

# Factors associated with having mammography examinations in primary health care users in Vitória, Espírito Santo, Brazil\*

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## Abstract

**Objectives:** to estimate prevalence and factors associated with having mammography examinations among adult women aged 40 to 59 years old in primary health care services. **Methods:** a cross-sectional study was performed in 26 health centers in Vitória, Espírito Santo, Brazil; data were collected from March to September 2014; the independent variables described sociodemographic, behavioral and reproductive characteristics, having mammography performed every two years as the outcome. **Results:** 400 users participated, 57.8% of whom undergo mammography every two years; having the examination was more prevalent among women aged 50-59 years (PR=1.48 – 95%CI 1.25;1.75), those belonging to economic class A/B (PR=1.81 – 95%CI 1.22;2.68) and those who no longer menstruate (PR=1.31 – 95%CI 1.08;1.60). **Conclusion:** although the proportion of mammography examinations performed is in keeping with recommended levels, a higher frequency was found among the 50-59 age group belonging to class A/B, suggesting unequal access to this examination.

**Keywords:** Mammography; Breast Neoplasms; Primary Health Care; Mass Screening; Health Services Accessibility.

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## Introduction

Breast cancer is a Public Health problem not only because of its progressively increasing incidence but also owing to the high cost of treating it.<sup>1</sup> Statistics show that worldwide this class of neoplasm has the second highest incidence and is the highest cause of death among women.<sup>2</sup> Breast cancer also has high incidence and high mortality in Brazil: for the years 2018 and 2019, some 59,700 new cases are expected to occur, with risk of 56.33 cases per 100,000 women. In the state of Espírito Santo, 1,130 new cases are estimated for the same period, while in the state capital, Vitória, 140 new cases per 100,000 women are expected.<sup>3</sup>

According to the literature, high incidence of breast neoplasms is related to increased diagnosis, availability of technologies, lifestyle habits and population aging. Moreover, a high number of people are diagnosed at more advanced stages of the disease, thus demonstrating the need to improve cancer detection at its outset,<sup>4</sup> since late diagnosis of this disease, as well as limited access to treatment, are important factors associated with lower patient survival.<sup>5</sup>

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It is therefore essential to implement actions enabling timely detection as a fundamental strategy for breast cancer control. In a document published in 2015 providing guidelines for early breast cancer detection in Brazil, the José Alencar Gomes da Silva National Cancer Institute (INCA) recommends that breast cancer screening should be done by means of mammography every two years in women in the 50-69 age range,<sup>6</sup> while the Brazilian Mastology Society (SBM) indicates that women should have examinations with effect from 40 years of age.<sup>7</sup> The examination should be performed systematically, among asymptomatic people, with the aim of discovering the disease in its pre-clinical stage, i.e. diagnosing cancer tumors at an initial stage, thus contributing to treatment being more effective and a greater chance of being cured.<sup>6</sup>

Given the magnitude of breast cancer and the importance of early detection, health professionals should include breast cancer screening in prevention program actions in a systematized manner, focusing on active tracing among the target population.<sup>8</sup> To this end, it is fundamental that the health care network be structured in such a way as to enable the provision of quality mammography and adequate treatment to women who need it.<sup>9</sup>

Our study is justified in view of the reality presented here and the scarcity of studies on adherence to mammography by women who use public health centers, as well as the fact that some studies point to certain sociodemographic characteristics,<sup>7-10</sup> and access to health services<sup>7</sup> as factors that contribute to having the examination. The objective of our study is to analyze prevalence and factors associated with adherence to mammography by adult women aged 40-59 who use primary health facilities provided by the public health service.

## Methods

This is a cross-sectional study conducted in all 26 health centers of the municipality of Vitória, capital of the state of Espírito Santo, covered by the Family Health Strategy and/or the Community Health Agents Program. According to the 2010 Demographic Census, the municipality of Vitória had 327,801 inhabitants<sup>11</sup> and a human development index of 0.845 in the same year.<sup>12</sup>

In order to calculate prevalence, we took the female population aged 40-59 years old living in the municipality of Vitória: 46,149 women according to the 2010 Census.<sup>11</sup> To this end we used a 95% confidence interval and 5% margin of error. When studying association between having mammograms and women's characteristics, we used a 95% confidence interval, statistical power of 80% and an exposed/non-exposed ratio of 1:1. This calculation was performed using OpenEpi software, version 3, based on a minimum sample of 381 women. The number of participants in each of the 26 health centers was defined by sampling proportional to the number of women registered with each health center. The interviews were conducted randomly with women aged 40-59 who used Brazilian National Health System (SUS) services and who were waiting for some kind of care at a SUS health center.

Data on these women were collected between March and September 2014, individually, by trained interviewers. A specific questionnaire was used, structured according to the women's sociodemographic, behavioral and reproductive characteristics:

#### **Sociodemographic variables**

- age (in completed years: 40-49; 50-59);
- race/skin color (White; Black; brown) – women who referred to themselves as Indigenous (n=5) or yellow (n=8) were excluded from the analyses because of the small number of participants in each of these categories –;
- marital status (with a partner; without a partner);
- schooling (in completed years: 0-8; 9-11; 12 or more);
- paid job (no; yes);

#### **Behavioral variables**

- tobacco smoker (no; yes);
- alcoholic drink consumption (no; yes);
- monthly breast self-examination (no; yes).

#### **Reproductive variables**

- age of menarche (before 12 years of age; at 12 years of age or over);
- currently menstruates (no; yes);
- number of pregnancies (none; 1-2; 3 or more).

In order to identify the economic class to which the women belonged, we used the instrument called the 'Brazilian Economic Classification Criterion' developed by the Brazilian Teaching and Research Association (ABEP), which categorizes an individual's economic class according to their purchasing power (economic classes: A/B; C; D/E).<sup>13</sup>

The outcome of the study was having a mammography examination every two years (yes; no). Given that the study was conducted in National Brazilian Health System (SUS) health centers, we opted for the two-yearly examination as this is the periodicity recommended by the Ministry of Health for breast cancer screening for women in the 50-69 age range.<sup>6</sup>

The data were input to an Excel spreadsheet and the analyses were performed using the STATA 13.0 statistical package. We performed univariate and bivariate analysis. Pearson's chi-square test was applied in the bivariate analysis. The data were arranged according to both crude and relative frequencies and respective 95% confidence intervals (95%CI). We used Poisson regression with robust variance for the multivariable analysis which included only those variables which had  $p < 0.05$  in the bivariate analysis.

Variables with  $p < 0.05$  were kept in the model. The variables were selected using the "backwards" selection technique.

The hierarchical model used in the adjusted analysis evaluated possible factors associated with the outcome. The sociodemographic and economic variables were evaluated on the first level; the behavioral variables on the second level; and the reproductive variables on the most proximal level.

The study project was approved by the Federal University of Espírito Santo (UFES) Research Ethics Committee on November 27<sup>th</sup> 2013, as per Certificate of Submission for Ethical Appraisal (CAAE) No. 21221513.4.0000.5060, in accordance with National Health Council (CNS) Resolution No. 466, dated December 12<sup>th</sup> 2012.

## **Results**

Four hundred women took part in the study. There were no refusals. Table 1 shows the participants' sociodemographic, behavioral and reproductive characteristics: more than half of them (53.8%) were aged between 50-59 years old; 51.7% self-reported their skin color as being brown; 76.0% reported not having a partner; 42.7% had up to 8 years of schooling; 61.0% had a paid job; and their overriding economic class was class C (49.0%). Most of these women did not smoke (88.5%) or consume alcoholic beverages (65.0%). With regard to the age of menarche, 82.2% had their first menstrual period aged 12 or over, half of the interviewees no longer menstruated (50.8%) and 52.7% had had three or more pregnancies (Table 1).

A significant majority of the women (75.3%) did not perform monthly self-examination of the breasts. With regard to the prevalence of having mammography examinations, approximately six in every ten women had this examination every two years (57.8%).

Having a mammography examination every two years was more prevalent among women aged 50-59 years, with 12 or more years of schooling, belonging to economic classes A/B and who no longer menstruated ( $p < 0.05$ ) (Table 2).

After adjusting for confounding variables, schooling ceased to be associated with having mammograms. The frequency of having mammography examinations every two years was higher among women in the 50-59 age

**Table 1 – Sociodemographic, behavioral and reproductive characterization of women using primary health care services (N=400) in Vitória, Espírito Santo, 2014**

Variables	n (%)	95%CI <sup>a</sup>
<b>Sociodemographic</b>		
<b>Age (in years)</b>		
40-49	225 (46.2)	51.3;61.1
50-59	175 (53.8)	38.9;48.7
<b>Race/skin color<sup>b</sup></b>		
White	103 (26.6)	22.4;31.3
Black	84 (21.7)	17.9;26.1
Brown	200 (51.7)	46.7;56.6
<b>Marital status</b>		
Without a partner	304 (76.0)	71.5;79.9
With a partner	96 (24.0)	20.1;28.4
<b>Schooling (in completed years)</b>		
0-8	171 (42.7)	38.0;47.7
9-11	165 (41.3)	36.5;46.2
≥12	64 (16.0)	12.7;19.9
<b>Paid job</b>		
No	156 (39.0)	34.3;43.9
Yes	244 (61.0)	56.1;65.7
<b>Economic class<sup>c</sup></b>		
A/B	161 (40.3)	35.5;45.2
C	196 (49.0)	44.1;53.9
D/E	43 (10.8)	8.1;14.2
<b>Behavioral</b>		
<b>Smoker</b>		
No	354 (88.5)	85.0;91.3
Yes	46 (11.5)	8.7;15.0
<b>Alcoholic drink consumption</b>		
No	260 (65.0)	60.2;69.5
Yes	140 (35.0)	30.5;39.8
<b>Monthly breast self-examination</b>		
No	301 (75.3)	70.8;79.2
Yes	99 (24.7)	20.8;29.2
<b>Reproductive</b>		
<b>Menarche (in years)</b>		
<12	71 (17.8)	14.3;21.8
≥12	329 (82.2)	78.2;85.7
<b>Currently menstruates</b>		
No	203 (50.8)	45.8;55.6
Yes	197 (49.2)	44.4;54.2
<b>Number of pregnancies</b>		
None	30 (7.5)	5.3;10.5
1-2	159 (39.8)	35.0;44.7
≥3	211 (52.7)	47.8;57.6
<b>Mammography every two years</b>		
No	169 (42.2)	37.5;47.2
Yes	231 (57.8)	52.3;62.5

a) 95%CI 95% confidence interval.

b) N=387.

c) As per the 'Brazilian Economic Classification Criterion', developed by the Brazilian Teaching and Research Association (ABEP).

range (PR=1.48; 95%CI 1.25;1.75), when compared to those in the 40-49 age group. Women belonging to economic classes A/B had the examination 1.81 times more frequently (95%CI 1.22;2.68) than those in classes D/E. Another relevant finding occurred in the group of women who no longer menstruated: mammography prevalence was 1.31 times greater (95%CI 1.08-1.60) in this group when compared to the group that still menstruated (Table 3).

## Discussion

Our study revealed that more than half the participants in the 40-59 age range had a mammography examination every two years. Mammogram prevalence was higher among women aged 50-59 who belonged to economic classes A/B and no longer menstruated.

Discussions have been taking place since the late 20<sup>th</sup> century about the use of mammography as a breast cancer screening method. According to INCA guidelines for early breast cancer detection, this examination should be performed every two years in women aged 50-69.<sup>6</sup> A review study recommends extending mammography screening to the 40-49 age range.<sup>14</sup> However, a recent study<sup>15</sup> reinforces mammography screening in accordance with the INCA recommendation, as it found reduced frequency of breast cancer diagnosis in women aged 40-49, thus resulting in unnecessary interventions and increased Health costs, without proven reduction in mortality. On the other hand, it is important to consider that a short length of time between diagnosis and treatment is fundamental for reducing the risk of relapse and metastasis.<sup>16</sup>

The findings of our study show that approximately 58% of women health service users have a mammogram every two years. In 2010, according to Breast Cancer Information System (SISMAMA) data, some 71% of Brazilian women aged 40-59 had a mammography examination that year.<sup>17</sup> With regard to mammography prevalence by age range, our study found higher prevalence of participants aged 50-59 having mammography examinations when compared to the 40-49 age group. This finding is similar to that found by a study conducted in the municipality of Pelotas, Rio Grande do Sul, where having mammography examinations was more prevalent in the 50-59 age group compared to women aged up to 50.<sup>18</sup>

Although screening prevalence was in keeping with the recommendations, it is noteworthy that 28.6% of the women did not have two-yearly mammography examinations. Screening is an inherent part of Primary Care and health professionals working at this level of Public Health services should know the methods, periodicity and target population of the care to be provided.<sup>6</sup> Poor knowledge of this process can contribute to failures in breast cancer screening.<sup>19,20</sup> Furthermore, the fact of mammography screening in Brazil being predominantly opportunistic, i.e. conducted at the time of a medical appointment, lack of such knowledge on the part of the health professional responsible hinders women's adherence to mammography.<sup>21</sup>

Another important matter to be highlighted is the need for breast cancer control programs to achieve higher coverage of mammography examinations performed, according to the target population and recommended periodicity. In this sense, active tracing by health center professionals is a fundamental strategy for recovering women who fail to attend appointments or reaching those who do not use the health service.<sup>19</sup>

Regarding economic class, after adjusting the analysis we found that this variable remained associated with having a mammography examination every two years. This can be seen to increase progressively as economic class becomes higher, i.e.: women belonging to socio-economic levels A/B had the examination 1.8 times more than those in economic classes D/E. A similar finding has been found in other studies.<sup>10,22,23</sup> Spanish women from higher economic classes, for instance, had 1.4 times more probability of having the examination than those in lower economic classes.<sup>24</sup>

It is important to reflect on the extent to which socio-economic status has been an important factor for women's adherence to prevention practices.<sup>10,22,23</sup> It can be seen that the higher a woman's socio-economic level, the greater the prevalence of medical appointments and, therefore, the greater the opportunity for requesting the health professional to perform the examination.<sup>23</sup> In order to promote equity in the use of preventive examinations, information on having mammograms should be made available to all women, regardless of their social and economic status.<sup>22</sup>

**Table 2 – Distribution of mammograms performed every two years according to the sociodemographic, behavioral and reproductive characterization of women using primary health care services in Vitória, Espírito Santo, 2014**

Variables	Mammography every two years	
	n (%)	p-value <sup>a</sup>
<b>Sociodemographic</b>		
<b>Age (in years)</b>		<0.001
40-49	106 (47.1)	
50-59	125 (71.4)	
<b>Race/skin color</b>		0.322
White	64 (62.1)	
Black	43 (51.2)	
Brown	115 (57.5)	
<b>Marital status</b>		0.078
Without a partner	183 (60.2)	
With a partner	48 (50.0)	
<b>Schooling (in completed years)</b>	0.003	0,003
0-8	85 (49.7)	
9-11	99 (60.0)	
≥12	47 (73.4)	
<b>Paid job</b>		0.546
No	93 (59.6)	
Yes	138 (56.6)	
<b>Economic class<sup>b</sup></b>		<0.001
A/B	111 (68.9)	
C	104 (53.1)	
D/E	16 (37.2)	
<b>Behavioral</b>		
<b>Smoker</b>		0.147
No	209 (59.0)	
Yes	22 (47.8)	
<b>Alcoholic drink consumption</b>		0.414
No	154 (59.2)	
Yes	77 (55.0)	
<b>Monthly breast self-examination</b>		0.507
No	171 (56.8)	
Yes	60 (60.6)	
<b>Reproductive</b>		
<b>Menarche (in years)</b>		0.289
<12	37 (52.1)	
≥12	194 (59.0)	
<b>Currently menstruates</b>		<0.001
No	141 (69.5)	
Yes	90 (45.7)	
<b>Number of pregnancies</b>		0.158
0	14 (46.7)	
1-2	100 (62.9)	
≥3	117 (55.5)	

a) Pearson's chi-square test.

b) As per the 'Brazilian Economic Classification Criterion', developed by the Brazilian Teaching and Research Association (ABEP).

**Table 3 – Crude and adjusted analysis of the effects of the sociodemographic, behavioral and reproductive variables on having mammograms every two years among women using primary health care services (N=400) in Vitória, Espírito Santo, 2014**

Variables	Crude analysis <sup>a</sup>			Adjusted analysis <sup>a</sup>		
	PR <sup>b</sup>	95%CI <sup>c</sup>	p-value	PR <sup>b</sup>	95%CI <sup>c</sup>	p-value
<b>Sociodemographic</b>						
<b>Age (in years)</b>						
40-49	1.00		<0.001	1.00		0.001
50-59	1.52	1.28;1.79		1.48	1.25;1.75	
<b>Marital status</b>						
Without a partner	1.00		0.099	1.00		0.221
With a partner	0.83	0.67;1.04		0.92	0.84;1.06	
<b>Schooling (in completed years)</b>						
0-8	1.00		0.001	1.00		0.239
9-11	1.21	0.99;1.47		1.12	0.91;1.37	
≥12	1.48	1.20;1.82		1.23	0.97;1.58	
<b>Economic class<sup>d</sup></b>						
A/B	1.85	1.24;2.77	<0.001	1.81	1.22;2.68	0.001
C	1.42	0.94;2.15		1.46	0.97;2.16	
D/E	1.00			1.00		
<b>Behavioral</b>						
<b>Smoker</b>						
No	1.00		0.189	1.00		0.664
Yes	0.81	0.59;1.11		0.98	0.89;1.08	
<b>Reproductive</b>						
<b>Currently menstruates</b>						
No	1.52	1.27;1.82	<0.001	1.31	1.08;1.60	0.007
Yes	1.00			1.00		
<b>Number of pregnancies</b>						
0	1.00		0.174	1.00		0.494
1-2	1.35	0.90;2.01		1.27	0.84;1.89	
≥3	1.19	0.79;1.78		1.21	0.80;1.82	

a) Poisson regression with robust adjustment.

b) PR: prevalence ratio.

c) 95%CI 95% confidence interval.

d) As per the 'Brazilian Economic Classification Criterion', developed by the Brazilian Teaching and Research Association (ABEP).

This result leads to reflection on the impact of economic inequality on having mammography examinations. Women health service users from lower economic classes appear to have fewer opportunities for accessing this examination. This reinforces the defense of the principles of equal and universal access to health services, as well as the need for health professionals to have an egalitarian approach to this group of vulnerable women.<sup>10,18</sup> Mammography is the main method for breast neoplasm screening and early detection and health services must ensure access to it.<sup>10</sup>

Another important finding of our study is that the prevalence of women who no longer menstruate having mammograms every two years was around 1.31 times higher compared to those who still menstruate. It is important to bear in mind that the menopause may contribute to increased breast cell density, which is a significant cancer risk factor. A population-based study followed 61,844 women over an average period of 3.1 years in order to estimate the risk of breast cancer according to mammographic categories of breast density. Its results showed that the risk of developing breast cancer was four times greater among women with

extremely dense breasts when compared to the same risk among women who did not have dense breasts. Mammography therefore reveals itself to be a useful examination for assessing risk of this neoplasm.<sup>25</sup>

A further finding of our study was that a large part of the participants (75.0%) did not self-examine their breasts on a monthly basis. This prevalence rate is greater than that found in a population-based study conducted in the state of Maranhão between July 2007 and January 2008, in which 66.2% of the women studied did not self-examine their breasts.<sup>26</sup> A study conducted in Aracaju, capital of the state of Sergipe, with women who had breast cancer, points to only 35.3% of them having self-examined their breasts.<sup>27</sup> Research published in 2016, showed that in Juiz de Fora, a city in the state of Minas Gerais, 62.4% of interviewed women receiving care at the city's University Hospital reported monthly breast self-examination (BSE).<sup>28</sup>

The difference found in the literature as to percentage BSE is worthy of reflection. It is important to highlight that BSE is not recommended by INCA or by the Ministry of Health as a breast screening strategy. Notwithstanding, BSE is a specific, systematic and time-defined method for women to examine themselves monthly, looking at and feeling their own breasts with the aim of identifying alterations or abnormalities suggesting cancer; its sensitivity varies between 26.3 and 28.2%; while its specificity varies between 92.2 and 96.2%.<sup>6,29</sup> Feeling one's own breasts is also important for being familiar with one's own body and, therefore, contributes to early identification of breast alterations. Doing this can make women aware of the normal aspect and structure of their breasts, increasing their ability to notice the appearance of signs and symptoms suggesting breast cancer.<sup>6</sup> If a woman finds her breasts to be altered, she can seek her primary health care service and thus avoid greater harm to her health.<sup>8,30</sup>

Once again the importance must be highlighted of health professionals, above all those working in Primary Health Care, undertaking educational actions to provide information on and encourage BSE. Health professionals need to help women health service users to understand the importance of self-care and knowing their own body, as well as encouraging them as to the need to seek medical care if alterations to their breasts occur. Health service professionals therefore need capacity building in order to be able to assist, provide guidance and perform necessary procedures in response to this stimulated demand.<sup>30</sup>

With regard to the limitations of this study, first of all the reliability of self-reported information as to having mammograms every two years needs to be considered, as it can be subject to recall and information bias, thus causing its regularity to be overestimated: the participant may be mistaken as to the length of time since they had the examination and thus cause its regularity to be overestimated. Notwithstanding, the interview technique has usually been adopted by other studies on this theme.<sup>10,17</sup> Secondly, the study's cross-sectional design, which limits the definition of temporality between outcome and exposure, does not enable causal relationships to be established, as can be seen in the relation between economic class and having mammograms. Another limitation of our study lies in the fact of it only having been conducted with women health service users, so that it is not possible to generalize its findings to women who do not use Public Health facilities. Despite these limitations, the data presented serve as a basis for a better understanding of access by women health service users to mammograms.

The work we developed enabled us to identify that the prevalence of women in the 50-59 age group having mammograms is in keeping with World Health Organization (WHO) recommendations, and that certain sociodemographic and reproductive factors may be associated with breast cancer screening. Prevalence of having mammography examinations every two years is greater among women aged 50-59 belonging to economic classes A/B and who are in the menopause.

Finally, it is appropriate to recall that this screening method does not reach all women in the target population, so that investments need to be made in building the capacity of health professionals to develop educational actions on the importance of having mammograms for the early detection of breast cancer. Health services should facilitate the provision of this examination, focusing on equity and access, scaling up its coverage among women SUS service users.

### Authors' contributions

Silva RP contributed to interpreting the data and writing the manuscript. Gigante DP and Amorim MHC contributed to the critical review of the study and the final version of the manuscript. Leite FMC contributed to conceiving and designing the study, as well as data analysis and interpretation. All the authors declare their responsibility for all aspects of this paper, ensuring its accuracy and integrity.

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