Polašek, O., Kolčić, I., Vončina, L., Strnad, M., Vuletić, S., Kern, J. Breast, colon, and prostate screening in the adult population of Croatia: does rural origin matter? *Rural and Remote Health* 7 (online), 2007: 749. Available from: http://www.rrh.org.au

First published in the journal, *Rural and Remote Health* [http://www.rrh.org.au]

http://medlib.mef.hr/314

Breast, colon, and prostate screening in the adult population of Croatia: does rural origin matter?

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Short title: Cancer Screening in Croatia

Sources of funding: The Ministry of Science, Education and Sport of the Republic of Croatia (Regionalism of cardiovascular behavioural risk factors – model of intervention; No: 108-1080135-0264).

ABSTRACT

BACKGROUND. The aim of this study was to investigate the utilization of breast, colon and prostate cancer screening in the adult Croatian population during a period without implemented national cancer screening programme, with a special interest in the rural vs. urban respondent's origin.

METHODS. Self-reported screening utilization was investigated in the Croatian Adult Health Survey, which collected health related information from the representative sample of the adult Croatian population. Breast cancer screening was investigated in women aged over 40, while colon and prostate in respondents aged over 50. The data were analysed with binary logistic regression.

RESULTS. One in five women reported a breast cancer screening uptake in the year preceding the survey (22.5%), while only 4.5% reported colon screening. A total of 6.1% men reported colon screening, while 13.7% of men reported having a prostate cancer screening. Respondents with rural origin reported all sites screening utilization less frequently than those with urban origin (breast 14.5% vs. 27.4%; prostate 9.6% vs. 16.3%; colon-men 5.7% vs. 6.3%; colon-women 3.6% vs. 5.1%; all rural vs. urban). Multivariable models indicated that people with higher socio-economic status more commonly reported breast and prostate cancer screening uptake. Access to health care was the only independent variable associated with colon cancer screening in men, and the strongest variable associated with colon cancer screening in women. Rural origin was associated only with lower odds of breast screening (adjusted odds ratio 0.60 [95% confidence interval 0.48-0.74]), while in the remaining models rural origin was not a significant predictor for cancer screening uptake.

CONCLUSIONS. Opportunistic cancer screening uptake is low in Croatian adult population, with existing socio-economic differences in breast and prostate screening, and their absence in colon cancer screening. Rural origin was significantly associated with breast screening, even after adjustment to socioeconomic status and problems in access to health care. Lack of rural origin significance in the other screening sites could be related to small sample sizes of people who reported opportunistic utilization of these screening sites. Overall conclusion suggests that the access to health care is the strongest cancer screening predictor, and that it should

have a prominent role in the development of the systematic cancer screening programme on a national level.

Key words: rural, socio-economic, inequality, access, transition, Croatia

Introduction

Social disparities in cancer present an interesting challenge. This research area has received a lot of attention, but there are still some basic misconceptions, even in the case of the phrase 'cancer disparities'[1]. Summarized results of this research area suggest that social disparities in cancer remain serious and persistent, despite major advances in the extent, determinants, treatment, and prevention of cancer[2]. In an attempt to further disentangle cancer development mechanisms, three large factor groups were identified; (a) cumulative economic deprivation, (b) exposure, susceptibility and resistance across the life course and (c) gene expression, not just gene frequency[1].

Screening is an important tool in early cancer detection and consecutive mortality reduction. Various countries have different guidelines, and varying policy implications for cancer screening programmes (in both screening frequency and the respondent's age). Despite these efforts, a number of studies have shown that socio-economic determinants have an important role in actual screening uptake. An association between higher socio-economic classes and more frequent screening utilization has been described in the cases of breast[3,4], prostate[5-7], and colon cancer screening[4,8]. A study from California suggests that decrease in the colon and rectum cancer incidence might be related to wide spread screening, especially among non-Hispanic white men and women who are considered to be the highest socio-economic group[9]. Additionally, it seems that rural origin has an important effect on the breast cancer screening uptake[3], even after adjustment to socioeconomic factors.

Cancer is ranked as the second commonest cause of death in Croatia, with steady and constant increase in the overall incidence[10]. The commonest male cancer sites in 2003 were trachea, bronchus and lung (21%), colon and rectum (14%), prostate (13%), and stomach (7%). Top cancer sites among women were breast (25%), colon and rectum (13%), trachea, bronchus and lung (6%) and uterine body (5%)[10]. At the same time, there was no implemented national cancer screening programme[11].

The aim of this study was to investigate social disparities in breast, colon and prostate cancer screening in the sample of adult Croatian population, with a special interest in the rural vs. urban respondent's origin.

Subjects and methods

Setting
We investigated breast, colon and prostate cancer screening in the sample of adult Croatian population. The data from the Croatian Adult Health Survey 2003 were used.

Croatian Adult Health Survey
Croatian Adult Health Survey (CAHS) was designed as the periodic survey of the Croatian population, aiming to provide surveillance of various risk factors[12,13]. CAHS sample was

defined on the basis of the 2001 Census of Population, in cooperation with the Central Bureau of Statistics of Republic of Croatia. The survey targeted persons aged 18 years or older who were living in private dwellings in Croatia (those in non-conventional dwellings, clientele of institutions, full-time members of the Croatian Armed Forces and residents of certain remote and island regions were excluded from the survey). Sample size was targeted at 10,766 households, which was stratified to six regions of Croatia, with coverage estimated to approximately 98% of the Croatian adult population. Public health nurses were surveying respondents in their homes during May-July 2003[13]. One adult inhabitant was randomly chosen from each household. The final collected sample consisted of 9,070 respondents, with a response rate of 84.2%. Finally, a weighting scheme was applied to the dataset, further increasing the representativeness of the CAHS sample and enabling the projecting of the results to the entire Croatian population[12].

Measurements

Questions on the breast, prostate, and colon cancer screening utilization during a year preceding the survey were used. Responses were coded as binary outcomes. Breast screening utilization was investigated in a sub-sample of women aged over 40, while prostate and colon cancer screening were investigated in a sub-sample of respondents aged over 50. Questions were of broader meaning and clear differentiation of screening method was not possible (e.g. whether colon screening was digito-rectal examination, sigmoidoscopy, colonoscopy or a faecal occult blood test, or if prostate screening was digito-rectal examination or the PSA testing).

We used education level (classified in four groups; without completed primary school, completed primary school, completed secondary school, and university degree), objective household income (classified as the ordinal measure of 4 classes, expressed in Croatian currency - Kuna), and occupation (binary; white- or blue-collared occupations) as socio-economic determinants. Rural vs. urban origin was assessed by the respondent's permanent address, according to the rural vs. urban location classification from the Central Bureau of Statistics and the Governmental classification of the rural and urban settlements. Additionally, subjective health care access estimates were calculated. Respondents had the opportunity to score accessibility to their general practitioner, policlinic and hospital from 1 to 3 (1 meaning no problems, 2 meaning moderate, and 3 meaning a substantial problem in health care access). Respondents who scored at least 6 points when all three variables were summed up were considered to have a health care access problem. We did not include health insurance as an independent variable, due to almost complete obligatory health insurance coverage in Croatia.

Statistical analysis

Analysis was performed in SAS 8.0.2 (Carry, NC, USA), with bootstrapping variance estimation performed by the Bootvare_sas.v20[12]. All results were presented as the weighted estimates, for the entire Croatian population. Coefficient of variation (CV) was used as an variation indicator for the weighted screening estimates. CV values less then 16.6 were considered as optimal; those between 16.6 and 33.3 were considered to reflect a greater extent of variation, while estimates over 33.3 were considered to reflect too much variation (consequently, these values were not considered as reliable in the interpretation of the results). Binary logistic regression was used in multivariable analysis, without interaction items. Bootstrap variance estimation was also used in the regression models. Screening was used as the dependent variable, with a number of other predictor variables in the models. Predictor variables included age, education class, occupation, access to health care, rural vs. urban

origin, and household income estimate. All models were gender-specific. Statistical significance was set at $P<0.05$.

Results

Analysis of the Croatian Adult Health Survey indicated that 22.5% of women (95% CI 21.3-23.8) aged over 40 reported having a breast cancer screening during a year preceding the survey. A total of 13.7% of men (95% CI 11.4-15.9) aged over 50 reported prostate screening. Fewer respondents reported having a colon screening during a year preceding the survey: 4.5% of women (95% CI 3.6-5.4), and 6.1% of men (95%CI 4.5-7.6).

Peak onset for breast cancer screening was reported in 50-59 age group, with significant reduction in the screening uptake in the oldest age groups (indicated by the non-overlap of the confidence intervals - Table 1). More frequent breast cancer screening uptake was reported by women in white-collared occupations and those from urban areas (Table 1). Similar results were recorded in prostate cancer screening in men, with less clear differences (Table 1). The oldest age group reported prostate screening most commonly, although higher coefficient of variation was recorded for this estimate (Table 1). All differences in the colon screening in both genders were less marked, sometimes without clear differences. The 60-69 age group in both genders reported peak onset for colon screening (Table 1). Screening utilization was systematically less commonly reported by the respondents with rural origin, compared to those of urban origin (Table 1).

Multivariable model of the self-reported breast cancer screening indicated that most of investigated variables were significantly associated with screening uptake, except lower education and occupation classes (Table 2). Respondent's age, two classes of education level, occupation, and access to health care were significantly associated with prostate screening (Table 2). Access to health care was the only significant independent variable associated with colon screening in men (Table 3). Women coming from the households with the highest incomes and those that reported having no problems in access to health care most often reported having a colon screening within the last year (Table 3).

Discussion

The results of this study indicate infrequent utilization of cancer related screening in the adult Croatian population. The effects of post-war health system transition or the lack of national screening programmes might have contributed to the current situation. There are, however, some preventive local actions (such as 'Breast cancer awareness day'), or non-systematic screening efforts (such as the 'Mobile mammography' project, which aims to reach population fractions that have difficulties in accessing the health care). In this situation, the effects of socio-economic determinants and respondent's urban origin could hypothetically be even more pronounced then in other countries that have implemented systematic screening programmes, because people have more individual responsibility in screening services utilization (combined with the recommendations from their physicians).

Social disparities in breast cancer screening have been extensively described, usually reporting the worse indices among women from lower socio-economic classes[3]. These women are less likely to respond to a screening invitation[14,15], and they are at an increased risk of late-

stage breast cancer diagnosis[16]. Interestingly, disparities in breast cancer screening remained even in a setting with a continuity of health care[17]. Rural origin is a factor that has been associated with lesser probabilities of breast screening uptake[3], although this finding does not seem to be universal[18]. The results of another study suggest that the rural origin is not by itself a crucial negative breast cancer screening predictor, but an element of the much finer interplay of various factors[19]. The results of this study contradict such finding, as the lesser extent of breast screening in rural women from this study remained even after controlling for the most obvious confounding factors, general lower socio-economic status, older age of rural women, and difficulties in accessing the health care facilities.

Access to health care was a significant predictor of breast cancer screening in this study, further supporting some previous findings[20]. It has been implied as one of the most important factors for breast screening in limited-resource settings[21]. However, other studies suggest that even in settings with the same access to mammography, women from lower socio-economic classes were less likely to use it[22]. Overall findings from this study supported clear socio-economic differences in self-reported breast cancer screening uptake, suggesting that women from higher socio-economic classes in Croatia are most likely to receive opportunistic breast screening.

In contrast to breast cancer screening, the overall effectiveness of prostate screening seems to be by far less convincing. There is still no consensus to whether the prostate screening is effective or not[23], with some studies suggesting that screening for prostate cancer cannot be justified in low-risk populations[24]. Nevertheless, more frequent screening utilization among men with higher socio-economic status has been implied in a number of studies[5,6], even suggesting that ethnic differences were diluted and the socio-economic differences persisted[25]. The current study also supports more frequent screening utilization among men from higher socio-economic classes, but with less clear differences than those for breast cancer screening in women. It is worth noticing that the respondents with rural origin had lower odds ratio of prostate screening in the multivariable analysis, but these differences were not statistically significant.

Access to health care was the only significant predictor in the colon cancer screening model in men. This finding suggests that either a model did not provide a good data fit (due to smaller sample sizes, and consequently large variation), or there is a true lack of socio-economic disparities in colon cancer screening in men. Women with problems in health care access reported more than three times lesser probabilities of receiving a colon cancer screening, suggesting that access to health care is the single most important predictor of the colon screening in both genders. In contrast to other screening methods, colon cancer screening effectiveness can be assessed, by investigation of the cancer site. A shift from rectal location predominance to more frequent right-sided colonic cancer has been associated with the increased screening rates[26]. An investigation of the colon cancer sites from the National Cancer Registry of Croatia could provide the basis for evidence based screening programme evaluation, once a national screening programme is developed and implemented.

Lack of the national screening programmes with the cancer mortality rates higher that in the EU or European region prompted creation of the "National Cancer Prevention and Screening Programme Proposal"[27]. Ministry of Health and Social Welfare launched a national screening programme in 2006, which introduced a regular mammography in women aged 50-69. Starting from 2007, the programme will introduce a regular colon occult blood screening for people aged over 50[27].

The shortcomings of this study include the use of the self-reported survey data, and the use of broad and unspecified questions. The use of targeted questions (on types of screening) supplemented with medical records would produce more precise estimates, and reduce the possibility of reporting diagnostic and therapeutic examinations as screening. There is an additional problem in colon cancer screening models, as some studies suggest that in systems with universal access to health care approximately two thirds of colonoscopies were performed due to known symptoms, while only a third was performed as screening[28].

Nevertheless, this study reports unsatisfactory cancer screening uptake in adult population of Croatia. While we may speculate whether this situation occurred as the consequence of the war, or the health system transition, the increasing trend in cancer incidence and mortality continues. People with higher socio-economic status more often reported breast and prostate screening, while we didn't detect association of socio-economic status with colon cancer screening. Rural origin was negatively associated with breast screening uptake, while the results from the other screening sites were less convincing. Overall results suggest that ensuring easier access to screening could increase the frequency of screening services utilization, with a final goal of cancer burden reduction.

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Table 1. Social disparities in utilization of screening services during a year preceding the survey, from the Croatian Adult Health Survey 2003 sample. Numbers are given as percentages and 95% confidence intervals.

Predictor	Breast (women)	Prostate (men)	Colon (men)	Colon (women)
Age				
40-49	28.2 [25.0-31.4]	n/a	n/a	n/a
50-59	32.2 [29.1-35.2]	11.6 [8.2-15.0]	4.6 [2.6-6.6] [a]	3.5 [2.3-4.7] [a]
60-69	19.7 [17.2-22.3]	16.5 [12.9-20.1]	7.8 [4.5-11.1] [a]	5.8 [4.0-7.6]
70-79	9.1 [6.3-11.8]	12.5 [8.9-16.2]	6.3 [3.9-8.6] [a]	4.2 [2.7-5.7] [a]
80 and more	7.3 [3.4-11.2] [a]	17.3 [8.5-16.1] [a]	5.9 [0.6-11.3] [b]	4.7 [1.3-8.2] [b]
Education				
Without primary school	10.9 [8.8-12.9]	5.5 [2.5-8.4] [a]	5.1 [1.1-9.1] [b]	3.8 [2.5-5.1] [a]
Completed primary school	18.9 [16.6-21.2]	12.0 [8.0-16.0] [a]	6.8 [3.7-9.9]	4.5 [3.0-5.7]
Completed secondary school	30.4 [27.9-32.9]	13.2 [10.0-16.3]	5.9 [3.9-7.9]	5.6 [3.0-8.2] [a]
University degree	38.0 [33.1-42.8]	23.0 [17.2-28.7]	6.4 [2.4-10.4]	4.9 [2.6-7.2] [a]
Occupation				
Blue collar	17.2 [15.3-19.0]	9.9 [7.6-12.2]	4.8 [3.2-6.4] [a]	3.8 [2.8-5.9]
White collar	32.7 [30.0-35.4]	19.4 [15.5-23.3]	7.1 [4.5-9.8] [a]	6.1 [3.9-8.2] [a]
Subjective access to health care assessment				
Problems	21.8 [20.6-23.1]	13.0 [10.6-15.3]	5.3 [3.7-6.9]	3.6 [2.8-4.4]
No problems	29.0 [23.5-34.5]	18.7 [12.5-24.8] [a]	11.5 [6.6-16-4] [a]	12.5 [8.1-16.9] [a]
Residence				
Urban	27.4 [25.7-29.1]	16.3 [13.5-19.0]	6.3 [4.3-8.3]	5.1 [3.9-6.3]
Rural	14.5 [12.6-16.2]	9.6 [6.6-12.6]	5.7 [3.6-7.7] [a]	3.6 [2.4-4.7] [a]
Household income				
Less than 2000 Kn	12.6 [10.6-14.6]	9.8 [6.7-12.9]	6.3 [4.0-8.6] [a]	4.2 [2.8-5.5]
2001-4000 Kn	23.0 [19.3-26.7]	13.3 [9.9-16.7]	5.4 [3.7-7.1]	4.0 [2.5-5.5] [a]
4001-6000 Kn	26.6 [23.4-29.8]	14.8 [9.7-19.9] [a]	6.5 [3.2-9.8] [a]	4.0 [2.4-5.7] [a]
More than 6000 Kn	30.7 [26.9-34.5]	18.6 [12.7-24.4]	6.2 [2.7-9.7] [a]	7.1 [3.9-10.4] [a]

[a]Coefficient of variation (CV) between 16.6 and 33.3; [b]CV over 33.3

Table 2. Logistic regression models of breast and prostate screenings during a year preceding the survey, from the Croatian Adult Health Survey 2003 sample

Predictor	Breast (women) OR	P	Prostate (men) OR	P
Age	0.97 [0.96-0.98]	<0.001	1.02 [1.00-1.04]	0.029
Education				
Without primary [*Ref.*]	1.00		1.00	
Completed primary school	1.32 [0.93-1.88]	0.120	2.24 [1.08-4.65]	0.030
Completed secondary school	1.57 [1.03-2.41]	0.037	1.91 [0.90-4.08]	0.092
University degree	2.15 [1.27-3.63]	0.004	3.04 [1.17-7.90]	0.023
Occupation				
Blue collar [*Ref.*]	1.00		1.00	
White collar	1.21 [0.91-1.61]	0.195	1.61 [1.06-2.45]	0.024
Access				
Problems [*Ref.*]	1.00		1.00	
No problems	1.76 [1.25-2.45]	<0.001	1.67 [1.03-2.69]	0.037
Residence				
Urban [*Ref.*]	1.00		1.00	
Rural	0.60 [0.48-0.74]	<0.001	0.73 [0.46-1.15]	0.174
Household income				
Less than 2000 Kn* [*Ref.*]	1.00		1.00	
2001-4000 Kn	1.60 [1.23-2.05]	<0.001	1.06 [0.64-1.78]	0.812
4001-6000 Kn	1.49 [1.12-1.98]	0.007	1.06 [0.56-2.01]	0.868
More than 6000 Kn	1.63 [1.20-2.22]	0.002	1.34 [0.79-2.28]	0.274

Ref. – referent group
*Kn-Croatian currency – Kuna

Table 3. Logistic regression models of colon screenings during a year preceding the survey, from the Croatian Adult Health Survey 2003 sample

Predictor	Colon (men) OR	P	Colon (women) OR	P
Age	1.02 [0.99-1.04]	0.179	1.02 [0.99-1.04]	0.118
Education				
Without primary [*Ref.*]	1.00		1.00	
Completed primary school	1.33 [0.33-5.30]	0.686	1.00 [0.54-1.87]	0.990
Completed secondary school	1.12 [0.27-4.59]	0.878	0.89 [0.39-2.00]	0.773
University degree	1.01 [0.19-5.35]	0.990	0.61 [0.23-1.63]	0.322
Occupation				
Blue collar [*Ref.*]	1.00		1.00	
White collar	1.61 [0.89-2.92]	0.113	1.80 [0.96-3.39]	0.068
Access				
Problems [*Ref.*]	1.00		1.00	
No problems	1.92 [1.03-3.58]	0.040	3.38 [2.03-5.62]	<0.001
Residence				
Urban [*Ref.*]	1.00		1.00	
Rural	0.99 [0.58-1.70]	0.978	0.91 [0.56-1.49]	0.709
Household income				
Less than 2000 Kn* [*Ref.*]	1.00		1.00	
2001-4000 Kn	0.75 [0.41-1.37]	0.346	1.04 [0.62-1.78]	0.074
4001-6000 Kn	1.13 [0.61-2.11]	0.696	1.05 [0.53-2.06]	0.119
More than 6000 Kn	1.03 [0.48-2.19]	0.941	2.11 [1.07-4.17]	0.032

Ref. – referent group

*Kn-Croatian currency – Kuna