



**Article title:** Practice of Breast Self-Examination and Knowledge of Breast and Cervical Cancer Screening: A bi-national Survey in Africa

**Authors:** Olabode Omotoso[1], Ghadier Matariek[2], Elizabeth Omotoso[3], Amira Matareek[4], Ghada Mahmoud Abdul-Rafee[5], Sucheta Malakar[6], Nabanita Chutia[7]

**Affiliations:** College of Medicine, University of Ibadan, Nigeria[1], Faculty of Pharmacy, Mansoura University, Egypt[2], Faculty of Education, University of Ibadan[3], Mansoura Health Insurance Organization, Egypt[4], University of Calcutta, India[5], Dibrugarh University, India[6]

**Orcid ids:** 0000-0002-9291-9289[1]

**Contact e-mail:** olabodeomotoso@gmail.com

**License information:** This work has been published open access under Creative Commons Attribution License <http://creativecommons.org/licenses/by/4.0/>, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. Conditions, terms of use and publishing policy can be found at <https://www.scienceopen.com/>.

**Preprint statement:** This article is a preprint and has not been peer-reviewed, under consideration and submitted to AfricArXiv Preprints for open peer review.

**Funder:** Not applicable

**DOI:** 10.14293/111.000/000013.v1

**Preprint first posted online:** 27 November 2020

**Keywords:** breast self-examination, breast cancer screening, early detection, African women, cervical cancer screening, cancer

**Practice of Breast Self-Examination and Knowledge of Breast and Cervical Cancer  
Screening: A bi-national Survey in Africa**

Olabode E. Omotoso\*<sup>1</sup>, Ghadier Matariek<sup>2</sup>, Elizabeth Omotoso<sup>3</sup>, Amira Matareek<sup>2</sup>, Ghada  
Mahmoud Abdul-Rafee<sup>4</sup>, Sucheta Malakar<sup>5</sup>, Nabanita Chutia<sup>6</sup>

Cancer Research and Molecular Biology Laboratories, Department of Biochemistry,  
University of Ibadan, Nigeria<sup>1</sup>, Faculty of Pharmacy, Mansoura University, Egypt<sup>2</sup>, Guidance  
and Counseling, University of Ibadan, Nigeria<sup>3</sup>, Mansoura Health Insurance Organization,  
Egypt<sup>4</sup>, University of Calcutta, India<sup>5</sup>, Dibrugarh University, India<sup>6</sup>

\*Correspondences to:

Olabode Omotoso

Email: [olabodeomotoso@gmail.com](mailto:olabodeomotoso@gmail.com)

Tel.: +234703 0927854

## **Abstract**

Background: The burden of breast and cervical cancer is increasing exponentially, especially among women in low- and mid-income countries due to late diagnosis, unhealthy lifestyle choices and adoption of western lifestyles. Early detection, hinged on screening uptake is a key to higher survival rate and managing cancer outcome. Despite some improvement noticed in developed countries, the control of these preventable diseases in African countries including Nigeria and Egypt seems insurmountable. Therefore, this study focused on assessing the knowledge and uptake of Nigerians and Egyptians towards breast self-examination (BSE) and breast and cervical cancer screening.

Results: A community-based cross-sectional questionnaire was utilized in both countries to obtain 1,006 respondents via a convenient sampling method. The mean age of study participants was  $30.43 \pm 6.69$ . About one-third of participants had a good knowledge ( $> 66\%$ ) of breast cancer screening (423, 42 %), cervical cancer screening (446, 44 %) and BSE practice (363, 36 %). Age range (26 – 40 years), educational level (tertiary) and marital status were demographic data that influenced knowledge level. Though with a fairly satisfactory knowledge level, the screening uptake among studied population is very poor as only (111, 11 %) had ever been screened and only (22, 2.2 %) ever vaccinated. The major reasons for poor screening uptake were “no awareness of where to be screened” and “no symptoms”.

Conclusions: Assessing the knowledge and uptake level of African women through studies like this is crucial in identifying the loopholes in the fight against cancer in Africa. More efforts are required in promoting utilization of cancer screening services, HPV vaccination and BSE practice among African women. The media and internet should be leveraged on as they are the major sources of information about cancer among the respondents.

**Keywords: breast self-examination, cancer screening, early detection, African women**

## **Background**

Breast and cervical cancer are the most common gynecological cancers globally in both developing and developed nations (1,2). The breast and cervical cancer burden in low- and mid-income countries is increasing significantly due to late diagnosis, unhealthy lifestyle choices, adoption of western lifestyles and increased life expectancy (3). Breast and cervical cancer constitute a major public health 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 (4). In Egypt, cervical cancer was not common as observed in Nigeria with only 969 (0.75 %) reported 128,892 new cancer cases in Egypt in 2018 (4). Meanwhile, breast cancer is also the most prevalent female cancer type in Egypt with a reported 23,081 (35.1 %) new cancer cases (4). Prevention is better and more cost-effective than seeking for 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 breast and cervical cancer burden in developed nations (5). Meanwhile, these interventions are lacking or limited in low- and mid-income countries leading to lots of preventable deaths. 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 (visual inspection with acetic acid for cervical cancer and clinical breast examination for breast cancer). Human Papilloma virus (HPV) has been found culpable in most cervical cancer cases (6). HPV vaccines (quadrivalent Gardasil and bivalent Cervarix)

have been developed and approved to prevent cervical cancer in women (5). Developed countries have also taken advantage of these vaccines which is 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 breast cancer screening (BCS) and cervical cancer screening (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 (7–11). An earlier study (10) 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 (11) 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. Other study (1) from the middle Eastern nation reported low awareness of BCS and breast self-examination (BSE) among the 200 study participants. With the knowledge that gynecological cancers are not spontaneous but develop with age and time, 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 screenings available in their countries. 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 national and global efforts against the menace of breast and cervical cancers.

## **Methods**

### ***Study design***

The cross-sectional questionnaire used as research instrument administered in the official language of both countries (Arabic – Egypt and English – Nigeria) in order to address 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 by virtue of their young population and influence among African nations. They are also among the leading countries with high prevalence of gynecological cancers in Africa. A short introduction was presented to all respondents before proceeding to fill the questionnaire clearly stating the purpose of the study, voluntary participation, anonymity and the safety of all data collected. Being a low-risk, anonymity upheld and non-inclusion of participants under 18 years, informed consent from all respondents was deemed necessary in lieu of an institutional ethics board approval. Informed consent was sought and the email of the principal investigator was supplied for any clarification or withdrawal of participation in line with the World Medical Association Declaration of Helsinki Ethical principles.

### ***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 (12), 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, 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 (13) 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).

### ***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 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: a) Sociodemographic characteristics of respondents, b) Knowledge of CCS, c) Uptake of the HPV vaccine, d) Knowledge of BCS, e) 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>)

### ***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 were 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 Cross-tabs. 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 test.



## **Results**

### ***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 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 (%)	
<i>Country</i>	Egypt (n = 503)	Nigeria (n = 503)
<i>Age (years)</i>		
18 – 25	81 (16.1 %)	66 (13.12 %)
26 – 40	406 (80.72 %)	358 (71.17 %)
>40	16 (3.18 %)	79 (15.71 %)
<i>Education</i>		
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 %)
<i>Marital status</i>		
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 bracket

### ***Sociodemographic information in relation to 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, practice of BSE was poor among the respondents; with only 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>					
Country	Nigeria	217 (43%)	106 (21%)	180 (36%)	503
	Egypt	68 (14%)	169 (34%)	266 (53%)	503
Age (years)	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
Marital status	Single	184 (26%)	198 (28%)	317 (45%)	699
	Ever married	101 (33%)	77 (25%)	129 (42%)	307
Educational level	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
<b>Sociodemographic data and BCS knowledge</b>					
Country	Nigeria	244 (49%)	89 (18%)	170 (34%)	503
	Egypt	72 (14%)	178 (35%)	253 (50%)	503
Age (years)	15-25	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	Secondary	59 (46%)	25 (20%)	43 (34%)	127
	Bachelors	215 (29%)	200 (27%)	319 (43%)	734
	Postgraduate	42 (29%)	42 (29%)	61 (42%)	145
<b>Sociodemographic data and BSE practice</b>					
Country	Nigeria	172 (34%)	156 (31%)	175 (35%)	503
	Egypt	94 (19%)	221 (44%)	188 (37%)	503
Age (years)	15 – 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

### ***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%) a satisfactory BSE knowledge from a maximum obtainable score of 13. The media/internet (n = 457/737, 62.01 %) and health practitioners (n = 172/737, 23.34 %) were respondents' major sources of information about breast and cervical cancer. Although majority 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, majority 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. Majority of participants (n = 871/1006, 86.6 %) are willing to be screened if properly oriented (Supplementary S1).

### ***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) have very good knowledge of BCS (355, 46 %) compared to other age groups.

The impact of age on CCS knowledge was likewise explored. The 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. 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,  $r = 0.455$ .  $Z_{obs}$  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. 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 ( $r=0.701$ ).  $Z_{\text{obs}}$  value was  $>1.96$ , hence, correlation coefficients are statistically significantly different.

## **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 death from the disease (6). Breast and cervical cancers are preventable and have a high survival rate if detected early but it is disheartening that most women present late for medical intervention (14). Early detection, hinged on presentation for screenings 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 majority of respondents have good knowledge of BCS (690, 68.59 %) and CCS (721, 71.67 %). We likewise observed that the media/internet (457, 62.01 %) and health professionals (172, 23.34 %) serve as major sources of information about cancer and cancer screening. The major limitations cited for not being screened were; “no observed symptoms”, not aware of where to be screened, lack of time, screening cost consideration and religious/cultural reasons.

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 in order to adhere to the World Health Organization’s social and public health guidelines associated with the novel coronavirus. The internet penetration rate in Egypt (48.1 %) and Nigeria (61.2 %) might have in a way contributed to the majority of participants identifying media/internet as their major source of information. Meanwhile, an earlier study also identified the media or internet as major source of information about cancer and cancer screening services (2). Earlier study (10) have 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 (10), 35 % CCS knowledge in Tanta governorate, Egypt (11) 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, (8) 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 knows how to perform BSE. Like other cancer types, early detection of breast cancer plays a vital role in increased 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 (5) suggesting financial constraint as a possible limitation to the uptake of cancer screening (Pap smear test – 30 \$ and clinical breast examination – 15 \$). BSE is a no- or low-cost and convenient screening method for early detection of changes in 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, women in low and mid-income countries seem to have good knowledge but bad practice of BSE. The major reasons for not practicing BSE is 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 lump or milky discharge.

Respondents have good knowledge of CCS but HPV vaccination and screening uptake was very poor. Awareness of CCS test was (495, 49.2 %) and HPV vaccines (118, 11.7 %). Only (111, 11.0 %) 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 (5) with only 22 (5.6%) and 103 (26.2%) studied female healthcare providers ever received HPV vaccination and Pap smear test respectively. Major reasons for not been screened include no symptoms (n = 456/895, 50.95 %), not aware of where to be screened (n = 276/895, 30.84 %). This corroborates a study (11) on Egyptian women whereby only 13.3 % of 1,000 study participants are aware of Pap smear test, while 199 (19.9 %) have ever taken HPV vaccine and 667 (83.3 %) identified lack of awareness as a reason for not being screened. 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 (11) on Egyptian women.

## **Conclusion**

Breast and cervical cancer are preventable and hold a good chance of survival if detected early. The uptake of cancer screening services promotes early detection. The present study showed fair knowledge of BCS and CCS among study participants. However, awareness level did not correlate with uptake of screening services as the majority of the women studied have never been screened or vaccinated. Also, the practice of BSE was not satisfactory; this calls for more efforts in promoting uptake or utilization of cancer screening, HPV vaccination and BSE among women. The media and internet should be leveraged on as they serve as the major sources of information about cancer for most young women. Further studies should look into assessing the knowledge and uptake of breast and cervical cancer screenings in older and other women with no internet accessibility in Nigeria and Egypt.

## **List of abbreviations**

ANOVA - analysis of variance

BCS - breast cancer screening

BSE - breast self-examination

CCS - cervical cancer screening

HPV - Human Papilloma virus

NGOs - Non-Governmental Organizations

## **Declarations**

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

A short introduction was presented to all respondents before proceeding to fill the questionnaire clearly stating the purpose of the study, voluntary participation, anonymity and the safety of all data collected. Being a low-risk, anonymity upheld and non-inclusion of participants under 18 years, informed consent from all respondents was deemed necessary in lieu of an institutional ethics board approval. Informed consent was sought and the email of the principal investigator was supplied for any clarification or withdrawal of participation in line with the World Medical Association Declaration of Helsinki Ethical principles.

### **Consent for publication**

Not applicable

### **Availability of data and material**

All datasets generated and used during this study have been presented as tables and supplementary file.

### **Competing interests**

The authors declare no competing interests

## **Funding**

No funding received for this study

## **Authors' contributions**

OO: Conceptualization, Methodology, Data analysis, Writing of first manuscript. GM: Methodology, Data collection, review and final draft. EO: Methodology, Language editing, Analysis, Review. AM: Data collection, review and final draft. GA: Data collection, review and final draft. SM: Data collection, review and final draft. NC: Data collection, review and final draft. All authors read and approved the final draft of this manuscript

## **Acknowledgements**

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

## **References**

1. Ewaid SH, Shanjar AM, Mahdi RH. Knowledge and practice of breast self-examination among sample of women in Shatra / Dhi-Qar / Iraq. Alexandria J Med [Internet]. 2018;54(4):315–7. Available from: <https://doi.org/10.1016/j.ajme.2017.12.002>
2. Kumar H, Tanya S. A Study on Knowledge and Screening for Cervical Cancer among Women in Mangalore City. Ann Med Heal Sci Res [Internet]. 2014;4(5):751–6. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4199169>
3. Cancer [Internet]. [cited 2020 Nov 17]. Available from: [https://www.who.int/health-topics/cancer#tab=tab\\_1](https://www.who.int/health-topics/cancer#tab=tab_1)
4. Global Cancer Observatory [Internet]. [cited 2020 Nov 17]. Available from:

<https://gco.iarc.fr/>

5. Heena H, Durrani S, Alfayyad I, Riaz M, Tabasim R, Parvez G, et al. Knowledge , Attitudes , and Practices towards Cervical Cancer and Screening amongst Female Healthcare Professionals: A Cross-Sectional Study. *J Oncol*. 2019;
6. WHO. Cervical cancer [Internet]. WHO Africa. 2020 [cited 2020 Aug 1]. Available from: <https://www.afro.who.int/health-topics/cervical-cancer>
7. Arulogun OS, Maxwell OO. Perception and utilization of cervical cancer screening services among female nurses in University College Hospital, Ibadan, Nigeria. *Pan Afr Med J*. 2012;11(69):1–8.
8. Ajayi MP, Amoo EO, Olawande TI, Iruonagbe TC, Idowu AE, Olujide A. Awareness of Breast and Cervical Cancer among Women in the Informal Sector in Nigeria. *Open Access Maced J Med Sci*. 2019;7(14):2371–6.
9. Ndikom CM, Ofi BA. Awareness , perception and factors affecting utilization of cervical cancer screening services among women in Ibadan, Nigeria: a qualitative study. *Ndikom Ofi Reprod Heal* [Internet]. 2012;9(11):1–8. Available from: <http://www.reproductive-health-journal.com/content/9/1/11>
10. Ezem BU. Awareness and uptake of cervical cancer screening in Owerri, South-Eastern Nigeria BU. *Ann Afr Med*. 2007;6(3):94–8.
11. Yakout SM, Moawed S, Gemeay EM. Cervical Cancer and Screening Test (PAP Test): Knowledge and Beliefs of Egyptian Women. *Am J Nurs Sci*. 2016;5(5):175–84.
12. OpenEpi Menu [Internet]. [cited 2020 Nov 17]. Available from: [https://www.openepi.com/Menu/OE\\_Menu.htm](https://www.openepi.com/Menu/OE_Menu.htm)

13. Africa Internet Users, 2020 Population and Facebook Statistics [Internet]. [cited 2020 Nov 17]. Available from: <https://www.internetworldstats.com/stats1.htm>
14. Cervical cancer [Internet]. [cited 2020 Nov 17]. Available from: [https://www.who.int/health-topics/cervical-cancer#tab=tab\\_1](https://www.who.int/health-topics/cervical-cancer#tab=tab_1)