



Factors associated with the proportion of abnormal results in screening mammograms: ecological study

Fatores associados a proporção de resultados alterados nas mamografias de rastreamento: estudo ecológico

Factores asociados a la proporción de resultados alterados en mamografías de tamizaje: estudio ecológico

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How to cite this article:
 Sverzut TVL, Cunha IP, Cortellazi KL Ambrosano GMB, Pecorari VGA. Factors associated with the proportion of abnormal results in screening mammograms: ecological study. Rev Gaúcha Enferm. 2023;44:e20220155.
 doi: <https://doi.org/10.1590/1983-1447.2023.20220155.en>

ABSTRACT

Objective: To analyze the factors associated with the proportion of abnormal results in screening mammograms.

Methods: Ecological study, with data from DATASUS/SISCAN, Atlas Brasil do Desenvolvimento Humano, Fundação SEADE, and Sistema e-Gestor, from 2016 to 2019, of women aged 50 to 69 years in the 645 municipalities of São Paulo (Brazil). Independent variables were associated with the outcome: proportion of unsatisfactory coverage of abnormal test results (Breast Imaging Reporting and Data System – BI-RADS® 0, 4 and 5 proportion >10% of tests performed). Multiple Poisson regression was used.

Results: Higher proportion of screening mammography (PR=1.20; 95%CI: 1.00;1.45), higher percentage of poor (PR=1.20; 95%CI: 1.07;1.36), low (PR=1.57; 95%CI: 1.38;1.78) and medium coverage of the Family Health Strategy (ESF) (PR=1.30; 95%CI: 1.09;1.52) were associated to the outcome.

Conclusion: Socioeconomic and FHS coverage factors mediate the proportion of mammograms with abnormal results in public health services. Therefore, they are important aspects in the fight against breast cancer.

Keywords: Breast neoplasms. Mammography. Diagnostic techniques and procedures. Health policy. Ecological studies.

RESUMO

Objetivo: Analisar os fatores associados a proporção de resultados alterados nas mamografias de rastreamento.

Métodos: Estudo ecológico, com dados do DATASUS/SISCAN, Atlas Brasil do Desenvolvimento Humano, Fundação SEADE, e Sistema e-Gestor, de 2016 a 2019, de mulheres de 50 a 69 anos dos 645 municípios de São Paulo (Brasil). Variáveis independentes foram associadas ao desfecho: proporção de cobertura insatisfatória de resultados de exames alterados (proporção *Breast Imaging Reporting and Data System* – BI-RADS® 0, 4 e 5 >10% dos exames realizados). Utilizou-se regressão múltipla de Poisson.

Resultados: Maior proporção de mamografia de rastreamento (RP=1,20; IC95%: 1,00;1,45), maior porcentagem de pobres (RP=1,20; IC95%: 1,07;1,36), baixa (RP= 1,57; IC95%: 1,38;1,78) e média cobertura de Estratégia Saúde da Família (ESF) (RP=1,30; IC95%: 1,09;1,52) foram associados ao desfecho.

Conclusão: Fatores socioeconômicos e de cobertura da ESF medeiam a proporção de mamografias alteradas no serviço público. Portanto, são aspectos importantes no combate ao câncer de mama.

Palavras-chave: Neoplasias da mama. Mamografia. Técnicas e procedimentos diagnósticos. Políticas saúde. Estudos ecológicos.

RESUMEN

Objetivo: Analizar los factores asociados a la proporción de resultados alterados en las mamografías de tamizaje.

Métodos: Estudio ecológico, con datos de DATASUS/SISCAN, Atlas Brasil del Desarrollo Humano, Fundación SEADE y Sistema e-Gestor, de 2016 a 2019, de mujeres de 50 a 69 años en los 645 municipios de São Paulo (Brasil). Las variables independientes se asociaron con el resultado: proporción de cobertura insatisfactoria de resultados de pruebas alteradas (*BreastImagingReporting and Data System* – BI-RADS® 0, 4 y 5 proporción >10% de pruebas realizadas). Se utilizó la regresión de Poisson múltiple.

Resultados: Mayor proporción de mamografía de tamizaje (RP=1,20; IC95%: 1,00;1,45), mayor porcentaje de mala (RP=1,20; IC95%: 1,07;1,36), baja (RP= 1,57; IC95%: 1,38;1,78) y cobertura media de la Estrategia Salud de la Familia (ESF) (RP=1,30; IC95%: 1,09;1,52) se asociaron al desenlace.

Conclusión: Factores socioeconómicos y de cobertura de la ESF median la proporción de mamografías alteradas en el servicio público. Por lo tanto, son aspectos importantes en la lucha contra CM.

Palabras clave: Neoplasias de la mama. Mamografía. Técnicas y procedimientos diagnósticos. Política de salud. Estudios ecológicos.

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INTRODUCTION

Close to 2 million new cases of breast cancer (BC) are diagnosed and nearly 500,000 women die from breast cancer every year globally⁽¹⁾. In Brazil, the National Cancer Institute (INCA) estimated 66,280 new cases of BC, per year, for the 2020-2022 period, with an estimated risk of 61.61 cases per 100,000 women. Compared to the other Brazilian states, the state of São Paulo had one of the highest incidence rates of breast cancer in the country, with crude rates of 65.24 cases per 100,000 women, with 18,280 new cases of BC being expected for the same period in the whole state⁽²⁾.

Breast cancer incidence and mortality rates have declined in recent years in developed countries^(3,4), which can be attributed to population screening program strategies, while in developing countries, such as Brazil, mortality rates for this cancer are still high⁽⁷⁾.

Given this scenario, breast cancer control measures were progressively incorporated into public health policies in the country. In 2015, the Ministry of Health updated the recommendations for early breast cancer detection, proposing biennial mammographic screening for all women between 50 and 69 years of age⁽⁸⁾. Preventive BC measures start in the Primary Health Care Units (PHC), where the screening of the target population is carried out, as well as other activities that support the production of care⁽⁹⁾.

However, breast cancer prevention faces challenges such as low coverage and disorganization of services⁽¹⁰⁾, in addition to socioeconomic barriers that increase inequality in the population's access to tests⁽¹¹⁾.

Breast cancer screening through mammographic examination contributes to early diagnosis and to more conservative interventions⁽¹²⁾. This exam aims to identify tumors that are not detectable in the manual clinical examination, allowing the initiation of treatment and, consequently, improvement of the prognosis^(13,14). Worldwide, mammographic examinations are described based on the Breast Imaging Reporting and Data System (BI-RADS®), which, by means of criteria for grouping and microcalcifications morphology and breast density, classifies breast lesions into categories ranging from 0 to 6, which enables better management of the cases⁽¹⁵⁾.

Given the high incidence rate of breast cancer in the state of São Paulo, understanding the aspects related to the occurrence of this tumor is relevant. Thus, the present study aims to analyze the factors associated with the proportion of abnormal results in screening mammograms in municipalities in the state of São Paulo standardized by the BI-RADS classification^{*}.

METHODS

This is an ecological study based on secondary data from the Health Information Systems of the Brazilian Unified Health System (SUS), of the state of São Paulo concerning the 2016-2019 period.

Publicly accessible data available on the website of the Department of Informatics of the Unified Health System/Cancer Information System (DATASUS/SISCAN) were used in the study. (http://www2.datasus.gov.br/DATASUS/index.php?area=0203&id=34622406&VObj=http://tabnet.datasus.gov.br/cgi/dhdat.exe?siscan/mamografia_resid).

The Atlas Brasil do Desenvolvimento Humano website (<http://www.atlasbrasil.org.br>) and data from the State System of Data Analysis Foundation (SEADE) (<https://www.seade.gov.br>) were used to measure the socioeconomic, population and industrial involvement of each municipality. To estimate the coverage of Primary Care (AB) and the Family Health Strategy (ESF), the website of the Primary Care Information and Management System (e-Gestor: <https://egestorab.saude.gov.br>) was used.

Data from 645 municipalities in the state of São Paulo referring to women aged 50 to 69 years (age range recommended by the Ministry of Health for mammographic screening) and who underwent a mammography exam by the SUS during the study period were analyzed. The starting year considered was 2016 because it was from that period onwards that the SISCAN started to provide recorded data on this screening.

The mammography reports generated at the SISCAN are standardized by the BI-RADS® System and their results are issued by the SISCAN. BI-RADS® categories 0, 4 and 5 are respectively classified as incomplete examination, findings suspicious of malignancy and findings highly suspicious of malignancy. In these cases, the recommended conduct is to carry out complementary tests for the diagnostic investigation of lesions suspected of malignancy⁽¹⁵⁾.

The outcome variable considered was the indicator of the Technical Form of Indicators Related to Breast Cancer Control Actions developed by the Ministry of Health, calculated by the Proportion of Abnormal Results classified as BI-RADS® 0, 4 and 5 (abnormal call rate) performed in women aged 50-69 years in each municipality investigated, with parameters from developed countries such as Canada and Australia, which have desirable organized tracking of mammographic reports of BI-RADS® 0, 4 and 5 up to 10%⁽¹⁶⁾. Thus, data for each municipality were dichotomized into satisfactory coverage (0) – within the recommended parameter (less than or equal

to 10%) and unsatisfactory (1) – outside the recommended parameter (greater than 10%).

Data extracted from the SISCAN Mammography Module were used in a formula in which the number of screening mammograms with BI-RADS® 0,4,5 results in women aged 50 to 69 years, in a given location and period, was multiplied by 100 and divided by the number of screening mammograms performed on women aged 50 to 69 years in the respective location and period.

The independent variables investigated were the proportion of screening mammograms in the recommended age group (PMMG), municipal human development index (HDI-M), percentage of poor individuals (% of poor), extremely poor, vulnerable to poverty, gross domestic product (GDP), population size, Primary Care (AB) and Family Health Strategy (ESF) coverage.

To evaluate the percentage of screening mammograms in the target age group in the total number of screening mammograms performed, the process indicator defined by the Technical Form of Indicators Related to BC Control Actions calculated by the PPMG, as follows: in the numerator, the number of screening mammograms in women aged 50-69 years and, in the denominator, the total number of screening mammograms in the respective location and period investigated. The parameter used in a study carried out in 2013 in Brazil was used with an acceptable value of up to 53%⁽¹⁶⁾. Thus, the results of each municipality were categorized into 0 – below the Brazilian average (53%), 1 – in the Brazilian average (53%) and 2 – above the Brazilian average (53%). The extracted data were entered into a formula, in which the number of screening mammograms in women aged 50 to 69 years, living in a given location and period, was multiplied by 100, and divided by the total number of screening mammograms in the respective location and period.

The HDI is a measure of per capita family income in the municipality that was extracted from the general data referring to each municipality in the sample on the Atlas do Desenvolvimento Humano no Brasil website, contained in the last 2010 census, in the query section, indicators subsection, HDI dimension. The HDI was categorized by municipality and classified as Very Low, Low, Medium, High, Very High according to the Atlas Brasil classification (<http://www.atlasbrasil.org.br>).

The percentage of poor, extremely poor and vulnerable to poverty was collected from the Atlas do Desenvolvimento Humano no Brasil website based on the last 2010 census, in the query section, subsection indicators, income dimension, the median being calculated and dichotomized above the median and below or equal to the median of the variable analyzed above.

GDP and population size were collected on the Fundação SEADE website, a statistics portal for the State of São Paulo. Data from the year 2016 were used and the median was calculated to categorize the municipalities. The GDP is an indicator that expresses the value of the total goods and services produced for final consumption in the state of São Paulo and its municipalities and the median was calculated at BRL 26,537.35 to categorize the municipalities as these are gross numbers. The population size was categorized according to SEADE parameters in up to 24,999 inhabitants, from 25,000 to 99,999 inhabitants and greater than 100,000 inhabitants.

The AB coverage and ESF coverage variables were collected in the Primary Care Information and Management System, considering the month of December of each year as a reference. Both variables were classified as low coverage (0-49.9%), medium coverage (50-74.9%) and high coverage (75 to 100%) as described in the study by Neves et al. (2018)⁽¹⁷⁾.

For the statistical analysis, a distribution table of absolute and relative frequencies of the variables was constructed in each year investigated. Next, Poisson regression models were estimated with robust variances for each variable and the outcome proportion of abnormal results of BI-RADS® 0,4,5, dichotomized into satisfactory (<10%) and unsatisfactory (>10%). Through these analyses, the unadjusted (crude) prevalence ratios were estimated with the respective 95% confidence intervals.

Variables with $p < 0.20$ in the crude analyzes were analyzed in a multiple Poisson regression model with robust variances. The variables with $p \leq 0.05$ remained in the final model after adjustments for the other variables. Based on the final model, adjusted prevalence ratios with 95% confidence intervals were estimated. In the model, data of the municipalities relative to the year were considered. The model fit was analyzed by QICu ("quasi-likelihood under the independence model criterion")⁽¹⁸⁾.

The study was approved by the Research Ethics Committee of Faculdade de Odontologia – UNICAMP under protocol no 018/2020 and was exempted from submission of the free and informed consent form, as it is a study with secondary data and freely accessed by the public.

■ RESULTS

Data collected at SISCAN showed that 991,572 mammograms were performed on women aged 50-69 years, in the 645 municipalities of the state of São Paulo during the 2016-2019 period. In the analyzed period, 9.6% of the mammogram results were classified into BI-RADS® 0; 27.7% into BI-RADS® 1; 59.7% into BI-RADS® 2; 2.1% into BI-RADS® 3; 0.6% into BI-RADS® 4; and 0.1% into BI-RADS® 5 categories.

The HDI, PEP, PP and PV showed similar values over time. According to the HDI, the municipalities in the state

of São Paulo had medium to very high levels of per capita income. No municipality was classified as having a low or very low index.

Table 1 presents the descriptive analyzes of data from the municipalities of the state of São Paulo during the study period. It can be seen that the percentage of municipalities

with an unsatisfactory proportion of abnormal results (>10%) increased from 37.8% in 2016 to 43.7% in 2019. Also, the percentage of municipalities with a proportion of screening mammograms in the recommended age group (PMMG), below the average for Brazil, increased from 20.6% in 2016 to 15.7% in 2019.

Table 1 – Descriptive analysis of the variables used in the study. São Paulo, Brazil, 2016 to 2019

Variable	Categorization	Year			
		2016	2017	2018	2019
Proportion of abnormal results in screening mammograms de (<i>abnormal call rate</i>)	Satisfactory (<10%)	401 (62.2%)	384 (59.5%)	347 (53.8%)	363 (56.3%)
	Not satisfactory (>10%)	244 (37.8%)	261 (40.5%)	298 (46.2%)	282 (43.7%)
PMMG	Below average	133(20.6%)	106 (16.4%)	111 (17.2%)	101 (15.7%)
	Average	106 (16.4%)	90 (14.0%)	101 (15.7%)	96 (14.9%)
MHD	Above average	406 (63.0%)	449 (69.6%)	433 (67.1%)	448 (69.5%)
	Very low	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
PEP	Low	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Medium	62 (9.6%)	62 (9.6%)	62 (9.6%)	62 (9.6%)
MHDI	High	559 (86.7%)	559 (86.7%)	559 (86.7%)	559 (86.7%)
	Very high	24 (3.7%)	24 (3.7%)	24 (3.7%)	24 (3.7%)
PEP	≤Median (1.07)	324 (50.2%)	324 (50.2%)	324 (50.2%)	324 (50.2%)
	>Median	321 (49.8%)	321 (49.8%)	321 (49.8%)	321 (49.8%)
Percentage of Poor	≤Median (4.75)	323 (50.1%)	323 (50.1%)	323 (50.1%)	323 (50.1%)
	>Median	322 (49.9%)	322 (49.9%)	322 (49.9%)	322 (49.9%)
Percentage of Vulnerable	≤Median (18.68)	323(50.1%)	323 (50.1%)	323 (50.1%)	323 (50.1%)
	>Median	322 (49.9%)	322 (49.9%)	322 (49.9%)	322 (49.9%)
GDP	≤Median (26537.35)	323 (50.1%)	323 (50.1%)	323 (50.1%)	323 (50.1%)
	>Median	322 (49.9%)	322 (49.9%)	322 (49.9%)	322 (49.9%)
Population size	Up to 24.999	426 (66.0%)	425 (65.9%)	423 (65.6%)	422 (65.4%)
	From 25.000 to 99.999	144 (22.3%)	145 (22.5%)	145 (22.5%)	145 (22.5%)
	Greater than 100.000	75 (11.6%)	75 (11.6%)	77 (11.9%)	78 (12.1%)
ESF	Low Coverage	211 (32.7%)	207(32.1%)	205 (31.8%)	212 (32.9%)
	Medium Coverage	113 (17.5%)	113 (17.5%)	114 (17.7%)	104 (23.4%)
	High Coverage	321 (49.8%)	325 (50.4%)	326 (50.5%)	329 (51.0%)
AB	Low Coverage	95 (14.7%)	89 (13.8%)	94 (14.6%)	100 (15.5%)
	Medium Coverage	137(21.2%)	137 (21.2%)	129 (20.0%)	122 (18.9%)
	High Coverage	413 (64.0%)	419 (65.0%)	422 (65.4%)	423 (65.6%)

PMMG: proportion of screening mammograms in the recommended age range; MHDI: municipal human development index; PEP: percentage of extremely poor; Vulnerable: percentage of individuals vulnerable to poverty; GDP: gross domestic product; ESF: coverage of the family health strategy; AB: Primary Health Coverage.

The prevalence of municipalities with an unsatisfactory proportion of abnormal results (>10%) was significantly higher in 2018 (PR: 1.21; 95%CI: 1.08-1.36) and in 2019 (PR= 1.14;

95%CI %: 1.02-1.28) than in 2016 ($p<0.05$), as shown in Table 2. The prevalence rate of municipalities with an unsatisfactory proportion of abnormal BI-RADS® 0,4,5 was significantly

Table 2 – Crude and adjusted analyzes of associations with the proportion of abnormal results in screening mammograms (*Abnormal Call rate*). São Paulo, Brazil, 2016 to 2019

Variable	Category	Crude PR (CI95%)	p-value	Adjusted PR (CI95%)	p-value
Year	2016	Ref		Ref	0.3023
	2017	1.07(0.96-1.20)	0.2375	1.06(0.95-1.19)	0.0009
	2018	1.22(1.09-1.37)	0.0007	1.21(1.08-1.36)	0.0193
	2019	1.16(1.03-1.29)	0.0123	1.14(1.02-1.28)	0.3023
PMMG	Below average	Ref		Ref	
	Average	1.28(1.05-1.54)	0.0134	1.20(1.00-1.45)	0.0500
	Above average	1.29(1.10-1.52)	0.0015	1.27(1.08-1.49)	0.0029
MHDl	Very low	-		-	-
	Low	-		-	-
	Medium	Ref			
PEP	High	1.19(0.97-1.47)	0.0992		
	Very high	1.50(1.05-2.12)	0.0240		
	≤Median (1.07)	Ref			
Percentage of Poor	>Median	1.10(0.97-1.24)	0.1486		-
	≤Median (4.75)	Ref		Ref	
Percentage of Vulnerable	>Median	1.14(1.01-1.29)	0.0417	1.20(1.07-1.36)	0.0024
	≤Median (18.68)	Ref			
GDP	>Median	1.04(0.91-1.17)	0.5890		
	≤Median (26537.35)	Ref			
Population size	>Median	1.19(1.06-1.35)	0.0043	-	-
	Up to 24.999	Ref			
	From 25.000 to 99.999	1.42(1.23-1.63)	<0.0001	-	-
ESF	Greater than 100.000	1.37(1.14-1.65)	0.0006		
	Low Coverage	1.54(1.35-1.75)	<0.0001	1.57(1.38-1.78)	<0.0001
	Medium Coverage	1.29(1.10-1.51)	0.0016	1.30(1.09-1.52)	0.0012
AB	High Coverage	Ref		Ref	
	Low Coverage	1.36(1.16-1.58)	0.0001	-	-
	Median Coverage	1.52(1.34-1.73)			
	High Coverage	Ref			

Source: Research data.

higher among municipalities with a higher mean proportion of screening mammograms performed in women aged 50 to 69 years (PR=1.20; 95%CI: 1.00-1.45) Table 2.

There is also a higher prevalence of municipalities with an unsatisfactory proportion among those with a higher percentage of poor people (PR=1.20; 95%CI: 1.07-1.36), ($p<0.05$) (Table 2). It can also be observed that the prevalence of municipalities with an unsatisfactory proportion was significantly higher among those with low coverage (PR=1.57; 95%CI: 1.38-1.78) and medium ESF coverage (PR=1.30; 95%CI: 1.09-1.52) compared to municipalities with high coverage ($p<0.05$) (Table 2).

As for the percentage of poor individuals, the population of 50.1% of the municipalities is below the median 4.75 and 50.2% of the municipalities are below the median with extremely poor populations.

Regarding GDP, it was found that 50.1% of the municipalities have a GDP below BRL 26,537.35. Of the 645 municipalities in the state of São Paulo, 66% have less than 25,000 inhabitants, 22.3% have 25,000 to 99,999 inhabitants and 11.6% have more than 100,000 inhabitants.

It can also be seen that the percentage of municipalities with low ESF coverage was 32.7% in 2016 and 32.9% in 2019, and regarding low PC coverage, the percentage was 14.7% in 2016 and 15.5% in 2019.

Unsatisfactory proportion of abnormal results ($>10\%$) was considered as an event in the outcome. Ref: Reference category for independent variables; PR: Prevalence ratio; CI: Confidence interval; PMMG: proportion of screening mammograms in the recommended age range; MHDl: municipal human development index; PEP: percentage of extremely poor; Vulnerable: Percentage of individuals vulnerable to poverty; GDP: gross domestic product; ESF: coverage of the family health strategy; AB: Primary Health Coverage; QICu (Initial model) = 6988,0270; QICu (Final model) = 6878,9447

■ DISCUSSION

In the study period, there was an increase in the proportion of abnormal results in screening mammography exams among the municipalities of the state of São Paulo, which is associated with a higher proportion of screening mammograms, a higher percentage of poor people and low and medium ESF coverage among the municipalities.

Corroborating the present findings, a previous study carried out in the state of São Paulo in the 2010-2012 period, reported a significant number of cancer diagnoses identified in screening tests in the age group of 50 to 69 years. The numbers of reported cases follow: 1,593 (year 2010), 1,879 (year 2011) and 2,399 (year 2012). Considering the

proportional distribution of mammograms by the BI-RADS® category, higher percentages were identified in the categories BI-RADS® 1 (no finding) and BI-RADS® 2 (benign findings)⁽¹⁹⁾.

The results also revealed an increase in the percentage of municipalities with unsatisfactory coverage of abnormal results (abnormal call rate) over the years, that is, with more than 10% of abnormal results. This fact can be explained by the organization of the screening program⁽²⁰⁾, which still faces challenges regarding the timeliness of the examinations, interfering with early diagnosis, and differences regarding the coverage of screening tests among the target population of the countryside and the capital of the state of São Paulo⁽¹⁹⁾, lack of integration of data in the line of breast cancer care by information systems⁽²¹⁾, in addition to access impasses caused by socioeconomic conditions that make it difficult for women to adhere to this service⁽¹¹⁾.

It was also found that most municipalities in the state of São Paulo had a proportion of screening mammograms in the recommended age group above the average for Brazil (53%), with an increase between 2016 and 2019. This fact can be explained by the expansion of screening mammography coverage across the country. From 2010 to 2018, 35,317,728 screening mammograms were performed in Brazil, with an average annual increase of 3.29% ($\pm 0.43\%$)⁽¹²⁾. This may have reflected in the results obtained. The findings indicate that in municipalities where more mammograms are performed in the age range recommended by the Ministry of Health, more cases of suspected breast cancer are found at the beginning of screening. This justifies the association of the variables abnormal call rate and PMMG. Municipalities that have an average PMMG have a prevalence ratio of 1.2 of abnormal exams compared to those municipalities that have a proportion lower than the average.

Also, the unsatisfactory proportion of abnormal results in screening mammograms was 20% higher among those municipalities with a higher percentage of poor people. A study that investigated the factors correlated with coverage of mammography screening in women aged 50 to 69 years, among 5,565 Brazilian municipalities, identified that cities that have high social inequality, measured by the Gini coefficient, and low development, according to the HDI, have less access to mammograms⁽²²⁾.

It is known that socioeconomic relationships contribute to differences in access to information, perceived needs, transportation difficulties for appointments and less willingness to leave work to undergo mammography exams⁽²³⁾. Furthermore, women from the upper economic classes (classes A and B) underwent up to 1.8 times more mammography exams compared to women from the lowest economic classes, who have fewer opportunities for accessing this examination⁽¹¹⁾.

Such reports clarify, therefore, the association found between poverty and the proportion of abnormal tests.

Therefore, the importance of human and economic development programs is reinforced, which focus on reducing poverty and social vulnerabilities. In 2004, the *Bolsa Família* Program was created in Brazil, a model implemented in more than 18 countries in Latin America as a conditional cash transfer program, which aims to reduce poverty and vulnerability. These social protection programs consist of a set of policies and programs aimed at reducing people's exposure to risks and helping to manage economic and social risks, such as unemployment, exclusion, disease and aging⁽²⁴⁾. The *Bolsa Família* Program was deactivated in 2021 and replaced by the *Auxílio Brasil* program. The conditions of the previous program for receiving the aid were maintained, with the presence of women in the Basic Family Health Units being encouraged, through the monitoring of the children's vaccination schedule, the growth and development of the children, and through the prenatal test for pregnant women and the monitoring of nursing mothers⁽²⁵⁾. It should be stressed that this state measure can have a positive impact on the health and lives of women, in addition to reinforcing access to Basic Family Health Units⁽²⁶⁾.

Regarding breast care, the ESF teams are responsible for actively seeking out women, assisting in the care flow for them, who will be submitted to mammography exams. The health teams carry out an educational activity, so that women overcome barriers related to education and adherence to exams, in addition to helping with management actions⁽²⁷⁾. Studies suggest that countries guided by the Primary health care model (PHC), as it is the case of ESF, allow for better education and greater adherence in the area where this program operates with better indicators such as early detection of BC⁽²⁸⁾. In PHC in Brazil, the navigation program for patients through the Community Health Agent stood out for collaborating with the BC screening exams⁽⁹⁾, being responsible for the increase from 23% to 88% in the coverage of screening mammography examinations in the city of Rio de Janeiro⁽²⁹⁾. Thus, the absence of preventive and care actions offered by the PHC was probably a condition that led municipalities to an unsatisfactory proportion of abnormal results in screening mammography abnormal call rate classified as BI-RADS® 0, 4 and 5 higher among those municipalities with low and medium ESF coverage compared to municipalities with high coverage.

The limitations of this study concern the use of secondary data, such as outdated data in some municipalities, which have not yet fully migrated to SISCAN, reliability of the information, failures in filling out the data, and especially the fact that the sample investigated includes only the public health

system of services provided under the SUS. There are also limitations related to the ecological study design, such as the ecological fallacy, since aspects verified in the collective proportion of BC screening tests in the municipalities may not reflect the real condition of women aged 50 to 69 years in the state and São Paulo.

■ CONCLUSION

It is concluded that despite the importance of the increased coverage of BC screening tests among the recommended age group, socioeconomic issues and access to the ESF mediate the presence of abnormal results, making it necessary to reinforce existing strategies in the field of social assistance and the organization of services to guarantee equal access to SUS users.

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The authors declared that there is no conflict of interest.

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Received: 06.07.2022

Approved: 09.19.2022

Associate editor:

Jéssica Teles Schlemmer

Editor-in-chief:

Maria da Graça Oliveira Crossetti

