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Knowledge and awareness of breast cancer symptoms, risk factors, and early detection methods among Nigerian university students

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Abstract

Breast cancer continues to be a major global health crisis, particularly impacting low- and middle-income nations like Nigeria. This research investigated breast cancer knowledge, attitudes, and preventative practices among students at Nnamdi Azikiwe University. A survey of 548 undergraduates and postgraduates revealed widespread awareness of the disease (99.3%), primarily attributed to social media (56.9%). Despite this high awareness, significant knowledge deficits persisted regarding risk factors, symptoms, and early detection techniques. Although most participants (90.5%) knew about breast self-examination (BSE), only two-thirds (67.2%) had performed it, and clinical breast examination (CBE) rates were alarmingly low (17.5%). Financial limitations (56.2%) and restricted access to healthcare facilities (44.5%) were identified as key obstacles to screening. These findings underscore the urgent need for focused educational programs, improved access to screening services, and robust public health campaigns to bridge the gap between knowledge and practice, ultimately promoting earlier detection and improved outcomes.

Keywords: Breast Cancer; Public Health; Breast Self- Examination (BSE); Clinical breast examination (CBE); Nigerian Students

1. Introduction

Breast cancer remains a pressing global health issue, ranking among the most frequently diagnosed cancers in women. This disease presents a particularly significant challenge in low- and middle-income countries, where incidence rates are on the rise. Worldwide, it is the most prevalent malignancy among women, accounting for nearly a quarter (23.8%) of all new cancer diagnoses in 2020 (1). The burden of cancer remains high in sub-Saharan Africa and Nigeria by extension, where limited access to healthcare services and early diagnostic tools/practices contributes to higher cancer mortality.

Alongside the escalating crisis of antimicrobial resistance in sub-Saharan Africa, particularly Nigeria, which presents an unprecedented challenge to healthcare infrastructure, cancer has also emerged as a significant public health burden with potentially devastating consequences for the Nigerian health system (2, 3). Although progress has been made in

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breast cancer treatment and diagnostics, it continues to be a primary cause of cancer-related mortality. The importance of early detection in enhancing patient outcomes and survival cannot be overstated; however, global understanding and awareness of breast cancer and effective early detection methods are inconsistent. Crucially, early detection strategies, including breast self-examination (BSE), clinical breast examination (CBE), and mammography, demonstrably improve survival by facilitating prompt access to appropriate treatment, as highlighted by the World Health Organization (WHO).

In contrast to high-income nations, which often have well-established breast cancer awareness initiatives, low- and middle-income countries (LMICs) like Nigeria struggle to effectively educate their populations about this disease. This lack of awareness is directly linked to diagnoses at later, more advanced stages, leading to poorer patient prognoses (4).

In Nigeria, breast cancer is the most common cancer among women, with an increasing incidence rate (5). Delayed diagnosis is a common issue, with over 70% of cases diagnosed at advanced stages (6). Several barriers to early detection exist in Nigeria: Lack of awareness and misconceptions about breast cancer, limited access to healthcare facilities and Socio-cultural stigma and gender dynamics (7, 8).

Educational institutions, particularly universities, play a vital role in shaping health behaviour. University students represent a demographic with a high potential for knowledge dissemination, making them a critical target for awareness campaigns. Studies indicate varying levels of breast cancer awareness among Nigerian university students. While many students are aware of breast cancer as a disease, their understanding of risk factors, symptoms, and early detection measures is often superficial (9).

Data from some Nigerian medical centres reveal a concerning prevalence of breast lumps requiring excision: approximately 20% of women between 20 and 29 years old, and a staggering 60% of those aged 40 to 49. This trend indicates that breast cancer is affecting a relatively younger population in Nigeria. Compounding the problem, women frequently present with advanced stages of the disease, often diagnosed with aggressive tumour types associated with less favourable outcomes. Consequently, there is a clear and urgent need for significantly enhanced public health initiatives focused on breast cancer education and early detection (10). This study explores the knowledge, attitudes and practices concerning breast cancer and its early detection measures among Nnamdi Azikiwe University students.

2. Methods

2.1. Study Design

This cross-sectional study used a structured questionnaire to collect data on breast cancer knowledge, attitudes and practices among Nnamdi Azikiwe University students.

2.2. Participants

Participants were undergraduate and postgraduate students from diverse faculties in Nnamdi Azikiwe University. The inclusion criteria were consent to participate and enrollment in the university at the time of the study.

2.3. Sample Size Determination

The sample size(n) was determined using $n=Z^2pq/d^2$. With a 95% confidence level (Zscore, 1.96), a 50% estimated prevalence (P, 0.5) and a margin of error (d) of 4.4%, a value of 496 was obtained. Adding an estimated non-response rate of 10%, the sample size was increased to 548.

2.4. Data Collection

Data for this study were collected using a 25-item, pretested, structured questionnaire administered online through Google Forms from consenting students of Nnamdi Azikiwe University. The questionnaire captured the following information on participants:

- Sociodemographic details.
- Knowledge of breast cancer symptoms and signs.
- Understanding of risk factors.
- Awareness, knowledge and practices related to breast cancer screening methods.

Participants completed the survey using their mobile devices, and their responses were automatically and instantly stored on the principal investigator's Google Drive.

2.5. Data Analysis

Responses were analysed using descriptive statistics to summarise findings and identify trends. Associations between demographic factors and knowledge levels were evaluated using cross-tabulations.

3. Results

3.1. Socio-Demographic Characteristics

The study surveyed 548 participants, mostly female (84.7%, n = 464) and aged between 20-25 years (66.4%, n =364). Most participants were single (94.1%, n =516) and pursuing undergraduate studies (72.3%, n = 396). A small proportion reported a family history of breast cancer (2.2%, n = 12), while 94.8% (n = 520) denied any family history (Table 1).

3.2. General Awareness and Knowledge of Breast Cancer

Almost all participants (99.3%, n = 544) had heard of breast cancer. The most common sources of information were social media (56.9%, n = 312), schools or universities (51.1%, n = 280), and healthcare professionals (36.5%, n =200). Despite this, only 38.7% (n = 212) believed that breast cancer could occur in men (Table 2).

The most recognized risk factor was a family history of breast cancer (81%, n = 444), followed by exposure to radiation (79.6%, n = 436) and smoking (41.6%, n = 228). Few participants identified a lack of physical activity (16.1%, n = 88) as a risk factor, and 5.8% (n = 32) did not know any risk factors.

The majority recognized a lump in the breast or armpit as a symptom (93.4%, n = 512), followed by nipple discharge (69.3%, n = 380) and breast pain (63.5%, n = 348). Only 2.2% (n =12) reported no knowledge of any symptoms (Table 2).

3.3. Knowledge of Early Detection Methods and Attitude Toward Screening

Most participants (90.5%, n = 496) were aware of breast self-examination (BSE), and 67.2% (n = 368) had performed it. About 48.2% (n = 264) correctly identified monthly BSEs as ideal. However, clinical breast examination (CBE) uptake was low, with only 17.5% (n = 96) having undergone one (Table 3).

Awareness of mammography screening guidelines was limited; 45.3% (n = 248) were unsure of the recommended age to start screening. Despite this, nearly all participants (99.3%, n = 544) believed early detection increases treatment success, and 78.1% (n = 428) expressed willingness to undergo regular screening (Table 3).

3.4. Barriers to Breast Cancer Screening

The primary barriers identified were financial constraints (56.2%, n = 308) and lack of access to screening facilities (44.5%, n = 244). Fear of diagnosis (28.5%, n = 156) and lack of awareness (29.2%, n = 160) were also notable factors.

3.5. Preferred Sources of Information

Social media and healthcare professionals were the preferred sources of education and awareness (Figure 1).

Table 1 Socio-Demographics of the Participants

	Category	Frequency	Percentage
Age Groups	<20 years	64	11.7
	20-25 years	364	66.4
	26-30 years	112	20.4
	>30 years	8	1.5
Sex	Male	84	15.3
	Females	464	84.7

Marital Status	Single	516	94.1
	Married	32	5.9
Level of Study	Undergraduate	396	72.3
	Postgraduate	152	27.7
Family History	Yes	12	2.2
	No	520	94.8
	Not Sure	16	2.9

Table 2 General Awareness of Breast Cancer, Risks, Signs and Symptoms.

General Awareness of Breast Cancer			
	Variable	**Frequency**	**Percentage**
Have you heard of Breast Cancer	Yes	544	99.3
	No	4	0.7
If Yes, the source of Information	Social Media	312	56.9
	TV/Radio	140	25.5
	Newspaper/Magazine	100	18.2
	School/University	280	51.1
	Healthcare Professionals	200	36.5
	Friends/Family	240	43.8
	Others	4	0.7
Do you think breast cancer can occur in Men	Yes	212	38.7
	No	200	36.5
	Not sure	136	24.8
Knowledge of Risk factors			
	Variable	Frequency	Percentage
Which of the following do you think are risk factors for Breast Cancer	Family history of breast Cancer	444	81
	Age(getting older)	224	40.9
	Being Overweight or Obese	164	29.9
	Smoking	228	41.6
	High alcohol consumption	204	37.2
	Exposure to Radiation	436	79.6
	Lack of Physical Activity	88	16.1
	No idea	32	5.8
Do you think breast cancer can be prevented by adopting a healthy lifestyle	Yes	428	78.1
	No	48	8.8
	Not sure	72	13.1
Knowledge of signs and symptoms			

	Variable	Frequency	Percentage
Which of the following do you recognize as symptoms of breast cancer? (Select all that apply)	Lump in the breast or armpit	512	93.4
	Change in the Size or shape of the breast	308	56.2
	Nipple discharge (Other than breast milk)	380	69.3
	Skin changes on the breast (e.g.Dimpling, redness)	324	59.1
	Pain in the breast or nipple	348	63.5
	I don't know any symptom	12	2.2
How Often should women check for changes in their breasts	Weekly	180	32.8
	Monthly	216	39.4
	Once every few months	84	15.3
	Annually	12	2.2
	I have no idea	56	10.2

Table 3 Knowledge of Early Detection Methods and Attitude Towards Breast Cancer Screening

	Variable	**Frequency**	**Percentage(%)**
Are you aware of breast self-examination?	Yes	496	90.5
	No	52	9.5
If yes, have you ever performed breast self-examination?	Yes	368	67.2
	No	180	32.8
How Often should women perform breast self-examination	Daily	196	35.8
	Monthly	264	48.2
	Once every Six (6)months	24	4.4
	Annually	0	0
	I have no idea	64	11.7
Have you ever had a clinical breast examination (CBE) by a healthcare professional?	Yes	96	17.5
	No	452	82.5
Do you know at what age women are advised to start Mammography screening?	Below 30 years	144	26.3
	40 years	96	17.5
	40-50 year	44	8
	Above 50 years	16	2.9
	I Don't Know	248	45.3
Do you believe that early detection of breast cancer increases the chances of successful treatment?	Yes	544	99.3
	No	4	0.7
Do you think breast cancer screening is important?	Yes	524	95.6

	No	0	0
	Not sure	24	4.4
Would you consider going for regular breast cancer screening?	Yes	428	78.1
	No	16	2.9
	Not sure	104	19
What are the reasons that might prevent you from going for breast cancer screening? (Select all that apply)	Fear of diagnosis	156	28.5
	Lack of awareness	160	29.2
	Cultural or religious beliefs	56	10.2
	Financial Constraints	308	56.2
	Lack of access to screening facilities	244	44.5
	None	104	19
	Not applicable	4	0.7
	Time	4	0.7

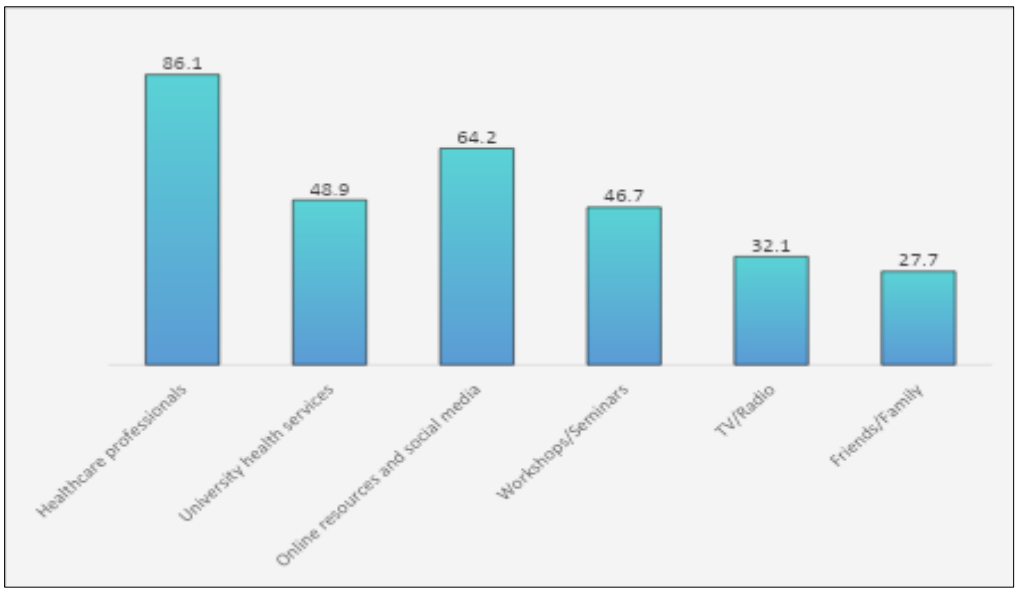

Figure 1 Prefered Source of Information and Education on Breast Cancer

4. Discussion

The findings of this study highlight critical gaps in the knowledge, attitudes and practices regarding breast cancer and its early detection methods among Nnamdi Azikiwe University students. While general awareness of breast cancer was high (99.3%), a deeper understanding of risk factors, symptoms and screening practices was inconsistent. This reflects the challenges of translating awareness into actionable knowledge and behaviours, which is vital for improving early detection and reducing breast cancer morbidity and mortality.

The majority of participants identified family history (81%) and exposure to radiation (79.6%) as significant risk factors for breast cancer. However, only a minority recognized lifestyle-related risks such as obesity (29.9%) and lack of physical activity (16.1%), despite strong evidence linking these factors to increased breast cancer risk (11, 12). This gap

underscores the need for targeted educational interventions that address modifiable risk factors, encourage healthy lifestyle changes and emphasize the importance of diet and exercise in reducing cancer risk.

Participants demonstrated a good level of awareness regarding key symptoms such as lumps in the breast or armpit (93.4%) and nipple discharge (69.3%). However, other important indicators, such as changes in breast size or shape (56.2%) and skin changes (59.1%), were less widely recognized. This partial knowledge could contribute to delayed presentation and diagnosis, as individuals may not recognize early warning signs beyond the most common symptom of a lump. Educational campaigns should emphasize the full spectrum of breast cancer symptoms to improve early recognition and timely medical consultation.

Awareness of breast self-examination (BSE) was high (90.5%), and 67.2% of participants had performed it. However, fewer students identified the correct frequency, with only 48.2% reporting monthly self-exams as ideal. While BSE is an important step in early detection, it has limitations in detecting deeper or smaller abnormalities. It should be complemented with clinical breast examinations (CBE) and mammography for optimal outcomes (13), especially in Nigeria where there is a huge surge in advanced-stage presentation and diagnosis (14).

Clinical breast examination uptake was notably low in this study, with only 17.5% of participants having undergone one. This low rate prompts the need for increased access to healthcare professionals and stronger advocacy for routine CBEs, particularly among young women. CBE is a crucial method for identifying abnormalities that may not be detectable through self-exams alone, making it an essential component of early detection strategies (15, 16). Similarly, awareness of mammography screening guidelines was limited, with 45.3% of participants unsure of the recommended age to start screening. Screening mammography remains the recommended standard for early breast cancer detection, as it can identify tumours at a stage when they are most treatable.

Given the low uptake of CBE and the limited knowledge of mammography guidelines observed in this study, it is critical to improve access to these screening methods. Public health initiatives should promote clear guidelines, such as recommending mammography starting at age 40—or earlier for individuals at high risk. These efforts should include both theoretical education and practical demonstrations to demystify and encourage the process.

University health centres can be equipped to provide CBEs, and partnerships with diagnostic centres can facilitate affordable mammography screenings. Awareness campaigns should emphasize the complementary roles of BSE, CBE, and mammography in a comprehensive early detection strategy.

Although most participants (99.3%) believe early detection is crucial for successful treatment, only 78.1% expressed willingness to undergo regular screening. The disparity between awareness and practice highlights significant barriers to screening. Financial constraints (56.2%) and lack of access to screening facilities (44.5%) were the most frequently reported challenges, consistent with prior research in Nigeria (17, 18). Fear of diagnosis (28.5%) and lack of awareness (29.2%) were also notable factors, reflecting socio-cultural stigmas and misconceptions surrounding cancer.

To overcome these barriers, it is essential to advocate for affordable or subsidized screening services and to establish accessible facilities within university campuses. Universities can play a pivotal role by organizing regular health fairs or partnering with healthcare providers to offer free or low-cost CBEs and mammography services. Additionally, community outreach programs can help address psychological barriers by educating students about the benefits of early detection and dispelling myths about cancer diagnosis.

Social media (64.2%) and healthcare professionals (86.1%) were the most commonly cited preferred sources of such information, highlighting their potential as key platforms for educational outreach. Universities and schools also play an important role (48.9%), which indicates possible value in integrating breast cancer awareness into academic curricula. Leveraging these channels can amplify the reach and impact of awareness campaigns, particularly among younger populations who are highly active on digital platforms.

4.1. Strategies to Educate University Students

- **Integrate Health Education into Curricula**: Including breast cancer awareness and prevention as part of general health education courses will ensure that all students, regardless of their field of study, receive foundational knowledge about breast cancer.
- **Leverage Digital Platforms**: Utilize social media, university websites, and mobile applications to disseminate information on breast cancer symptoms, risk factors, and screening guidelines. Infographics, videos, and testimonials can make the content more engaging and relatable.

- **Peer Education Programs**: Train student ambassadors to conduct peer-to-peer education sessions, leveraging the influence of peer networks to spread awareness and encourage positive health behaviours.
- **Workshops and Seminars**: Organize interactive workshops and seminars featuring healthcare professionals, cancer survivors, and public health experts. These events can provide practical demonstrations of BSE, explanations of CBE and mammography, and opportunities for students to ask questions.
- **On-Campus Screening Campaigns**: Partner with local healthcare providers to offer free or subsidized CBE and mammography screenings on campus. Regular health fairs can normalize these practices and make them more accessible.
- **Address Psychological Barriers**: Provide counselling services to help students overcome fear of diagnosis and address cultural stigmas. This could include group discussions, one-on-one sessions, and the use of positive messaging in campaigns.

4.2. Implications for Public Health

The findings of this study demonstrate the critical role of educational institutions in bridging the gap between awareness and practice. University students represent a demographic with significant potential for knowledge dissemination within their communities. Public health initiatives can empower young adults to adopt preventive measures and advocate for early detection within their networks by addressing gaps in knowledge, attitudes and practices.

In addition, this study emphasises the need for systemic improvements in Nigeria's healthcare infrastructure to support widespread access to CBEs and mammography. Investments in training healthcare professionals, equipping diagnostic centres and subsidizing screening costs can significantly enhance early detection efforts and reduce breast cancer mortality.

4.3. Strengths and Limitations of the study

This study provides a detailed evaluation of breast cancer knowledge, attitudes and practices among university students—a critical demographic with significant potential for knowledge dissemination. By focusing on university students, the study captures insights from a highly literate and socially influential group, making the findings valuable for public health planning. However, the sample was limited to students from a single university, which may restrict the generalizability of the findings. Also, the reliance on self-reported data may introduce recall bias or social desirability bias, as participants may overreport positive behaviours.

5. Conclusion

This study underscores the importance of addressing the knowledge-practice gap among university students to improve breast cancer outcomes. By leveraging education, accessible healthcare and community engagement, significant progress can be made in reducing the burden of breast cancer in Nigeria. These efforts are critical not only for individual well-being but also for strengthening the broader public health infrastructure.

To achieve these goals, a multifaceted approach involving educational institutions, healthcare providers, policymakers, and the community is essential. We can foster a culture of proactive health behaviours and early detection through collaboration and sustained effort, ultimately saving lives.

Compliance with ethical standards

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Authors Contributions

NEF, NOO and OI conceptualized and designed the study; Data collection was done by CKA, LIU, LC0 and UCO, Data Analysis was done by NEF, LCO, UCO and NOO while writing, editing, and proofreading was done by NEF, NOO, OI, TO and CKA. All the authors read and approved the manuscript.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

The study was approved by the College of Medicine, Health Research Ethics Committe prior to the commencement of the study (Ref: CMUL/HREC/12/24/1731).

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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