**BREAST CANCER AMONG WOMEN IN NIGERIA: SYSTEMATIC REVIEW OF A 15-YEAR PREVALENCE RATE AND A SITUATIONAL ANALYSIS.**

**ABSTRACT**

Breast cancer is a growing menace to the world, especially in developing West Africa countries such as Nigeria. Its incidence in Nigeria has been rising and yet so many cases remain undocumented especially due to poor reportage and late presentation. A number of issues and risk factors as identified such as lifestyle habits, social economic status, age and exposure to certain hormones predispose women to breast cancer and several challenges are currently faced in detecting and managing breast cancer in Nigeria especially in the aspect of medical imaging technology, update in treatment and finances. The purpose of this analysis is to document and explore the prevalence of breast cancer among women in Nigeria. A systematic review was done using the PRISMA review process this resulted in the eventual selection of studies that met the inclusion and exclusion criteria. It was observed that studies have shown that the prevalence of breast cancer in most parts of the Nigerian states do not give the true picture as many of these states lack national cancer registries and a few studies have been conducted on this paramount issue.

**KEYWORDS: Breast, Cancer, Prevalence, Community, Women, PRISMA**

**INTRODUCTION:**

The menace of breast cancer is currently noted to be increasing at an alarming rate and according to the GLOBOCAN 2020 [1], breast cancer has been reported as the most common cause of cancer related deaths in Nigeria accounting for 18.1% of all cancer deaths in the country [1]. To further buttress this, the latest 2020 report from the International Agency Research on Cancer (IARC) recorded 28,380 new BC cases which represent 22.7% of new cancers [2].

The annual rise in the incidence of breast cancer is dependent partly on the country’s human development index (HDI) [3,4]. It was noted that countries with a high HDI, such as the US and European countries, recorded a yearly breast cancer incidence rate increase of less than 0.5% (age-standardized incidence rate, 75.6 cases/100 000 population), whereas low- and middle-HDI regions like countries in sub-Saharan Africa (SSA) recorded an increase in age-standardized incidence rate of greater than 5% (low-HDI countries, 27.8 cases/100,000; middle-HDI countries, 36.1 cases/100 000) [5]. As regards Nigeria it is seen that the incidence of breast cancer, is currently 54.3/100,000, has risen significantly over the last 10–20 years [6]. This increase is projected to continue in the coming years [7] except necessary measures are put in place to mitigate the rate at which it is rampant.

High mortality rate in Nigeria has been attributed to factors such as inadequate population awareness, poor health seeking behavior, low levels of female education, and empowerment in addition to a poor health system leading to minimal level of treatment services [8]. To the extent it has been observed that the stage of diagnosis of breast cancer is a major contributor to poor survival [9]. Early-stage disease generally offers a more favorable prognosis compared to late-stage disease. In most high-income countries (HICs), significant reductions in breast cancer mortality rates over the past two decades can largely be attributed to earlier detection through improved screening practices and advancements in treatment options [10].

The motivation of the paper is especially from the point of view that most of the cancer registries in the country especially that of breast cancer are not properly documented. The main objectives of the paper include:

1. Document the recent prevalence of breast cancer amongst women as seen in as many studies, available data in states that they have been investigated.
2. Identify the factors that can be prone to breast cancer in Nigeria
3. Report on the situational analysis: knowledge, attitudes and practices in respect of breast cancer in Nigeria women
4. Discuss the challenges faced in the detection, diagnosis and management of breast cancer in Nigeria

**PREVALENCE OF BREAST CANCER**

In 1960, Nigeria cancer registration started with the formation of the Ibadan cancer registry [11]. Presently, the country has 33 cancer registries, comprising 13 population-based and 20 hospital-based registries, all coordinated by the Nigerian National System of Cancer Registries (NSCR) [12]. These registries are unevenly distributed, with approximately two-thirds (22) located in southern Nigeria. Each of the six regions in the country has at least one population-based cancer registry (PBCR), with the South-South region hosting four and the South-West region hosting three. However, the IARC GLOBOCAN 2020 publication included data from only four PBCRs in Nigeria: Abuja, Calabar, Ekiti, and Ibadan [13]. In Nigeria's North-West geopolitical zone, breast cancer ranks as the second most common cancer after cervical cancer. However, data from the cancer registry at the University College Hospital (UCH), Ibadan, indicates that breast cancer is the most prevalent malignancy among women [38]. In the North-Central region, breast cancer represents 22.41% of newly registered cancer cases over a five-year period and comprises 35.41% of all cancers diagnosed in women [36,39]. This goes to demonstrate that comprehensive and much reliable data gathering is not totally achieving its peak purpose for which it is meant for. However, the table below shows the recent or nearly information that relates to breast cancer prevalence gathered from some of the states in the country.

**METHODOLOGY**

A review of cancer registers from states and articles from past works seen in data bases such as PubMed, Advanced PubMed Search, Google Scholar and web of science with the following search MeSH terms (Breast Cancer[Title]),OR (Cancer of Breast[Title])), OR (Cancer of the Breast[Title])), (Women in Nigeria) OR (Nigerian Women), (Prevalence of Breast Cancer) OR (Breast Cancer Prevalence).

A total of 210 articles were initially identified through searches in electronic databases. After importing these articles into EndNote software, duplicate entries were eliminated, reducing the count to 93. Four independent researchers then reviewed the titles and abstracts of the remaining articles to assess their relevance, narrowing the selection to 31. Additionally, conference abstracts were searched, and the reference lists of the selected articles were examined to identify any further relevant studies. Following the application of predefined inclusion and exclusion criteria, 14 studies were ultimately selected for inclusion in the research of which 5 were from cancer registers of the states and 9 from data bases and previous studies conducted.

**Inclusion criteria**

Studies or online cancer register with quantitative data on prevalence rate in Nigeria with contributing risk factors were included in the review. This cut across different studies which included: cross-sectional study, systematic reviews and meta-analysis with available full text in English and published between January 2014 and December 2024 were also considered.

**Exclusion criteria**

The review excluded interventional studies, case-control studies, reviews, reports, commentaries, letters to the editor, and books. Furthermore, studies that focused on diagnostic methods, therapeutic approaches, or medication-based treatments were also not included in the analysis.

**Identification of studies via databases and registers**

Records removed *before screening*:

Duplicate records removed (n =100 )

Records marked as ineligible by automation tools (n =15 )

Records removed for other reasons (n = 2)

Records identified from\*:

Databases (n =205 )

Registers (n =5 )

**Identification**

Records screened

(n =31)

Records excluded

(n =17)

**Screening**

Reports assessed for eligibility

(n =14)

Studies included in review

(n =9)

Reports of included studies

(n =5)

**Included**

[44]

Fig.1 PRISMA FLOW CHART

Table 1 : Prevalence of breast cancer

|  |  |  |
| --- | --- | --- |
| **State** | **Prevalence rate (in % or 100,000)** | **Year Published** |
| Edo[14] | 35.8% | 2024 |
| Lagos [15] | 41% | 2022 |
| Abuja [16] | 45.3% | 2021 |
| Delta [17] | 36.5% | 2020 |
| Ekiti [12] | 28.3 per 100,000 | 2021 |
| Ibadan [19] | 40.8% | 2023 |
| Calabar [20] | 35 per 100,000 | 2016 |
| Enugu [21] | 54.3 per 100,00 | 2022 |
| Rivers [18] | 51.3% | 2012 |
| Ogun [21] | 40.9% | 2022 |
| Akwa Ibom [22] | 33% | 2018 |
| Anambra [16] | 40.9% | 2021 |
| Gombe [21] | 33.5% | 2022 |
| Kogi [23] | 6.6 per 100,000 | 2019 |

From the search conducted it was noted that many states in the country did not have a standard reference point or record for registration of newly diagnosed breast cancer cases. Furthermore, it was also seen that most of significant studies collated were not updating or keeping up with recent record of cases diagnosed as often, hence the reviewer saw most states that documented cases via their cancer inventory between the ranges of 10-15 years.

**IDENTIFIABLE RISK FACTORS FOR BREAST CANCER PREVALENCE IN NIGERIA**

A risk factor is an individual trait, whether genetic, acquired, or lifestyle-related, that has been linked to the likelihood of developing a disease condition which can have a lasting impact on patient health [24]. Risk factors also have been noted to have a great impact on the entire and eventually public health on the long run. Quick and prompt identification of these risk factors have led to early detection of diseases, better control and management of prevalence conditions. Another definite stride is the fact that awareness creation on the risk factors of certain conditions has been made known to the public to foster the sensitization on any disease condition of importance.

In the case of breast cancer, noted identifiable risk factors especially within the Nigeria context are discussed below;

1. **Social Economic Status:** High socioeconomic status, assessed through factors such as regional deprivation levels and individual indicators like a woman's education, income, and her husband's occupation, has been observed to be associated with an increased risk of breast cancer, particularly in high-income countries [25]. To this end it has been reported that most of this cases are mostly reported in the urban areas. However compared to the rural areas with low socioeconomic status, the incidence of the condition is under reported.
2. **Lifestyle habits:** Many women in Nigeria have been observed to indulge in habits that are detrimental to their state of health. Some of these life style habits include: Alcohol, Obesity, Lack of physical activity, Smoking, and Diet reach in saturated fats with less fibers are all seen to be precursors to developing breast cancer [26]. Women who have 1 alcoholic drink will develop a slight chance (about 7% to 10%) increase in risk compared with those who don't drink, while women who have 2 to 3 drinks a day have about a 20% higher risk of developing breast cancer. Estrogen hormone is majorly implicated in breast cancer and has been found to be in excess especially in women who are overweight. More fat tissues can predispose one to breast cancer especially after menopause and its prevalence has been observed to be more in women in Nigeria [27,28].
3. **Early onset of menstruation and late menopause:** a collective pool of analysis from more than 100 studies found that for every year younger a woman was when she began her period, the possibility of developing breast cancer risk increased by 5% [29]. Cases of this have been reported in Nigeria where case control studies reflected this risk factor [30].
4. **Family History of Breast cancer:** It has been studied that when there is a family history of first degree relatives who have been diagnosed of breast, ovarian, or colorectal cancer, have high probability of developing breast cancer on the long run [31]. Study has revealed that one in eight women in Nigeria have developed breast cancer from inherited genes (BRCA1 and BRCA2 genes) [32].

Other risk factors include early exposure to use of estrogen based drugs and use of dyes has been implicated in other studies as potential carcinogenic agents for breast cancer [32].

**REPORT ON THE SITUATIONAL ANALYSIS: KNOWLEDGE, ATTITUDES AND PRACTICES IN RESPECT OF BREAST CANCER IN NIGERIA WOMEN**

Awareness creation on breast cancer plays a key role in lowering the risk of developing the disease in Nigerian community. Related studies found that women were unaware of specific breast changes commonly linked to breast cancer [34]. Many studies have reported that the most frequently observed signs and symptoms include nipple discharge, alterations in breast size and shape, changes in breast coloration, persistent nipple itching, breast pain, tenderness, and inflammation [35,36,37].

The studies have revealed that while the majority of participants recognized breast cancer as the most prevalent cancer among Nigerian women, their understanding of the risk factors associated with its development and the role of diet in modifying these risks was insufficient. Participants primarily identified family history, poor diet, smoking, female gender, and alcohol consumption as the key risk factors for the disease. These findings highlight a significant gap in awareness regarding the risk factors for breast cancer among Nigerian women [39]. Most of the studies perused through made use of small populations sizes, while cancer registers not usually updated revealed are not significantly sufficient to be relied upon as it they give a rough estimated figure of the reality on ground. This implies that more up to date studies need out be carried out to ascertain recent prevalence of breast cancer in Nigeria.

Awareness and proactive health-seeking behavior for breast cancer management are notably low in Africa, leading to most patients seeking hospital care at advanced stages (III and IV) when eventually diagnosed [40], and at this stage, treatment options are limited. This delay is likely due to the lack of early disease detection in developing countries [41].

**THE CHALLENGES FACED IN THE DETECTION, DIAGNOSIS AND MANAGEMENT OF BREAST CANCER IN NIGERIA**

Despite the severe impact of breast cancer, it is of great concern that many Nigerian women have limited or no knowledge of the disease. Even among those who are aware, reluctance to seek medical care remains prevalent, leading to avoidable or premature deaths. This negative attitude has been attributed to various socio-cultural, religious, genetic, and economic influences [36].

Health beliefs differ across cultures and the perception of cancer as a fatal disease may deter many individuals from adopting health-promoting behaviors. In some societies, illnesses and catastrophic events are often seen as predestined or act of divine will, making fatalism a deeply ingrained worldview.

In many African communities, chronic illnesses are frequently linked to supernatural causes such as witchcraft or evil spirits. Cultural values and ethnic diversity significantly shape health beliefs, influencing how rural women engage with Western medicine, particularly in conditions like breast cancer. Fear and stigma further contribute to delays in seeking medical care, as some women worry that a breast cancer diagnosis could negatively impact their daughters' marriage prospects, based on the belief that the disease may be hereditary. Additionally, cancer is often regarded as a divine punishment or an unavoidable fate [36].

These cultural and societal factors continue to play a critical role in the high prevalence of breast cancer in Nigeria and other Sub-Saharan African countries.

Breast self-examination (BSE) is a basic skill in the early detection of breast cancer, however its knowledge and practice has been observed to vary amongst the women in Nigeria based on level of exposure and education. Practice has been reported to be high amongst women with relatively high level of education and amongst those in urban areas compared to the women in the rural areas [42]. Mammography screening can be used to identify breast cancer in women without symptoms. Despite its limitations in low- and middle-income countries (LMCs), where challenges such as poor infrastructure, poverty, and insufficient human resources exist, it remains the preferred method for screening and diagnosis. When implemented effectively, mammography has the potential to significantly reduce breast cancer-related morbidity and mortality [43].

**LIMITATIONS AND RECOMMENDATIONS**

In the review, it was observed that many states do not have a cancer register especially that for breast cancer. This is quite a setback as vital data is lost due to little or no documentations of newly diagnosed cases. Furthermore, it appears that hospitals, medical professionals especially surgeons are not taking into cognizance the need to investigate into the dilemma of the disease as the field of breast oncology is not only focused on diagnosing and treating the disease but a proper documentation and follow up of cases such that they can be published and explored for the benefit of science. To this end, the researchers hereby put forward that the government of various states take the health issues especially as regards breast cancer seriously so as to make available quality care to patients. Additionally, grants should be given to medical professionals to equip their training in the field and proper documentation and reporting of cases should be done. Public awareness creation, sensitization and education is very paramount in achieving regular screening, diagnosis, and treatment.

**CONCLUSION:**

From current situational analysis, it is clearly seen that the absence of fundamental knowledge and an effective system for disseminating and ensuring quality information about breast cancer poses an important barrier to the health and well-being of women in Nigeria. No doubt that Breast cancer has emerged as a leading cause of mortality, quietly claiming the lives of women especially in their reproductive age, particularly those with limited or no education. This issue is further exacerbated by the lack of timely access to information about breast cancer and inadequate diagnostic screening methods for early detection of the disease**.**

**REFERNCES**

1. Sung H, Ferlay J, Siegel RL , Laversanne M, Soerjomataram I, Jemal A, Bray F. CA Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries.: a cancer journal for clinicians.2021;71(3). CrossRef
2. Agodirin Olayide, Aremu Isiaka , Rahman Ganiyu et al. Breast Cancer Treatment and Outcomes in Nigeria: A Systematic Review and Meta-analysis (2023) DOI 10.31557/apjcc.2023.8.3.591-598
3. Trimble EL. Breast cancer in sub-Saharan Africa. J Glob Oncol 2017;3:187–188. doi:10.1200/JGO.2016.008433.
4. Huang J﻿, Chan PS﻿, Lok V﻿, et al. Global incidence and mortality of breast cancer: a trend analysis. 2021;13(4):5748-5803. doi:10.18632/aging.202502
5. Sharma R﻿. Breast cancer incidence, mortality and mortality-to-incidence ratio (MIR) are associated with human development, 1990-2016: evidence from Global Burden of Disease Study 2016. ﻿ Breast Cancer. 2019;26(4):428-445. doi:10.1007/s12282-018-00941-4
6. Olasehinde, O., Alatise, O., Omisore, A., Wuraola, F., Odujoko, O., Romanoff, A., Akinkuolie, A., Arowolo, O., Adisa, A., Knapp, G., Famurewa, O., Omisile, I., Onabanjo, E., Constable, J., Omoniyi-Esan, G., Adesunkanmi, A. R., Lawal, O., & Kingham, T. P. (2021). Contemporary management of breast cancer in Nigeria: Insights from an institutional database. *International journal of cancer*, *148*(12), 2906–2914. <https://doi.org/10.1002/ijc.33484>
7. Azubuike SO, Muirhead C, Hayes L, McNally R. Rising global burden of breast cancer: the case of sub-Saharan Africa (with emphasis on Nigeria) and implications for regional development: a review. World J Surg Oncol. 2018;16: 63. [DOI] [PMC free article] [PubMed] [Google Scholar
8. Copson E., Maishman T., Gerty S., et al. Ethnicity and outcome of young breast cancer patients in the United Kingdom: the POSH study. British Journal of Cancer . 2014;110(1):230–241. doi: 10.1038/bjc.2013.650. [DOI] [PMC free article] [PubMed]
9. Jedy-Agba E., McCormack V., Adebamowo C., Santos-Silva I. Stage at diagnosis of breast cancer in sub-Saharan Africa: a systematic review and meta-analysis. The Lancet Global Health . 2016;4(12):e923–e935. doi: 10.1016/S2214-109X(16)30259-5. [[DOI](https://doi.org/10.1016/S2214-109X(16)30259-5)] [[PMC free article](https://pmc.ncbi.nlm.nih.gov/articles/PMC5708541/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/27855871/)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=The%20Lancet%20Global%20Health&title=Stage%20at%20diagnosis%20of%20breast%20cancer%20in%20sub-Saharan%20Africa:%20a%20systematic%20review%20and%20meta-analysis&author=E.%20Jedy-Agba&author=V.%20McCormack&author=C.%20Adebamowo&author=I.%20Santos-Silva&volume=4&issue=12&publication_year=2016&pages=e923-e935&pmid=27855871&doi=10.1016/S2214-109X(16)30259-5&)]
10. Harbeck N., Gnant M., Thomssen C. Breast cancer is our global responsibility. Breast Care . 2015;10(6):360–360. doi: 10.1159/000443159. [DOI] [PMC free article] [PubMed] [Google Scholar][Ref list]
11. Jedy-Agba EE, Oga EA, Odutola M, Abdullahi YM, Popoola A, Achara P, et al. Developing National Cancer Registration in Developing Countries – Case Study of the Nigerian National System of Cancer Registries. Front Public Health. 2015;3. Available from: <http://journal.frontiersin.org/Article/10.3389/fpubh.2015.00186/abstract>
12. Akintola A, Odutola M, Olayinka T, Akinjola A, Nwokwu U, Adebamowo C, editors. Cancer in Nigeria 2009 - 2016. 2nd ed. Nigeria: Nigerian National System of Cancer Registries Federal Ministry of Health of Nigeria; 2021. Availablefrom: <https://nigeriancancerregistries.net/wp-content/uploads/2021/03/CANCER-IN-NIGERIA-VOLUME-II.pdf>.
13. International Agency for Research on Cancer W. IARC Globocan 2020: Nigeria Fact Sheets. IARC GLOBOCAN 2020. Lyon, France: IARC, WHO;p. 2. Available from:<https://gco.iarc.fr/today/data/factsheets/populations/566-nigeria-fact-sheets.pdf>
14. Oko-oboh, G.A., Auvinen, A., Obaseki, D.E. et al. Improving cancer incidence evaluation through local government area matching: a study of the Edo-Benin cancer registry in Nigeria. BMC Public Health 24, 514 (2024). <https://doi.org/10.1186/s12889-024-17972-6>
15. Omosun A, Abayomi A, Ogboye O, et al. Distribution of Cancer and Cancer Screening and Treatment Services in Lagos: A 10-Year Review of Hospital Records. JCO Glob Oncol. 2022;8:e2200107. doi:10.1200/GO.22.00107
16. Akintola A, Odutola M, Olayinka T, et al., editors. Cancer in Nigeria: 2009 – 2016 [Internet]. Nigeria: Nigerian National System of Cancer Registries; 2021. Table 1.3, Cancer Incidence in Abuja. 2009 to 2016 - Females. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK581057/table/abuja-federalcapitalterritory.t3/>
17. Uchendu, O. (2020). Cancer Incidence in Nigeria: A Tertiary Hospital Experience. *Asian Pacific Journal of Cancer Care*, *5*(1), 27-32. <https://doi.org/10.31557/apjcc.2020.5.1.27-32>
18. Jedy-Agba E, Curado MP, Ogunbiyi O, et al. Cancer incidence in Nigeria: a report from population-based cancer registries. Cancer Epidemiol. 2012;36(5):e271-e278. doi:10.1016/j.canep.2012.04.007
19. Agodirin .O , Aremu .I , Rahman .G et al ‘Breast Cancer Treatment and Outcomes in Nigeria: A Systematic Review and Meta-analysis’ Vol 8 No 3 (2023) DOI [**10.31557/apjcc.2023.8.3.591-598**](https://doi.org/10.31557/apjcc.2023.8.3.591-598). <https://waocp.com/journal/index.php/apjcc/article/view/1074>
20. Ima-Obong A. Ekanem, Donald M. Parkin,Five year cancer incidence in Calabar, Nigeria (2009–2013), Cancer Epidemiology, Volume 42,2016,Pages 167-172, ISSN1877-7821, <https://doi.org/10.1016/j.canep.2016.04.014.(https://www.sciencedirect.com/science/article/pii/S1877782116300546)>
21. Ntekim A, Oluwasanu M, Odukoya O. Breast Cancer in Adolescents and Young Adults Less Than 40 Years of Age in Nigeria: A Retrospective Analysis. *Int J Breast Cancer*. 2022;2022:9943247. Published 2022 Jul 29. doi:10.1155/2022/9943247
22. Nwafor CC, Nwafor NN. The pattern and distribution of cancers in Akwa Ibom State, Nigeria. Niger J Clin Pract. 2018 May;21(5):603-608. doi: 10.4103/njcp.njcp\_316\_17. PMID: 29735861.
23. Manir H.J , Aminu A.K. 2019 Clinical Prevalence and Management of Breast Cancer in Selected Tertiary Hospitals in Nigeria Texila International Journal of Public Health Special Edition Dec 2019. <https://www.texilajournal.com/thumbs/article/Public%20Health%20Special%20Edition_26.pdf>.
24. Virginia J. Howard, Stroke, Epidemiology, Reference Module in Neuroscience and Bio behavioral Psychology, Elsevier, 2018, SBN 9780128093245, <https://doi.org/10.1016/B978-0-12-809324-5.03904-3>. (<https://www.sciencedirect.com/science/article/pii/B9780128093245039043>)
25. Cancer research UK. [**Breast cancer incidence (invasive) statistics**](https://www.cancerresearchuk.org/health-professional/cancer-statistics/statistics-by-cancer-type/breast-cancer/incidence-invasive#heading-Six). 2020. Accessed June 26, 2020
26. Ikechukwu CILO, Amari O, Nnenna L, et al. Breast cancer knowledge among wmen in Ebonyi State, Nigeria: implication for women breast cancer education. J Health Edu Res Dev 2015;3:129. doi:10.4172/2380-5439.100012
27. American Cancer Society 2022 <https://www.cancer.org/cancer/types/breast-cancer/risk-and-prevention/lifestyle-related-breast-cancer-risk-factors.html>
28. Adeloye D, Ige-Elegbede JO, Ezejimofor M, Owolabi EO, Ezeigwe N, Omoyele C, Mpazanje RG, Dewan MT, Agogo E, Gadanya MA, Alemu W, Harhay MO, Auta A, Adebiyi AO. Estimating the prevalence of overweight and obesity in Nigeria in 2020: a systematic review and meta-analysis. Ann Med. 2021 Dec;53(1):495-507. doi: 10.1080/07853890.2021.1897665. PMID: 33783281; PMCID: PMC8018557.
29. Surveillance Research Program, National Cancer Institute. SEER\*Explorer. Breast Cancer – Breast cancer risk from birth over time, by sex, all races/ethnicities, risk of being diagnosed with cancer (2018-2019,2021). Accessed on July 9, 2024. https://seer.cancer.gov/explorer/, 2024. <https://www.komen.org/breast-cancer/risk-factor/references/>
30. Wang S, Ogundiran T, Ademola A, Olayiwola OA, Adeoye A, Sofoluwe A, Morhason-Bello I, Odedina S, Agwai I, Adebamowo C, Obajimi M, Ojengbede O, Olopade OI, Huo D. Development of a Breast Cancer Risk Prediction Model for Women in Nigeria. Cancer Epidemiol Biomarkers Prev. 2018 Jun;27(6):636-643. doi: 10.1158/1055-9965.EPI-17-1128. Epub 2018 Apr 20. PMID: 29678902; PMCID: PMC6086588.
31. Mukama T, Kharazmi E, Sundquist K, Sundquist J, Brenner H, Fallah M. Familial risk of breast cancer by dynamic, accumulative, and static definitions of family history. Cancer. 126(12):2837-2848, 2020.
32. Zheng Y, Walsh T, Gulsuner S, et al. Inherited Breast Cancer in Nigerian Women. *J Clin Oncol*. 2018;36(28):2820-2825. doi:10.1200/JCO.2018.78.3977
33. Cumber, S. N., Nchanji, K. N., & Tsoka-Gwegweni, J. M. (2017). Breast cancer among women in sub-Saharan Africa: prevalence and a situational analysis. *Southern African Journal of Gynaecological Oncology*, *9*(2), 35–37. <https://doi.org/10.1080/20742835.2017.1391467>
34. Thomas AS, Kidwell KM, Oppong JK, et al. Breast cancer in Ghana: demonstrating the need for population based cancer registries in low and middle-income countries. J Glob Oncol 2017. doi:10.1200/JGO.2016.006098
35. Etikan I, Alkassin R, Abubakar S. Statistical analysis on the reported cases of breast cancer. Biometrics &Biostatistics International Journal. 2016;4(1) <https://doi.org/10.15406/bbij.2016.04.00086>
36. George TO, Allo TA, Amoo EO, Olonade O. Knowledge and Attitudes about Breast Cancer among Women: A Wake-Up Call in Nigeria. *Open Access Maced JMedSci*. 2019;7(10):1700-1705. Published 2019 May 25. doi:10.3889/oamjms.2019.221
37. Azubuike, Samuel O. Breast Cancer Risk Factors and Signs: How Much do Nigerian Women Know?. International Journal of Advanced Medical and Health Research 4(1):p 40-43, Jan–Jun 2017. | DOI: 10.4103/IJAMR.IJAMR\_45\_16
38. Ogunsiji OO, Kwok C, Fan LC. Breast cancer screening practices of African migrant women in Australia:a descriptive cross-sectional study. BMC Women's Health. 2017 doi: 10.1186/s12905-017-0384-0. https://doi.org/10.1186/s12905-017-0384-0 PMid:28412942 PMCid:PMC5392914. [[DOI](https://doi.org/10.1186/s12905-017-0384-0)] [[PMC free article](https://pmc.ncbi.nlm.nih.gov/articles/PMC5392914/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/28412942/)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=BMC%20Women%27s%20Health&title=Breast%20cancer%20screening%20practices%20of%20African%20migrant%20women%20in%20Australia:a%20descriptive%20cross-sectional%20study&author=OO%20Ogunsiji&author=C%20Kwok&author=LC%20Fan&publication_year=2017&pmid=28412942&doi=10.1186/s12905-017-0384-0&)][[Ref list](https://pmc.ncbi.nlm.nih.gov/articles/PMC6560304/#ref3)]
39. Halmata M, Tagne RS, Kembaou GN, Baiguerel 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.
40. Ströbele L, Kantelhardt EJ, Traoré Millogo TFD, Sarigda M, Wacker J, Grosse Frie K. Prevalence of breast-related symptoms, health care seeking behaviour and diagnostic needs among women in Burkina Faso. BMC Public Health. 2018;18:447. doi: 10.1186/s12889-018-5360-6. [[DOI](https://doi.org/10.1186/s12889-018-5360-6)] [[PMC free article](https://pmc.ncbi.nlm.nih.gov/articles/PMC5883529/)] [[PubMed](https://pubmed.ncbi.nlm.nih.gov/29615015/)] [[Google Scholar](https://scholar.google.com/scholar_lookup?journal=BMC%20Public%20Health&title=Prevalence%20of%20breast-related%20symptoms,%20health%20care%20seeking%20behaviour%20and%20diagnostic%20needs%20among%20women%20in%20Burkina%20Faso&author=L%20Str%C3%B6bele&author=EJ%20Kantelhardt&author=TFD%20Traor%C3%A9%20Millogo&author=M%20Sarigda&author=J%20Wacker&volume=18&publication_year=2018&pages=447&pmid=29615015&doi=10.1186/s12889-018-5360-6&)]
41. Martei YM, Pace LE, Brock JE, Shulman LN. Breast cancer in low- and middle-income countries: Why we need pathology capability to solve this challenge. Clin Lab Med. 2018;38:161–73. doi: 10.1016/j.cll.2017.10.013. [DOI] [PMC free article] [PubMed] [Google Scholar]
42. Johnson OE. Awareness and Practice of Breast Self Examination among Women in Different African Countries: A 10-Year Review of Literature. *Niger Med J*. 2019;60(5):219-225. doi:10.4103/nmj.NMJ\_84\_19
43. Amoo EO, Olawole-Isaac A, Okorie N, Ajayi MP, Adekola PO, Amana TR, Olu-Owolabi F. Spousal desertion and coping strategies among women with cervical cancer in Nigeria:a schematic framework for wellbeing. African Population Studies. 2018;32(1) http://aps.journals.ac.za/pub/article/view/1172. [[Google Schol](https://scholar.google.com/scholar_lookup?journal=African%20Population%20Studies&title=Spousal%20desertion%20and%20coping%20strategies%20among%20women%20with%20cervical%20cancer%20in%20Nigeria:a%20schematic%20framework%20for%20wellbeing&author=EO%20Amoo&author=A%20Olawole-Isaac&author=N%20Okorie&author=MP%20Ajayi&author=PO%20Adekola&volume=32&issue=1&publication_year=2018&)ar]
44. McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71