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# Assessing nutrition-related knowledge, attitudes, and practices towards breast cancer prevention among female students at the Federal University of Oye-Ekiti, Nigeria

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## Abstract

**Background** Breast cancer remains a complex disease and leading cause of cancer-related death in Nigerian women. Recently, the role of nutrition has been highlighted in the etiology of breast cancer.

**Methods** The aim of this research was to evaluate the nutrition-related knowledge, attitude, and practices of female university students. We also investigated the correlation between their demographic characteristics and their knowledge and attitudes of the survey participants. A descriptive cross-sectional study was carried out among female students at the Federal University of Oye (FUOYE), Nigeria. Participants completed self-administered questionnaires designed to assess their knowledge, attitude, and practices concerning cancer prevention. Statistical analysis was performed using SPSS 20, and significance was set at  $p < 0.05$ .

**Results** Out of the 402 students who received the questionnaire, 300 completed it. The average age of the participants was 21.26 years with a standard deviation of 2.68. There was generally limited knowledge regarding breast cancer risk factors, with 45% of participants citing family history as the most recognized risk factor. Overall, knowledge level was influenced by the participants' permanent place of residence and course of study. Attitudes towards the impact of maternal and paternal nutrition on breast cancer prevention were notably low. Additionally, less than half of the participants demonstrated good dietary practices.

**Conclusion** This study revealed low levels of nutrition-related knowledge concerning cancer prevention, accompanied by poor dietary habits among the participants. These results suggest a possible link between inadequate knowledge about breast cancer prevention and the observed poor dietary practices among the participants. The frequent consumption of unhealthy foods among the participants may be a pointer to higher risk of breast cancer in the future, emphasizing a need for health education targeted at this group.

**Keywords** Breast cancer, Nutrition knowledge, Attitudes, Prevention, Nigeria

## Background

Breast cancer continues to be a substantial cause of cancer-related death and the most frequently diagnosed cancer among women irrespective of the racial and ethnic factors [1]. Prevention has been identified as the most cost-effective approach to control the increasing mortality and morbidity rates caused by breast cancer [2]. The disease impact varies widely across the populations, and

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African women including Nigerians are diagnosed at an earlier age and tend to display a more aggressive tumor phenotype [3]. Although developing countries present three times lower incidence of breast cancer compared to developed countries, the mortality to incidence rates is higher in the former due to disparities in access to adequate information, screening, diagnostic, and adequate treatment services [4]. In Nigeria, breast cancer accounts for 26% of all cancer cases with 70% women presenting at an advanced stage of the disease, and this makes an effective treatment more challenging [5, 6]. Studies have reported that most Nigerian women know little or nothing about symptoms and risk factors of breast cancer [7, 8]. Many known modifiable risk factors in prevention of breast cancer such as those related to diet and lifestyle have only been widely studied in the developed countries but not in developing countries including Nigeria.

Most countries in sub-Saharan Africa including Nigeria are focusing on treating infectious diseases such as HIV/AIDS, and tuberculosis, and noninfectious diseases such as breast cancers, are given low priority leading to low awareness and treatment facilities of breast cancer in the country [5, 9]. The incidence of breast cancer continues to rise especially among young Nigerian women, and the reason for the increasing incidence is not fully known, although this may be due in part to the lack of understanding of the local risk factors. Conceivably, poor understanding of the underlying risk factors that increase the mortality and mortality rates of the disease among Nigerian population could also contribute to increasing incidence of breast cancer in the country.

Our present study was conducted to fill in the research gap regarding the perspective of Nigerian women on nutrition-related breast cancer risk factors towards prevention of the disease. Adequate understanding of these factors could significantly contribute to research and enhance breast cancer prevention. Further, this study could potentially increase awareness and promote healthy lifestyles and reduce the incidence of the disease in Nigeria.

## Methodology

### Study design and population

Female participants (ages 17–30 years) were randomly selected from all departments within the main campuses of the Federal University of Oye-Ekiti. A written informed consent was obtained from each participant before collection of data. The data were collected using a self-administered questionnaire designed according to Lahiji et al. [20] with some modification to adapt to the local context and meet up with the objectives of study. An initial pilot study was conducted using 10 students to ensure clarity of questions and wording errors prior to

the definitive study. Content validity was assessed quantitatively and qualitatively to ensure data accuracy.

The final questionnaire consisted of four sections: (A) sociodemographic, (B) knowledge (8 questions), (C) attitude (10 questions), and (D) dietary practices (31 food items). The responses were anonymous to ensure confidentiality.

The inclusion criteria for the study included those of 17–30 years old and had not been diagnosed with breast cancer. After oral and written explanation to the participants about the aim and objectives of the study, an informed consent was obtained from the participants before administering the questionnaires.

The self-administered questionnaires were used to collect sociodemographic characteristics information, nutrition-related knowledge, attitudes, and eating pattern towards breast cancer prevention.

### Demographic questionnaire

Each participant was asked to report their age, marital status, religion, ethnicity, faculty of study, level of education, family history of breast cancer, and current and permanent place of residence.

### Knowledge questionnaire

There were eight nutrition-related knowledge questions (related to breast cancer prevention), and their respective responses were scored. Score of 1 was given to the right answers and score 0 to the wrong answers. The overall scores of knowledge for individual range from 0 to 8.

### Attitude questionnaire

Attitude questions were evaluated on a 5-point Likert scale in which 1 point was given to strongly disagree, 2 points to disagree, 3 points to agree, 4 points to strongly agree, and 0 for I do not know.

### Practice questionnaire

A food frequency questionnaire (FFQ) was used to assess dietary practice. The FFQ was compiled based on the commonly consumed foods in the southwest region of Nigeria according to the West African food composition table [11]. The modified FFQ included nine food groups: fish, meat, and their products, fruits and vegetables, snacks, cereal and grains, fat and oil, beverages, and alcoholic drinks. Participant indicated the frequency of consuming these foods in the past 3 weeks, with response options including daily, 2–3 times a week, once a week, and occasionally. Participants reported how frequent they consumed these foods during the past 3 weeks.

### Participant's recruitments

A descriptive cross-sectional study was conducted to evaluate the level of nutrition-related knowledge, attitude, and practices of female undergraduate students at the Federal University of Oye Ekiti, Nigeria. The study was carried out between October 2022 and February 2023 in Nigeria. Students from the faculty of basic sciences, agricultural sciences, arts, management science, social sciences, and education participated in this study. Only 300 out of 402 participants completed the questionnaires resulting to a response of 74.6%.

### Statistical analysis

The obtained data were coded and analyzed using SPSS 20 software. The variables were determined using frequency, percentage, mean, and standard deviation. The relationship between categorical data variables was evaluated using chi-square test. Linear regression analysis was performed to predict the level of knowledge and attitude. The significance level in all the tests was set at 0.05.

### Results

Responses were gotten from total of 300 out of 402 female students that participated in this study. The sociodemographic profiles of the participants are presented in Table 1. The mean and standard deviation of the age of the participants was  $21.26 \pm 2.68$ . Most of the students (93.3%) were single, most were Christian (85%), and majority of them (85.7%) were from Yoruba ethnic group.

### Knowledge

The nutrition-related knowledge question on breast cancer prevention and the percentage in proportion of the participants that answered correctly are shown in Table 2. Family history identified by 45% of the participants was the most identified risk factor for breast cancer development. It is also necessary to note that only 24% of this participant identified both obesity and physical inactivity as the risk of breast cancer. The result obtained from this study showed that less than 30% of the participants had overall good knowledge on breast cancer risk factors. More than 70% of the students did not know "age," "being female," "alcohol consumption," "early menstruation," "physical inactivity," "obesity," "breastfeeding," and "oral contraceptive" as breast cancer risk factors. Although, 85% and 83% of the students respectively knew that breast cancer can developed without family history and the disease is not contagious but majority of them lack adequate knowledge on breast cancer risk factors. A total of 73% of the

**Table 1** Frequency distribution of sociodemographic profiles of the students ( $N=300$ )

Variables	(%)
Age	
$\leq 23$	246 (82%)
$\geq 24$	54 (18%)
Mean age	$21.26 \pm 2.68$
Marital status	
Single	286 (95.3%)
Married	10 (3.3%)
Others	4 (1.3%)
Religious	
Christian	255 (85%)
Muslim	45 (15%)
Ethnicity	
Yoruba	257 (85.7%)
Igbo	19 (6.3%)
Hausa	4 (1.3%)
Others	20 (6.7%)
Faculty	
Basic sciences	119 (39.7%)
Agricultural sciences	86 (28.6%)
Arts	58 (19.3%)
Management science	17 (5.6%)
Social sciences	10 (3.3%)
Education	10 (3.3%)
Year/level of study	
First year	47 (15.7%)
Second year	82 (27.3%)
Third year	123 (41%)
Fourth year	48 (16%)
Current place of residence	
Student hostel	46 (15.3%)
Rented apartment	237 (79%)
With family	17 (5.7%)
Permanent residence	
Rural	99 (33%)
Urban	201 (67%)
History of BC	
First degree	9 (3%)
Other degree	7 (2.3%)
No family history	284 (94.7%)

participants knew breast cancer does not only affect postmenopausal women, while more than 80% knew breast cancer can be prevented and majority knew diagnosis of breast cancer do not always lead to death.

The relationship between demographic characteristics and good (scores equal to mean or more) and poor (scores lesser than mean value) level of nutrition-related

**Table 2** Knowledge questions related to breast cancer prevention of participants (N= 300)

Knowledge question	Correct response (%)
Is breast cancer the most common cancer in Nigerian women?	248 (82.7%)
Is --a determined risk factor for breast cancer?	
a. Age	63 (21%)
b. Being female	85 (28%)
c. Smoking	91 (30%)
d. Alcohol consumption	83 (28%)
f. Unhealthy diet	100 (33%)
g. Physical inactivity	71 (24%)
h. Obesity	72 (24%)
i. Family history	135 (45%)
j. Breastfeeding	68 (23%)
k. Use of oral contraceptive	77 (26%)
l. Early menstruation	51 (17%)
Knowledge of the food that can modify the risk of breast cancer?	120 (40%)
Is breast cancer preventable?	268 (89.3%)
Is breast cancer contagious?	251 (83.7%)
Does diagnosis of breast cancer always lead to death?	193(64.3%)
Does breast cancer only affect postmenopausal women?	220 (73.3%)
Can breast cancer be developed without family history?	256 (85.3%)

knowledge towards breast cancer prevention among the participants is presented in Table 3. Also, Table 4 indicated the results of correlation analysis between demographic characteristics and knowledge.

#### Attitude

The frequency and percentage in proportion of the participants with adequate attitudes towards breast cancer prevention are shown in Table 5. The mean attitude of the participants was 23.14. In this study, 84% and 79.4% of the participants agreed that consumption of fruits and vegetables can reduce the risk of breast cancer, while 64% and 79.7% of them had a negative attitude towards the influence of maternal and paternal nutrition in breast cancer development on offspring during preconception and pregnancy. However, 85% and 65% of the participants believed that consumption of healthy diets and maintaining healthy weight can lower the risk of breast cancer respectively. A total of 34% of the students did not know about the protective effect of breastfeeding against breast cancer, and only 74% and 59% respectively agreed that avoiding cigarette smoking and limiting consumption of alcohol are protective against breast cancer development. The linear regression model of total attitude score is indicated in Table 6.

#### Practice

The intake pattern from the food group indicated that the most daily consumed foods and food ingredients in

this study was rice, snacks, processed foods, fruits, palm oil, sugar, and garri. Less than half of the participants had a good dietary practices. The consumption pattern showed that 22% of the participants daily consumed fish, and 46% consumed it 2–3 times weekly. The consumption of homemade food was 67% daily. The intake of processed foods was 30% daily, and 41% of them consumed it 2–3 times weekly. Approximately, 30% of the participants consumed fruit daily. Among 79% of students that showed positive attitude towards regular consumption of vegetable in breast cancer prevention, only 21% of them ate vegetables daily, and 39% consumed it more twice weekly. We also found that less than 8% of the students consumed legumes, unprocessed grains, and red meat daily, while less 10% of them consumed this more three times weekly. Only 3% of the participants drank alcoholic drinks daily, and about 6% took it 2–3 times weekly. A total of 30% of the participants consumed carbonated drink 2–3 times weekly.

Although, married participants with first degree history of breast cancer and living with family had better nutritional practices towards breast cancer prevention compared to others but the difference is not significant.

#### Discussion

This study assessed the nutrition-related knowledge, attitude, and practices towards breast cancer prevention among the female undergraduate students at the Federal University of Oye Ekiti, Nigeria. There are

**Table 3** Relationship between demographic characteristics and nutrition-related knowledge (N=300)

Characteristics	Good	Poor	p-value
Age			
≤ 23	134 (44.7%)	112 (37.3%)	0.37
≥ 24	33 (11%)	21 (7%)	
Marital status			
Single	162 (54%)	124 (41.3%)	0.24
Married	3 (1%)	7 (2.3%)	
Others	2 (0.7%)	2 (0.7%)	
Religion			
Christian	145 (48.3%)	110 (36.7%)	0.32
Muslim	22 (7.4%)	23 (7.6%)	
Ethnicity			
Yoruba	142 (47.3%)	115 (38.3%)	0.54
Igbo	12 (4%)	7 (2.3%)	
Hausa	1 (0.3%)	3 (1%)	
Others	12 (4%)	8 (2.7%)	
Faculty			
Basic sciences	71 (23.7%)	48 (16%)	<b>0.03</b>
Agriculture	51 (17%)	35 (11.7%)	
Arts	31 (10.3%)	27 (9%)	
Management science	8 (2.6%)	9 (3%)	
Social sciences	5 (1.6%)	5 (1.6%)	
Education	1 (0.3%)	9 (3%)	
Year/level of study			
First year	26 (8.7%)	21 (7%)	< <b>0.00001</b>
Second year	67 (22.3%)	15 (5%)	
Third year	48 (16%)	75 (25%)	
Fourth year	26 (8.7%)	22 (7.3%)	
Current place of residence			
Student hostel	18 (6%)	28 (9.3%)	<b>0.01</b>
Rented apartment	142 (47.3%)	95 (31.7%)	
With family	7 (2.3%)	10 (3.3%)	
Permanent residence			
Rural	51 (17%)	48 (16%)	0.30
Urban	116 (38.7%)	85 (28.3%)	
History of BC			
First degree	7 (2.3%)	2 (0.7%)	0.32216
Other degree	3 (1%)	4 (1.3%)	
No family history	157 (52.3%)	127 (42.3%)	

\* Chi-square test. Significant P-value (< 0.05) was bolded

reports on knowledge, attitude, and practice on breast cancer screening methods and treatment in Nigeria [12–16], but to the best of our knowledge, no research has been done on nutrition-related knowledge, attitude, and practice towards prevention of breast cancer in Nigeria. Therefore, this is the first study reporting this among female university students in Nigeria. The purpose for this study is the need to have information on

**Table 4** Linear regression model of total knowledge score (N=300)

Variables	R <sup>2</sup>	SE	B	P
Age	0.001	0.034	0.026	0.441
Year of study <sup>a</sup>	0.011	0.0008	0.001	0.064
History of BC	0.00001	0.236	0.016	0.945
Faculty <sup>b</sup>	0.026	0.062	0.177	<b>0.005</b>

<sup>a</sup> Categorized as years 1, 2, 3, and 4

<sup>b</sup> Categorized as basic sciences, agricultural sciences, management sciences, social sciences, education, and arts. Significant P-value (< 0.05) was bolded

nutrition-related knowledge, attitudes, and practices towards prevention of breast cancer.

This study showed that most of the participants were aware that breast cancer is the most common cancer among Nigerian women but had inadequate knowledge on the risk factors involved in breast cancer development and on foods that can modify the risk factors of the disease. Family history, unhealthy diet, smoking, being female, and alcohol consumption were the mainly identified risk factors of the malignancy by the participants. These results indicated lack of awareness of risk factors involved in breast cancer among Nigerian women. Similar findings were reported in their respective studies [17, 18]. Only 45% of the participants indicated that family history can increase the risk of breast cancer. This result is similar to the one reported by Akhigbe and Omuemu in a study carried out among Nigerian female health workers towards their knowledge on breast cancer screening methods [12]. Despite majority of the participants knew breast cancer could be prevented, less than 30% of them had good knowledge on the risk factors. Age, an important risk factor for developing breast cancer was only indicated by 21% of the participants in this study. This is consistent with a report by Tazhibi and Feizi in a population-based study on awareness level of breast cancer risk factors in Iranian women [19]. Linear regression model showed that the level of knowledge in breast cancer prevention might be affected by course of study, consistent with what was reported in a study [20]. Besides, 74% of them had overall good knowledge towards breast cancer prevention except for the risk factors. Additionally, better level of nutrition-related knowledge was recorded among those living in urban areas compared to rural areas, and this might be due to increasing levels of cancer awareness in the urban area as this result is similar to what was reported by Azubuike and Okwuokei [13].

Our study showed that majority of the participants had poor attitude towards the influence of maternal and paternal nutrition during preconception and pregnancy



**Table 5** Nutrition attitude questions related to breast cancer prevention (N = 300)

Question	Right response
Do you believe regular consumption of vegetables can reduce the risk of breast cancer?	238 (79.4%)
Do you believe regular consumption of fruit can reduce the risk of breast cancer?	252 (84%)
Do you believe breastfeeding can reduce the risk of breast cancer?	199 (66.3%)
Do you believe that consumption of a healthy diet can reduce the risk of breast cancer?	265 (85%)
Do you believe avoidance of smoking can reduce the risk of breast cancer?	224 (74.4%)
Do you believe that maternal nutrition during pregnancy can increase the daughter's risk of breast cancer in the future?	108 (36%)
Do you believe that paternal nutrition during preconception can increase breast cancer in the future?	61 (20.3%)
Do you believe that limiting alcohol consumption can reduce the risk of breast cancer?	177 (59%)
Do you believe regular physical exercise can reduce the risk of breast cancer?	221 (73.7%)
Do you believe maintaining a healthy weight can reduce the risk of breast cancer?	195 (65%)

**Table 6** Linear regression model of total attitude score (N = 300)

Variables	R <sup>2</sup>	SE	B	P
Age	0.000004	0.113	0.012	0.910
Year of study <sup>a</sup>	0.026	0.002	0.007	<b>0.005</b>
History of BC	0.001	0.769	0.447	0.56
Faculty <sup>b</sup>	0.0006	0.206	0.091	0.658

<sup>a</sup> Categorized as years 1, 2, 3, and 4

<sup>b</sup> Categorized as basic sciences, agricultural sciences, management sciences, social sciences, education, and arts. Significant P-value (< 0.05) was bolded

in breast cancer prevention. Most of the participants showed good attitudes towards the role of regular consumption of fruits and vegetables in the disease prevention, but the best attitude was seen in regular consumption of healthy diet and fruits (Tables 5 and 7). Again, the level of nutrition-related attitudes towards breast cancer prevention was more positive among participants at the faculty of basic sciences, students at the second year of study, and those living permanently in the urban area.

With regard to dietary practices, the most frequently consumed foods in this study are processed foods (such as noodles, pasta, pizza), white bread, polished rice, fish, snacks (pastry), fried foods, carbonated drinks, sugar, and palm oil. The World Cancer Research Fund (WCRF) recommended everyone to embrace a healthy lifestyle such as being physically active; consumption of a diet loaded with fruits, vegetables, and legumes, and lesser consumption of processed foods high in sugar and fat; and intake of carbonated drinks [2]. In this study, only 30% and 21% daily consumed fruits and vegetables respectively. This is similar to the reports that Nigerian university students infrequently consumed fruits and vegetables [10, 21, 22]. The low consumption of fruits and vegetables in this study may be due to inadequate nutritional knowledge, food unavailability, and pricing [23,

24]. Fruits and vegetables are more expensive than some processed foods and not adequately available on university campuses possibly because of their low self-life and low demand. In relation to the protective effect of fish in breast cancer, 68% of the participants consumed fish frequently. Higher intake of fish has been reported to be associated with lower risk of breast cancer [25]. Our findings on high consumption of processed foods are consistent with a study by Oguizu and Celestine among adolescents in Nigeria on consumption of ultra-processed foods: 74.7% consumed carbonated drinks, 59.9% consumed instant noodles, and 68.8% consumed white bread frequently [26]. Apparently, Nigeria white bread contains potassium bromate used by bakers at a concentration between 3.6 µg/g and 12.16 µg/g to enhance bread texture and volume against 0.02 µg/g recommended by United States Food and Drug Agency [27, 28]. Similarly with a previous study that reported high consumption of snacks among adolescents in Nigeria [29], we found that 39% of the participants consumed snacks (pastry) daily, and 27.6% ate it 2–3 times in a week. This finding is also consistent with the result obtained from a study among university undergraduate students indicating that most students consumed pastry snacks daily [30]. Although, in the last two decades, there has been a significant shift in dietary patterns from normal traditional diets to ready-to-eat foods including snacks due to urbanization and technology explosion [31]. However, snacks are not good sources of dietary fiber and have been associated with diet-related noncommunicable diseases such as obesity. Otemuyiwa and Adewusi reported these foods to be calorie dense that can promote obesity among women [32]. The availability of many snack shops in the school premises and affordability of the snacks could be the reasons for its high consumption among the participants. Consumption of snacks and fried foods may increase the risk of breast cancer [33, 34]. Our study indicated that 57.7%

**Table 7** Relationship between attitude and demographic characteristics (N=300)

Characteristics	Positive	Negative	p-value
Age			
≤ 23	128 (42.7%)	118 (39.3%)	0.26
≥ 24	32 (10.7%)	21 (7%)	
Marital status			
Single	152 (50.6%)	134 (44.7%)	0.70
Married	8 (2.7%)	2 (0.6%)	
Others	1 (0.3%)	3 (1%)	
Religion			
Christian	139 (46.3%)	116 (38.7%)	0.48
Muslim	22 (7.3%)	23 (7.7%)	
Ethnicity			
Yoruba	136 (45.3%)	121 (40.3%)	0.68
Igbo	10 (3.3%)	9 (3%)	
Hausa	4 (1.3%)	0 (0%)	
Others	11 (3.7%)	9 (3%)	
Faculty			
Basic sciences	76 (25.3%)	43 (14.3%)	<b>0.05</b>
Agriculture	38 (12.7%)	48 (16%)	
Arts	30 (10%)	28 (9.3%)	
Management science	8 (2.7%)	9 (3%)	
Social sciences	4 (1.3%)	6 (2%)	
Education	5 (1.7%)	5 (1.7%)	
Year/level of study			
First year	17 (5.7%)	30 (10%)	<b>0.00004</b>
Second year	61 (20.3%)	21 (7%)	
Third year	57 (19%)	66 (22%)	
Fourth year	26 (8.7%)	22 (7.3%)	
Current place of residence			
Student hostel	23 (7.7%)	23 (7.7%)	0.80
Rented apartment	128 (42.7%)	109 (36.3%)	
With family	10 (3.3%)	7 (2.3%)	
Permanent residence			
Rural	47 (15.7%)	52 (17.3%)	0.13
Urban	114 (38%)	87 (29%)	
History of BC			
First degree	5 (1.7%)	4 (1.3%)	0.84
Other degree	3 (1%)	4 (1.3%)	
No family history	153 (51%)	131 (43.7%)	

and 55.66% consumed fried foods and sugar more than two times weekly respectively. This study showed that about 50% of the participants consumed palm oil daily. Palm oil has been reported to contain high amounts of saturated fats (50%) which facilitate body fat accumulation when consumed in excess and can be detrimental to human health [35]. Exposure to palm oil during gestation and lactation period results in changes of the offspring's

adipose tissue development and metabolism in adult life, increasing visceral fat deposition and subsequently influencing the risk of having metabolic diseases [36]. The consumption of legumes among the participants is very low in this study, and less than 8% ate legumes more than twice weekly. This finding is consistent with a report by Akah et al. [11]. Legumes contain dietary fiber, amino acid, and polyphenols, antioxidants, and many other phytochemicals that can lower the risk of cancer and other cardiovascular diseases [37]. Therefore, higher consumption of fiber-rich foods may reduce the risk of estrogen receptor (ER-) and progesterone receptor (PR-) breast cancer [38]. In summary, the participants had poor dietary practices. The consumption of foods that has been reported to lower the risk of breast cancer was less satisfactory in this study. Although, students older than 24 years of age had better dietary practices compared to younger students, and a similar result was reported by Lahiji et al. towards breast cancer prevention [20].

The small size of the study population may not fully reflect the broader Nigerian population. There are plans in progress to broaden the selection of cohorts to encompass a more diverse geographical range, thereby ensuring a more comprehensive representation of the entire Nigerian populace and enhancing the reliability of data interpretation.

## Conclusion

In conclusion, our studies showed inadequate knowledge about risk factors involved in breast cancer development, and this reflected in the dietary practices of the participants. The frequent consumption of unhealthy foods among the participants may be a pointer to higher risk of breast cancer in the future, emphasizing a need for health education targeted at this group.

## Abbreviations

BC	Breast cancer
PR	Progesterone receptor
ER	Estrogen receptor
WCRF	World Cancer Research Fund
FFQ	Food frequency questionnaire
HIV	Human immunodeficiency virus
AIDS	Acquired immunodeficiency syndrome

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## Authors' contributions

IDK and TPO designed the study. IDK, OK, and KA conducted the survey. IDK, OK, and KA collected the data. IDK, OK and TPO analyzed the data. IDK drafted the manuscripts. The authors read the manuscript, and IDK approved the final manuscript.

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**Availability of data and materials**

The data sets used and analyzed in this study are available from the corresponding author upon reasonable request.

**Declarations****Ethics approval and consent to participate**

The ethical clearance for this study was obtained from research ethics committee board with the ethical code (FUOYEFSC 2011-REC2023/009).

**Consent for publication**

Not applicable.

**Competing interests**

The authors declare that they have no competing interests.

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**References**

- Olaogun JG, Omotayo JA, Ige JT, Omonisi AE, Akute OO, Aduayi OS. Socio-demographic, pattern of presentation and management outcome of breast cancer in a semi-urban tertiary health institution. *Pan Afr Med J*. 2020;36:1–10.
- Clinton SK, Giovannucci E, Hursting SD. The World Cancer Research Fund/American Institute for Cancer Research Third Expert Report on Diet, Nutrition, Physical Activity, and Cancer: impact and future directions. *J Nutr*. 2020;150(4):663–71.
- Pitt J, Riestler M, Zheng Y, Yoshimatsu T, Sanni A, Oluwasola O, et al. Characterization of Nigerian breast cancer reveals prevalent homologous recombination deficiency and aggressive molecular features. *Nat Commun*. 2018;9(1):1–12.
- Azenha G, Bass LP, Caleffi M, Smith R, Pretorius L, Durstine A, et al. The role of breast cancer civil society in different resource settings. *Breast*. 2011;20:S81–7.
- Ali-Gombe M, Inuwa MM, Folasire A, Ntekim A, Campbell OB. Pattern of survival of breast cancer patients in a tertiary hospital in south-west Nigeria. *Ecantermedicalsience*. 2021;15:1192.
- Kolawole ID, Ong TP. Barriers to early presentation and diagnosis of breast cancer in Nigerian women. *Indian J Gynecol Oncol*. 2022;20(3):35.
- Allo TA, Edewor PA, Imhonopi D. Assessment of perceived risks of breast cancer and breast cancer screening among women in five selected local governments in Ogun State, Nigeria. *SAGE Open*. 2019;9(2):215824401984192.
- Motilewa O, Ekanem U, Ihesie C. Knowledge of breast cancer and practice of self-breast examination among female undergraduates in Uyo, Akwa Ibom State, Nigeria. *Int J Commn Med Public Health*. 2015;2:361–6.
- Ajayi MP, Amoo EO, Olawande TI, Iruonagbe TC, Adekeye OA. Awareness of breast and cervical cancer among women in the informal sector in Nigeria. *Macedonian J Med Sci*. 2019;7(14):2371–6.
- Folasire OF, Folasire AM, Chikezie SC. Nutrition-related cancer prevention knowledge of undergraduate students at the University of Ibadan, Nigeria. *South African J Clin Nutr*. 2016;29(4):165–71.
- Akah N, Kunyanga CN, Okoth MW, Njue LG. Pulse production, consumption and utilization in Nigeria within regional and global context. *Sustainable Agriculture Res*. 2021;10(2):48.
- Akhigbe AO, Omuemu V. Knowledge, attitudes and practice of breast cancer screening among female health workers in a Nigerian urban city. *BMC Cancer*. 2009;9:203.
- Azubuikwe S, Okwuokei SS. Knowledge, attitude and practices of women towards breast cancer in Benin City, Nigeria. *Ann Med Health Sci Res*. 2013;3(2):155.
- George TO, Allo T, Amoo EO, Olonade OY. Knowledge and attitudes about breast cancer among women: a wake-up call in Nigeria. *Open Access Maced J Med Sci*. 2019;7(10):1700–5.
- Odusanya OO, Tayo OO. Breast cancer knowledge, attitudes and practice among nurses in Lagos, Nigeria. *Acta Oncologica*. 2001;40(7):844–8.
- Okobia MN, Bunker CH, Okonofua F, Osime U. Knowledge, attitude and practice of Nigerian women towards breast cancer: a cross-sectional study. *World J Surg Oncol*. 2006;4:11.
- Amin TT, Al Mulhim AR, Al Meqihwi A. Breast cancer knowledge, risk factors and screening among adult Saudi women in a primary health care setting. *Asian Pac J Cancer Prev*. 2009;10(1):133–8.
- Halmata M, Tagne RS, Kembraou GN, Baiguere EM, Ndopwang LC, Kamdje AH, et al. Breast cancer awareness and screening practice amongst health personnel and general population of the littoral region of Cameroon. *Heliyon*. 2021;7(7):e07534.
- Tazhibi M, Feizi A. Awareness levels about breast cancer risk factors, early warning signs, and screening and therapeutic approaches among Iranian adult women: a large population based study using latent class analysis. *Biomed Res Int*. 2014;2014:1–9. <https://doi.org/10.1155/2014/306352>.
- Lahiji MR, Dehdari T, Shoorasti RS, Hosseini AF, Navaei M, Zarrati M. Nutrition knowledge, attitudes, and practice towards breast cancer prevention among the female population of Iran University of Medical Science students. *Nutr Cancer*. 2019;71(8):1355–64.
- Kayode OO, Alabi QK. Food consumption patterns, physical activity and overweight and obesity among undergraduates of a private university in Nigeria. *Clin Nutr Exp*. 2020;31:28–34.
- Layade AA, Adeoye IA. Fruit and vegetable consumption among students of tertiary institutions in Oyo state. *Russian J Agricultural Socio-Economic Sci*. 2014;30(6):3–8.
- Fadeyi EO, Popoola BR, Emuoke DK, Adeoye TA, Ogundana M. Factors influencing fruit consumption among undergraduates in Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. *Ife J Agriculture*. 2019;31(2):80–9.
- Olatona FA, Sosanya A, Sholeye OO, Obrutu O, Nnoaham KE. Knowledge of fruits and vegetables, consumption pattern and associated factors among adults in Lagos State, Nigeria. *Res J Health Sci*. 2018;6(2):50.
- Zheng J, Hu X, Zhao Y, Yang J, Yang B. Intake of fish and marine n-3 polyunsaturated fatty acids and risk of breast cancer: meta-analysis of data from 21 independent prospective cohort studies. *BMJ*. 2013;346(jun27 5):f3706.
- Oguizu AD, Celestine EU. Consumption of ultra-processed foods and anthropometric status of adolescents in Abia North LGA Abia state, Nigeria. *Nigerian J Nutr Sci*. 2021;42(2):88.
- Alli LA, Nwegbu MM, Inyang BI, Nwachukwu KC, Ogedengbe JO, Onaadepe O, et al. Determination of potassium bromate content in selected bread samples in Gwagwalada, Abuja, Nigeria. 2013;4(1):15–20.
- Dagari NMS, Jafiya NL, Idris NM, Baffa NA. Determination of potassium bromate in bread samples from Gashua and Nguru communities of Yobe state, Nigeria. *Int J Sci Tech Res Archive*. 2022;3(1):058–65.
- Onyiriuka AN, Egbagbe E, Onyiriuka EP. Snack consumption pattern among adolescent Nigerian urban secondary school girls. *Int J Child Adolesc Health*. 2013;6(3):311–7.
- Olatona FA, Onabanjo O, Ugbaja RN, Nnoaham KE, Adelekan D. Dietary habits and metabolic risk factors for non-communicable diseases in a university undergraduate population. *J Health Popul Nutr*. 2018;37(1):21.
- Uthman-Akinhanmi YO, Yangomodou DO, Lawal AO. Nutrient composition of selected snacks in South-West Nigeria. *KIU J Humanities*. 2020;5(2):423–30.
- Otemuyiwa IO, Adewusi SRA. Nutrient composition of some foods from Nigerian eatery. *J Food Chem Nutr*. 2014;2(1):11–8.
- Marzbani B, Abbasi M, Najafi F, Shahabadi S, Amini M, Moradinazar M, et al. Dietary patterns, nutrition, and risk of breast cancer: a case-control study in the west of Iran. *Epidemiology and Health*. 2019;41:e2019003.
- Romieu I, Khandpur N, Katsikari A, Biessy C, Torres-Mejia G, Angeles-Llerenas A, et al. Consumption of industrial processed foods and risk of premenopausal breast cancer among Latin American women: the PRECAMA study. *BMJ Nutrition, Prevention Health*. 2022;5(1):1–9.
- Imoisi O, Ilori G, Agho I, Ekhatior J. Palm oil, its nutritional and health implications (review). *J Appl Sci Environ Manag*. 2015;19(1):127.
- Magri TP, Fernandes FS, Souza AS, Langhi LG, Barboza T, Misan V, et al. Interestified fat or palm oil as substitutes for partially hydrogenated fat in maternal diet can predispose obesity in adult male offspring. *Clin Nutr*. 2015;34(5):904–10.



37. Gebrelibanos M, Tesfaye D, Raghavendra Y, Sintayeyu B. Nutritional and health implications of legumes. *Int J Pharm Sci Res.* 2013;4(4):1269–79.
38. Sangaramoorthy M, Koo J, John EM. Intake of bean fiber, beans, and grains and reduced risk of hormone receptor-negative breast cancer: the San Francisco Bay Area Breast Cancer Study. *Cancer Med.* 2018;7(5):2131–44.

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