Poverty and Blind Religious Faith Preclude Attendance at Breast Cancer Screening in Mexico

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Research Article

Keywords: Breast cancer screening, diagnosis delay, late intervention, north of Mexico, poverty, religious faith, socioeconomic, cultural factors

Posted Date: November 25th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-111928/v1>

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Abstract

Background

Attendance to mammography screening is low in Mexico with late breast cancer (BCa) intervention. This study investigates reasons for low attendance in screening programs. Socioeconomic and cultural factors were investigated. The present national BCa screening programs are discussed.

Methods

This is a cross-sectional study involving 1066 women in the Monterrey Metropolitan area. Women aged 40-79 years old with low-income/middle-income completed a questionnaire on socioeconomic and cultural factors. A descriptive and multivariate analysis was done.

Results

In total, 27 percent had never attended mammography and about 61 percent had only done a mammography during the last 2 years. Sixty-seven percent of the women went to the doctor only when they "felt sick". The two principal reasons for not attending were financial (38%) and fatalism related to religious faith (80%).

Conclusions

This study, is the first to quantify both the socioeconomic and cultural factors in women in Mexico. It analyzes the relationship of the factors precluding BCa screening, seeking care for breast symptoms and subsequent treatment. LI and MI women belong to different socioeconomic and cultural subgroups in MMA. Affordable National state of the art prevention programs are needed, considering a heterogeneous population where the majority have low income/are poor. Tailored information on the importance of mammography attendance is needed where the Catholic Church could help to deliver information. Subsequent BCa treatment should be based on current guidelines.

Trial registration

The Protocol was approved by the Ethic Committee, Hospital Metropolitano "Dr. Bernardo Sepulveda" Monterrey, Mexico, 5 October 2012.

Introduction

Breast cancer (BCa) is the most common cancer among women in the western world. Mammography screening has an important role in early detection and reduction of BCa mortality.

Cancer register quality varies widely by geographic regions. Most countries in Latin American countries have poor quality recording or absence of incidence data [1]. In Mexico, as in all the Latino countries, complete mammography registers do not exist. Existing registries are fragmentary, and information is

mainly based on global estimations. There are only a few countries in the world that have a population-based cancer register covering all the population, i.e. the Scandinavian countries, Finland, Island, England, Australia and Singapore.

Routine mammography screening for selected age groups, reduces mortality from BCa by 7-23 percent [2].). The public health impact of population-based screening programs depends to a large extent on optimizing participation rates [3].

In Mexico, the majority of the BCa cases are diagnosed in advanced stage (53 to 80%) [4,5]) with an average diagnostic delay of more than 7 months, i.e. time laps from onset of symptoms to BCa diagnosis [6].

Studies on Latinas living in the US with low-income show that the impact of high so-called “familism” (family first priority) had significant association with attendance to mammography. The major barrier was “distorted familism” i.e. neglecting own health because of family priorities [7]. Mexican American women with family attitudes supporting the women (positive familism), attend mammography screening more frequently. The cultural value of positive familism was associated with attendance to initial mammography screening for BCa in a group of American Mexican women [8]. Women with low-income and without family support had less favorable attitude towards mammography [9].

It is common for Latino women with BCa to fear diminished femininity and fear of being abandoned by their spouses, thus neglecting to go to the doctor and even refusing required therapy. For these reasons, screening programs in developing countries must also combat ignorance, tackle stigma and resolve discrimination and machismo which is frequent in the Latino countries [10].

Another barrier for the initial BCa mammography screening in Latina women is fatalism, defined as the belief that an individual cannot alter their predestined fate [11,12]. In fact, fatalism among Latinas living in the US was found to be the main cause of lack of screening attendance [7,13].

The current mammography screening programs in Mexico have three essential objectives: increased public awareness regarding the importance of mammography, increased awareness of the importance of early BCa detection, and to bridge cultural barriers that prevent early detection of BCa. Among these, maybe the most difficult obstacles to overcome are the cultural factors [10].

Characteristics of the Monterrey Metropolitan area (MMA). Monterrey is the capital and largest city of the north state of Nuevo Leon, Mexico. It is located close to the border of US with a strategic location for industry and trade between Mexico and US. The city has first class institutions for higher education, a highly developed health sector with the leading medical centers of Mexico.

MMA has 4.7 million people; with ~680,000 women between 40 to 69 years old, with ~2.3 percent rate of illiteracy 2015 [14]. Mainly three ancestral populations constitute the genetic structure of this Mexican mestizo population: Spanish (55%), Amerindian (40%), and African (5%) [15]. The MMA is the center of health care in the north of Mexico. It also includes three first-rate medical schools: Universidad Autónoma

of Nuevo León (UANL), Universidad de Monterrey and the Instituto Tecnológico de Monterrey. The UANL is managing the public University Hospital that is considered the best public hospital in the northeast of Mexico.

The Mexican health system is fragmented into social security, ministry of health and private sectors services, and a unified central national health care apparatus is missing [16]. The Mexican Institute of Social Security (IMSS) that covers approximately 30 percent of the population (data 2012) has two major regional centers in the city. An additional 7 percent are covered by other social security institutions like the Institute of Social Security and Social Services for State Employees (ISSSTE) [17]. The Metropolitan Hospital “Dr. Bernardo Sepúlveda” and the Regional Hospital of Children and Mother Care are from the State.

The state of Nuevo Leon has the highest gross domestic product (GDP) per capita \$35,000 USD (2013) the highest in country. This can be compared with the Chiapas state in the south of Mexico, the figure is \$3,303 USD. These regional disparities and income inequality are a feature of the Mexican economy. Eleven percent of the Mexican working population has PPP 3.10 \$USD per day [18]. The middle-income class is the 47 percent of the population in Mexico (2015) has a salary of 10 to 50 \$USD/day [19].

The official mammography guidelines in Mexico recommend annual mammary clinical examination from the age of 25 and biannual mammography in asymptomatic women from the age of 40. Breast ultrasound is the initial choice in women younger than 35 years with breast abnormalities [20,21].

Methods

Objective

The aim of this study was to identify social, financial and cultural factors preventing and affecting early detection of BCa in the north of Mexico (Monterrey Metropolitan area, MMA). This study might contribute to a better understanding of the cultural and socioeconomic factors when designing and planning BCa screening programs to improve early detection and BCa survival in Mexico. In order to impact BCa survival, the subsequent treatment and follow up need to follow existing guidelines e.g. the ESMO Clinical Practice Guidelines on Breast Cancer (CPG).

Study Design

This is a cross-sectional study involving 1066 women from the Monterrey Metropolitan area in Northern Mexico. Women aged between 40-79 years with low-income (LI) and middle-income (MI) (50/50), were questioned about BCa, and socioeconomic and cultural background that might impact attendance to mammography.

Measures

A structured questionnaire based on cultural factors, potential facilitators and barriers model previously validated was employed [7]. Sixty-two socioeconomic and cultural items were evaluated. The selection of the economic status was based in a first question. The LI women as: a) they do not have enough money to live; b) working as domestic aids or industry workers and c) having a low education level. The MI women as; a) they have enough money to live; b) working as academics or medical care and c) with a university education.

The questionnaire was designed as follows: 1) Quantitative and qualitative characteristics of women: age, body mass index (BMI), childbirth, breastfed habits, menarche, smoking and alcohol habits, hormonal replacement, BCa, marital status, occupation, educational level; 2) Qualitative characteristics of BCa screening: age at first mammography, years since last mammography, knowledge about BCa screening guidelines, family history of breast and ovarian cancer; 3) Socioeconomic characteristics: insurance type, who pay their health care, and economic problems to pay mammography screening; 4) Cultural and psychosocial characteristics: familism (couple and family support), fatalism, religious beliefs, negligence, BCa awareness; 5) How they would like to have information about mammography. Outcome of each specific question were recorded in percent of the total number of participants. The body mass index (BMI) was used as criterion for obesity.

Characteristics of participants

The study population included women from 8 municipalities/cities of the MMA. The recruitment strategy was as an invitation to participate with broad distribution, as follows: to waiting rooms of three hospitals situated in San Nicolas de los Garza and Monterrey, two shopping centers, one in San Pedro and Monterrey, two beauty parlor's in Guadalupe, two beauty parlor's in Monterrey, a Catholic parish situated in Villa de Santiago, a Catholic parish in Monterrey, an airport departure hall in Apodaca, a San Nicolas university campus, and at Santa Catarina university campus.

Formal procedures

After obtaining an Informed Consent, a total of 1066 women were interviewed for twenty-four months (January 2013 to January 2015).

At each location, personal interaction was included. The questionnaire staffers first presented themselves, proceeding to inform about the importance to participate in the study. The staffer asked them if they can read /write without problem and stays in the same area in case of questions. If the invitation was not accepted, the staffers kindly asked the women to state in writing why they did not want to participate.

Literature search

A literature review was performed (until June 2020) using Google scholar, Medline, PubMed database, searching on socioeconomic information and overview of the health care system of the MMA.

Statistical analysis

A descriptive and multivariate statistical analysis was done. The sample size was determined randomly. The sample was considered theoretical where $p = 0.5$ and $q = 0.5$. The questionnaires were divided into two groups according to socioeconomic status of Mexico (LI and MI). The statistical analysis plan included the following procedures, a) mean and standard deviation were evaluated for the following characteristics: age, length, weight, number of children, months of breastfeeding, age of menarche, age of menopause, smoking habits (quantitative characteristics), marital status, work occupation, type of insurance, education, BMI, history of breastfeed, duration of breastfeeding, (%) current smoker, (%) current alcohol use, (%) hormonal replacement therapy, (%) BCa history, history of performed mammography, age at first mammogram, frequency of mammograms, time since last mammogram (Tables 1 and 2); b) principal component analysis (multivariate analysis) was performed on populations (LI and MI groups) using IBM-SPSS-version 24, data from Tables 1 and Table 2.

Results

Participants characteristics

In total 1078 women were asked to participate and 1066 (98.8%) agreed giving informed consent. Twelve women declined to attend and motivated their decision because of confidentiality and privacy reasons.

The demographics: Comparison between the two groups of women, LI and MI, are presented in Tables 1 - 4.

Body mass index (BMI) was 26 (both groups) with the majority having BMI above upper normal value (73%).

Low-income women had more children than the MI women, a social indicator of family situation and workload. The percent of LI women diagnosed with BCa were slightly higher (4.9%) and at lower age (mean 52.3 years) compared to MI women (3.7% at mean 59.2 years). The association between BCa and hormone replacement was 4/26 (15.4%) in LI and 6/19 (31.6%) in MI.

The percentage of MI women that were married or lived together with their spouse as couples was higher than in LI women, which may be a social indicator of family support. Three percent of the LI women never went to school and less than 2 percent study at university level (Table 1).

Qualitative characteristics of BCa screening

Thirty percent of the LI women and 24 percent MI had never done a mammography. Sixty-one percent of the remaining women had done mammography once during the last 2 years and 34 percent had done mammography before the age of 40 both groups (Table 2).

Socioeconomic characteristics of participants

The majority of the women used the public health insurance and only 20 percent of MI women had private insurances (Table 3). However, the insurances do not pay the cost for the mammography. Only in one single MMA hospital the mammography was for free (Hospital Metropolitano inclusive with a community mobile screening unit). The cost appears to be the principal factor that prevents attendance to mammography (Table 3).

Cultural and social characteristics of participants

Cultural barriers e.g. reluctance to show the breasts, fear of results, fear of radiation exposure, and fear of pain during mammography, negative familism were important factors preventing attendance. Dependence of the family or partner was shown in 78 percent of both groups of women (could not solve their problems themselves). Sixty-seven percent of the women in both groups said they went to the doctor only when they had persistent symptoms ("Felt sick"). Other principal factors identified in this study was the expression of fatalism with resulting negligence of their own health, all related to the religious faith (~80%). More findings are listed in Table 4.

The vast majority of the women from both categories (90%) would prefer direct information by phone or/and written mammography information. Sixty-three percent of LI and 52 percent MI women would like a phone call reminding about pending mammographic screening appointment.

Principal component analysis

For the two areas of socioeconomic and cultural questions; the first two principal components account for 95.97 percent of the total variation in the sample. This analysis showed that the LI and MI belonged to different subgroups of women in MMA (Figure 1).

Discussion

In 2018, Mexico's government estimated that 44.4 percent of Mexico's population lives in moderate poverty and 7.4 percent lives in extreme poverty [22]. It is hard to estimate the correctness of these figures, but it can be assumed that the figures are not vastly different at the present date i.e. a large proportion of the population lives in poverty in Mexico. This fact is most important and may explain several of the findings in the present investigation. The MMA area is not representative of all Mexico in socioeconomic and cultural terms since Mexico is extremely diverse. Consequently, no single area reflects all Mexico. However, the principal factors can be extrapolated to the whole of Mexico.

A systematic review of barriers and facilitators to mammography attendance in Hispanic women showed that financial barriers and social characteristic were significant predictors of mammography attendance. This finding was similar to those found in other populations with LI women i.e. it is not unique to Latinas [13]. In terms of mammography screening, there are a very few Mexican studies on LI women [23,24].and only a few studies on middle or upper-income Latinas living in the United States [13].

Barriers to attend mammography screening for Latinas living in the United States include lack of health insurance, the cost, lack of information, and limited access to treatment [13]. These barriers seem to be very similar in Mexico and are in fact related to financial issues. Further complicating are the cultural factors associated with Latino women adding barriers to screening attendance.

The MMa mammography screening services are deficient [23] and appear to remain deficient (2019). This despite that MMa has the highest average income in Mexico and the most developed healthcare in the country.

Regarding the public conditions for national mammography screening and BCa treatment recommendation programs, Mexico does not have a national cancer register, precluding data sharing between public screening facilities or sharing from public to private healthcare institutions. There are no central monitoring and evaluation, nor documentation of BCa treatment outcomes. In case any monitoring exists, it is not systematic.

The BCa prevention programs in Mexico are fragmented, continue to be only limited to geographic areas and for short duration [17,25]. There are no comprehensive public reports that could provide information on the number, type, and scope of Mexican/Latin American BCa prevention programs [26].

Missing answers of the participants. The vast majority of the women irrespective of their socioeconomic status positively received the questionnaire. However, there were some questions that the subjects could not or did not want to answer. Most missing answers were about the mammography attendance, first mammogram, and age at first attendance. About one third in the LI group and one fifth in MI group did not answer. Other questions with missing answers were; whether lack or faith in God could cause the BCa (40%, in both groups), question on fatalism (51% LI, 16% MI), questions on the insurance status (41% LI and 63% MI) and, who paid for the health care (49% LI and 35% MI). The interpretation could be that they simply did not remember about mammography attendance and the financial questions were either in some way embarrassing or they did not remember. Questions regarding faith in God and relation to the BCa and fatalism appeared to be sensitive issues with missing answers especially among LI women.

Women secrecy. The participants paid great importance to the confidentiality of their answers. That was even the reason for the few women that refused to participate claiming that “My health it’s a very confidential matter”. Women with Mexican ancestry in USA responded actually with the same phrase in another screening barrier study [27].

Breast Cancer. The LI women were diagnosed at middle age (average 52 years) while MI women were diagnosed at upper middle age (average of 59 years). Maffuz et al. studied Mexican BCa patients from the center and south of Mexico and found that the average age of BCa diagnosis was 53 years while in Europe and US, the mean diagnosis age was 63 years [5].

Breast Cancer screening. In the USA in 2015, 65.3 percent of women aged 40 and over had a mammogram in the previous 2 years [28]. In MMa, ~61 percent of the MI and LI women had a

mammography during the last 2 years and a ~27 percent of women (both groups) never did a mammography. Its most probably among the highest attendance in Mexico. It can be anticipated that corresponding figure in rural areas would approach zero. WHO states that for a screening program to be effective, it must cover at least 70 percent of the intended population [29].

Knowledge about mammography. Seventy-three percent of the women considered themselves to be well informed about BCa and mammography. However, there were frequent misconceptions about the causes of BCa, e.g., ~ 47 percent believed that physical trauma could cause BCa and ~53 percent believed that mammography itself could cause BCa. Some of the official mammography recommendations in MMA were not up to date (frequency of examinations). Our search on the web information from MMA hospitals (public and private) showed that info was not up to date and sometimes even inaccurate. This results in "opportunistic" mammographic screenings that fail to comply with up to date international guidelines [30].

A Mexican study found that the dissemination of BCa information, both to the general population and to health providers, was deficient [31]. Consequently, there is a large general knowledge deficiency regarding BCa among the population, but also among the health care providers.

Women's socioeconomic situation. Only 24 percent of the women paid themselves their health care costs. Thirty-five percent of the women raised their children alone. Their financial dependence from spouse/partner, family or friends can be an obstacle for seeking early medical care. Women in financial dependence do not have decisional power of their lives and they have to stay under submission of the family or partner. The women assume family obligations, working at early age contributing to household economy. As a consequence, they leave school early resulting in low education level. Women living MMA area have the best working income and medical accessibility (private/public) with more hospitals and clinics per capita that the rest of the country. However, they continue struggling with mammography payments even when having the Popular Security (SP) insurance. The SP was established 2007 has increased the access and adherence to medical treatment [17]. However, it covers only a fraction of the population with the lowest income, approximately 60 percent of the Mexican population [19]. There are additional costs not covered by SP like "Out of the pocket payments" and needs from private health services, despite the SP [25]. In January 2020, the SP was replaced officially by the Institute of Health for Well-being insurance (Insabi). In August 2020, Insabi was still not completely implemented in MMA/ Mexico. Noteworthy is that Insabi only covers between 40-60% of the costs for major conditions as cancer and subsequent treatments. This limitation of Insabi might appear discouraging to attend cancer screening "since you anyway cannot afford treatment" if diagnosed with cancer.

This study shows that a 71 percent LI and 34 percent the MI group of MMA women were covered by the SP. Even the MI group of women uses the SP because of the high costs for medical care. For mammography, 38 percent of the women complain high costs. In general, the women cannot afford to pay for diagnoses and subsequent treatment. Instead they give priority to their children and their health care expenses. The minimum wage in Mexico is among the lowest in all Latino-America with 5.1

\$USD/Day from 1960 to 2019 [32] (increase to 6.36 \$USD in 2020). Mexican MI spend approximately 50 \$USD by month in medical services [33].

The mammography cost in MMA was 21 to 140 \$USD (May 2020). That means that the cost for one mammogram corresponds to 4 to 27.5 days woman income. Only two state hospitals in the MMA area offers mammography without cost until December 2019.

The result of the MMA women economic shortages is that approximately 70 percent of the women neglect their own health and seek medical care only when they are sick i.e. have disease symptoms. For the women that live in poverty/extreme poverty in the south of Mexico (10 times lower income) where access to health care is very limited, the situation is of course much more serious.

The mammography organization in Mexico is inefficient benefitting only a socioeconomic fraction of the population. As a consequence, available statistics show that a high percentage (68%) of the BCa patients come late for medical attention resulting in high treatment costs and low overall survival. To improve this, radical changes are needed, e.g. free mammography and free treatment when needed, a central cancer prevention institution with single data register and broad information programs regarding the importance of early detection of BCa.

Fear as mammography barrier. On average, 56 percent of women (both groups) hesitated to tell their spouse about “breast related problems”. BCa diagnosis induces life changes for the women, their families and their spouses/partners. BCa Interventions should also involve spouse and family [34].

Fear of pain during mammography was an important issue for ~67 percent of the women. Mammography staff could resolve this fear through appropriate training to properly address the women fears/concerns. Fear of cancer induced by the mammography itself (radiation) is another misconception to resolve through proper information [35].

This study shows that some women did mammography before the age of 40, which constitute a risk for incorrect diagnosis and subsequent overtreatment [36].

Religious faith influence on health behavior. The majority of the Mexican population belongs to the Roman Catholic Church. The religion is a prominent part of the socio-cultural life and can impact the attendance to health care programs (e.g. faith-based prevention programs) [37,38]. Women high degree of faith-related fatalism cause passive behavior and is a barrier for seeking help for health-related issues. We did not expect a so important association from the religious believes to health behavior. Typical remark of 70 percent of MMA women was, “We die when our time comes”. Another faith related answer from 25-50 percent of the MMA women was that “Lack of faith cause cancer”. Both are examples of a passive relationship with God, transferring to God the responsibility of their own health. In general, the first reaction to health problems was to pray, and wait for divine healing, thus delaying diagnosis and treatment. This was reflected in ~80 percent of the women answering, “Our future is in God hands”.

Previous studies indicate that a delay of ≥ 3 months is associated with more advance BCa which results in increased BCa mortality [39,40]. One study done in the USA on Latina women, also identified cultural beliefs as “Faith in God can protect me you from breast cancer” (48%) precluding BCa screening attendance [41].

One limitation of this study is the diversity of Mexico, making it very difficult to extrapolate results from one part of the country to another. However, the two principal findings appear to be general for all Mexico.

Summary And Conclusion

This is the first study in Mexico, investigating both the socioeconomic and cultural factors affecting mammographic attendance. It analyzes the relationship of the factors causing absence from screening programs and also why women “not are going to the doctor” when having breast related symptoms.

The statistical analysis showed that the LI and MI belonged to different socioeconomic and cultural subgroups of women in MMA.

Poverty i.e. missing financial resources and religious faith related issues (fatalism) were identified as the principal factors for not attending prevention programs. In addition, National state of the art BCa prevention programs including comprehensive information about BCa prevention are missing in Mexico. This precludes early BCa diagnosis and treatment. Regardless of income-level, early diagnosis is the most effective public health measure in cancer. When cancer is diagnosed early, it can be treated more effectively with less toxicities and less demands on the system both in terms of research allocation and cost. To impact BCa survival, not only early detection is necessary but also that treatment is available and affordable, which should follow current international guidelines for breast cancer treatment.

For the future, to mend these deficiencies, it will have to involve present and future Mexican political administrations as well as health care professionals, and preferable, also the Mexican Catholic Church. This is a huge but necessary undertaking to improve women health and BCa survival. If implemented, it would serve as model for other countries with similar healthcare/cultural status.

Abbreviations

BCa: breast cancer, MMA: Monterrey Metropolitan area, LI: low income, MI: middle income, IMSS: Mexican Institute of Social Security, ISSSTE: Institute of Social Security and Social Services for State Employees, GDP: gross domestic product, CPG: Clinical Practice Guidelines, BMI: body mass index, WHO: World Health Organization, SP: Popular Security, Insabi: Institute of Health for Well-being, USD: U.S. dollars.

Declarations

Ethics approval and consent to participate

Procedures followed the World Medical Association Declaration of Helsinki, Finland, 1964 (as revised in Fortaleza, Brazil, October 2013) and further modifications.

The Ethical Committee of the Metropolitan Hospital “Dr. Bernardo Sepúlveda”, Monterrey, Mexico, approved the study protocol and questionnaire.

After obtaining an oral informed consent, the subjects were interviewed anonymously.

Consent for publication: “Not applicable”

Availability of data and material: All data were obtained and analyzed during this study are included in this article. Corresponding author had full access to all the data in the study and all authors take responsibility for the integrity, the data and the accuracy of the analysis.

Competing interest: The authors declare no competing interest.

Funding: The Cancer Society in Stockholm and The King Gustav V Jubilee Fund supported this study.

Acknowledgments: We thank the women in Monterrey Metropolitan area who participated in the study. Special thanks to Dr. Manuel de Jesús García Solís from Metropolitan Hospital “Dr. Bernardo Sepulveda” and Dr. Lucia Torres Garcia from IMSS-UMAE 25, Monterrey, and, all the individuals who kindly helped to distribute the questionnaires.

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Tables

Table 1. Demographic characteristics of women in MMA.

Characteristics	LI n/N (%)	MI n/N (%)
Age (years)		
40-49	293/550 (53.3)	234/516 (45.3)
50-59	214/550 (38.9)	184/516 (35.6)
60-69	29/550 (5.2)	68/516 (13.1)
70-79	10/550 (1.8)	27/516 (5.2)
Mean age	49.48 ± 7.11	51.84 ± 8.60
BMI	25.9	27.7
Abnormal BMI	433/550 (78.8)	348/516 (67.4)
Women with no children	29/550 (5.27)	70/516 (13.5)
Average no. of children	3.3 ± 1.9	2.4 ± 1.6
No breastfeeding	445/503 (88.4)	371/434 (85.7)
Months breastfeeding	13.43 ± 13.78	7.35 ± 4.85
Age at menarche (years)	12.84 ± 1.62	12.80 ± 1.60
Age at menopause (years)	45.43 ± 5.86	46.56 ± 5.27
Hormonal replacement	42/517 (8.1)	46/492 (9.3)
Current smoker	68/531 (12.8)	94/513 (18.6)
Cigarette/day	5.51 ± 7.13	6.46 ± 6.82
Current alcohol use	39/526 (7.4)	19/486
Women with BCa	26/521 (4.9)	19/509 (3.7)
Age group with BCa		
(years) 40-49	7/26 (26.9)	4/19 (21.0)
50-59	13/26 (50.0)	5/19 (26.3)
60-69	5/26 (19.2)	6/19 (31.5)

70-79	1/26 (3.8)	4/19 (21.0)
Median age (years)	52.3	59.2

Marital status		
Married	353/535 (65.9)	370/481 (76.9)
Single	89/535 (16.6)	59/481 (12.2)
Divorced	92/535 (17.2)	52/481 (10.8)
Widow	33/535 (6.1)	35/481 (7.27)
Occupation		
House keepers	154/517 (29.9)	248/508 (48.6)
Working away from home	253/517 (49.1)	217/508 (42.9)
No job	110/517 (21.0)	43/508 (8.4)
Education		
None	15/526 (2.8)	0/508 (0.0)
Primary	172/526 (32.6)	40/508 (7.8)
Secondary	146/526 (27.7)	129/508 (25.3)
Preparatory	38/526 (7.2)	73/508 (14.1)
University	9/526 (1.7)	215/508 (42.3)

MMA (Monterrey Metropolitan area), BCa (breast cancer), BMI (body mass index), LI (low income), MI (middle income), m (meter), N (total number of subjects), n (response rate).

Table 2. Background characteristics of mammography attendants in MMA.

Characteristics	Category	LI n/N (%)	MI n/N (%)
Mammography	Performed previously	377/540 (69.8)	398/510 (78.0)
Age at first mammography (years)	< 40	111/369 (30.1)	154/408 (37.7)
	Between 40 and 49	217/369 (58.8)	200/408 (49.0)
	> 50	39/369 (10.5)	44/408 (10.8)
Understanding about BCa screening guidelines	Every year	172/371 (46.3)	198/411 (48.2)
	Every two years	69/371 (18.6)	87/411 (21.1)
	> Two years	32/371 (8.6)	48/411 (11.7)
	I do not know	98/371 (26.4)	78/411 (19.0)
Understanding about BCa and mammography	Do you feel well informed about BCa?	416/507 (82.0)	317/499 (63.5)
	Have you read about mammography?	290/499 (58.1)	330/502 (65.7)
	Cancer can be cured if detected early	443/477 (92.8)	479/493 (96.9)
	Physical trauma can cause BCa	179/383 (46.7)	175/300 (47.8)
Last performed mammography	< Two years	318/548 (58.0)	308/481 (64.1)

	> Two years	63/548 (11.5)	56/481 (11.6)
	Never done	167/548 (30.5)	117/481 (24.3)
Cancer and family history	First grade BCa	48/516 (9.8)	67/482 (13.9)
	First grade ovarian cancer	27/468 (5.9)	23/486 (4.7)
Obstacles precluding mammography	Technical malfunction	17/219 (7.7)	9/132 (6.8)
	Not available		11/132 (8.3)
	Bad treatment	31/219 (14.1)	14/132 (10.6)
	No time points available	14/219 (6.4)	16/132 (12.1)
	Appointment forgotten	15/219 (6.8)	24/132 (18.1)
	No priority		
	No understanding when to do mammography	39/219 (17.8)	21/132 (15.9)
	Other reasons		10/132 (7.5)
		31/219 (14.1)	
		17/219 (7.7)	27/132 (20.4)
		55/219 (25.1)	
Work conditions	Leave for mammography not allowed	27/438 (6.2)	38/452 (8.4)

MMA (Monterrey Metropolitan area), BCa (breast cancer), LI (low income), MI (middle income), N (total number of subjects), n (response rate).

Table 3. Socio-economic characteristics of women in the MMA.

Characteristics	Category	LI n/N (%)	MI n/N (%)
Who pay for health care?	Husband	119/278 (42.8)	111/336 (33.0)
	Family	44/278 (15.8)	121/336 (36.0)
	Herself	74/278 (26.6)	93/336 (27.6)
	Cannot afford cost	33/278 (11.8)	11/336 (3.3)
Type of insurance	Public	469/491 (95.5)	354/498 (71.1)
	Private	17/491 (3.4)	102/498 (20.5)
	Public/private	27/491 (0.4)	42/498 (8.4)
	No insurance	3/491 (0.6)	0/498 (0.0)
Public Insurances	Seguro Popular	231/324 (71.3)	64/189 (33.8)
	IMSS	86/324 (26.5)	75/189 (39.7)
	ISSSTE	0/324 (0.0)	24/189 (16.7)
	No insurance	5/324 (1.5)	0/189 (0.0)
Common reasons for not attending mammography	Cannot afford cost	212/512 (41.4)	123/367 (33.5)
	Preference to pay the children's health care costs	68/512 (13.3)	75/367 (20.4)
	Cannot afford possible treatment		

MMA (Monterrey Metropolitan area), IMSS (Mexican Institute of Social Security), ISSSTE (Institute of Social Security and Social Services for State Workers), LI (low income), MI (middle income), N (total number of subjects), n (response rate).

Table 4. Cultural and social characteristics of women in MMA.

Characteristics	Reasons	LI n/N (%)	MI n/N (%)
Fear of mammography	Results	236/496 (43.0)	224/496 (45.1)
	Radiation	264/467 (56.4)	246/490 (50.1)
	Pain	286/481 (59.4)	360/488 (73.7)
	Embarrassment	154/496 (31.0)	133/496 (26.6)
Familism Partner (support)	Good communication	299/418 (71.5)	323/380 (85.0)
	Provides family economic needs	293/393 (74.5)	326/372 (87.6)
	Provides family needs	300/386 (77.7)	333/379 (87.8)
	Gives emotional support	310/394 (78.6)	335/380 (88.1)
	"If I have problems, I tell my husband"	226/550 (41.0)	244/516 (47.0)
Family (support)	"If I have problems, I tell my family"	130/550 (23.6)	123/516 (23.8)
Autonomy	Problem solved by Themselves	95/550 (17.2)	139/516 (26.9)
Religion and fatalism	"We die when is our time"	270/384 (70.7)	290/431 (67.0)
	"Lack of faith cause BCa"	155/318 (48.7)	75/300 (25.0)
	"Our future is in God hands"	352/423 (83.6)	325/439 (74.0)
	"If I have a problem, I pray to God"	241/550 (43.0)	213/516 (41.2)
Negligence	"I go to the doctor only	343/478 (71.7)	309/495 (62.4)

	when I felt sick”		
	“I have never done mammography”	167/548 (30.9)	117/481 (24.3)
Awareness (Facilitators)	Know women with BCa	269/501 (53.7)	352/490 (71.8)
	Know women that have done mammography	244/488 (50.0)	358/494 (72.4)
	BCa family history	270/429 (62.9)	358/466 (76.8)
	Well informed about BCa	416/508 (81.8)	317/499 (65.5)

BCa (breast cancer), LI (low income), MI (middle income), N (total number of subjects), n (response rate).

Figures

Figure 1

Principal component analysis. Mty_MG (Monterrey Metropolitan area middle income women), Mty_LG (Monterrey Metropolitan area low income women), Mty_Total (Monterrey total number of subjects).