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MAMMOGRAPHIC SCREENING AND DETECTION OF BREAST CANCER

RASTREAMENTO MAMOGRÁFICO E A DETECÇÃO DO CÂNCER DE MAMA

RASTREO MAMOGRÁFICO Y LA DETECCIÓN DEL CÁNCER DE MAMA

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ABSTRACT

Objective: to analyze the relationship between mammographic screening and detection of breast cancer in Brazilian women aged 40 to 69, between 2009 and 2012. **Method:** observational, descriptive study, carried out with data collected in 2014 in the database of the Informatics Department of the Unified Health System and of the Brazilian Institute of Geography and Statistics. The incidence rates of malignant breast neoplasms were calculated according to Brazilian regions and schooling; distribution of mammography exams performed in Brazil; proportion of women who underwent mammography according to the age group and years investigated. **Results:** the incidence rates of malignant neoplastic lesions detected by palpation and imaging increased in the years 2009 and 2011, but there was a decrease in detection by palpation in 2011 and 2012. **Conclusion:** the proportion of women who underwent mammography increased by age group investigated, but the values are still below the recommended. **Descriptors:** Mammography; Breast Cancer; Early Detection of Cancer; Oncology.

RESUMO

Objetivo: analisar a relação entre o rastreamento mamográfico e a detecção do câncer de mama em mulheres brasileiras de 40 a 69 anos, entre 2009 e 2012. **Método:** estudo observacional, descritivo, realizado a partir de coleta de dados em 2014 no banco de dados do Departamento Informática do Sistema Único de Saúde e Instituto Brasileiro de Geografia e Estatística. Calcularam-se as taxas de incidência de lesão neoplásica maligna de mama segundo regiões brasileiras e escolaridade; distribuição dos exames de mamografia realizados no Brasil; proporção de mulheres que realizaram mamografia segundo faixa etária e anos investigados. **Resultados:** as taxas de incidência de lesão neoplásica maligna detectada por palpação e imagem aumentaram nos anos de 2009 e 2011, porém, entre 2011 e 2012, observou-se queda na detecção por palpação. **Conclusão:** a proporção de mulheres que realizaram mamografia aumentou por faixa etária investigada, contudo os valores encontrados ainda estão aquém do preconizado. **Descritores:** Mamografia; Neoplasias da Mama; Detecção Precoce de Câncer; Oncologia.

RESUMEN

Objetivo: analizar la relación entre el rastreo mamográfico y la detección del cáncer de mama en mujeres brasileiras de 40 a 69 años, entre 2009 y 2012. **Método:** estudio observacional, descriptivo, realizado a partir de recolección de datos en 2014 en el banco de datos del Departamento Informática del Sistema Único de Salud e Instituto Brasileiro de Geografía y Estadística. Se calcularon las tasas de incidencia de lesión neoplásica maligna de mama según regiones brasileiras y escolaridad; distribución de los exámenes de mamografía realizados en Brasil; proporción de mujeres que realizaron mamografía según la edad y años investigados. **Resultados:** las tasas de incidencia de lesión neoplásica maligna detectada por tacto e imagen aumentaron en los años de 2009 y 2011, sin embargo, entre 2011 y 2012, se observó caída en la detección por tacto. **Conclusión:** la proporción de mujeres que realizaron mamografía aumentó por edad investigada, pero los valores encontrados aún están lejos de lo deseado. **Descriptores:** Mamografía; Neoplasias de la Mama; Detección Precoz del Cáncer; Oncología.

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INTRODUCTION

Breast cancer is the most prevalent cancer in women, accounting for 25% of the new cancer cases every year and ranking second in the overall cancer incidence panel. The *International Agency for Research on Cancer* reported that there are about 1.7 million cases of the disease and 521,817 deaths each year, among which 16,673 deaths occur in Brazil.¹ In Brazil, the number of new cases of breast cancer expected for 2016 was approximately 57,000 cases.²

Risk factors for development of breast cancer include, among other factors: family history, especially if one or more first-degree relatives were affected by breast cancer before the age of 50, this risk factor corresponds to approximately 10% of total cases; age, the higher the age, the higher is the incidence; early menarche; late menopause (after 50 years of age); first pregnancy after 30 years; nulliparity; use of oral contraceptives for long periods and/or at an early ages, before the first pregnancy; regular intake of alcohol; exposure to ionizing radiation under the age of 35; hormone replacement therapy; obesity and sedentary lifestyle.³

For Breast Cancer Screening, the Consensus Document for Breast Cancer Control and Early Detection recommends annual clinical examination of the breasts from the age of 40 and a mammographic examination every two years for women aged 50-69 years. In the case of women in population groups considered to be at high risk for breast cancer (family history of breast cancer in first-degree relatives before age 50; family history of ovarian or bilateral breast cancer in first-degree relatives in any age; family history of male breast cancer; or histopathological diagnosis of proliferative mammary lesion with atypia or lobular neoplasm *in situ*), clinical breast examination and mammography are recommended to be performed every year from age 35 onwards.⁴

The Brazilian Society of Mastology, unlike the Consensus Document, recommends that mammography should be performed annually in asymptomatic women aged 40 and in high-risk women after 35, and may also be performed annually in women with genetic predisposition after 25 years. The Society further states that the benefits of mammographic screening are superior to the

theoretical risk of radiation. It justifies this indication by stating that although the majority of studies have shown a clearer reduction in mortality in women over 50 years of age, there are publications that show a reduction of 20 to 42% also in women aged 40 -49 years, and also that long screening intervals hinder earlier diagnosis in patients with breast cancer of rapid growth.⁵

Despite the controversies, there is no doubt that breast cancer screening, through mammography, is still the best method for early detection in the asymptomatic phase of the disease and that its realization leads to substantial reduction of the morbimortality caused by the late diagnosis.⁶

Regarding this issue about the ideal age for the start mammographic examination, the Law 11,664 was enacted in 2008 implementing health actions to ensure the prevention, detection, treatment and follow-up of uterine cervix and breast cancer in the Unified Health System (SUS). This law came into force in 2009 and has ensured, among other actions, mammographic examination to all women from the age of 40 onwards; referral to services of greater complexity in the case women whose mammography or clinical observation indicate the need for diagnostic complementation, treatment and follow-up that cannot be performed in the unit that provided the initial care; and subsequent mammographic exams.⁷

In the year of 2013, the Ordinance 1,253 was established, and contrary to Law nº 11,664, recommends that mammographic examination must start between 50 and 69 years of age. This ordinance was instituted because in the period from 2010 to 2012 there was a 25% increase in the number of mammograms performed by SUS at all ages.⁸

Given this context and considering the importance of breast cancer as a public health problem in Brazil and its consequence to Brazilian society, the following research question was established: what is the statistical relationship between mammographic screening and detection of breast cancer in Brazilian women aged 40 and 69 years? The objective of the study was to analyze the relationship between mammographic screening and detection of breast cancer in Brazilian women aged 40 to 69, between 2009 and 2012.

The importance of this study is justified by the priority character attributed by the Ministry of Health to the control of breast

cancer, as well as to the strengthening of the network of cancer prevention, diagnosis and treatment. In order to achieve effective control of breast cancer, screening and early diagnosis remain as the main recommended strategies. Therefore, it is important to evaluate epidemiologically whether the screening has met the health needs of Brazilian women, and followed the technical and legal recommendations established as care practices.

METHOD

This study used secondary data obtained from the official databases of the Department of Informatics of the Unified Health System/Information System of Breast Cancer - DATASUS/SISMAMA.⁹ As this is a public database, submission to the Research Ethics Committee was not necessary.

This is an observational study describing temporal spatial distribution and based on the analysis of secondary data obtained in the DATASUS/SISMAMA⁹ collected on the eighteenth day of March, 2014.

The period investigated was 2009 and 2012. The Brazilian Institute of Geography and Statistics (IBGE) was also accessed to obtain the number of women in Brazil and in each of region, by schooling and by age group, according to the 2010 census.¹⁰

The studied area corresponded to the Brazilian territory, divided into five regions (North, Northeast, Southeast, South and Midwest), which covers an area of 8,514,215.3 km² and has an estimated population of 191,481,045 inhabitants, of which 97,348,809 are women.¹⁰

The study included Brazilian women aged 40 to 69 years who underwent mammography and were diagnosed with malignant neoplastic breast lesion detected by histopathological examination or by clinical examination of the breast, registered in the DATASUS/SISMAMA between 2009 and 2012.

The following variables were collected from the DATASUS/SISMAMA and IBGE databases: malignant neoplastic breast lesion diagnosed by histopathological examination; malignant neoplastic lesion detected by clinical examination of the breast (palpable) and by imaging (not palpable) according to DATASUS/SISMAMA; number of mammograms, according to DATASUS/SISMAMA; schooling according to IBGE (illiterate/incomplete elementary school; complete elementary

school/incomplete high school; complete high school/incomplete higher education, and complete higher education) and age group according to IBGE (40-44 years; 45-49 years; 50-54 years; 55-59 years; 60-69 years).

The collected results were registered and processed with the aid of the *Microsoft Excel 2007 software*. Data were descriptively presented in figures.

For the analysis of the temporal evolution of cases of breast cancer, the incidence rates between the years 2009 and 2012 in Brazil were calculated according to the detection criteria. In order to calculate these rates, we first counted the confirmed cases of breast cancer detected by palpable clinical examination and by imaging in each year; then this value was divided by the reference population of women of that year and multiplied by 100,000 inhabitants (Figure 1). The populations used as denominators for the calculations of the incidences were related to annual population projections of the study period, provided by the Brazilian Institute of Geography and Statistics - Census 2010.¹⁰

In order to calculate the incidence rate of malignant neoplastic breast lesion detected by histopathological examination, the number of cases between 2009 and 2012 was calculated in Brazil and this value divided by the number of women living in each region in each year of study, and the result was multiplied by 100,000 inhabitants (Figure 2). After calculations, the incidence of malignant neoplastic breast lesion diagnosed by histopathological examination was evaluated according to schooling, for which four groups were created (illiterate, complete elementary school, complete high school, complete higher education) (Figure 3).

We also analyzed the proportional distribution of mammograms performed in Brazil in each age group and Brazilian region between 2009 and 2012.

In order to calculate the proportions of mammograms in Brazil, the number of women who underwent mammography in each age group was divided by the number of women in each age group in the respective year of study, according to the 2010 IBGE census (Figure 4).¹⁰

RESULTS

The data collected from the SISMAMA showed that the number of cases of malignant neoplastic lesion detected by

clinical examination of the breasts (palpable) was 14,780, while the number of cases detected by imaging was 8,715 in the period investigated. The incidence rates according to the year of investigation are shown in Figure 1. The number of cases recorded in the SISMAMA as "non-informed" as to the form of detection was 601 and these were not included in the preparation of the Figure 1.

Figure 1 shows that the highest incidence rates of malignant neoplastic breast lesion were detected by palpation in all years investigated. There was also a significant increase in the incidence rate of neoplasms between 2009 and 2011 for both palpation and imaging methods, but there was a decrease of approximately three points in the incidence rate of detection by palpation and an increase of four points in the incidence rate by imaging in 2012.

Figure 2 shows the incidence rates of malignant neoplastic breast lesion detected by histopathological examination. The lowest incidence rates in all Brazilian regions occurred in 2009. The Southeast presented the highest rates in the four years studied, with highest rate observed in 2012. The North region had the lowest number of new cases of malignant neoplastic breast lesion diagnosed by histopathological examination in the years studied, except in 2011, where the lowest incidence rate was seen in the Northeast region (Figure 2).

Figure 3 shows that in the analyzed period of 2009 and 2012 the highest incidence rates of malignant neoplastic breast lesion detected by histopathological examination occurred in the group of women with complete elementary school, while the lower rates occurred in the group of women with complete higher education. The number of new cases of malignant neoplastic breast lesion detected by histopathological examination was higher among women of the Southeast region who had complete elementary school, while the Northeastern

women with complete higher education presented the lowest rate. In all Brazilian regions, there was a downward trend in incidence rates as schooling increased, from complete elementary school upwards (Figure 3).

The distribution of mammograms performed in the Brazilian regions was studied considering the recommended age range for mammography, according to the Consensus Document for Breast Cancer Control and Early Detection⁴, which is between 50 and 69 years. The analysis showed that, between 2009 and 2012, more than 50% of mammograms in women aged 40 to 69 years were performed in the Southeast region, with 57.5% in 2011. On the other hand, less than 5% of the mammograms in women aged 40 to 69 years were performed in the North and Midwest regions of Brazil.

As for age group, among the years investigated, in 2010 the highest percentage of mammograms were performed in the age range between 45 and 49 years, with 22.7% of the mammograms performed in Brazil between 40 and 69 years of age. When comparing the distribution of mammograms per age in the years investigated, an increase was observed in the percentages in all age groups between 2009 and 2010, and a discrete decrease was observed between 2011 and 2012. In 2012, the percentage of exams in the analyzed age groups was less equidistant. Regarding the proportion of Brazilian women who underwent mammography during the years investigated, there was a progressive increase in the coverage of exams, especially in 2012. Women between the ages 50 and 54 were the ones who most performed mammography in 2012 (12.6%) (Figure 4).

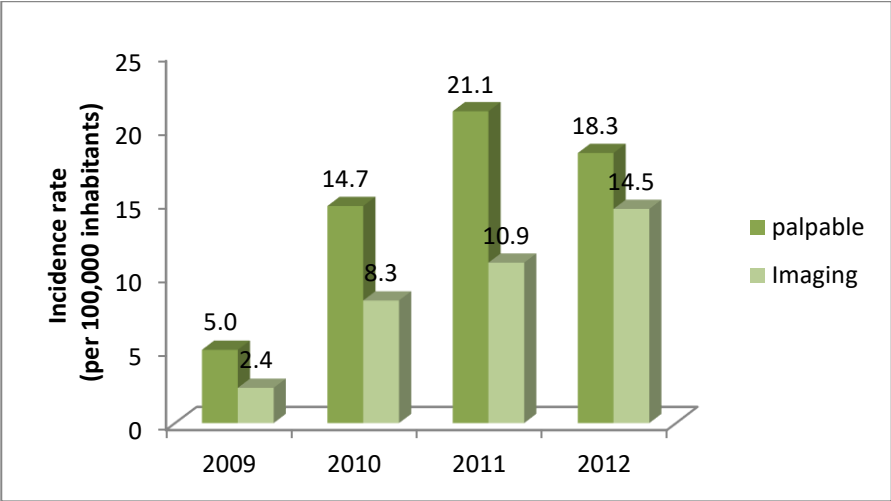


Figure 1. Incidence rate of malignant neoplastic breast lesion according to the form of detection in Brazilian women. 2009-2012.

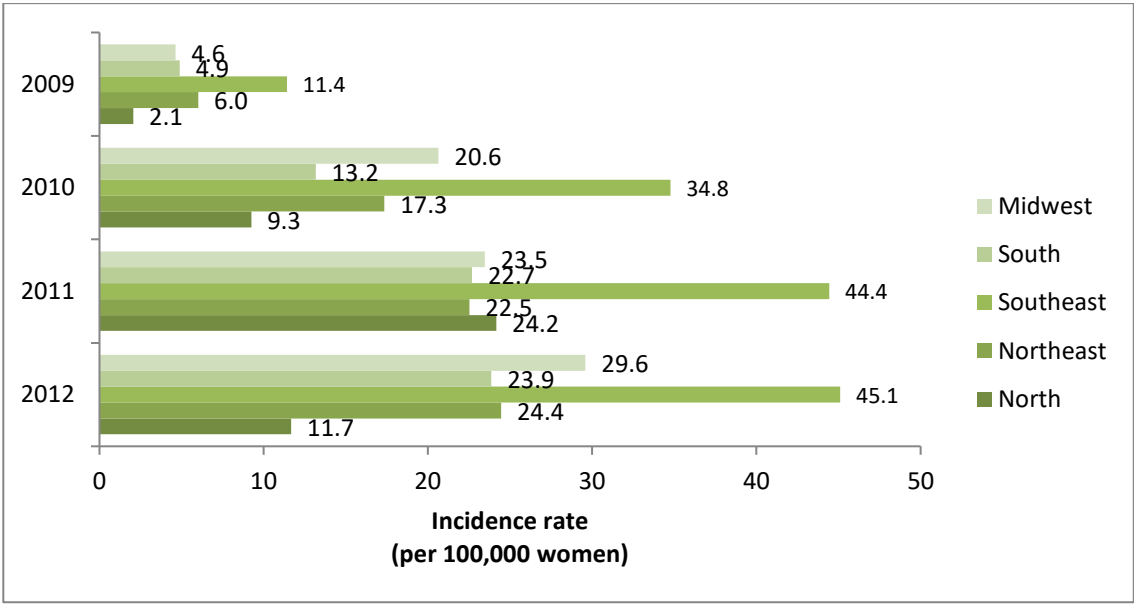


Figure 2. Incidence rate of malignant neoplastic breast lesion in Brazilian women detected by histopathological examination per region of Brazil. 2009-2012.

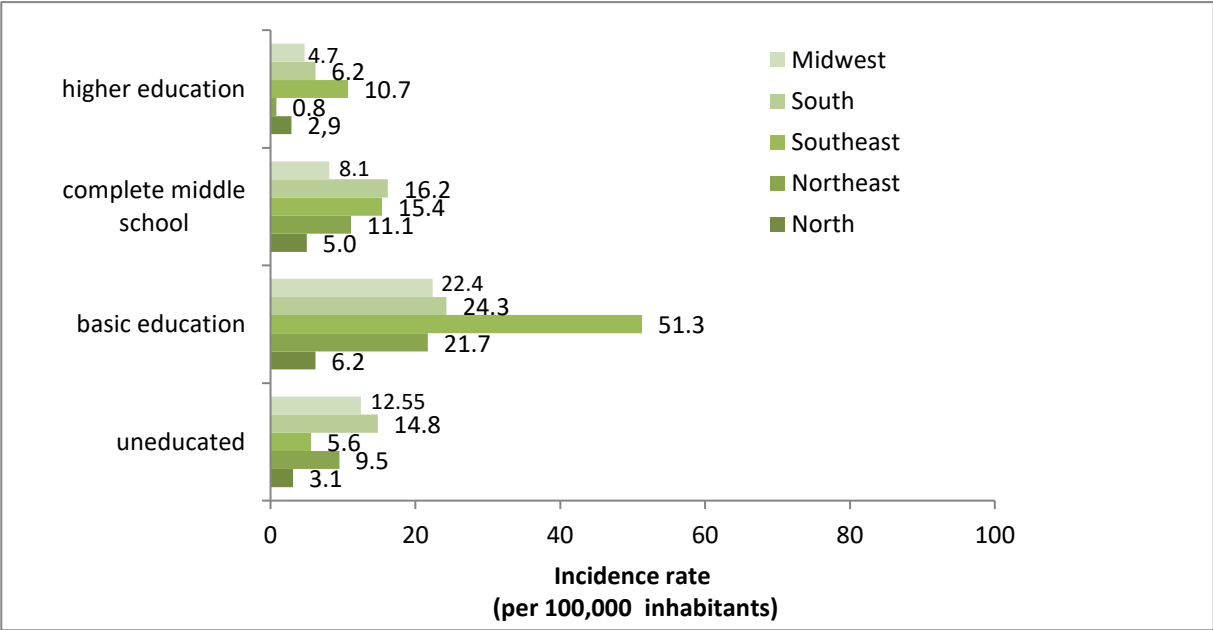


Figure 3. Incidence rate of neoplastic breast lesion detected by histopathological examination according to schooling per region of Brazil. 2009-2012.

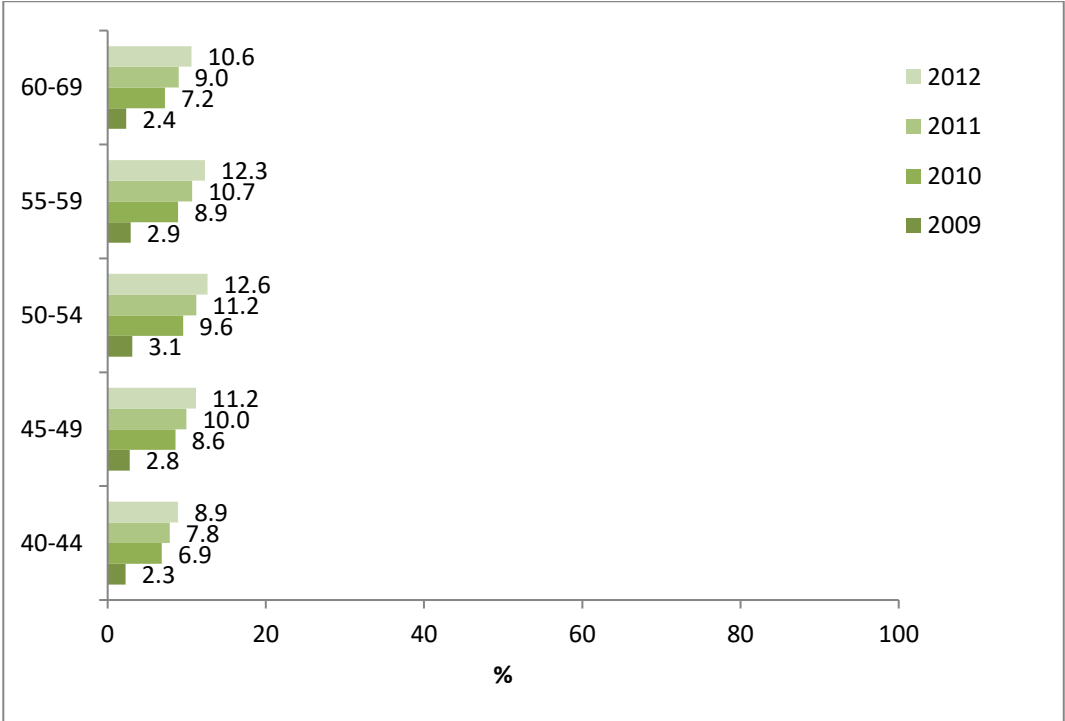


Figure 4. Proportion of Brazilian women who underwent mammographic examination per age group. 2009-2012.

DISCUSSION

Figure 1 shows that there was a considerable increase in the number of new cases of neoplastic lesions detected by palpation and imaging in the time interval investigated. The significant increase in the years 2010 and 2011 must be related to the improvement of service offer and health records in Brazil, which enhanced access and diagnosis. Added to this are the results of health programs implemented by the Ministry of Health and by organized social movements aimed at the care of women.

Between 2011 and 2012, there was a decrease in the rate of incidence by palpation, and an increase in the detection rate by imaging. Although discreetly, this shows a change in the profile of breast cancer screening and the possibility of better prognosis for the diagnosed women. Spreading information about the importance of mammography screening, such as in the October Pink movement, also represents a strategy that has allowed women to change their attitude regarding self-care.

However, the results in Figure 4 show that the proportion of Brazilian women who underwent mammography, according to the age groups, between 40 and 69 years, is below the recommended, because the ideal would be for all these women to perform the mammograms annually or bi-annually, so that the proportion should be at least 50%.

It is also worth noting that the age groups between 50 and 69 years are considered priority for research, but the findings reveal that between 55 and 69 years of age, the proportion causes concern, and require specific public policies.

The data analyzed here is similar to that of another study that also evaluated data available in the DATASUS. Such study revealed that 10 million mammograms in women aged 50-69 years were expected by INCA in 2013, but only 2.5 million were performed, and this represented a coverage of only 24.8%, a value much below the World Health Organization's recommendation of 70%.¹¹

It is also worth mentioning that self-examination, random palpation and clinical examination of the breasts are strategies recommended for the health care of women and allow the detection of alterations in the breast. All these strategies have their function and importance. In countries where access to professionals and examinations is limited, these strategies are more representative in the early detection of the disease. However, the detection of breast cancer by imaging methods, performed by screening, goes beyond early detection, as it may mean the possibility of cure or greater chance of survival of women who are diagnosed with cancer.

Mammography can be performed for screening, when indicated to women without breast cancer symptoms, or for

diagnosis, when indicated for women with symptoms of the disease.¹²

Randomized studies conducted in the previous decades have shown that the detection of breast cancer through self-examination and clinical examination of the breasts does not reduce breast cancer mortality.¹³⁻¹⁴

Since then, the studies have confirmed the reduction of mortality from breast cancer as a result of mammography screening for the age group between 40 and 79 years. This reduction ranges from 15% to 40%.^{7,11,15-16}

In this context, self-examination is part of an increasing awareness process, leading women to diagnostic evaluation. However, self-examination should not be encouraged as much as the clinical examination of the breasts as an isolated method; its effectiveness is justified when associated with mammography, especially in women above of 40 years of age.⁶

Considering the incidence of breast cancer estimated, i.e. 57,120 new cases for the year 2015, and the advanced staging found throughout the national territory, stage 2 in 36.89% and stage 3 in 30.16% of the cases in the year 2012⁽¹⁷⁾, it is clear that there is still much to be done in order for Brazil to achieve survival rates such as those in the United States, which are 89% in five years for all types of staging, 99% for cancers in the breast only, and 85% with regional lymph node involvement.¹⁸ The National Cancer Institute says that the survival of women with breast cancer in Brazil is 80%.³

The analysis of Figure 2 shows that the higher the development of the studied region, the higher is the incidence rate of the disease, as it is the case in the Southeast region. Based on the findings, it is still possible to deduce that the development of the Midwest and Northeast regions has reflected on the incidence of breast cancer, considering that values are close to those found in the South.

This finding points to the already scientifically proven, that the more industrialized the society, the greater is the exposure of women to risk factors, such as greater consumption of inadequate food, greater overweight and stress.¹¹

As for the relation between the incidence rates of malignant neoplastic breast lesion detected by histopathological examination and schooling, it was observed in the results presented in Figure 3 that they

are inversely related. The elementary school is considered the lower level of education. This result may be influenced by the predominance of the lowest levels of schooling among Brazilian women.

The distribution of Brazilian women aged 25 years or older per education level in 2012 was: illiterate and incomplete elementary school (45.2%); complete elementary school and incomplete high school (13.4%); complete high school and incomplete higher education (29%), and complete higher education (13.3%).¹⁹ Despite this social condition, other studies have shown that much better education and social and economic conditions help in the early detection of breast cancer.

Some studies carried out in the state of Minas Gerais, Maranhão, Santa Catarina, Pernambuco and other states confirm that higher educational level of women influence the periodic adoption of health care measures such as self-examination, clinical examination and mammography, favoring the early detection of tumors and better prognoses.²⁰⁻²⁴

Given these findings, it is notorious and not at all innovative to say that Brazilian social and educational policies really need to be implemented, otherwise we will continue to investigate and affirm what is already known. Before the scenario that is slowly changing, portraying reality remains one of the ways to show the needs of the Brazilian population, in this case, the women, and particularly those diagnosed with breast cancer.

The dichotomy between the indication of mammography from the age of 40 or 50 should be replaced by the real need of each woman, which goes beyond the indication of an imaging examination. It must include her health and life condition, the need to be seen as a whole, and that may need a mammogram or many other exams and care for the early detection of breast cancer, when the presence of lesions is not yet palpable.

Education and information on breast cancer oncogenesis, and on all types of cancers (from childhood to adulthood), the effective implementation of the National Health System guidelines, the improvement of social and economic conditions and cultural factors associated with the development of research, finding new avenues for prevention, and early detection

and better forms of treatment for the disease, may also lead to better quality of life for Brazilian women.

We endorse that only early detection, in special the opportunistic screenings, may reduce the incidence of advanced diagnoses and increase the survival rates of women with breast cancer.²⁵⁻²⁶

As a complication of the study, it is recorded that SISMAMA takes some time to compute all the information of the national territory; thus, the data collection carried out in this study may have excluded some information computed later. This condition of Brazilian information systems makes it difficult to develop research and plan actions in a short period of time.

CONCLUSION

The relationship between mammographic screening and detection of breast cancer in Brazilian women between the ages of 40 and 69, in the period between 2009 and 2012, showed an increase in the number of new cases in the period investigated, between 2011 and 2012, thus revealing the improvement of women's health care.

The study reinforced the evidence that the Southeast region, which has the highest economic development in the country, presented the highest rates of breast cancer incidence in all the years investigated. It is also worth noting that the Northeast region presented incidence rates similar to those of the South region in the years of 2011 and 2012, which may result from the reduction of social, economic and health inequalities between regions.

The study revealed that the proportion of women who underwent mammography was below that recommendations, since the highest figure was only 12.6% in 2012 in women aged 50-54 years. In 2010, women between 45 and 49 years of age had the highest number of mammograms performed between 40 and 69 years of age in Brazil (22.7%). However, between 2011 and 2012, this distribution of mammograms per age group was more homogeneous.

The results showed that, between 2009 and 2012, the Southeast region had more than 50% of all mammograms performed in Brazil between the ages of 40 and 69 years. On the other hand, the North and Midwest regions had less than 5% of these mammograms performed in Brazil. Such information confirmed that although the

distribution of mammographic examinations has become more homogeneous between age groups and regions of the country, there are still stark inequalities in these distributions.

Regarding schooling, the findings reaffirmed that lower levels of education contribute to illness in Brazil. In this context, we emphasize that the increase in schooling is directly linked to access to health services and better living conditions.

It was possible to identify the need for health education targeting all Brazilian women, as well as the need for access to health services and the integral care of women, the follow-up of technical and scientific recommendations regarding the screening of breast cancer, diagnostic and therapeutic ways to make the Brazilian public health system guarantee higher cure rates and higher survival rates.

Finally, the results show that public and social policies need to be adjusted to the needs of the Brazilian population.

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