

Women's knowledge of methods for secondary prevention of breast cancer

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Abstract *The objective of this study was to evaluate women's knowledge of methods for screening breast cancer. The study was done on a population of women aged 18 or over in the city of Rio Grande between April and November 2011. Interviewers used questionnaires on all of the women at selected households. Models were developed for every type of screening (self-examination of breasts, mammography, and clinical exams) that were analyzed through the use of Poisson regression. Out of the 1596 women interviewed, 1355 reported self-examination, 456, mammography, and only 191, clinical examination of the breast, performed by a health professional, as important for the prevention of breast cancer. White women with 11 years or more worth of schooling had a greater probability of having mammography exams and clinical examinations as methods for screening. We noted, linked to the aforementioned, that there was a linear tendency whereby there was a greater probability for those with high incomes to undergo one of the above interventions. The study noted that there was a need for more detailed information aimed at the population on prevention methods in order to avoid late diagnosis. We noted that non-white women with little education and on low incomes showed less knowledge of clinical examination methods and mammographies.*

Key words *Prevention of breast cancer, Knowledge, Diagnosis, Epidemiology*

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Introduction

Breast cancer is the second most common type of cancer in the world. It is most common in women who make up 22% of all new cases per year. If it is diagnosed and treated at an early stage, the chances of survival after five years, on average, rises to 61% in developed countries¹.

According to data from the National Institute of Cancer at Brazil (INCA) it is estimated that 57,120 new cases of breast cancer were diagnosed in 2014 which has a risk factor of 56.09 cases/per 100 thousand women². Despite their being an increase in early detection rates, one third of all new cases still present this type of localized cancer at an advanced stage²⁻⁵. This being the case, cancer mortality rates continue to be high. This is probably due to diagnosis occurring when it is at an advanced stage².

The best prognosis that leads to a reduction in mortality rates is related to screening and early diagnosis of the disease. This is done through secondary prevention where the largest number of preventative actions are carried out. Amongst the most effective ways for obtaining early diagnosis of breast cancer are through clinical examination of breasts (ECM) and mammographies (MMG)²⁻⁸. Currently self-examination of breasts (AEM) is not backed as an isolated strategy for early detection. It is seen as a way to get to know one's body⁸.

Screening should begin at the age of 40 through annual clinical breast examinations. Then between the ages of 50 to 69 women should have mammography exams that take place at a maximum interval of every two years. Women in high risk groups ought to start their annual screening at the age of 35 with ECM and MMG^{3,9}. The recommended age to start screening and the type of method used differs in part when one considers the recommendations from entities that have specialists in this area (MMG is recommended from the age of 40)⁹.

The medical literature relates knowledge on breast cancer and early detection examinations with the rise in women's motivation and interest in their health. This influences the practices of carrying out these exams. Some other studies suggest that raising awareness of breast cancer principally for elderly women who are in a high risk group and who generally take a while to notice the symptoms and to seek help, may help in promoting early diagnosis¹²⁻¹⁴. With this being the case, the aim of this study was to evaluate women's knowledge on screening methods

for breast cancer. This information may be very important in the evaluation of implementation measures for education in health.

Methods

This study is part of a wider project that took place under the title *Education, Knowledge on risk factors and the use of health services for women residents in a city in the south of Brazil: a study based on a population*. The target population was women residents in the city of Rio Grande that were 18 years of age or over. According to estimates from the IBGE (2010) the municipality had 197,288 inhabitants with 96% of them being residents in urban regions¹³.

The calculations for the size of the sample of people were carried out in the Info Epi program 6.04 (the Centers for Disease Control and Prevention, Atlanta, the United States of America). The study was a part of a wider study that estimated the size of the sample population of women to be 1,582. The post-hoc calculations of the statistical power showed that with n it would have a power of 80% to identify a RR of 2 considering a confidence level of 95%. This was for an exposure factor that had a reason of non-exposure/exposure of 5 and for a prevalence outcome of 5% in the non-exposed group.

Taking into consideration that there were 1,133 women over the age of 18 per household, it was estimated that it would be necessary to visit 1,400 households to obtain a representative sample.

The sample was randomly selected for women in multiple stages. Firstly a sample group was used after a random selection from 50 sectors amongst 246 existing sectors in the urban municipality area of Rio Grande. Later after all of the areas where random selection was done, we then selected areas (blocks) and sub-areas (street corners where there were households). Following on from these visits were made to one in two houses on randomly selected street corners until 28 were visited in a given sector. All the women that took part in the study were 18 years old or over who lived in randomly selected households and were of sound mind to respond to the questionnaire.

Knowledge on how screening was done for breast cancer was assessed through the question *Do you (Ms) know how breast cancer can be detected at a very early stage?* Contrary to research where the interviewer reads out a list of option and the interviewee responds to one of them,

in this study we opted to evaluate knowledge in spontaneous way and that is why the options were not read out. The interviewer wrote down the interviewee's response. The following measures were considered as adequate for secondary prevention of breast cancer: self-examination of breasts (AEM), clinical exams of breasts (ECM) and mammographies (MMG). The interviewer also wrote down the response "I don't know".

There are a number of independent studies in this area that include: age (made up of groups with ages starting from 10 years old), skin color (classified as white, black and other), marital status (with or without a partner), years of formal education that has been completed (classified as with or without a high school education completed), income per capita in the family transformed in quartiles (with the first quartile being the most poor), the work situation (with or without work), smoker or non-smoker, a drinker of alcohol or not and whether the person had a private health plan or not.

The information was collected through pre-coded questionnaires and tests. A pilot study was carried out to evaluate the tool and the logistics of the study in one of the sectors that was not randomly chosen. Six female interviewers that had been trained for this role and who applied the questionnaire in selected households. All the women residents in the households who were randomly selected, responded to the questionnaire. If the person was not at home at the time of the interview, the interviewer would return at a later date. Where there were people that declined to take part or could not be found, two further attempts were made Boston their participation using different strategies. Where on the third occasion the person declined again or the person could not be found, this was registered as a loss. The losses were not replaced with others. Before the interviews were conducted a Consent Form was read and only after this were the interviews carried out.

The data from the questionnaires were typed up twice and this was done by a third party entity using the program EpiData 3.1 (EpiData Association from Denmark). After checking for amplitude errors and consistency problems, the data was transferred to a statistical program called Stata version 11 (Stata Corp., College Station, United States). A descriptive analysis was carried out using average calculations and noting movements from the norm for numerical variables. Also calculations for proportions were done for cases of categorical variables. Then a bivariate

analysis was carried out to study the association between the outcome of the variables of interest with the calculated Reasons for Prevalence (RP) and their respective confidence intervals of 95% (IC95). At the multi-variate stage the Poisson regression was used with robust variation, type-back, and consideration was given for the sample option in groups for Stata (known as the "cluster" option). The adjusted RP and its IC95 were calculated following the hierarchical model¹⁴ that had two determination levels and the one that was the most distal was formed through socio-demographic variables. The second highest variables noted was smoking, the use of alcohol and having a private health plan. Variables for every level that had a p that were less than 0.005 were kept in the model to be adjusted in the following level. In the meaningfulness tests a value of p being less than 0.005 was used, being the two-tailed test. The research project was approved by the Ethics Commission and the Research Institution.

Results

Out of the 1,629 women that were found, 1596 responded to the questionnaire (2% loss). The sample's characteristics can be seen in Table 1. In relation to measures taken for early diagnosis of breast cancer: 1355 (84.6%) mentioned self-examination, 456 (28.6%) mammographies and only 191 (12%) clinical exams of breasts carried out by health care professionals. These were considered important measures for prevention. Only 88 (5.5%) were unable to respond in relation to one of the three above methods.

With reference to AEM as a way to obtain early diagnosis of breast cancer (Table 1), we noted that all of the age groups under 70 had a higher probability of between 25 and 33% in detections, depending on the age group, compared with groups whose ages were 70 and above. It was also observed that amongst women with partners there was a lesser probability of their mentioning this secondary preventive method, with a reduction of 4%. Other factors that were researched were not deemed as significant.

In relation to the carrying out of ECM by health care professionals as a way to obtain early detection of breast cancer (Table 2), there was a greater probability of this method being mentioned amongst white women (RP: 1.47; IC_{95%}: 1.05-2.07), with 11 years or more worth of formal education (RP: 1.32; IC_{95%}: 0.99-1.76) and who worked outside of the home (RP: 1.57; IC_{95%}:

Table 1. Profile of the sample group that was studied, knowledge of self-examination of breasts as a method for breast cancer prevention and its associated factors (n = 1596).

Variables	Sample Profile (%)	Self-examination		
		N (Prevalence)	Bivariate RP (IC95)	Multivariate RP (IC95)
Age			P < 0.001 ^b	P = 0.001 ^{b,c}
> = 70	159 (9.9)	108 (67.9)	1	1
60-69	186 (11.7)	156 (83.9)	1.23 (1.09-1.40)	1.25 (1.10-1.41)
50-59	272 (17.0)	241 (88.6)	1.30 (1.16-1.46)	1.32 (1.18-1.49)
40-49	303 (19.0)	262 (86.5)	1.27 (1.13-1.43)	1.29 (1.15-1.46)
30-39	257 (16.1)	229 (89.1)	1.31 (1.17-1.47)	1.33 (1.19-1.50)
< = 29	419 (26.3)	359 (85.7)	1.26 (1.13-1.41)	1.27 (1.13-1.42)
Skin Color			P = 0.2	P = 0.3
Black and others	465 (29.1)	403 (86.7)	1	1
White	1131 (70.9)	952 (84.2)	0.97 (0.93-1.01)	0.98 (0.94-1.02)
Marital Status			P = 0.5	P = 0.04 ^e
Without a partner	869 (54.4)	743 (85.5)	1	1
With a partner	727 (45.6)	612 (84.2)	0.98 (0.94-1.03)	0.96 (0.91-0.99)
Level of Education			P = 0.08	P = 0.9
High School Education Completed	973 (61.0)	814 (83.7)	1	1
High School Education Completed	623 (39.0)	541 (86.8)	1.04 (0.99-1.08)	0.99 (0.95-1.05)
Income in R\$ (quartile)			P = 0.3 ^b	P = 0.2
1st Average (DP)	215.5 (71.5)	335 (83.8)	1	1
2nd Average (DP)	440.8 (67.8)	330 (84.4)	1.01 (0.99-1.03)	1.02 (0.96-1.08)
3rd Average (DP)	745.3 (134.9)	367 (86.8)	1.04 (0.98-1.10)	1.06 (1.00-1.13)
4th Average (DP)	2421.4 (1506.9)	313 (85.5)	1.02 (0.96-1.08)	1.04 (0.97-1.11)
Work			P = 0.09	P = 0.6
No	1016 (63.7)	851 (83.8)	1	1
Yes	579 (36.3)	503 (86.9)	1.04 (0.99-1.08)	0.99 (0.94-1.03)
Smoking			P = 0.04	P = 0.1
No	1160 (72.7)	973 (83.9)	1	1
Yes	436 (27.3)	382 (87.6)	1.04 (1.01-1.09)	1.04 (0.99-1.09)
Alcohol			P = 0.5	P = 0.1
No	1238 (77.6)	1055 (85.2)	1	1
Yes	358 (22.4)	300 (83.8)	0.98 (0.93-1.03)	0.96 (0.91-1.01)
Have Private Health Plan			P = 0.4	P = 0.4
No	679 (42.5)	570 (83.9)	1	1
Yes	917 (57.5)	785 (85.6)	1.02 (0.98-1.06)	1.02 (0.97-1.07)

DP – Deviation from Standard.

1.2-2.03). With reference to income, a linear tendency was noted where there was a high response rate for clinical examinations of breast according to increases in household income which went up to three times more amongst women in the 4th quartile (RP: 3.04; IC_{95%}: 1.96-4.70) in comparison with the 1st quartile. Smoking was another factor that significantly affected the results. Women that smoked had a 56% lesser probability of mentioning clinical exams of breasts as a form of secondary prevention.

In relation to knowledge of MMG as a method for early diagnosis for breast cancer (Table 3),

there was a greater probability of white women mentioning this method (RP: 1.28; IC_{95%}: 1.06-1.74), with partners (RP: 1.26; IC_{95%}: 1.08-7.00), and with 11 years or more worth of formal education (RP: 1.31; IC_{95%}: 1.12-1.54). Again a linear tendency was seen in relation to the income quartile. The prevalence of the response where mammographies were identified as a way of secondary prevention was 26%, 77% and 90% higher than the second quartile in comparison to the first. Lastly, having a private health plan showed an increase in the probability in mentioning mammographies (RP: 1.28; IC_{95%}: 1.05-1.56).

Table 2. Knowledge of clinical examinations of breasts as a method for the prevention of breast cancer and its associated factors (n = 1596).

Variables	Clinical Examinations of Breasts		
	N (Prevalence)	Bivariate RP (IC95)	Multivariate RP (IC95)
Age		P = 0.4 ^b	P = 0.15
> = 70	17 (10.7)	1	1
60-69	20 (10.8)	1.00 (0.55-1.85)	0.99 (0.53-1.85)
50-59	36 (13.2)	1,24 (0.72-2.13)	1.42 (0.80-2.53)
40-49	32 (10.6)	0.99 (0.57-1.72)	1.18 (0.62-2.24)
30-39	40 (15.6)	1.46 (0.86-2.48)	1.65 (0.91-3.00)
< = 29	46 (11.0)	1.03 (0.61-1.74)	1.06 (0.58-1.93)
Skin Color		P = 0.004	P = 0.02 ^c
Black and others	38 (8.2)	1	1
White	153 (13.5)	1.66 (1.18-2.32)	1.47 (1.05-2.07)
Marital status		P = 0.006	P = 0.04 ^c
Without a partner	92 (15.9)	1	1
With a partner	99 (9.7)	0.68 (0.51-0.89)	0.76 (0.58-0.99)
Level of Education		P < 0.001	P = 0.06
High School Education Completed	86 (8.8)	1	1
High School Education Completed	105 (16.9)	1.91 (1.46-2.49)	1.32 (0.99-1.76)
Income in R\$ (quartile)		P < 0.001	P < 0.001 ^c
1st Average (DP)	23 (5.8)	1	1
2nd Average (DP)	29 (7.4)	1.2 (0.76-2.19)	1.10 (0.64-1.85)
3rd Average (DP)	47 (11.1)	1.93 (1.20-3.12)	1.55 (0.96-2.51)
4th Average (DP)	90 (24.6)	4.28 (2.77-6.61)	3.04 (1.96-4.70)
Work		P < 0,001	P < 0,001 ^c
No	99 (9.7)	1	1
Yes	92 (15.9)	1.63 (1.2-2.13)	1.57 (1.21-2.03)
Smoking		P < 0.001	P < 0.0001 ^c
No	170 (14.7)	1	1
Yes	21 (4.8)	0.33 (0.21-0.51)	0.44 (0.28-0.68)
Alcohol		P = 0.005	P = 0.06
No	164 (13.3)	1	1
Yes	27 (7.5)	0.57 (0.39-0.84)	0.67 (0.46-1.02)
Have Private Health Plan		P < 0.001	P = 0.2
No	47 (6.9)	1	1
Yes	144 (15.7)	2.27 (1.66-3.11)	1.23 (0.87-1.74)

Discussion

With this study we can observe that AEM is very much remembered by women as a secondary prevention method (84.5%) which did not show significant statistical differences with reference to socioeconomic factors. We believe that the mentioning of this method by so many participants is possibly due to the previous media campaigns on health where this method was mentioned as fundamental for the early detection of breast cancer. Studies have shown that the media is an

important means of communication for dispensing knowledge on breast cancer¹⁵ irrespective of a person's level of education or income¹⁶.

The ECM that is carried out by health care professionals is a simple and non-invasive method without costs with a sensibility rate of 94.5% and specificity rate of 87.7%¹⁷. When it is done by trained professionals this can result in their detecting a tumor the size of one centimeter if it is superficial¹⁷. This could be useful in areas where late diagnosis is a reality due to a lack of resources for making diagnosis using images. However, this

Table 3. Knowledge of mammographies as a method for the prevention of breast cancer and its associated factors (n = 1596).

Variables	N (Prevalence)	Mammography	
		Bivariate RP (IC95)	Multivariate RP (IC95)
Age		p = 0.06 ^b	p = 0.08 ^b
>=70	39 (24.5)	1	1
60-69	61 (32.8)	1.34(0.95-1.88)	1.2 (0.91-1.83)
50-59	92 (33.8)	1.38 (1.01-1.90)	1.32 (0.94-1.87)
40-49	90 (29.7)	1,21(0.88-1.67)	1.10 (0.76-1.58)
30-39	73 (28.4)	1.16 (0.83-1.62)	1.01 (0.69-1.49)
<=29	101 (24.1)	0.98 (0.71-1.36)	0.96 (0.68-1.39)
Skin Color		P = 0,009	P = 0,25
Black and others	111 (23.9)	1	1
White	345 (30.5)	1,28(1.06-1.54)	1.12 (0.93-1.34)
Marital Status		P = 0.02	P = 0.004 ^c
Without a partner	228 (26.2)	1	1
With a partner	228 (31.4)	1.2 (1.02-1.40)	1.2 (1.08-7)
Level of Education		P < 0.001	P = 0.001 ^c
High School Education Incomplete	392 (34.4)	1	1
High School Education Completed	231 (50.7)	1.60(1.38-1.87)	1.31 (1.12-1.54)
Income in R\$ (quartile)		P < 0.001 ^a	P < 0.001 ^{a,c}
1st	66 (16.5)	1	1
2nd	91 (23.3)	1.41 (1.06-1.88)	1.26 (0.94-1.69)
3rd	146 (34.5)	2.09 (1.62-2.70)	1.77 (1.34-2.32)
4th	144 (39.3)	2.38 (1.85-3.08)	1.90 (1.43-2.54)
Work		P = 0.001	P = 0.09
No	263 (25.9)	1	1
Yes	193 (33.3)	1,29(1.10-1.50)	1.14 (0.98-1.34)
Smoking		P = 0.002	P = 0.3
No	357 (30.8)	1	1
Yes	99 (22.7)	0.74 (0.61-0.90)	0.90 (0.74-1.11)
Alcohol		P = 0.005	P = 0.7
No	1238 (77.6)	1	1
Yes	358 (22.4)	0.57 (0.39-0.84)	0.96 (0.80-1.16)
Have Private Health Plan		P < 0.001	P = 0.02 ^c
No	138 (20.3)	1	1
Yes	318 (34.7)	1,71(1.43-2.03)	1.28 (1.05-1.56)

method was cited as a cancer preventive method by only 12% of the studied patients. We noted that white women with high levels of education and who worked outside of the home presented a greater probability of citing clinical examinations as routine in the prevention of breast cancer. Aside from this, it was observed that there was a linear tendency in responses referring to clinical examinations in as much as it increased the income quartile. The difference in the prevalence for the outcome between the last and the

first quartile was four times greater. Studies have shown that the carrying out of the ECM is associated with socio-demographic profiles of women with non-white women who have a lesser per capita family income and low levels of education and are treated on the National Brazilian Health System (SUS) present a lower probability of undergoing this exam¹⁸⁻²⁰. The group of women that presented a lot of difficulties in accessing diagnosis methods through images in the case of clinical exams had less success with this method. This

being the case, these women were unaware of the importance of having their breasts examined by a health care professional and they were not going to ask for this exam when they had an appointment to see their doctor.

In relation to ECM women with partners presented a greater probability of 40% than those without partners in not having this exam as a preventive method against cancer. This result seems to be paradoxical as studies show that women with partners present a higher probability of carrying out examinations of their breasts²⁰. In relation to smoking, the group of women smokers presented a 60% higher risk of not undergoing ECM. This result is predictable since it is the hallmark of a type of behavior that presents little concern for health. The studies therefore show that the carrying out of this examination was less amongst smokers²⁰. This fact is worrying as it is an important risk factor for the different types of neoplasia, including those for breasts^{6,15,21}. This group of smokers is not able to recognize the disease prevention methods. This fact can occur because smoking is frequently associated with pulmonary and cardiac problems but it is not associated with breast cancer by the general population.

The main screening method for early detection of neoplasia in breasts is through a radiological examination. A mammography is able to identify subclinical lesions²⁻⁵. In this study this method was mentioned as preventive by only 26.8% of the women who were interviewed. A study carried out on elderly women in São Paulo noted that 55% of them mentioned MMG as the examination they used as a means of early detection for breast cancer¹⁰. Remember that the least prevalence found in our study can happen through the way the question is given about knowledge of the methods since women's responses were spontaneous and not helped by the interviewee. We found in our study a prevalence in knowledge of the MMG that was two times higher than the prevalence of ECM. This difference can be explained by the greater amount of information that women received on this type of screening exam. The earlier study mentioned, found that 32% of women mentioned the media as the main source of information.

With reference to factors associated with the increase in the mentioning of MMG as a secondary prevention method we observed a linear tendency in relation to the income quartile, with prevalence moving from 26% in the 1st quartile to 90% being the 4th quartile ($p < 0,001$). Aside from

this, women with partners, a high school education completed and who had a private health care plan also presented a higher probability in making mention of mammographies, but the effects were less. Studies that have analyzed factors associated with carrying out MMG found that white women, who are not elderly, with partners and who have a high socioeconomic level, had a higher probability of undergoing examinations²²⁻²⁶. A study that took place in Juiz de Fora-MG interviewed 4,421 women that were older than 60 years old observed that women who were 70 or over, who did not have a partner, with 4 or less years of schooling and with an income that was less than three minimum wages and who also used the public health system, presented a low frequency in carrying out MMG²². A similar finding was observed in the Multicenter Inquiry into Health in the State of São Paulo (ISA-SP) where 290 women were interviewed who were 40 years old or over. It showed that women with an income of less than or equal to 5 minimum wages had a probability that was 2.5 times higher of not having carried out the MMG in the last two years²³. We can conclude that access to education and information as well as having the best socioeconomic conditions, all influence someone's knowledge of mammographies, knowledge of preventive methods and what a person should do.

Due to the limitations of the study it is important to note that the scope of the study did not permit an establishing of causal relations and only allowed for investigations in the factors that were studied as there was the possibility of reverse causality. But certainly and for determined factors such as sociodemographical ones, this possibility reduced because inverse relations is not plausible. The other limitation to consider is bias in recording. This type of systematic error also seems unlikely in this study because the reminder of the outcome (knowledge of the types of screening) did not seem to be affected by the passing of time. Another aspect to mention is that the responses to the questions on how to diagnosis breast cancer early on, contrary to other studies, were responded to by the interviewees without any type of inducements. We believe that it is for this reason the prevalence of the clinical exams and mammographies were low, as was mentioned earlier. On the other hand we can have a greater certainty that the values found, represent what the women knew with reference to the prevention methods without additional data or help that could help their memories. Finally as this study was based on a population

of women aged 18 years old or over, there was the possibility of extrapolating the results just for similar populations.

The study highlights the need for more understanding for women on secondary prevention methods against breast cancer in order to obtain early diagnosis and to avoid greater harm. The AEM was the method that was most remembered. This can be explained due to intense media campaigns in the past that mentioned it. The more knowledge on preventive methods by women the more like they are to carry them out. Women with less knowledge cannot act in an autonomous way in relation to taking care of their health. In relation to screening methods for breast cancer,

this lack of knowledge reduces the possibility to exercise the power to ask for a ECM to be carried out during a routine doctor's appointment and to remind the health care professionals of the need to ask for a MMG when indicated to do so. The media plays the role of highlighting these issues and providing knowledge on the procedures used in the prevention of breast cancer^{10,15,16}. We conclude that the existing prevention programs need to be bolstered and to form part of information campaigns about adequate methods for the prevention of neoplasia. They should provide information on self-examination noting that this on its own, is not effective as a form of secondary prevention for neoplasia.

Collaborations

Professor Dr. RA Mendoza-Sassi prepared and executed the study project and carried out the analysis of the data together with Professor Dr. CV Gonçalves. Medical academics VP Camargo, JM Cagol and B Miranda conducted the interviews at home, entered the database and did the bibliographic review for the article. The essay was written by all authors with a final review by professors RA Mendoza-Sassi and CV Gonçalves.

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