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Long travel distance for health care and poor adherence to breast cancer screening programs as predictors of patient delay

Milena Edite Case de Oliveira[1]; Tácila Thamires de Melo Santos[1]; Lorena Sofia dos Santos Andrade[1]; Kedma Anne Lima Gomes[1]; Tiago Almeida de Oliveira[2]; Mathias Weller[1]*

[1]Programa de Pós-graduação em Saúde Publica. Universidade Estadual da Paraíba (UEPB). Campina Grande-Paraíba, Brazil

[2]Departamento de Estatística. Universidade Estadual da Paraíba (UEPB). Campina Grande-Paraíba, Brazil

***Corresponding Author (s): Mathias Weller**

Programa de Pós- Graduação em Saúde Publica. Universidade Estadual da Paraíba (UEPB). Central Integrada de aulas. Rua Domitila Cabral de Castro, s/n 30andar – sala 310, Bairro Universitário. CEP. 58.429-570. Campina Grande. Paraíba. Brazil

Tel: 0055- 83-9941-8090;

Email: mathiasweller@uepb.edu.br

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Abstract

Patient delay (PD) is a leading cause of advanced stage of disease and poor prognosis among Brazilian breast cancer patients. The present study addressed socio-demographic variables and their impact on PD. Odds Ratios (OR) and Confidence Intervals (CI) were determined using regression analysis. Data of 103 breast cancer patients were obtained from medical records and interviews. All patients detected first symptoms of breast cancer on their own. On average, patients were seeking for medical help 67.5 (s= 124.1) days after recognition of symptoms. More than 60 days between recognition of symptoms and first medical visit was defined as PD in 33 (32.0%) cases. Low and intermediate educational level increased chance of PD, 1.22 (95%CI: 0.33-4.48) and 1.92 (95%CI: 0.53-7.00) fold. Having no stable relationship increased chance of PD 2.04 (95%CI: 0.88-4.73) fold. Patients without a private health insurance had a 1.90 (95%CI: 0.49-7.32) increased chance of PD. Women, who had not at all, or rarely performed medical visits at their own living place, had a 6.25 (0.76-51.33) increased chance of PD ($p< 0.05$). Patients who had never performed mammography and CBE had a 1.78 (0.57-5.53) and 1.47 (0.44-4.89) increased chance of PD. Not having a health service at the own living place was the most prominent causal factor of PD. As tumours of patients were not discovered during medical exams, the negative association between adherence to prevention programs and PD, points to additional attitudes of participating women that reduced treatment delay.

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Introduction

Changing lifestyle and longer life expectation have led to an increase in breast cancer incidence in developing countries, whereas incidence remained stable or even declined in most developed countries [1]. Latin American countries are characterized by high mortality-to-incidence ratios and the total number of deaths due to breast cancer was expected to double between 2008 and 2030 to 73,542 cases [2,3]. Furthermore, it was estimated that 30% to 40% of breast cancer patients in these countries are at advanced stages of the disease (III and IV) [3].

In Brazil, the largest Latin American country, 59,700 new cases were predicted for the year 2018 and breast cancer is currently contributing to 29.5% of all cancer cases among women [4]. In southern regions of Brazil, including the country's largest urban centres, São Paulo and Rio de Janeiro, the incidence of breast cancer has remained stable. This is in contrast to the North-eastern region, where increased life expectancy and changing lifestyle have led to an increase of the disease between 2005 and 2018, from 27.23 to 63.98 new cases per 100,000 women [4,5]. Additionally, from 1990 to 2011, breast cancer mortality rates declined in São Paulo and Rio de Janeiro, but increased significantly in states of the North- eastern region within the same 20-year time interval [6].

Treatment delays are considered to be one of the main reasons for the high mortality-to-incidence ratios in developing countries [7]. Previous studies have associated treatment delays with advanced stage of the disease and poor prognosis of breast cancer patients [8, 9]. Literature generally refers on time intervals between recognition of symptoms and breast cancer treatment as treatment delay. Furthermore, treatment delay is subdivided into two main time intervals [7, 10,11]: System Delay (SD) refers to the time interval between first medical visit and treatment initiation. Patient Delay (PD) in contrast, refers to the time interval between recognition of breast cancer symptoms and first medical visit.

Low income, low educational level, no family history of breast cancer and no help from family members, are among the most cited variables associated with PD [12-16]. Additionally, fear and poor knowledge about disease symptoms contribute to PD [13,14,17,18]. There are only few Brazilian studies about PD [19-24]. These studies did not clearly distinguish between PD, respectively SD and only two of them were performed in the North- eastern region of Brazil [20,23]. Studies also have not analysed the travel distance to the health service after recognition of symptoms, or the possible PD differences among women who sought first medical help in public or private health service centres after detection of symptoms. The Brazilian "Sistema Único de Saúde" (SUS) is a public health care system that provides free access to health facilities for all Brazilians. Additionally, about 25% of the Brazilian population has access to private health services, financed by individual health insurance [25,26]. This means that women who recognize symptoms have the option to seek first medical help in the public health service network or in a private health service.

Increasing incidence and mortality rates in the North- eastern region of Brazil underline the need to understand the reasons for PD. The present descriptive study aimed at identifying access barriers and socio- economic variables as causal factors for PD. The present study compared PD among women who sought first medical help in the public and private health service system. The impact of travel distance to health service centres on PD was also assessed. Furthermore, the study aimed at identifying underlying socio- economic variables that affect PD.

Material and method

Study population

The study protocol was reviewed and approved by the Brazilian National Research Ethics Committee (CONEP; Nr.: CEP-UEPB: 63083816000005187). Written informed consent was obtained from each participant to participate in this study and to publish data.

Patient data were obtained from two Brazilian cancer treatment referral centres: the *Napoleão Laureano* Hospital in João Pessoa and the *Fundação Assistencial da Paraíba* Hospital in Campina Grande. We refer to each as HNL and FAP, respectively. João Pessoa, the capital of the state of Paraíba, has about 800,000 inhabitants and is located on the state coast [27]. Campina Grande, with about 400,000 inhabitants, is the second largest urban centre in Paraíba and is located about 120 km away from the state capital in the inner state [27]. Paraíba has mixed-ethnic population of indigenous, African and European ancestry.

Data sampling

Data were collected between October 2016 and September 2018. Only patients who received treatment within this period in one of the both referral centres, FAP or HNL, were included in the study. Patients with disease recurrence and those with cognitive problems were excluded. Furthermore, the study did not include patients whose tumour was detected by clinical breast exam (CBE), mammography screening or any other image producing technique. Only patients who recognized first symptoms of invasive breast tumour within the last three years were included in the study. No differences were observed among data obtained from patients treated at FAP or HNL. Clinical and histopathological data were obtained from medical records. Data about first medical consultation were also obtained from medical records.

A structured questionnaire was administered to patients under chemotherapy and radiotherapy treatment at both hospitals. Interviews were performed by one of the researchers. Patients were asked about prevention behaviour, socio-economic status including marital status, income, occupation status, and health insurance status, educational level, place and type of medical visits and year, respectively the month of recognition of first symptoms. Of 155 women with invasive breast cancer, 52 did not remember the date of first symptom recognition or were not sure about it, being then excluded from the study. Among the remaining 103 patients, time interval of 60 days between first symptom recognition and first medical visit was defined as PD.

Educational level was defined as follows: 1. Low: Illiterate or incomplete and complete elementary education of nine years of basic school education, respectively incomplete high school; 2. Intermediate: Complete high school of 12 years; 3. High: Any type of high school or college meant that the patient had more than 12 years of schooling or university education. Minimum wage and multiple values were used to characterize income. This is a popular and well-known method used to define economic level among low- and middle-class subjects. Minimum wage or less was defined as "low" income, whereas minimum

wage multiples were defined as "high" income. The minimum wage in 2018 was R$954,00 (US$281.60 on 20 April 2018) per month. Information regarding ethnic origin was obtained by self-report of participating women.

The Brazilian Ministry of Health recommends annual CBE for women aged 40 years or older. The Ministry of Health recommends biannual mammography for women aged 50-69 years, whereas the Brazilian Society of Mastology recommends annual mammography screening (MS) starting at 40 years of age [28,29]. For healthy women aged 70 or older, regular MS is recommended [28,29]. Biannual and annual mammography screening, respectively, annual performance of CBE, both were defined as regular (Table 1).

Statistical analysis

Data were tabulated in Excel® software (version 10; MICROSOFT, 2010) and all statistical analyses were performed with SPSS STATISTICS™ software (SPPS; IBM company; version 24). Nominal logistic regression results for unadjusted variables were presented as odd ratios (OR) and 95% confidence interval (95%CI). Likelihood ratio test was applied to analyse significance level of each variable.

Results

A time interval of more than 60 days between recognition of symptoms and first medical visit was defined as PD in 33 (32.0%) cases. On average, the 103 patients sought for medical help 67.5 (s= 124.1) after recognition of symptoms. Of all patients, 56 (54.4%) sought medical help within the first 30 days after recognition of symptoms. Time interval varied from 0 for those who immediately sought help to maximum of 943 days.

The mean age of study patients was 53.08 years (s= 11.54). Of 103 patients, 40 (32.9%) and 63 (67.1%) aged < 50 years, respectively ≥ 50 years (Table 1). Of 102 patients, 45 (44.1%) and 55 (53.9%) were characterized as low educational level and low income (Table 1). Furthermore, 67 (66.3%) out of 101 and 88 (86.3%) out of 102 patients were unemployed, respectively, and had no private health insurance (Table 1). Of 103 patients, 62 (60.2%) had stable relationship. Regarding medical visits, 78 (76.5%) out of 102 patients informed never or rarely sought medical help at their own living place (Table 1). Of 102 patients, 46 (45.1%) never or rarely visited a basic health service unit (Table 1). Regarding adherence to screening programs, 36 (51.4%) and 35 (50.0%) out of 70 patients claimed to have performed regular mammography and clinical breast examination (Table 1).

Patients with low and intermediate educational level had 1.22 (95%CI: 0.33-4.48) and 1.92 (95%CI: 0.53-7.00) increased chance of PD, compared to women with high educational level (Table 1). Having no stable relationship increased the chance of PD by 2.04 (95%CI: 0.88-4.73) times, compared to women who live in a stable relationship (Table 1). Patients without private health insurance had 1.90 (95%CI: 0.49-7.32) increased chance of PD, compared to women with private health insurance (Table 1). Women who did not have medical visits at their living place had 6.25 (0.76-51.33) increased chance of PD compared to women who performed medical visits at their living place (Table 1). Women who rarely, never and sometimes visited a basic health service unit had 2.66 (95%CI: 0.96-7.36) and 2.76 (0.96-7.36) increased chance of PD, compared to those with regular visits (Table 1). Of the 36 women who regularly visited a basic health service unit, two (5.6%) claimed to perform medical visits always at their own living place. Furthermore, patients who had never performed mammography and CBE had 1.78 (0.57-5.53) and 1.47 (0.44-4.89) increased chance of PD, compared to those who performed mammography regularly (Table 1).

Of 96 patients, 61 (63.5%) perceived nodules as first symptom of the disease (Table 2). Of 85 patients, 53 (62.4%) presented at advanced stage (III or IV) of the disease (Table 2). Of 88 patients, 55 (62.5%), respectively, 30 (34.1%), had tumours of histological grades 2 and 3 (Table 2). Statistical analysis did not indicate significant associations between PD and tumour stage or grade.

Discussion

More than 50% of patients in the present study sought medical help within the first 30 days after recognition of symptoms. This value is very similar to that of a previous study performed in the state of São Paulo, were 52.4% of women sought medical help within 30 days [19].

Present results indicated that low and intermediate educational level was associated with PD. This is in agreement with previous studies from Nigeria, Rwanda, Tunisia, Turkey, Libya, Pakistan, Colombia, Haiti, Brazil, and the USA, which also identified low educational level and poor literacy status as causal factors for PD [13-16,19,24,30-35]. Unlike educational level, low or high income was not associated with PD among patients of the present study and negative employment status increased the chance of PD only slightly. This is in contrast with previous studies from Colombia, Mexico, Senegal, Hong Kong and the USA, which identified low [12,34,36,37] or high [38] income as decisive factor for PD.

Patients of the present study who did not live in a stable relationship were twice more likely of having increased chance of PD, compared to those who lived in a stable relationship. Studies performed in Pakistan, Malaysia, Mexico, the United Kingdom and the USA revealed comparable findings [13,36,38-41]. Living in a stable relationship may increase self- care and breast cancer prevention behaviour of women [36].

Present results indicated that patients without private health insurance were at increased risk of PD. In agreement with this finding, previous studies performed in Colombia, Haiti, Tunisia, India and the USA, also revealed that high financial costs of treatment and not having a private health insurance were serious treatment barriers, finally leading to PD [16,33,34,42-45].

Patients of the present study were asked if they had performed medical visits for any type of disease before diagnosis of breast cancer, generally at their own living place, or somewhere else. Data analysis revealed that patients who had performed it rarely or never at their own living place were six times more likely of having increased chance of PD, if compared to those who had performed medical visits always at their own living place. Furthermore, of 36 patients who had regularly visited basic health service units, only two performed it at their own living place. This result points to the existence of access barrier for women to seek for medical help. Present data indicate that the lack of medical services at living place increased PD. Long distances to health care centres as important causal factor for PD was identified in studies conducted at low- and middle-income countries like Tunisia, Nigeria, Brazil, India and Thailand, but also the USA [20,33,35,44,46,47]. Price and colleagues (2012) emphasized that long distance to health care centre is one of the most serious problems of treatment delay in developing

countries [48].

Authors from Australia, Estonia, Colombia, Brazil, United Kingdom and the USA emphasized that performance of breast cancer screening reduced time intervals between tumour detection and treatment initiation [24,49-54]. In the present study, breast cancer was not detected during medical exams. Instead, women detected symptoms first by themselves and searched for medical help after recognition of symptoms. Furthermore, present data argued in favour of the scenario that regular visit to basic health service units, performance of mammography and CBE were all associated with decreased chance of PD. The following should be highlighted: Tumours were not discovered by mammography and CBE, but women who performed them on a regular basis sought faster medical help as they had discovered symptoms. This indicated that women's prevention behaviour was associated with other attitudes that favoured faster medical help seeking behaviour. A previous Brazilian study identified fear of breast cancer and poor knowledge of symptoms as variables that increased PD (Oshiro et al., 2014). This could indicate that women who adhere to screening programs also have better knowledge of symptoms, less fear of breast cancer and for these reasons are more likely to seek early medical help.

A limitation of the present study was that symptom recognition, attitudes and psychological factors like fear of disease, self-care and self-esteem were not analysed in detail. The impact of family history on women's behaviour was not analysed. Patients were asked about events in the past, before disease diagnosis. The developed questionnaire may have caused a bias in recalling exact information. This could have resulted in misclassification of information and/or lack of comparability of results to those of prior studies that have used standard instruments. Low number of patients led to low data resolution. For this reason, regression modelling was not performed and it remains unclear which independent variables essentially contribute to PD.

The results have indicated that low educational level, not living in a stable relationship and not having a private health insurance were variables that increased PD in the population from North-eastern Brazil. Furthermore, long distance to health care service was identified as the most important variable of PD. The findings of the present study are in agreement with international literature. Surprisingly, despite the fact that patient tumours were not detected during medical exams, women who had participated on a regular basis on screening programs had reduced PD, compared to women who have not. This points to additional important attitudes associated with women's screening behaviour that reduce PD. Future studies about PD in North-eastern Brazil should elucidate these underlying attitudes and psychological aspects in more detail.

Tables

Table 1: Chance of delay, defined as first medical visit of > 60 days after recognition of symptoms, expressed as odds ratio (OR) and confidence intervals (95%CI), for each variable.

Variable	N (%)	OR (95%CI)
Age (N= 103)		
≥ 60 years	30 (32.3%)	Ref.
50 - 59 years	33 (34.8%)	0.87 (0.30-4.83)
40 - 49 years	27 (22.6%)	0.84 (0.27-2.59)
< 40 years	13 (10.3%)	1.25 (0.32-4.83)
Education level (N= 102)		
High	16 (15.7%)	Ref.
Intermediate	41 (40.2%)	1.92 (0.53-7.00)
Low	45 (44.1%)	1.22 (0.33-4.48)
Income (N= 102)		
High	21 (20.6%)	Ref.
Middle	26 (25.5%)	1.47 (0.44-4.85)
Low	55 (53.9%)	0.75 (0.25-2.22)
Occupation status (N= 101)		
Employed	34 (33.7%)	Ref.
Unemployed	67 (66.3%)	1.26 (0.51-3.07)
Stable relationship (N= 103)		
Yes	62 (60.2%)	Ref.
No	41 (39.8%)	2.04 (0.88-4.73)
Private Health Insurance (N= 102)		
Yes	14 (13.7%)	Ref.
No	88 (86.3%)	1.90 (0.49-7.32)
Religion (N= 102)		
Protestant	30 (29.4%)	Ref.
Catholic	72 (70.6%)	1.46 (0.57-3.76)
Medical visits at living place* (N= 102)		
Always	11 (10.8%)	Ref.
Sometimes	13 (12.7%)	1.82 (0.14-23.25)
Rarely/never	78 (76.5%)	6.25 (0.76-51.33)
Visit to basic health service unit (N= 102)		
Regular[2]	36 (35.3%)	Ref.
Sometimes	20 (19.6%)	2.76 (0.96-7.36)
Rarely/Never	46 (45.1%)	2.66 (0.96-7.36)
Performance of mammography (N= 70)		
Regular[1]	36 (51.4%)	Ref.
Sometimes	4 (5.7%)	4.14 (0.49-34.75)
Never	30 (42.9%)	1.78 (0.57-5.53)
Performance of CBE (N= 70)		
Regular[2]	35 (50.0%)	Ref.
Sometimes	9 (12.9%)	2.00 (0.40-10.05)
Never	26 (37.1%)	1.47 (0.44-4.89)

*p< 0.05; [1]Each year or each second year; [2]Each year

Table 2: Clinical and histopathological characteristics of breast cancer patients (N= 103).

Variable	N (%)
Perceived symptoms before diagnosis	
Nodule	61 (63.5%)
Nodule and other symptoms	18 (18.8%)
Other symptoms[1]	17 (17.7%)
Missing	7
TNM	
I	4 (4.7%)
II	28 (32.9%)
III	38 (44.7%)
IV	15 (17.7%)
Missing	18
Histological Grade	
I	3 (3.4%)
II	55 (62.5%)
III	30 (34.1%)
Missing	15

[1]Pulmonary haemorrhage, clear fluid; breast depression; swollen breast with areolar retraction; painful breast abscess; inverted areola, inflamed breast; breast pain; breast regurgitation; "burning sensation"; phlogistic signs in left breast; mammary protuberance; breast crease.

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