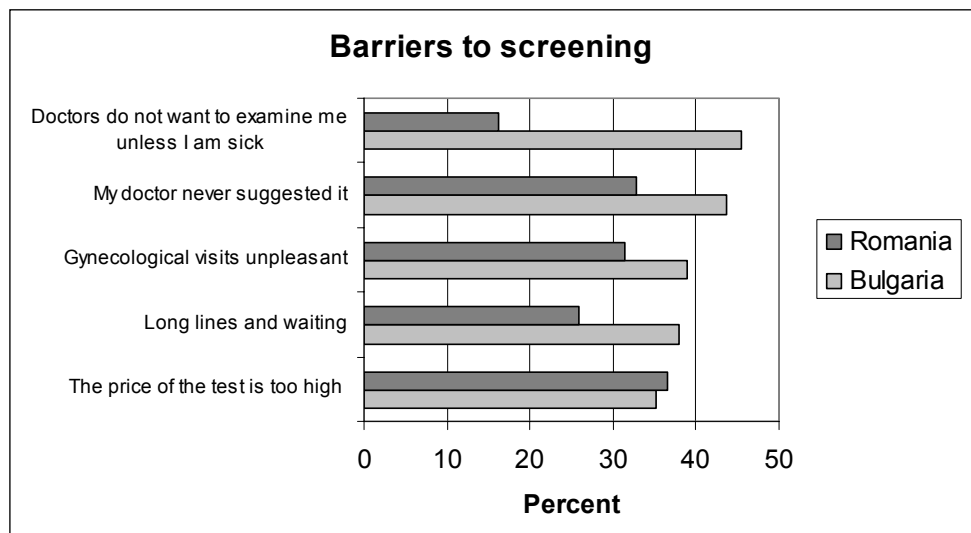
## Results

### *Screening history and socio-demographic dimensions of inequalities in screening uptake*

In Bulgaria, 45.9% of the women reported that they had had a smear test at least once and 49.4% reported they had never had a smear, while 4.7% of women could not confirm whether they had been tested or not. Of the women who had had Pap smears performed, 14.3% stated that their last one was less than 6 months ago, 21.7% that it was less than a year ago,

30.8% that it was less than 3 years ago, 10.5% that it was less than 5 years ago and for 21.1% it was over 5 years ago.

Our data document that only 20.2% of the Romanian women reported they had ever had a cervical smear; 73.4% stated that they had never received one, and 6.5% of women did not know if they had received one or not. Of those women who had had smears, 19% had their last smear less than 6 months ago, 22.3% less than one year ago, 25.1% less than 3 years ago, 10.9% less than 5 years ago and 21.8% over 5 years ago.



**Figure 2.** Most important systemic barriers to accessing cervical screening in Bulgaria and Romania.

Social and demographic characteristics are important determinants of women’s screening history. Our findings are consistent with what can be expected from the literature in terms of disparities in screening<sup>6</sup>; however the range between the different groups is very large. Tables 2 and 3 show that for both countries, women who were in the younger age group, who were single, who were of ethnic minorities, living in smaller villages and towns, having fewer years of education and lower financial resources were significantly less likely to have had a smear. For example, one out of two women of Bulgarian ethnicity reported being screened (50.9%), compared with one out of 3 women of Turkish ethnicity (39.2%), and about one out of ten women of Roma ethnicity (8.8%), pointing to a greater risk of cervical cancer among minority women in Bulgaria (Tab. 2). Similarly, Roma women in Romania had the lowest probability of having had a smear test, with only 5.2% of them reporting being screened (Tab. 3). Religious affiliation in Bulgaria was also associated with screening history, with 52% of women of Christian affiliation reporting having had a smear test, compared to 26% of Muslim women. For Romania, being Orthodox Christian, Catholic or Neo-protestant was not related to screening history.

#### *Systemic barriers to accessing cervical screening*

We identified a sub-scale of “systemic barriers” consisting of 10 items – having to do with access to the healthcare system and with provider-patient relationships and constructed an index based on them. We illustrate the barriers that the women identified as “important” or “very important” most frequently in Fig. 2. The most important barriers they have faced, or perceived that they might face (for those who have not had smears) are similar for Bulgarian and Romanian women,

though they do not rank exactly the same: “doctors do not want to examine me unless I am sick”, “my doctor never suggested the smear”, “gynecological visits are unpleasant”, “the price of the smear is too high” and “there are long lines and waiting”.

Our study found that the extent to which women faced systemic barriers was associated with socio-demographic variables, further underscoring the inequalities in access and relations in the healthcare system. Using the summed index of systemic barriers, we found that in Bulgaria, many barriers were reported mainly by women of Roma ethnicity, as well as Turkish ethnicity, compared to Bulgarian women ( $p < 0.001$ ). The small size of the settlement in which the women lived was associated with greater difficulties in accessing cervical smears ( $p < 0.001$ ). Women with primary education and middle school education were more obstructed in accessing screening, compared to those with high school and college educational levels ( $p < 0.001$ ). Importantly, women who reported a financial situation of poor or very poor, faced the most difficult barriers in accessing cervical screening ( $p < 0.001$ ).

In Romania, Roma women faced the most barriers, compared to those of Romanian and Hungarian ethnicity ( $p < 0.001$ ). Place of residence was not associated with the extent of barriers faced. Additionally, those that had less years of education faced more difficulties ( $p < 0.001$ ), as well as those who were in poorer financial circumstances ( $p < 0.001$ ).

As can be expected, women who had not had a cervical smear reported or perceived more barriers in the system than those who had: for Bulgaria  $p < 0.001$ ; for Romania  $p < 0.001$ .

In summary, there are very obvious socio-demographic gradients in screening history and barriers faced in the healthcare system for both Bulgarian and Romanian women, reflecting

	SES High	SES In between	SES Low	F	P
	N = 218	N = 445	N = 422		
Perceived stress $\alpha = 0.87$	12.61	13.93	17.09	88.73 <sub>(2,1082)</sub>	<0.001
Social support $\alpha = 0.87$	16.43	16.08	14.58	23.09 <sub>(2,1087)</sub>	<0.001
Susceptibility $\alpha = 0.60$	16.09	15.82	15.73	–	NS
Severity $\alpha = 0.59$	8.53	8.70	8.67	–	NS
Benefits $\alpha = 0.78$	11.14	11.59	12.77	14.04 <sub>(2,1055)</sub>	<0.001
Costs $\alpha = 0.79$	23.86	22.62	21.01	24.84 <sub>(2,1054)</sub>	<0.001
Attitudes $\alpha = 0.81$	8.96	9.07	10.16	14.36 <sub>(2,1070)</sub>	<0.001

**Table 4.** Differences in psychosocial and cognitive variables according to SES in Bulgaria<sup>1</sup>.

<sup>1</sup> Note that the variables are coded in such a way that higher values indicate lower susceptibility, severity, benefits, costs and less positive attitudes.

	SES High	SES In between	SES Low	F	P
	N = 106	N = 697	N=170		
Perceived stress $\alpha = 0.77$	13.99	15.71	18.81	46.02 <sub>(2,968)</sub>	<0.001
Social support $\alpha = 0.86$	17.53	16.39	13.83	37.99 <sub>(2,981)</sub>	<0.001
Susceptibility $\alpha = 0.52$	18.25	17.03	16.62	6.15 <sub>(2,970)</sub>	<0.05
Severity $\alpha = 0.43$	9.77	9.88	9.95	–	NS
Benefits $\alpha = 0.64$	10.82	11.21	12.52	8.96 <sub>(2,966)</sub>	<0.001
Costs $\alpha = 0.68$	23.72	22.48	21.36	9.36 <sub>(2,964)</sub>	<0.001
Attitudes $\alpha = 0.82$	10.11	10.07	10.40	–	NS

**Table 5.** Differences in psychosocial and cognitive variables according to SES in Romania.<sup>1</sup>

<sup>1</sup> Note that the variables are coded in such a way that higher values indicate lower susceptibility, severity, benefits, costs and less positive attitudes.

social inequalities in both countries. For the further analyses, we will focus on the differences according to economic situation (SES), since we are interested in the mediation effect of SES on screening history.

#### *Psychosocial and cognitive variables*

Women in Bulgaria, who had not had smears, experienced more perceived stress ( $p < 0.05$ ) and lower levels of social support ( $p < 0.001$ ), compared to those who had been tested. The mean scores difference for perceived stress and social support between Romanian women who had had a smear test and those who had not, was also significant for perceived stress ( $p < 0.001$ ) and for social support ( $p < 0.001$ ).

Women in Bulgaria who had not been screened perceived their susceptibility to the disease to be lower ( $p < 0.01$ ), the benefits of the test to be lower ( $p < 0.001$ ), the “costs” to be higher ( $p < 0.001$ ) than those who had been screened, and generally their attitudes toward the test were more negative ( $p < 0.001$ ). There were no significant differences in their perception of the severity of the disease, compared to women who had been screened.

Women in Romania who had never had a Pap smear perceived the subjective “costs” of having a test as significantly higher ( $p < 0.001$ ), and the benefits as significantly lower ( $p < 0.001$ ) compared to women, who had had smears. They also had less positive attitudes toward the smear test ( $p < 0.001$ ). There

**Table 6.** Socio-economic, psychosocial and cognitive predictors of screening history in Bulgaria. Numbers are odds ratios with 95 % confidence intervals in parentheses.

	Model 1 (SES and control variables)	Model 2 (SES, control variables and psychosocial variables)	Model 3 (SES, control variables and cognitive variables)	Model 4 (SES, control variables, Psychosocial variables and cognitive variables)
SES group				
1 (high SES)	2.38 [1.59–3.55] **	1.60 [1.01–2.52] *	1.72 [1.07–2.78] *	1.33 [0.80–2.23] n.s.
2	1.65 [1.20–2.27] *	1.42 [1.00–2.02] n.s.	1.50 [1.03–2.18] *	1.33 [0.89–1.98] n.s.
3 (low SES)	1.00	1.00	1.00	1.00
Psychosocial variables				
Perceived stress		1.00 [0.96–1.03] n.s.		1.00 [0.96–1.04] n.s.
Social support		1.02 [0.98–1.06] n.s.		1.00 [0.96–1.05] n.s.
Systemic barriers		0.90 [0.88–0.92] **		0.94 [0.91–0.96] ***
Cognitive variables				
Attitudes			0.94 [0.89–1.00] *	0.94 [0.88–0.99] *
Susceptibility			0.95 [0.90–1.00] *	0.95 [0.90–1.01] n.s.
Severity			0.98 [0.93–1.03] n.s.	0.95 [0.90–1.01] n.s.
Benefits			0.95 [0.90–1.00] *	0.97 [0.92–1.02] n.s.
Costs			1.21 [1.16–1.26] ***	1.16 [1.11–1.22] ***
Nagelkerke R2	.193	0.314	0.424	0.446

Control variables included in each analysis are age, ethnicity, education and perceived health. Wald statistic: \* significant at  $p < 0.05$ ; \*\* significant at  $p < 0.01$ ; \*\*\* significant at  $p < 0.001$ .

were no statistically significant differences, however, in their assessment of their susceptibility to cervical cancer, and their perception of the severity of the disease barely reached statistical significance.

The differences in psychosocial and cognitive parameters, according to SES are presented in Table 4 for Bulgaria and Table 5 for Romania. Poorer financial status for both Bulgarian and Romanian women was associated with increased levels of perceived stress and limited perceptions of social support. For Bulgarian women the perceptions of susceptibility to and severity of the disease did not differ according to SES, but poorer economic conditions were associated with lower perceived benefits of the test, greater perceived “costs” and less positive attitudes. For Romanian women poorer economic conditions were related to greater susceptibility to the disease, lower perceived benefits and greater perceived “costs”.

#### Multivariate Analysis

Inequalities in cervical screening are observed along several of the socio-demographic dimensions, but for the multivariate analysis, we delineated the extent to which one of the indicators of SES –the perceived financial situation of the household – predicts screening history, and the factors that mediate the relationship between SES thus defined, and screening history. We used a series of logistic regression analysis, with the dichotomous variable screening history as the dependent and

SES as the predictor. We tested the extent to which the effect of SES on screening history is mediated by systemic barriers, perceived stress and social support, as well as cognitive factors. We observed the extent to which adding the mediators modifies the odds ratios<sup>34</sup>, following a model similar to the one tested by Wardle et al.<sup>22</sup> as applied to predicting intentions for colorectal cancer screening. For this, certain conditions need to be met<sup>34</sup>, which include that the mediators be associated with dependent variable (screening history) and the predictor (SES). As we saw in the bivariate analysis, this condition is met for most of our data, with certain exceptions for beliefs related to severity and susceptibility to the disease. Nevertheless, we have left these constructs in the regression equations since their effects differed in the two countries, and since we were interested in their potential independent effects. We will not be making interpretations about their mediating effects. We controlled for age, ethnicity, education and perceived health. The results are presented in Table 6 for Bulgaria and Table 7 for Romania.

Model 1 tested the effect of SES on screening history (including the control variables). In Model 2 we included the psychosocial variables/health system barriers, which showed an obvious reduction of the odds ratio associated with SES, which illustrates that they mediate the effect of SES on screening history. In Model 3 we added only the cognitive factors. They produced a similar reduction in the odds ratio associated with levels of SES, i.e. a similar mediating effect as that of the

**Table 7.** Socio-economic, psychosocial and cognitive predictors of screening history for screening in Romania. Numbers are odds ratios with 95 % confidence intervals in parentheses.

	Model 1 (SES and control variables)	Model 2 (SES, control variables and psychosocial variables)	Model 3 (SES, control variables and cognitive variables)	Model 4 (SES, control variables, Psychosocial variables and cognitive variables)
SES group				
1 (high SES)	2.28 [1.21–4.29] *	1.46 [0.75–2.87] n.s.	2.33 [1.16–4.66] *	1.90 [0.92–3.93] n.s.
2	1.28 [0.79–2.07] n.s.	0.97 [0.58–1.62] n.s.	1.27 [0.75–2.17] n.s.	1.15 [0.66–2.00] n.s.
3 (low SES)	1.00	1.00	1.00	1.00
Psychosocial variables				
Perceived stress		0.98 [0.94–1.02] n.s.		0.98 [0.93–1.03] n.s.
Social support		1.03 [0.99–1.08] n.s.		1.01 [0.96–1.07] n.s.
Systemic barriers		0.93 [0.91–0.96] ***		0.97 [0.94–1.00] *
Cognitive variables				
Attitudes			0.95 [0.84–1.06] n.s.	0.92 [0.80–1.06] n.s.
Susceptibility			0.94 [0.90–0.98] **	0.92 [0.88–0.97] **
Severity			1.04 [0.98–1.10] n.s.	1.03 [0.97–1.09] n.s.
Benefits			0.96 [0.90–1.01] n.s.	0.98 [0.92–1.04] n.s.
Costs			1.21 [1.15–1.27] ***	1.19 [1.13–1.26] ***
Nagelkerke R2	.059	0.119	0.227	0.236

Control variables included in each analysis are age, ethnicity, education and perceived health. Wald statistic: \* significant at  $p < 0.05$ ; \*\* significant at  $p < 0.01$ ; \*\*\* significant at  $p < 0.001$ .

psychosocial variables for the Bulgarian data. The cognitive variables did not mediate the effect of SES in the Romanian data. In Model 4 we added both the psychosocial/systemic barriers and the cognitive factors, which allowed us to determine if they have independent effects<sup>22</sup>. In this model the effect of SES became insignificant. Health system barriers and the “costs” of screening retained their independent effects and proved to be the most important predictors of screening history for both the Bulgarian and Romanian sample. Additionally for Model 4, attitudes toward the smear were significantly related to screening history for the Bulgarian sample, while susceptibility to the disease was significantly related to screening history in the Romanian sample.

## Discussion

The political and economic changes in Bulgaria and Romania have created significant barriers to regular cervical cancer screening and intensified disparities in access to screening programs. The current coverage of cervical cancer screening is limited and is conducted on an opportunistic basis. A fundamental and generalized change of locus of responsibility for one’s health – from collective responsibility resting with the State, to one focused for the most part on individual responsibility is observed at present in Bulgarian and Romanian societies<sup>18,19</sup>.

Currently, the structural health system barriers faced by women are limiting access and uptake. The low effectiveness of the cervical screening programs is mainly due to factors associated with the unclear legal framework and regulations, poor program management and quality of health care system services and coverage<sup>18,19</sup>.

Our findings illustrate the low rates of screening in these two countries, with less than half of the women in Bulgaria and only 21 % of the women in Romania ever having had a smear. Serious socioeconomic disparities in access to smears were identified. Women with fewer socioeconomic resources, (lower education and finances) and with limited access to healthcare due to the smaller size of the settlement were identified as the most under-served groups. Disparities were particularly evident in relation to ethnicity, with low screening rates among women of Turkish and Roma ethnicity. The effect of economic conditions on screening history was mediated by structural barriers faced in the healthcare system and some of the beliefs that women held about the disease and the test, particularly their perceptions of the “costs” of the test. Women reported facing multiple barriers in obtaining a smear test. Barriers included lack of insurance or regular contact with a health professional, inconvenient and time-consuming services, a focus on curative care, and an absence of initiative on the part of providers<sup>18,19</sup>. Providers in Bulgaria are forced to limit preventive activities in order to preserve resources for curative care since they have rationed referrals to gynecology.

cologists, and avoid using them for the purpose of screening. Women and providers perceive this as a major barrier to accessing screening<sup>18,35</sup>. The structural barriers the women faced in the healthcare system were a major predictor of absence of cervical screening history, and also a major mediator of the effects of socioeconomic status on screening for both countries. The barriers were more pronounced for those women who were socio-economically vulnerable and affected their screening history.

Bulgarian and Romanian women have a positive attitude towards preventive health practices<sup>18,19,36</sup>, although this is not always translated into behaviors such as screening. This gap between attitude and behavior could be the outcome of historically-framed fear and dislike of the health system, and facing a medical system that is disorganized and emphasizes the curative dimension of health care. It can also have to do with the daily stressors that women face and their beliefs about the disease and the test. For many women, the benefits of cervical screening and early detection and treatment of pre-cancerous lesions are far outweighed by objective and subjective obstacles encountered in the decision-making process of engaging in illness preventive behaviors. Another major predictor of screening history for both countries was the cost of the smear, where cost included experienced or anticipated fear of the test, distress and discomfort, embarrassment, painfulness, inconvenience and extent to which they are time consuming. The perceived cost of the smear also was a major mediator of the effects of SES on screening history: women who were financially disadvantaged perceived the test as much more costly than those who were in more favorable financial circumstances. This finding indicates that health promotion approaches toward reducing socioeconomic disparities should include providing

information about the relative simplicity and painlessness of the smear<sup>8</sup>, in addition to providing information about the disease, susceptibility to the disease and benefits of the smear.

The main conclusion from this analysis is that structural and policy changes most definitively need to be made in parallel with any health promotion efforts, in order to assure that cervical screening is widely available and that all women have equal access. Cervical cancer prevention requires that reforms be undertaken in multiple directions simultaneously. Policy and legislative reform should be implemented, in order to reduce the barriers which obstruct women's pathways in the health care system. Our findings illustrate that interventions targeting only women's beliefs, attitudes and knowledge will have limited success in the context of significant disparities and barriers imposed by the current organization of services and health insurance, yet empowering women to have the motivation to navigate the chaotic system and to insist on smears is also important. The future of the cervical cancer prevention programs will also be impacted by the HPV vaccine, which is currently in the process of being introduced in the two countries. We see an urgent need for interventions to reorganize cervical cancer screening in Bulgaria and Romania through multiple strategies.

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