Association of Sociodemographic Factors, Breast Cancer Fear, and Perceived Self-Efficacy With Breast Cancer Screening Behaviors Among Middle-Aged Nigerian Women

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ABSTRACT

INTRODUCTION: Breast cancer (BC) is a major public health problem among women. However, BC screening uptake is abysmally low among Nigerian women. This study evaluated the association of BC fear and perceived self-efficacy with BC screening (clinical breast exam [CBE] and mammography) among middle-aged Nigerian women.

METHODS: A community-based cross-sectional study was conducted among middle-aged women in Enugu State, southeast Nigeria. The data were collected between September 2019 and February 2020. The BC screening uptake, fear, and self-efficacy were assessed using the validated Breast Cancer Screening Questionnaire (BCSQ), Champion Breast Cancer Fear Scale (CBCFS), and Champion's Mammography Self-Efficacy Scale (CMSES). Data were analyzed using frequencies and percentages, chi-square test, and univariate analysis of variance. Bivariate and multivariable logistic regression models were used to examine independent associations between selected sociodemographic factors, cancer fear, perceived self-efficacy, and BC screening.

RESULTS: The mean age of the participants was 55.3 years (SD: 5.75). More than half of the women (51%) reported having a BC screening in the past 12 months. However, only 12.5% and 16.9% reported having a CBE or mammogram in the past 12 months. The prevalence of a high, moderate, and low level of fear was 68%, 22.3%, and 9.8%, respectively. The prevalence of a high, moderate, and low self-efficacy level was 50.6%, 37.5%, and 12.0%, respectively. The multivariable logistics regression analysis showed that women aged 50-59 years and 60-64 years were 3.5 times (adjusted odds ratio [AOR] = 3.50, 95% confidence interval [CI]: 2.07-5.89, $P < .0001$), and 5.92 times (AOR = 5.92 95% CI: 2.63-13.35, $P < .0001$), respectively, more likely to perform mammogram than those aged 40-49 years. Women with a high level of self-efficacy were 2.68 times (AOR = 2.68, 95% CI: 1.15-6.26, $P < .0001$) more likely to use mammographic screening than those with low self-efficacy. Although not statistically significant, women with a moderate level of BC fear were 0.56 times less likely to use mammogram than women with a low level of BC fear.

CONCLUSION: A low proportion of women underwent CBE or mammography. Women had a high level of BC fear and a moderate level of self-efficacy for BC screening. The findings emphasize the need for health educational and psychosocial interventions that improve self-efficacy and promote regular BC screening among middle-aged women.

KEYWORDS: Breast cancer screening, fear, self-efficacy, clinical breast examination, mammography

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Introduction

Breast cancer (BC) is a major public health problem in women globally. Bray et al reported that BC accounted for 24% of new cancer cases and 15% of cancer-related mortality in 2018.[1] The GLOBOCAN report further projected that new cases of BC would increase by more than 46% in 2040. Also, there has an increase in BC cases among women in sub-Saharan Africa (SSA) from 1993 to 2001. For instance, Parkin et al[2] reported that BC was the predominant cancer in sub-Saharan African women, which accounted for 133 900 (about 27.6%) of all cancers.

The 2018 GLOBOCAN report showed that there were 26 310 new BC cases among Nigerian women, which represented 22.7% of new cases of all cancer types. Also, there were 11 564 (16.4%) BC deaths among Nigerian women in 2018.[3] Previous studies[4-6] have reported that BC is more prevalent among Nigerian women aged 40 years and above. In addition, research evidence suggests that Nigerian women present with

late-stage disease at cancer registries and hospitals with deleterious outcomes.[7-9] Therefore, early detection of women with BC via screening becomes a veritable tool in reducing BC-related morbidity and death in Nigeria.

Breast cancer screening (BCS) methods such as breast self-examination (BSE), clinical breast examination (CBE), and mammography are useful in the early detection of BC. However, the use of BCS in low-and-middle-income countries (LMICs), including Nigeria, is associated with some challenges such as higher cost, longer examination time, and low availability.[9-12] Thus, the most used BCS methods among Nigerian women include BSE, CBE, and mammography.[7,8]

Research from the United States suggests that women aged 45 to 54 should undergo annual or biennial screening.[13] Also, it has been recommended that women start routine screening at 40 to 44 years of age.[14] However, previous studies indicated that BCS uptake is deficient in Nigerian women.[15,16] For instance, a study[17] reported that only 3% of women who qualified for annual screening had undergone mammographic screening, while another study reported that only 27.4% participated in CBE.[14] Despite the benefits of BCS, many factors influence its uptake among Nigerian women. Such factors include women's personal or demographic characteristics, fear of screening outcome, lack of capacity (self-efficacy), ignorance, healthcare-related factors, poverty, and cost of screening.[9,12-18] These factors could be linked to avoidance of BCS and associated adverse outcomes in Nigerian women.[5-8] However, the present study specifically focused on the associations among BC fear, perceived self-efficacy, women's demographic characteristics, and BCS behaviors.

Factors such as BC fear and perceived self-efficacy have been identified to influence BCS behaviors among women.[19,20-22] According to Witte,[23] "fear is a negatively toned emotion accompanied by a high level of physiologic arousal stimulated by a threat that is perceived to be significant and personally relevant." Thus, cancer-related fear is an adverse emotional reaction to cancer risk, undermining the quality of life and lifespan.[19] Prior studies confirmed that BC fear is high among women, especially in women with a BC family history.[19,24,25] Fear about BC encompasses worry, fear of having cancer, and fear of the screening procedure.[26]

Fear can hinder or promote BCS uptake in women. For instance, Miranda-Diaz et al[27] reported that many Hispanic women avoided mammography because of fear. Contrarily, Andersen et al reported that fear could encourage routine BCS and that worry about BC risk seems to be linked to mammography use in rural American women.[28] Likewise, Consedine et al[29] reported in a study of African American, US-born white, English-speaking Caribbean, Haitian, Dominican, and Eastern European women that cancer fear was positively associated with mammography screening and CBE frequency.

Besides fear about BC, perceived self-efficacy has been identified to influence BCS behaviors.[30-32] A high level of self-efficacy is reported to influence BCS behavior while a low level of self-efficacy is associated with poor or non-completion of BCS.[22,30-32] Perceived self-efficacy has been conceptualized as the individuals' beliefs in their abilities to accomplish given outcomes.[32] Therefore, self-efficacy can enhance women's confidence to take necessary preventive health actions to improve their overall well-being. For instance, self-efficacy enhances a woman's capacity to adapt to the disease and treatment and effectively manage symptoms.[33,34] Also, self-efficacy promotes effective self-care practices among women.[33,34] Prior studies reported that BC fear and perceived self-efficacy are intrinsically linked, and they interplay to determine women's BCS uptake. For instance, studies[25,35,36] suggested that lower self-efficacy levels are linked to higher BC fear. In contrast, women with a low level of BC fear and a high level of self-efficacy are more likely to utilize any form of BCS, including CBE and mammography.[35]

Understanding the independent or combined influences of BC fear and perceived self-efficacy on BCS behaviors in middle-aged Nigerian women is crucial for isolating and addressing these factors as protective or risk factors for BCS. Understanding the potential protective or risk factors for CBE or mammography screening is critical for planning an effective BCS and interventional program, which hopefully can mediate and enhance optimal BCS uptake. Nevertheless, to the best of our knowledge, the influence of demographic factors, BC fear, and self-efficacy on BCS behaviors among middle-aged women in southeast Nigeria has not been studied. Therefore, the present study examined the impact of fear and self-efficacy on BCS behaviors of women in Enugu State, Nigeria. The study further examined the association of BCS with women's demographic characteristics. The findings could help develop psychosocial interventions for cancer fear mitigation, self-efficacy for BCS, and provision of preventive care for women. It may also facilitate the design of policies aimed at eliminating barriers to BCS among Nigerian women.

Methods

Study design and ethical consideration

This community-based cross-sectional study was conducted among 1046 middle-aged women in Enugu State from September 2019 to February 2020. The projected population of middle-aged women in Enugu State was 396 674.[37] Enugu city has both federal and state Universities with affiliated Teaching Hospitals (ie, University of Nigeria Teaching Hospital, Ituku-Ozalla, and Enugu State University of Science and Technology Teaching Hospital, Parklane, Enugu). These tertiary health facilities provide BCS services, including CBE and mammography for women from different parts of Enugu State and neighboring states in southeast Nigeria.

Sample

The study's sample size was calculated using a single population proportion formula. The criteria used to calculate the

sample size were the prevalence of BCS (CBE) in Nigeria, $P = 27.4\%$,[14] the margin of error, $d = 5\%$; $Z\alpha = 1.96$ for a 95% confidence level, a design effect of 3.0 to compensate for a random error due to a multistage sampling, and non-response rate of 15%. The formula illustrated below yielded an estimated minimum sample size of 1046 women:

$$n = \frac{Z\alpha^2 . p(1-p)}{d^2}$$

Therefore, the estimated minimum sample size required to determine factors associated with BCS behavior of middle-aged women was 1046. Multistage sampling was used to select the local government areas (LGAs), primary sampling units (political wards), and the study units (women aged 40-64 years). Six LGAs were randomly selected out of the 17 LGAs in Enugu State.[37] A sampling frame was created using a list of LGAs in the state. Furthermore, the investigators randomly selected five political wards in each LGA. Consequently, a total of 30 political wards were selected.

Convenience sampling was used to select at least 34 women from each of the political wards. The women were selected until the sample size was attained. Also, written informed written consent was obtained from the women after a detailed explanation of the study purpose. The participants were further informed that participation was voluntary and that they were free to withdraw from the study at any time. The inclusion criteria included women aged 40-64 years who were willing and gave consent to participate in the study. The exclusion criteria included women who had a disability that hinders activity were excluded from the study. Permission to conduct the study was obtained from the Enugu State Ministry of Health's Research Ethics Committee (Ref number: MH/MSD/REC19/070).

Measures

A validated structured questionnaire was used to collect information on the women's demographic characteristics, including age, marital status, residential location, education, occupation, and monthly income status. Age was measured as a continuous variable. However, three age categories (40-49 years, 50-59 years, and 60-64 years) were created for the analysis. The age categories were created to identify the group with a high level of BC fear and low self-efficacy in order to facilitate interventions to promote BCS uptake to that group. Residential location was dichotomized into urban/rural. Marital status was grouped into three categories (single, married, and divorced/separated/widowed). Education was categorized into four groups (no formal education/Primary/Secondary/Tertiary) while three categories were created for occupation (unemployed/civil servant/employed in a private firm & trader or entrepreneur). Monthly income was categorized into <N30 000.00, N30 000-N99 000, and ≥N100 000.

To measure the dependent variable-CBE and mammogram screening uptake in the past 12 months, the reliable and validated instrument, "Breast Cancer Screening Questionnaire (BCSQ)" was used. Three items were used to measure women's BCS behaviors. The investigators asked the women if they had ever had a BCS or received a CBE or mammogram in the past 12 months based on American Cancer Society (ACS) current BCS guidelines.[38] In addition, the study adopted the 12-month duration because majority of the sample (64.7%) was under age 55 years. For example, items in the BCSQ include, "Have you ever had a BCS (ie, BSE, CBE and mammography) based on a doctor's recommendation during the past 12 months?" "Have you ever used a mammogram during the past 12 months?" Have you ever had a clinical breast examination during the past 12 months?" The items were adapted from literature.[39,40] The items were assigned a dichotomous response format (0 = No/Never had a BCS; 1 = Yes/had a BCS).

Moreover, the BCSQ and other scales such as Champion Breast Cancer Fear Scale (CBCFS) and Champion's Mammography Self-Efficacy Scale (CMSES) were designed first in the English language. The scales were translated to the Igbo language by two translators, one bilingual health educator and an expert in the Igbo language (ie, Master of Arts in the Igbo Language). The experts later back-translated the forward-translated version into English and cross-examined and completed it as the back-translated English version to ensure retention of the original meaning. Subsequently, the two versions were compared (ie, the original and back-translated versions) to identify any disparities.[41] In cases where differences were detected, five investigators and the two translators worked together to resolve them (additional information on CBCFS, CMSES translation, and content validity of BCSQ is provided in Appendix 1). The I-CVI and S-CVI of 0.90 and 0.85 were obtained for the instrument, which was greater than the recommended 0.79.[42,43] Also, the internal reliability of the BCSQ was tested using the Kuder-Richardson formula (KR-20).[44] A reliability coefficient of 0.70 was obtained for the BCSQ (Supplementary material 1).

Breast cancer fear

We assessed breast cancer fear using the validated Champion Breast Cancer Fear Scale (CBCFS). The CBCFS is a self-report scale with eight items.[25] The CBCFS contained eight items that cover the emotional responses of women regarding BC. The eight items include scared, nervous, upset, depressed, jittery, elevated heartbeat, uneasy, and anxious. Examples of CBCFS items include "When I think about breast cancer, my heart beats faster," and "When I think about breast cancer, I feel nervous." The CBCFS was assigned a 5-item Likert-type scale and ranged from strongly agree (5) to strongly disagree (1). The total score on the CBCFS range from 8 to 40. Higher scores on the CBCFS indicate higher levels of fear about BC among women.

The content validity index (CVI) was conducted for the CBCFS. The I-CVI and S-CVI for the CBCFS were 92.5 and 89.5, respectively, indicating a suitable scale for women. Also, Champion et al reported that the scale had an adequate level of internal reliability with a Cronbach's coefficient of 0.91.[25] In this study, the Cronbach's alpha reliability coefficient of the CBCFS was 0.92 (Supplemental material 2). After the translation of CBCFS, the expert panel agreed that the translated version of the CBCFS is appropriate regarding its conceptual, semantic, content, operational, and measurement equivalence.[45] Previous studies[20,46,47] have validated the CBCFS to evaluate fear about BCS among women.

Mammography self-efficacy

The 10-item Champion's Mammography Self-Efficacy Scale (CMSES) was used to assess women's self-efficacy for CBE and mammography screening uptake.[48] The women responded to the items in the CMSES on a Likert-type scale ranging from strongly disagree (1 point) to strongly agree (5 points). Examples of items in the CMSES include "If I want to get a mammogram, I can do it," "I can arrange other things in my life to have a mammogram," and "I can make an appointment for a mammogram." The total score on the CMSES ranges from 10-50, with higher scores on the CMSES indicating higher self-efficacy levels for BCS among women. The CMSES was also back-translated into the Igbo Language by the expert panel using the translation protocol described earlier.[41] The I-CVI and S-CVI for the CMSES were 91.3 and 83.5, respectively, suggesting a suitable scale for use among the women.[41,42] The internal consistency of the scale was established using Cronbach's alpha. In this study, the Cronbach α reliability coefficient for the scale was 0.83 (Supplemental material 3). Previous studies[46-49] have validated the CMSES among women in many countries.

A pilot survey

A pilot survey of the translated and validated versions of the CBCFS and CMSES was administered to a sample of 30 women aged 40 years and older in Nsukka town, who were invited to assess whether the versions of the CBCFS and CMSES were easy to understand. A few items were modified based on evaluation results. Subsequently, the internal consistency reliabilities of the scales were assessed using Cronbach's alpha. The principal investigators and two health educators (with Master's degrees in science) were involved in data collection. The study was reported according to the STROBE guidelines for observational studies.[50]

Statistical Analysis

All continuous variables were examined using the Shapiro-Wilk test of normality. Quantitative variables were described using mean and standard deviation (SD) and analysis of variance. Furthermore, the nominal variables such as BCS uptake and demographic characteristics were described using frequencies and proportions and Pearson's chi-square test. As recommended in a previous study,[20,25] the composite fear score on the CBCFS was computed using three categories (strongly agree/agree, strongly disagree/disagree, and undecided). Next, the fear score was stratified into low (8-15), moderate (16-23), or high fear (24-40) categories.[25] Similarly, the perceived self-efficacy for mammography score was stratified into low (10-19), moderate (20-29), or high fear (30-50) categories. To examine associations between fear, perceived self-efficacy, demographic characteristics, and BCS (ie, CBE and mammographic screening), both bivariate and multivariable logistic regression models were used. All variables associated with CBE and mammogram uptake at $P < .20$ in the univariate analysis were included in the multivariable model. We also examined the interactions of BC fear and perceived self-efficacy levels with BCS among women. For the analysis, we performed dummy coding of the predictors. For instance, we coded low BC fear and self-efficacy as 1, moderate BC fear and self-efficacy were coded as 2, high BC fear and self-efficacy were coded as 3. Odds ratios (ORs) and adjusted odds ratios (AORs) with 95% confidence intervals (CI) were calculated to determine factors that are independently associated with BCS behavior in women. A P value of .05 or less was considered statistically significant. Model fitness was checked with a Hosmer-Lemeshow test.[51] Before performing the regression models, multicollinearity among variables was checked using variance inflation criteria (VIF). A variable with VIF >5 indicates a potential presence of collinearity of that variable with other variables in the model. All analyses were performed using SPSS version 25 software.

Results

The demographic characteristics of the participants in this study are presented in Table 1. Out of 1046, only responses from 993 women who provided complete information were included in data analyses. Women with incomplete information or who did not return the survey questionnaires were excluded from data analyses. This gave a response rate of 94.4%. The mean age of participants was 55.3 years (SD: 5.75). Overall, 52.9% ($n = 525$) of the women were aged 40-49 years, and 35.4% ($n = 325$) were aged 50-59 years. Almost two thirds (64.8%, $n = 643$) were married. Also, two fifths (41%) had tertiary education (41.1%, $n = 408$), and more than half lived in rural areas (53.0%, $n = 526$). Furthermore, two fifths (40.3%, $n = 400$) were civil servants and entrepreneurs/traders. Table 1 also shows that 56.1% ($n = 557$) were low-income earners (i.e., <30 000).

Table 1 shows the comparison of "ever had a BCS, CBE, and mammogram in the past 12 months?" with selected demographic variables. Women aged 50-59 years had the highest proportion (53.7%) of those who have ever had a BCS. Also, women aged 50-59 years had the highest proportion (19.6%) of those who had a CBE than other age groups ($\chi^2 = 10.157$,

Table 1. Sociodemographic characteristics of women by breast cancer screening behavior ($N = 993$).

VARIABLE	TOTAL SAMPLE	HAVE YOU HAD A BCS IN THE PAST 12 MONTHS[A]	CLINICAL BREAST EXAMINATION (CBE)				MAMMOGRAPHY			
	MEAN (SD)/N (%)	*N* (%)	YES *N* (%)	NO *N* (%)	χ^2	*P* VALUE	YES *N* (%)	NO *N* (%)	χ^2	*P* VALUE
Total sample		506 (51.0)	124 (12.5)	869 (87.5)			168 (16.9)	825 (83.1)		
Age (year)	55.3 (5.75)									
Age (group)										
40-49 years	525 (52.9)	277 (52.8)	91 (17.3)	434 (82.7)			38 (7.2)	487 (92.8)		
50-59 years	325 (35.4)	189 (53.7)	69 (19.6)	283 (80.4)	10.157	**.006**	66 (18.8)	286 (81.3)	28.270	**<0.000**
60-64 years	116 (11.7)	40 (34.5)	8 (6.9)	40 (34.5)			20 (17.2)	96 (82.8)		
Marital status										
Single	152 (15.3)	65 (42.8)	35 (23.0)	117 (77.0)			40 (26.3)	112 (73.7)		
Married	643 (64.8)	333 (51.8)	126 (19.6)	517 (80.4)	32.543	**<0.000**	73 (11.4)	570 (88.6)	36.061	**<0.000**
DSW	198 (19.9)	108 (54.5)	7 (3.5)	191 (96.5)			11 (5.6)	187 (94.4)		
Education										
NFE	68 (6.8)	13 (19.1)	0 (0.0)	68 (100.0)			9 (13.2)	59 (86.8)		
Primary	231 (23.3)	119 (51.5)	32 (13.9)	199 (86.1)	23.125	**<0.000**	52 (22.5)	179 (77.5)	40.839	**<0.000**
Secondary	286 (28.8)	121 (42.3)	66 (23.1)	220 (76.9)			11 (3.8)	275 (96.2)		
Tertiary	408 (41.1)	253 (62.0)	70 (17.2)	338 (82.8)			52 (12.7)	356 (87.3)		
Residence										
Rural	526 (53.0)	241 (45.8)	91 (17.3)	435 (82.7)	0.116	0.733	77 (14.6)	449 (85.4)	4.737	**.030**
Urban	467 (47.0)	265 (56.7)	77 (16.5)	390 (83.5)			47 (10.1)	420 (89.9)		
Employment status										
Unemployed	193 (19.4)	113 (58.5)	19 (9.8)	174 (90.2)			19 (9.8)	174 (90.2)		
Civil servant	400 (40.3)	261 (65.3)	101 (25.3)	299 (74.8)	33.509	**<0.000**	72 (18.0)	328 (82.0)	18.929	**<0.000**
Trader/entrepreneur	400 (40.3)	132 (33.0)	48 (12.0)	352 (88.0)			33 (8.3)	367 (91.8)		
Income level										
<#30000	557 (56.1)	267 (47.9)	66 (11.8)	491 (88.2)			53 (9.5)	504 (90.5)		
#30000-#90000	309 (31.1)	136 (44.0)	60 (19.4)	249 (80.6)	35.129	**<0.000**	39 (12.6)	270 (87.4)	23.280	**<0.000**
⩾#100000	127 (12.8)	103 (81.1)	42 (33.1)	85 (66.9)			32 (25.2)	95 (74.8)		

All bold values are statistically significant *P* values.
Abbreviations: BCS, breast cancer screening; CBE, clinical breast exam; DSW, divorced/separated/widowed; NFE, no formal education; SD, standard deviation; χ^2, Pearson's chi-square.
[a]Only the proportions of women who responded "Yes" to Ever had a BCS (ie, breast self-examination [BSE], CBE and mammography).
***$P < .0001$; **$P < .001$; *$P < .05$.

Table 2. Women's responses on breast cancer fear and mammography self-efficacy scales ($N = 993$).

VARIABLE	*N* (%)	(95% CI)	MEAN (SD)	(95% CI)
Breast cancer fear (overall)			24.38 (5.98)	–
Low	97 (9.8)	0.0807-0.1177	11.31 (2.86)	10.73-11.89
Moderate	221 (22.3)	0.1978-0.2495	20.20 (2.50)	19.87-22.53
High	675 (68.0)	0.6501-0.7080	27.63 (2.93)	67.41-67.85
Perceived self-efficacy (overall)		–	28.06 (6.86)	–
Low	119 (12.0)	0.1011-0.1415	13.27 (3.14)	12.70-13.84
Moderate	372 (37.5)	0.3451-0.4052	26.27 (2.81)	35.98-37.56
High	502 (50.6)	0.4745-0.5366	32.89 (2.69)	52.65-53.12

Abbreviations: CI, confidence interval; SD, standard deviation.

$P = .006$). Similarly, women aged 50-59 years (18.8%) more than those aged 40-49 years (7.2%) and 60-64 years (17.2%) had a significantly higher proportion of those who had a mammographic screening in the past 12 months ($\chi^2 = 28.270$, $P < .0001$). Furthermore, single women had a significantly higher proportion (23%) of those who had a CBE than the married and DSW ($\chi^2 = 32.543$, $P < .0001$). A significantly higher proportion of single women than the married and DSW had a mammogram in the past 12 months ($\chi^2 = 36.061$, $P < .0001$). Although a higher proportion (62%) of women with tertiary education reported having a BCS during the past 12 months, a significantly higher proportion of women with secondary education had a CBE ($\chi^2 = 23.125$, $P < .0001$). Also, a significantly higher proportion (22.5%) of women with primary education had a mammogram than those with other education levels. Having a CBE and mammogram was significantly associated with income level. Other results on differences in the proportion of BCS of women by demographic factors are contained in Table 1. Overall, 51% of women reported having a BCS in the past 12 months, with 16.9% reporting receipt of a mammogram and 12.5% reporting a CBE.

The mean BC fear score was 24.38 (SD = 5.98). The prevalence of a high, moderate, and low level of fear was 68%, 22.3%, and 9.8%, respectively. Table 2 showed that the mean perceived self-efficacy score was 28.06 (SD = 6.86). The prevalence of a high, moderate, and low self-efficacy level was 50.6%, 37.5%, and 12.0%.

Table 3 shows that there was a significant difference in the mean CBCFS scores among the participants of different age groups. Also, there was a significant difference in the mean CMSES scores among the participants of different age groups. In addition, there was a significant difference in the CBCFS scores among the participants based on marital status. Similarly, there was a significant difference in the CMSES scores among the participants of different marital status. The participants of different marital status differed significantly in their perceived self-efficacy level for a mammogram. There was a significant difference in the CBCFS scores among the participants based on the level of education. There was a significant difference in the BC fear level among participants of different education levels. Likewise, there was a significant difference in the CMSES scores among the participants of different education levels. The participants of different education levels differed significantly in their level of perceived self-efficacy for a mammogram. Other significant results on levels of BC fear and self-efficacy for mammogram among women are contained in Table 3.

Table 4 shows both the bivariate and multivariable logistic regression analysis for the study. The bivariate associations of demographic characteristics, BC fear, and perceived self-efficacy with BCS behaviors showed that being aged 60-64 years (OR = 0.35, $P < .001$), DSW (OR = 0.12, $P < .0001$), civil servant (OR = 3.09, $P < .0001$), having a monthly income of #30 000-#90 000 (OR = 1.79, $P < .001$), and ⩾#100 000 (OR = 3.68, $P < .0001$), moderate fear (crude odds ratio [COR] = 2.18, $P = .025$), and high self-efficacy (OR = 2.11, $P = .018$) were significantly associated with CBE screening. Also, being aged 50-59 years (OR 3.42, $P < .0001$), 60-64 years (OR 6.59, $P < .0001$), married (OR = 0.25, $P < .0001$), DSW (OR = 0.05, $P < .0001$), primary education (OR = 9.17, $P < .0001$), secondary education (OR = 0.34, $P = .050$), urban residence (OR = 0.20, $P < .0001$), a trader/entrepreneur (OR = 0.40, $P = .027$), and high self-efficacy (OR = 2.19, $P = .036$) were significantly associated with mammographic screening.

In addition, factors that showed a value of $P \leqslant .20$ were included in the multivariable regression analysis. In the multivariable analysis presented in Table 4, women aged 50-59 years and 60-64 years were 3.5 times (AOR = 3.50, $P < .0001$), and 5.92 times (AOR = 5.92, $P < .0001$), respectively more likely to perform mammogram than those aged 40-49 years. Married women and DSW were 0.20 times (AOR = 0.20, $P < .0001$) and 0.04 times (AOR = 0.04, $P < .0001$) less likely to use mammogram compared with single women. Women with primary education were 10.19 times (AOR = 10.19, $P < .0001$) more

Table 3. Breast cancer fear and perceived self-efficacy by women's demographic characteristics.

VARIABLE	BREAST CANCER FEAR				PERCEIVED SELF-EFFICACY FOR MAMMOGRAPHY			
	MEAN (SD)	LOW *N*(%)	MODERATE *N* (%)	HIGH *N* (%)	MEAN (SD)	LOW *N* (%)	MODERATE *N* (%)	HIGH *N* (%)
Age (year)								
40-49 years	24.78 (6.27)	50 (9.5)	95 (18.1)	380 (72.4)	27.89 (7.11)	56 (10.7)	212 (40.4)	257 (49.0)
50-59 years	23.68 (5.72)	39 (11.1)	97 (27.6)	216 (61.4)	28.84 (5.94)	34 (9.7)	136 (38.6)	182 (51.7)
60-64 years	24.72 (5.19)	8 (6.9)	29 (25.0)	79 (68.1)	26.44 (7.95)	29 (25.0)	24 (20.7)	63 (54.3)
t(*df*), χ^2(*df*), *F*(*df*), *P* value	*F*(2, 990) = 3.808, **.023**	χ^2(4) = 14.314, **.006**			*F*(2, 990) = 5.763, **.003**	χ^2(4) = 29.463, < **.0001**		
Marital status								
Single	24.78 (5.52)	10 (6.6)	44 (28.9)	98 (64.5)	27.64 (6.96)	20 (13.2)	78 (51.3)	54 (35.5)
Married	23.79 (6.28)	70 (10.9)	142 (22.1)	431 (67.0)	28.83 (6.78)	65 (10.1)	216 (33.6)	362 (56.3)
DSW	25.99 (4.93)	17 (8.6)	35 (17.7)	146 (73.7)	25.86 (6.56)	34 (17.2)	78 (73.7)	86 (43.4)
t(*df*), χ^2(*df*), *F*(*df*), *P* value	*F*(2, 990) = 10.891, < **.0001**	χ^2(4) = 8.947, **.062**			*F*(2, 990) = 14.981, < **.0001**	χ^2(4) = 30.035, < **.0001**		
Education								
NFE	25.04 (5.29)	0 (0.0)	17 (25.0)	51 (75.0)	21.50 (9.14)	22 (32.4)	26 (38.2)	20 (29.4)
Primary	23.38 (6.53)	36 (15.6)	86 (37.2)	109 (47.2)	26.32 (8.51)	72 (31.2)	27 (11.7)	132 (57.1)
Secondary	25.36 (6.27)	27 (9.4)	34 (11.9)	225 (78.7)	28.24 (6.01)	18 (6.3)	139 (48.6)	129 (45.1)
Tertiary	24.15 (5.44)	34 (8.3)	84 (20.6)	290 (71.1)	30.00 (4.68)	7 (1.7)	180 (44.1)	221 (54.2)
t(*df*), χ^2(*df*), *F*(*df*), *P* value	*F*(3, 989) = 5.256, < **.001**	χ^2(6) = 73.930, < **.0001**			*F*(3, 989) = 41.109, < **.0001**	χ^2(6) = 2.523, < **.0001**		
Place of residence								
Rural	25.16 (5.26)	25 (4.8)	103 (19.6)	398 (75.7)	28.84 (5.98)	31 (5.9)	238 (45.2)	257 (48.9)
Urban	23.51 (6.60)	72 (15.4)	118 (25.3)	277 (59.3)	27.17 (7.63)	88 (18.8)	134 (28.7)	245 (52.5)
t(*df*), χ^2(*df*), *F*(*df*), *P* value	*t* (991) = 4.374, < **.0001**	χ^2(2) = 42.125, < **.0001**			*t* (991) = 3.860, < **.0001**	χ^2(2) = 53.347, < **.0001**		
Employment status								
Unemployed	24.64 (5.82)	15 (7.8)	37 (19.2)	141 (73.1)	26.88 (6.67)	22 (11.4)	92 (47.7)	79 (40.9)
Civil servant	23.79 (5.86)	44 (11.0)	83 (20.8)	273 (68.3)	30.01 (5.31)	16 (4.0)	146 (36.5)	238 (59.5)
Trader/entrepreneur	24.85 (6.14)	38 (9.5)	101 (25.3)	261 (65.3)	26.67 (7.80)	81 (20.3)	134 (33.5)	185 (46.3)
t(*df*), χ^2(*df*), *F*(*df*), *P* value	*F*(2, 990) = 3.416, **.033**	χ^2(4) = 5.457, 0.244			*F*(2, 990) = 28.853, < **.0001**	χ^2(4) = 62.612, < **.0001**		
Income level								
<#30 000	24.41 (5.97)	58 (10.4)	97 (17.4)	402 (72.2)	27.17 (6.95)	74 (13.3)	240 (43.1)	243 (43.6)
#30 000-#90 000	25.11 (5.64)	27 (8.7)	72 (23.3)	210 (68.0)	28.21 (6.95)	45 (14.6)	90 (29.1)	174 (56.3)
⩾#100 000	22.48 (6.46)	12 (9.4)	52 (40.9)	63 (49.6)	31.58 (4.77)	0 (0.0)	42 (33.1)	85 (66.9)
t(*df*), χ^2(*df*), *F*(*df*), *P* value	*F*(2, 990) = 8.851, < **.0001**	χ^2(4) = 34.282, < **.0001**			*F*(2, 990) = 22.418, < **.0001**	χ^2(4) = 42.863, < **.0001**		

All bold values are statistically significant *P* values.
Abbreviations: DSW, divorced/separated/widowed; *F*(*df*), *F*-ratio and degrees of freedom; SD, standard deviation; NFE, no formal education; χ^2(*df*), Pearson's chi-square and degree of freedom; *t*(*df*), independent-samples *t*-test and degree of freedom.
***$P < .0001$; ** $P < .001$; * $P < .05$.

Table 4. Binary and multivariable logistic regressions showing associations between demographic characteristics, BC fear, and BC screening.

VARIABLE	COR FOR CBE (95% CI, *P* VALUE)	AOR FOR CBE (95% CI, *P* VALUE)	COR FOR MAMOG. (95% CI, *P* VALUE)	AOR FOR MAMOG. (95% CI, *P* VALUE)
Age				
40-49 years	1.00	1.00	1.00	1.00
50-59 years	1.16 (0.82-1.65, .394)	1.13 (0.78-1.64, .524)	3.42 (2.06-5.70, <**.0001**)	3.50 (2.07-5.89, <**.0001**)
60-64 years	0.35 (0.17-0.75, <**.001**)	0.60 (0.26-1.38, .231)	6.59 (2.97-14.64, <**.0001**)	5.92 (2.63-13.35, <**.0001**)
Marital status				
Single	1.00	1.00	1.00	1.00
Married	0.82 (0.53-1.25, .344)	0.67 (0.42-1.07, .091)	0.25 (0.14-0.45, <**.0001**)	0.20 (0.11-0.38, <**.0001**)
DSW	0.12 (0.05-0.29, <**.0001**)	0.16 (0.06-0.38, <**.0001**)	0.05 (0.02-0.12, <**.0001**)	0.04 (0.01-0.11, <**.0001**)
Education				
NFE	1.00	–	1.00	1.00
Primary	0.59 (0.04-0.41, .991)	–	9.17 (3.16-26.67, <**.0001**)	10.19 (3.45-30.09, <**.0001**)
Secondary	0.34 (0.12-1.00, .902)	–	0.34 (0.12-1.00, **.050**)	0.30 (0.10-0.90, **.032**)
Tertiary	0.66 (0.09-0.11, .997)	–	0.66 (0.25-1.78, .415)	0.58 (0.22-1.56, .282)
Residence				
Rural	1.00	–	1.00	1.00
Urban	0.94 (0.68-1.32, .733)	–	0.20 (0.11-0.37, <**.0001**)	0.19 (0.10-0.38, <**.0001**)
Employment Status				
Unemployed	1.00	1.00	1.00	1.00
Civil servant	3.09 (1.83-5.23, <**.0001**)	1.67 (0.89-3.13, .108)	2.16 (0.99-4.67, .052)	1.87 (0.86-4.09, .115)
Trader/entrepreneur	1.25 (0.71-2.19, .438)	0.94 (0.50-1.75, .837)	0.40 (0.18-0.90, **.027**)	0.46 (0.20-1.04, .062)
Income level				
<#30 000	1.00	1.00	1.00	1.00
#30 000-#90 000	1.79 (1.22-2.63, <**.001**)	1.13 (0.72-1.79, .600)	0.67 (0.35-1.25, .208)	0.83 (0.43-1.63, .596)
⩾#100 000	3.68 (2.34-5.77, <**.0001**)	2.02 (1.13-3.62, **.018**)	1.59 (0.76-3.32, .214)	2.11 (0.93-4.80, .074)
Breast cancer fear				
Low	1.00	1.00	1.00	1.00
Moderate	2.18 (1.11-4.30, **.025**)	1.89 (0.89-3.97, .095)	1.37 (0.66-2.85, .399)	0.56 (0.23-1.36, .198)
High	1.29 (0.68-2.45, .435)	1.34 (0.68-2.63, .403)	0.84 (0.42-1.67, .623)	0.95 (0.43-2.09, .902)
Perceived self-efficacy				
Low	1.00	1.00	1.00	1.00
Moderate	1.33 (0.69-2.53, .393)	0.79 (0.39-1.59, .509)	1.31 (0.61-2.82, .485)	2.16 (0.86-5.44, .102)
High	2.11 (1.14-3.89, **.018**)	1.21 (0.61-2.38, .588)	2.19 (1.05-4.55, **.036**)	2.68 (1.15-6.26, **.023**)
BCF levels × *SE* levels	1.00	1.00	1.00	1.00
Fear (2) by *SE* (2)	–	0.41 (0.14-1.22, .108)	–	1.57 (0.74-3.33, .240)
Fear (2) by *SE* (3)	–	5.19 (2.90-9.28, <**.0001**)	–	2.18 (1.15-4.13, **.017**)
Fear (3) by *SE* (2)	–	1.72 (0.98-3.00, .058)	–	0.90 (0.48-1.69, .745)
Fear (3) by *SE* (3)	–	1.37 (0.79-2.35, .261)	–	1.15 (0.66-2.03, .623)

All bold values are statistically significant *P* values.
Abbreviations: 1.00, reference category; AOR, adjusted odds ratios; BCF, breast cancer fear; CBE, clinical breast examination; CI, confidence interval; COR, crude odds ratio; DSW, divorced/separated/widowed; Fear (1), Low fear; Fear (2), Moderate fear; Fear (3), High fear; MAMOG, mammography; NFE, no formal education; *SE*, self-efficacy; *SE* (1), Low self-efficacy; *SE* (2), Moderate self-efficacy; *SE* (3), High self-efficacy.

likely to use mammographic screening than those with no formal education (NFE). The odds of using a mammogram were 0.30 times (AOR = 0.30, $P = .032$) less likely among women with secondary education than those with NFE. The odds of using a mammogram were 0.19 times (AOR = 0.19, $P < .0001$) less likely among urban women than rural women. Women with a high level of self-efficacy were 2.68 times (AOR = 2.68, $P < .0001$) more likely to use mammographic screening than those with low self-efficacy. Although not statistically significant, participants with a moderate level of breast cancer fear were 0.56 times (AOR = 0.56, $P = .198$) less likely to use mammogram than women with a low level of BC fear. In the interactions, having a moderate BC fear combined with a high level of perceived self-efficacy was associated with CBE and mammogram uptake among women. Women with moderate fear combined with high perceived self-efficacy were 5.19 times (AOR = 5.19) more likely than those with low BC fear self-efficacy to undergo CBE. Similarly, women with moderate fear combined with a high perceived self-efficacy were 2.18 times (AOR = 2.18) more likely than those with low BC fear and self-efficacy to use a mammogram.

Discussion

This study aimed to determine the associations between demographic characteristics, BC fear, and perceived self-efficacy with BCS among middle-aged Nigerian women. Our study possibly is one of the first to examine the association of sociodemographic, BC fear, and self-efficacy with BCS behaviors among middle-aged Nigerian women. Despite the increased BC cases in Nigerian women and late-stage disease presentation at health facilities,[7,14-17] our study showed that half (51%) of women reported having BCS (ie, BSE, CBE, and mammography) and only 16.9% and 12.5% of women reported having CBE and mammographic screenings, respectively, in the past 12 months. The reported discrepancy in the overall BCS, CBE, and mammography may be due to women's use of BSE, which was not assessed in this study. Also, it is possible that healthcare workers (nurses and doctors) taught women the procedures for performing BSE at the health facility or community level during BC prevention seminars and workshops. Although BSE is not precise compared with CBE and mammography, its application is cost-effective if performed appropriately. Studies have reported the use of BSE among women in Nigeria.[7,8] Therefore, women's use of BSE could account for the reported 51% BCS by women in this study.

Nevertheless, the proportion of women who received CBE in this study is lower than 27.4% and 19.7% reported in a previous study. Interestingly, the proportion of women who had undergone a mammogram is higher than 2.8%, 1.8%, and 3.1% reported in previous Nigerian studies.[14,17]

The unmet BCS needs in women might be responsible low uptake of BCS in this study. Such unmet BCS needs include the inadequate provision of specific BC information needs, inadequate provision and use of BC prevention services, patients' experiences and satisfaction with service provision, and inefficiencies in service delivery.[52,53] Addressing these needs through appropriate health interventions by healthcare professionals (doctors, nurses, and community health workers), stakeholders in the health sector, Federal and State Ministries of Health could allay BCS fear and boost self-efficacy for BCS uptake among middle-aged Nigerian women.

There were high, moderate, and low levels of fear level in our sample. In our sample, the mean score for BC fear falls into the higher fear category recommended by Champion et al.[25] Our sample's mean BC fear score was lower than that reported by Turkish women (26.36 [SD: 7.29]).[49] Nevertheless, the BC fear is high in our sample, and fear can prevent women from having a CBE or mammogram.[25,26,46] The finding is consistent with previous studies.[20,25,26] Therefore, psychological interventions that can reduce women's fear levels should be implemented by psychologists in collaboration with health workers and public health experts.

The mean perceived self-efficacy score in our sample was moderate. The prevalence of a high, moderate, and low self-efficacy level was 50.6%, 37.5%, and 9.8%, respectively. There is a lack of data about the level of self-efficacy for BCS among Nigerian women to compare evidence. Nevertheless, a moderate level of self-efficacy promotes a mammogram in women.[30,35] Future studies can explore interventions to increase perceived self-efficacy for BCS among middle-aged Nigerian women.

Older age (ie, aged 60-64 years), being a divorced/separated/widowed (DSW) and a civil servant, having a monthly income of N30 000-N90 000, and ⩾ N100 000, moderate fear and high self-efficacy were significantly associated with CBE screening in both bivariate and multivariable analysis. Older age (ie, women aged 50-59 years and 60-64 years), being married, being a DSW, high monthly income, primary education, urban residence, and a high level of self-efficacy were associated with CBE and mammography use in our sample. The finding on the association between older age and BCS is consistent with previous studies.[20,54] However, the results are mixed in our sample. The finding was non-significant for CBE, which implies that women are less likely to use CBE. In contrast, middle-aged women are more likely to receive mammographic screening. The plausible explanation could be that women do not like male doctors examining their breasts. In many Nigerian communities, women prefer female doctors to male doctors to conduct BCS. Therefore, this may suggest the need to train more female doctors, radiographers, or nurses to conduct CBE in Nigeria. Although Nigeria currently does not have national BCS guidelines,[14,17] our finding may suggest the government's urgent need to scale up efforts to provide more mammographic screening facilities for women since mammogram is considered a gold standard for BCS.

The odds of undergoing a CBE or mammography is less likely among married women and DSW than single women. Several factors not examined in this study may be responsible for the finding. Married women may need support from their

husbands to undergo CBE or mammography. Spousal support could be a significant factor in BCS uptake among women. Consequently, community-based BC awareness/education programs should integrate men and encourage men to support women with screening uptake resources. Furthermore, future studies should explore reasons for the abysmally low uptake of BCS among DSW.

The high cost of CBE or mammogram screening in Nigeria could imply that only women with moderate to high-income level can afford BCS. Although initiatives to reduce the cost of BCS have started in the country. However, it is still beyond the reach of poor women, especially those living in poor communities. Thus, the country's BCS procedures may require subsidies from the government, NGOs, or private health institutions for poor women. This hopefully may reduce the high prevalence of late presentation of women to health facilities.

The role of cancer fear in BCS uptake is challenging to comprehend. There is mixed evidence on the role of cancer fear in screening behaviors.[20] For instance, a study reported an association between BC fear and previous mammography completion,[29] while another study reported a null association between BC fear and BCS.[20] Nonetheless, our study confirms previous findings that moderate fear may encourage BCS.[25] Since the role of cancer fear in screening uptake is not crystal clear, future longitudinal studies can further examine the impact of cancer fear on screening behavior among older women. Consistent with previous studies,[22,25,31,33,35,47,54,55] our study further confirms that self-efficacy is a significant factor in BCS uptake.

The interaction terms' finding confirms that having a moderate BC fear combined with a high self-efficacy was associated with uptake of both CBE and mammography screening in our sample. The finding is consistent with previous studies.[28,35,56] The finding could suggest that a moderate level of BC fear may motivate women to use routine BCS. Although there is contradictory evidence on the influence of cancer fear on screening uptake among older women,[19,20,26,28] future studies using more robust designs such as longitudinal studies and randomized controlled trials could help provide clear evidence on the impact of BC fear on screening uptake.

The main disparity in BCS uptake between the women in previous studies and our sample could be attributed to improved access to BCS services at the tertiary and private health facilities in Enugu and other main towns such as Nsukka. Nonetheless, the findings may suggest a need for a community-wide BC awareness campaign through community mobilization and advocacy groups. Both government and non-governmental organizations (NGOs) can ramp up their community-based campaigns, especially among women in rural communities. Public health educators and community health workers (CHWs) can also implement intensive BC awareness education programs at the community level for rural women. An intensive BC awareness education program can be implemented for urban women via social media platforms such as WhatsApp, Facebook, and Twitter. Such campaigns hopefully can increase women's BCS uptake because a prior study has shown that mobile health (mHealth) apps can improve screening behavior and self-management, especially among BC survivors.[57-59]

Similarly, healthcare workers should educate women about the importance of annual routine BCS. Effective communication using verbal persuasion and social influence by healthcare workers recommended by Bandura[54] can boost women's ability and decisions to receive CBE or mammogram. They should also ensure prompt referral of all women with probable cases of BCs.[14] Future efforts to explore interventions that can significantly promote BCS uptake among Nigerian women are indispensable. Such interventions should also ensure that comprehensive resources that address women's unmet BCS needs are made more available.

Strengths

The present study is the first to thoroughly describe the association of sociodemographic characteristics, BC fear, perceived self-efficacy, and BCS behaviors in middle-aged Nigeran women. The study's strengths include a large sample size recruited from various communities in Enugu State. The sample is more representative of the population and enhances the external validity of the study. The use of validated scales to collect information from women guarantees reliability and increases the study's internal validity.

Limitations

Limitations of the study include its cross-sectional nature, which does not permit causal inference. Future studies should adopt longitudinal designs and integrate other factors that could influence Nigerian women's BCS behaviors. This may offer a complete understanding of the barriers to women's BCS behaviors. Furthermore, the study's self-reported nature could introduce report bias and the overestimation of women's BCS because clinical or diagnostic records did not confirm our data. Self-reported data have been identified as associated with overestimation of screening uptake.[60] This may plausibly explain more than half of the women that reported ever had a BCS. However, their responses on CBE and mammogram uptake suggested low BCSs uptake. Nevertheless, using a short recall period and validated scales for BCS is highly effective where clinical records are inaccessible. Since research evidence suggests that self-reported mammogram versus documented screening history showed sensitivity to be between 93% and 95% and specificity to be approximately 62%.[60,61]

Conclusions/Further Research

The study shows that a low proportion of women used CBE and mammogram. The study also indicates a high level of BC fear among middle-aged Nigerian women who require BCS. However, the women had a moderate level of self-efficacy for CBE and mammogram. Women's characteristics, such as age, marital status, education, residence, employment status, and

income level, were associated with women's BCS behaviors. There were significant differences in the BC fear and perceived self-efficacy for BCS among women by demographic characteristics. Also, older age, being married, divorced or separated or widowed, a civil servant, having a high monthly income, primary and secondary education were significantly associated with BCS. Interventions that focus on reducing the fear levels and promoting self-efficacy regarding BCS behaviors in women could be useful. Such interventions may include health education that focuses more on women's unmet needs for cancer care.

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Author Contributions

RNE: Principal investigator, conceptualization, manuscript development, and data collection; CCI: Conceptualization, assisted with manuscript development; OSA: Statistical analysis, main writer, and analysis plan; TEI: Assisted with manuscript editing and analysis plan; JIO: Manuscript editing; LIA, YW, & DDE: Data collection.

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Data Availability

Data used to support the findings of this study are available from the corresponding author.

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Appendix 1

S/N	BCSQ ITEMS	IGBO LANGUAGE TRANSLATED VERSION
1.	Have you ever had a breast cancer examination based on a doctor's recommendation in the past 12 months?	I meela nnyocha onwe maka ọrịamkpụrụakị n'ọnwa iri n' abụọ gara aga site n'ntuziaka dokinta?
2.	Have you had a clinical breast examination during the past 12 months?	Onye ọrụ ahụike emeela gị nnyocha ara gị kamgbe ọnwa iri n' abụọ gara aga?
3.	Have you had/received a mammogram during the past 12 months?	I meela onyo onyo nke ara kemgbe ọnwa iri n' abụọ gara aga?

Abbreviation: BCSQ, Breast Cancer Screening Questionnaire.

Translated version of the Breast Cancer Fear Scale: Nsialọ Ụjọ Maka Ọrịamkpụrụakị.

S/N	BCFS ITEMS	IGBO LANGUAGE TRANSLATED VERSION
1.	When I think about breast cancer, I am afraid	M cheta maka ọrịamkpụrụakị, ụjọ n' adị ṭụọ m.
2.	When I think about breast cancer, I feel nervous	M cheta maka ọrịamkpụrụakị, ahụ n' adị ama m kwekekweke.
3.	When I think about breast cancer, I get upset	M cheta maka ọrịamkpụrụakị, anaghị m enwe ọñụ.
4.	When I think about breast cancer, I get depressed	M cheta maka ọrịamkpụrụakị, ahụ n' adị akụnwụọ m, maọbụ m nwee obi mwute.
5.	When I think about breast cancer, I get edgy/jittery	M cheta maka ọrịamkpụrụakị, o n'eche m aka mgba.
6.	When I think about breast cancer, my heart beats faster	M cheta maka ọrịamkpụrụakị, mkpụrụobi m akụba ọsọ ọsọ/kpum-kpum-kpum.
7.	When I think about breast cancer, I feel uneasy/disturbed	M cheta maka ọrịamkpụrụakị, m nwee obi nkonelu.
8.	When I think about breast cancer, I feel anxious/restless	M cheta maka ọrịamkpụrụakị, obi n'amapụ m, ahụ amaba m jijiji.

Abbreviation: BCFS, Breast Cancer Fear Scale.

Translated version of the Mammography Self-Efficacy Scale (CMSES): Nsialọ Maka Adimire Nnyocha onwe ọrịamkpụrụakị Nke Ara.

S/N	CMSES ITEMS	IGBO LANGUAGE TRANSLATED VERSION
1.	I can arrange transportation	E nwere m ike ịkwụ ụgwọ ụgbọ ala ka enyochaa m.
2.	I can arrange other things in my life to have a mammogram	E nwere m ike ihazi ihe ndị ọzọ na ndụ m ka e wee new ike nyochaa m.
3.	I can talk to people about my concerns	E nwere m ike igwa ndi mmadụ okwu ebe a na-enyocha ahụ ka o si metụta m.
4.	I can get a mammogram even if I am worried	E nwere m ike ikwe ka enyocha m, ọbụrụgodu na obi erughi m ala.
5.	I can get a mammogram even if I do not know what to expect	E nwere m ike ikwe ka enyocha m, ọ bụrụgodu na m amaghi ihe m na-atụ anya inụ/ihụ.
6.	I can find a way to pay for a mammogram or clinical breast examination	Aga m achọtalị ụzọ m ga-esi kwụọ ụgwọ maka onyo onyo, ma ọbụ nnyocha nke ara e mere m.
7.	I can make an appointment for a mammogram	E nwere m ike iyiagba maka nnyocha nke ara.
8.	If I really want to get a mammogram, I can do it	Amara m nke ọma na e nwere m ike inyocha ahụ, ma m chọọ.
9.	I know how to go about getting a mammogram	Ama m ka m ga-esi jikere gaa ka e nyochaa m.
10.	I can find a place to have a mammogram	E nwere m ike ịchọpụta ebe a ga-enyocha m ara.

Additional information on procedure for translations and content validity of BCSQ

After the translation, copies of the instrument were given to a panel comprising five health education experts and two clinical experts. The panel members were asked to review the translated BCSQ, CBCFS, CMSES and evaluate their relevance/appropriateness for use and clarity. In addition, 30 women aged 40 to 64 years were conveniently selected to participate in cognitive interviews to assess their understanding of BCSQ items and evaluate their BCS behaviors. Next, we integrated the expert consultations' outcomes and cognitive interviews into the revised versions of BCSQ, and validation of the translated version was completed. The validated version still retained its three items (Appendix 1).

The BCSQ content validity was tested using the content validity ratio (CVR) and content validity index (CVI). The formula below was used to compute the CVR for the item in the BCSQ:

$$CVR = \frac{n\mathrm{E} - \frac{N}{2}}{\frac{N}{2}}$$

where *n*E implies the number of experts who choose the necessary option and *N* connotes the number of experts involved in the content validity process. The CVI includes the item-level content validity index (I-CVI) and the scale-level content validity index (S-CVI). The experts were asked to assess the CVI based on three criteria: relativity, simplicity, and clarity. The experts were also asked to evaluate each item on a four-point scale: 4 = very relevant, 3 = relevant with minor adjustment to phrasing, 2 = relevant with major adjustment to phrasing, and 1 = irrelevant. The experts were asked to adjust the wording where necessary. The CVI was calculated as the proportion of experts providing a rating of either 3 or 4, divided by the number of experts; in other words, the proportion in agreement about relevance.