# RESEARCH ARTICLE

# Knowledge about Risk Factors for Breast Cancer and Having a Close Relative with Cancer Affect the Frequency of Breast Self-Examination Performance

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## Abstract

Background: Breast cancer incidence and mortality rates are increasing in North-Eastern Brazil and the patients with the disease often presented at advanced stages. The present study was focused on identifying variables that affect women's frequency of breast self- examination (BSE) performance. Materials and Methods: Data on BSE, socio-economic parameters and risk factors for breast cancer were obtained from 417 women from a community in North-Eastern Brazil by a self-informant method. To identify independent variables that affect frequency of BSE, nominal logistic regression analysis was performed. Results: Of 417 women, 330 (79.3%) reported performing BSE. Compared to high-income women, BSE performance by low-income women every month was 7.69 (OD=0.130; CI 95%: 0.044- 0.0386; p=0.000) times lower. Women who did not live in a stable union performed BSE each month 2.73 (OD=0.366; CI 95%: 0.171-0.782; p=0.010) less often than those living in a stable union. BSE performance every month and every six months or every year by women with poor knowledge about risk factors for breast cancer was 3.195 (OD=0.313; CI 95%: 0.141- 0.695; p=0.004) times and 2.028 (OD=0.493; CI 95%: 0.248- 0.979; p=0.043) times lower, compared to women with good knowledge. Participants who had a close relative with cancer performed BSE every month and every six months or every year 2.132 (OD=0.469; CI 95%: 0.220-0.997; p=0.049) times and 2.337 (OD=0.428; CI 95%: 0.219-0.836; p=0.013) times less often, compared to those women without close relatives with cancer. Conclusions: The results of this study indicated that income, marital status, knowledge about risk factors and having a close relative with breast cancer, affect the frequency of BSE performance. Information about risk factors in public health campaigns could additionally strengthen avoidance behaviour and also motivate BSE performance.

Keywords: Breast cancer - breast self- examination - knowledge - risk factor

## Introduction

The burden of breast cancer is shifting from developed to developing countries of Asia, Africa and South America, where incidence and mortality rates are increasing (Torre et al., 2012). In Brazil, the largest Latin American country, the national cancer institute (INCA) expected 57.100 new breast cancer cases for 2014 (INCA, 2014). In southern regions of Brazil, incidence and mortality rates remained stable or slightly decreased from 2005 to 2014 (INCA, 2005; INCA 2014). In the North-eastern region of Brazil, in contrast, breast cancer incidence increased from 27.0 to 36.7 new cases per 100.000 women during the same time period (INCA, 2005; INCA 2014). It was estimated that the mortality rate increased 5.3% in this region from 1994 to 2009 (Freitas-Junior et al., 2012). Low mammography coverage and long distances to health centres impair the early detection of tumors and women often present the disease at advanced stages (Viacava et al., 2009; Lee et

al., 2012; Andrade et al., 2014). It has been suggested that in developing countries, where women are younger and present the disease at advanced stage III or IV, BSE should be an additional tool for early breast cancer detection (Corbex et al., 2012; Dey, 2014).

Recent Brazilian literature about early breast cancer detection is mainly focused on women's knowledge about prevention and mammography performance (Santos and Chubaci, 2011; Azevedo et al., 2012; Schneider et al., 2013; Vieira et al., 2015). Few Brazilian studies have assessed women's knowledge about BSE and underlying reasons for its performance: Most descriptive Brazilian studies about BSE, that mainly focused on intervention including small groups of women, have been conducted in southern regions of the country (Nascimento et al., 2009; Araujo et al., 2010; Kim et al., 2010; Grego et al., 2011; Silva and Riul, 2011; Gomes et al., 2012). In contrast, few studies have been aimed at the underlying socio-demographic factors of BSE knowledge and performance

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(Brito et al., 2010).

Recent studies carried out in different countries have shown that socio-demographic factors like marital status, educational level and occupational status affect the frequency of BSE performance (Oluwatosin et al., 2010; Paul et al., 2015; Tilaki and Auladi, 2015). Furthermore, different studies have emphasized that knowledge about the disease and risk factors, as well as the presence of close relatives with breast cancer, may affect women's motivation to perform BSE (Garber et al., 2013; Ardahan et al., 2015; Tilaki and Auladi, 2015; Rakkapao et al., 2016).

Increasing incidence and mortality rates in North-eastern Brazil underline the importance to understand women's motivation to perform BSE. We asked which socio-demographic factors might influence women's BSE performance behaviour. Taking into account that awareness about the disease might motivate BSE performance, we also asked if knowledge about risk factors and the presence of close relatives with cancer affect women's motivation to perform BSE.

## Materials and Methods

### Study population and data collection

The data sampling protocol was reviewed and approved by the Brazilian National Ethics Research Committee (CAAE plataforma Brasil: 44529115.0.0000.5187). Written informed consent was obtained from each participant for participation in this study. Female participants were eligible if aged 20 years or older and not having any type of breast cancer. Data collection of more than two women who were relatives like mother-daughter or two sisters was avoided by the inclusion of only one individual from this group. Data sampling was based on self-information of women in public health service centres of the community of Caicó, Rio Grande do Norte, Brazil. Caicó is situated in the inland, about 282 km away from Natal, the state capital at the Atlantic coast. In the year 2010 the community of Caicó had 62.709 inhabitants. Sampling was performed between September and November of 2015. This time period also included the "Outubro rosa", the month at which women were invited to participate on the public breast cancer screening program. As this month is accompanied by public advertisement in favour of the public screening program, communication with women and subsequent data sampling was facilitated.

### Development and structure of the applied questionnaire

The applied questionnaire was developed step-wise. The questionnaire development was initially based on literature research. Three medical and nursing lecturers of health science reviewed content quality and formulation of questions. Questions were reformulated according to their suggestions. Fidelity of information was subsequently tested in a pilot study that included 38 women: The questionnaire was applied two times with a time interval of two weeks between both applications and congruence of answers was tested using Kappa statistics.

In the questionnaire, participants had to choose among the following alternatives of BSE performance:

Never performed, sometimes, every month and every six months or every year, forming four different categories. Furthermore, women were asked about knowledge about BSE performance, importance of BSE and corresponding sources of information. Minimum wage and multiple values of it were used to characterize income. This is a popular and well-known method to define salary among low-and middle-class subjects. Women were invited to mark if any close relative, defined as brother, sister, mother, father or one of the grand parents, uncle or aunt and cousin, have had any type of cancer. To detect possible ethnic differences, women were also invited to give information about ethnic origin, subdivided into Caucasian (white) or Afro-descendent background. Information about religion was obtained by the question if the participant was catholic, had a protestant or any other confession.

Risk factors for breast cancer and prevention behaviours have been identified in literature (Almeida et al., 2015; Dey et al., 2015; Paul et al., 2015; Tilaki and Auladi, 2015). To assess knowledge about risk factors and prevention behaviour, women were asked to mark 26 potential risk factors and prevention behaviours. Of the 26 potential risk factors, 12 were related to lifestyle, five were reproductive risk factors and five were preventive behaviours. To enhance participant's reflection about risk factors, four additional no-risk factors were included in the questionnaire among 22 true risk factors.

### Data management about knowledge of risk factors and prevention behaviour

Regarding questions related to knowledge about risk factors and preventive behaviour, each factor correctly marked was assigned score 1 (known), while a factor incorrectly marked was assigned score 0 (unknown). The total score was determined for each participant as the sum of risk factors and correctly marked preventive activities. As the maximal sum was 26, the median value was 13.5 points. The latter was used to define two groups, the first with poor knowledge was defined by a score $\leq 13$ points and a second group with good knowledge defined by a score $\geq 14$ points.

### Statistical analysis

Chi-Square ($\chi^2$) test, T-test and ANOVA were performed on GraphPad Prism® software version 6 (La Jolla, CA). Chi-Square ($\chi^2$) test was applied to compare categorized variables. T-test and ANOVA were applied to compare continuous parametric variables. Multinominal logistic regression was performed using SPSS STATISTICS™ software (SPPS; IBM company; version 17).

Significant variables of univariate regression analysis were used for regression modelling: Variables with significance level less than 0.2 in the univariate analysis were entered into the model. Then, variables with significance level less than 0.05 were kept in the model. Backward selection was used when significant variables were selected. The final model was tested for fitness using the likelihood ratio test. Results were presented as adjusted odd ratios (OR), 95% confidence interval (CI) and p-value.

## Results

General information about participants is summarized in Table 1. The mean age of women was 40.25 (s=14.03) years and ranged from 20 to 81 years. Of all 417 women, 348 (83.45%) reported having knowledge on how to perform BSE and for 407 (97.60%) BSE was important (Table 2). Furthermore, 330 (79.33%) women reported performing BSE (Table 2). The three main sources of information about BSE were television (87.05%), followed by radio (51.56%) and communication with other persons (49.88%; Table 2). Conversation with a physician, was reported by 201 (48.20%) women as a source of information about BSE (Table 2).

Of 86 women who never performed BSE, 36 (41.86%) aged 20-29 years and 19 (22.09%) aged 60 ≥ years (Table 3). In contrast, of the 57 women who performed BSE every month, most (38.60% and 33.80%) aged 30-39 years (p=< 0.000; Table 3). Of 57 women who performed BSE every month, 11 (16.92%) and 23 (50.77%) had low and high income, respectively, whereas in the category of women who never performed BSE, 52 (61.18%) had low income

and 8 (9.41%) had high income (p=0.000; Table 3). Of all women who performed BSE sometimes, every month and every six months or every year, 42 (21.00%), 22 (39.28%) and 16 (22.85%), respectively, had graduate level, whereas among women who never performed BSE, 12 (13.95%) had graduate level (p=0.005; Table 3). Of 57 women who performed BSE every month, 39 (68.42%) lived in a stable union, whereas of 86 women who did not perform BSE, 36 (41.86%) lived in a stable union (p=0.005; Table 3). Similarly, 29 (40.84%) out of 71 women who performed BSE every six months or every year lived in a stable union (Table 3). Participants who performed BSE tended to have a close relative with cancer (Table 3): Of all women who performed BSE sometimes, every month, every six months or every year, 107 (52.97%), 37 (64.91%) and 47 (66.20%), respectively, had a close relative with cancer, whereas 47 (55.17%) women who never performed BSE, had no close relative with cancer (p=0.024; Table 3). In the category of women who never performed BSE, 59 (67.82%) had poor knowledge about risk factors, whereas the majority of women who performed BSE sometimes, every month, every six months or every year, respectively had good knowledge about risk factors (p< 0.000; Table 3). Employment status, religion and ethnic origin were not significantly different among categories (p=0.201; p=0.085; p=0.262; Table 3).

Of 416 women, 128 (30.77%) performed BSE regularly every month, every six months or every year. To determine independent variables that affect BSE

**Table 1. General Information Obtained from Participating Women (N= 417)**

|  | N | % |
|---|---|---|
| Age |  |  |
| 20- 29 years | 120 | 28.78% |
| 30- 39 years | 107 | 25.66% |
| 40- 49 years | 87 | 20.86% |
| 50- 59 years | 54 | 12.95% |
| 60 ≥ years | 49 | 11.75% |
|  | Mean | SD |
|  | 40.25 | 14.03 |
| Income |  |  |
| Low | 173 | 42.61% |
| Intermediate | 153 | 37.69% |
| High | 80 | 19.70% |
| Missing | 11 |  |
| Employment status |  |  |
| Employed | 146 | 37.15% |
| Not employed | 247 | 62.85% |
| Missing | 25 |  |
| Educational level |  |  |
| Graduation or less | 321 | 77.54% |
| Post-Graduation | 92 | 22.46% |
| Missing | 3 |  |
| Marital status |  |  |
| No stable union | 207 | 49.88% |
| Stable union | 208 | 50.12% |
| Missing | 2 |  |
| Religion |  |  |
| Catholic | 334 | 84.34% |
| Other one | 62 | 15.66% |
| Missing | 21 |  |
| Ethnic origin |  |  |
| European | 234 | 57.07% |
| Afro- descendent | 176 | 42.93% |
| Missing | 7 |  |
| Close relative with cancer |  |  |
| No | 187 | 44.84% |
| Yes | 230 | 55.16% |
| Knowledge |  |  |
| Poor | 209 | 50.12% |
| Good | 208 | 49.88% |

**Table 2. Women's Knowledge and the Sources of Information about BSE (N= 417)**

|  | N | % |
|---|---|---|
| Do you know how to perform BSE? |  |  |
| Yes | 348 | 83.45% |
| No | 52 | 12.47% |
| Don't know | 17 | 4.08% |
| BSE is important? |  |  |
| Yes | 407 | 97.60% |
| No | 4 | 0.96% |
| Don't know | 6 | 1.44% |
| Performance of BSE |  |  |
| Yes | 330 | 79.33% |
| No | 86 | 20.67% |
| No information | 1 |  |
| Media as source of information |  |  |
| Television | 363 | 87.05% |
| Radio | 215 | 51.56% |
| Flyers | 196 | 47.00% |
| Internet | 114 | 27.34% |
| Books | 95 | 22.78% |
| Conversation as source of information |  |  |
| Other persons | 208 | 49.88% |
| Physician | 201 | 48.20% |
| Cancer patients | 131 | 31.42% |

**Table 3. Variables Associated with Women's (N= 416) Frequency of Performance of BSE**

|  | Never (N=86) | | Sometimes (N=202) | | Each month (N=57) | | Six months (N=71) | | P value |
|---|---|---|---|---|---|---|---|---|---|
|  | N | % | N | % | N | % | N | % |  |
| Age |  |  |  |  |  |  |  |  |  |
| 20- 29 years | 36 | 41.86% | 57 | 28.22% | 10 | 17.54% | 16 | 22.53% | < 0.000 |
| 30- 39 years | 17 | 19.77% | 44 | 21.78% | 22 | 38.60% | 24 | 33.80% |  |
| 40- 49 years | 10 | 11.63% | 41 | 20.30% | 15 | 26.32% | 21 | 29.58% |  |
| 50- 59 years | 4 | 4.65% | 35 | 17.33% | 7 | 12.28% | 8 | 11.27% |  |
| ≥ 60 years | 19 | 22.09% | 25 | 12.37% | 3 | 5.26% | 2 | 2.82% |  |
| Income |  |  |  |  |  |  |  |  |  |
| Low | 52 | 61.18% | 71 | 36.22% | 11 | 16.92% | 38 | 55.07% | 0 |
| Intermediate | 25 | 29.41% | 87 | 44.39% | 21 | 32.31% | 20 | 28.99% |  |
| High | 8 | 9.41% | 38 | 19.39% | 23 | 50.77% | 11 | 15.94% |  |
| Missing | 1 |  | 6 |  | 2 |  | 2 |  |  |
| Employment status |  |  |  |  |  |  |  |  |  |
| Employed | 33 | 41.25% | 63 | 32.14% | 24 | 45.28% | 26 | 41.27% | 0.201 |
| Not employed | 47 | 58.75% | 133 | 67.85% | 29 | 54.71% | 37 | 58.73% |  |
| Missing | 6 |  | 6 |  | 5 |  | 8 |  |  |
| Educational level |  |  |  |  |  |  |  |  |  |
| Graduation or less | 74 | 86.04% | 158 | 79.00% | 34 | 60.71% | 54 | 77.14% | 0.005 |
| Post-Graduation | 12 | 13.95% | 42 | 21.00% | 22 | 39.28% | 16 | 22.85% |  |
| Missing |  |  | 2 |  | 1 |  | 1 |  |  |
| Marital status |  |  |  |  |  |  |  |  |  |
| No stable union | 50 | 58.13% | 96 | 48.00% | 18 | 31.57% | 42 | 59.15% | 0.005 |
| Stable union | 36 | 41.86% | 104 | 52.00% | 39 | 68.42% | 29 | 40.84% |  |
| Missing |  |  | 2 |  |  |  |  |  |  |
| Religion |  |  |  |  |  |  |  |  |  |
| Catholic | 75 | 89.28% | 166 | 85.13% | 38 | 73.08% | 54 | 84.37% | 0.085 |
| Other one | 9 | 10.72% | 29 | 14.87% | 14 | 26.92% | 10 | 15.63% |  |
| Missing | 2 |  | 7 |  | 5 |  | 7 |  |  |
| Ethnic origin |  |  |  |  |  |  |  |  |  |
| European | 41 | 47.67% | 119 | 60.10% | 34 | 59.65% | 39 | 57.35% | 0.262 |
| Afro- descendent | 45 | 52.33% | 79 | 39.90% | 23 | 40.35% | 29 | 42.65% |  |
| Missing |  |  | 4 |  |  |  | 3 |  |  |
| Close relative with cancer |  |  |  |  |  |  |  |  |  |
| No | 47 | 55.17% | 95 | 47.03% | 20 | 35.09% | 24 | 33.80% | 0.024 |
| Yes | 39 | 44.83% | 107 | 52.97% | 37 | 64.91% | 47 | 66.20% |  |
| Knowledge |  |  |  |  |  |  |  |  |  |
| Poor | 59 | 67.82% | 97 | 48.02% | 17 | 29.82% | 36 | 50.70% | < 0.000 |
| Good | 27 | 32.18% | 105 | 51.98% | 40 | 70.18% | 35 | 49.30% |  |

SD= Standard deviation

**Table 4. Odds Ratio (OD) and Confidence Intervals (CI) Represented in a Model of Nominal Logistic Regression for Data of Women (N= 403) Relative to "Never Performed" (N= 85)**

|  |  | Sometimes (N= 194) | | Each month (N= 55) | | Six months (N= 69) | |
|---|---|---|---|---|---|---|---|
|  | N (%) | OD (CI) | P value | OD (CI) | P value | OD (CI) | P value |
| Income |  |  |  |  |  |  |  |
| Low | 173 (42.61%) | 0.387 (0.162- 0.927) | 0.033 | 0.130 (0.044- 0.0386) | 0 | 0.754 (0.266-2.137) | 0.595 |
| Intermediate | 153 (37.69%) | 0.815 (0.332- 2.003) | 0.656 | 0.386 (0.138- 1.079) | 0.069 | 0.681 (0.226-2.048) | 0.494 |
| High | 80 (19.70%) | Ref. |  | Ref. |  | Ref. |  |
| Marital status |  |  |  |  |  |  |  |
| No union | 207 (49.88%) | 0.657 (0.385- 1.120) | 0.123 | 0.366 (0.171-0.782) | 0.01 | 1.036 (0.533-2.012) | 0.917 |
| Stable union | 208 (50.12%) | Ref. |  | Ref. |  | Ref. |  |
| Knowledge |  |  |  |  |  |  |  |
| Poor | 209 (50.12%) | 0.538 (0.306-0.943) | 0.031 | 0.313 (0.141-0.695) | 0.004 | 0.493 (0.248-0.979) | 0.043 |
| Good | 208 (49.88%) | Ref. |  | Ref. |  | Ref. |  |
| Close relative with cancer |  |  |  |  |  |  |  |
| No | 187 (44.84%) | 0.775 (0.455-1.320) | 0.348 | 0.469 (0.220-0.997) | 0.049 | 0.428 (0.219-0.836) | 0.013 |
| Yes | 230 (55.16%) | Ref. |  | Ref. |  | Ref. |  |

performance, regression modelling was performed (Table 4). Compared to high-income women, BSE performance by low-income women, sometimes and every month, was about 2.58 (OD=0.387; CI 95%: 0.162-0.927; p=0.033) and 7.69 (OD=0.130; 95%CI: 0.044-0.0386; p=0.000) times lower, respectively (Table 4). Compared to women living in a stable union, BSE performance every month by women not living in a stable union, was 2.73 (OD=0.366; CI 95%: 0.171-0.782; p=0.010) times lower (Table 4). BSE performance by women with poor knowledge about risk factors and prevention, sometimes, every month, every six months or every year, was 1.859 (OD=0.538; CI 95%: 0.306-0.943; p=0.031) times, 3.195 (OD=0.313; CI 95%: 0.141-0.695; p=0.004) times and 2.028 (OD=0.493; CI 95%: 0.248-0.979; p=0.043) times lower, compared to women with good knowledge in each of the three categories (Table 4). Furthermore, compared to participants who had a close relative with cancer, BSE performance every month, every six months or every year, by women who had no close relative with cancer, was 2.132 (OD=0.469; CI 95%: 0.220-0.997; p=0.049) times and 2.337 (OD=0.428; CI 95%: 0.219-0.836; p=0.013) times lower (Table 4).

## Discussion

Most women of the present study reported knowing how to perform BSE. Furthermore, more than 79.00% of the women reported performing BSE. This result is not very surprising, as awareness about breast cancer has been supported in Brazil by governmental and private initiatives for years, most intensively during the month of October, when television is the most important media. Interestingly, less than 50.00% of women reported that communication with physician was a source of information about BSE. However, only about 31.00% of women performed BSE regularly, every month, every six months or every year. Similarly, in a previous Brazilian study that included 202 female students conducted in the state of Minas Gerais, 30.20% of participants reported performing BSE regularly (Gomes et al., 2012). Previous studies from Tanzania, Cameroon, India, Turkey and Iran reported regular BSE performance, varying between 10.20% and 60.00% (Khokhar et al., 2009; Fotedar et al., 2013; Karadag et al., 2014; Morse et al., 2014; Ardahan et al., 2015; Tilaki and Auladi, 2015).

The present study indicated that several variables affected women's frequency of BSE performance and results contrasted with data available from few previous studies. BSE performance was common among women aged 30-59 years, whereas those who never performed BSE were mainly younger than 30 years or older than 60 years. In contrast to the present results, a previous Brazilian study performed in the state of Maranhão revealed better knowledge about BSE among women aged over 50, but did not identify differences of BSE performance among different age groups (Brito et al., 2010). Furthermore, contrary to present results, in an Iranian study, women younger than 30 years performed BSE, whereas women aged 30-49 years performed it less often (Tilaki and Auladi, 2015). This indicates that the age profile related to BSE performance in the present population may be different to that of previous studies.

Tilaki and Auladi (2015) did not identify income as a significant variable to predict BSE performance, whereas in the present study, high income was an independent variable of the regression model. Furthermore, the present results did not indicate that occupation status was associated with BSE performance, whereas in the Iranian study, occupation was positively associated with BSE performance (Tilaki and Auladi, 2015).

Women with a higher educational level tended to perform BSE more often. This is in agreement with previous studies carried out in Brazil, Nigeria, India and Iran (Brito et al., 2010; Oluwatosin et al., 2010; Paul et al., 2015; Tilaki and Auladi, 2015). However, in the present study, educational level was not an independent variable of the regression model. This could be due to the low number of participants with high educational level included in this study.

The present results indicated that women who were married or lived in any kind of union performed BSE more often. It is noteworthy that in the group of women who performed BSE every month, most of them were married. A positive association between BSE performance and living in any type of union was also reported in previous studies (Brito et al., 2010; Oluwatosin et al., 2010; Tilaki and Auladi, 2015). Like in the case of the educational level, marital status was not identified as an independent variable in the regression analysis.

Having a close relative with cancer positively affected women's BSE performance and was an independent variable in the regression model. A previous Brazilian study did not identify positive association between family history of breast cancer and BSE performance (Brito et al., 2010). However, this study assessed family history of breast cancer, whereas the present results were based on women's knowledge about any close relative with cancer. Cases of cancer among close relatives may affect women's prevention behaviour in general. Similar to present results, in a Turkish study, having a close relative with breast cancer increased the number of women who performed BSE (Ardahan et al., 2015). Gaber and colleagues (2013) described that daughters of women who had breast cancer performed BSE more often.

The present results indicated that knowledge about risk factors and prevention behaviour increased BSE performance. This variable was independent in the regression model and showed significant values for all BSE performance categories. In a recent study conducted in Thailand, knowledge of risk factors was identified as a relevant variable for the identification of breast cancer (Rakkapao et al., 2016). Literature points to the importance of different kinds of knowledge for BSE performance: Knowledge about cancer was positively associated with BSE performance in a health-beliefs model (Ardahan et al., 2015). Knowledge about breast cancer treatment was also positively associated with BSE performance (Oluwatosin et al., 2010). Finally, knowledge about symptoms and signs of the disease was also identified as an important variable (Tilaki and Auladi, 2015).

The present study had several limitations: First, the

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number of 417 women was low. This may have caused some bias regarding socio-economic factors analysed, for example in the case of a possible influence of educational level. Second, the study was performed in a representative community of North-eastern Brazil, but results cannot necessarily be extrapolated to all other communities of this region. Third, it was not proved if women who reported knowing how to perform BSE had really adequate knowledge. Finally, this study did not explore other important aspects of breast cancer awareness like women's knowledge about symptoms and signs of the disease or concrete reasons for performing BSE and not performing it. The study also did not elucidate in which way women's own perceived risk of breast cancer affects BSE performance.

To the best of our knowledge, this is the first study that identified income, having a close relative with cancer and knowledge about risk factors and prevention behaviour as predictors of BSE performance in a Brazilian population. All these variables were independent variables in a logistic regression model. Based on the present results, the communication about BSE between physicians and patients should be intensified. Public health campaigns should also strengthen knowledge about BSE performance and have a special focus on low-income younger and older women who do not live in a stable union. Information about risk factors in public health campaigns could additionally strengthen avoidance behaviour of risk factors and also motivate BSE performance. Future studies with populations in North-eastern Brazil should assess more detailed women's knowledge about BSE and their reasons of BSE performance and non-performance.

## Acknowledgements

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100.0

6.3

75.0

56.3

50.0

31.3

25.0

0

Newly diagnosed without treatment

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