

# Effect of Health Education on the Uptake of breast cancer screening among nursing students in Plateau State, Nigeria: A quasi-experimental study

Effect of health education on breast screening uptake

Mandong BM<sup>1</sup>[ID](#), Akinboye D<sup>2</sup>, Sodeinde KJ<sup>3</sup>[ID](#), Barnabas-Mandong J<sup>4</sup>

<sup>1</sup>Department of Pathology, Benjamin Carson College of Health and Medical Sciences, Babcock University, Ilishan-Remo, Ogun State

<sup>2</sup>Department of Public Health, Benjamin Carson College of Health and Medical Sciences, Babcock University, Ilishan-Remo, Ogun State

<sup>3</sup>Department of Community Medicine, Benjamin Carson College of Health and Medical Sciences, Babcock University, Ilishan-Remo, Ogun State

<sup>4</sup>I/C Department of Pathology, Jos University Teaching Hospital, Jos, Plateau State

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## Abstract

**Objective:** This study aimed at assessing the effect of health education on breast cancer screening uptake among female nursing students in Plateau State, Nigeria.

**Methods:** A quasi-experimental study involving 50 female nursing students that were selected using a systematic random sampling each from the Colleges of Nursing Jos South Local Government Area (LGA) (experimental group) and Jos North LGA (control group) both in Plateau State. The intervention involved health education training in the experimental group only for six (6) weeks. The tool used was a structured questionnaire with Cronbach's alpha coefficient of 0.782. Data analysis was done using IBM SPSS Version 22. ANOVA was used to compare mean changes in uptake scores as appropriate. Results were presented in tables and  $p < 0.05$  was taken as statistically significant.

**Results:** The mean breast cancer screening uptake scores were  $1.00 \pm 0.700$ ,  $2.46 \pm 0.706$  and  $2.54 \pm 0.676$  at baseline, one-month and three-month post-intervention respectively among the experimental group with a statistically significant difference in mean uptake score, ( $F[2, 147] = [77.982]$ ,  $p < 0.001$ ) (Effect size,  $R^2=0.515$ ). In the control group, the uptake scores were  $1.04 \pm 0.755$ ,  $1.16 \pm 0.738$ , and  $1.26 \pm 0.694$  at baseline, one-month post-intervention and three-month post-intervention respectively. There was no statistically significant difference in mean uptake scores between at least two phases ( $F [2, 147] = (1.140)$ ,  $p = 0.323$ ).

**Conclusion:** Health educational intervention can significantly improve breast screening uptake. There is a need to constantly educate youths on this benefit.

**Keywords:** Breast Cancer, Breast Screening, Female Nursing Student, Health Education, Plateau State, Uptake

Correspondence:

Sodeinde, Kolawole J

Department of Community Medicine, Benjamin Carson College of Health and Medical Sciences, Babcock University, Ilishan-Remo, Ogun State, Nigeria.

+2348062957695. [sodeindek@babcock.edu.ng](mailto:sodeindek@babcock.edu.ng)

### Plain English Summary

More people are diagnosed with breast cancer in developed countries as compared to developing countries like Nigeria. Ironically, more people in Nigeria and other developing countries die from breast cancer as compared to developed countries. The reason for this paradox is that breast cancers and other breast diseases are identified at an early stage before they become complicated in developed countries, unlike developing countries where patients usually present late in the hospital after the disease has advanced and become complicated. Early diagnosis in developed countries is usually made possible due to screening opportunities that are more common in these societies. Medical screenings are used to identify diseases early before they become more serious and problematic.

Health education helps people to adopt healthy practices. This fact was also established in our study where nursing students who had health education exercises improved more on their breast screening practices after one month and three months as compared to their counterparts who had no health education on breast screening practices. It is therefore important for health workers, policymakers and the general public to embrace breast screening as an important way to reduce death from breast cancer among women.

### Background

Breast cancer is the leading cause of cancer morbidity and mortality in women, globally. It is a major public health problem as a non-communicable disease, second to cardiovascular disease and diabetes mellitus. It is known to shorten life expectancy by 18.5 years and reduces the quality of life for more than a decade (1, 2). Globally it accounts for 25% of all cancers in women (1, 3) with some centres in Nigerian hospitals recording higher percentages (4).

There is a paradoxical high incidence and low mortality from breast cancer in developed countries while in developing countries, there is low incidence and high mortality from breast cancer. The incidences of breast cancer in these two climes are set at 92 per 100,000 and 27 per 100,000 respectively (4, 5). This discord in the incidence and mortality of breast cancer in developed and developing countries have been attributed to early and late presentations respectively by the patients in these regions which is largely dependent on breast screening practices (6, 7).

Medical screening tests are carried out among asymptomatic individuals to detect health disorders or diseases in the early stage. This is to ensure lifestyle changes and other modifications so that diseases can be treated early and complications prevented. Screening tests are not diagnostic. They only detect a group of people who needs further testing for the confirmation of the presence or absence of disease (8).

Breast cancer and other forms of medical screening have been reported to be good in developed societies but poor in developing societies including Nigeria (4). Various factors contribute to low breast cancer screening uptake in less developed societies. These include myths, cultural and religious inclinations, psychological issues, poor knowledge of the disease, low socio-

economic factor, and poor access to health insurance (9, 10, 11, 12). On the other hand, factors such as high educational level, being a female, advanced age of giving birth to first child, high socio-economic status, access to health insurance, and access to mass media all have positive associations with breast cancer screening uptake (9, 13, 14).

Creating awareness through health education programmes, particularly in health institutions has been hypothesized by researchers in various countries to be a key intervention in increasing the uptake of breast cancer screening (15, 16). This study therefore aimed to assess the effect of health education programmes on the uptake of breast cancer screening among nursing students in Plateau State, North-central Nigeria.

### Materials and Methods

#### *Study Area*

The study was conducted in Plateau State North-central Nigeria. Plateau State was created in 1967 from Northern Nigeria as the Benue-Plateau area with headquarters in Jos. In 1976, Benue State was carved out and Plateau became a state in 1976. The state has 17 local government areas, a projected population of 4,717,300 in the year 2022, a land area of 26,026 km<sup>2</sup>, and a population density of 181.3 km<sup>2</sup> (17). The state has 1073 Public Hospitals with screening programmes offered in these facilities. There are also two colleges of nursing in the state.

#### *Study Population*

Female nursing students of colleges of Nursing Jos South Local Government Area (LGA) (Experimental Group) and Jos North LGA (Control Group) both in Plateau State, Nigeria; are the only two colleges of nursing in the state.

### *Study Design*

The research was a quasi-experimental study, carried out in 3 phases – Pre-intervention, Intervention, and Post-Intervention phases.

#### *Pre-Intervention Phase*

A team was constituted which included the researchers and other senior health workers. All these personnel would assist in training the participants during the intervention phase. The baseline data were afterwards collected from both the experimental and control groups to serve as a reference point to compare with the post-intervention values. The instrument for collecting the data was administered by the researchers and their assistants.

#### *Intervention*

This was conducted for 6 weeks. The intervention involved health education training on breast screening in the experimental group only while the control group was given lectures in other areas not directly related to breast cancer screening. Training sessions were in six (6) modular units. (1 & 2): Introduction – Familiarising the participants with the researcher team (3) Definition of cancer and risk factors for breast cancer (4) Classification of breast cancer and the prognostic indicators (5 & 6) Breast cancer screening – Practical demonstration of breast self-examination. Training methods adopted were health talks, role plays, and pictorial demonstrations on PowerPoint as well as individual and group exercises. The personnel involved in the training included the researchers and other senior medical personnel. Relevant IEC materials on breast cancer/screening were used during training.

#### *Post-Intervention Phase*

This was conducted among both the intervention and the control groups in two phases- one-month post-intervention, and three-month post-intervention. The one-month post-intervention was carried out in September 2022 while the three months post-intervention was conducted in November 2022. The post-intervention evaluation was carried out using the same questionnaire that had been used during the pre-intervention evaluation to determine the gain (one-month post-intervention and three-month post-intervention) in terms of the effectiveness of the health education intervention on the uptake of breast cancer screening. Evaluation of the effects of the training was done using calculated scores for the various variables during analysis.

### *Sample size*

The minimum sample size (n) was determined by the statistical formula for comparing proportions between two groups using a standard normal deviate of 1.96, 95% confidence interval (C.I), and power of 80%. After adjustments for 10% attrition and another 10% for non-response rates, a total of 28 participants was gotten. However, 50 participants each were included in both the experimental and control groups.

### *Subject Selection and Sampling Methods*

The study was conducted in both the College of Nursing Jos South LGA and the College of Nursing, Jos North LGA. The balloting method was used to select the experimental group. Hence, the former was selected as the experimental group and the latter became the control group. The list of all the female students in each school was obtained from the school authorities. Systematic random sampling was then used to select the desired number of participants from each centre.

### *Inclusion Criterion*

All female nursing students who were at least 18 years of age

### *Exclusion Criteria*

All female nursing students who had a family history of breast disease.

### *Research Instrument and Data Collection*

A semi-structured self-administered questionnaire constructed from the review of similar literature was used to elicit data from the participants. The validity of the instrument was ensured by a review of experts on the research subject. A Cronbach's alpha coefficient of 0.782 was also obtained for instrument reliability. The questionnaire was pre-tested among ten (10) students of the University of Jos and necessary corrections were then made. The questionnaires were administered by the researchers and two (2) trained research assistants.

### *Data management and analysis*

The questionnaires were cross-checked for errors, and necessary corrections were made. Information obtained was inputted into Statistical Package for Social Sciences (SPSS) (IBM SPSS Inc., Chicago, IL) version 22.0 for statistical calculation and analysis. For breast cancer screening uptake, participants in both the experimental and the control groups were asked about the frequency of breast cancer screening

with the options of never (scored as 0), rarely (BSE and/or other tests once in a month or less, scored as 1), occasionally (BSE and/or other test(s) twice in a month, scored as 2) and frequently (BSE and/or other test(s) at least one in a week, scored as 3). Those who scored 2 and 3 were considered as having good breast cancer screening uptake while those who scored 0 and 1 were considered as having poor breast cancer screening uptake.

The dependent variable was the uptake of breast cancer screening, whereas the independent variables were socio-demographic characteristics including age, marital status, state of origin, and religion. Categorical variables were summarised as frequencies and percentages, whereas continuous variables were presented as means and standard deviations. The effect of the

intervention was tested on the uptake of breast cancer screening. ANOVA was used to compare the mean scores for the uptake of breast cancer screening among both the study group and control group at baseline, one-month post-intervention, and three-month post-intervention. Results were presented as tables and  $p < 0.05$  was taken as statistically significant.

### Results

Table 1 shows that there was a statistically significant difference between the study group and the control only in marital status ( $p=0.026$ ). About two-fifth of the participants in the experimental group were married, (38.0%) compared to one-fifth (18.0%) of the control who were married. Other socio-demographic factors did not show any statistical significance.

**Table 1: Socio-demographic Characteristics of respondents (n=50)**

Variable	Experimental Grp n(%)	Control n(%)	Test Statistics
<b>Age (Years)</b>			
<25	21 (42.0)	26 (52.0)	$X^2= 1.173$ $P=0.556$
25-34	22 (44.0)	17 (34.0)	
≥35	7 (14.0)	7 (14.0)	
<b>Marital Status</b>			
Single	31 (62.0)	41 (82.0)	$X^2= 4.960$ $P=0.026$
Married	19 (38.0)	9 (18.0)	
<b>Religion</b>			
Christianity	48 (96.0)	47 (94.0)	$X^2=0.211$ $P=1.00$
Islam	2 (4.0)	3 (6.0)	
<b>State of Origin</b>			
Plateau	34 (68.0)	39 (78.0)	$X^2=0.211$ $P=1.00$
Others	16 (32.0)	11 (22.0)	

Table 2 shows the baseline uptake of breast screening among the experimental and control groups. There was no statistically significant difference in the frequency of uptake of breast screening among the experimental and control participants at baseline ( $p=0.305$ ). There were

also no statistically significant differences in the types of breast screening done ( $p=0.640$  &  $1.000$ ) and category of breast screening among the experimental and control groups ( $p=0.248$ ) at baseline.

**Table 2: Baseline Uptake of Breast Screening among Experimental and Control Groups**

Variable	Experimental Group	Control Group	Test statistics
<b>Frequency of Screening uptake</b>			
Never	11 (22.0)	13 (26.0)	$X^2=3.627$ $p=0.305$
Rarely	29 (58.0)	22 (44.0)	
Occasionally	9 (18.0)	15 (30.0)	
Frequently	1 (2.0)	0 (0.0)	
<b>Type of Screening ever taken</b>			
<b>BSE</b>			
Yes	39 (78.0)	37 (74.0)	$X^2=0.219$ $p=0.640$
No	11 (22.0)	13 (26.0)	

<b>CBE</b>			
Yes	2 (4.0)	2 (4.0)	X <sup>2</sup> =0.0
No	48 (96.0)	48 (96.0)	p=1.000
<b>Uptake Category</b>			
Poor Uptake	40 (80.0)	35 (70.0)	X <sup>2</sup> =1.333
Good Uptake	10 (20.0)	15 (30.0)	p=0.248

Table 3 shows the factors that were associated with the uptake of breast cancer screening at baseline. None of the socio-demographic characteristics of the participants was significantly associated with the uptake of breast cancer screening at baseline among the experimental and control groups

**Table 3: Factors Associated with Uptake of Breast Cancer Screening at Baseline**

Variable	Experimental Group		Control	
	Good Screening Uptake	Poor Screening Uptake	Good Screening Uptake	Poor Screening Uptake
<b>Age Group</b>				
≤24	3 (14.3)	18 (85.7)	8 (30.8)	18 (69.2)
25-34	6 (27.3)	16 (72.7)	6 (35.3)	11 (64.7)
≥35	1 (14.3)	6 (85.7)	1 (14.3)	6 (85.7)
<b>X<sup>2</sup>(P)</b>	<b>1.299 (0.522)</b>		<b>1.057(0.589)</b>	
<b>Knowledge</b>				
Good Knowledge	6(23.1)	20(76.9)	13(36.1)	23(63.9)
Poor Knowledge	4(16.7)	20 (83.3)	2(14.3)	12 (85.7)
<b>X<sup>2</sup>(P)</b>	<b>0.321(0.571)</b>		<b>0.286(0.131)</b>	
<b>Perception</b>				
Good Perception	6(22.2)	21(77.8)	6(27.3)	16(72.7)
Poor Perception	4(17.4)	19(82.6)	9 (32.1)	19 (67.9)
<b>X<sup>2</sup>(P)</b>	<b>0.181(0.670)</b>		<b>0.139(0.709)</b>	
<b>Religion</b>				
Christianity	10 (20.8)	38 (79.2)	14 (29.8)	33 (70.2)
Islam	0 (0.0)	2 (100.0)	1 (33.3)	2 (66.7)
<b>X<sup>2</sup>(P)</b>	<b>0.521(0.470)</b>		<b>0.017(0.897)</b>	
<b>State of Origin</b>				
Plateau	6(17.6)	28(82.4)	13 (33.3)	26 (67.7)
Others	4 (25.0)	12 (75.0)	2 (18.2)	9 (81.8)
<b>X<sup>2</sup>(P)</b>	<b>0.368(0.544)</b>		<b>0.938 (0.333)</b>	
<b>Marital Status</b>				
Single	4 (12.9)	27 (87.1)	13 (31.7)	28 (68.3)
Married	6 (31.6)	13 (68.4)	2 (22.2)	7 (27.8)
<b>X<sup>2</sup>(P)</b>	<b>2.568(0.109)</b>		<b>0.316(0.574)</b>	

Table 4 shows the mean uptake scores for the experimental and control groups. Mean breast cancer screening uptake scores were 1.00 ± 0.700, 2.46 ± 0.706, and 2.54 ± 0.676 at baseline, one-month post-intervention, and three-month post-intervention respectively among the

experimental group. Mean breast cancer screening uptake scores were 1.04 ± 0.755, 1.16 ± 0.738, 1.26 ± 0.694 at baseline, one-month post-intervention, and three-month post-intervention respectively among the control group.

**Table 4: Mean Uptake Scores for Experimental and Control Groups**

Phase	Mean
<b>Experimental Group</b>	
Baseline	1.00 ± 0.700
One-month post-intervention	2.46 ± 0.706



Three-months post-intervention	2.54 ± 0.676
<b>Control Group</b>	
Baseline	1.04 ± 0.755
One-month post-intervention	1.16 ± 0.738
Three-months post-intervention	1.26 ± 0.694

Table 5 shows ANOVA analysis for breast screening uptake among the experimental and the control groups. In the experimental group, there was a statistically significant difference in mean breast cancer screening uptake score between at least two groups (F [2, 147] =

[77.982],  $p < 0.001$ ), Effect Size=0.515. On the contrary, there was no statistically significant difference in mean breast cancer screening uptake score between at least two phases among the control group (F [2, 147] = [1.140],  $p = 0.323$ ).

**Table 5: ANOVA Analysis for Screening Uptake among Experimental and Control Groups**

	Sum of Squares	DF	Mean Square	F	P-value	Effect Size R <sup>2</sup>
<b>Experimental Group</b>						
Between Groups	75.160	2	37.580	77.982	<0.001	0.515
Within Groups	70.840	147	0.482			
Total	146.000	149				
<b>Control Group</b>						
Between Groups	1.213	2	0.607	1.140	0.323	
Within Groups	78.260	147	0.532			
Total	79.473	149				

Table 6 shows multiple comparisons of phases in the experimental group using Tukey's HSD Test. The mean value of breast cancer screening uptake score among the experimental group was significantly different at baseline compared to one-month post-intervention ( $p < 0.001$ , 95% C.I. = [-1.79, -1.13]). The mean value of breast cancer screening uptake score among the experimental

group was also significantly different at baseline compared to three-month post-intervention ( $p < 0.001$ , 95% C.I. = [-1.87, -1.21]). However, the mean value of breast cancer screening uptake score among the experimental group was not significantly different at one-month post-intervention as compared to three-month post-intervention ( $p = 0.833$ , 95% C.I. = [-0.41, 0.25]).

**Table 6: Tukey's HSD Test for Multiple Comparison in Experimental Group**

	Mean Difference	95% Confidence Interval	P-value
Baseline/One-month Post-intervention	-1.460	-1.79, -1.13	<0.001
Baseline/Three -month Post-intervention	-1.540	-1.87, -1.21	<0.001
One-month Post-intervention/Three-month Post-intervention	-0.080	-0.41, 0.25	0.833

## Discussion

The experimental and control groups have similar baseline characteristics. In this current study, significant improvement was observed in the experimental group after intervention. However, no significant changes were observed among the participants in the control group during the same period.

Health education programmes particularly when they are conducted in schools enable young people to shape their attitudes and practice skills needed to adopt and maintain a lifetime of healthy behaviour. Schools have been documented to play a vital role in achieving this goal. Exposures

that young people have set the stage for adult health (18). The outcome of such health education is more rewarding when it is been anchored by experts particularly those who are important to these youths and also when the education is done earlier in the youth's life (19). Conducting this intervention study in a school setting, therefore, offers several benefits to the participants and the community at large.

This current study showed low screening uptake among both the intervention and the control groups at baseline. This low uptake was similar to what was reported among nurses in Lagos State, Nigeria by Odusanya and Tayo (20). It was

also similar to the findings of studies conducted among undergraduate students of Usmanu Danfodio University (12) and Ahmadu Bello University (21) in the Northwestern part of Nigeria. This low uptake of breast cancer screening among nursing students would not only expose them to high risk of severe breast diseases, it would also indicate that as health personnel in training, they would likely not encourage the general public to undergo breast screening exercises exposing many to high morbidity and mortality from breast diseases. Health education has a positive effect on the health-seeking behaviour of an individual and it helps in making informed decisions regarding the health choices an individual makes. This current study showed a significant increase in the uptake of breast cancer screening among the intervention group. This finding agrees with what was reported among researchers in different parts of the world. For instance, Kocaoz reported that women who had health education had significant improvement in the uptake of mammography in Nigde Province in Turkey (22). In a similar vein, increased uptake of breast cancer screening was reported by Akhtari-Zavare in a randomized control trial to increase breast cancer screening and awareness in Malaysia (23). Furthermore, in Iran, Heydari showed a significant increase in mammography uptake in an intervention study using the Health Belief Model (24). In addition, Goel reported a higher proportion of mammogram uptake among the intervention group than the control group in a Spanish study (25). This direct relationship between health education and uptake of breast screening may be due to the improved awareness of the individual about the benefits of early detection of breast cancer and other breast pathologies and the danger of late intervention for these medical conditions which include high cost of medical care, poor quality of life and death among other things.

### Conclusion

This study is important because it lends a voice to the importance of health education in increasing the uptake of breast cancer particularly among young women. The implication of this is to ensure continuous education, training, re-training, and various other health education intervention programmes where key messages that promote breast screening uptake will be factored into such programmes.

### List of Abbreviations

ANOVA:	Analysis of Variance
BSE:	Breast Self–Examination
BUHREC:	Babcock University Health Research and Ethics Committee
CBE:	Clinical Breast Examination
C.I:	Confidence Interval
IBM:	International Business Machine
IEC:	Information Education Communication
LGA:	Local Government Area
SPSS:	Statistical Package for Social Sciences

### Declarations

#### *Ethics approval and consent to participate*

Ethical clearance was obtained from Babcock University Health Research Ethics Committee (BUHREC 669/22) and Plateau State Ministry of Health, Jos. Similarly, with the approval, an introduction letter from the Public Health Department of Babcock University and an informed consent form were taken to the two (2) Colleges of Nursing and Midwifery while carrying out the study. The documents were used to obtain permission from the College to get the consent of the respondents for the study. Verbal and written informed consent was obtained from all the participants and strict confidentiality was maintained throughout the study.

#### *Consent for Publication*

The authors hereby transfer all copyright ownership exclusively to the journal, if this work is accepted and published by the journal.

#### *Availability of Data*

Data for this work are available with the authors and may be presented on request

#### *Conflicts of Interest*

The authors have declared no conflict of interest.

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#### *Authors' Contributions*

MBM conceived the research idea and collected the data. SKJ analyzed the data and wrote the first draft of the manuscript. All authors reviewed the manuscript and approved the final submission.

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## References

1. Vinay, K., Abdul, K. A., & Jon C. A. (2021). In Cancer Epidemiology in Robbins and Cotran Pathologic Basis of Disease. Publisher Elsevier Saunders 10th Edition, Chapter 7 Pg 271- 280.
2. Zuha, N., Christine G., Varsha G., Ishan P., & Mohammad A H. Breast Cancer Incidence and Behaviour in younger patients: A study from the surveillance, Epidemiology and End Results Database. World J Oncol. 2020; 11(3) 88 – 97. <https://doi.org/10.14740/wjon1278>
3. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global Cancer Statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J. Clin. 2018; 68(6): 1-31. <https://doi.org/10.3322/caac.21492>
4. Silas OA, Manasseh AN, Musa J, Dauda AM, Zoakah AI, Mandong BM et al. Changing pattern in trend of top 10 cancers in the Jos University Teaching Hospital Cancer Registry (1996 -2018); Jos North Central Nigeria. J Med Trop. 2019; 21(2) 81 – 86. [https://doi.org/10.4103/jomt.jomt\\_20\\_19](https://doi.org/10.4103/jomt.jomt_20_19)
5. Mandong BM, Madaki AKJ, Manasseh AN. Malignant diseases in Jos: A follow up. Annals Afri Med.2003; 2(2):49-53
6. Jedy-Agba EE, Curado MP, Oga E, Samaila MO, Ezeome ER, Obiorah C et al. (2012). The role of hospital-based cancer registries in low-and-middle income countries-The Nigerian case study. Cancer Epidemiol. 2012; 36(5):430-35. <https://doi.org/10.1016/j.canep.2012.05.010>
7. Ibrahim, NA, Oduşanya OO. (2009). Knowledge of risk factors, beliefs and practices of female healthcare professionals towards breast cancer in a tertiary institution in Lagos, Nigeria. BMC Cancer. 2009; 9:76-83. <https://doi.org/10.1186/1471-2407-9-76>
8. John Hopkins Medicine. Screening tests for common diseases. Available at <https://www.hopkinsmedicine.org>. Accessed on 06/04/2022
9. Noman S, Shahar HK, Abdul Rahman H, Ismail S, Abdulwahid Al-Jaberi M, Azzani M.Sarah, N., Haya, K. S., & Hejar, A. R. et al (2021). The effectiveness of educational intervention on breast cancer screening uptake, knowledge and beliefs among women: A systemic review. Int J of Environ Res Public Health. 2020; 18(1): 263-92. <https://doi.org/10.3390/ijerph18010263>
10. Udoh RH, Tahiru M, Ansu-Mensah M, Bawontuo V, Danquah FI, Kuupiel D. Women’s knowledge, attitude and practice of breast self-examination in sub-Saharan Africa: a scoping review. Arch Public Health. 2020; 78 (1): 84-93. <https://doi.org/10.1186/s13690-020-00452-9>
11. Al-Wassia RK, Farsi NJ, Merdad LA, Hagi SK. Patterns, knowledge, and barriers of mammography use among women in Saudi Arabia. Saudi Med J. 2017; 38(9): 913-21. <https://doi.org/10.15537/smj.2017.9.20842>
12. Raji MO, Adamu SP, Akinnibosun-Raji HO, Raji HO, Ango UM, Kaoje AU. Knowledge, attitude, and uptake of Mammography among female health workers in two tertiary health facilities of Sokoto State, Nigeria. Int J Community Med Public Health. 2021; 8(2): 511-17. <https://doi.org/10.18203/2394-6040.ijcmph20210199>
13. Mahumud RA, Gow J, Keramat SA, March S, Dunn J, Alam K et al. Distribution and predictors associated with the use of breast cancer screening services among women in 14 low-resource countries. BMC Public Health. 2020; 20(1):1467-81. <https://doi.org/10.1186/s12889-020-09557-w>
14. Sarker R, Islam MS, Moonajilin MS, Rahman M, Gesesew HA, Ward PR. Effectiveness of educational intervention on breast cancer knowledge and breast self-examination among female university students in Bangladesh: a pre-post quasi-experimental study. BMC Cancer. 2022 ;22(1):199-205. <https://doi.org/10.1186/s12885-022-09311-y>
15. Kisuya J, Wachira J, Busakhala N, Naanyu V, Chite AF, Omenge O, Otieno G, Keter A, Mwangi A, Inui T. Impact of an educational intervention on breast cancer knowledge in Western Kenya. Health Educ Res. 2015; 30(5):786-96. <https://doi.org/10.1093/her/cyv043>
16. Wu TY, Liu YL, Chung S. Improving breast cancer outcomes among women in China: practices, knowledge, and attitudes related to breast cancer screening. Int J Breast Cancer. 2012; 2012 (1): 921607. <https://doi.org/10.1155/2012/921607>
17. Plateau State Nigeria Population Statistics Charts, Map and Location. Available at <https://www.citypopulation.de>php>nigeria>. Accessed on 20/05/23



18. Nation M, Crusto C, Wandersman A, Kumpfer KL, Seybolt D, Morrissey-Kane E et al. What works in prevention? Principles of effective prevention programs. *Am Psychol.* 2003; 58(6-7):449-56. <https://doi.org/10.1037/0003-066x.58.6-7.449>
19. Rasberry CN, Tiu GF, Kann L, McManus T, Michael SL, Merlo CL et al. Health-Related behaviors and academic achievement among high school students - United States, 2015. *MMWR Morb Mortal Wkly Rep.* 2017; 66(35):921-927. <https://doi.org/10.15585/mmwr.mm6635a1>
20. Odusanya OO, Tayo OO. Breast cancer knowledge, attitudes and practice among nurses in Lagos, Nigeria. *Acta Oncol.* 2001; 40(7): 844-8. <https://doi.org/10.1080/02841860152703472>
21. Gwarzo UM, Sabitu K, Idris SH. Knowledge and practice of breast self-examination among female undergraduate students of Ahmadu Bello University Zaria, north-western Nigeria. *Ann Afr Med.* 2009; 8(1):55-8. <https://doi.org/10.4103/1596-3519.55766>
22. Kocaöz S, Özçelik H, Talas MS, Akkaya F, Özkul F, Kurtuluş A et al. The Effect of Education on the Early Diagnosis of Breast and Cervix Cancer on the Women's Attitudes and Behaviors Regarding Participating in Screening Programs. *J Cancer Educ.* 2018; 33(4):821-832. <https://doi.org/10.1007/s13187-017-1193-8>
23. Akhtari-Zavare M, Juni MH, Said SM, Ismail IZ, Latiff LA, Ataollahi Eshkoo S. Result of randomized control trial to increase breast health awareness among young females in Malaysia. *BMC Public Health.* 2016; 16(1): 738-48. <https://doi.org/10.1186/s12889-016-3414-1>
24. Heydari E, Noroozi A. Comparison of Two Different Educational Methods for Teachers' Mammography Based on the Health Belief Model. *Asian Pac J Cancer Prev.* 2015;16(16):6981-6. <https://doi.org/10.7314/apjcp.2015.16.16.6981>
25. Goel MS, O'Connor R. Increasing screening mammography among predominantly Spanish speakers at a federally qualified health center using a brief previsit video. *Patient Educ Couns.* 2016; 99(3):408-413. <https://doi.org/10.1016/j.pec.2015.09.007>