

Barriers to Organized Mammography Screening Programs in Hungary: A Questionnaire-based Study of 3,313 Women

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Abstract. *Background: Despite well-organized Hungarian invitational mammography screening, participation rates have never reached 50%. This is similar to rates in Central Eastern Europe. In order to reduce breast cancer mortality, the participation rate should be at least 70%. This questionnaire-based study assessed the barriers associated with low adherence rates. Materials and Methods: Women 45-65 years of age were interviewed by questionnaire containing 15 structured questions focused on socioeconomic status and barriers to screening. Results: A total of 3,313 women completed the questionnaire. The main reasons for avoiding screening were work absenteeism (18.9%), fear of painful examination (18.39%), and poor understanding of mammography screening (14.94%). Conclusion: Education is required to increase awareness among women about the utility and availability of breast screening services. This report provides information on the appropriate level of intervention needed to increase screening participation in Hungary and other developing countries in Central Eastern Europe to reduce breast cancer-related mortality.*

Breast cancer is one of the most prevalent malignancies and is the main cause of cancer death for women in the Western world (1). Most breast cancer deaths are caused by locally advanced or stage IV disease. Therefore, many countries have implemented organized mammography screening programs (OMSP) in order to detect breast cancer at an earlier stage and reduce breast cancer mortality (1-3). In

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January 2002, Hungary initiated a nationwide OMSP for women 45-65 years of age with a biannual screening interval (4). The efficacy of mammography screening in preventing breast cancer deaths has been shown in randomized controlled trials, with a reduction of mortality of between 17% and 32% (5-9). However, some recent studies have questioned the efficacy of early-stage tumour detection in reducing mortality (10, 11) These authors believe that in advanced breast cancer effective adjuvant therapy may play a greater role in reducing breast cancer mortality than screening (12-14).

One of the most important roles of OMSP is to disclose breast tumours before they become palpable, during stage 0, thereby decreasing the percentage of advanced breast cancer cases and thus reducing breast cancer-related mortality (15-17).

The Hungarian National Cancer Registry recorded nearly 7,900 new cases of breast cancer in women, with more than 2,100 deaths in 2014. While not statistically significant, the incidence of breast cancer in Hungary has been increasing since the implementation of an OMSP, but the mortality has not changed measurably between 2002 and 2014 (18, 19) (Figure 1). According to the World Health Organization (WHO), the breast screening adherence rate should be at least 70% in order to reduce breast cancer mortality (20). Despite the fact that screening is invitational and free of charge, participation in the Hungarian OMSP has never reached 70%. The total screening and diagnostic coverage of mammography examinations was 53.46% from 2002 to 2003, 50.8% from 2004 to 2005, 49.7% from 2006 to 2007 and 50.1% from 2008 to 2009. Thus, participation in the Hungarian OMSP program did not change considerably between 2002 and 2009 (21-23).

The association between marital status, education level, socioeconomic characteristics, knowledge, and beliefs about breast cancer and mammography screening have not been

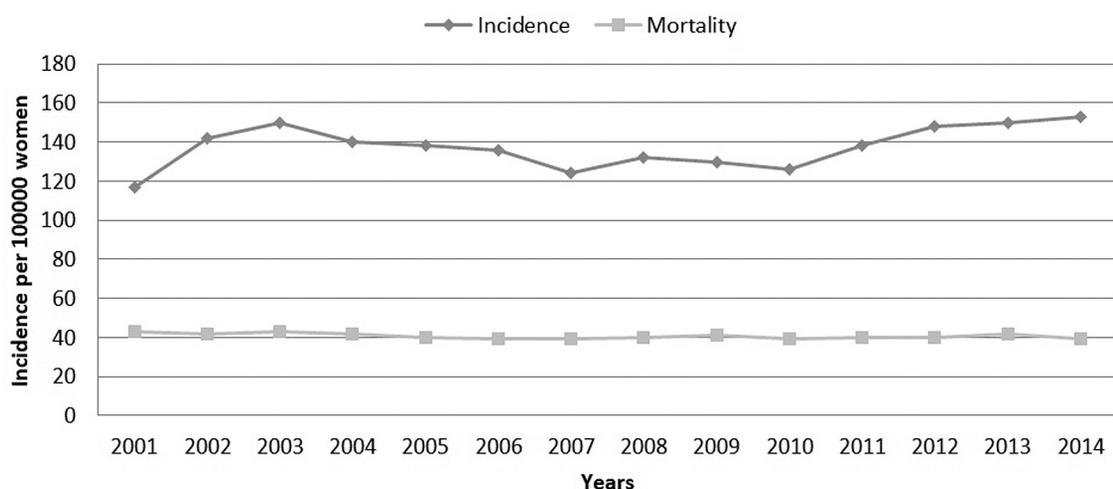


Figure 1. Breast cancer incidence and mortality per 100,000 women in Hungary between 2001 and 2014 (19).

Table I. Breast cancer screening programs in 2010 and last update: coverage by test, coverage by invitation, participation rate in Austria, Bulgaria, Latvia, Poland, the Czech Republic and Hungary (22, 26).

Country	Update period	Annual eligible population	Number of invitations	Number of women screened	Participation rate (%)	Coverage by test (%)
Austria	2010	200,000	200,000	27,000	13.5	13.5
	2014	1,500,000	1,500,000	600,000	40.0	40.0
Bulgaria	2013-2014	1,057,000	123,647	10,392	8.4	1.0
Czech Republic	2013	878,576	521,187a	538,997	13.4	61.3
	2010	203,336	196,578	38,148	19.4	18.8
Latvia	2014	159,223	142,168	51,060	35.9	32.1
	2010	2,522,421	2,419,459	945,283	39.1	37.5
Poland	2014	2,668,119	2,749,919	1,207,214	43.9	45.2
Hungary	2007	751,627	393,343	205,417	52.5	27.3

properly analysed to date. There is an urgent public health need to explore the barriers to the OMSP (24). It is important to have a validated instrument to answer this question. The current study examined the factors associated with women's screening behaviour, beliefs, and barriers based on interviews of the target population *via* questionnaire to assess and report on the psychometric and demographic properties of the barriers leading to low adherence rates in the Hungarian OMSP. Our goal was to acquire information on the appropriate level of intervention necessary to increase screening participation.

Neighbouring Central Eastern European countries such as Poland, the Czech Republic, Bulgaria, Austria and Latvia have similar economies and living standards, and also present low breast screening coverage rates comparable to those in Hungary (25, 26) (Table I).

Increased knowledge regarding the barriers to mammography screening may provide information to extend our knowledge of breast cancer screening and effective treatment in Hungary and above mentioned Central-Eastern European countries.

Materials and Methods

This study was performed in accordance with the Research Ethics Committee of the National Institute of Oncology which conforms to the provisions of the Declaration of Helsinki. The study was performed without additional financial support at the National Institute of Oncology in Budapest between 2015 and 2016. The study received non-financial administrative support from the Hungarian AVON Cosmetics Company and the Mellrákinfo advocacy group.

A cross-sectional survey was designed to examine women's screening behaviour, beliefs, and barriers to OMSP. The Hungarian

Table II. Questionnaire containing 15 structured questions given to women aged 45-65 years regarding their participation in national organized mammography screening programs in Hungary.

Q1: Age: Q2: Educational level:	Primary Village	Secondary Provincial town	Tertiary Capital
Q3: Residence:			
Q4: County:			
Q5: Marital status:	Unmarried	Married	Divorced
Q6: Do you undergo mammography examinations?	Yes		No
Q7: If yes, how regularly?	Regularly		Occasionally
Q8: If yes, how frequently?	Annually		Biennially
Q9: Have you received Invitation Letter for Screening?	Yes		No
Q10: When did you receive Invitation Letter for Screening?	Year:		
Q11: Do you undergo regular breast screening?	No		Regularly
Q12: Where was your last breast exam?	Organized mammography screening at designated screening centre	Opportunistic mammography screening outside of designated screening centre (medical office, private clinic, etc.)	
Q13: How far is the designated screening centre from your residence?	Close		Far Very far
Q14: Why did you not undergo an organized mammography screening?	Because of fear of breast cancer. Because of fear of mastectomy. Because the designated screening centre is too far. Because of my job. Because I do not have enough information on mammography screening. Because mammography examinations are harmful. Because I undergo opportunistic mammography screening. Because mammography examinations are painful. Because examination of an intimate body part is embarrassing Because of the expenses to get there. Other		

Q15: What should be changed in order for you to attend the screening program?

breast screening target population of women 45-65 years of age were interviewed anonymously using web-based and printed questionnaires containing 15 structured questions. The questionnaire was designed to assess and report on the psychometric and demographic properties of barriers leading to low participation rates (Table II). The 15-item questionnaire was composed of four sections. The first five questions focused on education level, marital status, residence (capital, provincial town, or village) and county of residence. Three questions focused on mammography receptive behaviour, five questions directly addressed OMSP (receiving invitation letter, participation frequency in mammography screening, distance from screening centre), and two questions focused on barriers that prevented women from attending the screening program.

The sample population was reached *via* e-mail and Facebook campaign through web-based questionnaires by the Hungarian AVON Cosmetics Company. The questionnaire link was secured by Hypertext Transfer Protocol Secure system. The survey's web-based link was sent to the e-mail contact list and Facebook followers of the Hungarian AVON Cosmetics Company. Printed forms were sent by mail and distributed at local social functions by the Mellrákinfo advocacy group and Hungarian AVON Cosmetics Company. Hungarian AVON used its own contacts to reach the target population.

To ensure that the study sample was representative of the screening population, only surveys from women 45-65 years of age were accepted. Answering the survey questions was voluntary and

anonymous. The data protection law was followed and respected. Questionnaires with unreadable or unclear answers were excluded from the analysis.

All answers were statistically analysed in the context of marital status, educational level, and type of residence using chi-square test; *p*-values of less than 0.05 were considered to be significant. Statistical analysis was performed using PAST 1.86 and Statistica 12.0 (StatSoft, Tulsa, OK, USA) (27).

Results

A total of 58,839 questionnaire links were sent *via* e-mail, 21,501 links were sent by Facebook campaign, 500 printed questionnaires were mailed, and 293 questionnaires were completed at social events. A total of 12,345 links were opened *via* e-mail and 5,739 links were opened *via* Facebook. Overall, 1,774 women 45-65 years of age completed the survey by e-mail, 1,262 on Facebook, 76 forms by mail and 201 at social events. The online response rate was 18.32% and 15.2% for mailed forms. A total of 3,313 women between 45 and 65 years of age completed the questionnaire.

The demographic characteristics of the respondents are summarized in Table III. The majority of responders were married, had completed secondary school or lived in provincial towns.

Descriptive statistical analysis of the answers for structured questions (Q6-Q14) of the questionnaire is shown in Table IV. The questions that focused on barriers to participating were also systematically analysed. A total of 1,042 women responded to the questions regarding their reasons for not undergoing breast screening. Briefly, the main barriers to participation in the OMSP were work absenteeism (18.9%), fear of painful examination (18.39%) and false beliefs regarding mammography screening (14.94%). Of survey respondents, 13.92% of those who did not attend the OMSP underwent opportunistic screenings; 11.11% answered that their designated screening centre (DSC) was too far from their home. Only 5.49% of those who did not participate in screening reported not having enough information on mammography screening and 4.85% answered that it was too expensive to get to the screening centre. Fear of breast cancer diagnosis prevented 3.58% of non-participants from attending the OMSP, and 2.04% did not participate for fear of mastectomy.

Based on patient marital status and place of residence, the responses were analysed to compare a number of criteria. (Table V) There was a significant association ($p=0.029$) between the responders' marital status and OMSP attendance, with married women attending breast screenings more frequently than single women. There was also a significant difference ($p=0.038$) between the place of residence and the frequency of mammography examination: women from the capital or from provincial towns more frequently underwent and were more compliant with screening than women who lived in villages. There was a significant association between the responders' residence and the distance from the DSC ($p<0.0001$): women living in the capital or provincial towns had better access to their DSC than those living in villages.

There was a significant association between the place of residence and the travel expenses incurred to reach the DSC ($p=0.009$) (Table VI). Compared to those living in the capital, women in rural populations reported financial difficulties in traveling to their DSC. Female residents of the capital were more likely to choose opportunistic screening compared to those living in rural areas ($p=0.005$). Barriers such as lack of information on mammography screening ($p=0.001$) and fear of breast loss ($p=0.003$) were also significantly associated with lower education level. Educated women were less likely to fear breast cancer and more likely to have sufficient information regarding mammography screening compared to interviewed women with lower levels of education. In the current study, married marital status appeared to be a protective factor against barriers such as feeling embarrassed about the examination ($p=0.0002$) and expenses incurred to reach the DSC ($p<0.0001$).

Table III. Responders' demographic characteristics (by response to questions 2, 3, and 5 of the questionnaire, Table II) ($n=3,313$).

Characteristic	No. of responders	%
Marital status		
Unmarried	153	4.62%
Married	1945	58.71%
Divorced	833	25.14%
Widowed	336	10.14%
No answer	46	1.39%
Educational level		
Primary school	173	5.22%
Secondary school	2106	63.57%
Tertiary school	1005	30.34%
No answer	29	0.88%
Place of residence		
Capital	693	20.92%
Provincial town	1979	59.73%
Village	612	18.47%
No answer	29	0.88%

Discussion

To improve breast cancer screening attendance among Hungarian women, it is imperative to have a valid instrument for exploring and understanding the factors associated with their screening behaviour. Our questionnaire has the appropriate psychometric properties to provide insights into tailor-made strategies designed to address the needs of the screening target population.

Our findings highlight that the main reasons for not attending the OMSP were work absenteeism, fear of pain associated with the examination, and false beliefs regarding mammography screenings. To reduce barriers such as work absenteeism, a paid day off might increase women's willingness to participate in the OMSP. It would be important for employers also to participate in helping their employees utilize preventative measures.

The results of our questionnaire study show that women with lower levels of education were less likely to have adequate information on breast screening, and were more likely to fear mastectomy compared to women with higher levels of education. There is a need for a multi-pronged strategy to inform and educate women about breast awareness and bring about a behavioural change. It may be beneficial to provide more information about breast cancer, breast cancer treatment, and the importance of mammography screening through health awareness education in primary school or through alternative information channels such as magazines, TV advertisements, online sites and brochures. Other authors with similar findings came to the same conclusion (28).

Table IV. Descriptive statistical analysis of the responses to structured questions (Q6-Q14) of the questionnaire (Table II).

	n	%
Q6: Do you undergo mammography examinations?		
Q7: If yes, how regularly?		
Q8: If yes, how frequently?		
Yes, annually	952	28.74%
Yes, biennially	1485	44.82%
Yes, occasionally	540	16.30%
No	290	8.75%
No answer	46	1.39%
Q9: Have you received an Invitation Letter for Screening?		
Yes	2194	66.22%
No	1073	32.39%
No answer	46	1.39%
Q11: Do you undergo regular breast screening?		
Regularly	2359	71.20%
Occasionally	320	9.66%
No	560	16.90%
No answer	74	2.23%
Q12: Where was your last breast exam?		
Organized mammography screening in a designated screening centre	1590	47.99%
Opportunistic mammography screening not in a designated screening centre (medical office, private clinic, etc.)	1482	44.73%
No answer	241	7.27%
Q13: How far is the designated screening centre from your residence?		
Close	2221	67.04%
Far	884	26.68%
Very far	58	1.75%
No answer	150	4.53%
Q14: Why did you not undergo organized mammography screening?		
Because of fear of breast cancer	28	3.58%
Because of fear of mastectomy	16	2.04%
Because the designated screening centre is too far	87	11.11%
Because of my job	148	18.90%
Because I do not have enough information on mammography screening	43	5.49%
Because mammography examinations are harmful	117	14.94%
Because I undergo opportunistic mammography screening	109	13.92%
Because mammography examinations are painful	144	18.39%
Because examination of an intimate body part is embarrassing	36	4.60%
Because of the expenses to get there	38	4.85%
Other	276	35.25%

Fear of pain in the examination was the second most common reason for avoiding mammography examinations. According to a previous study, discomfort was reduced when women were provided with written or verbal information, and when a breast cushion was used (29). Providing verbal or written information, as well as supporting women during the examination, is a simple and easily achievable intervention and can help to reduce pain during screening mammography. Use of alternative breast compression strategies or premedication with acetaminophen has not been reported to significantly reduce breast pain and discomfort (29).

It is important to note that half of responders in the current study chose opportunistic screening and that 13.92% of non-

participants chose a location other than their DSC for their mammography examinations. This finding is consistent with reports that opportunistic screening only covers half of the screened target population in Hungary (21-23). The non-participants described other barriers such as long waiting times in clinics, unorganized DSCs, dissatisfaction with facility staff, difficulties in changing scheduled mammogram appointments, and a lack of concern about breast cancer. To increase screening attendance rates, these barriers should also be addressed. The environment and facility staff are important for women's satisfaction and their willingness to attend their next screening. Similar barriers and suggestions have been described in other studies (30-33). A patient

Table V. Significant associations between patient marital status, residence, and responses to the questionnaire (by response to questions 3, 5-8, and 13, Table II).

Factor	Response			p-Value*	
	Regularly	Occasionally	No		
Screening					
Unmarried	97	21	30	0.029	
Married	1438	165	320		
Divorced	588	89	148		
Widow	228	42	60		
Mammogram	Annually	Biennially	Occasionally	No	0.038
Capital	221	285	123	60	
Provincial town	565	925	317	160	
Village	166	275	100	70	
Distance from DSC		Close	Far	Very far	9.5×10 ⁻¹⁷
Capital		476	184	7	
Provincial town		1413	450	35	
Village		332	250	16	

DSC: Designated screening centre. *Chi-square test.

Table VI. Statistical analysis of significant barriers to undergoing mammography screening associated with socioeconomic status (answer to question 14: Why did you not undergo organized mammography screening?).

Answer to Q14	Factor	Status	Response, n		p-Value*
			Chosen	Not chosen	
Because I attend other mammography screening	Location	Capital	39	147	0.005
		Provincial town	50	401	
		Village	20	126	
Because of the expenses to get there	Location	Capital	3	183	0.009
		Provincial town	22	429	
		Village	13	133	
		Marital status	Unmarried	2	
Married	10	421			
Divorced	12	198			
Because of fear of mastectomy	Education	Widowed	13	78	0.003
		Primary	4	43	
		Secondary	10	487	
Because I do not have enough information	Education	Tertiary	2	237	0.001
		Primary	8	39	
		Secondary	26	471	
Because undergoing examination of an intimate body part is embarrassing	Marital status	Tertiary	9	230	0.0002
		Unmarried	3	43	
		Married	12	419	
		Divorced	8	202	
		Widowed	12	79	

*Chi-square test.

navigator system could utilize prevention nurses to organize an effective screening program by offering education on breast awareness, screening invitation, and management of biennial mammogram appointments (34).

Only two-thirds of responders had received an Invitation Letter for Screening (ILS) in the previous 2 years, which is

below the minimum 70% adherence rate required by the WHO to reduce breast cancer mortality (20). Further investigations are needed to determine the causes for the lack of receipt of ILS.

In our study, the fear of breast cancer and fear of mastectomy among non-participants emphasizes the barriers

to participating in the OMSP. This finding is similar to a previous study where cancer anxiety and worry were associated with avoidance of breast cancer screening (35).

Married status appeared to be a protective factor against barriers, including embarrassment regarding the examination, financial challenges associated with travelling to the DSC and avoiding breast screening. Single women, mainly widows, were more likely to skip or were less likely to participate in the OMSP compared to married women. There is strong positive association between relationship and participation behaviour in mammography screening, which is also supported by other authors (36). Single women require special attention to inform them about the importance of breast screening, which could be addressed through well-organized patient navigation programs, as well as breast cancer support groups and self-help organizations.

In subjective response to the question “How far is the designated screening centre from your residence?”, one-quarter of women answered far, while fewer than 2% answered very far. Excessive distance to reach the DSC was the fifth most frequent barrier to breast screening. Statistical comparative analyses indicated that living in villages or in single households were associated with lower participation rates because of financial difficulties and problems in travelling long distances to the DSC. Others concluded similarly that women living in rural areas were less likely to participate in OMSPs compared with those living in urban areas (37). According to a previous interview-based survey, time required to travel to and distance from the DSC are important factors for women (38). Well-situated units with advanced promotion about public transportation and parking facilities may encourage greater uptake. Rural women require special attention because of their lower participation rates in mammography examination. Patient navigation, free public transport for the day of screening, specialized round-trip bus lines, or mobile breast screening units may help to overcome these barriers.

In conclusion, our findings highlight that the main reasons for women to avoid participation in OMSP included work absenteeism, fear of painful examination, lack of adequate information, and false beliefs about mammography screenings.

Conflicts of Interest

The Authors received non-financial administrative support from the Hungarian Avon Cosmetics Company and Mellrákinfo advocacy group.

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