BREAST CANCER SCREENING: SOCIAL INEQUALITIES BY COUNTRY OF ORIGIN AND SOCIAL CLASS AND ITS IMPACT ON MORTALITY

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ABSTRACT

The general objective of this dissertation is to study breast cancer screening and specifically social inequalities by social class and country of origin and its relationship with decreasing mortality. Therefore, four different studies have been done: three with quantitative methodology and one with qualitative. According to the quasi-experimental study, breast cancer mortality decreased in Barcelona before the introduction of the population screening program, but this reduction is more marked after its introduction. According to data from the Spanish National Health Survey in 2006, there are inequalities in the rate of breast cancer screening according to country of origin and social class. According to two studies conducted in Barcelona, immigrant women from low-income countries are less aware, and hence do less, early detection practices, as they have other priorities and perceive more barriers and taboos. Chinese women are the immigrants who present more differences with native women, followed by Maghribian and Philippine women. Place of origin, social class and migration process are key factors in preventive practices. In conclusion, it is necessary to encourage access to preventive screening practices for all women and also to undertake specific actions directed at the most vulnerable groups, taking into account any socio-cultural factors that influence the use of preventive practices.

RESUM

L'objectiu general d'aquesta tesi és estudiar el cribratge de càncer de mama i en concret les desigualtats socials per classe social i país d'origen, així com la seva relació amb la disminució de la mortalitat. En conseqüència, s'han realitzat quatre estudis diferents: tres de metodologia quantitativa i un de qualitativa. Segons l'estudi quasi-experimental, la mortalitat per càncer de mama a Barcelona disminueix des d'abans de la introducció del programa poblacional de cribatge, però aquesta reducció és més accentuada després de la seva introducció. En base a l'Enquesta Nacional de Salut de l'Estat Espanyol de l'any 2006, existeixen desigualtats en la realització de mamografies periòdiques segons país d'origen i classe social. Segons els dos estudis realitzats a Barcelona, les dones immigrades procedents de països de renda baixa coneixen i realitzen menys les pràctiques de detecció precoç, ja que tenen altres prioritats i perceben més barreres i tabús. Les dones xineses són les que presenten més diferències amb les dones autòctones, seguides de les magribines i les filipines. El lloc d'origen, la classe social i el procés migratori són factors claus en les practiques preventives. En conclusió, és necessari afavorir l'accés a les pràctiques preventives a totes les dones i també realitzar accions específiques dirigides als grups més vulnerables sense deixar de tenir en compte els factors socioculturals que influeixen en les pràctiques preventives de les dones.

PREFACE

Breast cancer is the most common form of cancer among women in the western world and is a major public health issue. Lack of efficient methods for primary prevention makes secondary prevention by mammography screening important in reducing breast cancer mortality. The literature shows that just as in the women in unprivileged social classes, breast cancer preventive services are less used by immigrants.

The general objective of this dissertation is to study breast cancer screening and specifically social inequalities by social class and country of origin and its relationship with the decrease of mortality. In consequence, four different studies have been done: three with quantitative methodology and one with qualitative. This complementarity of quantitative and qualitative methods used is an added value of this dissertation. Qualitative studies facilitate understanding of the knowledge, perceptions and practice of individuals. While quantitative studies help to quantify the phenomenon and its predictors in the study population.

This dissertation has been made in the *Servei de Sistemes d'Informació Sanitària* of the *Agència de Salut Pública de Barcelona* and under the direction of PhD. Carme Borrell. The studies III and IV fall within the Project FIS (*Fondo de Investigación Sanitaria*) (PI061130): "*Conocimientos, beneficios y barreras percibidas y prácticas frente a la detección precoz del cáncer de mama*". The main researcher of FIS project is Rosa Puigpinós Riera.

I have been involved in the design and execution of all the studies. Specially, it is necessary to mention that I have worked actively in the fieldwork phase of the studies III and IV. It is a very interesting part in all stages of a project of this magnitude from the beginning to the end because it is a very important learning opportunity.

In order to obtain the European Mention of the PhD, I received a grant from *CIBER de Epidemiologia y Salud Pública* (CIBER-ESP). This grant allowed me a 3-month stay at the Division of Social Medicine, Department of Public Health Sciences in the Karolinska Institutet (Stockholm - Sweden) in 2009.

CONTENTS

LIST OF ABBREVIATIONS

ABS: Primary Health Care District

BC: Breast Cancer

BRCA: Breast cancer gene

CI: Confidence Interval

CIBER-ESP: *Centro de Investigación Biomédica en red de Epidemiología y Salud Pública*

ENS-2006: *Enquesta Nacional de Salud 2006* – National Health Survey 2006 (Spain)

FIS: *Fondo de Investigación Sanitaria*

HBM: Health Belief Model

IARC: International Agency for Research on Cancer

ICEF: *Índex de Capacitat Econòmica Familiar* - Family Purchasing Power Index

ICD: International Classification of Diseases

NHS: National Health System

OECD: Organization for Economic Co-operation and Development

PAM: *Programa de Detecció Precoç d'Alteracions Mamàries*

PAMEM: *Prestació d'Assistència Mèdica als Empleats Municipals*

PDPCM: *Programa de Detecció Precoç de Càncer de Mama de Barcelona* - Barcelona Breast Cancer-Screening Program

PR: Prevalence Ratio

Ref.: Category of reference

RR: Relative Risk

Std.Err: Standard Error

TPB: Theory of Planned Behaviour

TRA: Theory of Reasoned Action

List of abbreviations

U.S.: United States

USPSTF: U.S. Preventive Services Task Force

WHO: World Health Organization

1. INTRODUCTION

1.1 – Breast cancer: A public health problem

Breast cancer is the most common form of cancer among women in the world and is a major public health issue. Breast cancer accounted for 23% of all cancers in women, making it by far the most common cancer in females. It was estimates that 1,301,867 cases occurred and 464,854 women died of this illness in the world during 2007 (1). For this reason, breast cancer is also the most important cause of neoplasic deaths among women. However, it does not follow the same tendencies in the entire world (2).

The incidence of breast cancer is high in the high-income countries in comparison with low-income countries. The incidence of breast cancer in women in high-income countries in 2000 was at least twice than any other cancer in women, and was similar to the incidence of cervix cancer in low-income countries. More than half of breast cancer throughout the world occurred in high-income countries (3). These differences could be explained by reproductive factors, by diet, and because the risk increased directly with age.

Mortality from breast cancer has been declining in high-income countries over the last two decades due to improved diagnosis (mammography) and improved treatment, where survival now achieves 85%. However, survival in low-income countries remains around 50-60% (2).

Breast cancer is by far the most common form of cancer diagnosed in European women. In 2008, there were 421,000 new cases that explained

28.2% of all female cancers (4). Breast cancer incidence varied considerably in Europe. The highest incidence rate occurs in Western and Northern Europe and the lowest in Central Europe (5). Due to the increasing aging population in Europe and the strong association between the risk of developing cancer and age, a significant increase in the incidence of all cancers is foreseen. There is an 8% probability of developing breast cancer before age 75 in European Union countries (6).

Breast cancer was ranked as the leading cause of cancer death in 2008 in European women. It caused 129,000 deaths, a 17.0% of total deaths (4). In the last decade, mortality rates decreased in most European countries (5,7), like in Spain (8,9). After 1992, mortality declined steadily at a rate of –2.1% per year (95% CI= -2.4; -1.8) in Spain (8,10). However, it is estimated that there will be 6200 deaths from breast cancer and 27,000 new diagnoses of breast cancer among Spanish women in 2012 (11). A recent Spanish study shows that breast cancer registered lower survival among young than among middle-aged women (12).

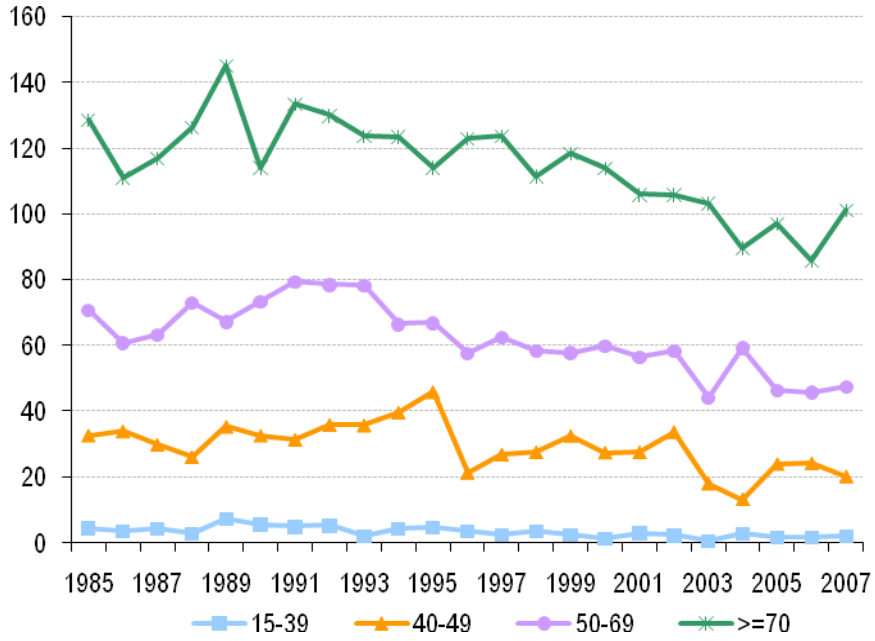
In Catalonia, there is not a global registry of cancer, but there are two population registers (*Registre de Càncer de Girona* and *Registre de Càncer de Tarragona*) and some registers at hospital level. Since there are not any widespread population or hospital registers, no accurate data is available. Consequently, all data are estimates drawn from existing registers. In Catalonia, breast cancer accounts for 28.1% of all cancers in women (3,366 new cases every year on average), twice as much as colon and rectal cancer (13). The incidence in Catalonia would place it below the European average. Throughout life, it is estimated that 1 in 13 women will

develop breast cancer before age 74 (14). It is the leading cause of death among women 35 to 64 years old (15). In 2002, 1,029 women died of breast cancer, i.e. the 17.9% of all female cancers deaths. In the European set, the breast cancer mortality rate in Catalonia is among the lowest. The relative survival accounted 5 years after women were diagnosed breast cancer during the period 1995-1999 was 80.9%. Indeed, recent projections for 2015 are foreseeing an increase in the number of diagnosed cases (14).

In the city of Barcelona, there is not a population register of cancer either. But the estimations made from the register population of Tarragona, indicate a steady increase of the incidence. Although mortality has declined globally from the 90s, breast cancer mortality is the first cause of death from cancer in women 35+ (16). In addition, in the group of women from 45 to 74 years old, breast cancer is the first cause of death (45.6 deaths per 100,000 women in the year 2007) (17).

It has been described that breast cancer is more common in women of higher socio-economic groups (18,19), mainly due to reproductive factors, but in Barcelona there are not socio-economic inequalities in breast cancer mortality (20,21).

Figure 1: Breast cancer mortality per year among age-groups. Age-standardised death rates per 100,000 women. Barcelona, 1985-2007.



Personal compilation.
Source: *Registre de Mortalitat de Barcelona. Agència de Salut Pública de Barcelona.*

1.2 – The prevention of breast cancer

Breast cancer has no clear or evident cause. However, there have been described some risk factors related to the appearance of the disease (2,22) (Table 1). For example, breast cancer risk is related to age, family history of breast cancer, nulliparity, late first birth, early menarche and late menopause; and it is reduced by breastfeeding. But these risk factors only explain 40% of the cases of breast cancer (23). These factors are also difficult to modify and in consequence, primary prevention is not possible.

Table 1: Known factors related to the development of breast cancer.

Risk factors	Protective factor
Old age	Breastfeeding
Sex female	More than one pregnancy
Race (White women)	Soy intake
Benign breast diseases	Folate intake
Family history of breast cancer	Physical activity
Mutations of several high-penetrance genes (BRCA)	
High mammographic density	
Cumulative number of ovarian cycles	
Early menarche (<12 years)	
Late menopause (>54 years)	
Late first birth (>30 years)	
Nulliparity	
Current or recent use of oral contraceptives	
Use hormonal replacement therapy	
High level of estrogens	
High level of testosterone and other androgens	
High body mass index in post-menopausal women	
High alcohol consumption	

Personal compilation.
Sources: 1) IARC. World Cancer Report, 2008. Lyon: IARC, 2008. 2) Castells X, Sala M, Ascunce N, Salas D, Zubizarreta R, Casamitjana M, et al. Descripción del cribado del cáncer en España. Proyecto DESCRIC. Informes de Evaluación de Tecnologías Sanitarias, AATRM núm 2006/01. Madrid: Ministerio de Sanidad y Consumo. Agència d'Avaluació de Tecnologia i Recerca Mèdiques de Catalunya; 2007.

Secondary prevention is the most suitable approach for breast cancer control. Breast cancer has the necessary conditions for a disease to be subjected to screening. These conditions were laid down by Wilson and Jungner some 40 years ago. These are (24):

- The condition being screened for should be a common disease that causes problems in the population
- The natural history of the condition should be well known

- Effective treatment should be available for all individuals that are diagnosed with the disease
- The rates of attendance at the screening should be high
- Diagnosis and treatment of condition being screened for should lead to a higher quality of life
- The examination should not involve unacceptable risks or inconveniences

However, all that is not enough for a screening program to be successful. In addition, it is necessary an adequate test: economic, easy to do, accepted by the population and by the public health personnel, reliable and valid test results, etc. Mammography is a test that fulfills these conditions.

Despite the benefits of screening, the possible adverse effects should also be taken into consideration, e.g. the inconvenience and risks of the test (pain, radiation, etc), the complementary tests related to false positives, the anxiety generated, the possible overdiagnosis of the disease, etc (24,25). It has been reported that, apart from giving rise to anxiety and higher costs, such false-positive mammogram results might also affect subsequent screening attendance (26). Overdiagnosis is defined as the diagnostic of a cancer as a result of screening that would not been diagnosed in the woman's lifetime had screening not taken place. Estimates of overdiagnosis range from less than 10% of tumours diagnosed in a screening program to around 50% (27-30). For example, Gotzsche *et al*. (31) have asserted that for 2000 women screened for 10 years, only 1 life will be saved and 6 additional cases will be diagnosed. Also, a recent English study estimated that for every 11 cases diagnosed, 2 lives will be

saved, and 1 case will be overdiagnosed (32). There is a majority of view that benefits of breast screening outweigh the harms (33,34), but before implementing a population screening program, its effectiveness in reducing mortality should be assessed.

Table 2: Screening trials evaluating effects of mammography-based screening on breast cancer mortality.

Reference (year)	Setting	Sample size	Age range	Follow-up (years)	Mortality [a] (10^{-5})
Shapiro et al. (1982)	New York	60,995	40-64	18	23/29
Andersson et al.(1997)	Malmö	42,283	45-70	19	45/55
Nyström et al. (2002)	Malmö	17,793	43-49	9	26/38
Hakama et al. (1997)	Finland	158,755	50-64	4	16/21
Tábar et al. (2000)	Kopparberg	56,448	40-74	20	27/33
Alexander et al. (1999)	Edinburgh	52,654	45-64	13	34/42
Miller et al. (2000)	Canada	39,405	50-59	13	50/49
Miller et al. (2000)	Canada	50,430	40-49	13	37/38
Nyström et al. (2002)	Östergötland	76,617	40-74	17	30/33
Nyström et al. (2002)	Stockholm	60,117	40-64	15	15/17
Bjurstam et al. (2003)	Gothenburg	51,611	39-59	13	23/30
Moss et al. (2006)	United Kingdom	160,921	40-49	10	17/20

a) Mortality in the screening group versus control group.
Source: Hakama M, Coleman MP, Alexe DM, Auvinen A. Cancer screening: evidence and practice in Europe 2008. Eur J Cancer. 2008;44(10):1404-13.

Early detection of breast cancer through mammography is one of the screening tests on which more studies and trials have been done. During the sixties, seventies and eighties, randomised trials of breast cancer screening by mammography were initiated in several countries. As a result, the efficacy of mammography screening was evaluated in twelve screening trials (35-44) (Table 2). These have shown consistent mortality reductions of 20 to 35% amongst women in the age range from 50 to 69 years old (45). As a consequence of these results, the majority of scientific and

professional organizations recommend screening mammography and a large number of countries have implemented population screening programs for breast cancer (46). The Council of Europe recommends population-based, organised mammography screening for breast cancer in women aged 50 to 69 years old, and that screening programs comply with European guidelines on quality assurance (47). In addition, the European Union recommends in its European Code Against Cancer periodic screening of breast cancer after age 50 (48).

In 2000 and 2001, Gotzsche and Olsen published two papers in which randomised trials were criticized for methodological weaknesses (49,50). These authors stated that it was only possible to evaluate the mammography in two of the studies because the rest did not accomplish the requirements for the study. Then, they did a systematic review with only these two trials and they showed no benefit of breast cancer screening. They also argued that breast cancer mortality is not a valid end-point for screening trials. These articles raised a large controversy and triggered a major debate among the scientific community. Years later, the authors responsible of the clinical trials, who were earlier criticized, published new data analysis after more years of observation. The results showed that there was a reduction in mortality (33). In addition, the International Agency for Research on Cancer (IARC) published a review stating that there is sufficient evidence of the efficacy of breast screening in reducing mortality from breast cancer in women 50 to 69 years old, while this evidence is limited in women 40 to 49 years old (3). All these arguments have not prompted changes to the European recommendation on screening in women between 50 to 69 years old.

Last year (2009) a new polemic came untied in the United States (US). The U.S. Preventive Services Task Force (USPSTF) released updated recommendations for breast cancer screening (51), informed by additional follow-up from previous studies and a new study focused on statistical modelling (52,53). The two most substantive and controversial recommendations were that mammography be eliminated as a "standard test" for women 40 to 49 years of age and that mammography be performed biennially rather than annually in women from 50 to 74 years of age.

As mentioned previously, most European countries have established nationally or regionally organized programs (46). Sweden began the program in 1986, Finland and Iceland in 1987, and the United Kingdom and Netherlands in 1989 (54). Most programs have been aimed at women 50 to 69 years old with a biennial mammography, with or without breast examination (46). In Spain, the first population screening program for breast cancer began in 1990 at the Floral Community of Navarre (55), and the first screening program in Catalonia started in 1992 in Molins de Rei-El Papiol (56). Among the women from 40 to 49, there is a widespread practice of opportunist screening in Spain (55).

In Barcelona, early detection of breast cancer began in 1987 with a non-population program: *Programa de Detecció Precoç d'Alteracions Mamàries* (PAM). The PAM was a breast cancer screening program aimed at 50 to 70 years old municipal workers affiliated to PAMEM (*Prestació d'Assistència Mèdica als Empleats Municipals*) (57). The population program (*Programa de Detecció Precoç de Càncer de Mama de*

Barcelona - PDPCM) began in late 1995 in two districts of the city and it was progressively implemented throughout the entire city (2004). The screening program is aimed at all the healthy resident women in the city (registered or not) 50 to 69 years old. The program consists in a free mammography review every 2 years in the main public hospitals of the city (58).

It is difficult to assess how efficacious a population screening program is; i.e., how effective it is. The main objective of a screening program cannot be achieved other than decreased mortality by this tumour on the target population and consequently in the general population. But, it is necessary to take into account that there are other elements that influence breast cancer: e.g., therapeutic and technological improvements. In consequence, it is difficult to determine the individual effect of each factor and know exactly which the role of the screening is. Also, the impact of breast cancer screening programs cannot be established until 7-10 years after start (59). Therefore, to assess the effectiveness of the program in mortality is complex and requires long periods of analysis. Several studies have evaluated it and conclude that mammography screening programmes implemented at least 10 years ago have a similar, but not greater, mortality reduction as the randomised controlled trials (45,54,58).

1.3 - Spain: Immigration and Health System

Migrations are an ancient and permanent phenomenon; though in Spain the international immigration is a new phenomenon and it has experienced a rapid growth from the late 20th century. In 2009, 13.8% of the Spanish population was born in a foreign country, whereas in the year 1998 it was

only 2.9% (60). In 2006, Spain was the twelfth country of the Organization for Economic Co-operation and Development (OECD) with more foreign population. Regarding Autonomous Communities, Catalonia, Madrid, Valencia, Andalusia, Canarias and Murcia have 77.0% of the foreigners who live in Spain (61). These new citizens are for the most part young, coming from countries which do not belong to the European Union and do manual and/ or seasonal works (62).

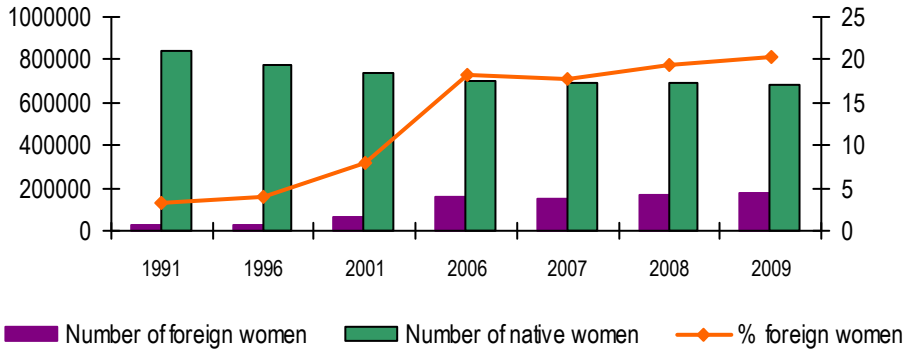
Spain has a National Health System (NHS), financed mainly by taxes, which gives universal and free health coverage to all of the registered population, including early detection of breast cancer (63). The right to health care with equal conditions as those enjoyed by nationals is recognised for registered foreigners (with or without a residency permit), to young people, pregnant women and to emergency cases in the event of serious disease or accidents (64). Apart from the public service, some individuals pay for private service, enjoying double health coverage (10.6% of the women) (65) and a more personalised service, particularly with regard to specialised non-hospital care.

1.4- Immigration in Barcelona

Based on data from the Statistics Department of Barcelona City Hall, the amount of people born in a foreign country residing in Barcelona and registered on the 30th June 2009 was 356,418 persons, representing 21.8% of the total population. If we focus only on the female population, there were 173,790 women born in a foreign country, 20.3% of the women in the city. This percentage has increased in recent years, especially since 2001, when it represented 8.0% (Figure 2) (66).

In 2010, women between 50 and 69 years old (the target population of the breast cancer screening program) were 206,338, an 12.0 % of whom were born in a foreign country. These women are from different nationalities, though according to the same Census data, mainly and in decreasing order they are from: Peru, Ecuador, Chile, Colombia, Morocco, Philippines, Bolivia, France, Dominican Republic, China, Chile, Germany, Uruguay, Brazil and Russia.

Figure 2: Evolution of the female population in Barcelona: native women and women born in a foreign country. Years 1991-2009.



Personal compilation.
Source: *Departament d'Estadística, Ajuntament de Barcelona.*

1.5-Framework of accomplishment of breast cancer screening

In order to design the conceptual model of this dissertation, different existing frameworks and the bibliographical review have been had into consideration. One of the models used to explain the determinants of health and the inequalities is the model described by Dahlgren and

Whitehead (67). In this model, the health determinants are distributed in various layers of influence, where each affects the other and which, in addition, in the case of immigrants, are all affected by the migration process itself. The individual factors in the environment are not modifiable (age, sex, genetics, etc.). There are a number of determinants that surround the daily life of people and eventually lead to an influence on health status. At first level, there is the lifestyle of people, then social and community influences, since the interaction with people from the immediate environment also affects health. At a higher level, encompassing the previous fall, living conditions and work, we finally reach the last level which is determined by the political, socio-economic, cultural and environmental conditions.

The Behavioural Model of Health Services Use was designed by Andersen and it is a model that seeks to explain patterns of use of health services (68). It is among the most commonly used model in Public Health and is widely accepted among health services researchers. The model categorizes factors that contribute to use health services into three groups: enabling factors, predisposing factors and patient need for health care.

The Health Belief Model (HBM) is one of the most widely used theoretical models to study the behaviour related to the detection of breast cancer. This model considers that there are four psychological variables that predispose a person to adopt a preventive behaviour. These variables are: perceived vulnerability, perceived severity of breast cancer, perceived benefits of mammography and perceived barriers during the screening. Therefore, a person who perceives the threat would undergo preventive

practice depending on the balance between benefits and barriers. Later on, modifications were made at HBM. One of these modifications is that during the decision-making process, there is a key element in triggering action that may be internal (e.g. physical symptoms) or external (e.g. receiving an invitation to join a screening program). Often other variables are added in the model such as: motivation for general health, the role of social influences and the self-efficacy on behaviour could be performed (69,70).

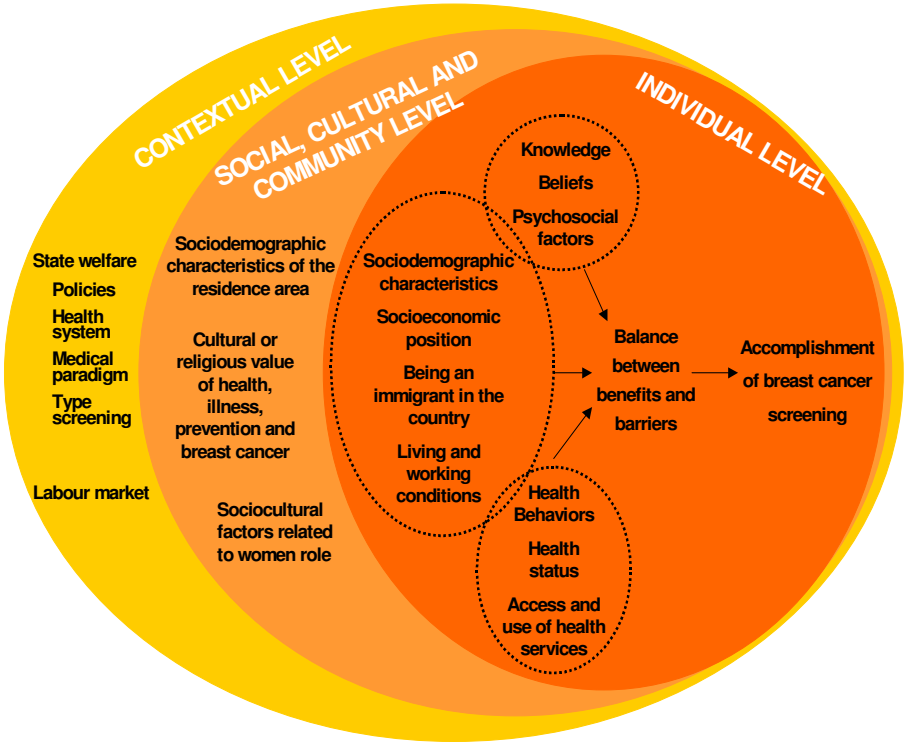
There are also studies that are not based on the HBM, but on the Theory of Reasoned Action (TRA), or the Theory of Planned Behaviour (TPB) or a mixture of two or three of the aforesaid models. All these three models agree on the following points: taking into account the subjects' beliefs about the consequences of behaviour as well as the degree to which this behaviour is under voluntary control by the subject and her social influence(69,70).

The following conceptual framework has been developed as it has been mentioned previously, on the basis of the previous models and on the bibliographical review carried out (Figure 3). The framework is designed taking into account three levels of determinants of use in preventive mammography: 1) Contextual level, 2) Social, cultural and community level and 3) Individual level.

There are several studies that have demonstrated the political influence on the health of the population (71). Consequently, in the **contextual level**, there are health policies that are being carried out in the country, its health system, the type of screening done and its characteristics, etc. It has been

shown previously that the type of screening program (opportunistic or mass screening) (72), lack of public health insurance (73,74), the cost of screening (73-75), etc. are factors that determine the participation of women in the screening.

Figure 3: Framework of accomplishment of breast cancer screening.



Personal compilation.

At the **social, cultural and community level**, we can find three blocks of determinants. The first is the socio-demographic characteristics of the area of residence of the woman. For example, place of residence of a woman can determine her conduct (76). Some studies have demonstrated that women living in rural areas participate less in screening than women who

live in cities (70,73,74,77,78). One possible reason would be the greatest distance to the health services. The second block of determinants of this level are the cultural or religious values related with health, disease, prevention and breast cancer. The cultural and religious values involved in the woman's community influence very much the final woman's conduct. If the woman lives in a community where breast cancer is as a taboo or is experiencing health-illness in a fatalistic view, behaviour toward screening will surely be very different from the woman who lives in an environment where prevention has an important role (79,80). The third block of determinants is the sociocultural factors that surround the role of women. Among these factors are the degree of dependence of women towards their husbands in some cultures or the role of women as caretaker of the family, which may place her health as last priority (81).

At an **individual level,** we find a number of factors closely interrelated to each other. There are individual socio-demographic characteristics which were associated with an uneven use of breast cancer screening, e.g., age, marital status, health insurance, presence of family history of breast cancer, having a personal history of benign disease, the role of social support, parity, etc (73,82). Older age has turned out to predict non-attendance in some studies (77,83-85). Married women have been found to be significantly more likely to attend than other women (83-86). In some studies, parity has shown to affect mammography screening attendance (87,88). It seems that single women or women without children have less gynaecological controls and in consequence, they undergo less breast cancer screening (88). Also, it seems that the more children a woman has, the less screening is done; because woman has more family work and less

time for her (87-89). Women with private health insurance were somewhat more likely to undergo screening compared with women who have public insurance (65,90,91). Knowing someone (family or friend) with breast cancer or having her own breast problems can influence the screening(82,86,92).

The socio-economic position of women has also partnered to mammographic conduct. It affects directly in the behaviour and also in other determinants of this behaviour. The educational level, the income, home-ownership etc are some determining factors (73,82). Studies consistently demonstrate that low educational level (84,85,93,94) and low income status (78,82,84,88) were associated with lower rates of mammography use. In some studies women with part-or full-time employment have been found to be more likely to attend than unemployed women (84,86,87). Home-ownership or size of dwelling significantly predicted attendance in some studies (87).

Being an immigrant appears to have a negative effect on mammography use. The literature shows that immigrants are less likely to use preventive care than natives (76,83,87,95-101), but also, there are some other studies that show the effect attenuates after adjusting to socio-economic factors (102). Lack of local language skills (81,103), short stay durations (87,92,104-106), lack of knowledge about health system (107,108), having other priorities like integration (109), pre-emigration medical habits (104) and low level of acculturation (74,92) can act as a barrier (110). Acculturation is the process in which individuals whose primary learning has been in one culture, adopt attitudes, values, and behaviour from

another culture (92). Very closely related to the immigration, we find worse living conditions and work; factors that can influence the screening(88,103).

The knowledge that women have about breast cancer, its risk factors, its prevention, the methods of early detection, the mammography, the functioning of the screening, the treatment, etc influence the mammographic conduct (70,80,86,111,112). For example, women who know about mammographic screening are more likely to attend (3).

Closely related to the knowledge women may have about breast cancer are the beliefs and the psychosocial factors. Beliefs have an important role in the decision of mammography use. Women are more likely to attend screening if they belief that mammographic screening is effective in finding small cancers that can be cured (3). If women believe that mammograms are ineffective or not necessary in absence of breast symptoms, it is all too easy to sideline screening (79,82).

Related to psychosocial factors, there are some determinants of use. Strong fear that breast cancer will be detected is associated with a less likelihood of attending screening (79,80,92). Women who report being very concerned about breast cancer may not attend screening whereas moderate anxiety about breast cancer is most likely to predict attendance at screening (70). Perceived personal risk is also a key predictor for attending screening. Women who believe they are more likely to develop breast cancer are more likely to attend (113,114). Women who report that mammography is embarrassing, distressing, harmful or painful have lower rates of mammographic screening (92,112,113).

There are several health behaviour or health practices that are related to screening. If a woman has a proactive attitude towards health and preventive care, she is more likely to undergo screening than a woman who has a fatalistic approach (81,86). In addition, lifestyles seem to play an important role, e.g., smoking cigarettes has become a stronger negative influence on mammography use (77,86). Furthermore, women who do physical exercise are slightly more likely to be screened (77,85,115).

The health status can influence screening, e.g., women who report self-assessed poor health have lower rates of mammographic screening (73).

Women who have more access and use more health services seem to participate more in preventive practices (70,73,116) e.g., women who have a regular physician or gynaecologist are more likely to have a mammogram (75,77,80,86). Also, a recommendation by a doctor to attend for screening appears to be very influential and has been shown to be associated with attendance in many studies (79,86,117). Many studies have shown that women who participate in other screening programmes, such as those for cervical cancer, are more likely to attend mammographic screening (86,94,117). Previous negative health care and preventive experiences can act as a barrier (113).

The living and working conditions are other factors to consider when studying screening mammography. Worse conditions of life and work could be a barrier, since women have other major problems or priorities than preventive practices (88,103). Inability to take time off from work can act as a barrier, as well (81).

Taking into consideration all of these factors, women outweigh benefits and barriers in their decision on breast cancer screening. That is to say, if she perceives more benefits than barriers, she will undergo breast cancer screening.

1.6 – Social Inequalities, immigration and early detection of breast cancer

The literature suggests inequalities between the immigrant and native population in terms of health, access and use of the health services (108,110,118). There are different determinants of these inequalities: social, economic and health characteristics of the country of origin, the cause of the migration, the disorders linked to the migratory process, the perception and the value of health in their culture, the pre-emigration medical habits, the social, economic and working conditions in the new country, the communication difficulties, the difficulty in understanding and navigating in the health care system, etc (107,108,110,119). Therefore, the migratory process is an axis of inequality. In addition, migration cannot be understood without taking into account the social class and gender(120,121).

Nowadays, the majority of immigrant women in Barcelona are young, but the average age has been gradually increasing due to the length of stay in the host country, family reunification, etc. These women are coming from a different cultural reality that determines their lifestyle and, therefore, perceptions and attitudes towards reacting to different circumstances, including illness.

Apart from the different cultural reality, the migration process itself determines that in many cases the priority for immigrants is to adapt to their new reality and work. Hence, it causes health care to shift to the background (122). In some cases, immigrants tend to go down the social scale in the host country, sometimes even affecting the role that women have within their own family (123). Sometimes this social class displacement causes immigrants to live and work in worse conditions. Therefore, they can experience worse health and different access or use of health services than the native population (124). The results of different studies undergone in Spain showed that the immigrants have a poor perception of their health (99,120,125,126). In addition, immigrants have a lower access to specialists and visit emergency rooms more often than nationals (99,125-131).

Immigrants also experience a shift in terms of mortality rates in their countries of origin than in the host country. That is, when a woman from a country with low rates of mortality from breast cancer moves to a country with high rates, the risk for her happens to be the same as that of a native woman (132-134). Sometimes, we observed that while mortality from breast cancer decreased in native women, in some ethnic minorities it is increasing and more cancers are diagnosed in advanced stages due to the cost of health services or wrong beliefs and stigma of the disease which make women reject the screening (80,135).

Preventative practices in general and those practices related to women's health in particular, such as having mammograms regularly, often present socio-economic inequalities (73,82). This is taking place even in those

countries like in Spain, where there is a universal healthcare system that guarantees access to all citizens (84,85,136).

The experience of countries with a longer tradition of immigration, as observed so far, shows that just as in the unprivileged social classes, breast cancer preventive services are used less by immigrants, especially between immigrants from low-income countries (74,101,137,138). This can be due to many different reasons, such as cultural and belief factors or facts related to the process of immigration itself.

At a European level, it is interesting to mention five studies in which it was observed that the immigrant women had less mammographic screening that the native population (76,83,87,95,101). In the United States and Canada, countries with a longer migratory tradition, this phenomenon has been studied more widely. All these studies have shown again that the immigrant population was using the preventive services less than the native population (96-98,102).

In Spain, the relation between the use of the preventive services and the socio-economic level has been widely studied, being a higher socioeconomic position associated with a greater participation in screening (84,85,136). But, the studies that describe the use of breast cancer screening among immigrant women are scanty. Two works have described differences between the native and immigrant population, showing again a minor accomplishment of preventive practices on the part of the immigrant women (99,100). In spite of this, the joint role of the social class and the country of origin in our context have not been studied.

Different studies show that the immigrant's participation in breast cancer screening is usually low for several reasons: age (older women, the same as native, have less rates) (123,139), communication problems (due not only to the language, but also to the intercultural understanding sometimes linked to beliefs as well as low levels of literacy) (81,103), fear, lack of knowledge related to treatment and possibility to cure breast cancer, the belief that sometimes there is a question of predestination (140,141), etc. Sometimes, however, some security-related practices such as breast self-examination can generate false expectations or feelings (142). Breast self-examination is widely used in Eastern countries and is negatively associated with participation in screening programs where the mammogram is the method of early detection. In addition, several studies have shown that two of the predictors of participation in a screening program by immigrant women, are time spent in the foreign country and degree of integration (98,105).

Knowledge, attitudes and perceptions related to disease and its prevention will determine the behaviour that women adopt. Nevertheless, adequate knowledge and intention cannot always generate a consistent behaviour because there can be other barriers.

1.7- Justification

As mentioned previously, breast cancer mortality has declined globally from the 90s in Barcelona. In this context, there are not studies that examine and evaluated the contribution of the program in this fall. In consequence and after 10 years of the starting the screening program in Barcelona, it

seems necessary to evaluate the impact of the program in reducing breast cancer mortality among the target population.

Due to an increasing immigration growth in the last years, it is interesting to know what is happening in our context. It is necessary to know what knowledge, attitudes, perceived benefits, perceived barriers and practices women have in relation to breast cancer screening. Moreover, these variables should be studied separately because native and immigrants have different cultural background. The socio-economic level should also be taken into account. Therefore, we studied the influence of culture, socio-economic status as well as migration in the breast cancer screening decision taking. This investigation may help to find specific actions in order to remove breast cancer screening barriers, whatever the origin and social class of the women implied.

There is an increasingly clear complementarity of quantitative and qualitative methods (143,144). Qualitative studies facilitate understanding of the knowledge, perceptions and practices of individuals. While quantitative studies help to quantify the phenomenon and its predictors in the study population. In this investigation, as there is a considerable lack of knowledge about what women think and what the determinants concerning perceptions and behaviour of immigrant women are, the qualitative approach will formulate new hypotheses that will subsequently be measured in the quantitative study.

Specifically, the thesis will be divided into four different studies:

- Study I: Breast cancer mortality in Barcelona following implementation of a city breast cancer-screening program.
- Study II: Preventative control of breast and cervical cancer in immigrant and native women in Spain: the role of country of origin and social class.
- Study III: Country of origin and prevention of breast cancer: beliefs, knowledge and barriers.
- Study IV: Knowledge, attitude and perceptions of breast cancer screening among native and immigrant women in Barcelona.

The studies III and IV fall within the Project FIS (Fondo de Investigación Sanitaria) (PI061130) (2007-2009): "*Conocimientos, beneficios y barreras percibidas y prácticas frente a la detección precoz del cáncer de mama*". The main researcher of this FIS project is Rosa Puigpinós Riera.

2. OBJECTIVES

The general objective of this dissertation is to study breast cancer screening and specifically social inequalities by social class and country of origin and its relationship with the decrease of mortality.

The specific aims of the studies described in this thesis are:

- Study I: To assess the impact of breast cancer-screening program in the city of Barcelona on breast cancer mortality among women aged 50–74 years.
- Study II: To describe rates of use of breast and cervical cancer screening services among women resident in Spain in 2006 according to their country of origin, and to analyse whether the associations observed are modified by social class.
- Study III: To describe the concept of prevention and identify the knowledge, benefits and perceived barriers, as well as the practices of early detection of breast cancer in native and immigrant women from low-income countries of different social classes from 40 to 69 year old residents in Barcelona.
- Study IV: To quantify and compare knowledge, attitude, vulnerability, benefits and barriers in relation to breast cancer and mammography among native women and immigrant women from low-income countries from 45 to 69 years old residents in Barcelona.

3. HYPOTHESIS

Study I: Breast cancer mortality in Barcelona following implementation of a city breast cancer-screening program.

- The breast cancer-screening program contributes to reducing mortality for this disease.
- The mortality reduction is more pronounced in areas where the program was implemented earlier compared to those where the program came in later.

Study II: Preventative control of breast and cervical cancer in immigrant and native women in Spain: the role of country of origin and social class.

- Immigrant women from low-income countries undergo less periodic preventative control of breast and cervical cancer than native women and immigrant women from high-income countries.
- Social class also affects immigrant women in their preventive behaviour. Thus, manual working class immigrant women undergo fewer periodic preventative control of breast and cervical cancer than those from non-manual classes.
- Women with double health coverage (public and private) undergo more periodic preventative control of breast and cervical cancer than women who only have public coverage.
- Women who live with a partner undergo more periodic preventative control of breast and cervical cancer than women who do not.

Study III: Country of origin and prevention of breast cancer: beliefs, knowledge and barriers.

- Prevention is a dynamic value over the time with a cultural and social component. Consequently, it is different among women of different origins.
- The cultural background and the migration process affect attitude towards breast cancer screening in the host country.
- Socio-economic status and rural or urban setting also influence breast cancer screening in the host country regardless of cultural origin and migration process.

Study IV: Knowledge, attitude and perceptions of breast cancer screening among native and immigrant women in a Barcelona, Spain.

- Immigrant women from low-income countries are less aware of early detection of breast cancer, have less positive attitude towards health and breast cancer and perceive more vulnerability to breast cancer than native women.
- Immigrant women from low-income countries perceive more barriers and fewer benefits towards the mammography than native women.
- Regardless of origin, women from non-manual classes have more knowledge, more positive attitude, less vulnerability and perceive more barriers and less benefits towards the mammography than those from manual classes.
- Regardless of origin, women from urban areas have more knowledge, more positive attitude, less vulnerability and perceive less barriers and more benefits towards the mammography than those from rural areas.

4. METHODS AND RESULTS

The four studies in which this thesis is divided are explained in the following four papers:

- Paper I: Pons-Vigués M, Puigpinós R, Cano-Serral G, Mari-Dell'Olmo M, Borrell C. Breast cancer mortality in Barcelona following implementation of a city breast cancer-screening program. Cancer Detect.Prev. 2008; 32(2):162-167.
- Paper II: Pons-Vigués M, Puigpinós-Riera R ,Rodríguez-Sanz M, Serral G, Palència L, Borrell C. Preventative control of breast and cervical cancer in immigrant and native women in Spain: the role of country of origin and social class. (Under review).
- Paper III: Pons-Vigués M, Puigpinós-Riera R, Rodríguez D, Fernández de Sanmamed MJ, Pasarín MI, Pérez G, Borrell C, Casamitjana M, Benet J. Country of origin and prevention of breast cancer: beliefs, knowledge and barriers. (Under review).
- Paper IV: Pons-Vigués M, Puigpinós-Riera R, Serral G, Pasarín MI, Rodríguez D, Pérez G, Benet J, Casamitjana M, Borrell C. Knowledge, attitude and perceptions of breast cancer screening among native and immigrant women in Barcelona. (Under review).

In the appendix, there is the following methodological note which explains the fieldwork carried out in the study III:

- Pons-Vigués M, Puigpinós R, Rodríguez D, Fernández de Sanmamed MJ. Estrategias para reclutar mujeres inmigrantes para participar en una investigación cualitativa. Gac.Sanit. 2009; 23 (Suppl 1):90-92.

Paper 1: Pons-Vigués M, Puigpinós R, Cano-Serral G, Mari-Dell'Olmo M, Borrell C. Breast cancer mortality in Barcelona following implementation of a city breast cancer-screening program. Cancer Detect. Prev. 2008; 32(2):162-167.

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Paper 2: Pons-Vigués M, Puigpinós-Riera R, Rodríguez-Sanz M, Serral G, Palència L, Borrell C. Preventative control of breast and cervical cancer in immigrant and native women in Spain: the role of country of origin and social class. (Under review)

PREVENTATIVE CONTROL OF BREAST AND CERVICAL CANCER IN IMMIGRANT AND NATIVE WOMEN IN SPAIN: THE ROLE OF COUNTRY OF ORIGIN AND SOCIAL CLASS.

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ABSTRACT

Background: To describe the periodic use of cervical and breast cancer screening by women resident in Spain according to their country of origin, and to analyse if the associations observed are modified by social class.

Methods: A cross-sectional design was used in which the population under study was women between 25-69 years who were resident in Spain in 2006. The information source was the National Health Survey of 2006. The study groups were women aged 25-65 years for cervical cancer screening (N=10093) and women aged 40-69 for breast cancer screening (N=6674). The dependent variables were: undergoing a periodic cervical cancer screening exam (every 5 years or less) and undergoing a breast cancer screening exam (every 2 years or less). The independent variables were: country of origin, social class, healthcare coverage, cohabitation and age. A descriptive analysis was carried out and robust Poisson regression models were fit.

Results: Women from low-income countries underwent fewer periodic screening exams for cervical cancer and breast cancer. Independent of country of origin, women from the manual classes underwent fewer controls than those from the non-manual classes. In the 50-69 years age group, it was mainly the women from manual classes from low-income countries who underwent fewer periodic mammograms. Moreover, having only public healthcare coverage and not cohabiting with a partner was associated with lower rates of use.

Conclusions: It is necessary to encourage access to preventive screening practices for all women and also to undertake specific actions directed at the most vulnerable groups.

Keywords: preventive service, immigrants, social class, cancer screening, inequalities in health.

INTRODUCTION

Inequalities between immigrant and native populations in terms of access and use of health services have been described previously (1). This may be due to social, economic, employment and health characteristics both in the origin and the destination countries, the reason for migrating, perception and value of one's health, and language difficulties (1-3). Therefore, migration constitutes an additional axis of inequality in addition to social class, gender, and interactions between these axes (4-5).

In Spain, international immigration is a new phenomenon which has seen a rapid increase since the end of the 20th century. In 1998 only 2.9% of the Spanish population had been born in a foreign country, but this figure had increased to 10.8% by 2006 and 13.1% by 2008 (6). In 2006, Spain was ranked twelfth among Organisation for Economic Co-operation and Development (OECD) countries, in terms of the percentage of the population born abroad (7).

Spain has a National Health System (NHS), financed mainly by taxes, which gives universal free coverage to all of the registered population (8). The right to health care with equal conditions as those enjoyed by nationals is recognised for registered foreigners (with or without a residency permit), to young people, pregnant women and to emergency cases in the event of serious disease or accidents (9). Apart from the public service, some individuals pay for private service, enjoying double health cover (10.6% of women(10)) and a more personalised service. Cervical cancer screening is opportunistic and without explicit invitation to the target population (women from 25 to 65). In contrast, breast cancer screening has been population-

wide among women from 50 to 69 years since the mid-1990´s, and among those from 40 to 49 years there is an extended practice opportunistic screening (11).

Preventive practices, such as cervical and breast cancer screening, are often less used by immigrants from low-income countries, as has been described in some American studies (12-14). In Europe, four studies may be highlighted in which it has been observed that immigrant women undergo breast cancer screening exams less frequently than the native population (15-18). In the United States and Canada, this phenomenon has been studied in more detail for both breast and cervical cancer (19-21), and the immigrant population has again been shown to use preventive services less frequently.

In Spain, the use of preventive services according to socio-economic status has been widely studied (22). However, studies that describe the use of these preventive practices by immigrant women are more scarce (23-24). Two studies have reported differences in the use of these services among native compared to immigrant women, again showing a lower rate of use of these preventive services by the latter. However the joint effects of social class and level of income in the country of origin has been less well studied. The current work contributes to previous studies in being the first to examine at the national level the periodicity of the screening tests, while taking into account the country of origins of the immigrant women as well as their socio-economic position. The objectives of this study were to describe rates of use of breast and cervical cancer screening services among women resident in Spain in 2006 according to their country of

origin, and to analyse whether the associations observed are modified by social class.

METHODS

Design, study population, sample and data collection

This study used a cross-sectional design, and was based on the National Health Survey 2006 (ENS-2006), a survey representative of the non-institutionalised population of Spain carried out by the Ministry of Health and Consumption. The ENS-2006 used a stratified multi-stage sample. The units of the first stage were census sections, and those of the second stage were the principal family dwellings. Within each dwelling an adult was selected to complete the questionnaire via a personal interview with a specialised interviewer (sample of 29478 persons) (25).

The study population was that women resident in Spain in 2006, and aged 25-65 years (N=10093) and 40-69 years(N=6674) in the cervical and breast cancer screening groups, respectively. These age groups were selected on the basis of guidelines for screening set by the relevant national authority(11).

Variables

The dependent variables were being submitted to a periodic cervical or breast cancer screening exam, which were dichotomous variables based on the questions: “Have you ever undergone a vaginal cytology exam?” and “Have you ever undergone a mammography exam?”, respectively, and “How often have you undergone new exams apart from the first one you had?”. Undergoing periodic screening exams for breast and cervical cancer

was defined when the relevant test was carried out every 2 years or less, or every 5 years or less, respectively. The use of these periodicities was based on existing recommendations (11).

The independent variables were country of origin, social class, healthcare coverage, cohabitation with a partner and age. On the basis of country of birth, country of origin was categorised in 3 groups: Spain, high-income countries, and low-income countries. Women born in the rest of Western Europe, Canada, the USA, Japan, Australia and New Zealand were considered to be from high-income countries; those born in other countries were considered to be from low-income countries.

Socioeconomic position was measured by occupational social class (26-27). Two categories of social class were defined: the manual classes (IV-V) and the non-manual classes (I-II-III) (28). Social class was established on the basis of the occupation of the person who contributed the largest income to the home, where this occupation was measured according to a Spanish adaptation of the British Registrar General classification proposed by the Spanish Society of Epidemiology (28). Healthcare coverage was categorised as exclusively public and double coverage (public and private). Cohabitation was defined as a dichotomous variable: living with a partner or not. Age was categorised in two groups (40-49 and 50-69 years) and one group (25-65 years) for the breast and cervical cancer screening groups, respectively.

Data analysis

A descriptive analysis was carried out to describe differences in the rates of breast and cervical cancer screening exams according to country of origin, and was standardized by age for the cervical cancer screening group and stratified according to the two age groups described above for the breast cancer screening group. The prevalence of periodic breast and cervical cancer screening exams was calculated according to country of origin, social class, healthcare coverage, and cohabitation status. These prevalences were also calculated within each stratum of social class. Four robust Poisson regression models were estimated (29) for each dependent variable, with the aim of obtaining the age-adjusted prevalence ratios (PR) (30) and 95% confidence intervals (95%CI) according to country of origin, social class, healthcare coverage and cohabitation status. Finally, another multivariate model was fit for each dependent variable with the aim of testing for association between rates of periodic exams and the variables age, country of origin, social class, healthcare coverage and cohabitation status. This multivariate analysis was also performed within each stratum of social class.

In all regression models, the goodness of fit was checked using deviance. In the case of overdispersion of the data, the model was corrected using the overdispersion parameter (x^2)(31). All analyses were carried out using a weighting derived from the design of the sample (25). The statistical package STATA/SE 10.1 (32) was used to perform all analyses.

RESULTS

Table 1 shows the distribution of the independent variables in the sample according to age group. More than 80% of the women were born in Spain and had only public health coverage.

Table 2 shows the periodicities breast and cervical cancer screening according to country of origin and age group. Between 56.1% of women from low-income countries and 65.1% of native women declared that they underwent cytological exams with the recommended periodicity. Notably, 26.6% of women from high-income countries and 27.8% from low-income countries had never undergone a cytological exam. In both breast cancer screening age groups, women from low-income countries were most likely to have never had mammography (46.4% in women from 40 to 49 years and 27.6% in those from 50 to 69 years), followed by women from high-income countries. Among those who reported having regularly undergone breast cancer screening, native women and those from high-income countries generally quoted a periodicity of 2 years, as recommended by most population screening programs, both at national and international level. In contrast, among women from low-income countries this period is annual.

Table 3 shows that native women undergo more regular cytological exams (65.1% compared to 60.6% in high-income countries and 56.1% in low-income countries). The age-adjusted PR of regular cervical cancer screening among women from low-income countries and native women is 0.7 (IC 95% 0.7-0.8). Women from the manual classes undergo periodic cytological exams less frequently than those from non-manual classes

(48.8% compared to 68.2%; PR = 0.8 IC95% 0.7-0.8). Women who have double health coverage undergo a higher percentage of regular cytological exams compared to those who only have public coverage. Similarly, women who do not live with a partner tend to undergo cervical cancer screening less frequently. The results of the multivariate analysis show the same pattern as those for the bivariate analysis.

Also, table 3 shows the results for breast cancer screening. 26.0% of women from low-income countries and 42.1% from high-income countries between 40 and 49 years undergo regular breast cancer screening exams. Among women from 50 to 69 years, the rate varies between 47.1% (among women from low-income countries) and 80.2% (among Spanish women). In both age groups, a significant difference in the prevalence of screening was observed between native women and those from low-income countries (age-adjusted PR = 0.7 IC95% 0.5-0.9 among younger women and PR = 0.6 IC95% 0.5-0.8 among older women), but not between native women and those from high-income countries. The percentage of breast cancer screening was higher among women from 50 to 69 years than those from 40 to 49 years, independent of country of origin. Women from manual classes undergo fewer breast cancer screening exams, regardless of age. The age-adjusted PR was statistically significant and the inequalities between social classes tend to be less among women from 50 to 69 years. Having only public health cover and not living with a partner was significantly associated with a lower rate of periodic mammograms.

The PR of undergoing periodic breast cancer screening according to country of origin was significantly different among native women and those

from low-income countries when we adjust for the rest of the variables and show a lower rate of this practice among women from low-income countries. In contrast, among the native women and those from high-income countries the RP is only significantly different among women from 50 to 69 years (RP=0.8 IC95% 0.6-0.9). The inequalities in the rate of mammograms according to social class and health cover are less striking in the 50 to 59 years age group, compared to the 40 to 49 years age group after adjusting for the other variables.

Table 4 shows that women from low-income countries undergo cancer screening tests less frequently, regardless of social class. However, these differences are only statistically significant for breast cancer screening among women from 50 to 69 years, in that women from manual classes from low-income countries undergo fewer exams (32.6%) than native women (RP = 0.4 IC95% 0.3-0.7), while among those from the non-manual classes the differences are smaller (RP = 0.8 IC95% 0.7-1.0). Independent of country of origin, women from manual classes tend to undergo fewer preventative tests. In the manual classes and after adjusting for the rest of the variables, there were no significant differences in healthcare coverage.

DISCUSSION

These results show inequalities according to country of origin in the use of preventive screening services for cancer in Spain. Women from low-income countries undergo fewer periodic cervical and breast cancer screening. Independent of country of origin, women from the manual classes undergo fewer controls than those from the non-manual classes. In 50 to 69 years age group, it is mainly the women from manual classes from low-income

countries who undergo fewer periodic mammograms. Moreover, having only public health cover and not living with a partner is significantly associated with lower likelihood of undergoing these tests.

The frequency of periodic breast cancer screening was greater among women aged 50 to 59 years compared to those aged 40 to 49 years, regardless of country of origin and social class. This is almost certainly due in part to the fact that Spain has a population-level breast cancer screening program aimed at women aged 50 to 69 years, and that in the 40 to 49 years age group, neither the evidence nor the screening guidelines are very clear (11).

It is notable that only 56.1% of women from low-income countries and 65.1% of native women undergo periodic Pap smear exams. These results are similar to those of previous studies (33), and are possibly due to the fact that cervical cancer is only screened for opportunistically.

Inequalities according to country of origin

It is interesting to be able to stratify these data for immigrant women according to whether they come from high- or low-income countries. The realities of these two groups of immigrants are very different and they cannot be analysed together. The main differences between these two groups are related to the social, economic and health characteristics of the region of origin, and the reason for migration, which results in different behaviours in relation to preventative practices (1-2). The women from low-income countries have the worst indicators for preventative cancer screening, probably because they have other priorities before their health

(34-35), communication problems (language and intercultural comprehension), and factors linked to the cultural value of health (1,36-39).

Native women and those from high-income countries generally behave similarly with respect to preventive controls. Nonetheless, it should be borne in mind that immigrant women from high-income countries, though not economic migrants, may also have barriers to access the health system (poor knowledge of the functioning of the health system, language, cultural differences, though these may nor be as marked as among economic migrants, etc), which could explain the poorer results observed among some women from high-income countries, compared to native women.

Previous studies have compared rates of preventive screening between native and immigrant populations (15-21,23-24,40), and all have reported a lower rate of breast and cancer screening among the immigrant population. In Sweden, it has been reported that being an immigrant women from a non-Nordic country (15) is related to lack of participation in breast cancer screening programs. Moreover, participation is particularly low among older immigrant women and those who have spent less time in the country. These patterns were also observed in data from screening programs in Denmark (18) and Holland (16). In the United States and Canada, health surveys have also reported a lower rate of breast and cervical cancer screening exams within the immigrant population (19-21), particularly among those who have been in the country for less than 10 years (40).

The role of social class

Inequalities in the use of preventative services according to social class appear to persist in Spain, despite the existence of a universal health system which should counter-act this. Irrespective of country of origin, women from manual social classes undergo fewer preventive screening exams, as has been shown previously (22). The results show that rates are particularly low among women from the manual classes from low-income countries, although these differences are not always statistically significant. Consequently, the interaction between origin and social class is another axis of inequality. Again, it is observed that having access to the tests does not guarantee that they will be used, and that socioeconomic factors play an important role.

Population screening may also play an important role in terms of reducing class inequalities. Inequalities according to social class were lower among women aged 50 to 69 years. A study that analysed these preventative practices in various European countries according to type of screening program has demonstrated that inequalities according to socioeconomic position are greater in countries that do not have population screening programs (41).

Other variables: health cover and cohabitation

In this study, it was observed that women who have double health cover are more likely to undergo screening for both breast and cervical cancer, and this is probably because they are encouraged to do so by the fact of having paid for the service. It should be noted that women from non-manual classes have the highest percentage of double health coverage.

Two American studies (19-20), have shown that inequalities in breast and cervical cancer screening rates between recent immigrants and natives tend to diminish when it is controlled by medical insurance. However, the inequalities continue to exist among women who do not have insurance. We note that the results in terms of health cover in the US may not be comparable with our results. The American studies were carried out in a context where a public health service with universal cover was not available, which does exist in our country.

Independent of country of origin, we observe that women who live with a partner are more likely to undergo screening, which is consistent with the results of two previous studies. In Sweden, it was shown that not living with a partner was a contributing factor to non-participation (14). Moreover, a Canadian study showed that women who were older, single, less well-education, or born outside of the country underwent fewer cervical cancer screening exams (21).

Strengths and limitations

The ENS-2006 is a reliable source for understanding the state of health of the population and the use of health services. Moreover, ENS-2006 includes a sufficient number of the immigrant population allow analysis of the use of health services by this group. Despite this, stratifying immigrants according to high- and low-income countries of origin, the number of women from high-income countries is small. Thus, care is required in drawing inference from data related to this group. It would be interesting to analyse the effect of the length of time lived in the receiving country, since

previous studies have shown this to be an important factor (15,40); however, the ENS-2006 does not contain this information. We highlight the fact that health surveys do not include unregistered persons, who are likely to have a lower rate of use of preventative practices.

Conclusions and recommendations

The results show that country of origin and social class are key contributors to inequality in the use of breast and cervical cancer screening services among women resident in Spain. It is necessary to promote access to preventive practices for all women and also to carry out specific actions directed at the most vulnerable groups, taking into account the socio-cultural factors that influence the use of preventive services among women.

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Table 1 – Distribution of independent variables (number and percentage) among women aged 25-65 years, 40-49 years and 50-69 years. Spanish National Health Survey 2006.

	25-65 years (Nw = 10,093)			40-49 years (Nw = 2,841)			50-69 years (Nw = 3,833)		
	N	Nw	%1	N	Nw	%1	N	Nw	%1
Country of origin									
Spain	10,731	8,594	85.1	3,089	2,456	86.5	4,935	3,579	93.4
High-income countries	231	219	2.2	75	71	2.5	74	81	2.1
Low-income countries	929	1280	12.7	247	314	11.0	135	173	4.5
Social class									
Non-manual	6,323	5,268	52.2	1,938	1,551	54.6	2,399	1,781	46.5
Manual	5,426	4,712	46.7	1,449	1,269	44.7	2,616	1,957	51.1
Missing	142	113	1.1	24	21	0.7	129	95	2.4
Health insurance									
Only NHS	10,059	8,34	82.6	2,856	2,342	82.4	4,531	3,269	85.3
NHS & private	1,628	1,56	15.5	489	436	15.4	542	499	13.0
Missing	204	193	1.9	66	63	2.2	71	65	1.7
Cohabitation									
Yes	8,806	7,707	76.4	2,649	2,33	82.0	3,541	2,937	76.6
No	3,08	2,378	23.5	761	510	17.9	1,598	888	23.2
Missing	5	8	0.1	1	1	0.1	5	8	0.2

NHS = National Health System
N = Number of women without sample weighting
Nw = Number of women including weights derived from the complex sample design
1 – Percentage including weights derived from the complex sample design

Table 2: Frequency of cervical and breast cancer screening by country of origin. Spanish National Health Survey 2006.

	Spain	High income countries	Low income countries
	%	%	%
Cervical cancer screening			
Women 25-65 years[1]			
Between 1 and 5 years	65.1	60.6	56.1
more than 5 years	1.7	1.5	1.8
Only 1 previous cytology exam	14.2	7.2	11.4
Never	16.8	26.6	27.8
Missing	2.2	4.1	2.9
Breast cancer screening			
Women 40-49 years			
Every year	18.8	12.2	16.9
Every 2 years	19.6	29.9	9.1
Other periodicities	7.2	3.3	6.0
Only 1 previous mammography exam	18.9	16.7	19.5
Never	34.6	37.9	46.4
Missing	0.9	0.0	2.1
Breast cancer screening			
Women 50-69 years			
Every year	26.6	24.6	27.5
Every 2 years	53.6	41.5	19.6
Other periodicities	7.1	8.7	10.2
Only 1 previous mammography exam	4.6	10.0	13.3
Never	7.3	15.2	27.6
Missing	0.8	0.0	1.8

1 – Frequency of cervical cancer screening standardized by age

Table 3: Prevalence of periodic cervical and breast cancer screening (%) and age-adjusted Prevalence Ratios (PR2), and Prevalence Ratios obtained by multivariate analysis (PR3) and 95%CI, according to country of origin, social class, health insurance coverage and cohabitation status. Spanish National Health Survey 2006.

	Cervical cancer screening 25-65 years					Breast cancer screening 40-49 years					Breast cancer screening 50-69 years				
		Bivariate		Multivariate			Bivariate		Multivariate			Bivariate		Multivariate	
	%1	PR2	95% CI	PR3	95% CI	%	PR2	95% CI	PR3	95% CI	%	PR2	95% CI	PR3	95% CI
Country of origin															
Spain	65.1	1		1		38.5	1		1		80.2	1		1	
High-income countries	60.6	1.0	0.9-1.1	0.9	0.8-1.1	42.1	1.2	0.9-1.6	1.2	0.9-1.6	66.1	0.8	0.7-1.0	0.8	0.6-0.9
Low-income countries	56.1	0.7	0.7-0.8	0.8	0.7-0.9	26.0	0.7	0.5-0.9	0.7	0.6-0.9	47.1	0.6	0.5-0.8	0.6	0.5-0.8
Social class															
Non-manual	68.2	1		1		43.1	1		1		83.5	1		1	
Manual	48.8	0.8	0.7-0.8	0.8	0.8-0.9	30.3	0.7	0.6-0.8	0.8	0.7-0.9	74.6	0.9	0.8-0.9	0.9	0.9-1.0
Health insurance coverage															
Only NHS	56.0	1		1		33.7	1		1		77.2	1		1	
NHS & private	77.8	1.3	1.3-1.4	1.2	1.2-1.3	55.7	1.6	1.4-1.8	1.5	1.4-1.7	86.7	1.1	1.1-1.2	1.1	1.1-1.2
Cohabitation															
Yes	67.3	1		1		38.3	1		1		82.3	1		1	
No	40.5	0.7	0.7-0.8	0.7	0.7-0.8	32.3	0.8	0.7-1.0	0.9	0.7-1.0	65.9	0.8	0.7-0.8	0.8	0.8-0.9

1 – Prevalence of cervical cancer screening standardized by age
2 – Prevalence Ratios adjusted by age
3 - Prevalence Ratios adjusted by age and independent variables
NHS = National Health System

Table 4: Prevalence of periodic screening (%) and age-adjusted Prevalence Ratios obtained by multivariate analysis (PR[2]) and 95%CI, according to country of origin, health insurance coverage and cohabitation status, stratified by social class. Spanish National Health Survey 2006.

	Cervical cancer screening 25- 65 years			Breast cancer screening 40-49 years			Breast cancer screening 50-69 years		
	%[1]	PR[2]	95% CI	%	PR[2]	95% CI	%	PR[2]	95% CI
NON MANUAL									
Country of origin									
Spain	70.4	1		43.2	1		84.7	1	
High-income countries	70.4	1.0	0.8-1.1	63.5	1.4	1.0-1.9	67.1	0.8	0.6-1.0
Low-income countries	63.7	0.9	0.8-1.0	33.8	0.8	0.6-1.1	69.5	0.8	0.7-1.0
Health insurance coverage									
Only NHS	62.6	1		38.1	1		82.2	1	
NHS & private	83.0	1.3	1.1-1.5	59.6	1.6	1.4-1.8	90.0	1.1	1.0-1.2
Cohabitation									
Yes	73.0	1		44.5	1		87.2	1	
No	49.6	0.7	0.6-0.8	35.5	0.8	0.7-1.0	67.0	0.8	0.7-0.8
MANUAL									
Country of origin									
Spain	56.7	1		32.2	1		77.0	1	
High-income countries	44.5	0.8	0.6-1.1	13.6	0.4	0.2-1.1	61.6	0.7	0.4-1.2
Low-income countries	45.6	0.8	0.7-1.0	21.5	0.7	0.4-1.1	32.6	0.4	0.3-0.7
Health insurance coverage									
Only NHS	48.0	1		29.4	1		74.1	1	
NHS & private	50.4	1.1	0.8-1.5	42.0	1.4	1.0-1.9	81.6	1.1	1.0-1.3
Cohabitation									
Yes	57.2	1		12.9	1		77.9	1	
No	31.7	0.6	0.4-0.8	36.4	1.0	0.7-1.3	65.0	0.9	0.8-0.9

1- Prevalence of cervical cancer screening standardized by age
2– Prevalence Ratios adjusted by age and independent variables
NHS = National Health System

Paper 3: Pons-Vigués M, Puigpinós-Riera R, Rodríguez D, Fernández de Sanmamed MJ, Pasarín MI, Pérez G, Borrell C, Casamitjana M, Benet J. Country of origin and prevention of breast cancer: beliefs, knowledge and barriers.
(Under review)

COUNTRY OF ORIGIN AND PREVENTION OF BREAST CANCER: BELIEFS, KNOWLEDGE AND BARRIERS.

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ABSTRACT

Aim: To describe the concept of prevention and identify the knowledge, perceived benefits and barriers, and practices engaged in for early detection of breast cancer (BC) among women from different cultural backgrounds and socioeconomic levels.

Methods: Socioconstructivist qualitative study conducted in Barcelona city (2007-2008). The study population consisted of women who were either native or immigrants from low income countries, aged 40 to 69 years. The informants were selected based on a theoretical sample which took account of: country of birth, raised in rural or urban area, age, educational level, having a partner or not, and time residing in Spain. Narrations of the 68 informants were subjected to sociological discourse analysis. The

information was generated through 6 discussion groups, 9 triangulation groups and 5 individual in-depth interviews.

Results: Social and cultural origins lie behind differences in knowledge about and engagement in preventive practices. Beliefs and values of immigrant women change with entry into contact with the host country culture and with time in the host country. Younger women, those from urban areas, those of high socioeconomic level and those from countries valuing prevention are more inclined to participate in preventive activities. There is a discrepancy between knowledge and behaviours in the host country, which may be related with the migratory process, cultural barriers or with failure to understand the workings of the health system.

Conclusions: Place and culture of origin, social class and the migratory process are key factors in the utilisation of preventive practices and intervene as facilitators or barriers. Screening programmes ought to adopt a transcultural approach, and be capable of handling diversity through sensitisation and educational strategies adapted to the different realities.

Key words: Qualitative research, prevention, breast cancer, screening, immigration, attitudes, social class, beliefs

INTRODUCTION

Since the final years of the 20th century, Barcelona city has experienced a rapid growth in international immigration. In 2009 20.3% (173,790) of the women resident in the city had been born in a foreign country, whereas in 1996 this proportion was only 4.0% (1). These new citizens are mainly young, come from countries outside the European Union, and do mostly manual and/or seasonal work (2).

The effectiveness of mammographic screening in reducing mortality due to breast cancer (BC) has been demonstrated for women from 50 to 69 years of age (3), despite current controversy (4-6). Consequently, the recommendation is that all women should be informed about the possibility of early breast cancer detection, and about the benefits and risks deriving from mammographic screening, in order to enable them to make free and fully informed decisions in this regard. In Barcelona a populational BC screening program has been operating since 1995, targeting all women resident in the city aged 50 to 69 years, and consists of a free mammographic check-up every two years (7).

Health-related behaviours, including preventive practices, are strongly related to all sorts of social and cultural baggage which people carry about with them throughout their lives. In Spain, although the proportion of women undergoing regular BC controls has risen, recent studies have shown that there are still inequalities in regard to having periodic mammographic check-ups, both in terms of social class (8) and country of origin (9). As in other countries (10-13), preventive practices linked with BC are utilised less by the immigrant population. Although there is some

literature referring to the possible determinants of this lower participation of immigrant women (14-16), in a setting such as ours, i.e. multicultural and with a health system that provides universal coverage, no qualitative studies have yet been done comparing different groups of immigrants with native women. The justification for studying this is that, although there may be aspects common to all cultures, there are also certain culture-specific factors which relate differently with the various forms of health care. Moreover, specific actions are needed to favour equitable access to preventive practices for all women. Thus a profound understanding is needed of the perceptions, attitudes, barriers and facilitating aspects in regard to BC prevention perceived by women of different groups living in our society. In such a situation, the use of qualitative methodologies can contribute to advances in the comprehension of the phenomenon, by listening to the women themselves (17), and seeing the influence of culture and other structural factors related with country of origin, of socioeconomic position, and the fact of being an immigrant, in decisions made by women when it comes to undergoing mammographic controls for BC.

Hence the aim of the present study was to describe the concept of prevention and identify levels of knowledge, perceived benefits and barriers, as well as the practices engaged in with regard to early detection of breast cancer among native women and women immigrants from low-income countries, of different social classes, aged between 40 and 69 years, resident in the city of Barcelona. The study intended to identify particularly those aspects related with cultural origins, social status and the influence of the fact of being an immigrant.

PARTICIPANTS AND METHODS

Methodological development

We conducted a qualitative research from a socioconstructivist perspective (18), as it sought a sociocultural approach to the study object. Consistent with the perspective, the study was descriptive-interpretative (19) and carried out in Barcelona during the years 2007 and 2008.

Participants and sampling technique

The study population consisted of women who were either native, or immigrants from low-income countries, aged between 40 and 69 years, residing in Barcelona city. Participants were selected through a theoretical sample (20) defining profiles of informants in order to be representative of different groups of city residents and their differing discourses. The profiles were elaborated based on a literature review, on the experience of the research team, and information provided by key informants. The following aspects were taken into account: country of birth, urban or rural environment, age, educational level, having a partner or not, and time residing in Spain. The groups selected consisted of women from: Spain, Latin America, Eastern Europe, Philippines, China, Maghreb, Pakistan and India. Women who had (or had had) BC were excluded from the study. Various strategies were employed to locate participants, the most effective being contacts made through cultural mediators and in cultural associations(21).

Data collection and generation techniques

Data collection involved conversational techniques, both with groups and individuals. We initially planned to use 8 discussion groups (22) and 5

triangulation groups (23). However, due to difficulties met with in the search for informants (21), and in an attempt to achieve saturation of the discourse, in the end we employed 6 discussion groups, 9 triangulation groups and 5 individual in-depth interviews with community leaders (22). Groups were segmented by country of origin and, in the case of native and Latin American women, also by educational level, as an approximation to socioeconomic position. A total of 68 women participated, 18 native, 50 immigrants, 7 of whom were community leaders (Table 1). Semi-structured interviews were conducted in order to obtain information on participant's knowledge about and beliefs regarding benefits and barriers to early BC detection, which were pilot tested with one group, and further adapted where necessary as group interviewing proceeded.

Four cultural mediators were involved, from Morocco, Pakistan, China and the Ukraine. Mediators participated in the preparation and execution of information collection techniques. All interviews were conducted by the same moderator and in the presence of a cultural mediator and one observer from the research team. They were mostly held on the premises of cultural associations, and lasted for between 1 and 2 hours. Participants did not know research team members, and their participation was rewarded, without prior notification, with refreshments and a shopping voucher.

Processing and analysis of information

All sessions were sound-recorded and transcribed literally and systematically. In accordance with the approach used, a sociological analysis of the discourse of the information obtained was carried out,

paying particular attention to interpretational aspects, and to underlying meanings in the language employed (24,25). After successive readings of the transcriptions and formulation of preanalytical intuitions, we identified the axes along which the concept of prevention was elaborated. First, the texts obtained from each of the different groups were analysed separately, and subsequently a joint comparative analysis was carried out. The analytical procedures used were those proposed by Conde (25). The analysis process was triangulated (26) between members of the research team. Results for each community were validated (26) by the cultural mediator or by one participant from that community. This validation process added elements to the analysis and helped to clear up certain other confusing aspects.

Ethical considerations

The study was approved by a research ethical committee, and the informants participated voluntarily, after signing their informed consent. Anonymity and confidentiality was guaranteed, as was the protection of stored data.

RESULTS

The concept of prevention

The concept of prevention held by the different cultural groups was constructed in terms of three axes:: 1. “Before” *vs.* “now” ; 2. The proactive or deterministic conception of health-disease and 3. The motives behind their care practices directed to “the others” or to “me in relation to”.

1."Before *vs*. now" in the different cultural groups

Women from different groups clearly distinguished between 'before' and a 'now' in regard to BC prevention. In native women, 'before' was represented by what their mothers or grandmothers did. In the case of immigrant women, 'before' was symbolised by experiences lived in their countries of origin, by the cultural conception about prevention that existed there and by the resources on offer by the health system. Moreover, the perceptions and beliefs among immigrant women about preventive practices in their culture of origin act as facilitating or obstaculising factors in the prevention of BC in the host country. But these beliefs and values are also modified by entry into contact with the host country's culture.

> *"I can't forget how I lived in the Philippines, and here things are different...here I live like Spanish people but my way of being me is mine, the same as ever (Philippine woman –46 yrs)*

> *"When they come here, even women raised in small village; here you notice. You notice differences" (East European woman – 42 yrs)*

According to **native women,** prevention is a social value that they have learned and assimilated, even though it is of relatively recent introduction. Before there was no prevention since the resources currently available did not exist, one simply went to the doctor when sick, and anyway there was a certain taboo related to visiting a gynaecologist.

> *"My mother never went and we insisted that she had to go. On her first mammogram they found a calcification and had to remove a breast. And its not so much for lack of knowledge...like we were saying before: -«No. If I've had four kids, what do I have to go to the doctor for? »--. Its this, if you feel well: «why do I have to go?»--. These things that*

> *I suppose are more about mentality, not a necessity..." (Native woman—46 yrs)*

Prevention is not uniformly valued among **Latin American women**, partly due to characteristics of their health care models which make differences according to social class. In their countries health care resources tend to be concentrated in important cities and/or in private services, so that users must pay to get care. Consequently, women of higher socioeconomic class and/or in urban areas have better access to facilities, to information and to preventive practices; to a certain extent these class-related inequalities persist even after migration.

> *"In South America the same happens as in the rest of the world, right? There are more developed and less developed places, ok? And in the more developed areas they have much more information; they know more and have more ways and techniques to fight cancer" (Latin American woman – 60 yrs)*

Women from ex-Soviet Union countries, in general, are perfectly accustomed to prevention, mainly because the old Communist regimes promoted regular occupational health check-ups, and promoted gynaecological check-ups from a young age. Prevention was based on breast self-examination. They also have ingrained the concept that one must be healthy to be able to work and care for the family, something which is accentuated after migration. Romania, in contrast, did not promote health care or preventive practices in the same way.

Philippine women do not have the concept of prevention so strongly inculcated as a value. In their country check-ups must be paid for and hence prevention is not within the reach of the whole population. With time

in the host country, personal growth of the women themselves, plus the influence of the new environment, this concept gets modified.

> *"In the Philippines it is not something common. It is not normal to go for check-ups there. Only if you have some problem, there they'll find it for you. But prevention as such doesn't exist. There is no prevention because doctors aren't free there, you have to pay, and keep on paying" (Philippine woman – 61 yrs)*

In the case of **Chinese women,** oriental medicine and the culture itself have inculcated the habit of looking after oneself. They were accustomed to going for periodic occupational medical check-ups, although not so systematically as in the case of ex Soviet Union countries. For them prevention consists of looking after yourself in general and they do not tend to engage in specifically medical activities.

According to **women from Pakistan and India**, prevention is a rare commodity and hence does not lead to knowledge of it, nor to preventive attitudes or behaviours.

> *"There are people with breast cancer, but they don't know it. They don't do prevention there [...] the women don't know what's happening to them, until in the end they notice a lump or something and go to the doctor, have tests and find it's breast cancer. But they don't go until then. (Pakistani woman – 41 yrs)*

> *"We Pakistani women don't know what breast cancer is or how to prevent it...Nobody goes for check-ups." (Pakistani woman – 41 yrs)*

Women informants from Maghreb countries have a conception of prevention and health strongly influenced by the role of the woman in Islamic culture, which determines their life styles. In general, they do not

have the idea of prevention deeply rooted, their main health concerns deriving from their reproductive role.

> *"Moroccan women really look after themselves. The topic of fertility is very important to the women. So they look after themselves, for example they particularly look after their womb.(Moroccan woman – 40 yrs)*

According to the immigrant participants, in all their countries of origin, above all in China, the Philippines, Maghreb, and Pakistan and India, health care resources are mainly concentrated in urban areas and thus coverage is not universal. Therefore there are inequalities in knowledge, practices and resources between geographical areas, as well as between educational and socioeconomic levels. As a consequence part of the population, particularly in rural areas, use traditional medicine since it is cheaper than paying for allopathic medicine and drugs. In some cases, especially China, traditional medicine is highly respected and utilised by women of all social classes who prefer it and believe in it, although they are also clear about the roles of the two medical paradigms in the process of curing BC.

> *"They say it's the disease of the rich, because you need lots of money to get over it" (Philippine woman – 57 yrs)*

> *"I think that when you're born in city, everything is easier, right? Hospital or whatever always closer. Yes, and also more freedom, more time, in country different." (Chinese woman – 50 yrs)*

2. The proactive or deterministic conception of health-disease

Women cope with prevention of disease from different positions along an axis, the extremities of which correspond to deterministic and proactive attitudes. Among the most proactive, two very different realities are to be found, even though these coexist to a greater or lesser extent in all groups.

On one hand, those who consider prevention something involving technology and tests, on the other those who see it from a more holistic perspective, related to healthy habits and a healthy attitude to life (e.g. Chinese, Philippine and Maghreb women). Independently of origin or social class, all the women speak of healthy habits as a way of achieving better quality of life in general, but they do not relate them with prevention of BC. According to them, it is an unpredictable disease which can affect any woman at any time, and nothing can be done to avoid it. Being conscious of this, along with beliefs specific to each culture and woman, determines whether their attitude will be more or less proactive or deterministic.

> *"I think that its sort of in the physical make up of our organism and some develop it and some don't…I believe it develops at random, there are no fixed rules about whether one person will get and another not, regardless of whether you lead a healthy life, smoke or not, live this way, or live that way. I reckon its something you carry inside, it can come out, or not." (Native woman – 57 yrs)*

3. The motives behind their care practices directed to "the others" or to "me in relation to"

Women from different cultural groups have different motivations to look after their health and undertake prevention. For example, native and Chinese women tend to look after their own health and, although the family is present, they are not usually the principal object of their cares. In contrast, for East European women, looking after their health and being healthy is a duty and obligation in order to be able to work and care for the family. And this is even more important in the host country than in their country of origin because here they are either alone with children, or with a very limited family network. Maghreb, Pakistani and Indian women on the other hand tend to have an attitude of caring little for their own health since

they are expected to concentrate on care for and wellbeing of the family and this occupies all of their time.

In general self-awareness and the need to look after themselves increases among immigrant women with time in the host country and after a certain age (40-50 years), at which they say they are more prone to illness due, partly, to menopause. For example, Pakistani and Indian women manifest that after this age they are somewhat freer of family obligations and, with not feeling so young and healthy, begin to look after their health better.

> *"Culture, lots of responsibilities. Before, there is no time because much family politics. They have to worry about getting integrated, because marriages are arranged. So, lots of nerves about integration. From 45 years on, things are more settled. Up to 45, much shame. Later on yes, they look after themselves." (Pakistani woman – 41 yrs)*

Knowledge and practices of early detection of BC

Native women are able to distinguish between primary and secondary prevention, and mention knowing about various tests for early detection of BC: mammography, breast ecography, etc. In regard to mammography, they are convinced of its utility, but the contradictions and disparate opinions among professionals in respect of periodicity and age to start screening provokes mistrust and means they draw their own conclusions, not always in accord with Public Health guidelines. Thus, according to some women, mammograms should be done jointly with breast ecography, a test they have heard about recently. Their concept of BC prevention is linked to technology and undergoing tests periodically, because they know that BC can't be prevented but can be detected early. They express the need to have tests in order to get if off their mind, although they are also aware of the secondary effects of radiation. Many

women of the more advantaged social classes mention using private health services in order to obtain an annual mammogram, while women from more disadvantaged classes usually undergo the controls through the public system. In general, native women undergo preventive controls but in some cases admit to doing so rather less than would be necessary, through not having time.

> *"once you're at the doctor's, you might as well have a full check-up, right?" (Native woman – 59 yrs)*

> *"I remember that for my part I did go. But there were times when really it was a struggle. Mostly for the pressure of work. You never found the right moment…you never had time…I mean, I made myself go for my own good, I would have skipped it heaps of times. But not for prudishness or fear, really just to get another thing done and out of the way" (Native woman – 62 yrs)*

Latin American women are vaguely aware of the difference between primary and secondary prevention, but do not have the difference so clearly established as native women. They believe that mammography is painful and that, depending on machine and operator, can hurt even more. They are conscious that radiation can provoke adverse effects, and for some this the justification for having mammograms biannually. Some consider that in Spain, with the necessary health resources within reach, health and check-ups are each person's individual responsibility. In contrast, particularly more recent immigrants and/or those of more deterministic attitudes, comment rather that they can't afford to take time off work in order to go for preventive tests.

> *"Because another problem is the radiation. Its all a bit scary, you don't know which is worse, the control or the radiation, but, well, the doctors say there's no problem.*

> *Because, often they send you not every year, but every second one for the same reason. Overdoing it can be as bad as not enough, can't it?" (Latin American woman – 58 yrs)*

> *"Here there are all the means for anyone to have all the tests they want. And its easy. But its a question of time and what that means in terms of money. You're supposed to be sending money to your husband, kids, your parents, to everyone" (Latin American woman – 50 yrs)*

As mentioned earlier, **ex Soviet Union women** are accustomed to the habits of BC prevention. Even so, in the host country there are differences at times between what they believe (going for periodic mammographic check-ups is very important) and what they actually do, mainly because their priority is to integrate, and also because they don't know how the health system works here. Breast self-examination was the method used in their home countries and thus they consider it archaic and unreliable, but better than doing nothing. Once in the host country, they have considerable faith in mammography and associate it with higher probabilities of early detection and thus of obtaining a cure for the disease. In contrast **Romanian women** have a certain degree of prudishness when it comes to going for check-ups, and less knowledge, barriers which are being overcome among the younger women and those who have been living in the host country for longer.

> *"In my opinion, mammography is the most advanced method, the most modern way to detect breast cancer. In our country there was an older way, breast self-examination… and every woman knows how to do it, and knows well enough that it's necessary from time to time." (East European woman – 58 yrs)*

Philippine women appear not to have a very clear idea about BC prevention; partly due to their perception that it is a rare disease, and also the association between being wealthy and getting cured in their country. Apart from relating health care with healthy habits and not feeling vulnerable to BC, the migration process and the role of the working immigrant woman have a considerable influence on BC preventive practices. In the host country, they need to work and can't waste time going for periodic preventive check-ups.

Chinese women know about BC early detection measures, although to a lesser extent among rural and/or less educated women. In spite of this knowledge, they find it difficult to talk about this topic as it produces fear and sadness; for them sadness is a source of disease. Culturally they lend more importance to healthy habits than to periodic controls. Moreover, they tend to prefer to go for control check-ups when they visit their home country rather than here, partly due to language difficulties, but also to mistrust in the health system and health care professionals.

> *"The language is a bit hard, isn't it? If you don't understand the language it makes things difficult at times. In China its your language and so everything's easier." (Chinese woman – 50 yrs)*

In general **women from Pakistan and India** do not do anything about BC prevention because they don't know about early detection measures, BC is a disease surrounded by a certain taboo which, like other intimate aspects of the body, cause embarrassment, and anyway there is a belief that in absence of symptoms there is no need to go to the doctor. Some of them see having blood and urine tested occasionally as a form of prevention, considering that these tests will detect any problem.

> *"The women don't go for tests and cancer is a big word so people don't talk about it much." (Indian woman – 42 yrs)*

Culturally, **Maghreb women** lend considerable importance to looking after their reproductive organs in both the physiological and aesthetic sense, but this care is focused on reproduction more than prevention of diseases like BC. Consequently such care is mostly something done by women of child-bearing age. They know about breast self-examination and mammography, but this is recent and they are not widely spread practices. They do not feel particularly vulnerable and are afraid of having a mammographic examination, and of the radiation. In their countries of origin mammography is possibly something they associate with "modern women", in other words women with studies and/or from urban settings.

> *"In Morocco touching yourself is a rather limited topic for women, well, for men too. We don't have all this so assimilated… (…) it's considered the responsibility of the doctor to do. Anyway, I could get it wrong, (…) I prefer a nurse to do it, or some other person, not me." (Moroccan woman – 40 yrs)*

Barriers to, and facilities for, early detection in the host country

In all the groups of immigrant women, regardless of origin and hence of their knowledge, beliefs and values with respect to prevention, the migratory process and role of the immigrant woman influence prevention related behaviours in the host country. This is determined by factors such as ignorance and lack of information about the health system (more or less marked, depending on the group), lack of time, prioritising work over going to the doctor, family burden with little support, language difficulties, etc. Young age, being from an urban area, high socioeconomic level and the

value attributed to prevention in their countries of origin favoured engaging in preventive activities. With time, there is a tendency for immigrant women's preventive behaviours to evolve, as they acquire facilitating factors and barriers lessen. This evolution towards acceptance of prevention is more rapid in those groups working outside the home and thus have to fully integrate in the host society.

Table 2 summarises the main barriers faced by immigrant women in regard to BC prevention in the host country, both those related with their sociocultural origin, and those deriving from the migratory process.

DISCUSSION

The most noteworthy findings of this research are described below. The concept of prevention is a cultural construct influenced, among other aspects, by socioeconomic level, coming from a rural or urban background, and the migratory process itself. All these aspects intervene as either facilitators or barriers to BC prevention in the host country. Hence social and cultural origins result in differences in knowledge and practices related to BC prevention. Beliefs and values of immigrant women change through their contact with the host country culture and with duration of this contact. Younger women, those from urban areas, those of high socioeconomic level and those from countries where the value of prevention is recognised are more inclined to participate in preventive activities. The main barriers to early detection related with the migratory process are: ignorance and lack of information about the health system, lack of time, priority given to working compared to going to the doctor, family burdens, and language difficulties.

As far as we are aware, this is the first study to compare knowledge, perceptions and barriers faced by women from different countries of origin and social classes in regard to early detection of BC in a multicultural society with a heath system providing universal coverage. The existing studies (16,27-34) deal with specific groups, and do not compare different groups of immigrants with native women. Taking country of origin into account is important since the concepts and values attributed to health and prevention result from a dynamic construction involving cultural, socioeconomic and structural aspects (35). The women's values and significations regarding breast health practices are deeply rooted in cultural suppositions which condition their attitudes and behaviours in this respect. Moreover, cultural values or meanings have been identified related with prudishness as barriers to early detection among women from different backgrounds, such as Islamic women, or those from Southern Asia, etc.(34)

In general, women immigrants come from low income countries where promotion of, and/or the necessary resources for, prevention are not within the reach of all. In the groups studied, difficulties of access to prevention are magnified in the less favoured social classes and in rural areas; these inequalities are brought to the host country, as these women are the ones with the least knowledge about BC and its prevention, and also the ones who perceive the barriers more acutely. Spain has a health system providing universal coverage, something which is not the case in their countries of origin, and this fact is mentioned by participants as a positive aspect facilitating preventive control of BC. But the universal health system coverage is not sufficient to overcome their concerns (36) due to the strong

influence of aspects such as the value attributed to prevention in their countries of origin, their socioeconomic level, whether they are from rural or urban areas, and the migratory process itself, as other studies have reported (14,27,37). These determinants also have certain peculiarities and specificities which vary from one group of women to another. Moreover it must be borne in mind that at times there may be discrepancies between knowledge, beliefs and behaviours in the host country, explainable, once more, by their migrant status, by cultural barriers and failure to comprehend the health service. For example, women immigrants from ex Soviet Union countries are perfectly familiar with prevention but do not act in consequence in the host country due to barriers related with their being immigrants. Another study found that scant knowledge about the workings of their "new" health system, its services, and their rights, conceding higher priority to integration than to health, etc. were barriers which impeded Russian women from maintaining their old prevention routines (27).

The situation of women immigrants from low-income countries is not so different from lifestyles in Spain only a few decades ago. The native participants themselves mention how prevention is a recently acquired value which was not commonplace in the era of their mothers or grandmothers. Nowadays, they consider that prevention is available for the entire population and many women associate it with technology and tests, the more the better.

Length of time residing in the host country is a key factor in many aspects, not just health, although it may act differently depending on country of origin. The longer the time of residence, the greater the opportunities to

enter into contact with the host country's culture, to overcome migration related barriers, etc. and hence to assimilate the concepts of early detection without losing their identity of origin (10,16). In the same way that there has been a generational change in regard to prevention and cancer as a taboo disease in most native women, it is to be expected that the same will eventually happen among the immigrants. Most of the immigrant women in the study had arrived here recently, in other words, as adults. It may be assumed that for women of newer generations it will be easier to make this change of mentality. As has already been reported (11,27,38,39), older women participate less in screening programmes.

One cultural aspect with considerable impact on many areas of life, including preventive practices, is the family (40). Earlier studies have observed that married women tend to undertake BC preventive controls more (11,39,41). Possible reasons for this have been suggested, such as that these women enjoy greater social support, or are more conscious of their health, or feel responsibility towards the family (41). But in the present study we see that the family may be an incentive to look after oneself and engage in prevention, but it may also be a barrier. For example women from East Europe say they must look after themselves to be able to look after the family, whereas Maghreb women, and those from Pakistan and India say they do not have time to look after themselves, due to family responsibilities.

Actions to promote early detection of BC and eliminate barriers are necessary, but each group of women has its specific peculiarities and thus these actions should be specific to each group. It is true that some barriers

are common but they do not affect all immigrant women in the same way, nor do they have the same weight for them. For example, among women from ex Soviet Union countries, actions oriented to inform about the health system and its services would be appropriate. Among Chinese women, work to build up confidence in the health system and staff could be undertaken, since once in the host country, as they interact relatively little and have language difficulties, mutual distrust is generated. This means that many opt to go for complete check-ups only during trips back home. Among Philippine women, the issue to address is that BC can be cured if treated in time, regardless of socioeconomic level. Among Maghreb women one could make use of their contacts with the health system, for other fertility related matters, to disseminate the messages. And for Pakistani and Indian women knowledge about the disease and its prevention must be reinforced, since this lack of knowledge (both about screening and its benefits, and the disease, etc.) is an important barrier to their engagement in preventive practices (41-45). All these actions would be much more beneficial if designed and executed taking into account immigrant's associations and cultural entities, such as we visited during the fieldwork, since they are very helpful and a source of health-related information for immigrant women (46). Moreover, one could take advantage of the good rapport the women have with their family doctor, who could inform them about BC screening, since some studies have reported that recommendation of screening by a doctor is a key element for attending screening. (41,47,48).

Strengths and limitations

The qualitative method adopted has yielded considerable, and diverse, information; even so, saturation of the discourse was not total in some cases. The research team is conscious of not having reached those immigrant women in the most disadvantaged socioeconomic levels, women who are more vulnerable and in consequence the ones who engage least in preventive practices. Despite working together with cultural mediators, it was difficult to capture meanings when language difficulties meant communication between the researchers and the informants was suboptimal. Some of the participating immigrants appeared to condition their discourse in such a way as to leave a good impression about the host country, and about their own culture of origin, in the eyes of the research team. Apart from facilitating contact with the participant women, working with cultural mediators allows for greater impartiality and avoids the risk of over-interpretation or miss-interpretation of people from other cultures. The rigor procedures used (triangulation, achieving saturation, working with cultural mediators, validation of the results by informants and/or mediators, etc) have ensured the validity of the findings.

Conclusions

The results of the present study show that the culture and place of origin (in both senses: country and rural/urban setting), social class and the migratory process itself are key factors in the utilisation of preventive practices. Thus, screening programmes ought to adopt a transcultural approach, and be capable of handling diversity through educational and sensitisation activities adapted for the different realities.

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Table 1: Description of the women informants according to origin

Group of women	Number women	Country of origin	Age (years)	Educational level	Couple	Children	Area of origin	Time of residence
Native	16	Spain	Between 46 and 65	8 university 4 secondary+high school 4 primary	9 with couple 7 without couple	12 with children 4 without children	7 from Catalonia 9 from other parts of Spain	Not applicable
Latin American	12	2 Perú 2 Ecuador 4 Colombia 3 Argentina 1 Bolivia	Between 45 and 64	8 university 4 secondary+high school	7 with couple 5 without couple	10 with children 2 without children	9 urban area 3 rural area	3 ≤ 5 years 9 > 5 years
Eastern European	9	2 Russia 2 Ukraine 4 Moldavia 1 Romania	Between 41 and 58	6 university 3 secondary+high school	6 with couple 3 without couple	8 with children 1 without children	6 urban area 3 rural area	4 ≤ 5 years 5 > 5 years
Filipino	10	Philippines	Between 31* and 62	6 university 4 secondary+high school	7 with couple 3 without couple	7 with children 3 without children	10 rural area	1 ≤ 5 years 9 > 5 years
Chinese	10	China	Between 40 and 69	3 university 6 secondary+high school 1 primary	5 with couple 3 without couple 2 no answer	10 with children	5 urban area 5 rural area	2 ≤ 5 years 9 > 5 years
Maghrebi	5	4 Morocco 1 Algeria	Between 40 and 43	4 university 1 primary	4 with couple 1 without couple	3 with children 2 without children	3 urban area 2 rural area	1 ≤ 5 years 5 > 5 years
Pakistani-Indian	6	4 Pakistan 2 India	Between 31* and 57	3 university 1 secondary+high school 2 primary	3 with couple 3 without couple	5 with children 1 without children	3 urban area 3 rural area	3 ≤ 5 years 3 > 5 years

* 2 of the participants were under 40 years, but were interviewed as community leaders. For this reason, they were not excluded.

Table 2: Main barriers perceived by immigrant women to breast cancer (BC) prevention in the host country

Aspects of the country of origin	Demographic socio-economic aspects	Aspects of the health system	Aspects of the early detection of BC
Health system in the country of origin with few public resources	Low social class	No knowledge of the health system and how to use it	No knowledge of the disease, its importance and severity
Inequalities by socioeconomic position of information, access and resources	Low educational level	Perceptions, attitudes and mistrust of health services	Not knowing what causes the disease: random causes, will of God, etc.
Inequalities by education level of information, access and resources	Age	Factors due to saturation of the system: slow, long waiting lists, few resources, scant resolution processes.	No knowledge of the possibility of early detection and cure
Inequalities of information, access and resources depending on setting of origin (urban/rural)	Lack of language of the host country	Aspects of system performance: doctor's opening hours, planning visits and long-term tests	Lack of culture of prevention and, therefore, have a deterministic attitude
Patriarchal culture as a limiter of information and knowledge	A little time spent in the host country	Perceptions and mistrust of health professionals: shortage of professionals, impersonal care, low empathy, constant change.	Low risk perception
Cultural issues that mean health is not a priority	Lack of available time	Bad previous experiences with the health system and health professionals	Suffering and fear related to the process of conducting the mammogram
Health care linked to reproductive function. Therefore for single women or menopausal women care not a priority	Low integration	No faith in Western medicine	Fear of radiation from mammography
Value-Role given to health and disease	Have other priorities linked from the migration process: work, home, integration, etc.		Fear of the result of mammography: finding cancer
	Low family and social support		Not wanting to think and be afraid of BC
	Lack of breast cancer cases as an information source		Shame, sometimes related to gynaecologist's sex
			Erroneous beliefs about treatment: e.g. to treat cancer has always been to amputate the breast
			Contradictions between professionals over the age of onset and frequency of screening
			Generational age: deterministic mindset

Paper 4: Pons-Vigués M, Puigpinós-Riera R, Serral G, Pasarín MI, Rodríguez D, Pérez G, Benet J, Casamitjana M, Borrell C. Knowledge, attitude and perceptions of breast cancer screening among native and immigrant women in Barcelona. (Under review)

KNOWLEDGE, ATTITUDE AND PERCEPTIONS OF BREAST CANCER SCREENING AMONG NATIVE AND IMMIGRANT WOMEN IN BARCELONA.

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ABSTRACT

Objective: Inequalities between immigrant and native populations in terms of access and use of health services have been described. The objective of this study is to compare knowledge, attitudes, vulnerabilities, benefits and barriers related to breast cancer (BC) and screening mammography among women from different countries resident in Barcelona.

Methods: A cross-sectional survey carried out in Barcelona in 2009. The study population consisted of female residents in Barcelona between 45 and 69 years of age; participants were Spanish nationals or immigrants from low-income countries of origin. 960 participants were asked 72 questions, mainly with Likert responses. The dependent variables were 5 quantitative scales: 1) knowledge of BC and early detection, 2) positive attitude towards health and BC, 3) perceived vulnerability to BC, 4) perceived barriers to mammography, and 5) perceived benefits of

mammography. The independent variables were country of origin, social class, urban or rural setting, cohabitation, age, mammography use, length of residence and fluency in either of the languages of the host country. Analyses compared scale scores stratified by the independent variables. Multivariate linear regression models were fitted to determine the relationship between the scales and the independent variables.

Results: We observed inequalities according to country of origin on all scales after adjustment for independent variables. Chinese women presented the greatest differences with respect to native women, followed by Maghrebi and Filipino women. Inequalities exist on the vulnerability and barriers scales according to social class and urban/rural setting, and on the attitude scale according to social class.

Conclusions: Country of origin, social class and urban/rural setting are key contributors to inequality in these scales.

Keywords: Screening, Breast cancer, Immigration, Barriers, Knowledge, Perceptions

INTRODUCTION

Worldwide, breast cancer (BC) is the most common form of cancer among women (1) and is the leading cause of death among women aged 45-74 years in Barcelona (2). Mammography is the only screening test that has been shown to improve BC survival (3). In Barcelona a populational BC screening program has been operating since 1995, targeting all women resident in the city (native or immigrant) aged 50 to 69 years, and consists of a free mammography examination every 2 years (4).

Previous studies have indicated that BC screening services are used less frequently by different groups of immigrants (5-9), which mirrors the pattern observed among women from lower social classes (10-12). This inequality is caused by a number of factors, including social, economic, employment and health conditions in both the origin and destination countries, reason for migrating, health disorders related to the migration process, value of health and prevention in the culture of origin, understanding of BC, language difficulties, etc (13-16). Consequently, migration constitutes an axis of inequality that is distinct from and additional to those of social class, gender, and interactions between these axis (17,18).

At the end of the 20th century, a wave of foreign immigration from low income countries to Barcelona began. In 2009, 20.3% of women resident in Barcelona were born in a foreign country, compared to 4.0% in 1996. The majority of these immigrants are from Latin American, Eastern European, and North African countries (19).

Previous studies of the use of BC screening practices by immigrant women have only described the patterns of use of preventive practices and their relationship with socio-demographic and socio-economic factors. As far as we are aware, important factors such as knowledge, attitudes, benefits or barriers to BC screening have not been assessed to date among native and immigrant women in a country with universal healthcare coverage, and where the immigrant population has increased markedly in only a few years. The present article tries to address these issues because knowledge, attitudes and perceptions towards the disease and its prevention are determinants of behaviour. Following a qualitative study (20), whose main purpose was to quantify knowledge, beliefs, attitudes, benefits and barriers to BC and mammography among women from different backgrounds, we conducted a questionnaire-based study. Better understanding of the factors that ultimately influence screening is important because BC can be cured if detected in time. This investigation may help to find specific actions in order to remove breast cancer screening barriers, whatever the origin and social class of the women involved. In summary, the main aim of this study was to compare knowledge, attitude, vulnerability, benefits and barriers in relation to BC and screening mammography among women of different nationalities resident in Barcelona.

METHODS

Design, study population and sample

We carried out a cross-sectional survey in Barcelona during 2009. The study population consisted of all women residing in the city of Barcelona aged between 45 and 69 years, who were either Spanish nationals or

immigrants from low-income countries of origin (N= 253,125). The women aged 45 to 49 years, although not being part of the program's target population, have been included because they will, presumably, soon be part of it, and it is important to determine their knowledge and beliefs. The selected low-income countries were the same as those used in a previous qualitative study (20), representing the most numerous and culturally diverse nationalities in the city. Specifically, women born in the following regions were selected: Latin America, Eastern Europe, Maghreb, The Philippines, China, Pakistan and India. The convenience number of sample comprised 960 women. Immigrant women were over-represented and distributed according to their relative proportions in the population (275 native women, 257 from Latin America, 154 from Eastern Europe, 96 from Maghreb, 78 from The Philippines, 75 from China and 25 from Pakistan or India). A representative sample of each group was selected from the study population by simple random sampling from the census, which includes personal data such as telephone number. In order to obtain the sample, 2822 women were contacted. On average, one native and one immigrant participant was recruited for every 1.6 and 3.8 individuals contacted, respectively. In immigrant groups, the average fluctuated between 2.5 in Latin-American women and 5.7 in Chinese women. The main reasons for non-participation were inability to make contact (41.6%), change of address (39.9%) and unwillingness to participate (13.3%). Women who had or had had BC (3.8%) were excluded from the study.

Questionnaire

A structured questionnaire was developed. Many of the questions were obtained from surveys used in previous cancer screening studies (21-23)

and additional questions were developed based on earlier qualitative research (20). The questionnaire was adapted (content validation and cultural adaptation) by a team of researchers and a comprehension test was carried out among women from the target group (17 native and immigrant women). A pilot study of 50 respondents identified necessary amendments to be made to the questionnaire. The final version included 72 questions in 7 areas: 1) socio-demographic and socioeconomic factors, 2) knowledge of BC and early detection, 3) beliefs and attitudes towards health and BC, 4) perceived benefits of and barriers to screening mammography, 5) behaviour with respect to early detection of BC 6) familiarity with the BC screening program, and 7) use of health services. Most of the questions in areas 2, 3, 4 and 7 were formulated as statements where answers were given on a 5-point Likert scale, ranging from "completely disagree" to "completely agree". An additional "don't know or don't remember" option was included. This report focuses on areas 1 to 5. The questionnaire was developed in Catalan and Spanish (both official languages), and subsequently translated into English, Russian, Arabic and Chinese. To ensure correct translation and the cultural adaptation, for each language a bilingual person reviewed the questionnaire.

Data collection

The survey was performed during 5 months, from December 2008 to April 2009. A letter was sent to each of the women selected, describing the study and indicating that an interviewer would contact her. The questionnaire was administered by telephone by trained female interviewers and 3 cultural mediators (from Morocco, China and the Ukraine). The telephone calls were made between 9 am to 9 pm from

Monday to Friday. The interviewers made at least 9 attempts at different times before considering a woman as a non-participant. To achieve the desired number of interviews, we also searched for immigrant participants in various associations and religious centres (3.8% of interviews). The interview took about 17 minutes. For reasons related to language, 13.5 % of the participants answered the questionnaire in a language other than Catalan or Spanish. The study was approved by an ethics committee and the informants participated voluntarily and without received incentives. Anonymity and confidentiality was guaranteed, as was the protection of stored data.

Variables

The 5 dependent variables were: 1) **knowledge** of BC and early detection, 2) positive **attitude** towards health and BC, 3) perceived **vulnerability** to BC, 4) perceived **barriers** to screening mammography, and 5) perceived **benefits** of screening mammography.

The dependent variables were scales composed of various elements. A priori reasoning about questions, and results of the univariate analysis, factor analysis, and correlation analysis informed the selection of these elements. Scales were composed of between 5 and 7 items (see appendix). The internal consistency of the 5 multi-item scales was measured by the standardized Cronbach alpha: 0.42 for knowledge, 0.49 for attitude, 0.67 for vulnerability, 0.69 for barriers and 0.71 for benefits. Scale scores were computed for each subject by summing the scores for the items included and then expressing the global score on a scale of 0-100. Higher scores represented better knowledge and attitude, and greater

perception of vulnerability, benefits and barriers. As a rule, missing values were allowed for a maximum of 2 items per scale for each subject; results for individuals who failed to respond to more than 2 items were treated as missing (between 1 and 11 women per scale). The response option "don't know or don't remember" was considered as a missing value. Individuals with ≤2 missing values were assigned the average score for the items to which they did not respond, except on the knowledge scale, for which missing items were assigned the value 0. Overall, 71% of the women answered 27 or more of the total of 30 items.

The independent variables were:

- Country of origin: defined according to country of birth, categorized in 7 groups: native, Latin American, Eastern European, Maghrebi, Filipino, Chinese and Pakistani-Indian.
- Social class: based on the current or last occupation, or in its absence, the occupation of the partner; measured with a widely used Spanish adaptation of the British Registrar General classification (24) consisting of 5 classes, which were collapsed into two groups for the purposes of this study: non-manual (I-II-III) and manual (IV-V).
- Setting: a variable consisting of two categories according to whether the participant had resided in an urban area or in rural area for most of their life; considered to be urban when the woman had resided in a city with ≥10,000 inhabitants, and rural otherwise.
- Cohabitation: a dichotomous variable indicating whether or not the participant lived with her partner

- Mammography use within the previous 2 years: assessed using 2 questions: “Have you ever had a mammography?”, and “How long has it been since your last mammography?”.
- Time of residence in the host country: categorized in 2 groups: ≤10 years, and >10 years.
- Facility in one of the languages of the host country: indicated whether immigrant participants were capable holding a conversation with one of the two official languages in Catalonia.

Data analysis

A descriptive analysis of all variables was carried out stratified by country of origin. The mean ($\overline{X}$) and standard error of each scale were calculated stratified by the independent variables. Normality and homoscedasticity of the 5 scales were verified. Where the requirements for normality and homoscedasticity were met, we tested for differences in the 5 scales according to country of origin using ANOVA. If these requirements were not met (in scales of knowledge, barriers and benefits), the non-parametric Kruskal-Wallis test was used. Subsequently post hoc tests were carried out for both cases to determine which groups were different with respect to native women. The Student’s T-test or Mann-Whitney test was used to test for differences between the 5 scales when the independent variables were dichotomous.

Finally, multivariable linear regression models were fitted to assess the relationship between the dependent and independent variables. The native women constituted the reference category in each analysis. In all

regression models, goodness of fit and multi-collinearity were assessed. All analyses were performed using the STATA/SE 10.1 statistical package(25).

RESULTS

Table 1 shows the distribution of the independent variables in the sample stratified by country of origin. Most women were between 50 and 59 years of age and had lived longer in urban areas. Immigrant women were more often categorised in the manual class, and native women more often in the non-manual class.

Table 2 shows the mean of each dependent variable according to country of origin and the results of the ANOVA or Kruskal-Wallis tests and the post hoc tests. Native ($\overline{X}$ =55.7) and Latin American ($\overline{X}$ =55.5) women had greater knowledge. Chinese women scored 12.2 points lower than native women on the knowledge scale. Immigrant women had fewer points on the positive attitude scale than native women ($\overline{X}$ =72.6). However, these differences were only significant between native women and Filipino ($\overline{X}$ =68.1) and Maghrebi ($\overline{X}$ =65.6) women. Chinese ($\overline{X}$ =44.0) and Filipino ($\overline{X}$ =44.6) women felt least vulnerability to BC, while Maghrebi ($\overline{X}$ =59.0) and Latin American ($\overline{X}$ =56.3) women were those who felt most vulnerable. All immigrant women perceived significantly more barriers to mammography than native women ($\overline{X}$ =23.7). Maghrebi women perceived the most barriers to screening, being 14.0 points higher than native women. Native women ($\overline{X}$ =77.3) and those from eastern European countries ($\overline{X}$ =77.3) had the most positive perception of the benefits of mammography. There were significant differences in this perception

between native women and Filipino ($\overline{X}$ =73.0), Chinese ($\overline{X}$ =74.1) and Maghrebi ($\overline{X}$ =73.5) women.

Table 3 shows the mean of the dependent variables stratified by the dichotomous independent variables and the results of the corresponding Student T-tests and Mann-Whitney tests. Women from non-manual classes had significantly better knowledge, a more positive attitude, perceived less vulnerability to BC and fewer barriers to BC screening than women from manual classes. Women from urban settings and those cohabiting with a partner had a more positive attitude and fewer barriers. In addition, urban women perceived greater benefits. Having had a mammography within the past 2 years was significantly associated with a higher mean score on the knowledge scale, a more positive attitude and a lower mean score on the perceived barriers scale. Immigrants living in the city for more than 10 years perceive less vulnerability and greater benefits. The immigrants who speak one of the official languages had greater knowledge and perceived fewer barriers.

Table 4 shows the results obtained from the multivariable linear regression models. After adjusting for social class, setting, mammography use and age, Chinese women had 12.47 fewer points on the knowledge scale (95% CI -16.27; -8.67) than native women. Immigrant women had fewer points on the positive attitude scale compared to native women, and these differences were significant for Filipino, Chinese and Maghrebi women. Eastern European, Chinese and Filipino women felt significantly less vulnerable to BC. In contrast, Maghrebi women scored 4.51 points higher (95% CI 0.35; 8.67) on this scale. Moreover, immigrant women perceived

fewer benefits of mammography, with the exception of Latin American women, Eastern European women and Pakistani-Indian women. In addition, immigrant women perceived significantly more barriers than native women, except Filipino women. Women from non-manual classes had a significantly more positive attitude, less vulnerability and fewer barriers than those from manual classes, after adjustment for the other variables. Women from urban settings perceived less vulnerability and fewer barriers, while women who had had a mammography within the previous 2 years (-3.86; 95% CI –6.18; -1.53) perceived fewer barriers to screening mammography.

DISCUSSION

This study's main contribution to current evidence about BC screening is the fact that it shows that there are country of origin-dependent inequalities on all scales, even after adjustment for social class and setting. Chinese women showed the greatest differences with respect to native women. They had poorer knowledge, less positive attitude, perceived greater vulnerability to BC, perceived fewer benefits from screening and more barriers to screening compared to native women. After Chinese women, Maghrebi and Filipino women showed the greatest differences with respect to native women. We observed inequality according to social class and urban/rural setting on the vulnerability and barriers scales, and also according to social class on the attitude scale.

Strengths and limitations

This study has several strengths. It is the first study of this kind conducted in a Southern European country and the results take different sources of

social inequality (country of origin and social class) into account. Therefore, it is a reliable source for understanding the beliefs and attitudes of these women. It is interesting to be able to stratify the data for immigrant women according to their country of origin. The realities of these distinct immigrant groups are very different and they cannot be analysed together. This should be taken into account when implementing policies to encourage screening, as not all women have the same needs, so these policies must be adapted for each group. Working with cultural mediators allowed us to get closer to immigrant women and to include individuals who could not speak any of the languages of the host country.

One limitation is the low internal consistency of the knowledge and attitude scales, despite the fact that these were developed from previous qualitative and quantitative studies (20-23). Consequently, more research is needed to develop appropriate scales for knowledge and attitude. We highlight the fact that the survey did not completely capture the population of immigrant women at the lowest socio-economic levels because these individuals may not be listed in the census, however they are a minority. These women are much more vulnerable and use preventive practices much less frequently. However, the large, heterogeneous and representative sample used lends support to our findings. It is notable that the results from Pakistani-Indian women had wide confidence intervals, mainly due to the small number of participants, and it should be borne in mind that the number of Pakistani-Indian women of this age in Barcelona is limited. Nevertheless, it was considered interesting to study their opinions and beliefs because they are a very diverse cultural group.

Inequalities according to country of origin

This study found that native and immigrant women show markedly different patterns on several scales. Immigrant women resident in Barcelona are a heterogeneous population with heterogeneous knowledge, attitude, vulnerability, barriers and benefits. The concepts of health and prevention, as well as everything that surrounds them, have a dynamic construction of a cultural, socioeconomic and structural type (26). Consequently, the meaning of concepts such as vulnerability, beliefs and perceptions to BC and BC screening are not universal and hence should not be uniformly treated across diverse groups (27). However, the patterns of indicators observed were generally worse among all immigrant groups (except in the case of the vulnerability scale). It should be borne in mind that resettlement is accompanied by a reduction in health consciousness as a result of preoccupation with immediate problems of survival and adjustment in the new country (28). Therefore, origin is an axis of inequality not only in carrying out preventive practices. All 5 dependent variables are key components of several well-known models of health behavior (29). In consequence, as immigrants have a lower BC screening control (8,9,30), it is necessary to work on these 5 points in order to promote screening.

The immigrant group that showed the greatest differences with respect to native women, were the Chinese; Latin-American women showed the least differences followed by Eastern Europeans. A possible explanation might be that the cultural distance between natives and Chinese is much bigger than for the other groups studied. Moreover, examining the level of integration since the time of entry and the ability to speak one of the languages of the host country, we see that only 33.3% of Chinese women

can speak one of the languages, while 64% of them have lived here for more than 10 years. In contrast, 72.1% of Eastern European women speak one of the languages, while only 14.3% have lived here for more than 10 years. Previous studies show that Chinese women have misconceptions and inaccurate knowledge about breast cancer and screening (31,32). Many view themselves as having much lower vulnerability to developing BC compared to native women (31). The results of this study are consistent with these previous findings. After Chinese, Maghrebi and Filipino women showed the greatest differences with respect to native women. Again, these women have a cultural background distinct from that of native women.

As seen in previous studies (16), all immigrant groups perceived more barriers to mammography than native women. This marked difference is not only due to cultural factors, but may also be partly due to the migratory process. For example, between 8% and 30.2% of immigrants perceived lack of time as a barrier, whereas this reason was cited by only 4% of native women. Previous studies have shown that lack of time is one of the important barriers among immigrants: time limitations because of commitments to work or family can act as a barrier and create stressful situations that hinder the use of health care services (13).

Independently of country of origin, it is interesting to note that women who had had a mammography within the previous 2 years perceived fewer barriers than women who had not. Similarly, previous studies have found that women who undergo regular screening have higher perceived benefit scores and lower barriers scores than those who do not (33-35).

The role of social class & setting

Independently of origin, women from non-manual classes had a more positive attitude, a lower perception of vulnerability, and perceived fewer barriers than women from manual classes. Women from urban areas felt less vulnerable and perceived fewer barriers than those from rural areas. Thus, it appears that social class (10-12) and setting (6,29) not only affect screening practices, but also influence perceptions. Socio-economic position and urban/rural setting influence health, indirectly through information seeking and directly though screening behaviours.

Since many countries lack a universal healthcare system, women from disadvantaged groups and rural areas were more vulnerable to disease because of lack of information and resources (36). In Spain, with a universal healthcare system, this perception changes over time. This change is visible in our results, where immigrants living in the country for over 10 years felt less vulnerable than recent immigrants.

Time of residence and language use

These variables indicate immigrant women's level of integration into the host country, which plays a role in knowledge and perceptions. As mentioned above, we observed changes in vulnerability according to time of residence. In addition, women can obtain and understand healthcare information better if they speak a language of the host country (13). Consequently, they can gain greater knowledge and have fewer barriers to screening mammography.

Conclusions and recommendations

Our results show that immigrant women had poorer knowledge, less positive attitude, perceived fewer benefits and more barriers to screening compared to native women. Social class, urban/rural setting and major or minor cultural differences with country of origin are key contributors to these inequalities. It is necessary to promote access to information for all women and also to carry out specific sensitisation actions directed at the most vulnerable groups, taking into account the socio-cultural factors in order to increase BC screening participation. All these actions would be much more beneficial if designed and executed taking into account immigrant's associations and cultural entities, since they are very helpful and a source of health-related information for immigrant women.

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Table 1: Description of the independent variables in the sample according to country of origin (number and percentage).

		NATIVE N=275		LATIN AMERICAN N=257		EASTERN EUROPEAN N=154		FILIPINO N=78		CHINESE N=75		MAGHREBI N=96		PAKISTANI – INDIAN N=25	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
Age (years)	45-49	40	14.6	28	10.9	12	7.8	15	19.2	10	13.3	14	14.6	8	32.0
	50-59	109	39.6	173	67.3	110	71.4	46	59.0	54	72.0	58	60.4	8	32.0
	60-69	126	45.8	56	21.8	32	20.8	17	21.8	11	14.7	24	25.0	9	36.0
Social class	Non manual	150	54.5	55	21.4	31	20.1	7	9.0	36	48.0	23	24.0	17	68.0
	Manual	94	34.2	187	72.8	108	70.1	69	88.5	32	42.7	65	67.7	5	20.0
	Missing	31	11.3	15	5.8	15	9.8	2	2.5	7	9.3	8	8.3	3	12.0
Setting	Urban	219	79.7	223	86.8	126	81.8	34	43.6	54	72.0	64	66.7	19	76.0
	Rural	24	8.7	23	9.0	12	7.8	32	41.0	19	25.3	18	18.7	2	8.0
	Missing	32	11.6	11	4.2	16	10.4	12	15.4	2	2.7	14	14.6	4	16.0
Cohabitation with a partner	Yes	210	76.4	103	40.0	67	43.5	50	64.1	51	68.0	54	56.2	20	80.0
	No	65	23.6	154	60.0	87	56.5	28	35.9	23	30.7	42	43.8	5	20.0
	Missing	0	0.0	0	0.0	0	0.0	0	0.0	1	1.3	0	0.0	0	0.0
Time of residence[1]	>10 years	-	-	84	32.7	22	14.3	69	88.5	48	64.0	81	84.4	19	76.0
	≤10 years	-	-	173	67.3	132	85.7	9	11.5	24	32.0	15	15.6	6	24.0
	Missing	-	-	0	0.0	0	0.0	0	0.0	3	4.0	0	0.0	0	0.0
Use of 1 of the languages[1,2]	Yes	-	-	-	-	111	72.1	75	96.2	25	33.3	78	81.3	25	100
	No	-	-	-	-	43	27.9	3	3.8	50	66.7	18	18.7	0	0.0
Mammography in the previous 2years	Yes	259	94.2	221	86.0	101	65.6	54	69.2	51	68.0	79	82.3	22	88.0
	No	16	5.8	36	14.0	53	34.4	24	30.8	24	32.0	17	17.7	3	12.0

1- Variables for migrant women only
2- Latin American women not included because Spanish is also their native language

Paper 4

Table 2: Distribution of each scale according to country of origin (mean and standard error). Results of ANOVA or Kruskal-wallis tests and Post hoc tests.

	NATIVE		LATIN AMERICAN		EASTERN EUROPEAN		FILIPINO		CHINESE		MAGHREBI		PAKISTANI INDIAN		ANOVA or Kruskal-wallis tests	
	N=275		N=257		N=154		N=78		N=75		N=96		N=25			
-	Mean	Std.Err	Mean	Std.Err	Mean	Std.Err	Mean	Std.Err	Mean	Std.Err	Mean	Std.Err	Mean	Std.Err	F/χ2	p
Knowledge*	55.7	0.80	55.5	0.77	52.6	1.18	51.7	1.47	43.5	1.94	54.0	1.30	54.0	2.77	38.65	0.0001
Post hoc								p≤ 0.05		p≤ 0.05						
Attitude	72.6	0.54	71.1	0.62	70.5	0.87	68.1	0.99	69.8	1.19	65.6	1.03	70.2	1.62	7.09	<0.0001
Post hoc								p≤ 0.05				p≤ 0.05				
Vulnerability	51.9	0.93	56.3	0.99	50.5	1.43	44.6	1.82	44.0	1.59	59.0	1.63	51.3	3.38	12.17	<0.0001
Post hoc				p≤ 0.05				p≤ 0.05		p≤ 0.05		p≤ 0.05				
Barriers*	23.7	0.61	29.1	0.79	30.9	1.13	30.5	1.58	34.8	1.43	37.7	1.80	26.2	1.80	86.38	0.0001
Post hoc				p≤ 0.05		p≤ 0.05		p≤ 0.05		p≤ 0.05		p≤ 0.05		p≤ 0.05		
Benefits*	77.3	0.60	76.8	0.54	77.3	0.94	73.0	0.90	74.1	0.75	73.5	0.76	76.7	1.11	37.44	0.0001
Post hoc								p≤ 0.05		p≤ 0.05		p≤ 0.05				

Std.Err = Standard Error
F= ANOVA test result
χ2 = Kruskal-wallis test result
* = Scales where non-parametric test was used
Level of significance post hoc: $p \leq 0,05$
Reference group: native women

Table 3: Distribution of each scale according to independent variables (mean and standard error). Results of T-student's test or Mann Whitney test.

	KNOWLEDGE*				ATTITUDE				VULNERABILITY				BARRIERS*				BENEFITS*			
	Mean	Std. Err	t/U	p	Mean	Std. Err	t/U	p	Mean	Std. Err	t/U	p	Mean	Std. Err	t/U	p	Mean	Std. Err	t/U	p
Social class																				
Non- manual	55.0	0.82	2.17	0.030	73.5	0.54	7.17	<0,001	46.7	0.83	-7.75	<0,001	24.6	0.63	-7.10	<0,001	76.5	0.56	0.99	0.322
Manual	52.9	0.56			68.6	0.41			55.3	0.70			32.1	0.60			75.8	0.37		
Setting																				
Urban	54.2	0.50	1.45	0.147	70.9	0.36	3.10	0.002	52.0	0.60	-1.13	0.258	28.4	0.48	-4.97	<0,001	76.7	0.35	3.04	0.002
Rural	51.7	1.29			68.0	0.81			53.8	1.39			34.8	1.25			74.3	0.79		
Cohabitation																				
Yes	54.2	0.59	1.19	0.065	71.4	0.41	3.05	0.002	51.5	0.70	-1.85	0.065	28.2	0.57	-2.62	0.009	76.1	0.42	0.35	0.725
No	53.0	0.69			69.4	0.50			53.5	0.82			30.7	0.68			76.2	0.42		
Residence[1]																				
>10years	52.6	0.77	0.91	0.365	69.3	0.58	0.97	0.334	50.8	0.94	2.73	0.007	30.5	0.78	1.28	0.199	74.9	0.47	2.80	0.005
≤10years	53.3	0.74			70.0	0.52			54.3	0.89			32.3	0.75			76.5	0.51		
Languages[1,2]																				
Yes	52.9	0.56	3.30	0.001	69.1	0.55	0.78	0.435	49.6	0.98	-1.37	0.172	31.7	0.81	-2.55	0.011	75.0	0.49	-1.01	0.310
No	47.0	1.46			68.2	1.07			52.2	1.56			36.3	1.42			74.4	1.00		
Previous MX																				
Yes	54.5	0.47	3.00	0.003	70.8	0.35	2.10	0.036	52.7	0.59	1.39	0.165	28.1	0.47	-5.24	<0,001	76.3	0.32	1.51	0.131
No	50.2	1.18			69.1	0.76			50.8	1.27			34.3	1.08			75.6	0.78		

1- Variables only for migrant women
2- Latin American women not included because Spanish is also their native language
MX = Mammography
Std.Err = Standard Error
t= T-Student test result
U = Mann Whitney test result
* = Scales where non-parametric test was used

Table 4: Multivariable associations between the different scales and the independent variables.

	KNOWLEDGE		ATTITUDE		VULNERABILITY		BARRIERS		BENEFITS	
	Coef	**95% CI**	**Coef**	**95% CI**	**Coef**	**95% CI**	**Coef**	**95% CI**	**Coef**	**95% CI**
Origin										
Native	Ref.		Ref.		Ref.		Ref.		Ref.	
Latin American	1.49	-1.12; 4.11	-0.26	-2.14; 1.62	1.14	-1.90; 4.18	2.65*	0.18; 5.12	-0.78	-2.63; 1.07
E.European	-1.66	-4.78; 1.46	-1.02	-3.26; 1.22	-3.82*	-7.45; -0.19	4.78**	1.84; 7.72	-0.99	-3.20; 1.21
Filipino	-1.95	-5.99; 2.08	-3.02*	-5.88; -0.17	-11.97***	-16.61; -7.33	0.91	-2.87; 4.69	-3.92**	-6.75; -1.09
Chinese	-12.47***	-16.27; -8.67	-3.58**	-6.27; -0.89	-8.12***	-12.46; -3.77	9.75***	6.21; 13.28	-3.28*	-5.93; -0.63
Maghrebi	0.10	-3.50; 3.70	-5.85***	-8.42; -3.28	4.51*	0.35; 8.67	10.85**	7.47; 14.22	-3.20*	-5.73; -0.66
Pakistani-Indian	-1.17	-7.68; 5.34	-3.53	-8.09; 1.02	2.22	-5.12; 9.56	6.86*	0.88; 12.84	-1.24	-5.72; 3.25
Social class										
Manual	Ref.		Ref.		Ref.		Ref.		Ref.	
Non-manual	2.01	-0.11; 4.13	4.38***	2.86; 5.89	-9.80***	-12.26; -7.35	-5.87***	-7.86; -3.88	0.12	-1.38; 1.61
Setting										
Rural	Ref.		Ref.		Ref.		Ref.		Ref.	
Urban	0.39	-2.31; 3.10	1.36	-0.55; 3.27	-3.43*	-6.53; -0.33	-4.51***	-7.03; -1.99	1.18	-0.71; 3.07
Mammography										
No	Ref.		Ref.		Ref.		Ref.		Ref.	
Yes	2.46	-0.02; 4.93	0.39	-1.38; 2.16	1.20	-1.67; 4.06	-3.86**	-6.18; -1.53	0.28	-1.47; 2.02
Age	-0.01	-0.17; 0.15	-0.25***	-0.36; -0.13	-0.14	-0.32; 0.05	-0.01	-.015; 0.14	0.01	-0.11; 0.11
Constant	52.30	42.43; 62.16	82.53	75.48; 89.58	66.45	55.05; 77.86	35.22	25.96; 44.48	76.16	69.21; 83.10

Cohabitation was tested and appeared to be not significant, and therefore it was excluded from the final model
Time of residence and language could not be in the model due to their collinearity with country of origin
Ref. = Category of reference
* p< 0.05 - ** p< 0.01 - *** p< 0.001

APPENDIX

Table 5: Items used in the questionnaire.

DIMENSIONS	ITEMS
Knowledge about breast cancer and early detection	Breast cancer can be cured if caught in time A woman can have breast cancer even if she cannot tell and does not feel unwell Stress can influence the appearance of breast cancer There are viruses and bacteria that can cause breast cancer Breast cancer can sometimes be inherited The probability of developing breast cancer increases with age Hormone treatment during menopause can cause breast cancer
Attitude towards health and breast cancer	I want to discover any health problems as soon as possible I think its important to carry out activities that improve my health I don't want to know if I have breast cancer I need to be healthy and take care of myself because I have to take care of my family I have other priorities before looking after my health Only God can decide if I will have a disease Getting breast cancer is a question of bad luck
Perceived vulnerability to breast cancer	It is very probable that I will suffer from breast cancer in the future Thinking about breast cancer scares me If I had breast cancer, it would change my life and that of my family I am more likely to develop breast cancer than other women If I had breast cancer, I would not live longer than five years
Perceived barriers to screening mammography	HAVING A MAMMOGRAM TAKEN: - It could be harmful due to the X-rays - It would be embarrassing - It would scare me in case something abnormal was found - It would be difficult for me because I am always busy - It is useless because if something abnormal is found nothing can be done about it
Perceived benefits to screening mammography	HAVING A MAMMOGRAM TAKEN: - It would confirm that everything is okay - It would enable a quick diagnosis of breast cancer if I had it - It would enable cancer to be detected that I could not find with a self-exam - It would reduce the likelihood of dying of breast cancer - It would help to put my mind at rest - It would enable cancer to be detected quickly and therefore the treatment would not be so bad

5. DISCUSSION

The main findings of this dissertation are: A) Breast cancer mortality decreased in Barcelona before the introduction of the population screening program, but this reduction is more marked after its introduction. B) There are inequalities in the rate of breast cancer screening according to country of origin and social class in Spain, being women from low-income countries and those from manual classes the ones who undertake less screening. C) Immigrant women from low-income countries are less aware, and hence do less early detection practices, as they have other priorities and perceive more barriers and taboos. Chinese women are the immigrants who present more differences with native women, followed by Maghribian and Philippine women. D) Place of origin, social class and migration process are key factors in preventive practices.

In general, the findings reported in the four papers supported our hypothesis and were in line with previous studies. There was also an internal consistency in findings between our different studies. By means of different complementary methodologies we have been able to gather information on breast cancer screening in our society. Furthermore, all the concepts and results presented offer clear perspectives of future development, specially in the area of health inequalities, and with immediate application in priority setting and actions to promote early detection of breast cancer in our society.

The speed with which we have become a multicultural society and the peculiarities of our health care system (universal free health coverage that coexists with double health coverage, quite widespread in Barcelona) imply

that the results of these studies are hardly comparable to those that can be carried out elsewhere. Moreover, as far as we are concerned, these are the first studies to compare knowledge, perceptions and barriers faced by women from different countries of origin and social classes regarding early detection of breast cancer in a multicultural society with a heath system providing universal coverage. Consequently, despite the limitations presented in the four studies, it is very interesting to see that we need to study further the phenomenon, improve our information systems and carry out specific actions to favour equitable knowledge and access to preventive practices for all women.

In the next sections, the results of this dissertation are discussed: on the one hand, mortality study (study I) and on the other hand, the rest of the studies.

5.1- Relationship between breast cancer screening and the decrease of mortality in Barcelona

In the mortality study (study I), the results show a reduction in breast cancer mortality over the whole period in Barcelona and a more marked reduction after introducing breast cancer-screening program. However, there is not a steeper decline in those areas where the Program was implemented earlier compared to the control area, one of our hypothesis. On the other hand, by the time the Program had been implemented in the entire city, mortality had fallen by 17% compared to the time when there was no screening program. Nevertheless, it is not possible to affirm that this reduction is due to the Program alone.

It is essential to assess the impact of screening programs in breast cancer mortality. But, it is complex to do so because it requires long periods of analysis and there are other elements that influence breast cancer mortality (59). In the case of Barcelona Breast Cancer Screening Program, in addition to these general difficulties common to all programs, there are other conditions which make it more difficult to determine the impact. There is no cancer register; in consequence, there is no real data about the incidence of the disease or it is not possible to separate the deaths from breast cancer cases diagnosed outside the Program. Furthermore, the gradual implementation of the Program was carried out for 8 years and there was a widespread opportunistic screening before the start, especially between women who have double health coverage. As a result of all that, the effect of the program screening is been diluted and not all our hypothesis are been confirmed. Further follow-up will be necessary before conclusive results can be obtained. But, it is also necessary to create a population-based breast cancer register which records information on all new cases and deaths from breast cancer. The cancer registry is an essential information system because it is a key element for cancer control and plays an important role in cancer research (145).

With the available data, we can describe the breast cancer mortality in all the period and we can also do a before-and-after comparison. As in another Spanish study in Navarre (146), our results show a reduction in breast cancer mortality over the whole period and a more marked reduction after the introduction of the breast cancer-screening program. The general introduction of new neoadjuvant therapies at the end of the 1980s, and specifically, the systematic use of tamoxifen, might explain this reduction

before introduction of the program (59,146). Also, it is important to highlight that a before-and-after comparison could be biased due to the contribution of external factors to the program: more widespread use of mammography, the use of tamoxifen and other adjuvant chemotherapy, as well as greater access to diagnostic test and treatment (147). In consequence, it is difficult to quantify the effect of each of these factors. In some countries, it has been possible to differentiate the cohorts of women participants and nonparticipants (control group) in the screening program and compare the evolution of mortality in both (148), although in some causes both groups may not be comparable (149,150).

The impact of population breast cancer screening programs in European countries with long experience such as Italy and Sweden show reductions in breast cancer mortality ranging from 16% to 40% (54). It evidences a clear, albeit variable impact on breast cancer mortality. This variation is partly due to the different assessment methods used. For instance in the same paper, a Swedish study shows just under a 30% reduction in breast cancer mortality associated with a screening policy (mortality in the screening period compared with the prescreening), but a 40% reduction in the screened women(151,152). Despite these positive results, there are still skeptical people. For example, the research team of Professor Gøtzsche has published a study this year (2010) which shows that there was a similar or larger decline in breast cancer mortality in Copenhagen among women in areas that did not undergo screening than in those that did (153).

Twenty years from the start of the first population programs and taking into account the methodological difficulties, its effectiveness continues to

generate controversy. Sometimes, as in the case of Barcelona, it is difficult to establish the exact contribution of the program, but it seems clear that the screening programs have a role in mortality reduction together with other factors (54).

5.2- Breast cancer screening and social inequalities by country of origin and social class

According to the results of the study II (Spanish National Health Survey), III (qualitative study) and IV (quantitative scales), it is possible to affirm that there are social inequalities in knowledge, attitude, perceptions and practices of breast cancer screening between native and immigrant women. Immigrant women from low-income countries and / or women from manual class and / or women from rural areas are the ones who have more barriers towards early detection and who undergo less regular mammograms. Among the different groups of immigrant women from low income countries there are also differences, being women who are more culturally distant the ones with a more marked differences compared to native women.

5.2.1- Screening inequalities according to country of origin

As we can see in our results, country of origin constitutes an axis of social inequalities, and it is insufficient to group the population into two categories: natives and immigrants. It is necessary to stratify at least for immigrant people according to high- or low-income countries of origin. The realities of these two groups of immigrants are very different (as it is possible to see in study II – Spanish National Health Survey) and they cannot be analyzed together. Also, it should be noted that internal migration, usually neglected,

may be taken into account whenever it is possible. In Catalonia, two studies show health inequalities, being people born in the rest of Spain the ones who more often reported poor health status compared with other groups, although they emigrated many years ago (120,154). In Barcelona, another study shows that migrants within Spain use less preventive services, such as cervical cancer screening in an opportunistic setting (155).

As shown in the study II (Spanish National Health Survey), migration-related breast cancer screening inequalities are mainly limited to immigrants from low-income countries, and are more pronounced in manual classes. Previous studies (76,83,87,95,97-100,102,105) have compared rates of preventive screening between native and immigrant populations, and they all have reported a lower rate of breast cancer screening among the immigrant population. Moreover, participation is particularly low among older immigrant women and those who have spent less time in the country (87). In study II, we could not analyze the effect of the length of time lived in the host country because the ENS-2006 (Spanish National Health Survey in 2006) does not contain this information. But results in study III (qualitative study) and IV (quantitative scales) show that the length of time lived in the host country is an important factor in our society, as in other places (83,87,105). Length of time residing in the host country is a key factor in many aspects, not just health, although it may act differently depending on country of origin. The longer the time of residence, the greater the opportunities to enter into contact with the host country's culture, overcome migration related barriers, etc. and hence assimilate the concepts of early detection without losing their identity of origin (87,92).

The effect of age in study II (Spanish National Health Survey) is conditioned by the type of screening. The frequency of periodic breast cancer screening was greater among women aged 50 to 69 compared to those aged 40 to 49, regardless of country of origin and social class. This is almost certainly due in part to the fact that Spain has a population breast cancer screening program aimed at women aged 50 to 69, and that in the 40 to 49 years age group, neither the evidence nor the screening guidelines are clear (22,55). Besides, in the study III (qualitative study), native and immigrant women told us that for them age is a key factor. According to them, younger women, those from urban areas, those of high socioeconomic level and those from countries where the value of prevention is recognized are more inclined to participate in preventive activities. Probably, if we separated women aged 50 to 69 in two groups, we would see differences in behavior, due to age-related mentality as we can see in study III (qualitative study). In this study, the native participants themselves mention how prevention is a recently acquired value which was not commonplace in their mothers or grandmothers time. In those times, there was no prevention since the resources currently available did not exist. One simply went to the doctor when sick; visiting a gynaecologist was regarded as taboo. In the same way that there has been a generational change regarding prevention and cancer as a taboo disease in most native women, it is to be expected that virtually the same will eventually happen among the immigrants. Most of the immigrant women in the study had arrived to the country recently, in other words, as adults. It may be assumed that women of newer generations will change their mentality more easily.

5.2.2- Screening inequalities according to social class and its interaction with country of origin

Without minimizing the importance of cultural aspects in relation to health, disease and health practices, the results of this thesis show that it is necessary to contextualize in a socio-economic level the health and the behaviour of immigrants and the cultural difference should not be overestimated by attributing it social responsibilities. The magnitude and strength of inequalities by social class stand out independently of birthplace. Moreover, in study III (qualitative study) the same immigrant women from low-income countries said that one of the axis of prevention inequalities is the socioeconomic position (social class or educational level). In consequence, studies on migration and health practices must take this dimension of inequality into account.

In study II (Spanish National Health Survey), the women from low-income countries have the worst rates of preventive breast cancer screening, and these inequalities are more pronounced in manual classes. The interaction between origin and social class implies the existence of a "summative effect" of both axis of inequalities. This "summative effect" may result from the cumulative burden of socioeconomic, cultural and gender-role-relative disadvantages and disempowerments, and of women's greater vulnerability to adverse living conditions (154). This finding can be probably explained because they have other priorities before health, communication problems (language and intercultural comprehension), and factors linked to the cultural value of health. In the study III (qualitative study), we could see that these hypothesis were proved. We found that all these factors can act as barriers in immigrant women from low-income countries. These women's

values and significations towards breast health practices are deeply rooted in cultural suppositions which condition their attitudes and behaviour in this respect, but as we have seen it is not only a cultural factor. The concept of prevention is a cultural construct influenced, among other aspects, by socioeconomic level, coming from a rural or urban background, and the migratory process itself. As it is mentioned by Mota (156), the concepts and values attributed to health and prevention result from a dynamic construction involving cultural, socioeconomic and structural aspects. For that reason and as it is possible to see in the study III (qualitative study), all these aspects intervene as either facilitators or barriers to breast cancer prevention in the host country. But these beliefs and values are also modified by coming into contact with the host country's culture.

5.2.3- The influence of the health system and the type of screening program on the extent of inequalities

Independent of country of origin, inequalities in the use of preventative services according to social class appear to persist in Spain, despite the existence of a universal health system which should counteract this. It is observed that having access to the tests is very important, but it does not guarantee that they will be used, and that socioeconomic and other factors play an important role, as it was considered in the framework of the thesis. In general, immigrant women come from low income countries where promotion of, and/or the necessary resources for, prevention are not within the reach of all. For that reason, immigrant participants mentioned the free universal health coverage as a positive aspect facilitating preventive control of breast cancer. Related to the free universal health coverage and social class, there is the role of the double health coverage in screening. In the

study II (Spanish National Health Survey), it was observed that women who have double health coverage are more likely to undergo breast cancer screening, and this is probable because they are encouraged to do so by the fact of having paid for the service beforehand and because they are more health aware. Also, it should be noted that women from non-manual classes have the highest percentage of double health coverage. In another Spanish study, women with private insurance tended to be more higher educated, attend gynaecologic consultations more often and were more likely to receive mammography recommendations by a gynaecologist in a private setting that is, outside of the population screening program (157).

Population screening may also play an important role in terms of reducing social class inequalities. In study II (Spanish National Health Survey), inequalities according to social class were lower among women aged 50 to 69, the target population of the screening program. A study that analysed these preventative practices in various European countries according to type of screening program has shown that inequalities according to socioeconomic position are greater in countries that do not have population screening programs (72). In Barcelona, social inequalities have diminished in recent years, more markedly in the group aged 50 to 69. This group of women is the target population of the screening program (158). Recruitment methods used by organized programs, as well as efforts to ensure equal access for all eligible women, may foster equal access for all social classes. Previous studies have suggested that opportunistic programs or self-referral mammographies attract women with medium to high levels of education, whereas organised programs tend to attract

women from lower social classes. However, other studies have not reported education-related differences in participation (157).

5.2.4- Screening inequalities according to urban or rural setting

Another area of interest is the role of the urban or rural setting in breast cancer screening. Some studies have demonstrated that women living in rural areas participate less in screening than women who live in cities (70,73,74,77,78). The authors discussed that one possible reason could be the greatest distance to the health services. We can explore this determinant in the studies III (qualitative study) and IV (quantitative scales). According to the immigrant participants in the qualitative study (study III), in all their countries of origin, above all in China, the Philippines, Maghreb, and Pakistan and India, health care resources are mainly concentrated in urban areas being focused on cure rather than prevention and moreover coverage is not universal. In consequence, there are inequalities in knowledge, practices and resources between geographical areas in the country of origin, as well as between educational and socioeconomic levels. As a consequence, part of the population, particularly in rural areas, use traditional medicine since it is cheaper than paying for allopathic medicine and drugs. These inequalities due to the geographic area also dragged in the host country. Study IV (quantitative scales) showed that women from urban areas feel less vulnerable and perceive fewer barriers than those from rural areas.

5.2.5- Knowledge, attitude, vulnerability, barriers and benefits to early detection of breast cancer

Their background (origin, culture, socioeconomic position, urban or rural setting, etc), the experiences lived in their countries, the cultural conception about prevention that existed there and the resources offered by the health system in their countries of origin intervene in breast cancer prevention in host country. Apart from this background related to their life in the country of origin, immigrants have some other screening barriers related to migration process in the host country. We studied this type of barriers in the study III (qualitative study). The main barriers to early detection related to the migratory process are: ignorance and lack of information about the health system, lack of time, priority given to work compared to visiting the doctor, family burdens, and language difficulties. Some of these barriers related to the migratory process can be overcome through their contact with the host country society and duration of this contact. It is true that these barriers are common to other health practices (110), but they do not affect all immigrant women from low income countries in the same way, nor do they have the same weight for them. For example, immigrant women from ex Soviet Union countries are perfectly familiar with prevention but do not act in consequence in the host country due to barriers like lack of time or other priorities. However, the main barriers for Chinese women are distrust with the health system and language difficulties. But, language difficulties are not a barrier for Latin American women in Spain, although in other European countries it would be a barrier.

In study IV (quantitative scales), we quantified specifically the barriers to mammography in the different groups of women. As seen in previous

studies (159), all immigrant groups perceived more barriers to mammography than native women. And also, their frequency of mammography within the previous 2 years was lower. In addition to factors related to migration (lack of time, other priorities, etc), a possible explanation for having more barriers to mammography could be the fact of being less familiar with the test than native women. In the qualitative study (study III), none of the groups of immigrant women told us that the mammography was a routine screening test in their countries, partly because of the very few system resources and that the health system is focused on cure rather than prevention. In countries where prevention was encouraged, as the ex-Soviet countries, the screening test done was breast self-examination. Because of the lack of prevention or prevention without resources (breast self-examination), immigrant women associated breast cancer with death because it is detected in advanced stages. In contrast, in the host country and with the confidence towards mammography, immigrant women begin to believe that breast cancer can be cured if it is caught in time.

Study IV (quantitative scales) shows that immigrant women from low income countries residing in Barcelona are a heterogeneous population with heterogeneous knowledge, attitudes, vulnerability, barriers and benefits to early detection of breast cancer. The patterns of these indicators were generally worse among all immigrant groups from low-income countries compared to native women. Chinese women had poorer knowledge, a less positive attitude, and perceived greater vulnerability to breast cancer, fewer benefits of screening and more barriers to screening compared to native women. After Chinese women, Maghrebi and Filipino

women showed the greatest differences with respect to native women, while Latin-American women showed the least differences followed by Eastern Europeans. A possible explanation might be that the cultural distance between natives and Chinese or Maghrebi women is much bigger than for the other groups studied. Also, inequalities exist on the vulnerability and barrier scales according to social class and urban/rural setting, and on the attitude scale according to social class.

The main important conclusion of the study IV (quantitative scales) is that country of origin is an axis of inequality not only in carrying out preventive practices, but also in the elements studied in study IV which are key components of several well-known models of health behavior (70) and also in our framework. As immigrants have a lower breast cancer screening control, it is necessary to work on these five determinants (knowledge, attitude, vulnerability, barriers and benefits) in order to promote screening. According to different results in this thesis, inequalities may occur in the three levels of determinants of screening mammography that make up the conceptual framework of this thesis: 1) contextual level, 2) social, cultural and community level and 3) individual level. In study II (Spanish National Health Survey), the role of population screening (element of the first level in the model) has shown a reduction in inequalities. In studies III (qualitative study) and IV (quantitative scales), we have explored the elements of the two following levels: on the one hand, social, cultural and community level and, on the other hand individual level. In these studies, we demonstrated their role in the implementation of preventive practices and their inequalities. Accordingly, it is recommended to perform actions in these three levels to avoid inequalities in the performance of mammograms.

In accordance with the findings reported in studies III (qualitative study) and IV (quantitative scales), women have lack of information or confusion related to risk factors, functioning of the health system and guidelines related to screening. For example, in study III (qualitative study), women were not so sure about the role of age as a risk in developing breast cancer. Since they know a lot of young women with breast cancer, some of them belief that older women have less possibilities of developing breast cancer. Although they believe that, they say that after a certain age (40-50 years) they are more prone to illness in general. Native women distrust contradictions and disparate opinions among professionals with respect to periodicity and age to start screening, and some women think that the reason for the biennial mammography and not to expand the age range of the screening program is a cost saving issue.

As a summary of the studies II (Spanish National Health Survey), III (qualitative study) and IV (quantitative scales), the screening (practices, knowledge, beliefs, barriers, etc) inequalities between native and immigrant women are not only the product of migration itself, but existing, historically rooted cultural, social and geographical inequities that affect some immigrant groups and are reproduced by their placement within the social structure of the host society. Hence social and cultural origins result in differences in knowledge and practice related to breast cancer prevention.

5.2.6- Strengths and limitations of the studies II, III and IV

The main strengths and limitations of these three studies related to breast cancer screening inequalities are clearly explained in each article accordingly. The study II (Spanish National Health Survey) contributes to

previous studies in being the first to examine at the national level the periodicity of the screening tests, while taking into account the country of origin of the immigrant women as well as their socio-economic position. The ENS-2006 is a reliable source for understanding the state of health of the population and the use of health services. The studies III (qualitative study) and IV (quantitative scales) are the first studies to compare knowledge, perceptions and barriers faced by women from different countries of origin (and also with native women) and social classes with regard to early detection of breast cancer in a multicultural society with a heath system providing universal coverage.

It is important to explain that working with immigrants and studying migrant health has not been easy due to the added methodological difficulties involved. The main problems that we found when we carried out the fieldwork of the studies III (qualitative study) and IV (quantitative scales) have been the difficulties of communication and finding women willing to participate among those groups of fewer women in the city (160). For example, to gather participants from Pakistan or India, we contacted all women of the study population of these countries who are registered and who live in Barcelona. To overcome the barriers of language, we worked with cultural mediators and immigrant associations. Mediators participated in the preparation and execution of information collection techniques. Apart from facilitating contact with the participant women, working with cultural mediators allows for greater impartiality and avoids the risk of over-interpretation or miss-interpretation of people from other cultures.

In the study II (Spanish National Health Survey) it is important to note that the sample does not include unregistered people, but they are a minority. However, we cannot rule out the possibility that unregistered immigrant differed in any way. Compared to registered people, they may have belonged to a category with poorer health, more extreme behavior and social conditions, and more negative attitudes towards mammography and health in general. Moreover, ENS-2006 includes a sufficient number of the immigrant population allowing analysis of the use of health services by this group. Despite this, stratifying immigrants according to high- and low-income countries of origin reduces the number of women from high-income countries in some categories.

When considering the implications of the qualitative study (study III), it should be taken into account that this investigation included a small but representative number of women, which did not aim at generating conclusive findings for direct implementation in all the countries. Discussion groups, triangulation groups and in-depth-interviews are limited to people that are able and willing to express their views. Furthermore, as well as producing a rich data, the group setting and other factors may also suppress some views and opinions. It is therefore possible that other important ideas related to breast cancer screening exist both among the participants and in the rest of the population. However, the rigor procedures used (triangulation, achieving saturation, working with cultural mediators, validation of the results by informants and/or mediators, etc) have ensured the validity of the findings.

The main limitation of the study IV (quantitative scales) is the low internal consistency of the knowledge and attitude scales, despite the fact that these were developed from previous qualitative and quantitative studies (160-163). Consequently, more research is needed to develop appropriate scales for knowledge and attitude. In addition, it would be interesting to validate transculturally the questionnaire and the two forms of administration used. Due to the difficulties of investigation and to reach the convenience sample, we administered the questionnaire mostly by telephone but also some face to face. One study (164) has demonstrated the equivalence of these two ways of survey administration in preventive practices.

5.3- Recommendations and implications for future research

Based on our findings described in studies I-IV, we can say that the breast cancer screening program in Barcelona had a positive impact on reducing mortality and that there are still social inequalities in breast cancer screening in our society. For that reason, we believe that attending mammography screening can and should be increased in certain groups. The breast cancer screening program is population-based, and as such one of its fundamental principles is equity and work so that all women of the target population have an opportunity to participate in the program. In consequence, it is necessary to promote knowledge and access to preventive practices for all women and also to carry out specific actions directed at the most vulnerable groups, taking into account the socioeconomic and socio-cultural factors that influence the use of preventive services among women.

Actions to promote early detection of breast cancer and eliminate barriers are necessary in the three different levels of the framework, but each group of women has its specific peculiarities and thus these actions should be specific to each group. All these actions would be much more beneficial if designed and executed taking into account immigrant's associations and cultural entities, such as the ones we visited during the fieldwork of the study III (qualitative study), since they are very helpful and a source of health-related information for immigrant women (160).

Due to the lack of information or possible confusion, it is necessary that health authorities and screening programs should provide accessible, appropriate, comprehensive and understandable information. The information must be based on evidence, must be tailored to individual needs and characteristics of women and must be specific for each stage of screening. It needs to show both the benefits and adverse effects of screening. Also, the information should take into account the different educational levels, linguistic and religious differences of women and recognize the importance of ethnicity, social class and culture. This will allow a woman to make an informed decision as to whether or not to participate in the screening program (165). Moreover, one could take advantage of the good rapport women have with their family doctor (as mentioned in study III – qualitative study), who could inform them about breast screening. Some studies have reported that recommendation of screening by a doctor is a key element for attending screening (79,86,117).

The results of this thesis have to be taken into account when developing policies addressed to the immigrant population. Furthermore, the evidence

obtained in this thesis, together with the ones from the published literature, should be available to health professionals in the field of primary care and hospitals to improve accordingly, the preventive control of breast cancer in women.

This dissertation opens several research lines in the field of breast cancer screening. On the one hand, it would be advisable to reassess the impact of breast cancer screening program with more recent mortality data. This would allow a more accurate estimation. On the other hand, the different possibilities of increasing the attendance could be tested and evaluated in a randomized intervention study. Furthermore, it is necessary to determine the temporal evolution of social inequalities by country of origin and social class in breast cancer screening. Future health surveys, both national and regional (located in Barcelona), will allow to monitor this phenomenon.

6. CONCLUSIONS

The conclusions of this dissertation are:

- There was a reduction in breast cancer mortality throughout the period studied (1984-2004), and this reduction was more marked after the breast cancer screening program was introduced (a statistically significant annual decline of 5%).
- By the time the breast cancer screening program had been implemented in the entire city (years 2003–2004), mortality had fallen by 17% with respect to when there was no screening program.
- There are inequalities according to country of origin in the use of preventive screening services for cancer in Spain. Women from low-income countries undergo less periodic breast cancer screening than native women and those from high-income countries.
- Independent of country of origin, women from the manual classes undergo fewer controls than those from the non-manual classes.
- The concept of prevention is a cultural construct influenced, among other aspects, by socioeconomic position, coming from a rural or urban background, and the migratory process itself. All these aspects intervene as either facilitators or barriers to breast cancer prevention in the host country.
- Younger women, those from urban areas, those of privileged socioeconomic position and those from countries where the value of prevention is recognised are more inclined to participate in preventive activities.

- The main barriers that immigrant women from low-income countries face in early detection of breast cancer related with the migratory process are: ignorance and lack of information about the health system, lack of time, priority given to working compared to going to the doctor, family burdens and language difficulties.
- There are country of origin-dependent inequalities on scales of knowledge of breast cancer and early detection, positive attitude towards health and breast cancer, perceived vulnerability to breast cancer and perceived barriers and benefits to mammography, even after adjustment for social class and urban/rural setting.
- There are inequalities according to social class and urban/rural setting on the vulnerability and barriers scales, and also according to social class on the attitude scale.

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APPENDIX

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