

ORIGINAL RESEARCH ARTICLE

Influence of age and education on breast cancer awareness and knowledge among women in South Western Nigeria

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Abstract

The rising incidence of breast cancer (BC) in sub-Saharan Africa is aggravated by poor prognosis. Health education and several screening methods, including breast self-examination (BSE), clinical breast-examination (CBE) and mammography, have been advanced to achieve early detection and reduction in its mortality rate. This study evaluated the level of awareness and knowledge of BC and BSE amongst female students and staff of six educational institutions in Ota, Southwest Nigeria. The participants, consisting of 917 (80.79%) students and 218 (19.21%) staff, aged between 13 and 60 years, were selected using a stratified random sampling technique and categorized into age groups [adolescents (13-19 years), young adults (21-40 years) and middle-aged adults (41-60 years)] and levels of education. Data was collected via questionnaires and analysed using Epi-info software and SPSS version 20. Frequencies, percentages, regression and correlation co-efficient were calculated and used to determine the levels of association between age groups and levels of education. Mean age of the participants was 21 ± 1.7 years; over 75% were adolescents. BC and BSE awareness was 94.80% and 65.11% respectively, with 7 (0.62%) having BC. The major sources of BC and BSE information were television, health workers and internet. The average BC knowledge score of the participants was 4.06 (40.57%); it was highest among young adults, 4.31 (43.07%), and least among the adolescents, 3.88 (38.78%). The same trend was observed for BSE practice among the age groups. There was a direct relationship between BC knowledge and levels of education; the postgraduates had the highest BC knowledge score of 4.49 (44.89%) while the secondary students had the least score of 3.82 (38.12%). Similar trend was observed for BSE practice and the levels of education. Paucity of BSE knowledge largely accounted for the low BSE practice among the adolescents and secondary students. The huge gap in BC knowledge and BSE practice underscores the need for a structured health education and screening programmes in Nigerian schools to enhance prevention and early detection of BC and other ailments. BSE is free, easy to perform, and able to detect BC at earlier stage. The practice should be encouraged alongside mammography to reduce the burden and mortality rate of BC in Nigeria. (*Afr J Reprod Health* 2023; 27 [3]: 87-107).

Keywords: Breast cancer, breast self-examination, risk, practice, early detection

L'incidence croissante du cancer du sein (CB) en Afrique subsaharienne est aggravée par un mauvais pronostic. L'éducation à la santé et plusieurs méthodes de dépistage, y compris l'auto-examen des seins (ESB), l'examen clinique des seins (CBE) et la mammographie, ont été avancées pour parvenir à une détection précoce et à une réduction de son taux de mortalité. Cette étude a évalué le niveau de sensibilisation et de connaissance de la Colombie-Britannique et de l'ESB parmi les étudiantes et le personnel de six établissements d'enseignement à Ota, dans le sud-ouest du Nigéria. Les participants, composés de 917 (80,79%) étudiants et 218 (19,21%) membres du personnel, âgés de 13 à 60 ans, ont été sélectionnés à l'aide d'une technique d'échantillonnage aléatoire stratifié et classés en groupes d'âge [adolescents (13-19 ans), jeunes adultes (21-40 ans) et adultes d'âge moyen (41-60 ans)] et les niveaux d'éducation. Les données ont été collectées via des questionnaires et analysées à l'aide du logiciel Epi-info et SPSS version 20. Les fréquences, les pourcentages, les coefficients de régression et de corrélation ont été calculés et utilisés pour déterminer les niveaux d'association entre les groupes d'âge et les niveaux d'éducation. L'âge moyen des participants était de $21 \pm 1,7$ ans ; plus de 75 % étaient des adolescents. La connaissance de la Colombie-Britannique et de l'ESB était de 94,80 % et 65,11 % respectivement, 7 (0,62 %) ayant la Colombie-Britannique. Les principales sources d'information sur la Colombie-Britannique et l'ESB étaient la télévision, les travailleurs de la santé et Internet. Le score moyen de connaissance de la Colombie-Britannique des participants était de 4,06 (40,57 %) ; il était le plus élevé chez les jeunes adultes, 4,31 (43,07%), et le moins chez les adolescents, 3,88 (38,78%). La même tendance a été observée pour la pratique de l'ESB parmi les groupes d'âge. Il y avait une relation directe entre les connaissances en Colombie-Britannique et les niveaux d'éducation; les étudiants de troisième cycle avaient le score de connaissance le plus élevé de la Colombie-Britannique de 4,49 (44,89%) tandis que les étudiants du secondaire avaient le score le plus bas de 3,82 (38,12%). Une tendance similaire a été observée pour la pratique de l'ESB et les niveaux d'éducation. Le manque de connaissances sur l'ESB explique en grande partie la faible pratique de l'ESB chez les adolescents et les élèves du secondaire. L'énorme fossé entre les connaissances sur la Colombie-Britannique et la pratique de l'ESB souligne la nécessité d'une éducation

sanitaire structurée et de programmes de dépistage dans les écoles nigérianes afin d'améliorer la prévention et la détection précoce de la Colombie-Britannique et d'autres affections. L'ESB est gratuite, facile à réaliser et capable de détecter le BC à un stade plus précoce. La pratique devrait être encouragée parallèlement à la mammographie pour réduire le fardeau et le taux de mortalité du CS au Nigeria. (*Afr J Reprod Health* 2023; 27 [3]: 87-107).

Mots-clés: Cancer du sein, auto-examen des seins, risque, pratique, détection précoce

Introduction

Many developing countries, particularly in sub-Saharan Africa, are facing an upsurge in the incidence of non-communicable diseases (NCDs) in addition to the enormous burden of infectious diseases, poor nutrition, and weak health systems^{1,2,3,4}. Cancer ranks among the NCDs with escalating prevalence, morbidity and mortality^{5,6}. Breast cancer (BC), a cancer of the mammary gland, is the most commonly diagnosed cancer (11.7%) with an estimated 2.3 million new cases annually, and the fifth cause of cancer deaths (6.9%) worldwide⁷. The female gender is a major risk factor of BC; only 0.5-1% cases of BC occur in men^{8,9}. The disease has continued to exert heavy tolls on the lives, health, quality of life, overall wellbeing and life expectancy of women in the developing countries¹⁰.

Effective health education leading to early detection of BC could reduce its incidence, morbidity, and mortality¹¹. Such education should involve deliberate awareness creation and knowledge inculcation on the key aspects of the disease, including information dissemination on such areas as the risk factors, causes, mode of spread, treatment strategies, means of detection, prevention, mortality and survival^{12,13}. Different channels of communication, for instance, mass and social media, formal and informal education, word of mouth and peer association, may be engaged to achieve the best result¹⁴. Early detection increases the chance of survival and life expectancy of BC patients, thereby reducing the high mortality rate associated with it¹⁵. Unlike other types of cancer, BC is visible and easy to detect. The common symptoms are breast lumps, redness of the breast, discharge, breast skin distortions, and chest pain¹⁶. Breast self-examination (BSE), clinical breast examination (CBE), breast awareness and mammography are different screening methods for BC. Mammography is the preferred and recommended method because of its specificity which eliminates the challenges associated with biopsy of benign tumours. Unfortunately, it is grossly underutilized in low income countries in

sub-Saharan Africa including Nigeria due to the high cost¹¹. BSE was and still remains the most commonly used BC detection technique because it is free, painless and can be practiced as often as possible¹². Though some health authorities no longer recommend BSE for general use, it is deemed suitable in women who have a particularly high risk of developing BC¹⁷, and certainly for use in places where mammography is either unavailable or unaffordable. Numerous benefits of BSE include awareness of breast structural changes, and the easy and early detection of breast abnormalities. It can be carried out standing in front of the mirror, lying down, using circular motions to examine all parts of the breast, lifting one hand above the head while examining the breast on that side, using opposite hands to examine each breast, pressing the nipples to check for discharge, observing changes in breast shape and size, etc.

BC is more aggressive in black women compared to their white counterparts¹⁸. Its aggressiveness and poor prognosis have been linked to its growing incidence, high mortality and low survival rates in Nigeria¹⁰. Other factors associated with the upsurge of BC in developing countries are industrialization, changes in diets and lifestyle, inactivity and increase in life expectancy¹⁰. BC affects a wide range of age groups in Nigeria; it has been detected in under 30 women, including 16-year-old¹¹. This has been attributed to exposure to numerous risk factors including environmental, dietary and genetic elements that stimulate the development of the disease¹⁹. The present study examined the level of awareness and knowledge of BC, BSE, and BSE practice amongst females in selected educational institutions in Ota, South Western Nigeria. The influence of age and level of education on the parameters that may enhance prevention and early detection of BC, and the survival rate were determined.

Methods

The participants were randomly selected from six educational institutions (two public secondary

schools, three private secondary schools and a private university) located in Ota, Ado-Odo/Ota Local Government Area of Ogun State, Nigeria. A stratified random sampling technique was used in the cross-sectional survey. The first stage of the sampling involved a streamlined selection of educational institutions with large population of female students, teachers, faculty and non-teaching staff (NTS), on which basis six institutions consisting of five secondary schools and one university, were selected. The second stage involved the division of participants in each institution into different categories and sub-categories. The third stage involved the random selection of participants from each stratum based on the inclusion criteria. The target population were females aged 13 years and above, who have developed or still developing breasts, and have begun to menstruate and still menstruating. The age range was 13 to 60 years. The study was devoid of activities that pose a risk or harm to human life and property. Ethical approval was obtained from Covenant Health Research Ethics Committee. Those who met the inclusion criteria and filled the consent form were elected for the study. The target sample size was 1200 out of an estimated female population of 12,000 in the selected institutions. Questionnaires were used as research instrument following the methods of Ifediora and Azuike¹¹ and Chaka *et al.*²⁰. The questionnaire had carefully selected closed-ended questions based on their relevance to the study objectives, and also taking into cognisance the Nigerian environment and target population. It was structured into four major sections: demographic characteristics of the participants, BC awareness and medium, BC and BSE knowledge, and BSE practice. The questionnaire was validated by a demographer and health research personnel, and the reliability was asserted using a Test-retest method. The questionnaires were distributed to 1200 selected participants. The level of BC and BSE awareness were assessed using three closed ended structured questions while the level of knowledge was evaluated using 14 close-ended structured questions with a mixture of multiple and single correct options.

Variables operationalization

The study was transformed and recoded using Epi-info, Ms Excel and SPSS version 20 statistical

software. Frequencies, percentages and means were calculated. Regression and correlation analysis was used to determine p-values and the levels of association. The level of awareness was assessed using 'Yes' or 'No' questions coded as '1' and '0' respectively. The level of knowledge was assessed using '2', '1' and '0' for correct, partially correct and incorrect responses respectively. The total scores were collated and the average was calculated for the various age groups and levels of education. The level of BSE practice was assessed and codes assigned: daily (7), biweekly (6), weekly (5), bimonthly (4), monthly (3), biannually (2), annually (1), never (0).

Results

Response rate

Out of the 1200 participants selected for the study, 1135 returned their filled questionnaires, giving a response rate of 94.58%. The returned questionnaires were used for the subsequent analyses.

Socio-demographic characteristics

The socio-demographic characteristics of the study participants is presented in Table 1. Over 75% of the participants were adolescents; the young adults and middle-aged adults were 18.68% and 6.08% respectively. The mean age of all the participants was 21 ± 1.7 years. Students constituted 80.79% of the participants (33.84% secondary school students; 41.41% undergraduates; and 8.11%, postgraduates) while the remaining 19.21% were faculty and staff of the selected institutions. In terms of educational qualification, 12.85% of the faculty and staff had only secondary education; 73.85% were graduates with 13.30% possessing higher degrees. Most of the participants (87.49%) were single; 12.16% were married; 0.36% were either divorced or widowed. Spouses of the married participants have different levels of education ranging from primary (0.72%), secondary (13.04%), professional certifications (21.74%), to tertiary (61.59%); (2.90%) had no educational qualification. Most of the participants (95.86%) were Christians; 4.14% were Muslims. The participants' attitude to BC was assessed through their responses to questions on willingness to know their BC risk status, BSE practice, and the reasons

Table 1: Socio-demographic characteristics of study participants (n. = 1135)

Variables	Classification	Frequency	%
Age of respondents			
Adolescents	13 – 19	854	75.24
Young adults	20 – 40	212	18.68
Middle-aged	41 – 60	69	6.08
Type of institution			
Secondary school	Private/Public schools (n = 5)	592	52.16
University	Private university (n = 1)	543	47.84
Staff and Students			
Students	All students	917	80.79
	SS1	134	11.81
	SS2	128	11.28
	SS3	122	10.75
	Undergraduate	470	41.41
	Postgraduate	63	5.55
	Faculty and Staff	All staff	218
Teachers/NTS		207	18.24
Faculty/NTS		11	0.97
Staff highest education (n = 218)			
	Secondary (WAEC/NECO)	28	12.85
	Graduate (First degree/HND)	161	73.85
	Higher degree (Masters/Others)	29	13.30
Religion			
	Christianity	1088	95.86
	Islam	47	4.14
Marital Status			
	Single	993	87.49
	Married	138	12.16
	Divorced/separated	2	0.18
	Widow	2	0.18
Spouse highest education (n = 318)			
	None	4	2.90
	Primary	1	0.72
	Secondary	18	13.04
	Tertiary	85	61.59
	Professional	30	21.74

SS = Senior Secondary; NTS = Non-Teaching Staff, HND = Higher National Diploma; WAEC = West African Examination Council; NECO = National Examination Council.

for performing or not performing BSE. The participants were allowed to pick as many options as they choose in order to ascertain their knowledge of the subject matter and eradicate uninformed guesses. The total score of each participants was collated and the level of knowledge determined from the score,

BC and BSE awareness

Table 2 shows the participants' level of awareness of BC and BSE. They were more aware of BC (94.80%) than BSE (65.11%). The major sources of information were television (65.37%), health workers (45.90%) and internet (45.11%). Television and radio were most effective (62.11%), followed by social media (50.22%) and testimonies of BC survivors (46.43%). Seven (7) participants (0.62%) have BC while 55 (4.85%) have a family history of BC; the claims were not clinically established.

Attitude towards BC and BSE

The participants' attitude to BC is shown in Table 3. Although 83.35% of the participants indicated interest in knowing their BC risk levels, only 38.15% actually performed BSE. The participants who perform BSE, indicated early detection of BC (84.30%), fear of having BC (72.29%) and media information (62.82%). as their major reasons Majority of the participants who never performed BSE (72.08%) attributed this to lack of knowledge on how it is done. Mean percentage of respondents' willingness to know their BC status and perform BSE was used to determine overall attitude. The result showed that 60.79% of the respondents have a positive attitude towards BC while 39.21% have a negative attitude.

Knowledge of BC and BSE

The BC and BSE knowledge level of the participants is shown in Table 4. Questions used to

Table 2: Level of BC and BSE awareness amongst the respondents (n = 1135)

Parameters	No Frequency (%)	Yes Frequency (%)
Level of awareness		
BC awareness	59 (5.20)	1076 (94.80)
BSE awareness	396 (34.89)	739 (65.11)
BC status (a participant having BC)	1128 (99.38)	7 (0.62)
Family history (a family member having BC)	1080 (95.15)	55 (4.85)
Non-family member having BC	965 (85.02)	170 (14.98)
Source of BC and BSE information		
Radio	843 (74.27)	292 (25.73)
Textbooks	861 (75.86)	274 (24.14)
Magazines	846 (74.54)	289 (25.46)
Newspapers	876 (77.18)	259 (22.82)
Facebook	823 (72.51)	312 (27.49)
Google (internet)	623 (54.89)	512 (45.11)
Twitter	1014 (89.34)	121 (10.66)
WhatsApp	841 (74.10)	294 (25.90)
Home/Family	887 (78.15)	248 (21.85)
Church/Mosque	945 (83.26)	190 (16.74)
Friends	725 (63.88)	410 (36.12)
School teachers	793 (69.87)	342 (30.13)
Health workers	614 (54.10)	521 (45.90)
Television	393 (34.63)	742 (65.37)
Effective methods of BC awareness		
Television and radio programs	430 (37.89)	705 (62.11)
Educational books and brochures	882 (77.71)	253 (22.29)
Illustrations and plays	943 (83.08)	192 (16.92)
Video and films	822 (72.42)	313 (27.58)
Gathering people together for health education	795 (70.04)	340 (29.96)
Social media	565 (49.78)	570 (50.22)
Teaching people in church and schools	850 (74.89)	285 (25.11)
Teaching people songs on breast cancer	1044 (91.98)	91 (8.02)
BC survivors teaching from their experience	608 (53.57)	527 (46.43)

assess the respondents' knowledge of BC and BSE were categorized into basic BC knowledge, symptoms of BC, persons that should practice BSE, best time for BSE and BSE associated activity. On the overall, the respondents had low BC and BSE knowledge. The basic BC knowledge was very low (2.47%); knowledge of BC symptoms, best time for BSE, and BSE associated activities was 9.96%, 4.58%, and 3.70%

Table 3: Percentage distribution of participants' attitude towards BC

Parameter	No Frequency (%)	Yes Frequency (%)
Attitude towards BC		
Willingness to know BC status	189 (16.65)	946 (83.35)
Perform BSE	702 (61.85)	433 (38.15)
Reasons for performing BSE (n = 416)		
Family history of BC	401 (96.30)	15 (3.70)
Fear of having BC	115 (27.71)	301 (72.29*)
To detect BC early	65 (15.70)	351 (84.30*)
Previous breast problems	368 (88.45)	48 (11.55)
Information from the media	155 (37.18)	261 (62.82*)
Encouraged by a friend	320 (76.91)	96 (23.09)
Reasons for not performing BSE (n = 719)		
Too busy	608 (84.62)	111 (15.38)
Keep forgetting	526 (73.22)	193 (26.78)
Do not know how to do it	201 (27.92)	518 (72.08*)
Afraid of finding a lump in my breast	590 (82.05)	129 (17.95)
Overall attitude towards BC		
Positive	690	60.79
Negative	445	39.21

respectively. However, the knowledge of persons that should practice BSE was quite high (82.47%).

Breast self-examination (BSE) practice

Table 5 shows the frequency of BSE practice amongst the participants. Majority of the participants, 62.35% had never performed BSE; 6.96% performed BSE annually; 4.58% biannually, 9.25% monthly; 3.26% bimonthly, 5.02% weekly; 2.03% biweekly while 5.55% performed BSE daily. The overall level of BSE among the participants was very low. Daily, weekly, biweekly, monthly and bimonthly BSE practice were considered as a high (25.11%); annually and biannually BSE practice were considered as moderate (11.54%).

Influence of age on BC and BSE awareness

Table 6 shows participants' level of awareness of BC and BSE among age groups. BC awareness was 94.96%, 95.28% and 91.30% respectively for adolescents, young adults and middle-aged adults.

Table 4: The level of BC and BSE knowledge

Parameter	No Frequency (%)	Yes Frequency (%)
(a) Basic Knowledge		
BC is a common cause of cancer death in Nigerian women	651 (57.36)	484 (42.64)
BC is communicable	18 (1.59)	1117 (98.41)
BC is hereditary	363 (31.98)	772 (68.02)
Females below the age of 20 can develop BC	382 (33.66)	753 (66.34)
Females above 20 years can develop BC	563 (49.60)	572 (50.40)
BSE practice can help detect and prevent BC	592 (52.16)	543 (47.84)
BC can occur in males and females	231 (20.35)	904 (79.65)
Half of all BC are hereditary	290 (25.55)	845 (74.45)
All women with BC mutation will have BC	188 (16.56)	947 (83.44)
A woman without BC mutation can have BC	481 (42.37)	650 (57.27)
BC can spread to other parts of the body leading to other types of cancer	486 (42.82)	649 (57.18)
A woman who removed her breast will not have BC	387 (34.10)	748 (65.90)
Summary	Frequency	Percent
Correct	28	2.47
Partially correct	475	41.85
Incorrect	632	55.68
(b) Symptoms of BC		
Lumps in the breast	272 (23.96)	863 (76.04)
Nipple discharge	801 (70.57)	334 (29.43)
Chest pain	1003 (88.37)	132 (11.63)
Distorted breast shape	1132 (99.74)	3 (0.26)
Pain in the breast	555 (48.90)	580 (51.10)
Summary	Frequency	Percent
Correct	110	9.96
Partially correct	961	84.67
Incorrect	64	5.64
(c) Persons that should practice BSE		
Married women only	1108 (97.62)	27 (2.38)
Sexually active women only	1119 (98.59)	16 (1.41)
Every woman with breast	151 (13.30)	984 (86.70)
Women that have been pregnant only	1130 (99.56)	5 (0.44)
Post-menopausal women only	1133 (99.82)	2 (0.18)
Only women with family history of breast cancer	1116 (98.33)	19 (1.67)
I do not know	1053 (92.78)	82 (7.22)
Summary	Frequency	Percent
Correct	936	82.47
Incorrect	199	17.53
(d) Best time for BSE		
No specific time	574 (50.57)	561 (49.43)
During menstruation flow	1117 (98.41)	18 (1.59)
Some days after periods	1083 (95.42)	52 (4.58)
Midway into your cycle	1124 (99.03)	11 (0.97)
Some days before your period	1121 (98.77)	14 (1.23)
I do not know	656 (57.80)	479 (42.20)
Summary	Frequency	Percent
Correct	52	4.58
Incorrect	1083	95.42
(e) BSE associated activity		
Lie down	912 (80.35)	223 (19.65)
Stand in front of the mirror	890 (78.41)	245 (21.59)
Use fingernails to examine the breast	962 (84.76)	173 (15.24)
Undress to the waist	943 (83.08)	192 (16.92)
Examine one breast with opposite hand and vice versa	770 (67.84)	365 (32.16)
Use circular motions to examine all parts of the breast	795 (70.04)	340 (29.96)
Look at the shape of nipples	1003 (88.37)	132 (11.63)
Observe changes in breast shape and size	885 (77.97)	250 (22.03)

Press the nipples to check for discharge	933 (82.20)	202 (17.80)
Use three middle fingers only to examine the breast	951 (83.79)	184 (16.21)
Lift one hand above the head and examining breast on the other side	892 (78.59)	243 (21.41)
Summary	Frequency	Percent
Correct	42	3.70
Partially correct	724	63.79
Incorrect	369	32.51

Table 5: Level of BSE practice

BSE Frequency	No	Yes
	Frequency (%)	Frequency (%)
Daily	1072 (94.45)	63 (5.55)
Weekly	1078 (94.98)	57 (5.02)
Biweekly	1112 (97.97)	23 (2.03)
Monthly	1030 (90.75)	105 (9.25)
Bimonthly	1098 (96.74)	37 (3.26)
Biannually	1083 (95.42)	52 (4.58)
Annually	1056 (93.04)	79 (6.96)
Never	427 (37.65)	719 (62.35)
Level of BSE practice	Frequency	Percent
Never	719	63.35
Moderate	131	11.54
High	285	25.11

The level of BSE awareness was lowest in adolescents (57.38%) compared to the young (88.68%) and middle-aged adults (88.41%). There was strong positive correlation between the level of BC awareness across the age groups, $C^a = 0.9602$; $C^b = 0.9518$ and $C^c = 0.9994$. There were significant differences in the level of BC awareness between the adolescents and young adults ($p^a = 0.0095$), the adolescents and middle aged ($p^b = 0.0126$) and between the young and middle-aged adults ($p^c = 0.0000$).

The sources of BC and BSE information across age groups were also determined. Television, health workers and the internet (google) were the major sources of BC and BSE information. However, the young adults had the highest use of this source of information (56.13%) compared to the adolescents (46.79%) and middle-aged adults (27.54%). The least source of information for all age groups was twitter. The source of BC and BSE information showed least correlation ($C^b = 0.7179$) between the adolescents and middle-aged adults and highest correlation ($C^c = 0.8541$) between the young and middle aged adults. There were significant differences in the sources of BC and BSE information among the adolescents and young adults ($p^a = 0.0005$), adolescents and middle-aged adults ($p^b = 0.0038$), and the young and middle-aged adults ($p^c = 0.0001$).

The most effective methods of BC awareness across age groups were television and radio programs, social media and BC survivors teaching from their experience. The level of correlation in the methods of BC awareness was highest ($C^c = 0.9059$) between the young adults and middle aged, and least ($C^a = 0.7190$) between the adolescents and young adults. There were significant differences between the effective methods of BC awareness among the adolescents and young adults ($p^a = 0.0290$), adolescents and middle aged ($p^b = 0.0032$) and young adults and middle aged ($p^c = 0.0008$).

The influence of age on attitude towards BC and BSE

The participants' attitude to BC is shown in Table 7. A high percentage of the respondents (82.08% adolescents, 87.26% young adults and 86.96% middle-aged adults) indicated interest in knowing their BC risk levels. However, only 16.28% of the adolescents, 52.83% young adults and 66.67% middle-aged adults actually performed BSE. The major reasons for carrying out BSE among the adolescents that performed BSE were early detection of BC (31.62%) and fear of having BC (30.91%). For the young and middle-age adults, early detection and information from the media were the core reasons for carrying out BSE. There was low level of correlation ($C^a = 0.7505$) and no statistical significant difference ($p^a = 0.0856$) in the reasons for performing BSE between the adolescents and young adults. However, there was strong positive correlation ($C^b = 0.9289$) and significant difference ($p^b = 0.0074$) between the adolescent and middle aged in the reasons for performing BSE. Not knowing how to carry out BSE was the major reason for not performing BSE among young adults (29.72%) and middle-aged adults (36.51%). There was high positive correlation ($C^b = 0.9407$) but no significant difference ($p^b = 0.0592$) in the reasons for not performing BSE between the adolescents and

Table 6: Level of BC and BSE awareness among age groups (n = 1135)

Parameters	AD (854) F(%)	YA (212) F(%)	MA (69) F(%)	p-value	Correlation co-efficient
Level of awareness					
BC awareness	811 (94.96)	202 (95.28)	63(91.30)	p ^a = 0.0095	C ^a = 0.9602
BSE awareness	490 (57.38)	188 (88.68)	61(88.41)	p ^b = 0.0126	C ^b = 0.9518
BC status (participants having BC)	4 (0.47)	2 (0.94)	1(1.45)	p ^c = 0.0000	C ^c = 0.9994
Family members having BC	36 (4.21)	13 (6.13)	6 (8.70)		
Non-family members having BC	126 (14.75)	33 (15.57)	11 (15.94)		
Source of BC and BSE information					
Radio	199 (23.30)	66 (31.13)	27 (39.13)	p ^a = 0.0005	C ^a = 0.8034
Textbooks	211 (24.71)	51 (24.06)	12 (17.39)	p ^b = 0.0038	C ^b = 0.7179
Magazines	226 (26.46)	48 (22.64)	15 (21.74)	p ^c = 0.0001	C ^c = 0.8541
Newspapers	193 (22.83)	47 (22.17)	19 (27.54)		
Facebook	195 (22.83)	91 (42.92)	26 (37.68)		
Google (Internet)	374 (43.79)*	119 (56.13)*	19 (27.54)*		
Twitter	81 (9.48)	36 (16.98)	4 (5.80)		
WhatsApp	206 (24.12)	68 (32.08)	20 (28.99)		
Home/Family	221 (25.88)	23 (10.85)	4 (5.80)		
Church/Mosque	129 (15.10)	45 (21.23)	16 (23.19)		
Friends	317 (37.12)	76 (35.85)	17 (24.64)		
School teachers	292 (34.19)	45 (21.23)	5 (7.25)		
Health workers	355 (41.57)*	126 (59.43)*	40 (57.97)*		
Television	541 (63.35)*	141 (66.51)*	60 (86.96)*		
Effective methods of BC awareness					
Television and radio programs	531 (62.18)*	128 (60.38)*	46(66.67)*	p ^a = 0.0290	C ^a = 0.7190
Educational books and brochures	203 (23.77)	45 (21.23)	5(7.25)	p ^b = 0.0032	C ^b = 0.8558
Illustrations and plays	135 (15.81)	47 (22.17)	10(14.50)	p ^c = 0.0008	C ^c = 0.9059
Video and films	255 (29.86)	48 (22.64)	12(17.39)		
Health education Programs	242 (28.34)	74 (34.91)	24(34.78)		
Social media	410 (48.00)*	132 (62.26)*	28(40.58)*		
Teaching in church and schools	209 (24.47)	60 (28.30)	16(23.19)		
Teaching people songs on BC	64 (7.49)	22 (10.38)	5(7.25)		
Teaching by BC survivors	410 (48.00)*	94 (44.34)*	23(33.33)*		

p^a = Adolescents (AD) and Young Adults (YA); p^b = Adolescents (AD) and Middle Aged (MA); p^c = Young Adults (YA) and Middle Aged (MA); C^a = Correlation between Adolescents (AD) and Young Adults (YA); C^b = Correlation between Adolescents (AD) and Middle Aged (MA); C^c = Correlation between Young Adults (YA) and Middle Aged (MA); F = Frequency.

middle-aged adults. Overall, the adolescents had the least positive attitude (49.18%) towards BC whereas young and middle-aged adults had a high positive attitude of 70.28% and 76.81% respectively.

The influence of age on knowledge of BC and BSE, awareness and practice

The BC and BSE knowledge level of the participants across age groups is shown in Table 8 and 9. Five categories of questions were assessed to determine the level of BC and BSE knowledge of the participants. Out of the 5 question categories, the level of knowledge on persons that should practice BSE was highest across age groups, with the young adults having the highest level of knowledge (83.96%) followed by the adolescents

(82.67%) and the middle aged (75.36%) with a high level of correlation (C^a = 0.9993, C^b = 0.9980, C^c = 0.9984) and statistically significant difference between age groups (p^a = 0.0000, p^b = 0.0000, p^c = 0.0000) respectively.

The level of basic BC knowledge was higher among the middle aged (4.35%), followed by the young adults (4.25%) and least among the adolescents (1.87%). There was a statistically significant difference and a high level of correlation in the BC basic knowledge across age groups: adolescents and young adults (p^a = 0.0000, C^a = 0.9319), adolescents and middle aged (p^b = 0.0004, C^b = 0.8574), young adults and middle aged (p^c = 0.0002, C^c = 0.8738).

The knowledge of BC symptoms was highest among the young adults (11.32%), followed by the adolescents (9.37%) and least

Table 7: Percentage distribution of participants' attitude towards BC among age groups

Parameter	AD (854) F(%)	YA (212) F(%)	MA (69) F(%)	P value	Correlation co-efficient
Attitude towards BC					
Willingness to know BC status	701 (82.08)	185 (87.26)	60(86.96)		
Perform BSE (high performance)	139 (16.28)	112 (52.83)	46(66.67)		
Reasons for performing BSE					
	n = 221	n = 149	n = 46		
Family history of BC	4 (1.76)	0 (0.00)	1 (1.45)	p ^a = 0.0856	C ^a = 0.7505
Fear of having BC	68 (30.91)*	22 (15.09)	12 (25.64)	p ^b = 0.0074	C ^b = 0.9289
To detect BC early	70 (31.62)*	52 (34.91)*	14 (30.43)*	p ^c = 0.0103	C ^c = 0.9161
Previous breast problems	10 (4.33)	8 (5.19)	1 (2.90)		
Information from the media	45 (20.37)	54 (36.32)*	14 (30.43)*		
Encouraged by a friend	18 (8.31)	17 (11.32)	3 (7.25)		
Reasons for not performing BSE					
	n = 633	n = 63	n = 23		
Too busy	56 (8.78)	8 (12.26)	2 (10.14)	p ^a = 0.3906	C ^a = 0.6094
Keep forgetting	95 (15.00)	15 (23.11)	4 (15.94)	p ^b = 0.0592	C ^b = 0.9407
Do not know how to do it	326 (51.52)*	15 (23.58)*	5 (23.19)*	p ^c = 0.3731	C ^c = 0.6269
Afraid of finding lump in my breast	79 (12.41)	3 (4.72)	3 (14.49)		
Overall attitude towards BC					
Positive	420 (49.18)	149 (70.28)	53 (76.81)		
Negative	434 (50.82)	63 (29.72)	16 (23.19)		

p^a = Adolescents (AD) and Young Adults (YA); p^b = Adolescents (AD) and Middle Aged (MA); p^c = Young Adults (YA) and Middle Aged (MA); C^a = Correlation between Adolescents (AD) and Young Adults (YA); C^b = Correlation between Adolescents (AD) and Middle Aged (MA); C^c = Correlation between Young Adults (YA) and Middle Aged (MA); F = Frequency.

Table 8: The level of BC and BSE knowledge across age groups

Parameter	AD (854) F(%)	YA (212) F(%)	MA (69) F(%)	P value	Correlation Co-efficient
(a) Basic Knowledge					
BC is a common cause of cancer death in Nigerian women	503 (58.90)	112 (52.83)	36 (52.17)	p ^a = 0.0000	C ^a = 0.9319
BC is communicable	13 (1.52)	4 (1.89)	1(1.45)	p ^b = 0.0004	C ^b = 0.8574
BC is hereditary	261 (30.56)	84 (39.62)	18 (26.09)	p ^c = 0.0002	C ^c = 0.8738
Females below the age of 20 can develop BC	320 (37.47)	51 (24.06)	11 (15.94)		
Females above 20 years can develop BC	446 (52.22)	95 (44.81)	22(31.88)		
BSE practice can help detect and prevent BC	464 (54.33)	105 (49.53)	23(33.33)		
BC can occur in males and females	171 (20.02)	52 (24.53)	8(11.59)		
Half of all BC are hereditary	223 (26.11)	47 (22.17)	20(28.99)		
All women with BC mutation will have BC	145 (16.98)	32 (15.09)	11(15.94)		
A woman without BC mutation can have BC	374 (43.79)	92 (43.40)	19(27.54)		
BC can spread to other parts of the body leading to other types of cancer	359 (42.03)	100 (47.17)	27(39.13)		
A woman who removed her breast will not have BC	298 (34.89)	74 (34.91)	15(21.74)		
Summary					
Correct	16 (1.87)	9(4.25)	3(4.35)		
Partially correct	361 (42.27)	83(39.15)	31(44.93)		
Incorrect	477 (55.85)	120(56.60)	35(50.73)		
(b) Symptoms of BC					
Lumps in the breast	622 (72.83)	188 (88.68)	54 (78.26)	p ^a = 0.1729	C ^a = 0.7169
Nipple discharge	240 (28.10)	76 (35.85)	18(26.09)	p ^b = 0.2358	C ^b = 0.6492
Chest pain	99 (11.59)	27 (12.74)	6(8.70)	p ^c = 0.0022	C ^c = 0.9849
Distorted breast shape	192 (22.48)	46 (21.70)	11(15.94)		
Pain in the breast	458 (53.63)	43.87)	32(46.38)		
Summary					
Correct	80 (9.37)	24 (11.32)	6(8.70)		
Partially correct	721 (84.43)	182 (85.85)	58(84.06)		
Incorrect	53 (6.21)	6(2.83)	5(7.25)		
(c) Persons that should practice BSE					
Married women only	23 (2.69)	3 (1.42)	1(1.45)	p ^a = 0.0000	C ^a = 0.9993

Parameter	AD (854) F(%)	YA (212) F(%)	MA (69) F(%)	P value	Correlation Co-efficient
Sexually active women only	9 (1.05)	3 (1.42)	4(5.80)	$p^b = 0.0000$	$C^b = 0.9980$
Every woman with breast	736 (86.18)	192 (90.57)	56(81.16)	$p^c = 0.0000$	$C^c = 0.9984$
Women that have been pregnant only	3 (0.35)	1 (0.47)	1(1.45)		
Post-menopausal women only	1 (0.12)	1 (0.47)	0(0.00)		
Only women with family history of BC	16 (1.87)	1 (0.47)	2(2.90)		
I do not know	66 (7.72)	11 (5.19)	5(7.25)		
Summary					
Correct	706 (82.67)	178 (83.96)	52(75.36)		
Incorrect	148 (17.33)	34 (16.04)	17 (24.64)		
(d) Best time for BSE					
No specific time	401(46.96)	129 (60.85)	31 (44.93)	$p^a = 0.0261$	$C^a = 0.8650$
During menstruation flow	14 (1.64)	4 (1.89)	0(0.00)	$p^b = 0.0005$	$C^b = 0.9820$
Some days after periods	25 (2.93)	21 (9.91)	6(8.69)	$p^c = 0.0138$	$C^c = 0.9025$
Midway into your cycle	7 (0.82)	4 (1.89)	0(0.00)		
Some days before your period	7 (0.82)	2 (0.94)	5(7.24)		
I do not know	400 (46.84)	52(24.53)	27(39.13)		
Summary					
Correct	25 (2.93)	21 (9.91)	6(8.69)		
Incorrect	829 (97.07)	191 (90.09)	63(91.30)		
(e) BSE associated activity					
Lie down	160 (18.74)	55(25.94)	8(11.59)	$p^a = 0.0002$	$C^a = 0.8943$
Stand in front of the mirror	154 (18.03)	75(35.38)	16(23.19)	$p^b = 0.0196$	$C^b = 0.6869$
Use fingernails to examine the breast	123 (14.40)	41(19.34)	9(13.04)	$p^c = 0.0034$	$C^c = 0.7950$
Undress to the waist	131 (15.34)	55 (25.94)	6(8.70)		
Examine one breast with opposite hand and vice versa	250 (29.27)	99 (46.70)	16(23.19)		
Use circular motions to examine all parts of the breast	227 (26.58)	96 (45.28)	17(24.64)		
Look at the shape of nipples	81 (9.48)	43 (20.28)	8(11.59)		
Observe changes in breast shape and size	175 (20.49)	60 (28.30)	15(21.74)		
Press the nipples to check for discharge	140 (16.39)	51 (24.06)	11(15.94)		
Use three middle fingers only to examine the breast	112 (13.11)	59 (27.83)	13(18.84)		
Lift one hand above the head and examining breast on the other side	160 (18.74)	69 (32.54)	14(20.29)		
Summary					
Correct	27 (3.16)	14 (6.60)	1(1.45)		
Partially correct	522 (61.12)	156 (73.58)	46(66.67)		
Incorrect	305 (35.71)	42(19.81)	22(31.88)		

p^a = Adolescents (AD) and Young Adults (YA); p^b = Adolescents (AD) and Middle Aged (MA); p^c = Young Adults (YA) and Middle Aged (MA); C^a = Correlation between Adolescents (AD) and Young Adults (YA); C^b = Correlation between Adolescents (AD) and Middle Aged (MA); C^c = Correlation between Young Adults (YA) and Middle Aged (MA); F = Frequency.

among the middle-aged (8.70%). There was a high positive correlation ($C^c = 0.9849$) and statistical difference ($p^c = 0.0022$) in the knowledge of BC symptoms between the young adults and middle aged. However, between the adolescents and young adults ($C^a = 0.7169$, $p^a = 0.1729$) and the adolescents and middle-aged ($C^b = 0.6492$, $p^b = 0.2358$) there was a low positive correlation and no statistically significant difference.

The knowledge of the best time to carry out BSE was highest among the young adults, (9.91%), followed by the middle-aged (8.69%) and least among the adolescents (2.93%). There was a high positive correlation ($C^a = 0.8650$, $C^b = 0.9820$, $C^c = 0.9025$) and statistically significant difference ($p^a = 0.0261$, $p^b = 0.0005$, $p^c = 0.0138$) in the

knowledge of the best time to carry out BSE among the different age groups.

The knowledge of BSE associated activity was highest among the young adults (6.60%), followed by the adolescents (3.16%) and least among the middle-aged (1.45%). The level of correlation of the knowledge of BSE associated activity among the adolescent and young adults were the highest ($C^a = 0.8943$), followed by the young adults and middle-aged ($C^c = 0.795$) and least among the adolescents and middle-aged ($C^b = 0.6869$). There was a statistically significant difference between BSE associated activity between age groups ($p^a = 0.0002$, $p^b = 0.0196$, $p^c = 0.0034$). The BC and BSE knowledge scores among the different age groups were compared (Table 9).

Table 9: BC and BSE Knowledge scores across age groups

Parameter	Total Score (10)	AD (854)	YA (212)	MA (69)	Total score
(a) Basic Knowledge					
Correct	2	16	9	3	
Partially correct	1	361	83	31	
Incorrect	0	477	120	35	
Mean score		0.46	0.48	0.54	0.49
Percentage (%)		23.00	23.82	26.81	24.55
(b) Symptoms of BC					
Correct	2	80	24	6	
Partially correct	1	721	182	58	
Incorrect	0	53	6	5	
Mean score		1.03	1.08	1.01	1.04
Percentage (%)		51.58	54.25	50.73	52.18
(c) Persons that should practice BSE					
Correct	2	706	178	52	
Incorrect	0	148	34	17	
Mean score		1.65	1.68	1.51	1.61
Percentage (%)		82.67	83.96	75.36	80.67
(d) Best time for BSE					
Correct	2	25	21	8	
Incorrect	0	829	191	61	
Mean score		0.06	0.20	0.23	0.16
Percentage (%)		2.92	9.91	11.59	8.14
(e) BSE associated activity					
Correct	2	27	14	1	
Partially correct	1	522	156	46	
Incorrect	0	305	42	22	
Mean score		0.67	0.87	0.70	0.75
Percentage (%)		33.72	43.40	34.78	37.30
Total mean scores		3.88	4.31	3.99	4.06
Total percentage		38.78	43.07	39.86	40.57

Table 10: Level of BSE practice across age groups

Frequency of BSE	AD (854) F(%)	YA (212) F(%)	MA (69) F(%)	P value	Correlation co-efficient
Daily	41 (4.80)	16 (7.55)	6(8.70)	p ^a = 0.0299	C ^a = 0.7564
Weekly	29 (3.40)	22 (10.38)	6(8.70)	p ^b = 0.0107	C ^b = 0.8304
Biweekly	15 (1.76)	7 (3.30)	1(1.45)	p ^c = 0.0003	C ^c = 0.9514
Monthly	38 (4.45)	52 (24.53)	15(21.74)		
Bimonthly	16 (1.87)	15 (7.08)	6(8.70)		
Biannually	30 (3.51)	19 (8.96)	3(4.35)		
Annually	52 (6.09)	18 (8.49)	9(13.04)		
Never	633 (74.12)	63 (29.72)	23(33.33)		
Level of BSE practice					
Never	633 (74.12)	63 (29.72)	23(33.33)		
Moderate	82 (9.60)	37 (17.45)	12(17.39)		
High	139 (16.28)	112 (52.83)	34(49.48)		

p^a = Adolescents (AD) and Young Adults (YA); p^b = Adolescents (AD) and Middle Aged (MA); p^c = Young Adults (YA) and Middle Aged (MA); C^a = Correlation between Adolescents (AD) and Young Adults (YA).; C^b = Correlation between Adolescents (AD) and Middle Aged (MA); C^c = Correlation between Young Adults (YA) and Middle Aged (MA); F = Frequency.

The score assigned to the five categories of questions was 2 marks each, giving a total of 10 marks. Correct answers attracted 2 marks, partially correct answers were awarded 1 mark while incorrect answers were assigned 0 mark. The scores were multiplied by the frequencies and an

average score was calculated for each question which was summed up to give a total of 10 marks. Percentage scores were also calculated. Overall, the mean and percentage BC and BSE knowledge score was 4.06 out of 10 and 40.57% out of 100%. The highest score was observed among the young

adults (4.31, 43.07%) followed by the middle-aged (3.99, 39.86%) and the least being the adolescents (3.88, 38.78%).

The influence of age on breast self-examination (BSE) practice

Table 10 shows the frequency of BSE practice among age groups. BSE practice was highest among the young-adults (70.08%), followed by the middle-aged (66.87%) and least among the adolescents (25.88%). Daily, biweekly, weekly, bimonthly and monthly BSE practice were considered to be high; annual and biannual BSE practice were considered to be moderate. The level of correlation in the BSE practice between age groups was highest among the young-adults and middle-aged ($C^c = 0.9514$), followed by the adolescents and middle-aged ($C^b = 0.8304$) and least among the adolescents and young adults ($C^a = 0.7564$). There was a statistically significant difference in the level of BSE practice between age groups ($p^a = 0.0299$, $p^b = 0.0107$, $p^c = 0.0003$).

The influence of education on knowledge of BC and BSE, awareness and practice

The influence of education on BC knowledge, BSE practice and awareness was determined by dividing the participants into four levels of education consisting of secondary (412), undergraduates (470), graduate (161) and postgraduate (92). Their frequencies and percentages were calculated as summarized in table (11 – 15). Regression and correlation analysis was carried out across age groups to determine their relationship.

The influence of education on BC and BSE awareness

Table 11 shows the participants' level of awareness of BC and BSE among levels of education. The undergraduates and postgraduates had the highest level of BC awareness, 96.60% and 96.74% respectively, followed by the graduates (94.41%) and least among the secondary (92.48%). There was a direct relationship between increase in the level of education and BSE awareness. Secondary participants had the least (46.84%), followed by the undergraduates (66.81%), graduates (89.44%) and postgraduates (95.65%). 2(0.49%), 2(0.43%), 1(0.62%) and 2(2.17%) of the secondary,

undergraduates, graduates and postgraduate participants respectively indicated that they had breast cancer, although this was not clinically proven. 9(2.18%), 28(5.96%), 9(5.59%) and 9(9.78%) of the secondary, undergraduates, graduates and postgraduate participants respectively indicated that they had family history of breast cancer. There was a strong positive correlation of the between the level of BC awareness across the levels of education, $C^a = 0.9847$; $C^b = 0.9261$, $C^c = 0.9131$, $C^d = 0.9757$, $C^e = 0.9700$ and $C^f = 0.9961$. There was a statistically significant difference between the level of BC awareness among the secondary and undergraduates ($p^a = 0.0023$), secondary and graduates ($p^b = 0.0238$), secondary and postgraduates ($p^c = 0.0303$), undergraduates and graduates ($p^d = 0.0045$), undergraduates and postgraduates ($p^e = 0.0062$), graduates and postgraduates ($p^f = 0.0003$).

The source of BC and BSE information across age groups was also determined. Television, health workers, facebook and the internet (google) were the major sources of BC and BSE information. The major source of information for the secondary level participants was television (63.83%), Facebook (37.14%) and health workers (35.44%); the undergraduates was television (63.62%), google (internet) (57.45%) and health workers (47.45%); the graduates was television (70.81%), health workers (60.25%), facebook (48.45%) and google (internet) (47.83%); the postgraduates was television (71.74%), google (internet) (60.87%), health workers (59.78%) and facebook (35.87%). The least source of information for all levels of education was twitter. The source of BC and BSE information between the undergraduates and graduates had the least correlation ($C^d = 0.6415$) while the graduates and postgraduates had the highest ($C^f = 0.9252$). There was a statistically significant difference between the source of BC and BSE information among the secondary and undergraduates ($p^a = 0.0163$), secondary and graduate ($p^b = 0.0009$), secondary and postgraduates ($p^c = 0.0062$), undergraduates and graduates ($p^d = 0.0134$), undergraduates and postgraduates ($p^e = 0.0004$), graduates and postgraduates ($p^f = 0.0000$).

The effective methods of BC awareness were assessed across levels of education. The most effective method chosen among the secondary

Table 11: Level of BC and BSE awareness across levels of education

Parameters	SEC (412) F(%)	UG (470) F(%)	GD (161) F(%)	PG (92) F(%)	P value	Correlation co-efficient
Level of awareness						
BC awareness	381(92.48)	454(96.60)	152(94.41)	89(96.74)	p ^a = 0.0023	C ^a = 0.9847
BSE awareness	193(46.84)	314(66.81)	144(89.441)	88(95.65)	p ^b = 0.0238	C ^b = 0.9261
BC status (participant having BC)	2(0.49)	2(0.43)	1(0.62)	2(2.17)	p ^c = 0.0303	C ^c = 0.9131
Family member having BC)	9(2.18)	28(5.96)	9(5.59)	9(9.78)	p ^d = 0.0045	C ^d = 0.9757
Non-family member having BC	46(11.17)	80(17.02)	21(13.04)	23(25.00)	p ^e = 0.0062	C ^e = 0.9700
					p ^f = 0.0003	C ^f = 0.9961
Source of BC and BSE information						
Radio	123(29.85)	86(18.30)	57(35.40)	26(28.26)	p ^a = 0.0163	C ^a = 0.6274
Textbooks	83(20.15)	132(28.09)	33(20.50)	26(28.26)	p ^b = 0.0009	C ^b = 0.7842
Magazines	92(22.33)	137(29.15)	39(24.22)	21(22.83)	p ^c = 0.0062	C ^c = 0.6909
Newspapers	91(22.09)	104(22.13)	38(23.60)	26(28.26)	p ^d = 0.0134	C ^d = 0.6415
Facebook	153(37.14)*	48(10.21)	78(48.45)*	33(35.87)	p ^e = 0.0004	C ^e = 0.8135
Google (internet)	109(26.46)	270(57.45)*	77(47.83)*	56(60.87)*	p ^f = 0.0000	C ^f = 0.9252
Twitter	35(8.50)	51(10.85)	16(9.94)	19(20.65)		
WhatsApp	88(21.36)	122(25.96)	55(34.16)	29(31.52)		
Home/Family	122(29.61)	101(21.49)	17(10.56)	8(8.70)		
Church/Mosque	57(13.83)	77(16.38)	37(22.98)	19(20.65)		
Friends	126(30.58)	196(41.70)	55(34.16)	33(35.87)		
School teachers	115(27.91)	180(38.30)	25(15.53)	22(23.91)		
Health workers	146(35.44)*	223(47.45)*	97(60.25)*	55(59.78)*		
Television	263(63.83)*	299(63.62)*	114(70.81)*	66(71.74)*		
Effective methods of BC awareness						
Television and radio programs	235(57.04)*	309(65.74)	99(61.50)	62(67.39)	p ^a = 0.0033	C ^a = 0.8546
Educational books and brochures	58(14.08)	147(31.28)	31(19.25)	17(18.48)	p ^b = 0.0006	C ^b = 0.9117
Illustrations and plays	25(6.07)	111(23.62)	29(18.01)	27(29.35)	p ^c = 0.0061	C ^c = 0.8259
Video and films	57(13.83)	203(43.19)	30(18.63)	25(27.17)	p ^d = 0.0008	C ^d = 0.9054
Giving health education	81(19.66)	165(35.11)	61(37.89)	33(35.87)	p ^e = 0.0009	C ^e = 0.9000
Social media	113(27.43)	306(65.11)	86(53.42)	65(70.65)	p ^f = 0.0000	C ^f = 0.9534
Teaching in church and schools	53(12.86)	159(33.83)	44(27.33)	29(31.52)		
Teaching people songs on BC	15(3.64)	51(10.85)	14(8.70)	11(11.96)		
Teaching of BC survivors	131(31.80)*	284(60.43)	71(44.10)	41(44.57)		

p^a = Secondary and undergraduate participants; p^b = Secondary and graduate level participants; p^c = Secondary and postgraduate level participants; p^d = Undergraduate and graduate level participants; p^e = Undergraduate and postgraduate level participants; p^f = Graduate and postgraduate level participants; C^a = Correlation between secondary and undergraduate level participants; C^b = Correlation between secondary and graduate level participants; C^c = Correlation between secondary and postgraduate level participants; C^d = Correlation between undergraduate and graduate level participants; C^e = Correlation between undergraduate and postgraduate level participants; C^f = Correlation between graduate and postgraduate level participants; F = Frequency.

level participants were television and radio programs (57.04%), BC survivors teaching from their experience (31.80%) and social media (27.43%). Among the undergraduates the most effective methods were television and radio programs (65.74%), social media (65.11%), BC survivors teaching from their experience (60.43%), video and films (43.19%). Among the graduates, the most effective methods were television and radio programs (61.50%), social media (53.42%) and BC survivors teaching from their experience

(44.10%). Among the postgraduates, the most effective methods were social media (70.65%), television and radio programs (67.39%) and BC survivors teaching from their experience (44.57%). The level of correlation in the effective methods of BC awareness between the levels of education was highest among the graduates and postgraduates (C^f = 0.9534), the secondary and graduates (C^b = 0.9117), the undergraduates and graduates (C^d = 0.9054), the undergraduates and postgraduates (C^e = 0.9000), the secondary and undergraduates (C^a =

Table 12: Percentage distribution of participants' attitude towards BC across levels of education

Parameter	SEC (412) F(%)	UG (470) F(%)	GD (161) F(%)	PG (92) F(%)	P value	Correlation co-efficient
Attitude towards BC						
Willingness to know BC status	339(82.28)	382(81.28)	139(86.34)	86(93.48)	-	-
Perform BSE	69(16.75)	78(16.60)	91(56.52)	47(51.09)	-	-
Reasons for performing BSE						
	n = 86	n = 144	n = 120	n = 66		
Family history of BC	1 (0.73)	4 (2.55)	1(0.62)	0 (0.00)	p ^a = 0.6020	C ^a = 0.2721
Fear of having BC	32 (37.39)*	36 (25.32)*	16 (13.66)	13 (19.57)	p ^b = 0.3834	C ^b = 0.4394
To detect BC early	24 (27.43)*	50 (34.68)*	39 (32.30)*	27 (40.22)*	p ^c = 0.2153	C ^c = 0.5925
Previous breast problems	3 (3.88)	6 (4.47)	4 (3.73)	5 (7.61)	p ^d = 0.9519	C ^d = 0.0321
Information from the media	11 (12.62)	38 (26.17)*	46 (38.51)*	25 (38.04)*	p ^e = 0.8576	C ^e = 0.0952
Encouraged by a friend	2 (2.43)	19 (13.19)	14 (11.80)	6 (9.78)	p ^f = 0.0012	C ^f = 0.9714
Reasons for not performing BSE						
	n = 326	n = 326	n = 41	n = 26		
Too busy	27 (8.25)	31 (9.36)	5 (13.04)	2 (8.70)	p ^a = 0.1155	C ^a = 0.8845
Keep forgetting	25 (7.52)	70 (21.49)	9 (21.12)	6 (23.91)	p ^b = 0.5570	C ^b = 0.4430
Do not know how to do it	187 (57.28)	151 (46.17)	9 (22.36)	5 (18.48)	p ^c = 0.7917	C ^c = 0.2083
Afraid of finding a lump in my breast	15 (17.48)	28 (8.51)	3 (6.21)	1 (4.35)	p ^d = 0.1954	C ^d = 0.8046
					p ^e = 0.3624	C ^e = 0.6376
					p ^f = 0.0646	C ^f = 0.9354
Overall attitude towards BC						
Positive	204 (49.52)	230 (48.94)	115 (71.43)	67 (72.83)		
Negative	208 (50.49)	240 (51.06)	46 (28.57)	25 (27.17)		

p^a = Secondary and undergraduate level participants; p^b = Secondary and graduate level participants; p^c = Secondary and postgraduate level participants; p^d = Undergraduate and graduate level participants; p^e = Undergraduate and postgraduate level participants; p^f = Graduate and postgraduate level participants; C^a = Correlation between Secondary and undergraduate level participants; C^b = Correlation between Secondary and graduate level participants; C^c = Correlation between secondary and postgraduate level participants; C^d = Correlation between undergraduate and graduate level participants; C^e = Correlation between undergraduate and postgraduate level participants; C^f = Correlation between graduate and postgraduate level participants; F = Frequency.

0.8546) and least among the secondary and postgraduates (C^c = 0.8259). There was a statistically significant difference between the effective methods of BC awareness among the different levels of education (p^a = 0.0033, p^b = 0.0006, p^c = 0.0061, p^d = 0.0008, p^e = 0.0009, p^f = 0.0000).

The influence of education on attitude towards BC and BSE

The participants' attitude to BC is shown in Table 12. A high percentage, 82.28%, 81.28%, 86.34% and 93.48% of the secondary, undergraduates, graduates and postgraduate participants respectively indicated interest in knowing their BC risk levels, however, only 16.75%, 16.60%, 56.52% and 51.09% respectively actually performed BSE. The performance of BSE among the secondary (16.75%) was least, this is in correlation with their least BSE awareness (46.84%) when compared to other levels of

education (table 11) and a high percentage of them (57.28%) not knowing how to carry it out.

Among the secondary level participants who perform BSE, 37.39% and 27.43% indicated the fear of having BC and early detection of BC as

their major reasons for carrying out BSE. The undergraduates indicated early detection (34.68%), information from the media (26.17%) and fear of having BC (25.32%) as their major reasons for carrying out BSE. Likewise, among the graduates and postgraduates, the same reasons of early detection (32.30% and 40.22% respectively) and information from the media (38.51% and 38.04%) were their reasons for BSE practice. The reasons for performing BSE among the graduates and postgraduates had the highest level of correlation (C^f = 0.9714) with a statistical significant difference (p^f = 0.0012). However, among other levels of education, there was a lower level of

Table 13: The level of BC and BSE knowledge across levels of education

Parameter	SEC (412) F(%)	UG (470) F(%)	GD (161) F(%)	PG (92) F(%)	P value	Correlation co-efficient
(a) Basic Knowledge						
BC is a common cause of cancer death in Nigerian women	226(54.85)	290(61.70)	79(49.07)	56(60.87)	p ^a = 0.0330	C ^a = 0.6157
BC is communicable	11(2.67)	2(0.43)	2(1.24)	3(3.26)	p ^b = 0.0000	C ^b = 0.9084
BC is hereditary	71(17.23)	193(41.06)	52(32.30)	47(51.09)	p ^c = 0.0301	C ^c = 0.6242
Females below the age of 20 can develop BC	87(21.12)	238(50.64)	28(17.39)	29(31.52)	p ^d = 0.0043	C ^d = 0.7582
Females above 20 years can develop BC	133(32.28)	321(68.30)	58(36.02)	51(55.44)	p ^e = 0.0000	C ^e = 0.9073
BSE practice can help detect and prevent BC	233(56.55)	243(51.70)	77(47.83)	39(42.39)	p ^f = 0.0005	C ^f = 0.8478
BC can occur in males and females	23(5.58)	150(31.92)	27(16.77)	31(33.70)		
Half of all BC are hereditary	121(29.37)	106(22.55)	40(24.84)	23(25.00)		
All women with BC mutation will have BC	85(20.63)	64(13.62)	27(16.77)	12(13.04)		
A woman without BC mutation can have BC	149(36.17)	232(49.36)	65(40.37)	39(42.39)		
BC can spread to other parts of the body leading to other types of cancer	189(45.87)	185(39.36)	71(44.10)	41(44.57)		
A woman who removed her breast will not have BC	155(37.62)	151(32.13)	49(30.43)	32(34.78)		
Correct	3(0.73)	13(2.77)	7(4.35)	5(5.43)		
Partially correct	228(55.34)	218(46.38)	83(51.55)	30(32.61)		
Incorrect	181(43.93)	239(50.85)	71(44.10)	57(61.96)		
(b) Symptoms of BC						
Lumps in the breast	215(52.18)	421(89.57)	140(86.96)	88(95.65)	p ^a = 0.3880	C ^a = 0.5027
Nipple discharge	81(19.66)	168(35.75)	44(27.33)	41(44.57)	p ^b = 0.0634	C ^b = 0.8572
Chest pain	40(9.71)	64(13.62)	15(9.32)	13(14.13)	p ^c = 0.3853	C ^c = 0.5051
Distorted breast shape	57(13.83)	138(29.36)	31(19.25)	23(25.00)	p ^d = 0.0884	C ^d = 0.8211
Pain in the breast	210(50.97)	263(55.96)	67(41.61)	43(46.74)	p ^e = 0.0054	C ^e = 0.9725
					p ^f = 0.0626	C ^f = 0.8584
Summary						
Correct	3(0.73)	77(16.38)	13(8.07)	17(18.48)		
Partially correct	384(93.20)	363(77.23)	141(87.58)	73(79.35)		
Incorrect	25(6.07)	30(6.38)	7(4.35)	2(2.17)		
(c) Persons that should practice BSE						
Married women only	17(4.13)	7(1.49)	2(1.24)	1(1.09)	p ^a = 0.0000	C ^a = 0.9994
Sexually active women only	6(1.46)	3(0.64)	4(2.48)	3(3.26)	p ^b = 0.0000	C ^b = 0.9987
Every woman with breast	340(82.52)	418(88.94)	141(87.58)	85(92.39)	p ^c = 0.0000	C ^c = 0.9958
Women that have been pregnant only	1(0.24)	2(0.43)	1(0.62)	1(1.09)	p ^d = 0.0000	C ^d = 0.9996
Post-menopausal women only	1(0.24)	0(0.00)	1(0.62)	0(0.00)	p ^e = 0.0000	C ^e = 0.9974
Only women with family history of BC	12(2.91)	5(1.06)	2(1.24)	0(0.00)	p ^f = 0.0000	C ^f = 0.9988
I do not know	35(8.50)	35(7.45)	10(6.21)	2(2.17)		
Summary						
Correct	333(80.83)	394(83.83)	128(79.50)	81(88.04)		
Incorrect	79(19.17)	76(16.17)	33(20.50)	11(11.96)		
(d) Best time for BSE						
No specific time	155(37.62)	255(54.26)	99(61.49)	52(56.52)	p ^a = 0.0083	C ^a = 0.9245
During menstruation flow	12(2.91)	2(0.43)	3(1.86)	1(1.09)	p ^b = 0.1073	C ^b = 0.719
Some days after periods	12(2.91)	13(2.77)	15(9.32)	12(13.04)	p ^c = 0.0815	C ^c = 0.7568
Midway into your cycle	5(1.21)	2(0.43)	3(1.86)	1(1.09)	p ^d = 0.0076	C ^d = 0.9279
Some days before your period	6(1.46)	3(0.64)	3(1.86)	2(2.17)	p ^e = 0.0051	C ^e = 0.9411
I do not know	222(53.88)	195(41.49)	38(23.60)	24(26.09)	p ^f = 0.0000	C ^f = 0.9938
Summary						
Correct	12(2.91)	13(2.77)	15(9.32)	12(13.04)		
Incorrect	400(97.09)	457(97.23)	146(90.68)	80(86.96)		
(e) BSE associated activity						
Lie down	62(15.05)	101(21.49)	35(21.74)	25(27.17)	p ^a = 0.0995	C ^a = 0.5221
Stand in front of the mirror	41(9.95)	117(24.89)	56(34.78)	31(33.70)	p ^b = 0.2597	C ^b = 0.37219
Use fingernails to examine the breast	53(12.86)	71(15.11)	26(16.15)	23(25.00)	p ^c = 0.0275	C ^c = 0.6588

Parameter	SEC (412) F(%)	UG (470) F(%)	GD (161) F(%)	PG (92) F(%)	P value	Correlation co-efficient
Undress to the waist	32(7.77)	99(21.06)	36(22.36)	25(27.17)	$p^d = 0.0000$	$C^d = 0.9432$
Examine one breast with opposite hand and vice versa	81(19.67)	170(36.17)	67(41.61)	47(51.09)	$p^e = 0.0000$	$C^e = 0.9437$
Use circular motions to examine all parts of the breast	48(11.65)	180(38.30)	68(42.24)	44(47.83)	$p^f = 0.0001$	$C^f = 0.9036$
Look at the shape of nipples	15(3.64)	68(14.47)	32(19.88)	17(18.48)		
Observe changes in breast shape and size	61(14.81)	116(24.68)	43(26.71)	30(32.61)		
Press the nipples to check for discharge	40(9.71)	103(21.91)	35(21.74)	23(25.00)		
Use three middle fingers only to examine the breast	24(5.83)	94(20.00)	41(25.47)	25(27.17)		
Lift one hand above the head and examining breast on the other side	33(8.01)	130(27.66)	53(32.92)	27(29.35)		
Summary						
Correct	2(0.49)	25(5.32)	9(5.59)	6(6.52)		
Partially correct	254(61.65)	281(59.79)	121(75.16)	68(73.91)		
Incorrect	156(37.86)	164(34.89)	31(19.25)	18(19.57)		

p^a = Secondary and undergraduate level participants; p^b = Secondary and graduate level participants; p^c = Secondary and postgraduate level participants; p^d = Undergraduate and graduate level participants; p^e = Undergraduate and postgraduate level participants; p^f = Graduate and postgraduate level participants; C^a = Correlation between secondary and undergraduate level participants; C^b = Correlation between secondary and graduate level participants; C^c = Correlation between secondary and postgraduate level participants; C^d = Correlation between undergraduate and graduate level participants; C^e = Correlation between undergraduate and postgraduate level participants; C^f = Correlation between graduate and postgraduate level participants; F = Frequency.

correlation ($C^a = 0.2721$, $C^b = 0.4394$, $C^c = 0.5925$, $C^d = 0.0321$, $C^e = 0.0952$) and no statistical significant difference ($p^a = 0.6020$, $p^b = 0.3834$, $p^c = 0.2153$, $p^d = 0.9519$, $p^e = 0.8576$).

Secondary (79.13%), undergraduates (69.00%), graduate (25.00%), and postgraduate (28.00%) participants do not perform BSE with the major reason attributed to not knowing how to carry out BSE. There was a high positive correlation ($C^f = 0.9354$) but no significant difference ($p^f = 0.0646$) between the reasons for not performing BSE among the graduates and postgraduates. The secondary and undergraduates, secondary and graduates, secondary and postgraduates, undergraduates and graduates, undergraduates and postgraduates had positive but lower levels of correlation ($C^a = 0.8845$, $C^b = 0.4430$, $C^c = 0.2083$, $C^d = 0.8046$, $C^e = 0.6376$ respectively) and no statistically significant difference ($p^a = 0.1155$, $p^b = 0.5570$, $p^c = 0.7917$, $p^d = 0.1954$, $p^e = 0.3624$ respectively) between them. Overall, undergraduates (48.94%) had the least positive attitude towards BC, followed by the secondary (49.52%), graduates (71.43%) and the postgraduates (72.83%).

The influence of education on the knowledge of BC and BSE, awareness and practice

The BC and BSE knowledge level of the participants across the levels of education is shown

in Table 13 and 14. Five categories of questions were assessed to determine the level of BC and BSE knowledge of the participants. Out of the 5 question categories, the level of knowledge on persons that should practice BSE was highest across the levels of education, with the postgraduates having the highest level of knowledge (88.04%) followed by the undergraduates (83.83%), secondary (80.83%) and the graduates (79.50%) with a high level of correlation ($C^a = 0.9994$, $C^b = 0.9987$, $C^c = 0.9958$, $C^d = 0.9996$, $C^e = 0.9974$, $C^f = 0.9988$) and statistically significant difference between age groups ($p^a = 0.0000$, $p^b = 0.0000$, $p^c = 0.0000$, $p^d = 0.0000$, $p^e = 0.0000$, $p^f = 0.0000$).

The level of basic BC knowledge was higher among the postgraduates (5.43%), followed by the graduates (4.35%), undergraduates (2.77%) and least among the secondary (0.73%). There was a statistically significant difference and a positive level of correlation in the BC basic knowledge across levels of education: secondary and undergraduates ($p^a = 0.0330$, $C^a = 0.6157$), secondary and graduates ($p^b = 0.0000$, $C^b = 0.9084$), secondary and postgraduates ($p^c = 0.0301$, $C^c = 0.6242$), undergraduates and graduates ($p^d = 0.0043$, $C^d = 0.7582$), undergraduates and postgraduates ($p^e = 0.0000$, $C^e = 0.9073$), graduates and postgraduates ($p^f = 0.0005$, $C^f = 0.8478$). The knowledge of BC symptoms was highest among

Table 14: BC Knowledge according to the levels of education

Parameter	Total Score (10)	SEC (412)	UG (470)	GD (161)	PG (92)	Total score
(a) Basic Knowledge						
Correct	2	3	13	7	5	
Partially correct	1	228	218	83	30	
Incorrect	0	181	239	71	57	
Mean score		0.57	0.52	0.60	0.43	0.53
Percentage (%)		28.40	25.96	30.12	21.74	26.55
(b) Symptoms of BC						
Correct	2	3	77	13	17	
Partially correct	1	384	363	141	73	
Incorrect	0	25	30	7	2	
Mean score		0.95	1.10	1.04	1.16	1.06
Percentage (%)		47.33	55.00	51.86	58.15	53.09
(c) Persons that should practice BSE						
Correct	2	333	394	128	81	
Incorrect	0	79	76	33	11	
Mean score		1.62	1.68	1.59	1.76	1.66
Percentage (%)		80.83	83.83	79.50	88.04	83.05
(d) Best time for BSE						
Correct	2	12	13	15	12	
Incorrect	0	400	457	146	80	
Mean score		0.06	0.06	0.19	0.26	0.14
Percentage (%)		2.91	2.77	9.32	13.04	7.01
(e) BSE associated activity						
Correct	2	2	25	9	6	
Partially correct	1	254	281	121	68	
Incorrect	0	156	164	31	18	
Mean score		0.63	0.70	0.86	0.87	
Percentage (%)		31.31	35.21	43.17	43.48	
Total mean scores		3.82	4.06	4.28	4.49	4.06
Total percentage		38.12	40.55	42.80	44.89	40.60

Table 15: Level of BSE practice across levels of education

BSE Frequency	SEC (412) F(%)	UG (470) F(%)	GD (161) F(%)	PG (92) F(%)	P value	Correlation co-efficient
Daily	27(6.55)	14(2.98)	11(6.83)	11(11.96)	$p^a = 0.0000$	$C^a = 0.9929$
Weekly	18(4.37)	16(3.40)	16(9.94)	7(7.61)	$p^b = 0.1567$	$C^b = 0.5513$
Biweekly	8(1.94)	9(1.91)	4(2.48)	2(2.17)	$p^c = 0.0216$	$C^c = 0.7829$
Monthly	12(2.91)	27(5.74)	47(29.19)	19(20.65)	$p^d = 0.1304$	$C^d = 0.5817$
Bimonthly	4(0.97)	12(2.55)	13(8.07)	8(8.70)	$p^e = 0.0169$	$C^e = 0.8007$
Biannually	4(0.97)	26(5.53)	12(7.45)	10(10.87)	$p^f = 0.0025$	$C^f = 0.8967$
Annually	13(3.16)	40(8.51)	17(10.56)	9(9.78)		
Never	326(79.13)	326(69.36)	41(25.47)	26(28.26)		
Level of BSE practice						
Never	326(79.13)	326(69.36)	41(25.47)	26(28.26)		
Moderate	17 (4.13)	66(14.04)	29(18.01)	19(20.65)		
High	69(16.75)	78(16.60)	91(56.52)	47(51.09)		

p^a = secondary and undergraduate level participants; p^b = secondary and graduate level participants; p^c = Secondary and postgraduate level participants; p^d = Undergraduate and graduate level participants; p^e = Undergraduate and postgraduate level participants; p^f = Graduate and postgraduate level participants; C^a = Correlation between secondary and undergraduate level participants; C^b = Correlation between secondary and graduate level participants; C^c = Correlation between secondary and postgraduate level participants; C^d = Correlation between undergraduate and graduate level participants; C^e = Correlation between undergraduate and postgraduate level participants; C^f = Correlation between graduate and postgraduate level participants; F = Frequency.

the postgraduates (18.48%), followed by the undergraduates (16.38%), graduates (8.07%) and least among secondary participants (0.73%). There

was a high positive correlation ($C^e = 0.9725$) and statistical difference ($p^e = 0.0054$) in the knowledge of BC symptoms between the undergraduates and

postgraduates. However, there was no statistically significant difference ($p^a = 0.3880$, $p^b = 0.0634$, $p^c = 0.3853$, $p^d = 0.0884$ and $p^f = 0.0626$) in the knowledge of BC symptoms between other levels of education.

The knowledge of the best time to carry out BSE was highest among the postgraduates (13.04%), followed by the graduates (9.32%), secondary (2.91%) and least among the undergraduates (2.77%). There was a high positive correlation ($C^a = 0.9245$, $C^b = 0.7190$, $C^c = 0.7568$, $C^d = 0.9279$, $C^e = 0.9411$, $C^f = 0.9938$). There was a statistically significant difference in the knowledge of the best time to carry out BSE among the secondary and undergraduates ($p^a = 0.0083$), undergraduates and graduates ($p^d = 0.0076$), undergraduates and postgraduates ($p^e = 0.0051$) and the graduates and postgraduates ($p^f = 0.0000$). However, there was no statistically significant difference between the secondary and graduates ($p^b = 0.1073$), the secondary and postgraduates ($p^c = 0.0815$).

The knowledge of BSE associated activity was highest among the postgraduates (6.52%), followed by the graduates (5.59%), undergraduates (5.32%) and least among the secondary (0.49%). The level of correlation of the knowledge of BSE associated was high among undergraduates and graduates ($C^d = 0.9432$), undergraduates and postgraduates ($C^e = 0.9437$), the graduates and postgraduates ($C^f = 0.9036$), with a statistically significant difference between them ($p^d = 0.0000$, $p^e = 0.0000$, $p^f = 0.0001$ respectively). However, the secondary and undergraduates, secondary and graduates, and the secondary and postgraduates had lower levels of correlation of $C^a = 0.5221$, $C^b = 0.37219$ and $C^c = 0.6588$ respectively. This was accompanied by a non-statistically significant difference between them, $p^a = 0.0995$, $p^b = 0.2597$ and $p^c = 0.0275$ respectively.

The BC and BSE knowledge scores among the different levels of education were compared (Table 14). The score assigned to the five categories of questions was 2 marks each, giving a total of 10 marks. Correct answers attracted 2 marks, partially correct answers were awarded 1 mark while incorrect answers were assigned 0 mark. The scores were multiplied by the frequencies and an average score was calculated for each question which was summed up to give a total of 10 marks. Percentage scores were also

calculated. Overall, the mean and percentage BC and BSE knowledge score was 4.06 out of 10 and 40.60% out of 100%. There was a direct relationship between the level of education and the knowledge of BC and BSE. The highest score was observed among the postgraduates (4.49, 44.89%) followed by the graduates (4.28, 42.80%), the undergraduates (4.06, 40.55%) and the least being the secondary (3.82, 38.12%).

The influence of education on breast self-examination (BSE) practice

Table 15 shows the frequency of BSE practice among age groups. BSE practice was highest among the graduates (74.53%), followed by the postgraduates (71.74%), the undergraduates (30.64%) and least among the secondary (20.87%). Daily, biweekly, weekly, bimonthly and monthly BSE practice were considered to be high; annual and biannual BSE practice were considered to be moderate. The level of correlation in the BSE practice between levels of education was highest among the secondary and undergraduates ($C^a = 0.9929$), followed by the graduates and postgraduates ($C^f = 0.8967$), undergraduates and postgraduates ($C^e = 0.8007$), secondary and postgraduates ($C^c = 0.7829$), the undergraduates and graduates ($C^d = 0.5817$) and least among the secondary and graduates ($C^b = 0.5513$). There was a statistically significant difference in the level of BSE practice between the secondary and undergraduates ($p^a = 0.0000$), secondary and postgraduates ($p^c = 0.0216$), undergraduates and postgraduates ($p^e = 0.0169$), graduates and postgraduates ($p^f = 0.0025$).

Discussion

Inclusion criteria and response rate

Only female participants were recruited for this study. The female gender is recognised as the strongest risk factor of BC; about 0.5-1% of breast cancers occur in men⁸. According to American Cancer Society (ACS)⁹, 'men account for less than 1% of all breast cancers diagnosed in the United States; about 2,700 men are estimated to develop the disease, compared to 287,000 women in 2022. In view of the early onset of menstruation and breast development in Nigerian women, 13 years was selected as the minimum age of the study

participants. Oyewole *et al.*²¹ recently reported that 12.4 ± 1.5 years and 16.2 ± 1.6 respectively as the age of onset and completion of pubertal maturation in Southwest, Nigeria. A response rate of 94.58% was recorded in this study. The rate was higher than 74.30% and 74.00% reported by Ifediora *et al.*¹¹ and Jiwa *et al.*²² respectively.

BC and BSE awareness

BC awareness plays an indispensable role in the detection, prevention and management of the disease¹². There was a high level of awareness of BC (94.80%) and BSE (65.11%) among the participants. The BC awareness level was higher than 92.30%²³, 63.00%²⁰, 34.00%¹⁴, 83.4%¹⁵ and 49.90%²⁴ recorded in other surveys. It is, however, lower than 100%, 98.20% and 98.00% reported by Ng'ida *et al.*²⁵, Morse *et al.*²⁶ and Godfey *et al.*²⁷ respectively among Tanzanian and Ugandan women.

BC knowledge and BSE practice

BC knowledge relates to an individual understanding of BC that could influence the person's way of life, dietary habits, lifestyle, physical activity and the overall wellbeing. The BC knowledge level of participants in this study: 56.92% low, 40.62% moderate and 2.47% high, was similar to the findings of Legesse *et al.*¹⁵, although they reported 12.70% high level of BC knowledge. A high knowledge level enables an individual make informed decisions on how best to prevent BC, reduce its risk and manage it effectively. BC knowledge was highest amongst the young adults. This could be attributed to their access to internet and social media which accounted for 45.11% of the source of their breast cancer knowledge. The overall low level of knowledge of BC, causes, BSE and BSE practice underlines the need for increased BC education amongst females of all ages, especially the middle-aged adults who have higher risk of developing BC.

Though 52.16% of the participants believe that BSE can help detect and prevent BC, only 38.15% of them had ever performed BSE (Table 4). The value obtained in this study was lower than 53.60% and 74.70% respectively reported by Legesse *et al.*¹⁵ and Heena *et al.*¹². BSE practice helps to reduce BC mortality by enhancing early

detection of BC²⁶. Hussain *et al.*¹³ had observed that poor prognosis and low survival rate of BC in developing countries may largely be due to paucity of BC knowledge, low BSE practice, poor awareness and negative attitude to BC. More than 72% of the participants admitted that they do not know how to perform BSE. This points to the need for more education to enlighten the populace on the importance of BSE practice in a bid to enhance early detection of BC. The young adults had the highest level of BSE practice and BC knowledge compared to other age groups. The young adults (21 – 40 years) are in the most active and reproductive years of their lives. At this stage, women are very consciousness of their physique and pay much attention at putting up an attractive physical appearance. The age group has a better chance of detecting BC earlier than the other age groups as a result of high BSE performance. In terms of levels of education, the postgraduates were the best regarding BSE practice. There was a direct relationship between BSE practice and the levels of education.

BC knowledge and BSE practice: The impact of age and education level

Age is a notable risk factor of BC²⁸⁻³⁰. The present study indicates that age and level of education impact on BC knowledge and BSE practice in diverse ways. The young and middle-aged adults showed a direct relationship between the BC knowledge and BSE practice whereas there was an inverse relationship in the adolescents. BC knowledge had little or no effect on BSE practice of the three age groups. Knowledge was expected to increase with higher levels of education. However, there was a significant difference between BC knowledge and BSE practice levels. BC knowledge had significant effect on BSE practice amongst the postgraduates and graduates, but little or no effect on BSE practice amongst the undergraduates and secondary school students. There was an obvious gap in both BC knowledge and BSE practice.

Conclusion

This study examined the level of awareness and knowledge of BC, BSE, and BSE practice amongst females in selected Nigerian educational institutions. The level of knowledge of BC, BSE,

and BSE practice amongst the participants was low across all age groups and levels of education, though the awareness of BC and BSE was high. The low level of BSE practice could contribute to late BC detection, high mortality rate and low survival rate in Nigeria. There is need for a well-structured health education and screening programmes in Nigeria's educational institutions to enhance the prevention and early detection of diseases such as BC. BSE practice should be encouraged alongside mammography to enhance early detection of BC and curtail the increasing burden in Nigeria.

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Contribution of authors

Shalom N. Chinedu and Israel I. Afolabi conceived and designed the study. Magdalene E. Effiong collected and analyzed the data; all the authors prepared and proofread the manuscript.

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