



## Practice of Breast Self-Examination and Knowledge of Breast and Cervical Cancer Screening

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Received 21 February 2021; Revised 22 May 2021; Accepted 19 June 2021; Published 01 September 2021

### Abstract

The burden of breast and cervical cancer is increasing exponentially, especially among women in low- and mid-income countries. Early detection, hinged on screening uptake is a key to higher survival rate and managing cancer outcome. The present study assessed Nigerians and Egyptians' knowledge of breast self-examination (BSE) and breast and cervical cancer screening. A cross-sectional questionnaire was utilized to obtain 1,006 respondents via a convenient sampling method. The mean age of respondents was  $30.43 \pm 6.69$ . About one-third of participants had good knowledge (> 66%) of breast cancer screening (42%), cervical cancer screening (44%) and BSE practice (36%). Age range (26–40 years), educational level (tertiary), and marital status were demographic data that influenced knowledge level. The screening uptake among the studied population is very poor as only (11%) had ever been screened and only (2.2%) ever vaccinated. The major reasons for poor screening uptake were “no awareness of where to be screened” and “no symptoms”. Assessing the knowledge and uptake level of African women through studies like this is crucial in identifying the loopholes in the fight against cancer. More efforts are required for promoting the utilization of cancer screening services, HPV vaccination, and BSE practice among African women.

*Keywords:* Breast Self-examination; Cancer Screening; Early Detection; African Women; Knowledge.

## 1. Introduction

Breast and cervical cancer are the most common gynecological cancers globally [1, 2]. The breast and cervical cancer burden in low- and mid-income countries are increasing significantly due to late diagnosis, genetic factors, unhealthy lifestyle choices (sedentary lifestyle and poor hygiene), adoption of western lifestyles, abuse and long-term use of contraceptives, and increased life expectancy. Breast and cervical cancer constitute a major public health

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 <http://dx.doi.org/10.28991/SciMedJ-2021-0303-3>

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concern. Breast and cervical cancer represent 26,310 (37 %) and 14,943 (21 %) respectively of the total 71,022 new cancer cases in Nigerian women in 2018. From the reported 70,327 cancer-related deaths in Nigeria, 11,564 (16.4 %) and 10,403 (14.8 %) were due to breast and cervical cancers respectively [3]. In Egypt, cervical cancer was not common as observed in Nigeria with only 969 (0.75 %) reported cervical cancer cases from the 128,892 new cancer cases in Egypt in 2018. Meanwhile, breast cancer is also the most prevalent female cancer type in Egypt with a reported 23,081 (35.1 %) new cancer cases [3].

Prevention is better and more cost-effective than seeking a cure. Breast and cervical cancers are highly preventable. There is an increased chance of survival if cancers are detected early but late presentation and diagnosis is a common experience in developing nations. Early detection remains the best measure for effective breast and cervical cancer control. Increased awareness, effective national cancer screening programs and preventive strategies have contributed to reducing the breast and cervical cancer burden in developed nations [4]. Meanwhile, these interventions are lacking or limited in low- and mid-income countries leading to lots of preventable deaths. The aim of screening is early detection of precancerous changes to facilitate early intervention and treatment. Breast cancer screening (BCS) can be achieved by mammography, clinical breast examination (CBE), BSE, magnetic resonance imaging, and ultrasound or sonography. While cervical cancer screening (CCS) can be done by visual inspection with acetic acid (VIA) or Lugol's iodine (VILI), liquid-based monolayer cytology, Pap smear test (cytology), and HPV DNA testing (Figure 1). The intervention of some Non-Governmental Organizations (NGOs) and health institutions has promoted opportunistic breast and cervical cancer screening among women in developing nations with the provision of approved less costly screenings (VIA for cervical cancer and CBE for breast cancer). Human Papillomavirus (HPV) has been found culpable in most cervical cancer cases. HPV vaccines (quadrivalent Gardasil and bivalent Cervarix) have been developed and approved to prevent the risk of cervical cancer in women [4]. Developed countries have also taken advantage of these vaccines which are lacking in most developing nations. Early detection is hinged on the presentation for screening. The decision to go for screening highly depends on awareness and good knowledge of BCS and CCS. Several studies have been carried out in both study population to assess the knowledge, perception, attitude and beliefs of women about BCS and CCS [5–9]. An earlier study [7] explored the knowledge of women in South-Eastern, Nigeria, majorly civil servants and teachers with a reported 52.8 % level of cervical screening awareness with a 7.1 % uptake. A study [9] involving 1,000 women carried out at two obstetrics clinics in Egypt identified a poor CCS awareness as 86.7 % of the participants had no idea about Pap smear test while only 13.3 % could identify it. Another study [1] from the Middle Eastern nation reported low awareness of BCS and breast self-examination (BSE) among the 200 study participants. Al-Shareef et al. (2020) found limited knowledge of breast cancer and its symptoms among 400 female teachers in Saudi Arabia [10]. The study likewise identified a significant difference in respondent's age and marital status about BC knowledge. Major efforts to promote BCS have focused on women, but a study from Saudi Arabia [11] identified that husband's BC knowledge influences their wives' practices or attitudes towards BCS. Educating men on BCS and CCS might be a promising approach in several countries in the Middle East, Africa, Arab nations, and other parts of the world where husbands play key roles in their wives' decision making.

BSE is a simple and cost-effective screening method for identifying any sign of abnormalities in the breast [1]. BSE is gradually being advocated especially in low resourced settings where mammography and CBE seem unaffordable. Likewise, most countries offer routine mammography only for women  $\geq 40$  years, hence leaving out younger women who may also be at risk of breast cancer. In a survey of 385 Ghanian women [12], 64.9 % had good knowledge of breast cancer, meanwhile only 27.5 % practice BSE. Most respondents got their information about breast cancer and BSE from the radio (40 %) and healthcare workers (30 %). Women who practice BSE regularly as required have good knowledge of their breast (the appearance and feel), and hence, stand a good chance of detecting lumps, changes in colour, size, or other abnormalities much early [12]. As such, BSE holds promising result for all age groups and in low- and mid-income settings for early breast cancer detection [13, 14]. However, earlier reports [1, 12] have identified very low knowledge and practice of BSE among women in many developing nations. Yaghmour et al [15] identified that 70.9 % of the 203 study participants learnt how to perform BSE from their healthcare provider, friends, or mothers. This again points out the importance of healthcare providers in promoting BSE and cancer screening.

A study [16] of 305 women living in an urban slum in Nigeria reported that only 2 (0.7 %) respondents had done a CCS, while none have been immunized with any of the HPV vaccines. Despite the low awareness, most (88.9 %) were willing to do the test but 70 % of them mentioned that they will need the approval of their husband [16]. This again reiterates the need to educate men on BCS and CCS [11, 16]. Poor CCS and HPV awareness were also reported in studies involving 516 [17] and 770 [18] Ethiopian women. With the knowledge that gynecological cancers are not spontaneous but develop with age and time [19], the present study aim is to investigate the knowledge of women about BCS, CCS and BSE practice from two African nations (Nigeria and Egypt). We also identified women's source of information about cancer screening and reasons for not utilizing the available breast and cervical cancer screening services available in their countries. To the best of our knowledge, this is the first study focusing on understanding

young women’s knowledge and BSE practice covering more than one African country. Findings from the present study would contribute immensely to the ongoing efforts against the menace of breast and cervical cancers.

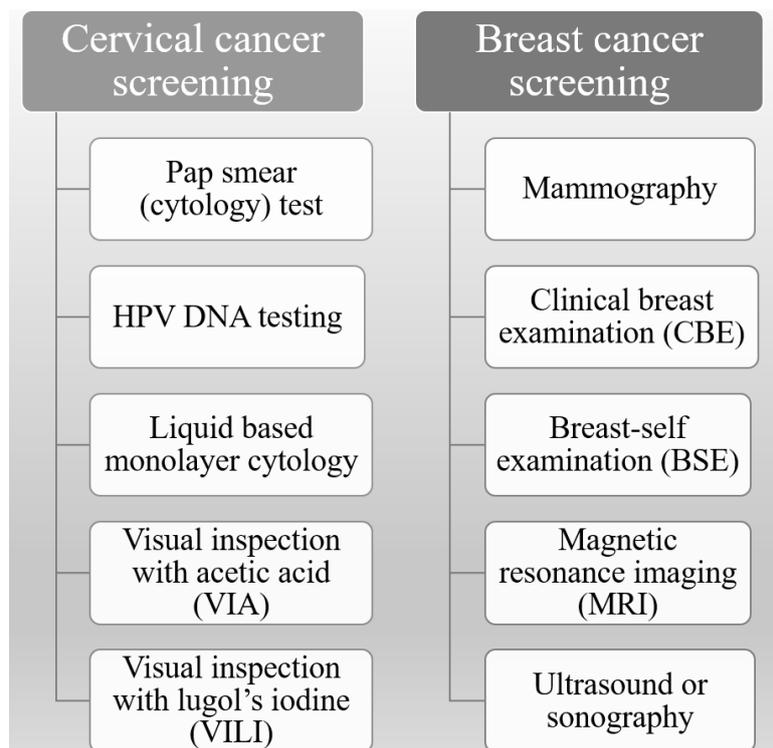


Figure 1. Common breast and cervical cancer screening methods

## 2. Methods

### 2.1. Study Design

The cross-sectional questionnaire used as a research instrument administered in the official language of both countries (Arabic – Egypt and English – Nigeria) to avoid any form of potential language bias. It was released online on September 1, 2020, and the dataset (n = 1,006) was collated on October 20, 2020. The choice of both African countries-Nigeria and Egypt was facilitated due to their young population and influence among African nations. They are also among the leading countries with a high prevalence of gynecological cancers in Africa. A short introduction was presented to all respondents before proceeding to fill the questionnaire stating the purpose of the study, voluntary participation, anonymity, and the safety of all data collected.

### 2.2. Study Participants, Sample Size and Sampling

The inclusion criteria were women who gave consent for participation and are within the age range; 18 and 59 years of age. Men and non-consenting women and women below 18 and above 59 years of age were excluded from the study. For sample size calculation, we hypothesized that 50% of the respondents would have a satisfactory knowledge level of the independent variables (BCS, CCS and BSE practice) at a 99% confidence level. Using the Open Source Epidemiologic Statistics for Public health web interface [20], v.3.01, the required sample size was 664. We added a 50% contingency to make the required minimum sample size of 996 respondents from both countries. Due to the present realities, the paper-based questionnaire format was not feasible due to the global coronavirus pandemic; we restricted our study to women with internet access. Due to the relatively close internet penetration rate [21] in both countries, the respondents were sampled in a ratio of 1 (Nigeria):1 (Egypt) using a convenience sampling method to reach the respondents via social media platforms. Respondents were recruited from major cities, Ibadan (Nigeria) and Dakahlia Governorate (Egypt). The research methodology is as illustrated in Figure 2.

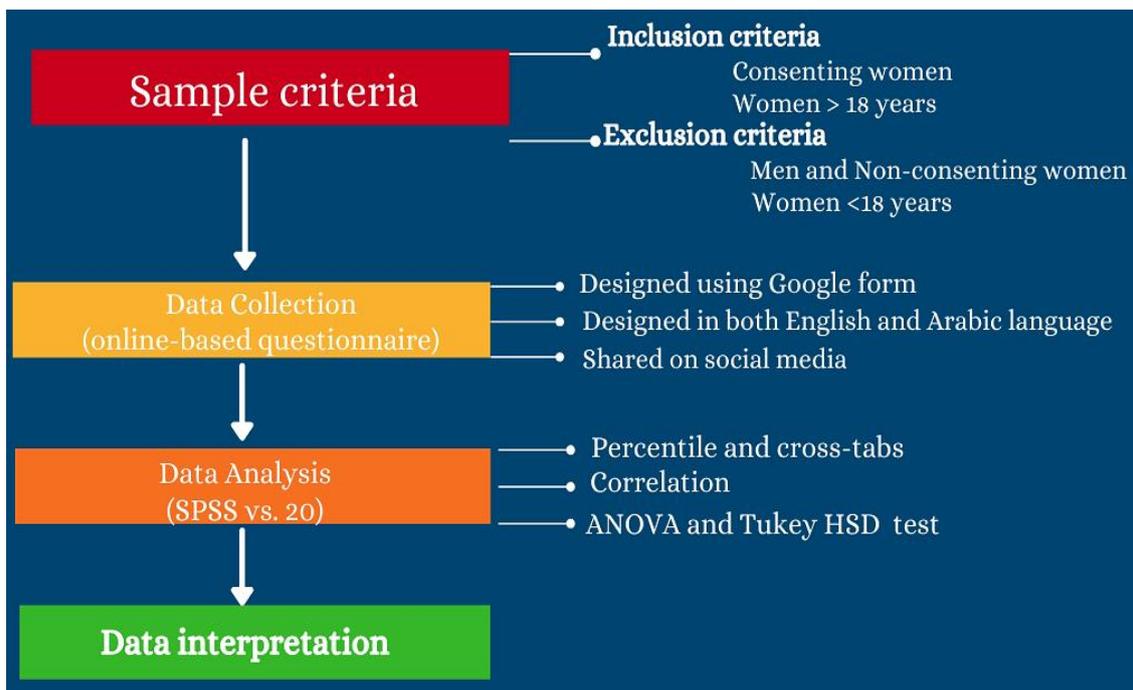


Figure 2. Flowchart illustrating the research methodology

### 2.3. Questionnaire Design

The administered questionnaires (Arabic and English) were designed using Google forms (Alphabet Inc., California, USA) and pre-validated by two independent reviewers from both countries. The questionnaire in Arabic was initially translated into English to ensure items in the questionnaires are communicating the same thing both in English and Arabic. The questionnaires were pre-tested on 20 respondents which were not included in the analysis. The instrument (designed as a quiz) consists of 5 major parts:

- Sociodemographic characteristics of respondents;
- Knowledge of CCS;
- Uptake of the HPV vaccine;
- Knowledge of BCS;
- The practice of BSE.

We also assessed respondents' major sources of information about cancer screening, reasons for not yet being screened (for those who are not) and willingness to be screened if well educated about cancer screening. The questionnaire can be accessed online (<https://forms.gle/B9WNNARL4vjF7icQ7>).

### 2.4. Data Analysis

Responses were imported from Google form as a Microsoft Excel spreadsheet. Collated data from Egypt in Arabic was translated into English. All data were then analyzed using the Statistical Package for the Social Sciences software, v.20. Descriptive statistics were used to summarize respondents' sociodemographic information. Respondents' knowledge of cancer screening and practice of BSE was assessed using a numbered scoring pattern (1 for a correct response and 0 for an incorrect response). The dependent variables were computed and then binned into equal percentile (33.33 %) based on mean scores to categorize the knowledge level. Study participants with numeric scores greater than the mean scores were classified as good or satisfactory knowledge level and vice-versa. The association between the demographics (independent variables) and the dependent variables were tested using Crosstabs. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. Where required correlation analysis was performed to test for relationships. One-way analysis of variance (ANOVA) was used to test for differences in the knowledge score across the independent variables. Significant relationships ( $p < 0.05$ ) were subjected to further significant tests.

### 3. Results

#### 3.1. Participants' Demographics

A total of 1006 respondents (503 each from Nigeria and Egypt) were included in this present study. Most respondents (75.94%, n = 764/1006) were between the ages of 26-40 years. Most respondents (69.48%, n = 699/1006) were single (never married). Similarly, most of the respondents have at least a University degree (87.37%, n = 879/1006) compared to other women with a low educational level (12.63%, n = 127/1006) (Table 1).

**Table 1. Demographics of respondents used in this study (n = 1006)**

Variables	Number of respondents (%)	
	Egypt (n = 503)	Nigeria (n = 503)
<b>Country</b>		
<b>Age (years)</b>		
18 – 25	81 (16.1 %)	66 (13.12 %)
26 – 40	406 (80.72 %)	358 (71.17 %)
>40	16 (3.18 %)	79 (15.71 %)
<b>Education</b>		
Up to secondary school	52 (10.34 %)	75 (14.91 %)
Bachelor's degree	400 (79.52 %)	334 (66.4 %)
Postgraduate degree	51 (10.14 %)	94 (18.69 %)
<b>Marital status</b>		
Single (never married)	356 (70.78 %)	343 (68.19 %)
Ever married	147 (29.22 %)	160 (31.81 %)

Results presented as frequencies and corresponding percentage in a bracket.

#### 3.2. Sociodemographic Information about Respondents BCS and CCS Knowledge

Satisfactory CCS knowledge was observed in most Egyptians (266, 53%) compared to Nigerians (180, 36%). The same trend was observed in the BCS knowledge from Egyptians (253, 50%) and Nigerians (170, 34%). In contrast, the practice of BSE was poor among the respondents; with only a few Egyptian (188, 37%) and Nigerian women (175, 35%) with satisfactory BSE practice. Young women in the age range (26-40 years) have good knowledge of BCS (355, 46%), CCS (375, 49%) and BSE practice (304, 40%) compared to other age groups. The BCS and CCS knowledge of women according to their marital status (single or ever married) was almost the same. Participants with education up to tertiary level seem to have good knowledge of BCS (380, 42.5%), CCS (403, 48.5%) and BSE practice (327, 40.5%) compared to women with lower educational level (Table 2).

**Table 2. Relationship between sociodemographic data and outcome variables**

	Variable	Low score (<33.33%)	Average (33.33-66.66%)	High score (>66.66%)	Total
<b>Sociodemographic data and CCS knowledge</b>					
<b>Country</b>	Nigeria	217 (43%)	106 (21%)	180 (36%)	503
	Egypt	68 (14%)	169 (34%)	266 (53%)	503
<b>Age (years)</b>	18-25	55 (37%)	41 (28%)	51 (35%)	147
	26-40	173 (23%)	216 (28%)	375 (49%)	764
	>40	57 (60%)	18 (19%)	20 (21%)	95
<b>Marital status</b>	Single	184 (26%)	198 (28%)	317 (45%)	699
	Ever married	101 (33%)	77 (25%)	129 (42%)	307
<b>Educational level</b>	Up to Secondary	53 (42%)	31 (24%)	43 (34%)	127
	Bachelors	193 (26%)	214 (29%)	327 (45%)	734
	Postgraduate	39 (27%)	30 (21%)	76 (52%)	145

Sociodemographic data and BCS knowledge					
Country	Nigeria	244 (49%)	89 (18%)	170 (34%)	503
	Egypt	72 (14%)	178 (35%)	253 (50%)	503
Age (years)	18-25	62 (42%)	36 (24%)	49 (33%)	147
	26-40	185 (24%)	224 (29%)	355 (46%)	764
	>40	69 (73%)	7 (7%)	19 (20%)	95
Marital status	Single	204 (29%)	197 (28%)	298 (43%)	699
	Ever married	112 (36%)	70 (23%)	125 (41%)	307
Educational level	Up to secondary	59 (46%)	25 (20%)	43 (34%)	127
	Bachelors	215 (29%)	200 (27%)	319 (43%)	734
	Postgraduate	42 (29%)	42 (29%)	61 (42%)	145
Sociodemographic data and BSE practice					
Country	Nigeria	172 (34%)	156 (31%)	175 (35%)	503
	Egypt	94 (19%)	221 (44%)	188 (37%)	503
Age (years)	18 – 25	63 (43%)	49 (33%)	35 (24%)	147
	26 – 40	155 (20%)	305 (40%)	304 (40%)	764
	> 40	48 (51%)	23 (24%)	24 (25%)	95
Marital status	Single	179 (26%)	280 (40%)	240 (34%)	699
	Ever married	87 (28%)	97 (32%)	123 (40%)	307
Educational level	Up to secondary	50 (40%)	41 (32%)	36 (28%)	127
	Bachelors	188 (26%)	286 (39%)	260 (35%)	734
	Postgraduate	28 (19%)	50 (35%)	67 (46%)	145

### 3.3. Knowledge of BCS and CCS and BSE Practice among Respondents

From a maximum obtainable score of 14, most respondents (n = 690/1006, 68.59% and n = 721/1006, 71.67%) had satisfactory knowledge of BCS and CCS, respectively. Most respondents had (n = 529/1006, 52.58%) satisfactory BSE knowledge from a maximum obtainable score of 13. The media/internet (62.01%) and health practitioners (23.34%) were respondents’ major sources of information about breast and cervical cancer. Although most of the respondents (n = 808/1006, 80.3%) believe breast or cervical cancer is preventable, surprisingly, some respondents opine that positive diagnosis of cancer is a death sentence (n = 253/1006, 25.1%) and that cancer screening is only meant for those feeling symptoms (n = 265/1006, 26.3%). Out of the respondents (n = 174/1006, 17.3%) who had at a time observed lumps or abnormalities in their breast, many of them said they did nothing, and the symptoms disappeared over time (n = 89/174, 51.15%) while some consulted their healthcare giver (n = 77/174, 44.25%).

Out of the 787 (78.2%) respondents who have ever heard of cervical cancer, only 495 (62.9%) are aware of CCS tests and 321 (40.79%) know where to be screened. Most study participants (n = 895/1006, 89%) have never undergone CCS, with the majority identifying no symptoms (n = 456/895, 50.95%) and not aware of where to be screened (n = 276/895, 30.84%) as major reasons for not being screened. Meanwhile, only 22 (2.2%) of study participants have ever been vaccinated with the HPV vaccine. Most participants (n = 871/1006, 86.6%) are willing to be screened if properly oriented (Table 3).

Table 3. Differences in Respondent’s BCS and CCS Knowledge

Variables	Egypt (N = 503)		Nigeria (N = 503)	
	Yes (%)	No (%)	Yes (%)	No (%)
Does early detection increase survival?	492 (98%)	11 (2%)	358 (71%)	145 (29%)
Heard of cervical cancer?	373 (74%)	130 (26%)	414 (82%)	89 (18%)
Aware of screening tests (VIA	133 (26%)	370 (74%)	362 (72%)	141 (28%)

or Pap smear test)?					
Do you know where to be screened?		73 (15%)	430 (85%)	248 (49%)	255 (51%)
Undergone cervical cancer screening test (VIA or Pap smear test)?		61 (12%)	442 (88%)	50 (10%)	453 (90%)
Can screening be done without a healthcare provider?		0 (0%)	503 (100%)	11 (2%)	492 (98%)
Why are you not screened?	Not aware of where to be screened	63 (13%)		213 (42%)	
	Lack of time	20 (4%)		21 (4%)	
	Fear of positive result	8 (2%)		6 (1%)	
	Screening cost consideration	12 (2%)		26 (5%)	
	No symptoms	325 (65%)		131 (26%)	
	Not necessary	24 (5%)		13 (3%)	
	Religious/cultural reasons	37 (7%)		0 (0%)	
	I have been screened	14 (3%)		93 (18%)	
Heard of Gardasil or Cervarix?		38 (8%)	465 (92%)	80 (16%)	423 (84%)
Vaccinated against cervical cancer?		8 (2%)	495 (98%)	14 (3%)	489 (97%)
Source of information	No knowledge at all	116 (23%)		153 (30%)	
	Health practitioners	21 (4%)		151 (30%)	
	Media/internet	320 (64%)		137 (27%)	
	Family/friends	18 (4%)		19 (4%)	
	School	28 (6%)		39 (8%)	
	Religious or social groups	0 (0%)		4 (1%)	
Willingness to do the test if oriented?		420 (83%)	83 (17%)	451 (90%)	52 (10%)
Heard of breast cancer?		491 (98%)	12 (2%)	362 (72%)	141 (28%)
A positive diagnosis is a death sentence?		56 (11%)	447 (89%)	197 (39%)	306 (61%)
Is breast or cervical cancer preventable?		414 (82%)	89 (18%)	394 (78%)	109 (22%)
Screening only meant for those feeling symptoms?		50 (10%)	453 (90%)	215 (43%)	288 (57%)
Heard of BSE?		365 (73%)	138 (27%)	323 (64%)	180 (36%)
Taught how to perform BSE?		267 (53%)	236 (47%)	268 (53%)	235 (47%)
Can effectively perform BSE?		254 (50%)	249 (50%)	240 (48%)	263 (52%)
Why do you not perform BSE?	I perform BSE	154 (31%)		140 (28%)	
	I have not been taught	157 (31%)		259 (51%)	
	I am too busy	54 (11%)		4 (1%)	
	Fear of discovering lump or abnormalities	31 (6%)		13 (3%)	
	I forget too often	107 (21%)		87 (17%)	
Ever screened or examined (via CBE or mammogram)?		84 (17%)	419 (83%)	126 (25%)	377 (75%)
How often should BSE be performed?	Daily	1 (0%)		68 (14%)	
	Weekly	20 (4%)		234 (47%)	
	Monthly	210 (42%)		95 (19%)	
	Yearly	25 (5%)		5 (1%)	
	Only when symptoms are felt	26 (5%)		3 (1%)	
	Only during a routine check	21 (4%)		13 (3%)	
	I do not know	200 (40%)		85 (17%)	
Ever observed a lump or abnormalities in your breast?		86 (17%)	417 (83%)	88 (17%)	415 (83%)
	I have never experienced such	400 (80%)		417 (83%)	
	I used over-the-counter drugs	1 (0%)		8 (2%)	
What did you do about it?	I consulted a healthcare giver	48 (10%)		29 (6%)	
	I prayed over it	6 (1%)		8 (2%)	
	I did nothing and it disappeared with time	48 (10%)		41 (8%)	

### 3.4. Influence of Predictors on BSE practice, BCS and CCS Knowledge

The impact of age on the knowledge and practice of BSE was explored. Levene's test significance value of 0.232 depicts non-violation of the homogeneity of variance assumption. There was a statistically significant difference at the  $p < 0.05$  level in BSE practice scores for the three age groups [ $F(2, 1003) = 40.131, p = 0.01$ ]. The Post-hoc comparisons using the Tukey HSD test indicated that the mean score was significantly different across all age groups; the effect size (0.074), calculated using eta squared depicts a large effect size. As shown in Table 2, young women in the age range (26-40 years) had very good knowledge of BCS (355, 46%) compared to other age groups.

The impact of age on CCS knowledge was likewise explored. Levene's test significance value was 0.477 depicting non-violation of the homogeneity of variance assumption. There was a statistically significant difference at the  $p < 0.05$  level in knowledge of cervical screening scores for the three age groups [ $F(2, 1003) = 24.309, p = 0.01$ ]. Though the Post-hoc comparisons using the Tukey HSD test indicated that the mean score was significantly different across all age groups, the effect size, calculated using eta squared was 0.046 depicting a moderate effect.

The relationship between knowledge of BCS and practice of BSE was investigated using Pearson product-moment correlation coefficient. There was a strong, positive correlation between the two variables [ $r = 0.564, N = 1006, p < 0.005$ ], with a high knowledge level of breast cancer screening associated with a higher level of BSE practice. The coefficient of determination depicts that knowledge of BCS helps to explain nearly 32% of the variance in respondents' score on BSE practice. The correlation between BCS knowledge and BSE practice was very strong for Nigeria ( $r = 0.632$ ), while for Egypt it was moderate,  $r = 0.455$ . Zobs value was  $> 1.96$ , hence, correlation coefficients are statistically significantly different.

The relationship between knowledge of BCS and CCS was investigated using Pearson product-moment correlation coefficient. There was a strong, positive correlation between the two variables " $r = 0.825, N = 1006, p < 0.005$ ", with a high knowledge level of BCS associated with a higher level of CCS. The coefficient of determination depicts that knowledge of BCS helps to explain nearly 68% of the variance in respondents' score on CCS. The correlation between BCS and CCS knowledge was very strong for both Nigeria ( $r = 0.89$ ) and Egypt ( $r = 0.701$ ). Zobs value was  $> 1.96$ , hence, correlation coefficients are statistically significantly different.

## 4. Discussion

To the best of our knowledge, this present study is one of the first to assess the BCS and CCS knowledge and BSE practice of young women in Egypt and Nigeria, which are two of the most populated countries in Africa. Although a global trend, the burden of breast and cervical cancer is a major public health challenge in both countries. Globally, an estimated 570,000 women were diagnosed with cervical cancer in 2018, with about 311,000 deaths from the disease [22]. Breast and cervical cancers are preventable and have a high survival rate if detected early, sadly, most women present late for medical intervention. Early detection, hinged on the presentation for screening has been a promising approach in developed nations to curtail the menace of breast and cervical cancer [1]. The major finding of the present study is that most respondents have good knowledge of BCS (690, 68.59 %) and CCS (721, 71.67%). We likewise observed that the media/internet (62.01%) and health professionals (23.34 %) serve as major sources of information about cancer and cancer screening. Earlier reports [1, 12, 15] have also identified print/electronic media and health practitioners as women's major sources of information about BCS and/or CCS. From a study of 516 Ethiopian women [17], respondents who got their information from healthcare providers had better CCS knowledge compared to other sources.

The two major limitations to our study are the number of respondents (879, 87.38%) with tertiary education (bachelors or postgraduate degree) and the use of an online survey to adhere to the World Health Organization's social and public health guidelines associated with the novel coronavirus pandemic. The internet penetration rate in Egypt (48.1%) and Nigeria (61.2%) might have in a way contributed to most participants identifying media/internet as their major source of information. Meanwhile, an earlier study also identified the media or the internet as the major source of information about cancer and cancer screening services [2]. An earlier study [7] has also identified a positive correlation between cancer screening and respondent's level of education. This implies that the awareness level about BCS and CCS found in our study might be relatively lower in other parts of the countries with a lower educational level.

Good knowledge of BCS (68.59%) and CCS (71.67%) in our study is higher than 52.8% in Owerri, South-Eastern, Nigeria [7], 35% CCS knowledge in Tanta governorate, Egypt [9] and low BCS and BSE level in Dhi-Qar Province, Iraq [1]. Although 535 (53.2%) of the respondents have been taught how to perform BSE, only 494 (49.1%) can effectively perform BSE. Our findings agree with an earlier study in Nigeria [5], where 55.4% of participants do not practice BSE, while only 24% of women in Dhi-Qar Province, Iraq [1] practice BSE out of the 53% who know how to perform BSE. Like other cancer types, early detection of breast cancer plays a vital role in increasing survival rate and decreasing morbidity and mortality [1]. About 105 million Nigerians (51%) of the total population live below the

poverty threshold (1.90 \$) which is a common trend in most developing countries suggesting financial constraint as a possible limitation to the uptake of cancer screening. BSE is a no- or low-cost and convenient screening method for early detection of changes in the breast. Most breast cancer cases are self-observed via observations of abnormalities in the breast [1]. This highlights the importance of BSE in curtailing the menace of breast cancer, especially in low-income settings. However, as revealed in our study and earlier findings [1, 12], women in low- and mid-income countries seem to have good knowledge but bad practice of BSE. The major reasons for not practicing BSE are that most (416, 41.4%) have not been taught and 194 (19.3%) forget too often, while others are too busy or for the fear of discovering a lump or milky discharge. Likewise, out of 385 Ghanian women studied [12], most respondents (72.5%) do not practice BSE. Major reasons for not practicing BSE include no knowledge of the BSE technique (50.1%), no breast complaint or problem (17.4%), and lack of privacy at home (7.3%).

Respondents have good knowledge of CCS but HPV vaccination and screening uptake were very poor. Less than half, 495, (49.2%) were aware of the CCS test and very few, 118 (11.7%) are aware of HPV vaccines. Only 111 (11.0%) respondents have ever been screened for cervical cancer and 22 (2.2 %) vaccinated with either Gardasil or Cervarix. Among women studied in Mangalore, India, only 7.23% have been screened [2]. Poor uptake of HPV vaccination and CCS also shows a similar trend in Saudi Arabia [4] with only 22 (5.6%) and 103 (26.2%) studied female healthcare providers ever received HPV vaccination and Pap smear test respectively. The major limitations cited for not being screened were “no observed symptoms”, no awareness of where to be screened, lack of time, screening cost consideration and religious/cultural reasons. This corroborates a study [9] on Egyptian women whereby only 13.3% of 1,000 study participants are aware of Pap smear test, while only 199 (19.9%) have ever taken HPV vaccine and 667 (83.3%) identified lack of awareness as a reason for not being screened. A study of 516 Ethiopian women also identified lack of awareness of screening service, lack of time, and cost of screening as major reasons for not being screened [17]. An earlier report from Saudi Arabia also identified sociocultural influence as a barrier to the uptake of BCS. Sociocultural barriers must be addressed so they do not undermine the impact of well-established cancer screening programs [11]. A greater percentage (97.8%) of Egyptian women from this present study believed early detection increases chances of survival in a clear improvement over 42.9% reported in an earlier report [9] on Egyptian women. Most respondents (86.6%) are willing to be screened if properly oriented. This is an improvement over 75.6% of Ethiopian women who agreed to be screened if offered a free screening with an assurance of no harm or pain [17].

## 5. Conclusion

Breast and cervical cancer are preventable and hold a good chance of survival if detected early. Despite some improvement observed in developed countries, the control of these preventable diseases in low- and mid-income countries seems insurmountable. The uptake of cancer screening services promotes early detection. The present study showed good knowledge of BCS and CCS among the study participants. However, awareness level did not correlate with the uptake of screening services as most of the women studied have never been screened for breast or cervical cancer nor vaccinated with any of the HPV vaccines. Also, the practice of BSE was not satisfactory; this calls for more efforts in promoting the uptake or utilization of cancer screening, HPV vaccination, and BSE among women. The media and the internet should be leveraged as they serve as the major sources of information about breast and cervical cancer for most of the respondents. Healthcare providers should also put on more effort to utilize an opportunistic approach to sensitize women about the need for vaccination and regular screening. Despite the poor uptake, most respondents identified their willingness to be screened or vaccinated if oriented. Increased awareness about BSE, BCS and CCS is highly recommended. Further studies should assess the knowledge and uptake of breast and cervical cancer screenings in older and other women with no internet accessibility and/or low educational status in Nigeria and Egypt. Future studies can also investigate the influence and role of husbands in their wives' awareness and uptake of BCS and CCS services.

## 6. List of Abbreviations

ANOVA	Analysis of Variance	BCS	Breast Cancer Screening
BSE	Breast Self-Examination	CBE	Clinical Breast Examination
CCS	Cervical Cancer Screening	HPV	Human Papillomavirus
NGOs	Non-Governmental Organizations	VIA	Visual Inspection with Acetic Acid
VILI	Visual Inspection with Lugol's Iodine		

## 7. Declarations

### 7.1. Author Contributions

Conceptualization, O.O.; methodology, O.O., G.M., E.O.; data collection, O.O., G.M., E.O., A.M., G.A.; data analysis, O.O., G.M.; writing—original draft preparation, O.O., S.M., N.C.; writing—review and editing, O.O., G.M., E.O., A.M., G.A., S.M., N.C. All authors have read and agreed to the published version of the manuscript.

### 7.2. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

### 7.3. Acknowledgements

We acknowledge all consenting respondents who took out time to respond to this questionnaire. We appreciate all our friends who helped in sharing the questionnaire with their contacts.

### 7.4. Ethical Approval

Though a low-risk study, anonymity upheld and non-inclusion of participants under 18 years, informed consent was sought and obtained from all respondents. The email of the principal investigator was likewise supplied for any clarification or withdrawal of participation. The present study was ethically conducted in line with the World Medical Association Declaration of Helsinki Ethical principles.

### 7.5. Data Availability Statement

The data presented in this study are available in article.

### 7.6. Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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