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Breast cancer screening practice and associated factors: Women's Health Survey in Uberaba MG Brazil, 2014

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Abstract *This study aimed to characterize women's socioeconomic and epidemiological profile in Uberaba according to the breast cancer screening practice and identify associated factors with this practice. This is a cross-sectional research part of the Women's Health Survey in Uberaba (MG). Data was collected by home interview, referring to socioeconomic and epidemiological issues and breast cancer screening practice, from a sample of 1,520 women above 20 years of age. After processing the data, we performed statistical analysis with measures of association by the Chi-square test, bivariate and multivariate Poisson regression, with a significance level of 5%. The results showed a profile of breast cancer screening practice with white women (66%), high schooling and per capita income, in common-law marriage (67,5%), non-heads of households (64,4%) and non-smokers (64,6%). Factors associated with higher practice were the age groups 40-49 and 50-69 years (PR = 0.7 and 0.64), per capita income higher than one minimum wage (PR = 1.17) and public or health plan mammography coverage (PR = 1.98 and 1.94). We can conclude that factors associated with breast cancer screening practice have been identified in the studied sample.*

Key words *Women's health, Secondary prevention, Epidemiological surveys*

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Introduction

The most common type of women cancer worldwide is breast cancer, accounting for 23% of all new cases of this disease. In Brazil, its incidence was around 57 thousand new cases[1] in 2014. Most of the deaths from this cause are found in developing countries and are becoming a public health issue[2]. Breast cancer has the highest cancer mortality rate among Brazilian women, with 11.1 deaths per 100,000 women. The significant mortality of this disease is not only due to its high incidence but also to the fact that approximately 60% of the cases are detected late[3].

Screening and early diagnosis are the only ways to reduce the mortality of this disease. The early diagnosis actions contribute to slower disease progression in its subsequent stages and are characterized by the approach of people with signs or symptoms of the disease[3]. Screening actions include the detection of cancer in asymptomatic populations and are targeted at women in the age group where screening benefit-risk balance is more favorable, with significant impact on mortality reduction[3].

In Brazil, clinical breast examination (CBE) and mammography (MMG) are the screening strategies. MMG allows the detection of alterations that are not palpable, which facilitates a more effective treatment[4], with the recommendation that women in the 50-69 years age group submit to mammography every two years, and CBE annually. For women aged 40-49 years, annual clinical examination and, in case of alterations, diagnostic mammography are indicated. For groups at risk, which involve family history and previous diagnoses of cancer, clinical breast examination, and annual mammograms are recommended from the age of 35[5].

Access to breast cancer screening has been linked to some health inequities. Some factors may positively and negatively influence the performance of screening exams, such as economic status, schooling, income, ethnicity, number of medical appointments, location of the home and the source of payment for screening tests[6]. In this context, age should also be considered, since the elderly over 70 years are not included in mammographic screening programs[3].

Considering the higher incidence of breast cancer cases in the country, its cost and impact on health services and society as a whole, and the importance of early detection of the disease in order to reduce mortality and possible associated factors, it is necessary to identify the profile of the breast cancer screening exam practice in the population and its peculiarities. Such information is valuable to health services, professionals and managers, as it enables the formulation of more specific and comprehensive strategies regarding breast cancer early detection actions in Uberaba (MG). For the field of research, this information allows a reflection on such strategies with the possibility of evaluating the current interventions. Thus, this study aims to characterize women's socioeconomic and epidemiological profile in Uberaba, according to the practice of breast cancer screening tests, as well as to verify the factors associated with this practice.

Methods

This is a cross-sectional population-based study and is part of a larger project – Women's Health Survey in Uberaba (MG) (*ISA Mulher Uberaba MG*), approved by the Research Ethics Committee of the Federal University of the Triângulo Mineiro (UFTM) (1826 / 2010), whose general objective is to identify the health profile of women from the age of 18 in the city of Uberaba (MG), Brazil. Inclusion criteria were women residing in the city of Uberaba, aged 20 years and older, who understood the research content and were able to respond to the interview after signing the Informed Consent Form.

The sample was selected by multistage probabilistic sampling. In the first stage, 50% of the districts were randomly selected by a computer-based draw in each health district observing population proportionality of each district concerning the number of districts. Then, within each randomly selected neighborhood, 25% of the census tracts were randomly selected, observing population proportionality of each district concerning the number of census tracts. Within the census tract, households were systematically selected by random selection of the first household, and the remainder were those from the sequence of 32 households.

The sample calculation considered the lack of a priori knowledge about the estimates of the prevalence of the events of interest (all were considered equal to 50%); 95% confidence level and a maximum error margin of 2.5% and 20% of losses, resulting in a sample of 1,530. In the composition of the sample, the strata of age, income, schooling and skin color were respected according to data from the IBGE (Brazilian Institute of Geography and Statistics)[7]. At the end of field-

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work stage, 1,560 people were interviewed, of which 1,520 were women aged 20 years or over, who were subjects of this study.

Data were collected via questionnaire organized explicitly for the *ISA Mulher Uberaba* research. For the evaluation of epidemiological, socioeconomic and health characteristics, the identification block, general data, and physical activity were used.

The physical activity level was evaluated by extended version of the International Physical Activity Questionnaire (IPAQ), validated for the Brazilian population[8] and also for the elderly[9], with a cutoff point of 150 minutes, which considers active women those that perform 150 minutes or more weekly physical activity, while inactive women perform zero to 149 minutes of weekly physical activity, both for adult women[10] and for the elderly[11].

The anthropometric data, corresponding to the body mass index (BMI), were obtained by weight in kilograms divided by height in meters squared (weight/height²), values given in kilograms per square meter (kg/m²), classified as underweight: < 18.4 kg/m², eutrophy: 18.5 ┤24.9 kg/m², overweight: 25.0 ┤29.9 kg/m² and obesity: > 30.0 kg/m²[12]. A specific classification was applied to the elderly, namely, underweight: < 22.0 kg/m², eutrophy: 22.0 ┤27.0 kg/m² and overweight > 27.0 kg/m²[13].

A free access questionnaire developed for a health history survey was used for the analysis of the self-referenced practice of breast cancer screening tests, with the same goal[14]. This questionnaire addressed questions about the last date of CBE and MMG. The recommendations of the Brazilian National Cancer Institute (INCA)[3] were used to determine the practice of breast cancer screening tests, which establish annual CBE and MMG if any alteration is noted for women aged 40-49 years and annual CBE and biannual MMG for women aged 50-69 years. For the other age groups, a triennial CBE for women up to 39 years and annual CBE and biannual MMG for those older than 70 years, as suggested by the Brazilian Society of Mastology[15,16].

Data was collected through home interviews by 22 female interviewers, specially trained for this study, from March to October 2014. There was field supervision with a review of interviews on receipt, and random verification via telephone of 10% of the interviews. Data were processed by program EpiData® version 2.0 (Odense, Denmark, EpiData Association) and double-entered. Consistency between the two databases was checked.

The descriptive analysis with chi-square test was performed to determine the sample's profile according to the practice of breast cancer screening tests. We verified the association between the practice of breast cancer screening tests and variables per capita income, schooling (in years of study), personal history of neoplasms (malignant or benign) and age. These associations were initially analyzed by bivariate regression, with the purpose of determining the crude prevalence ratio. The next process of analysis was the multivariate analysis to detect the prevalence ratio adjusted through Poisson regression. The variables for adjustment were selected from bivariate regression models with all variables relevant to these objectives; those that showed significance $0.05 < p < 0.20$ were maintained in the multivariate model for adjustment purposes. The variables were inserted by the stepwise backward method, in which variables are entered all at once in the model and are removed one by one[17]. The level of significance used was 5%. The software used for data analysis was Stata®11 (College Station, USA, StataCorp LP).

Results

Table 1 shows the profile of women according to the practice of breast cancer screening tests.

The mean age of participants was 50.7 years (± 16.7). It is possible to observe the predominance of the practice of breast cancer screening tests in the 40-49 years age group, with declining prevalence with age. This practice also increased with increased schooling. The most common ethnicity/skin color was white, which also showed a higher frequency of the practice of screening tests.

As for marital status, the most frequent practice in breast cancer screening tests was "Common-law marriage". More than 40% of the sample declared to be head of the family. Of these, 58.7% perform breast cancer screening tests. Also, the frequency of screening tests increased in direct proportion to per capita income. Most of the sample (69.9%) self-declared as being non-smoker, and the practice of screening tests is also higher among non-smokers.

Table 2 shows the crude model with the bivariate Poisson regression. The variables per capita income, schooling, neoplasms, benign breast neoplasms, age group, public source of payment of mammography, health plan payment of mammography and marital status were associated to the practice of breast cancer screening tests.

Table 1. Sociodemographic, epidemiological and health characterization of women in Uberaba, according to the practice of breast cancer screening tests* for breast cancer. ISA-Mulher, Uberaba - MG, 2014.

Variable	Breast cancer screening test n(%)	p**	Total n (%)
Age group	943(62.3%)	**0.0001**	1512 (100%)
20 ┤ 39 years	260(56.8%)		457(30.2%)
40 ┤ 49 years	172(70.2%)		245(16.2%)
50 ┤ 69 years	418(68.6%)		609(40.2%)
≥ 70 years	93(46.2%)		201(13.2%)
Schooling***	943(62.3%)	**0.0001**	1512(100%)
Illiterate	23(41%)		56 (3.7%)
Until 5 years	176(54.4%)		323(21.3%)
> 5 a < 9 years	230(64.6%)		356(23.5%)
9 a < 12 years	188(64.3%)		292(19.3%)
12 yearsor more	326(67.2%)		485(32%)
Race	939(62.4%)	**0.003**	1504(100%)
White	554(66%)		839(55.7%)
Black/Brown	364(58.4%)		623(41.4%)
Others	21(50%)		42(2.8%)
Marital status	942(62.3%)	**0.0001**	1511 (100%)
Single	177(52.8%)		335(22.1%)
Common-lawmarriage	540(67.5%)		800(52.9%)
Divorced	96 (65.7%)		146(9.6%)
Widow	129(56%)		230(15.2%)
Head ofthefamily	912(62%)	**0.026**	1471 (100%)
Yes	375(58.7%)		638 (43.3%)
No	537(64.4%)		833 (56.6%)
Per capita income****	943(62.3%)	**0.0001**	1512 (100%)
Until 0.5 MW	196(52.4%)		374(24.7%)
> 0.5 – 1 MW	331(65.5%)		521(34.4%)
> 1SM – 2.5 MW	282(65.2%)		432(28.5%)
> 2.5 MW	134(72.4%)		185(12.2%)
Smoking	929(62.2%)	**0.002**	1.492 (100%)
No	675(64.6%)		1044(69.9%)
Yes	154(53.4%)		288(19.3%)
Ex-smoker	100(62.5%)		160(10.7%)
Presense of Neoplasms	94(78.3%)	**0.0001**	120 (7.9%)
Benigni Breast Neoplasia	28 (93.3%)	**0.0001**	30 (1.9%)
Breastcancer	7(100%)	**0.039**	7(0.4%)
BMI	934(62.3%)	0.617	1497 (100%)
Low weight	62(59%)		105(7%)
Eutrophy	332(61.4%)		540(36%)
Overweight	360(62.3%)		577(38.5%)
Obesity	180(65.4%)		275(18.3%)
PhysicalActivityLevel	852(64.1%)	0.072	1.329 (100%)
Active	778(64.8%)		1.199(90.2%)
Inactive	74(56.9%)		130(9.7%)

* Mammography and Clinical Breast Examination;** x^2 test; ***Schooling inyearsof study; ****_Per capita_ income inminimum wage (MW); BMI: body mass index; maximum number of losses: 183.

The higher income per capita was associated with a higher practice of screening tests, and for income > 2.5 minimum wages, the practice of the exams was 38% higher compared to the lower in-

come bracket. This logic also applies to schooling, where we can observe that for women with 12 years or more of study there was a 63% greater practice of screening tests against the range of lower schooling.

Histories of general neoplasms and benign breast neoplasms also behaved similarly, and the practice of breast cancer screening tests was respectively 28% and 51% higher compared to women who did not show such conditions. The age group showed a decrease in the prevalence ratio with increasing age. The age range 40-49 years evidenced a 23% higher screening practice against the base age group (20-39 years). For the age group 50-69 years, the practice was 20% higher, and for the 70 years or older, the practice was 19% lower compared to the base age group.

Regarding the source of payment of the mammography exam, the one performed by the Unified Health System (SUS) showed 26% greater practice compared to that performed by the health or private plan. Concerning the health plan as a source of payment, the prevalence ratio showed a 23% increase in the practice of screening tests for non-payment by the health plan. Regarding the private payment of tests, the results were not statistically significant. The "Common-law marriage" marital status showed

Table 2. Bivariate Poisson regression model for the practice of screening tests for breast cancer for the purpose of determining the Crude Prevalence Ratio.ISA Mulher Uberaba – MG, 2014.

Variables	n(%)	CrudePR	CI 95%	p**
Age group	943(62.3%)			**0.001**
20 ┤ 39 years	260(56.8%)	1		
40 ┤ 49 years	172(70.2%)	1.23	**1.01– 1.49**	**0.032**
50 ┤ 69 years	418(68.6%)	1.20	**1.03– 1.4**	**0.018**
≥ 70 years	93(46.2%)	0.81	0.64– 1.03	0.087
Schooling***	943(62.3%)			**0.036**
Illiterate	23(41%)	1		
Until 5 years	176(54.4%)	1.32	0.85– 2.04	0.202
> 5 a < 9 years	230(64.6%)	1.57	**1.02– 2.41**	**0.038**
9 a < 12 years	188(64.3%)	1.56	**1.01– 2.41**	**0.042**
12 yearsor more	326(67.2%)	1.63	**1.07– 2.49**	**0.022**
Race	939(62.4%)			0.107
White	554(66%)	1		
Black/Brown	364(58.4%)	0.88	0.77– 1	0.070
Others	21(50%)	0.75	0.48– 1.17	0.211
Marital status	942(62.3%)			**0.016**
Single	177(52.8%)	1		
Common-lawmarriage	540 (67.5%)	1.27	**1.07– 1.51**	**0.005**
Divorced	96 (65.7%)	1.24	0.97– 1.59	0.084
Widow	129(56%)	1.06	0.84– 1.33	0.606
Head ofthefamily	375(58.7%)	0.91	0.79 – 1.04	0.170
Per capita income****	943(62.3%)			**0.020**
Until 0.5 MW	196(52.4%)	1		
> 0.5 – 1 MW	331(63.5%)	1.21	**1.01– 1.44**	**0.033**
> 1SM – 2.5 MW	282(65.2%)	1.24	**1.03– 1.49**	**0.018**
> 2.5 MW	134(72.4%)	1.38	**1.1 – 1.72**	**0.004**
PresenseofNeoplasms	94(78.3%)	1.28	**1.03 – 1.58**	**0.025**
Benigni Breast Neoplasia	28 (93.3%)	1.51	**1.03– 2.2**	**0.043**
Public payment of the MMG	431(71.4%)	1.26	**1.11– 1.44**	**0.001**
Health plan payment of the MMG	188(74%)	1.23	**1.05– 1.44**	**0.010**
Private payment of the MMG	27(69.3%)	1.11	0.75– 1.63	0.583

* Mammography and Clinical Breast Examination;** x^2 test; ***Schooling in years of study; ****_Per capita_ income in minimum wage (MW); PR: prevalence ratio; CI: confidence interval; MMG: mammography; maximum number of losses: 41.

27% higher practice of screening tests against the "Single" status. Other marital status classifications did not show statistically significant results.

In the multivariate analysis, after adjustments, variables that remained associated with breast cancer screening tests were per capita income, age group, public and health plan sources of payment of MMG, with only variable breast neoplasms remaining as model adjustment variable (Table 3). This analysis allowed to verify the behavior of the variable under this condition. Thus, it was possible to state that, in a conditioned adjustment situation, the per capita income of > 1-2.5 MW and > 2.5 MW showed a higher prevalence of breast cancer screening tests, showing a growing prevalence ratio trend with higher income. The age group behaved inversely, showing a declining practice of screening test with age. Concerning the mammography test payment source, tests performed by the SUS and health plans have shown an association with the practice of breast cancer of screening tests even in the adjusted model.

Discussion

The practice of breast cancer screening tests showed a prevalence of 62.3% in this sample. It is worth remembering that the construction of this variable took into account INCA's recommended screening strategy according to the age group[3]. The characteristics of the profile of the practice of breast cancer screening tests among research participants evidence a prevailing profile of women aged 40-49 years, 12 years or more schooling, per capita income > 2.5 MW, white, in common-law marriage status, non-heads of household and non-smokers.

The study by Schneider et al.[18] also observed an MMG practice profile of women with high schooling (12 years of age and above), white, living with a partner, corroborating the results of this study. Lages et al.[19] evaluated the profile of non-performing MMG in the state of Piauí and found a higher prevalence of non-realization in brown, single status, smokers, illiterate, and household income under two minimum wages. This result is also similar to this study.

International studies indicate that the screening profile for breast cancer screening differs between developed and developing countries by type of screening program (opportunistic or organized). For middle- and low-income developing countries, socioeconomic inequities, such as higher income, schooling, and marital status are more important characteristics in the practice of screening tests[20]. On the other hand, in rich countries, opportunistic screening still has socioeconomic gaps and income, in particular, a characteristic not observed in systematic screening in developed countries[21].

Thus, findings of this research, as well as the literature on the subject show socioeconomic gaps in the accomplishment of MMG, reinforcing the unfavorable pattern to women in a worse socioeconomic situation. This information may be useful for health management, since it shows

Table 3. Poisson multivariate regression model for the practice of breast cancer screening * for the purpose of determining the Adjusted Prevalence Ratio. ISA Mulher Uberaba – MG, 2014.

Variables	n(%)	Adjusted PR	IC 95%	p**
Per capita income****	943(62.3%)			
Until 0.5 MW	196(52.4%)	1		
> 0.5 – 1 MW	331(63.5%)	1.17	0.98– 1.4	0.07
> 1SM – 2.5 MW	282(65.2%)	1.22	1.01– 1.47	**0.037**
> 2.5 MW	134(72.4%)	1.33	1.06– 1.67	**0.014**
Benigni Breast Neoplasia	28 (93.3%)	1.34	0.92– 1.96	0.120
Age group	943(62.3%)			
20 ┤ 39 years	260(56.8%)	1		
40 ┤ 49 years	172(70.2%)	0.70	0.53– 0.93	**0.014**
50 ┤ 69 years	418(68.6%)	0.64	0.49– 0.83	**0.001**
≥ 70 years	93(46.2%)	0.45	0.33– 0.62	**<0.001**
Public payment of the MMG	431(71.4%)	1.98	1.55– 2.52	**<0.001**
Health plan payment of the MMG	188(74%)	1.94	1.49– 2.52	**<0.001**

* Mammography and Clinical Breast Examination; ** Poisson regression model p < 0,05; *** *Per capita* income inminimum wage (MW); ***Schooling in years of study; PR: prevalence ratio; CI: confidence interval; MMG: mammography

the profile of women with less access to MMG, providing an opportunity to plan targeted interventions.

The variables per capita income, age group, the public and health plans sources of payment of MMG showed an association with the practice of cancer screening tests, confirming other reports in the literature for the MMG and CBE tests[6,18,22,23]. Income plays a vital role in the performance of screening tests, with a directly proportional mutual relationship. Throughout history, women with higher incomes have had easier access to tests, medical appointments, and health plans or private payments for these tests[24,25]. Critically, this finding shows the inequity of this practice in health, contrary to what is proposed by the guidelines of equity and equality of the SUS[26], and by the National Woman Healthcare Policy[27]. It is necessary to provide breast cancer screening services equitably, and income can be considered a fundamental factor for the analysis of this provision.

The association of the practice of breast cancer screening tests with the public payment source of the MMG test can be considered an advance for the actions geared to breast cancer screening in the municipality. In this research, more than 50% of the MMGs performed by the participants were paid with public funds, a factor associated with the practice of this test in the city of Uberaba. In a study carried out in Piauí, Lages et al.[19] showed a public payment source of MMG of 56.3%. This result is similar to that found in this study. Contrary to Amorim et al.[6], in a study carried out in Campinas (SP), they found the payment of the MMG test by the public system of 28.8% and by health plan/private payment of 71.2%. This finding may reflect the regional characteristics of each research and SUS organization in each region. In Uberaba, one can consider the result found as a probable consequence of actions to promote the MMG test by the SUS, such as the "Pink October" campaign, which has a significant mobilization of public health services to encourage breast cancer screening in the city. Besides, the city's territory is home to several universities, one of which is public, which facilitates people's access to screening tests through the partnership of these universities with other municipal public health services.

Health plans paid approximately 23% of the MMGs made in this study, and this characteristic was associated with the practice of screening tests. A similar association was found in the study by Schneider et al.[18]. Corroborating this result, according to data from the National Supplementary Health Agency (ANS), approximately 24% of the women in Minas Gerais are covered by a health plan[28]. Health plans are more generous in carrying out the screening tests, with a higher frequency of MMG and for a wider age group[29], and this periodicity is at the discretion of the individual medical decision, in comparison to that recommended by the INCA[3], a fact that may justify this association.

In the bivariate regression analysis, the age group was a factor associated with the practice of screening tests for the age range of 40-49 and 50-69 years, with a PR of 1.23 and 1.20, respectively. Thus, the age group between 40-49 years showed a more significant accomplishment of the screening tests than the range between 50-59 years that is the one recommended by INCA[3]. Such a finding may critically reflect overuse of the screening tests by women that are not indicated for screening, based on scientific evidence and adopted by the INCA[3]. For the age group of 70 years or more, there was no association between the practice of screening tests. This finding reflects the age distribution advocated for the actions of breast cancer screening, in general[3,29]. The lack of association for the age group above 70 years can be justified by the fact that it is not covered by the screening actions advocated by INCA. In the multivariate regression analysis, in a conditioned adjustment situation, the age group showed a behavior with a tendency to reduce the prevalence of screening tests with increasing age.

Similar results were found in the study by Oliveira et al.[24] who used PNAD 2008 and Rodrigues et al.[23] data. They found a non-linearity in this variable, that is, at a certain point in life, increasing age decreased the likelihood of women performing MMG. The authors also argue that the pattern of prevention by age tends to reduce with time[23,24].

These findings show the importance of taking an exclusive look at the aging of women with a focus on breast cancer prevention. It is necessary to take into account the increased longevity and consequently the higher demand for health services by the elderly population. Also, aging is a significant risk factor for the development of the disease, with higher incidence with women's increased age[3]. Thus, health services and policies should seek comprehensive care that is also related to breast cancer[23]. Regarding the analysis of the age group and the practice of screening tests, it is worth mentioning, in addition to the non-linearity of this association, mainly a higher

prevalence of tests among young women (20-39 years) than in older women (over 70 years) and higher achievement of tests by women aged 40-49 years than those aged 50-69 years, contrary to what is established by the INCA as the target age for screening[3].

Thus, more than discussing types of breast cancer screening tests and increasingly seeking to increase the prevalence of breast cancer screening and age range, we need to think about screening to integrate all available resources rationally and safely to the population, seeking reduced mortality by early diagnosis[30]. According to Tiezzi[30], the Brazilian breast cancer screening program is ineffective, possibly based on opportunistic diagnosis and without adequate coverage. Thus, it is necessary to invest in population awareness, using the structure available in PHC to reduce the high diagnosis rates at advanced stages[30]. While not in the multivariate model, disagreeing with other studies that found such an association, schooling is also a factor related to the practice of tests[18,19,21,23,25] and is strongly related to income, showing a direct relationship with the practice of screening exams, and the higher the practice, the higher the level of schooling[18].

In this study, the illiterate were the ones with a lower prevalence of the practice of screening tests, and this prevalence increases as schooling improves, reaching almost 70% for this category with 12 years or more of years of study. Low schooling is associated with a lower socioeconomic level and culturally implies less access to prevention services to this population[31]. It is related to the level of understanding of the relevance of performing tests, as well as access to this information[18,25], and its relationship with the practice of screening tests is considered a health inequity[18].

The common-law marriage marital status also did not remain in the multivariate model; however, other studies have shown its relationship with the practice of breast cancer screening tests[19,23]. While not associated with the practice of screening tests after the adjusted model, the common-law marriage marital status presupposes a more active sexual life, and as a consequence, more significant health care related to the need for gynecological consultation for problems originating from life sexual orientation and for contraceptive proposals, and not to a broader perspective of women's health care. Conversely, women without a partner use health services less. Such logic justifies the association of marital status with the practice of breast cancer screening tests[23]. In the crude model, the association with the history of general neoplasms, and especially of benign breast neoplasms, indicates that the care with this type of test is already part of the health/illness routine care proposed for these women, since for benign breast neoplasms, the detection of this alteration is done initially by the CBE and MMG tests, and require periodic control and follow-up[15].

A difference between the studies cited and this research is the method of evaluating the practice of screening tests. This research took into account the screening strategy proposed by INCA[3], which consists of MMG and CBE tests with different periodicities. The other studies evaluated the isolated practice of MMG or CBE every two years. This characteristic may justify the differences between the results found, despite the similarity of several associated factors found.

This research has limitations that must be considered. Data were collected through home interviews, and the practice of tests and the occurrence of breast cancer were self-reported. Thus, the memory and information bias may interfere with the participant's response. Also, the cross-sectional study limits the interpretation of associations as cause-and-effect relationships. Another limitation is the fact that the research encompasses several themes, restricting the possibility of discussing further details of the practice of breast cancer screening tests among women from Uberaba (MG). Besides, the non-response rate for some variables can be considered high even for a population-based study.

Final considerations

As per the research objectives, the profile of women according to the practice of breast cancer screening exams in Uberaba (MG) is of white women with high schooling level, higher per capita income, and non-family heads. Factors associated with the practice of screening were age, reducing practice with advancing age, per capita income higher than a minimum wage, and public and health plan source of payment for mammography.

The findings of this study generated information about the practice of breast cancer screening tests in the city of Uberaba, providing supporting evidence to managers and health professionals involved in the healthcare of women, to formulate more effective breast cancer screening strategies. In addition, the research emphasized

the need to seek to achieve SUS[26] equity precepts of the National Women's Health Care Policy[27], to organize services taking into account income, MMG source of payment and especially the age groups recommended by the INCA and the Ministry of Health, providing greater equity in the supply of breast cancer screening services in Uberaba (MG).

Collaborations

MCCC Meirelles, IAP Walsh and GA Pereira: design, implementation and drafting and approval of the final manuscript. MC Buranello: implementation, analysis and final drafting of the manuscript. SS Castro: design, implementation, analysis and drafting and approval of the final manuscript.

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