RESEARCH ARTICLE

Socio-Economic Status and Clinical Breast Examination Screening Uptake: Findings from the First Cohort Study among Iranian Kurdish Women

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Abstract

   Clinical Breast Examination (CBE) is utilized as a screening modality in many low income countries without widespread mammography capability. The aim of the current study was to evaluate the impact of socio-economic status (SES) on CBE screening rates in Iranian Kurdish women. A cross-sectional study was conducted in the western region of Iran. A sample of 5,289 Iranian Kurdish women aged 35-65 years old was analyzed. Data were collected from July 2014 to September 2018. The Concentration Index-CI and Concentration Curve were used to estimate the socioeconomic inequalities in CBE rate. The analysis of data was done by STATA software (Version 14). 12.3% of the women had received CBE at least once. CBE rates in the 46-50 age group were higher than in other age groups (OR = 2.06; 95% CI = 1.56-2.71). Women with 6-9 years of education had higher odds ratio of receiving CBE (OR = 1.41; 95% CI = 1.02-1.94). Women living in rural areas were less likely to have received CBE compared to those living in urban areas (OR=0.54; 95% CI = 0.42-0.61). The overall concentration index for receipt of CBE was 0.188. In countries without widespread mammography programs, strategies for the promotion of CBE should focus on the lower SES population.

Keywords: Breast neoplasms- screening- deprivation- Iran

Introduction

   Cancer mortality has been decreasing in developed countries in recent years, due to a decline in risk factors, such as smoking, and an improvement in screening (Bray et al., 2018; Al Rifai and Nakamura, 2015; Jemal et al., 2010). However, cancer remains the second highest cause of death globally, with an estimated 9.6 million deaths in 2018 (WHO, 2020). Some 70% of cancer deaths occur in low and middle income countries (LMIC) such as some of the countries in Africa, Asia and regions of central and South America (WHO, 2020; Rivera-Franco and Leon-Rodriguez, 2018). Breast cancer is the most common cancer in women, and the second most common cancer in developed and developing countries, but LMICs have the highest breast cancer mortality rates, from 40% to 60% (WHO, 2020). Based on the estimate provided by

the GLOBOCAN study in 2018 there will be 2,088,849 new breast cancer diagnoses and 626,679 deaths globally (Bray et al., 2018; Al Rifai and Nakamura, 2015).

   Breast cancer is the most prevalent cancer among Iranian females, accounting for 24.6 to 33.3% of all cancer cases in Iran (Farzaneh et al., 2017). In 2017, one out of four Iranian women with breast cancer was diagnosed with late stage disease, resulting in 3,742 deaths (Bouya et al., 2018). The incidence of breast cancer is increasing in Iran, and the age of the patients being diagnosed with late stage disease is ten years younger than that seen in developed countries (Mirzaei-Alavijeh et al., 2018a). It is predicted that as life expectancy increases in Iran, by the year 2,035 the number of deaths caused by breast cancer will be greater than 7,000 a year (Bouya et al., 2018).

   Early diagnosis of breast cancer has a significant role in the reduction of mortality and improved prognosis

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seen in more wealthy countries. The higher rate of late stage diagnoses and high mortality rates seen in LMICs are largely due to a lack of screening programs. Women in these countries may also have limited access to primary care and diagnostic and treatment services that are available may be less than adequate when compared to those in wealthier countries (Rivera-Franco and Leon-Rodriguez, 2018).

The World Health Organization (WHO) recommends yearly screening for breast cancer (Pashayan et al., 2018). Studies show that the relative risk of breast cancer mortality is decreased more than 20% in women participating in breast cancer screening programs (Coldman et al., 2014; Marmot et al., 2012). A breast cancer screening program was initiated in Iran in 2012. The Iranian Ministry of Health and Medical Education (MOHME) recommended that (a) women older than 40 should have an annual mammogram, (b) women 20 to 40 years of age should have one Clinical Breast Examination (CBE) every 3 years and, also, after 40 an annual CBE by a health professional, and (c) women over 20 years of age should do monthly Breast Self-Exam (BSE) (Aminisani et al., 2016).

Mammography is the most commonly recommended screening methodology (Monticciolo et al., 2018), however in LMICs there may be limited access to mammography and so CBE performed by a health care provider may be the only screening tool available (Mualla et al., 2014). In LMICs, diagnosis of breast cancer may be based on clinical signs and symptoms of the disease (Romanoff et al., 2017). The Breast Health Global Initiative Summit recommends CBE as a screening criterion for diagnosis of breast cancer in countries with limited resources (Yen et al., 2016). Moreover, CBE can be performed prior to mammography so that radiologists take into consideration any abnormal CBE findings as they read the mammograms (Lee et al., 2015).

The Canadian National breast screening study evaluated the combination of annual mammography and CBE and the teaching of breast self-examination for a sample of women, 40 to 49 years of age, and found that a yearly mammogram plus CBE detected more small, node negative tumors than mammogram alone, but there was no impact on mortality rates in a 7 year follow up (Takkar et al., 2017). CBE has been found to detect 50% of the cancers found in mammography and, also, it can detect some tumors which were not found by mammography (Fari et al., 2014), but the primary benefit of CBE is cost. Although screening mammography is the only standalone modality that has shown improvement in breast cancer mortality in prospective randomized trials, it may be too expensive for large scale use in some LMICs (Rivera-Franco and Leon-Rodriguez, 2018).

Despite widespread availability of CBE in Iran, this modality is underused as well (Mirzaei-Alavijeh et al., 2018a; Maurice et al., 2012). Different factors including psychological, social, demographic, economic, religious and cultural factors have been implicated as barriers towards screening (Mirzaei-Alavijeh et al., 2015; Mirzaei-Alavijeh et al., 2018b; Maheswaran et al., 2006). Low socioeconomic status (SES) has been found to be a major barrier in cancer screening programs (Donnelly et al., 2015; Quaglia et al., 2013; Vahabi et al., 2015). Furthermore an association between socioeconomic status and health seeking behavior has been found; individuals with higher SES tend to be more likely to participate in health seeking behavior (Wardle and Steptoe, 2003; Benova et al., 2014; Siddique et al., 2016; Adler, 2002). Indeed incidence and prognosis of breast cancer has been found to correlate with SES, in that high SES is correlated with higher risk of breast cancer incidence, whereas low SES is correlated with a poor prognosis of breast cancer related to delays in diagnosis and treatment (Quaglia et al., 2013). Moreover, socioeconomic, cultural, structural and systemic barriers are likely to be related to inequalities found in breast cancer treatment (Vahabi et al., 2015).

Cohort studies are the best type of observational investigations to find causative relations and etiology of diseases, incidence, and the natural progression of disease. They have played an important role in revealing the environmental risk factors for chronic diseases in recent years (Mann, 2012). The first cohort study in Iran, based on population (Tehran Lipid and Glucose Study), was done in 1997 (Kheradmand et al., 2015). After that, many cohort studies were done; one of which was the Prospective Epidemiological Research Studies in Iran (PERSIAN), which was coordinated by the Deputy of Research and Technology of the Ministry of Health in Iran. That study included the Ravansar non-communicable cohort study (RaNCD), which was conducted in the west of Iran, and which provided the data for this study (Pasdar et al., 2019).

The purpose of this study was twofold: to assess breast cancer screening utilization (CBE) by a cohort investigation among Kurdish Iranian women in the western region of this country and to consider the relationship between CBE and socioeconomic factors, including the determination of socioeconomic inequalities affecting CBE utilization in this population of women.

Materials and Methods

Study Design and Population

The data of the RaNCD cohort study was analyzed to determine the rate of CBE and the socioeconomic determinants affecting CBE among Kurdish women in the western region of Iran. This data was collected to assess the prevalence and incidence of non-communicable diseases among 35-65 year old residents of Ravansar located in Kermanshah Province. This town is located near Iraq and most of its people are Kurdish. It has a population of 50 thousand individuals and three urban and two rural health centers. This town also has 32 active local primary health care units (clinics). This cohort study was started in 2014 and data from 10 thousand people has been collected up to now (Poustchi et al., 2018).

In the present study, 5289 women aged 35 to 65 years old, fitting the criteria as determined by the Iranian Ministry of Health and Medical Education to be eligible for breast cancer screening participated in RaNCD from July 2014 to September 2018. The data were collected through interviews performed by trained female research assistants. The protocol of this study (including:

objectives, outcomes of interest, design of study, site selection, participant selection, sample size, sampling methods, inclusion criteria, and quality assurance and quality control was published in International journal of epidemiology (Pasdar et al., 2019).

Measures
Dependent Variables

In the present study, the outcome measure was the receipt of CBE. Breast cancer screening prevalence based on CBE during the last year and the number of referrals to the doctor for breast exam was assessed. Women who had been diagnosed with and treated for breast cancer were excluded, this included women who had undergone the following procedures: who had mastectomy, lumpectomy, axillary lymph node excision and prophylactic oophorectomy for cancer prevention (Moradinazar et al., 2020). The history of receipt of CBE was assessed by a Yes/No question.

Independent Variables

These variables were included: age groups (35-40, 41-45, 46-50, 51-55, 56-60 and 61-65 years old), marital status (single, married, divorced/widowed), educational level (less than five years, 6-9 years, 10-12 years, 13 years and more), residence (town and village), smoking (yes, no), and daily physical activity measured by metabolic equivalent of task (METs). The MET of each activity was obtained based on participant self-report. Physical activity levels were classified as low (24-36.5 MET-hours per week), moderate (MET-36.6-44.9 hours per week) and heavy (MET-≥45 hours per week (Najafi et al., 2020). Additionally, BMI status (≤24.9, 25-29.9, 30-34.9 and >35), contraceptive drug use (yes, no), and pregnancy number (0, 1-3, 4-5, ≥6).

Socioeconomic status (SES) was determined based on the collection of multiple variables relevant to life in Iran: owning a private car, refrigerator, freezer, washing machine, vacuum cleaner, cell phone, and/or laptop and housing status including the number of rooms for every member of the family, house area per meter, cooking fuel route, whether or not the home had air conditioning, and the number of domestic and international flights taken in one year (Hebert et al., 2008; Nelson, 2002). Utilizing a Principle Components Analysis (PCA) all participants were ranked and divided into five groups according to the factors addressed in the survey, which resulted in these groups: poorest, poor, middle class, rich and richest) being included in this data analysis. This ranking is based on the socio-economic status of the participants and is not compared with national or international standards.

Statistical Analysis

The analysis of data was done by Stata software (Version 14). Logistic regression was used to determine the association between the rate of receipt of CBE and demographic characteristics. Both Crude and Adjusted odds ratio (with 95% confidence interval) were measured. In order to estimate the socioeconomic inequality in receiving CBE, a Concentration Index-CI and Concentration Curve were used. A concentration curve

is a two dimensional diagram in which the cumulative percentage of a population, based on SES, is shown on the horizontal axis and the cumulative percentage of receipt of CBE is shown in the vertical axis. The line of 45 degrees represents the equal distribution of that variable. If the receipt of CBE is concentrated among the groups with low SES, the concentration curve is located over the equal line and the value of the concentration index becomes negative. The opposite is true for those with high SES. The concentration index is extracted from the concentration curve and is equal to two times the space between the concentration curve and equal line (45 degrees). If the index rate is zero, it demonstrates that the supposed variable is distributed equally among socioeconomic groups (Wagstaff et al., 1991).

Continuous variables were analyzed as mean ± standard deviation and qualitative variables were measured by frequency (%). Also a Univariate linear regression analysis was performed. Then, variables with p<0.3 were entered into the multiple model.

Data availability

Data used for this study can be accessed upon request from the corresponding author.

Results

The mean age of women was 48.36 years (SD=± 8.42), with a range from 35 to 65 years.

About 57% of the female population is urban, but 70% of the CBE has been received by urban women. As the SES increased, a higher percentage of women were found to have received CBE.

More details of the demographic characteristics of the participants are shown in Table 1. According to the results, 12.3% of the Iranian Kurdish women received CBE at least once.

In Table 1, the crude odds ratio of receipt of CBE in women aged 46-50 was higher and in the 61-65 year old group was lower than other age groups. However, the association of CBE with age and SES showed that as SES increased, the receipt of CBE was significantly increased (from crude odds ratio 0.99 in the first quantile to 1.30 in the fifth quantile).

CBE receipt among single, widowed and divorced women was found to be lower when compared to married women.

In addition, women with 6-9 years of education had a greater likelihood to have received CBE.

The relationship between receipt of CBE and number of pregnancies and SES showed that in the first quantile, the crude odds ratio for receipt of CBE and increased number of pregnancies was 0.94 (CI: 0.75_1.17), but as SES improved, the relationship between the receipt of CBE and number of pregnancies was greater.

The present research revealed that women with a BMI greater than 30 were more likely to receive CBE. The adjusted odds ratio (AOR) of receipt of CBE for the second SES quantile was higher than the first SES quantile (reference group) (AOR: 1.55_ CI: 1.13-2.13), and as the SES improved, the odds of CBE increased, so that AOR

Table 1. Socioeconomic Variables Related to Receipt of CBE

Variables		Total N (%)	CBE N (%)	Crude OR (95%CI)	Adjusted OR (95%CI)
Total (%)		5289 (100)	649 (12.3)		
Age (year)	35-40	1168 (22.08)	95 (8.1)	1	1
	41-45	1144 (21.63)	170 (14.7)	1.97 (1.51-2.57)	1.98 (1.49-2.62)
	46-50	927 (17.53)	143 (15.4)	2.06 (1.56-2.71)	2.05 (1.5-2.79)
	51-55	760 (14.37)	116 (15.3)	2.03 (1.52-2.71)	2.19 (1.55-3.1)
	56-60	738 (13.95)	83 (11.2)	1.43 (1.04-1.95)	1.62 (1.08-2.42)
	61-65	552 (10.44)	42 (7.6)	0.93 (0.63-1.35)	1.21 (0.75-1.96)
Marital status	Married	4437 (83.89)	606 (13.3)	1	1
	Single	329 (6.22)	5 (1.5)	0.09 (0.40-0.23)	0.12 (0.02-0.96)
	Divorced/ widow	526 (9.95)	38 (7.2)	0.49 (0.35-0.69)	0.58 (0.4-0.83)
Level of education	illiterate	3318 (62.73)	382 (11.5)	1	1
	1-5 years	1292 (24.43)	171 (13.2)	1.17 (0.96-1.42)	0.99 (0.79-1.25)
	6-9 years	316 (5.97)	49 (15.5)	1.41 (1.02-1.94)	1.17 (0.8-1.69)
	10-12 years	218 (4.12)	29 (13,3)	1.17 (0.78-1.76)	0.99 (0.62-1.59)
	≥13 years	145 (2.74)	18 (12.4)	1.08 (0.65-1.80)	0.84 (0.47-1.5)
Place of residence	Town	3029 (57.27)	459 (70.7)	1	1
	Village	2260 (42.73)	190 (29.3)	0.54 (0.42-0.61)	0.67 (0.55-0.81)
Smoking Status	No	4999 (94.52)	598 (11.9)	1	1
	Yes	276 (5.22)	34 (12.3)	1.00 (0.69-1.45)	1.38 (0.94-2.04)
BMI	≤24.9	1194 (22.58)	101 (8.5)	1	1
	25-29.9	2141 (40.48)	277 (12.9)	1.60 (1.26-2.04)	1.28 (1.00-1.64)
	30-34.9	1446 (27.34)	198 (13.7)	1.71 (1.33-2.21)	1.16 (0.89-1.51)
	>35	475 (8.98)	71 (14.9)	1.90 (1.37-2.63)	1.35 (0.97-1.89)
Daily physical activity measured by METs	24-36.5 (low)	1188 (22.46)	145 (12.2)	1	1
	36.6-44.9	3671 (69.41)	545 (12.7)	1.04 (0.85-1.27)	1.00 (0.81-1.23)
	≥45	528 (9.98)	50 (9.5)	0.75 (0.53-1.05)	0.93 (0.65-1.34)
Use of Contraceptive Drug	No	1221 (23.09)	103 (8.4)	1	1
	Yes	4060 (76.76)	546 (13.4)	1.58 (1.32-2.10)	1.06 (0.83-1.35)
Pregnancy Number	0	233 (4.41)	12 (5.1)	1	1
	3-Jan	1800 (34.03)	249 (13.8)	2.95 (1.62-5.36)	1.39 (0.72-2.69)
	5-Apr	1376 (26.02)	206 (15.0)	3.24 (1.78-5.90)	1.28 (0.65-2.5)
	≥6	1648 (31.16)	178 (10.8)	2.23 (1.22-4.06)	1.19 (0.6-2.36)
Socio-economic Status	1st quintile (the poorest)	1058 (20.0)	72 (6.8)	1	1
	2nd quintile	1058 (20.0)	112 (10.6)	1.62 (1.19-2.20)	1.55 (1.13-2.13)
	3rd quintile	1058 (20.0)	129 (12.2)	1.90 (1.40-2.57)	1.74 (1.27-2.38)
	4th quintile	1058 (20.0)	148 (14.0)	2.22 (1.66-2.99)	1.92 (1.4-2.64)
	5th quintile (the richest)	1057 (20.0)	188 (17.8)	2.96 (2.22-3.95)	2.34 (1.68-3.26)

for the richest group (OR: 2.34_CI: 1.68-3.26) was more than twice as high as the poorest group (Table 1).

Figure 1 indicates that the overall concentration index for CBE receipt was 0.188. The concentration index for CBE uptake equal was +0.188, indicating that CBE receipt is concentrated in the group with the highest level of SES, falling below the equilibrium low concentration curve (45 degrees).

As Figure 2 shows, the CBE proportion of women aged 65-35 is 0.122. Overall, among all the variables under study, the lowest CBE proportion was showmen in single women (0.09) and the highest was in the best SES group (0.19).

With incrasing age and improve the SES, the average number of CBE times increases, the average number of CBE times of quantum 1, 2, and 3 close together, and the average number of times CBE increases sharply in quantities 4 and 5.

Discussion

Our results indicated that the 12.3% of the Iranian Kurdish women received CBE at least once, which is higher than the 9.8% rate reported as 9.8% in a study
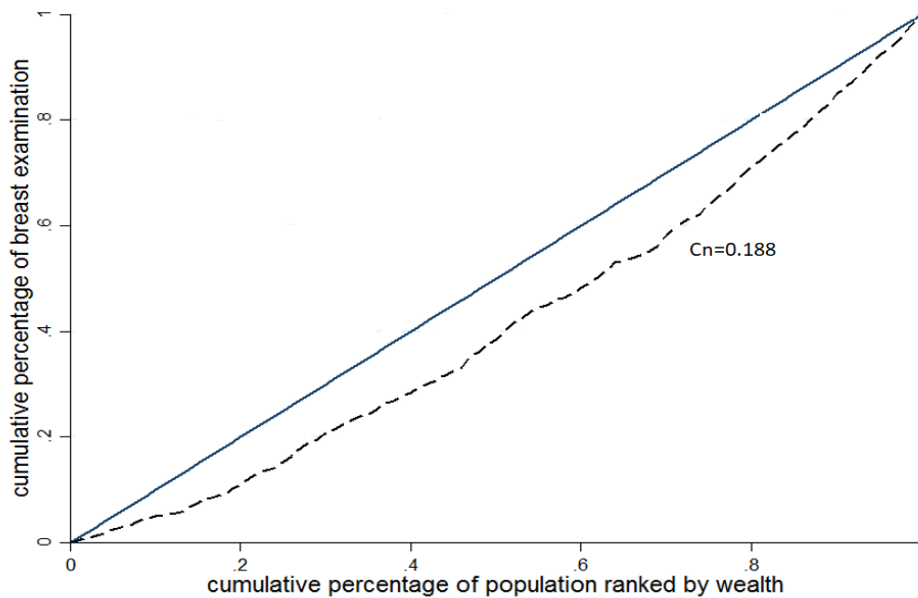
Figure 1. Concentration Curves for CBE Uptake among Irainan Kurdish Women

conducted in Ardabil (Northwest Iranian province) (Farzaneh et al., 2017). Our findings are similar to those found in Asian countries. Islam et al., (2016) conducted an investigation in Bangladesh in which 1,590 women aged 30-59 years old participated. They reported the prevalence of breast cancer screening conducted by CBE was 8% (Islam et al., 2016). Dey et al., (2015) conducted a study among 2,017 women aged 14 to 75 years (30.7 mean age) of high and low socioeconomic status in New Delhi. They found that only 6.9 percent of the participants received CBE (Dey et al., 2015). Yılmaz and Durmuş (2016) studied on 720 female health professionals (FHPs) in Turkey and reported that 4.9% of the participants

had received annual CBE (Yılmaz and Durmuş, 2016). Meanwhile, the rate of breast cancer screening is over 60 percent in most European countries (Dowling, 2010). The comparison of breast cancer screening among Iranian, Asian and European women demonstrated that the rate is dramatically low among Asian women. This can be a warning alarm for the Iranian women's health decision-makers to take into consideration.

The odds ratio of receiving CBE for women 46-50 years of age in this sample was than other age groups. This can be attributed to the fact that the Iranian MOHME policies recommend annual breast cancer screening such as CBE to start at age 40 (Aminisani et al., 2016).
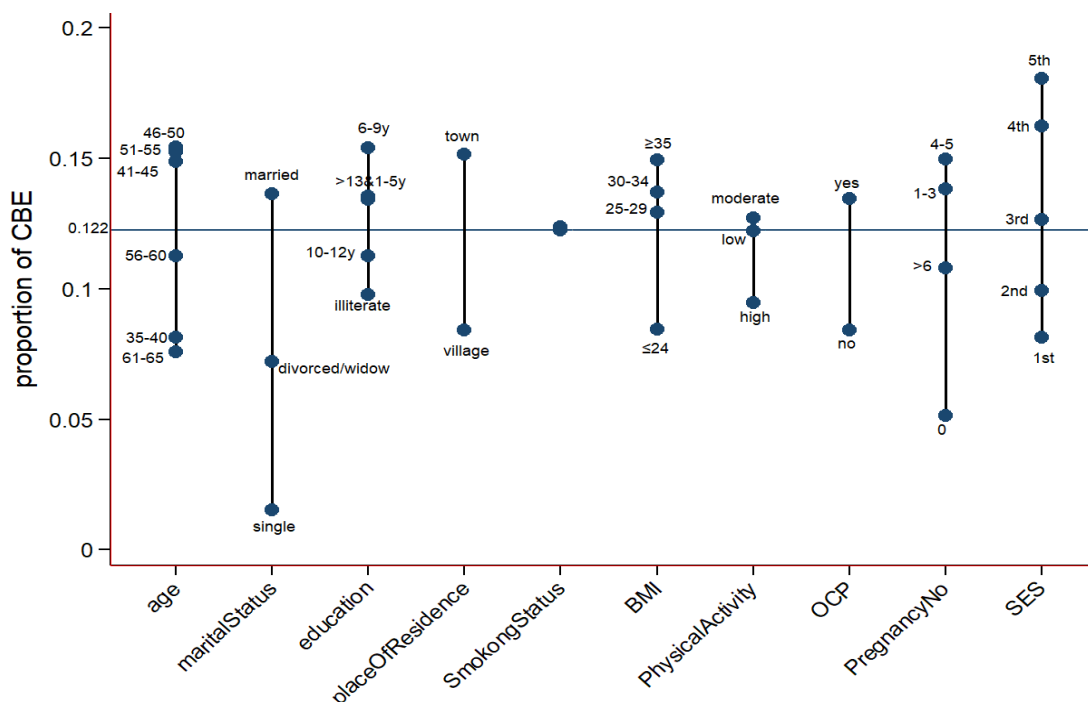

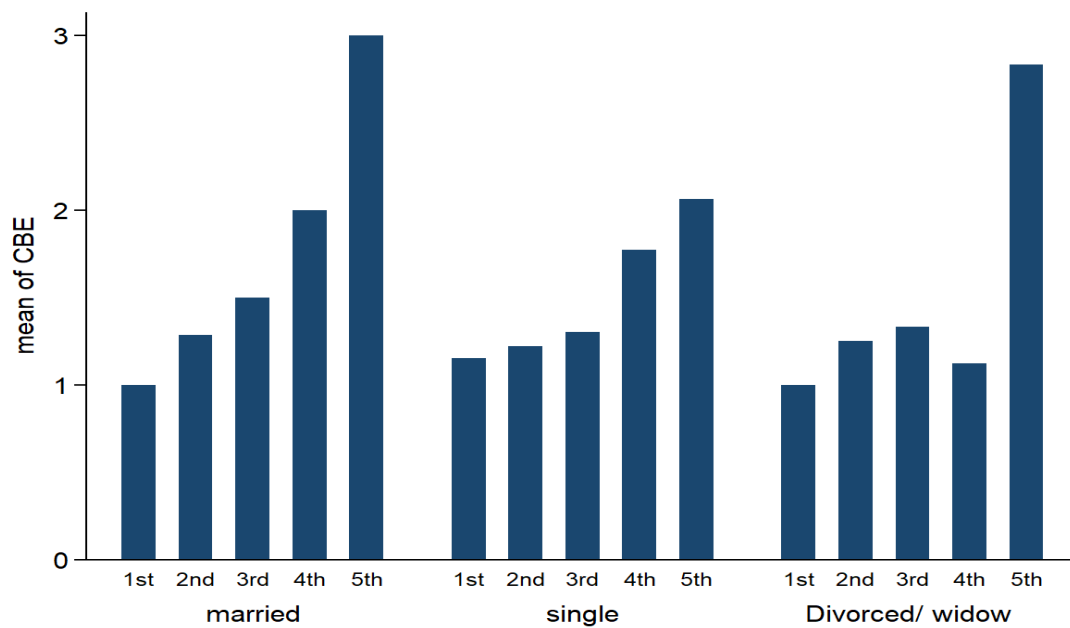Figure 2. CBE Prevalence in the Variables under Study

Figure 3. Average CBE Frequency according to Marital Status in Different Socioeconomic Quantities

Carrasco-Garridoetal (Carrasco-Garrido et al., 2013) and Lopez-anders et al (López-de-Andrés et al., 2010) demonstrated that the likelihood of being screened was higher among younger women. While other studies have found that the likelihood of breast cancer screening increased with increasing age (Ricardo-Rodrigues et al., 2015; Martín-López et al., 2013; Cabeza et al., 2007), this was not found in our study. The possible reason for a low CBE rate among the 61-65 age group in the present study can be the low level of education in this older cohort and possibly less breast cancer knowledge in this group as well. Additionally younger women are more likely to seek health care due to pregnancy, and therefore are more likely to receive CBE.

The present study showed a considerably lower likelihood of CBE receipt among single, widowed and divorced women in comparison to married women. This result has been found in other studies confirming the role of marriage status in access to and utilization of health care (Hanske et al., 2016; Moretto et al., 2017; Van Jaarsveld et al., 2006; Wuebker, 2012). Married women may receive more consults and higher psychosocial supports for cancer screening when compared to single women.

This investigation illustrated that women with 6-9 years of education had a higher likelihood of CBE receipt. Islam et al., (2016) showed that the illiterate women had a significantly lower odds of receiving CBE ($P=1.04$, 0.014, 038, 0.059) (Islam et al., 2016). Higher education
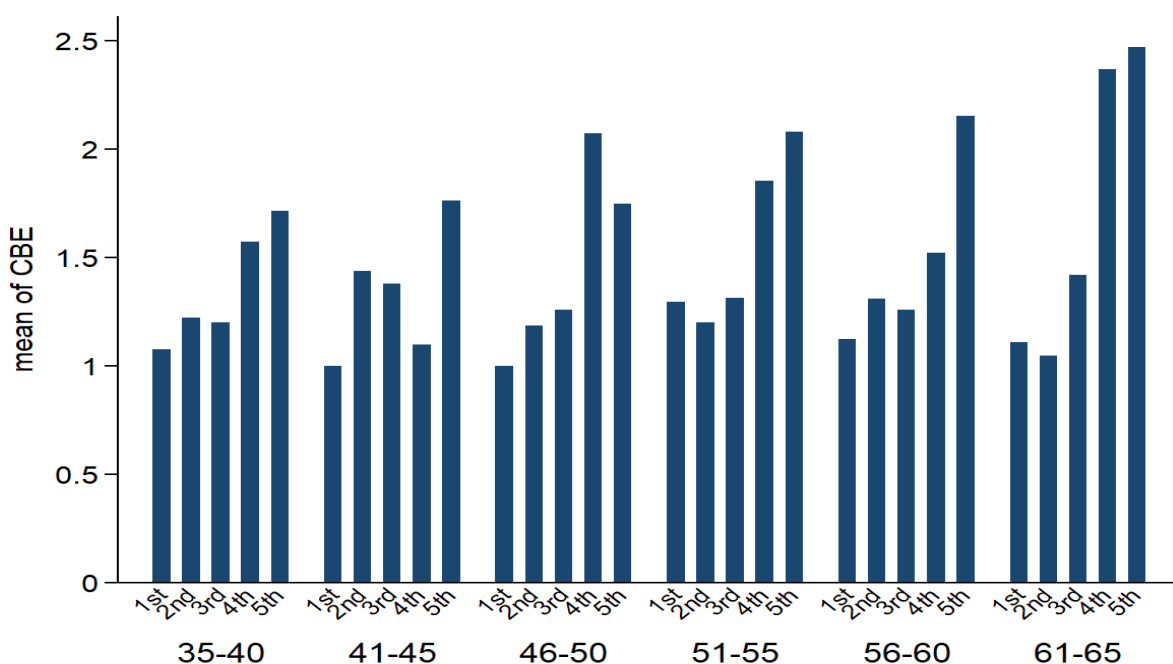

Figure 4. Average Frequency of CBE Performance by Age in Different Socioeconomic Quantities

may increase the use of screening services. An educated woman may perceive the benefits of cancer screening and, at the same time, would be more prone to recognize the early warning signs of breast cancer. Such a group of women may be more likely to visit the doctor if her signs and symptoms progress (Moretto et al., 2017). Other studies also highlight the crucial role of education level in the utilization of breast screening. In the present study, 62.7% of women were illiterate and this can affect their perception of the importance of breast cancer screening. Teaching women with a low education level about the benefits of screening tests is very important to improve screening behaviors. Willems and Bracke (2018) found that educational inequalities were significantly lower in countries that have organized cancer screening (OR=0.716, CI= 95%, 0.549-0.935) than they were in countries with opportunistic screening (Willems and Bracke, 2018). Organized breast cancer screening is done in Iran by the MOHME (Aminisani et al., 2016).

This investigation demonstrated the low odds ratio of CBE receipt among women living in rural regions (OR=0.54). The results of similar studies are consistent with our findings (Nguyen-Pham et al., 2018; Leung et al., 2014; Anderson et al., 2013; Williams et al., 2015). For example, the evidence achieved from a systematic review showed that the diagnosis of breast cancer in advanced stages is more common among women residing in rural areas (Nguyen-Pham et al., 2018). Leung et al., (2014) studied 11200 women aged 50-55 years old in Australia. They reported low CBE receipt among women living in rural areas; in other words; women suffering from breast cancer and living in regions with restricted access to health care services are more prone to be diagnosed in advanced stages. This can be related to more barriers in accessibility and availability of health services such as cancer screening tests. Smoking was seen among 5.2% of the women in the present study. There was no relationship between CBE receipt and a history of smoking. However, some studies have found that women who smoke ha the lowest rate of mammography (Fredman et al., 1999). Byrne et al., (2010) found that nicotine dependence is correlated with a lower rate of screening of breast and cervical cancers. Such findings should be taken into consideration in health planning.

The present research revealed that women with BMI greater than 30 were more likely to have had CBE. The role of obesity as a barrier for screening is a novel issue of research57, 58. Our results indicated that obesity was not a barrier to CBE. Meanwhile, the studies of Damianiet al.,(2012) and Maruthur et al., (2009) illustrated an inverse correlation between obesity and the likelihood of mammography. One of the potential reasons for this difference could be the acceptance of obesity and being overweight as social norms in this population, and so that it was not regarded a barrier for CBE.

Our results showed that CBE was somewhat higher among women with higher levels of physical activity. In general, there is a positive correlation between participating in health-related behaviors such as physical activity and performing screening tests (Shapiro et al., 2001). Our findings support this result.

In addition, our results illustrated a positive correlation between SES and CBE receipt. The concentration index of CBE uptake was 0.188 which demonstrated the socioeconomic inequality for CBE receipt. This is in line with the findings of other studies (Smith et al., 2019; Pornet et al., 2010; Giuliani et al., 2016; Maheswaran et al., 2006; Wardle et al., 2015; Duffy et al., 2017). For example, a systematic investigation reviewing 13 studies about breast cancer screening in seven European countries showed a positive correlation between increasing SES and breast cancer screening (Smith et al., 2019). Pornet et al. (2010) found in their study that a positive association was seen between low SES and the low rate of mammography among French women (OR=.71: CI=95%: .59-.86) (Pornet et al., 2010). Giuliani et al. (2016) showed a negative association between low SES with receiving CBE or mammography (OR=.81, CI=95%:.65-1.00) (Giuliani et al., 2016). Maheswaran et al (2006), in a study conducted in North Derbyshire (England) among women aged 50-64 years old, found that socioeconomic deprivation was the predictor of less breast cancer screening with an odds ratio of 0.64 (Maheswaran et al., 2006). It should be noted that the participation in health promotion is voluntary (Wardle et al., 2015). Some evidence illustrates that people with higher SES are more likely to participate in breast cancer screening promotion programs (Duffy et al., 2017). This can foster the promotion of breast cancer screening among individuals with high SES. Consequently, interventions that focus on women with lower SES are needed.

In conclusion, our findings suggest that the receipt of CBE is concentrated primarily among the high-SES Kurdish women in Iran, and therefore strategies for the promotion of breast cancer screening behaviors such as CBE should focus on the lower SES population. Knowing the inequalities in the receipt of CBE occur can be helpful in focusing interventions on the populations at risk so as to avoid late stage breast cancer diagnoses. In Iran, a focus on increasing breast cancer knowledge in lower income Kurdish women may be helpful in reducing the rate of late stage diagnoses in this population. Nurses who work with Kurdish women in this region of Iran can try to encourage discussion of breast cancer screening during primary care visits so that women will be prepared for and understand the need for CBE as a facet of primary care.

Study Strengths and Limitations

Although the present study has several strengths, such as large sample size, the findings reported in this study have certain limitations. Firstly, it was conducted in Kurdish regions and the findings may not be generalizable to other ethnicities. It should be mentioned that primary health care in Iran is delivered to all families by an effective network and so therefore, it is not expected that CBE receipt would be very different in different provinces. Secondly, some crucial variables were not studied such as the frequency of CBE receipt and family history of breast cancer. In fact, the history of its performance was assessed by a Yes/No question. Thirdly, the data were collected by self-report, which can be accompanied with social desirability or recall biases (Marlow et al., 2017). And finally, since this investigation was a cross-sectional one,

the interpretation of findings should be done with caution, because causality cannot be demonstrated. Nevertheless, the present study provides considerable information about breast cancer screening and also lays the foundation for the planning of further research before developing health promotion programs.

The findings of this study showed that receipt of CBE among Iranian Kurdish women was very low. Our findings show the need to remove the barriers against screening such as improving the accessibility to breast cancer screening services, especially among women with low SES, low education, those who are single, widowed and divorced and also those who live in rural areas.

Author Contribution Statement

Study concept and design, Farid Najafi, Yahya Pasdar, Behrooz Hamzeh. Analysis and interpretation of data, Mehdi Moradinazar, Farzad Jalilian, Mehdi Mirzaei-Alavijeh, Mahin Amini. Drafting of the manuscript, Behzad Karami-matin, Mehdi Kargar, Razieh Pirouzeh, Negar Karimi, and Seyyed Nasrollah Hosseini. Critical revision of the manuscript for important intellectual content, Bonnie Jerome-D'Emilia, Mehdi Mirzaei-Alavijeh and Farzad Jalilian; All authors provided comments and approved the final manuscript.

Conflict of interest

The authors declare that they have no conflict of interest.

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