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ASSESSING THE EFFECT OF HEALTH EDUCATION ON KNOWLEDGE OF BREAST AND CERVICAL CANCER AMONG SECONDARY SCHOOL GIRLS IN SOUTHEASTERN NIGERIA

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ABSTRACT

Background: Breast and cervical cancers are major public health concerns in Nigeria, contributing substantially to cancer-related morbidity and mortality. Low awareness contributes to late presentation and poor outcomes. Adolescence presents an opportunity to instill preventive health behaviors, yet knowledge levels among Nigerian secondary school girls remain suboptimal.
Objective: This study assessed the impact of an educational intervention on the knowledge of breast and cervical cancers among secondary school girls in Enugu, Southeastern Nigeria.
Methods: A pre- and post-intervention study was conducted among 600 female senior secondary school students (SS1–SS3) selected from three randomly chosen schools across Enugu metropolis. Data were collected using a structured self-administered questionnaire assessing awareness, risk factors, prevention, and screening methods for both cancers. Knowledge scores were categorized as "good" or "poor" based on predefined cut-offs. Chi-square and Mann–Whitney U tests were used for analysis, with significance set at $p < 0.05$.
Results: At baseline, good knowledge of cervical cancer was observed in 23.7% of students, breast cancer in 56.2%, and overall cancer knowledge in 42.8%. Post-intervention, these proportions increased significantly to 93.3%, 96.3%, and 97.2%, respectively (all $p = 0.001$). Age and class were significantly associated with knowledge in the pre-test ($p = 0.001$) but not post-test, indicating improvement across all demographic subgroups.
Conclusion: The educational intervention significantly improved short-term knowledge of breast and cervical cancers among secondary school girls in Enugu. Integrating cancer awareness programs into school curricula could promote early adoption of preventive behaviors, ultimately reducing the future burden of these diseases in Nigeria.

Keywords: Breast Cancer, Cervical Cancer, Adolescent, Female

INTRODUCTION

Breast and cervical cancers continue to pose substantial public health challenges worldwide, especially in low- and middle-income nations such as Nigeria. Breast cancer is the most frequently diagnosed cancer in

Nigerian women and holds the second place worldwide after non-melanoma skin cancers.[1,2] On the other hand, cervical cancer is the fourth most prevalent cancer among women worldwide and the second most common cancer affecting women in Nigeria, especially those aged 15 to 44 years.[2,3]

High-income countries have seen a decline in cancer incidence and mortality due to early detection and preventive measures.[4] In contrast, Nigeria is facing an increasing burden of both cancers. Recent estimates indicate that more than 12,000 women in Nigeria are diagnosed with cervical cancer each year, resulting in nearly 8,000 deaths from the disease.[5] In a similar vein, cases of breast cancer are frequently diagnosed at advanced stages, which markedly diminishes the likelihood of successful treatment and survival.[6]

The late presentation is often linked to limited awareness, cultural beliefs, and inadequate access to screening services.[6,7] Human papillomavirus (HPV), particularly types 16 and 18, is responsible for approximately 70% of cervical cancer cases.[8] The World Health Organization recommends HPV vaccination for girls aged 9 to 14 years, before the onset of sexual activity, as a primary preventive measure.[5] Despite the availability of vaccines and screening tools, such as the Pap smear, uptake remains low in Nigeria, which is attributed to poor awareness and accessibility.[7]

Breast cancer prevention relies on early detection strategies like breast self-examination (BSE), clinical breast examination (CBE), and mammography. Again, these practices are limitedly used in Nigeria, largely due to insufficient knowledge and sociocultural barriers.[6] The risk factors for breast cancer include age, family history, hormonal influences, obesity, alcohol consumption, and reproductive history, while cervical cancer risk is associated with early sexual debut, multiple sexual partners, smoking, and prolonged use of oral contraceptives.[5]

Adolescence represents a critical window for health education, as behaviors and attitudes formed during this period often persist into adulthood. Educating secondary school girls about breast and cervical cancer can foster early adoption of preventive practices and informed health decisions. However, studies have shown that knowledge levels among Nigerian adolescents are not optimal. For instance, a recent study revealed that many secondary school girls lacked a basic understanding of HPV and the benefits of vaccination and screening.[6] Adolescence is a strategic stage to teach and promote healthy habits that will reduce the burden of breast and cervical cancer in southeastern Nigeria.

Given the high burden and preventable nature of these cancers, this study aims to assess the pre- and post-intervention knowledge of breast and cervical cancer among secondary school girls in Enugu, Southeastern Nigeria. The findings will inform targeted educational strategies to improve awareness and reduce the long-term burden of these diseases.

MATERIALS AND METHODS

Study Population

The Study population included female senior secondary school students from the selected

schools in SS1, SS2, & SS3. Three secondary schools were randomly selected from the three Local Government Areas (LGAs) in the State Metropolis: Enugu East—Trans-Ekulu Girls Secondary School, Enugu South—Idaw River Girls Secondary School, and Enugu North—Command Day Secondary School, Enugu. The first two schools were all-girls schools, while the last was a mixed secondary school. Visits to all three schools were completed between February and May 2023.

Approval

Approval for the study was obtained from the Enugu State Post-Primary Schools Management Board. Permission was also obtained from the principals of each participating secondary school. Oral assent was obtained from all participating students prior to data collection.

Data Collection

Data were collected using a structured, self-administered questionnaire developed by the researchers and adapted from relevant literature. The questionnaire included 26 items and demonstrated good internal consistency, with a Cronbach's Alpha coefficient of 0.867. The instrument comprised two sections addressing cervical and breast cancer, respectively. The cervical cancer section included 13 items assessing awareness of cervical cancer, its association with human papillomavirus (HPV), modes of HPV transmission, knowledge of HPV vaccination and screening, and recognition of cervical cancer symptoms. The breast cancer section contained 10 items evaluating awareness of breast cancer, knowledge of risk factors, understanding of breast self-examination (BSE), and its role in early detection. During the pretest phase, participants were given approximately 15 minutes to complete the questionnaire. This was followed by a 20-minute lecture on breast and cervical cancer, covering content similar to that in the questionnaire. The posttest was then conducted, in which the same questionnaire was re-administered to the same respondents after 15 minutes.

Data analysis

Data were analyzed with SPSS version 27. A score of '1' and '0' was assigned to correct and wrong responses to question items for cervical and breast cancer, respectively. A total sum of 13 and 10 was obtained for cervical and breast cancer questions, respectively. Knowledge scores were categorized as either good or poor. Participants who scored at least 50% of the total obtainable score were classified as having good knowledge, whereas those who scored less than 50% were classified as having poor knowledge. Scores of 0-7 and 8-13 were grouped as 'poor' and 'good' knowledge, respectively, for cervical cancer question items, while scores of 0-5 and 6-10 were grouped as 'poor' and 'good' knowledge, respectively, for breast cancer question items. For the overall knowledge score, scores of 0-11 and 12-23 were grouped as 'poor' and 'good' knowledge, respectively. The significance was set at the 0.05 level.

RESULTS

Table 1: Participating Schools and Students' Respective Classes

School	Class	Test type	
		Pretest n (%)	**Post-test n (%)**
Command Day Secondary School, Enugu	SS1	101 (98.1)	**137 (99.3)**
	SS2	2 (1.9)	**1 (0.7)**
	Total	103 (100.0)	**138 (100.0)**
Trans-Ekulu Girls Secondary School	SS2	65 (33.7)	**68 (37.6)**
	SS3	128 (66.3)	**113 (62.4)**
	Total	193 (100.0)	**181 (100.0)**
Idaw River Girls Secondary School	SS1	140 (47.5)	**116 (41.3)**
	SS2	155 (52.5)	**165 (58.7)**
	Total	295 (100.0)	**281 (100.0)**
Overall Total	SS1	241 (40.8)	**253 (42.2)**
	SS2	222 (37.6)	**234 (39.0)**
	SS3	128 (21.6)	**113 (18.8)**
	Total	591 (100.0)	**600 (100.0)**

A total of 591 students completed the pretest and 600 completed the post-test across the three participating schools. In Command Day Secondary School, Enugu, nearly all participants were SS1 students, constituting 98.1% of the pretest and 99.3% of the post-test, with only a few SS2 students. At Trans-Ekulu Girls Secondary School, students were mainly from SS3, representing 66.3% of the pretest and 62.4% of the post-test, while SS2 students made up 33.7% and 37.6%, respectively. In Idaw River Girls Secondary School, participation was fairly balanced between SS1 and SS2 classes. SS2 students accounted for 52.5% of the pretest and 58.7% of the post-test, while SS1 students represented 47.5% and 41.3%, respectively. Across all schools combined, SS1 students formed the largest proportion (40.8% pretest; 42.2% post-test), followed by SS2 (37.6%; 39.0%) and SS3 (21.6%; 18.8%). See Table 1.

Table 2: Demographic Characteristics of Participants

Variable		Frequency (N = 600)	Percentage
Age (in years)	13 - 14	125	**20.8**
	15 - 16	285	**47.5**
	17 - 18	137	**22.8**
	> 18	12	**2.0**
	Missing	41	**6.8**
	Mean ± SD	*16.0 ± 1.44*	
Class	SS1	253	**42.2**
	SS2	213	**35.5**
	SS3	110	**18.3**
	Not recorded [a]	24	**4.0**

[a] Refers to the students who didn't report their class

Of the 600 participating students, the majority (47.5%) were aged 15-16 years, while 20.8% were between 13-14 years, and 22.8% between 17-18 years. The mean age was 16.0 ± 1.44 years. A small proportion (2.0%) were older than 18 years. Regarding class distribution, most students were in SS1 (42.2%) and SS2 (35.5%), while 18.3% were in SS3. See Table 2.

Table 3: Proportion of Students with Good Knowledge of Breast and Cervical Cancer In The Pre- And Post-Test

Variable		Test type		X^2 (p-Value)
		Pretest	Post-test	
Knowledge of Cervical cancer	Good	140 (23.7)	560 (93.3)	**596.0 (0.001*)**
	Poor	451 (76.3)	40 (6.7)	
Knowledge of Breast Cancer	Good	332 (56.2)	578 (96.3)	**266.3 (0.001*)**
	Poor	259 (43.8)	22 (3.7)	
Overall knowledge	Good	253 (42.8)	583 (97.2)	**420.5 (0.001*)**
	Poor	338 (57.2)	17 (2.8)	

X^2 = Chi-square Test; *Test statistic is significant at 0.05 level.

At pretest, only 23.7% of students demonstrated good knowledge of cervical cancer, which rose markedly to 93.3% post-test (X^2 = 596.0, p = 0.001). On the other hand, more than half of the schoolgirls (56.2%) demonstrated good knowledge of breast cancer in the pre-test, and the proportion increased significantly to 96.3% after the post-test (X^2 = 266.3, p = 0.001). Overall knowledge also showed a significant improvement, increasing from 42.8% to 97.2% following the intervention (X^2 = 420.5, p = 0.001). See Table 3.

Table 4: Relationship Between Students' Demography and Knowledge of Breast and Cervical Cancer In The Pre- And Post-Test

Variable		**Knowledge score**		
		Good	Poor	
				U (p-Value)
Pretest	Age	16.0 (15.0 – 17.0)	16.0 (14.0 – 17.0)	**47032.5 (0.001*)**
Post-test	Age	16.0 (15.0 – 17.0)	16.0 (14.5 – 17.5)	**3779.0 (0.363)**
	CLASS			**X^2 (p-Value)**
Pretest	SS1	78 (30.8)	150 (44.4)	**19.829 (0.001*)**
	SS2	109 (43.1)	108 (32.0)	
	SS3	63 (24.9)	64 (18.9)	
	Not recorded[a]	3 (1.2)	16 (4.7)	
Post-test	SS1	247 (42.4)	6 (35.3)	**0.609 (0.894)**
	SS2	207 (35.5)	6 (35.3)	
	SS3	106 (18.2)	4 (23.5)	
	Not recorded [a]	23 (3.9)	1 (5.9)	

U = Mann-Whitney U Test; X^2 = Chi-square Test; *Test statistic is significant at 0.05 level; [a] Refers to the students who didn't report their class

In the pretest, students with good knowledge had a slightly higher median age (16.0 years; IQR: 15.0–17.0) compared to those with poor knowledge (16.0 years; IQR: 14.0–17.0), and this difference was statistically significant ($U = 47032.5$, $p = 0.001$). However, no significant age-related difference was observed in the post-test ($U = 3779.0$, $p = 0.363$). A significant association was observed between class and knowledge level in the pretest ($X^2 = 19.829$, $p = 0.001$), with SS2 students contributing the largest proportion of those with good knowledge (43.1%). This association was no longer significant in the post-test ($X^2 = 0.609$, $p = 0.894$), indicating that the intervention effectively improved knowledge across all class levels. See Table 4.

DISCUSSION

Prior to the educational intervention, only 23.7% of the students demonstrated good knowledge of cervical cancer, while 56.2% had good knowledge of breast cancer. Although knowledge of breast cancer was relatively higher, the findings generally indicate inadequate awareness of both cancers among the participants, despite their high burden in Nigeria. This observation is consistent with previous studies conducted among secondary school students. Ajao et al. (2025) reported an overall low level of breast cancer knowledge among female secondary school students in South-Western Nigeria.[9] Similarly, a study among 432 female senior

secondary school students aged 15-19 years in South-Eastern Nigeria found that only 42.7% had prior knowledge of cervical cancer.[10] Furthermore, among 348 female secondary school students aged 10-19 years in Ibadan, Nigeria, only 9.5% demonstrated adequate

baseline knowledge of breast cancer and breast self-examination (BSE).[11] These findings reflect the generally poor level of cancer awareness in many low-resource settings, which contributes to poor uptake of screening services and the persistent challenge of late-stage presentation among women with breast and cervical cancers.[12]

Following the educational intervention, the proportion of participants with good knowledge increased markedly to 93.3% for cervical cancer and 96.3% for breast cancer, representing absolute increases of 69.6 and 40.1 percentage points, respectively. These findings demonstrate the effectiveness of structured health education in improving cancer awareness among adolescents. Similar results have been reported elsewhere. A study conducted among female secondary school students in Saudi Arabia showed that knowledge and confidence regarding breast self-examination improved significantly following an educational program, with the proportion of students demonstrating adequate knowledge increasing from 13.7% before the intervention to 90.2% afterward.[13] The substantial improvement observed in the present study underscores the critical role of educational interventions in promoting cancer awareness and fostering preventive health behaviors. Given that adolescence represents an important period for the establishment of lifelong health practices, targeted educational programs delivered during this stage may contribute significantly to future cancer prevention and early detection efforts.

The absence of a significant association between participants' age or class level and post-intervention knowledge scores suggests that the educational program was equally effective across different age groups and educational levels. This finding indicates that cancer education initiatives can be successfully introduced even among younger secondary school students without compromising effectiveness. Early implementation of such interventions may provide an opportunity to establish foundational knowledge, encourage healthy behaviors, and promote positive attitudes toward cancer prevention and screening from an early age.

CONCLUSION

This study demonstrated that a structured health education intervention significantly improved knowledge of breast and cervical cancer among female secondary school students in Enugu Metropolis in South-Eastern Nigeria. The substantial increase in post-intervention knowledge scores highlights the effectiveness of school-based educational programs in addressing gaps in cancer awareness among adolescents.

These findings support the integration of comprehensive cancer awareness and prevention education into secondary school curricula. Early education on topics such as breast cancer awareness, breast self-examination, cervical cancer prevention, and HPV vaccination has the potential to promote preventive health behaviors, encourage early detection practices, and ultimately contribute to reducing the burden of these cancers in Nigeria.

Further studies are needed to assess long-term knowledge retention and determine whether improved awareness translates into sustained behavioral change. To ensure sustainability and wider impact, cancer awareness programs

should be incorporated into national school health policies and implemented across the educational system.

Limitations

This study had several limitations. First, there was no comparison or control group, limiting the ability to attribute the observed improvements solely to the educational intervention. Second, the questionnaires were self-administered and may have been subject to response and social desirability bias. Third, outcomes were assessed immediately after the intervention, precluding the evaluation of long-term knowledge retention and sustained behavioral change. Finally, the study was conducted in only three secondary schools within a single metropolitan area, which may limit the generalizability of the findings to adolescents in other parts of Nigeria.

Declarations

Conflict of interest

The authors declare no conflict of interest.

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