Health Iniquity, Unhealthy Behavior, and Coverage of Mammography in Brazil

Iniquidade em saúde, comportamentos não saudáveis e cobertura de mamografia no Brasil

Iniquidad de salud, comportamiento no saludable y cobertura de mamografía en Brasil

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ABSTRACT
Objective: To investigate the prevalence of mammography screening and the association among socio-demographic, behavior factors and non-adherence to mammography screening among women between 50 and 69 years old, using data from Vigitel 2016. Method: Cross-sectional, population-based study with data from Vigitel including 12,740 women in the 50-69 age group. The variables were analyzed using logistic regression. Results: Among the women studied, 21.8% had not had a mammography in the past 2 years. The characteristics associated with non-adherence to the test were having less than 12 years of education (p<0.001), having no partner (p=0.001), being underweight (p=0.002), having a negative self-perceived health status (p<0.001) and having at least one negative health behavior (p<0.001). Conclusion: There is a subgroup of women with markers of social vulnerability, which reflect the inequality in mammography screening.

Descriptors: Mammography; Health Status Disparities; Health Services Coverage; Health Services Accessibility; Mass Screening.

RESUMO
Objetivo: Investigar a prevalência da cobertura de mamografia e a relação entre fatores sociodemográficos e comportamentais associados à não realização de mamografia em mulheres de 50 a 69 anos de idade, usando dados do Vigilância 2016. Método: Estudo transversal, base populacional, que utilizou dados do Vigilância e incluiu 12.740 mulheres na faixa etária de 50 a 69 anos. As variáveis foram analisadas por meio da regressão logística. Resultados: Entre as mulheres estudadas, 21,8% não haviam realizado a mamografia nos últimos 2 anos. As características associadas à não realização do exame foram mulheres com menos de 12 anos de estudo (p<0,001), que declararam não ter companheiro (p=0,001), com baixo peso (p=0,002), autoavaliação da sua saúde como negativa (p<0,001) e com pelo menos um comportamento negativo em saúde (p<0,001). Conclusão: Observa-se um subgrupo de mulheres com marcadores de maior vulnerabilidade, os quais refletem as iniquidades na cobertura da mamografia.

Descritores: Mamografia; Iniquidade em Saúde; Cobertura de Serviços de Saúde; Acesso aos Serviços de Saúde; Programas de Rastreamento.

RESUMEN
Objetivo: Investigar la prevalencia de la cobertura de mamografías y su relación entre los factores sociodemográficos y comportamentales asociados a la no realización de mamografías en mujeres de 50 a 69 años de edad, según datos del Vigilte 2016. Método: Se trata de un estudio transversal, de base poblacional, realizado con los datos del Vigilte que incluye a 12.740 mujeres entre 50 y 69 años. Las variables se analizaron con regresión logística. Resultados: Entre las mujeres estudiadas, el 21,8% no se había hecho una mamografía en los últimos 2 años. La no realización del examen estaba relacionada con determinadas características: menos de 12 años de estudio (p<0,001), no tener pareja (p=0,001), bajo peso (p=0,002), autoevaluación de su salud como negativa (p<0,001) y por lo menos un comportamiento de salud negativo (p<0,001). Conclusión: Se observa un subgrupo de mujeres con marcadores de vulnerabilidad más elevados, lo que refleja las desigualdades en la cobertura de las mamografías.

Descritores: Mamografía; Iniquidad en la Salud; Cobertura de los Servicios Sanitarios; Acceso a los Servicios Sanitarios; Programas de Rastreo.
INTRODUCTION

Breast cancer is the most common cancer in women worldwide. Mammography screening aims at early detection and reduction of mortality rates\(^6\). The highest incidence rates are in developed countries; however, the mortality rate is higher in developing countries, which can be attributed to late diagnosis\(^3-4\) and lack of timely access to treatment\(^6\).

Screening mammography is recommended every two years from 50 to 69 years old, for early detection and reduction of mortality\(^6\). This recommendation is for the population at risk\(^1\), as too many mammographies out of the age range may have a negative cost-benefit related to overdiagnosis, overtreatment, excessive exposure to radiation and death from radiation-induced cancer\(^2-5\).

According to data from Vigitel, the mammography screening rate in Brazil in 2012 was 77.4%, exceeding by seven percentage points the goal proposed by the Ministry of Health for 2022\(^6\). However, results from the 2013 National Health Survey show variations according to region (North – 38.7%; and Southeast – 67.9%), level of education, and paying a private healthcare plan versus public healthcare - SUS (79.5% and 51.0%, respectively)\(^7\). These differences between the surveys can be attributed to methodological designs.

Studies show social inequalities in access to breast cancer screening\(^8-14\). Black and brown (pardo) women\(^8\), with a low level of education\(^8,10,11,13\), who were single or living without a partner\(^9,10,15,16\), who smoked\(^8\) and did not have health insurance\(^12-14\) had mammographies less often. Additionally, studies with small samples\(^8,12\) have shown that unhealthy behaviors, such as insufficient physical activity level and low intake of fruits and vegetables, may be associated with non-adherence to mammography screening.

Non-adherence to mammography screening is a serious health risk, as early detection increases the likelihood of finding a tumor at an early stage, which improves the chance of success in the treatment of this disease\(^17\). Thus, studies of negative health behaviors may point to an accumulated risk of breast cancer, as these behaviors are risk factors for this type of cancer and may be associated with non-adherence to mammography screening.

OBJECTIVE

To investigate mammography screening and the association among socio-demographic, behavior factors and non-adherence to mammography screening among women between 50 and 69 years old, using data from Vigitel 2016.

METHOD

Ethical aspects

Vigitel was approved by the National Commission for Ethics in Research with Human Beings (Conep no. 355.590/2013)\(^18\) and verbal consent was obtained during telephone contact with participants\(^19\).

Design, setting and period

This is a cross-sectional population-based study with data from Vigitel 2016. Vigitel is performed through telephone interviews consented during telephone contact with participants\(^19\).

Study protocol

The main outcome was not having a mammography in the past two years. The following questions were used: “Have you ever had a mammography/x-ray of the breasts?” and “How long has it been since you had a mammography?” Women who had never had the test done and those who had not had it in the past two years were classified as “non-adherence to mammography screening.”
Socio-demographic variables were skin color/race (white, brown and black, yellow and indigenous), age group in years (50 to 59, 60 to 69), level of education in years (12 or more, 9 to 11, 0 to 8) and marital status (with and without a partner). The behavior and health variables were: diabetes, high blood pressure, body mass index - BMI (normal weight, underweight, overweight, obesity), physical activity during leisure time, recommended intake of fruits and vegetables, smoking, alcohol intake, self-reported health status (positive, negative), having a health insurance and negative health behaviors (none to four). The last variable was based on having negative health behaviors: not engaging in physical activity during leisure time, not consuming the recommended amount of fruits and vegetables, being a smoker/ex-smoker, consuming alcohol.

BMI was classified according to the World Health Organization (WHO) definition: normal weight ≥ 18.5 and < 25; underweight < 18.5; overweight ≥ 25 and < 30, obesity ≥ 30 kg/m².[10]

Engagement in physical activity during leisure time was defined by 150 minutes of light or moderate physical activity per week or at least 75 minutes of vigorous physical activity per week.[19] The recommended intake of fruits and vegetables was determined according to Vigitol: five or more daily portions of fruits and vegetables, at least five days a week.[19] Self-reported health status was positive if the woman assessed her health as very good or good, and negative when it was assessed as regular, bad or very bad.[19]

Analysis of results and statistics

Data analysis included estimates of mammography screening, prevalence of non-adherence to mammography screening and standard error (±SE). Unadjusted and adjusted analyzes of potential socio-demographic, behavior and health variables associated with non-adherence to mammography screening in the past two years were conducted using logistic regression. The Odds Ratio (OR) and its respective 95% confidence intervals (95% CI) were estimated using the Stata statistical package, version 14.0, Survey module.

RESULTS

The mammography screening rate in the past two years among women in the target age group for this test (50 to 69 years old) was 78.2%. The prevalence of non-adherence to mammography screening was 21.8%, varying according to socio-demographic factors, behaviors, and health variables. This prevalence was higher in some groups, such as women who had a low level of education (28.8%), did not have a partner (26.3%), did not have health insurance (30.8%), had three (25.4%) and four (35.6%) unhealthy behaviors, were underweight (42.6%) or smokers (33.8%), among others (Tables 1 and 2).

Regarding the characteristics of women, most self-identified as white, were between 50 and 59 years old, had between 0 and 8 years of education, lived with their partners and were from the Southeast region. In the unadjusted analysis, women who self-identified as non-white had a lower level of education (0 to 8 and 9 to 11 years of education) and lived without a partner were more likely not to adhere to mammography screening, as were those who lived in the Northeast and Center-West regions (Table 1).

<table>
<thead>
<tr>
<th>Behavior and health characteristics</th>
<th>n (%) (±SE)</th>
<th>Non-adherence to mammography screening % (95% CI) OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>12,740</td>
<td>Diabetes No 10,573 82.4 (0.7) 20.9 (19.12-22.79) Ref.</td>
</tr>
<tr>
<td>Yes</td>
<td>2,167</td>
<td>17.6 (0.7) 26.1 (21.99-30.68) 1.33 (1.03-1.71)</td>
</tr>
<tr>
<td>Hipertension</td>
<td>12,740</td>
<td>Hipertension No 6,675 51.5 (0.9) 19.7 (17.58-22.07) Ref.</td>
</tr>
<tr>
<td>Yes</td>
<td>6,065</td>
<td>48.5 (0.9) 24.0 (21.58-26.68) 1.28 (1.05-1.57)</td>
</tr>
<tr>
<td>Nutritional status</td>
<td>12,740</td>
<td>Nutritional status Adequate weight 4,844 37.6 (0.9) 214 (18.66-24.43) Ref.</td>
</tr>
<tr>
<td>Underweight</td>
<td>249</td>
<td>Underweight 2,000 2.02 (0.2) 42.6 (29.56-56.68) 2.72 (1.50-4.92)</td>
</tr>
<tr>
<td>Overweight</td>
<td>4,805</td>
<td>Overweight 36.1 (0.9) 19.1 (16.76-21.60) 0.86 (0.68-1.09)</td>
</tr>
<tr>
<td>Obesity</td>
<td>2,842</td>
<td>Obesity 24.3 (0.8) 24.8 (21.38-28.76) 1.21 (0.93-1.57)</td>
</tr>
<tr>
<td>Physical activity during leisure time*</td>
<td>12,740</td>
<td>Physical activity during leisure time* Active 4,134 26.1 (0.8) 11.3 (9.32-13.7) Ref.</td>
</tr>
<tr>
<td>Inactive</td>
<td>8,606</td>
<td>Inactive 73.9 (0.8) 25.5 (23.44-27.7) 2.68 (2.09-3.42)</td>
</tr>
<tr>
<td>Recommended intake of fruits and vegetables††</td>
<td>12,740</td>
<td>Recommended intake of fruits and vegetables†† Yes 4,486 33.3 (0.9) 15.1 (12.69-18.03) Ref.</td>
</tr>
<tr>
<td>No</td>
<td>8,254</td>
<td>No 66.7 (0.9) 25.1 (23.04-27.35) 1.87 (1.48-2.37)</td>
</tr>
<tr>
<td>Smoking</td>
<td>12,740</td>
<td>Smoking No 7,799 58.3 (1.0) 19.3 (17.45-21.39) Ref.</td>
</tr>
<tr>
<td>Ex-smoker</td>
<td>3,832</td>
<td>Ex-smoker 29.8 (0.9) 21.9 (18.88-25.25) 1.16 (0.93-1.46)</td>
</tr>
<tr>
<td>Yes</td>
<td>1,109</td>
<td>Yes 11.9 (0.7) 33.8 (27.72-40.44) 2.12 (1.55-2.90)</td>
</tr>
<tr>
<td>Alcohol intake</td>
<td>12,739</td>
<td>Alcohol intake No 9,553 75.4 (0.8) 22.5 (20.65-24.56) Ref.</td>
</tr>
<tr>
<td>Yes</td>
<td>3,186</td>
<td>Yes 24.6 (0.8) 19.5 (16.35-23.20) 0.83 (0.65-1.06)</td>
</tr>
<tr>
<td>Self-perceived health status</td>
<td>12,688</td>
<td>Self-perceived health status Positive (very good, good) 7,605 59.8 (0.5) 16.9 (15.09-18.98) Ref.</td>
</tr>
<tr>
<td>Negative (regular, poor, very poor)</td>
<td>5,083</td>
<td>Negative 40.2 (0.5) 28.2 (25.38-31.22) 1.92 (1.57-2.35)</td>
</tr>
</tbody>
</table>

Note: * sample size, † population estimate, ‡ standard error, § 95% confidence interval, || Odds Ratio.

Table 1 – Prevalence and unadjusted Odds Ratio of non-adherence to mammography screening among Brazilian women between 50 and 69 years old, according to socio-demographic characteristics, Brazil, 2016

Table 2 – Prevalence and unadjusted Odds Ratio of non-adherence to mammography screening according to behavior and health variables, Brazil, 2016
As for behavior and health variables, most women were not diagnosed with diabetes and hypertension, also had an adequate weight, were inactive, did not consume the recommended amount of fruits and vegetables, did not smoke, did not consume alcohol, had a positive self-perception of health, had health insurance and had at least one negative health behavior (Table 2). In the unadjusted analysis, women who had diabetes and hypertension, were underweight, were inactive, did not consume the recommended amount of fruits and vegetables, were smokers, had a negative self-perception of health, did not have health insurance and had one or more negative health behavior were more likely to not adhere to mammography screening (Table 2).

The adjusted model showed that women who had a lower level of education did not have a partner, were underweight and had a negative self-perception of health were more likely to not adhere to mammography screening (Table 2).

### Table 3 - Adjusted Odds Ratio (OR) and 95% CI of non-adherence to mammography screening according to socio-demographic, behavior, and health variables, Brazil, 2016

<table>
<thead>
<tr>
<th>Behavior and health variables</th>
<th>n’</th>
<th>Non-adherence to mammography screening % (95% CI)</th>
<th>OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health insurance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7.353</td>
<td>57.7 (0.5)</td>
<td>11.2 (9.60-12.97)</td>
<td>Ref.</td>
</tr>
<tr>
<td>No</td>
<td>5.336</td>
<td>42.3 (0.5)</td>
<td>30.8 (28.11-33.51)</td>
<td>3.53 (2.85-4.36)</td>
</tr>
<tr>
<td>Unhealthy behaviors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>907</td>
<td>5.5 (0.4)</td>
<td>5.5 (3.71-7.92)</td>
<td>Ref.</td>
</tr>
<tr>
<td>One</td>
<td>3.047</td>
<td>21.7 (0.8)</td>
<td>16.1 (13.14-19.57)</td>
<td>3.33 (2.08-5.30)</td>
</tr>
<tr>
<td>Two</td>
<td>5.157</td>
<td>39.8 (0.9)</td>
<td>22.5 (20.04-25.12)</td>
<td>5.03 (3.28-7.71)</td>
</tr>
<tr>
<td>Three</td>
<td>2.888</td>
<td>26.3 (0.9)</td>
<td>25.4 (21.90-29.33)</td>
<td>5.92 (3.78-9.25)</td>
</tr>
<tr>
<td>Four</td>
<td>740</td>
<td>6.7 (0.5)</td>
<td>35.6 (27.95-44.08)</td>
<td>9.59 (5.61-16.40)</td>
</tr>
</tbody>
</table>

Note: *Sample size, †Population estimate, ‡Standard error, §Odds Ratio, ||95% confidence interval.

The variable health insurance was not included in the final adjusted model, as it was correlated with level of education (correlation=0.3382). It should be noted that level of education and negative health behaviors showed a dose-response relationship (p<0.001 for both associations).

### DISCUSSION

The mammography screening rate in this study was 78.2% in the past two years, which is higher than the recommended goal[4]. There were significant differences between the groups studied. Rates were proportionally lower in the most socially vulnerable groups. In the present study, the women who had a low level of education, lived without a partner, were underweight and had a negative self-perception of health were more likely to not adhere to mammography screening. Similar results were found in relation to the cervical cancer prevention test[21].

As it is a socioeconomic factor[8,14], the low level of education could explain why women in these conditions have less access to information related to the mammography and do not understand its importance, which decreases the chance of getting the exam[8,14,22].

The association between civil status and breast cancer screening is controversial in the literature. Studies in more developed countries such as Australia demonstrated that the partner can encourage women to get tested and that their contribution can be related to social support and its vital role as incentive for women to seek health care[3]. In contrast, a study showed that in more conservative countries, such as Mexico, married women may not get tested due to the male chauvinism of their partner (related to the exposure of the woman's body)[8]. Despite of the association between civil status and higher adherence to mammography screening, the authors point out that asking about civil status does not necessarily reveal if the person lives with or without a partner, making it difficult to infer how the partner influences women' screening habits[10,16].

In this study, women who self-perceived their health as regular, poor or very poor were more likely to not adhere to mammography screening. A negative self-perceived health status is related to negative health behaviors such as smoking, alcoholism and physical inactivity[4]. Thus, it can be inferred that, in addition to these behaviors, this population seeks health promotion and disease prevention services less often, and do not adhere to screening guidelines.

Unhealthy behaviors, such as insufficient physical activity, intake of alcohol and tobacco and unhealthy diets are considered risk factors for breast cancer[41]. In this study, these factors were associated with a lower chance of getting a mammography, which makes them a double risk, as they are factors associated with breast cancer and with failure to make an early diagnosis[17]. The use of an unhealthy behavior score in this study allowed this assessment. It should also be noted that some studies show that women do not get a mammography because they do not consider themselves at risk for breast cancer, as they do not feel pain or do not feel any changes[28, or because they do not have a family history[29]. This behavior demonstrates lack of knowledge about the disease and its risk factors and perhaps a deficiency of the health care service in relation to health education for disease prevention and health promotion. Our findings related to level of education may reinforce this.
It is observed that the achievement of the quantitative goals of mammography screening does not have the expected impact on the reduction of breast cancer incidence and mortality rates in the country[5]. Prevention actions complemented by timely access to treatment and priority screening for groups less likely to perform the test and groups at high risk of the disease can help reduce mortality from breast cancer through early detection[30].

Therefore, our findings indicate that, despite the increase in mammography screening rates in the country and the compliance with the national goal, disparities still exist, revealing inequalities in screening. The exam was less frequent in groups with socio-demographic and behavior differences, with emphasis on who had a low level education, were underweight and had negative health behaviors, which are also risk factors for the occurrence of breast cancer. Thus, it is demonstrated that inequalities are barriers to examination. This evidence is useful and should be considered when defining the allocation of resources to improve the screening of the disease in the country.

**Limitations of the study**

The limitations of the present study must be explained. Cross-sectional studies only indicate associative relationships between exposure and outcome variables. However, it is plausible that women with low socioeconomic levels and unhealthy behaviors adhere to public mass screening in a smaller proportion. Memory bias may also be present in the characterization of the period in which the exam was performed, which results in difficulty estimating its direction and magnitude.

**Contributions to Nursing**

Nurses have a fundamental role in primary health care, where screening strategies occur in our country, and thus can contribute to the improvement of the disparities found. Prioritizing the most vulnerable women, who do not perform the exam or who do it less often, could be the first step towards building more strategic and less opportunistic screening. In addition, it would allow affordable and qualified care for this group of women.

**CONCLUSION**

The prevalence of mammography in the prior two years among women who were in the target age group for this exam (50 to 69 years old) was 78.2%. The prevalence of non-adherence (21.8%) varied according to socio-demographic factors, behaviors and health characteristics, and was higher among women with characteristics that may indicate social and behavior inequities, such as having a low level of education, being underweight, having a negative self-perceived health, having a high score of unhealthy behaviors and having no partner.

Therefore, the presence of social and behavioral inequities potentially determines disparities in mammography screening rate in Brazil. This result points out possibilities to identify groups that are more distant from the recommended screening goals.

**FUNDING**


**REFERENCES**


