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RESEARCH ARTICLE

PREVALENCE OF MAMMOGRAPHY IN BRAZIL: A NATIONAL ANALYSIS.

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Abstract

Objective: to identify the prevalence of realization of mammography in Brazil, the socio-demographic characteristics of women that realized this exam, the time past since the last exam according to region, age and per capita income. Methods: the reference population was every Brazilian woman whose age was 30 years old or more (n=100.840). Prevalence of mammography realization was considered the outcome. The exploratory variables were: age, federative units, mammography realization local, familiar income per capita. Results: the mammography realization prevalence was 45,9%. The highest prevalence of mammography was among women between 50-59 years old (58,3%), white (52,2%). 42,2% of the exams were paid by the public health sector, 46% by private health plan and 18,8% by own patients. Conclusion: the prevalence of mammography is still low. The women that more had been examned live in Southeast region, are between 50-59 years old, are white, and with best familiar income per capita.

Introduction:-

Breast cancer stands out for its high incidence, prevalence and mortality. It is the second malignant tumor with the highest number of new cases in the world, being the first among women (Parkin et al., 2005). It is estimated that in 2002 there were 1.15 million new cases of the disease worldwide. In the same year it was the cancer that killed the most women (about 411,000) and the most prevalent among them (4.4 million people) (Parkin et al., 2005).

The National Cancer Institute (INCA) estimates that 49,240 new cases of breast cancer occurred in Brazil in 2010, representing an estimated 49.3 new cases per 100,000 women (Brasil, 2009b). Regarding the mortality rate due to neoplasia, there were stability in Brazil around 10 deaths per 100,000 women between 1995 and 2004 (Chatenoud et al., 2010).

The etiology of breast cancer is multifactorial and involves both individual and environmental aspects. The relationship of the tumor with mutations in the BRCA1 and BRCA2 genes, hormonal changes and family history of the disease is well established (Nasir et al., 2009). In addition, early menarche, nulliparity, first gestation after 30 years of age, and late menopause also appear as well described risk factors in the literature (Clavel-Chapelon et al., 2002). In addition, low level of physical activity, overweight and worse socioeconomic status have been associated with the tumor (Carmichael, 2006; Strand et al., 2007; Friedenreich, 2010).

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The main strategy for reducing breast cancer mortality is early diagnosis through screening (Akhigbe and Omuemu, 2009), thus maximizing the survival time and minimizing the physical and psychological injuries that it entails. A systematic literature review conducted by Köster et al (2007) has identified that the only radiological modality with proven efficacy in the diagnosis is the mammography.

In Brazil, the public policy of the Ministry of Health (MH) recommends a mammographic examination every two years for women between 50 and 69 years of age and annual clinical examination of the breasts for women aged 40 to 49 years. Exception is given to women in at-risk groups, for whom clinical breast examination and mammography should be performed annually from the age of 35. In addition, it is indicated that clinical examination of the breast should be performed, regardless of age, in all women who seek the health service (Brasil, 2004).

The objective of the present study was to describe the prevalence of mammography among women aged 50 to 69 years in Brazil, its distribution among the federative units of the country and the nature of the health services used to perform the exam. We also identified demographic, socioeconomic and health service use factors associated with mammography in the two years prior to the survey.

Methods:-

Data from the National Household Sample Survey (PNAD) 2008 were analyzed. This is a cross-sectional study of national coverage that every five years includes information on the health of the population and the use of health services.

The 2008 PNAD was carried out through a three-stage sampling process (Brasil, 2010a). For the first one, the municipalities, classified as self-representative - probability equal to 1 belonging to the sample - were considered. The census tracts, selected with probability proportional to the number of households and with replacement, were considered for the second stage. The third stage was composed of households, selected with equiprobability in each unit.

The present study investigated the prevalence of mammography and its associated factors. The outcome information was obtained through the question: "*When was the last time you had a mammogram*?". The response options were: up to one year, one to two years, two to three years, more than three years and never had. These possibilities were then grouped into two categories: (i) women who underwent the test less than 2 years ago, as directed by the MH, and (ii) women who had undergone the test for more than two years or never performed the test.

The descriptive analysis was initially conducted, calculating the prevalence of the test in women between 50 and 69 years of age in the 27 federative units of Brazil and according to socioeconomic and demographic variables. It was also collected information on the type of health service used to perform mammography according to the macro-region of residence (public or private).

The exploratory variables were age (50-59 and 60-69 years), region of residence (north, northeast, southeast, south and center-west), self-reported race/color (white, brown and black), local of residence (urban or rural), per capita income (measured in Reais and categorized in quintiles), health insurance coverage (yes or no) and medical consultation in the last 12 months (yes or no).

Data were analyzed using the statistical program Stata 9. The prevalence were described with their respective 95% confidence intervals (95% CI). In the analysis of factors associated with mammography in the last two years the Poisson regression was used. All analyzes used the *svy* command to incorporate weights and design effect of complex samples.

Results:-

The sample of the present study consisted of 100,840 women aged 30 years and older. The mean age was 49.2 years (SD = 14.2). Most of the women interviewed lived in the northeast and southeast regions and self-reported white (almost 50%).

The prevalence of mammography in Brazil in the last two years was 54.2% (95% CI 53.1-55.3). The proportion of women with delayed examination (performed more than two years ago) was 16.9% (95% CI: 16.3-17.4) and almost

one out of three women never performed mammography (28.9% CI 95% 27.8-30.0). There were profound geographical differences in the performance of the exam in Brazil. While in the Federal District (DF), 70.4% of the women underwent mammography in the last two years, in Tocantins this figure reached only 27.3%, that is, a relative difference of 2.6 times. In addition to DF, the highest values of mammography were observed in São Paulo (69.4%), Espírito Santo (60.0%) and Rio de Janeiro (59.3%).

The majority of mammographic examinations were not performed in the public health system (56.1%, 95% CI 55.2% -57.0%), and almost one in five women (17.7%) paid some value to perform the last mammography. The use of the public health system varied significantly between the income strata of women and their regions of residence. The center-west region had the lowest percentage of mammograms performed by the public health system, while in the northeast a higher proportion of examinations were observed through the public health system. Regarding income, in Brazil as a whole, eight out of ten women from the poorest strata underwent mammography at the public health system, a percentage that reached only 12.9% in the richest group. This pattern is repeated in all regions, with the difference between income extremes equal to 10.7 times in the northeast (Table 1).

Table 1:-Prevalence of mammography according to the time since the last examination and sociodemographic variables. Women between the ages of 50 and 69, Brazil, 2008.

	Mammography				
	Less than 2 years ago		**More than 2 years**		**Never**
	Prevalence ($CI_{95\%}$)		**Prevalence ($IC_{95\%}$)**		**Prevalence ($IC_{95\%}$)**
Region of residence					
North	35,2 (32,2-38,3)		14,6 (12,7-16,4)		50,2 (46,6-53,7)
Northeast	39,8 (37,6-42,0)		15,1 (14,2-16,0)		45,1 (42,6-47,7)
Center-west	52,4 (49,5-55,2)		16,4 (14,9-18,0)		31,2 (28,1-34,3)
Southeast	63,8 (62,4-65,1)		18,1 (17,3-19,0)		18,1 (16,9-19,2)
South	55,1 (53,0-57,2)		16,7 (15,5-17,9)		28,2 (26,0-30,4)
Age (years)					
50-59	58,3 (57,1-59,4)		15,8 (15,2-16,4)		25,9 (24,8-27,0)
60-69	47,9 (46,6-49,3)		18,5 (17,7-19,2)		33,6 (32,2-35,0)
Race/Skin Color					
White	61,2 (60,0-62,3)		16,7 (16,0-17,4)		22,1 (21,1-23,2)
Brown	45,2 (43,8-46,6)		17,0 (16,2-17,8)		37,8 (36,2-39,4)
Black	48,5 (46,3-50,7)		16,9 (15,3-18,6)		34,6 (32,3-36,8)
Residence					
Urban	58,3 (57,3-59,2)		17,5 (17,0-18,1)		24,2 (23,2-25,1)
Rural	29,5 (27,3-31,7)		12,7 (11,5-13,8)		57,8 (55,2-60,3)
Per capita income					
Quintile 1	31,5 (29,8-33,2)		16,9 (15,8-18,0)		51,6 (49,6-53,5)
Quintile 2	42,6 (41,0-44,3)		18,4 (17,3-19,5)		39,0 (37,3-40,6)
Quintile 3	48,6 (47,0-50,3)		18,2 (17,1-19,2)		33,2 (31,5-34,8)
Quintile 4	62,1 (60,6-63,6)		19,1 (18,0-20,2)		18,8 (17,6-20,0)
Quintile 5	80,4 (79,2-81,6)		12,3 (11,4-13,2)		7,3 (6,5-8,1)
Health insurance					
Yes	78,1 (77,1-79,2)		13,0 (12,2-13,7)		8,9 (8,2-9,6)
No	43,4 (42,2-44,6)		18,6 (18,0-19,2)		38,0 (36,6-39,2)
Medical appointments in the last 12 months					
0	21,1 (19,6-22,6)		25,4 (23,9-26,9)		53,5 (51,5-55,4)

1	50,6 (48,7-52,4)		16,6 (15,3-17,9)		32,8 (30,9-34,8)
2	59,0 (57,3-60,8)		15,2 (14,1-16,2)		25,8 (24,2-27,4)
3 or more	62,6 (61,4-63,8)		15,1 (14,5-15,7)		22,3 (21,2-23,4)

Regarding the factors associated with mammography in the last two years, it is worth noting that prevalence ratio was 1.72 (95% CI 1.64-1.81) in the richest quintile relative to the poorest, 1.45 (95% CI % 1.36-1.55) among the residents in the urban area compared to rural areas and 1.24 (95% CI 1.21-1.26) in women aged 50-59 years (Table 2). Finally, it should be noted that women with a health plan and those who had more medical appointments in the last 12 months had a higher prevalence of mammography in the last two years.

Table 2:-Prevalence ratios in crude and adjusted mammography screening in the last 2 years. Women between 50 and 69 years old, Brazil, 2008.

		Mammography			
		Prevalence ratio[b] ($CI_{95\%}$)	**p-value**	**Prevalence ratio[a] ($CI_{95\%}$)**	**p-value**
Region of residence			<0,001		<0,001
North		1,00		1,00	
Northeast		1,13 (1,02-1,25)		1,15 (1,06-1,25)	
Center-west		1,48 (1,42-1,72)		1,22 (1,13-1,32)	
Southeast		1,81 (1,65-1,98)		1,38 (1,28-1,48)	
South		1,56 (1,42-1,72)		1,24 (1,14-1,33)	
Age (years)			<0,001		<0,001
50-59		1,00		1,00	
60-69		1,22 (1,19-1,24)		1,24 (1,21-1,26)	
Race/Skin Color			<0,001		<0,001
White		1,00		1,00	
Brown		0,93 (0,89-0,98)		0,99 (0,95-1,04)	
Black		1,26 (1,20-1,32)		1,04 (1,00-1,09)	
Residence			<0,001		<0,001
Urban		1,00		1,00	
Rural		1,97 (1,83-2,12)		1,45 (1,36-1,55)	
Per capita income			<0,001		<0,001
Quintile 1		1,00		1,00	
Quintile 2		1,35 (1,28-1,42)		1,24 (1,18-1,30)	
Quintile 3		1,54 (1,46-1,63)		1,35 (1,29-1,42)	
Quintile 4		1,97 (1,86-2,08)		1,54 (1,47-1,61)	
Quintile 5		2,55 (2,41-2,69)		1,72 (1,64-1,81)	
Health insurance			<0,001		<0,001
Yes		1,00		1,00	
No		1,80 (1,75-1,85)		1,28 (1,25-1,31)	
Medical appointments in the last 12 months			<0,001		<0,001
0		1,00		1,00	
1		2,40 (2,23-2,57)		2,18 (2,04-2,34)	
2		2,80 (2,61-3,00)		2,47 (2,31-2,65)	
3 or more		2,97 (2,78-3,18)		2,59 (2,42-2,77)	

Discussion:-

The prevalence of mammography was 45.9%. The data of this study are in accordance with the literature, in which Silva shows a prevalence of 63.5% (Silva, 2008); Lima-Costa shows a prevalence of 42.5% (Lima-Costa and Matos, 2007); Corrêa et al. (2010) found 61%. Although the incidence of breast cancer was directly proportional to age, we noticed that the relative number of women who underwent mammography screening declined from 50-59 years to 60-69 years, being 58.3% and 47, 9%, respectively.

The highest prevalence of mammography was observed in the Southeast region (55.4%) and the lowest in the North (30.5%). These findings are consistent with those found by Lima-Costa and Matos (2007). The household survey conducted by INCA in 2002 and 2003 shows a large variation in the mammographic coverage between the different state capitals, with prevalence ranging from 37% in Belém to 76% in Vitória (Brasil, 2005). Similar data are pointed out by Vigitel 2008, with oscillation of the mammographic prevalence from 74.7% in Macapá to 94.8% in the Federal District (Brasil, 2009a). Vigitel 2009 also reports macro-regional divergences in the prevalence of the exam, from 55.6% in Boa Vista to 82.6% in Belo Horizonte (Brasil, 2010b). Kohatsu et al. (2009) developed a study in the state of Mato Grosso do Sul and found large differences in mammographic coverage among municipalities, which indirectly suggested an unequal access of women to mammography, although there were enough mammograms to serve the entire population.

Regarding the color of the women who underwent mammography, the highest prevalence was observed among white women (52.5%). When women were asked about the last time they performed the mammography, they reported having undergone the exam up to one year (30.1%), up to two years (14.8%), for up to three years (4.8 %), for more than three years (8.2%) and 42.1% reported never having mammograms. Lima-Costa and Matos (2007) found that 42.5% of women between 50-69 years had mammograms in the last two years or less. Novaes et al. (2006) show in their study that 50% of the women aged 40-59 years had the test within the time indicated by the MH, whereas only 38% of the women between 60-69 years did so within that time interval.

It is worth mentioning that more than a quarter (25.9%) of women between 50-59 years of age and more than one third (33.6%) of women between 60-69 years have never had a mammogram. This failure is also pointed out by Lima-Costa and Matos (2007), Amorim (2005) (23) and Silva (2008).

In relation to the per capita family income, we found a prevalence of 66.5% among women belonging to quintile 5 of income, while in the less privileged (quintile 1) this prevalence was only 23%. Novaes et al. (2006) divided the income into three classes and described that the prevalence for the test is also increasing proportionally. Amorim reports that 68.8% of women 40 years of age or older and with family income per capita equal to or less than a minimum wage did not perform mammography (Amorim, 2005).

In our study, 42.2% of mammograms were performed by the public health sector, 46.0% were covered by health insurance, and 18.8% of the exams were paid out-of-pocket. We also observed that in all macroregions, as the income increases, the mammography performed by the health sector decreases.

Marchi et al. (2006) found an alarming result: approximately half (45.8%) of the women interviewed in public services had never previously undergone mammography. However, previous mammographic screening was reported by the vast majority (79.5%) of the users of the private health system, and 64.7% were undergoing mammography for the third or even the seventh time. Mammographic coverage estimates were much lower in the public health services (38.3%) than in the private health sector (68.9%), with the same levels observed in developed countries.

We found an increase in the prevalence of mammography compared to PNAD 2003 data, particularly in the 50-69 age group, showing a higher adherence to the MH recommendations. However, the value found still falls short of the goal of 60% stipulated. This study shows that there are inequalities in access to mammographic examination. Whether they are due to lack of mammography, lack of specialist doctors, disproportionate allocation of services by population, geographical difficulty of access, or other factors. It is important to conduct additional and in-depth studies on inequalities in access to mammography in the country.

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