



AN EXPLORATORY STUDY OF BREAST CANCER INCIDENCE RATES AND THE SCREENING FREQUENCIES IN BENUE STATE, NIGERIA

LIAMBEE ALUMUKU AND JOSEPH TERYIMA IORTILE

Email: liambeealumuku@gmail.com

(Received 3 February 2025; Revision Accepted 14 May 2025)

ABSTRACT

Breast cancer incidence in North Central Nigeria has notably surged in the recent past. To investigate the incidence of breast cancer within Benue State as a distinct entity, an exploratory retrospective study was conducted to examine the correlation between breast cancer incidence and screening rates across four selected healthcare facilities in Benue State over a 14-year time frame from 2010-2024. This study involved a thorough analysis of prior clinical records pertaining to breast cancer, concentrating on the incidence of cases and the frequency of screening, regardless of the specific programme methodologies employed. The findings revealed a significant disparity between the incidence of breast cancer and the rates of screening, with a mean incidence of 31.38 cases and a mere 3.86 cases receiving screening. The research identified a robust positive correlation between incidence and the number of screened cases, indicating that heightened awareness or increased incidence may lead to augmented screening initiatives. Nevertheless, the data agrees with the inconsistencies present in detection methodologies, as certain years exhibited a decline in screenings despite a flow in incident cases. The results reiterate the essential role of screening in the early detection of breast cancer and the potential for reducing the prevalence of advanced cases. This research reveals important consequences for public health approaches designed to enhance screening frequencies among populations that face a higher risk of breast cancer.

KEYWORDS: Breast, Cancer screening, Malignant, Benue, Women

INTRODUCTION

Breast cancer is a notable health challenge worldwide, severely influencing women's health and their comprehensive quality of life (Understanding Breast Cancer as a Global Health Concern, 2022). The World Health Organization (WHO) foresees that by 2050, there will be more than 35 million new cancer cases identified worldwide, indicating a remarkable 77% increase in comparison to the figures noted in 2022 (Saika & Matsuda, 2023). In Nigeria, the prevalence of breast cancer has escalated, with nearly 49% of women over the age of 36 receiving diagnoses, positioning Nigeria as the second highest in Africa in terms of prevalence. Early detection through screening is imperative for enhancing treatment outcomes and survival rates (Obahiagbon & Uchendu, 2022).

Numerous modalities for breast cancer screening exist, including mammography, ultrasound, Breast Computed Tomography (BRCT) and Magnetic Resonance Imaging (MRI), with each presenting certain benefits and constraints relevant to particular situations. In resource-limited regions, particularly Nigeria, ultrasound has revealed its potential as a beneficial adjunct to mammography, notably for younger women and those possessing dense breast tissues (Ji, 2023). Nevertheless, the advent of Breast Computed Technology (BRCT) and photon-counting CT (PCT) is revolutionizing breast screening technology, potentially improving early detection rates. The incorporation of these advanced technologies into existing screening initiatives could substantially enhance breast cancer outcomes in Benue State, addressing the pressing need for effective detection strategies, (Rodríguez, 2022).

Liambee Alumuku, Department of Pure and Applied Physics, Federal University Wukari, Wukari, Nigeria
Joseph Teryima Iortile, Department of Physics, National Open University Abuja, Nigeria

The availability and accessibility of these technologies differ across various regions in Nigeria. Breast cancer screening in Benue State poses particular challenges due to insufficient Breast screening modalities and awareness (Omisore, et al., 2023). It is essential to confront these obstacles to enhance early detection and treatment outcomes for women within the region (Adesokan et al., 2021). As noted by Ntekim et al., 2022, breast cancer is the most common form of cancer found in young adults in various cancer registries throughout Nigeria, with a notably higher rate observed in the Southern parts than in the North. However, specific statistics for individual states, including Benue, are absent from the analysis. An examination in North Central Nigeria, which included Benue State, established that malignant breast lesions constituted 33% of breast biopsy results, with invasive ductal carcinoma identified as the primary type (Ayo-Aderibigbe et al., 2022). In the population of North Central Nigeria, breast cancer is the most frequently diagnosed site-specific cancer among women, underscoring a significant proportion of malignant breast lesions within the studied group (Obahiagbon, & Uchendu 2022). This suggests the urgent necessity for targeted interventions and awareness campaigns aimed at improving breast cancer screening and treatment accessibility in Benue State. It imperative to enhance activities through non-governmental organizations to advocate for national policies regarding the training of personnel for clinical and self-breast examination, as well as to implement a nationwide screening program (mammography) to boost early detection, mitigate the upward trends, and reduce the mortality rate associated with breast cancer (Cuoghi et al., 2022)

A scholarly investigation by Olumide et al., 2024, identifies various risk determinants that contribute to the rising incidence of breast cancer among the female population in Nigeria, emphasizing both modifiable and non-modifiable elements. The researchers employed statistical analysis utilizing Fisher's Formula to assess the significance of these risk determinants. The study produced a remarkable result indicating that 81% of individuals who had employed hormonal contraceptives, particularly oral forms, at any stage in their lives faced a slightly heightened risk of breast cancer, which highlights the vital need for the identification and management of these risk elements to reduce the occurrence of breast cancer. Efforts to raise awareness and improve knowledge about breast cancer screening are crucial for empowering women in Benue State to engage in preventive practices and seek timely medical intervention (Ayoola et al., 2022). These issues outlined by researchers as aforementioned may be part of the issues in Benue State.

Although comprehensive data and rigorous statistical analyses pertaining to the incidence and prevalence

of breast cancer in Benue State have been limited (Sharma, 2020). Emerging research indicates an escalating concern regarding the rates of breast cancer incidences in North Central Nigeria, the region in which Benue State is located. Motivated by the increasing rates of breast cancer incidence rates in North Central, this preliminary investigation seeks to evaluate incidence cases across selected hospitals in relation to the screening frequencies. The outcomes of this research will furnish immediate insights into the present conditions of breast cancer detection and its screening programs within Benue State, thereby informing future health policy and intervention frameworks.

METHODOLOGY

This study is motivated by the prevalence of breast cancer reported in North Central Nigeria, where Benue State is located. Our objective is to conduct an exploratory study to investigate the incidence of breast cancer cases presented in selected hospitals within the state. We identified essential variables for data gathering, including screening modalities and the documented incidence cases reported by selected hospitals in Benue State. We established a timeline for the study spanning from 2010-2024, enabling us to compile data on the number of breast cancer incidence cases reported yearly.

To facilitate access to necessary information, researchers provided letters of introduction from their affiliations to various hospitals in the state that were involved in breast cancer diagnosis and screening. Four hospitals agreed to participate in the exploratory study, granting us access to their recorded data on breast cancer patients seeking clinical screening. Due to confidentiality and various considerations, the real names of the participating hospitals were omitted in this report as a condition by those hospitals to access previous records. For the purpose of this study, we designated these hospitals as A, B, C and D respectively, representing real healthcare facilities in Benue State.

We focused our data collection on the number of breast cancer cases screened and documented by each hospital yearly over the designated 14-year period. To ensure the reliability of our findings, we implemented rigorous validation protocols. This involved cross-checking and auditing data against multiple sources to verify its accuracy. To analyse the relationship between screening processes and breast cancer incidence, we meticulously examined trends in the number of cases identified each year at each hospital. Our analysis aimed to explain whether screening practices correlate with the incidence rates, thereby providing insights that may inform future healthcare strategies in the state.

This methodology provides the groundwork for a thorough investigation into breast cancer incidence in Benue State, offering the potential for substantial contributions to public health knowledge and cancer management strategies in Nigeria.

RESULTS AND DISCUSSION

This section provides details of results analysed from four hospitals in Benue State during a retrospective analysis.

Table 1: The occurrences of breast cancer incidence and statistical analysis at A Hospital in conjunction with the cases that underwent screening

Year	Breast modality screening	Incident cases of Breast cancer	Screened Cases
2011	SFM	16	6
2012	SFM	22	5
2013	None	51	-
2014	None	39	-
2015	SFM	54	23
2016	None	30	-
2017	None	41	-
2018	SFM	21	-
2019	SFM	50	7
2020	SFM	33	-
2021	None	23	-
2022	SFM	56	26
2023	SFM	58	21
2024	SFM	55	24
Incidence cases of Breast cancer Screened cases			
Mean	37.42	13.62	
Standard Deviation	15.50	8.52	
Range	16-58	0-26	
Correlation Analysis for incidence and screened cases			r=0.24 p=0.11 Weak positive correlation

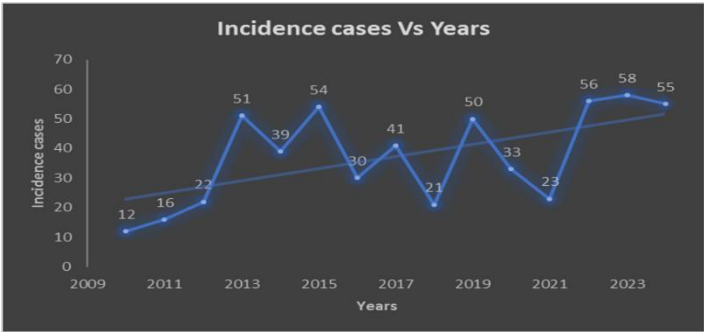


Figure 1: Incident cases of breast cancer at A Hospital versus years

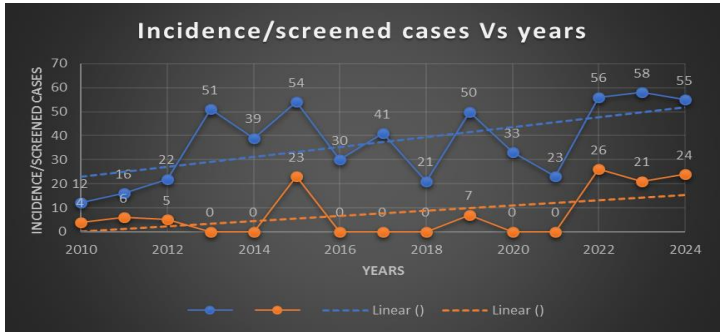


Figure 2: Incident cases compared with screened cases at A hospital versus y

Table 2: The occurrences of breast cancer incidence and statistical analysis at B Hospital in conjunction with the cases that underwent screening

Year	Breast screening modality	Incident cases of Breast cancer	Screened cases
2010	SFM	25	10
2011	SFM	10	10
2012	SFM	40	27
2013	SFM	35	33
2014	SFM	17	17
2015	SFM	44	23
2016	SFM	46	21
2017	SFM	42	10
2018	None	33	12
2019	SFM	55	7
2020	2-DM	52	30
2021	2-DM	55	22
2022	2-DM	60	10
2023	2-DM	56	20
2024	2-DM	78	33
	Incidence cases of Breast cancer	Screened cases	
Mean	33.44	17.78	
Standard Deviation	13.35	8.34	
Range	10-55	7-33	
Correlation Analysis between incidence and screened cases		Between incidence and screened cases	$r=0.83$, Strong positive correlation $p<0.01$

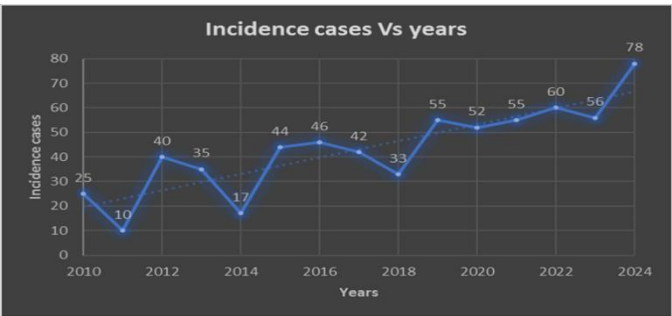


Figure 3: Incident cases of breast cancer at B Hospital Versus years

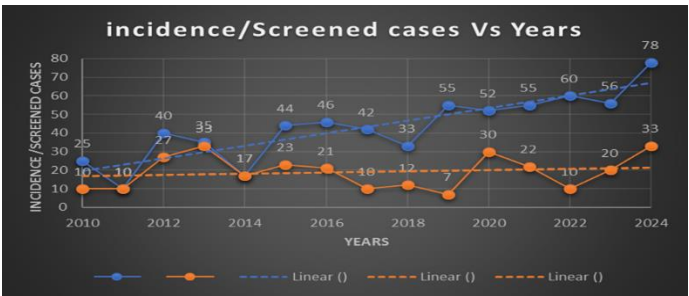


Figure 4: Incident cases compared with screened cases at B hospital versus years

Table 3: The occurrences of breast cancer incidence and statistical analysis at C Hospital in conjunction with the cases that underwent screening

Year	Breast Screening modality	Incident cases of Breast cancer	Screened cases
2010	SFM	7	7
2011	SFM	11	3
2012	SFM	19	4
2013	SFM	25	0
2014	SFM	15	1
2015	SFM	23	0
2016	None	32	0
2017	None	36	0
2018	None	20	0
2019	None	28	0
2020	None	21	0
2021	None	22	0
2022	None	34	0
2023	None	40	0
2024	SFM	45	16
	Incidence cases of Breast cancer	Screened cases	
Mean	21.29	3.86	
Standard Deviation	14.35	5.92	
Range	7-45	0-16	
Correlation Analysis between incidence and screened cases			r=0.83, p:0.021 strong positive correlation

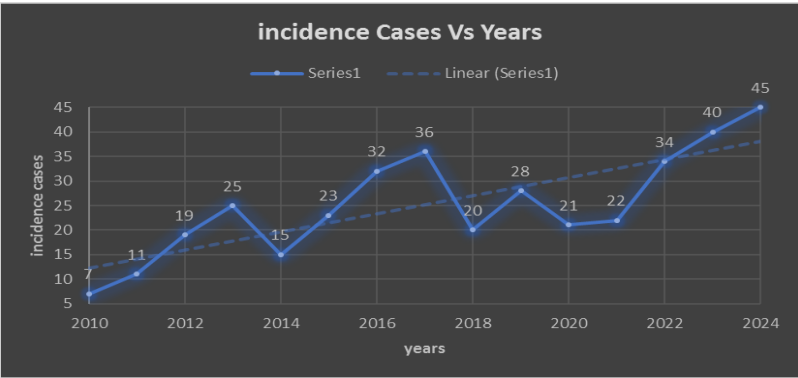


Figure 5: Incident cases of breast cancer at C Hospital Versus years

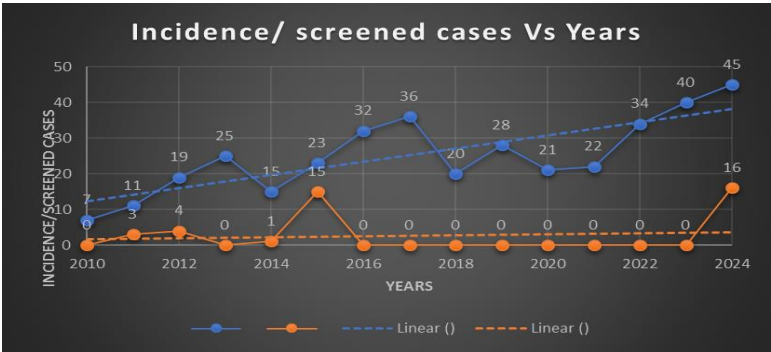


Figure 6: Incident cases compared with screened cases at C hospital versus years

Table 4: The occurrences of breast cancer incidence and statistical analysis at D Hospital in conjunction with the cases that underwent screening

Year	Breast Modality	Screening	Incident cases of Breast cancer	Screened cases
2010	SFM		0	0
2011	SFM		2	1
2012	SFM		24	4
2013	SFM		8	0
2014	SFM		6	3
2015	SFM		22	11
2016	SFM		45	40
2017	SFM		49	33
2018	SFM		22	25
2019	SFM		28	23
2020	SFM		44	2
2021	SFM		64	14
2022	SFM		67	22
2023	NONE		56	0
2024	SFM		55	16
	Incidence cases of Breast cancer		Screened cases	
Mean	31.38		3.86	
Standard Deviation	23.34		5.92	
Range	0-67		0-16	
Correlation Analysis between incidence and screened cases				r=0.83, p:<0.01 strong positive correlation

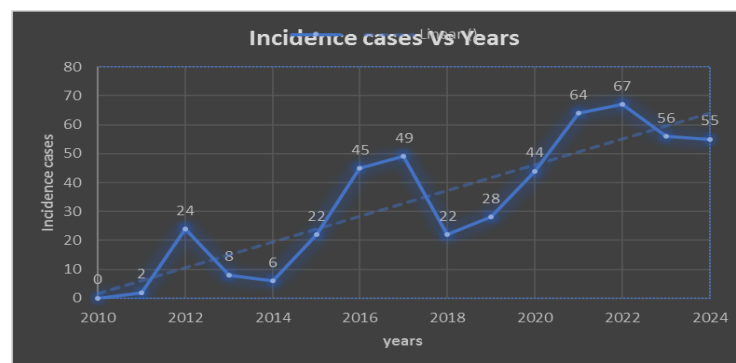


Figure 7: Incident cases of breast cancer at D Hospital Versus years

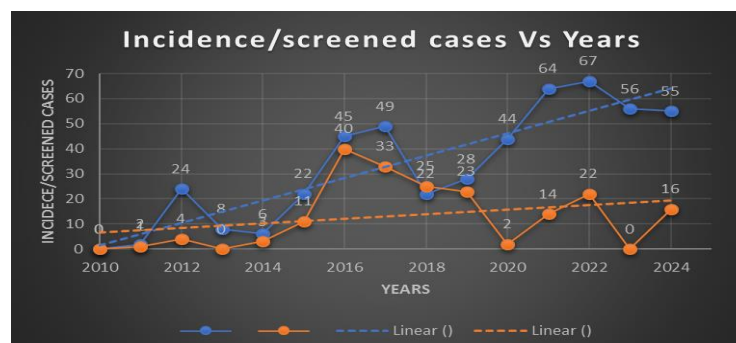


Figure 8: Incident cases compared with screened cases at D hospital versus years

DISCUSSION

The exploratory investigation conducted across four medical facilities in Benue State yielded significant insights regarding the incidence of breast cancer cases. The dataset, which encompassed duration of 14 years, scrutinized the available breast screening modalities, the incidences of breast cancer cases, and the number of individuals screened. The principal domain of inquiry derived from the available data concentrated on the screening modalities, which were predominantly Screen Film Mammography (SFM) and 2-D mammography. The investigation particularly highlighted the incident cases of breast cancer, as the yearly incidence of breast cancer was meticulously examined across four hospitals namely, A, B, C and D hospitals who agreed to present data for the investigations without exposing the true identities of the hospitals. Additionally, attention was directed towards the total number of cases whose information were utilised over the 14-years timeframe under consideration.

The use of SFM from 2010-2024 at A Hospital showed fluctuations in breast cancer incident cases. There were notable discrepancies between incident cases and screened cases, such as in 2012 when there were 22 incident cases but only 5 screened cases (Table 1). The mean incidence of breast cancer cases was 37.42, while the mean number of screened cases was significantly lower at 13.62. The correlation between breast cancer incidence and screening rates was weak and not statistically significant as shown in Table 1. Increasing screening rates could lead to earlier detection and better outcomes for those diagnosed with breast cancer, emphasizing the critical role of screening in public health.

The data suggests a correlation between the use of screen film mammography and the number of detected breast cancer cases as seen in Figure 1. However, the absence of screening in certain years led to a sharp drop in detected cases. For example, in 2014 and 2017, there were 39 and 41 cases, respectively. This suggests that many cases might go undiagnosed until they reach later stages without screening. The study also found a concerning disparity between the number of incidence cases and the number of screened cases (Figure 2).

The use of SFM at B Hospital from 2010 - 2019 showed a fluctuating incident case count, with a peak of 55 cases in 2019, but a low number of screened cases. Despite an increasing trend in incident cases, the number of screened cases did not match (Figure 3), suggesting possible under utilization or access issues with screening. In 2020, there was a shift to 2D mammography, which led to a general increase in screened cases. This is attributed to more awareness. However; the data indicates a challenge

in effectively increasing screened cases relative to incident cases. The transition to 2D mammography seems to have positively influenced detection rates, but there remains a need for strategies to ensure that increasing incident cases correspond with adequate screening efforts. The study analysed the relationship between breast cancer incidences and screening rates (Figure 4), revealing an average of 33.44 incidence cases and 17.78 screened cases, with a significant gap between incidences and screening rates (Table 2). The correlation analysis showed a strong positive correlation between incidence and screened cases, suggesting that as incidence cases increase, screened cases also tend to increase as shown in (Figure 4). However, the gap between incidence and screening rates raises concerns about healthcare access, awareness, or screening protocols. The findings have important implications for public health initiatives aimed at improving screening rates in populations vulnerable to breast cancer.

At C Hospital, the study on breast cancer incidence and screening rates revealed a significant gap between the two. From 2010 - 2015, SFM was used, but the number of screened cases remained relatively low, with incident cases varying and increasing over time (Figure 5). When screening was halted from 2016 - 2023, incident cases surged, peaking at 40 in 2023, raising concerns about the effectiveness of early detection as depicted in Table 3.

The data highlights the critical role of screening in early detection and potentially reducing advanced cases. A shift back to SFM in 2024 showed 45 incident cases and 16 screened cases, indicating a renewed focus on screening. The correlation analysis showed a strong positive correlation between incidence and screened cases as shown in Table 3, suggesting that increased awareness or incidence may lead to more screening efforts. However, the significant variability in both incidence and screening rates (Figure 6) warrants further investigation to identify underlying factors and inform policies to enhance screening accessibility and awareness.

The data on breast cancer incidence and screening rates from 2010 -2024 at D Hospital shows a fluctuating trend as shown in Figure 7, with a peak of 67 incident cases in 2022. However, there were inconsistencies in detection practices, with some years showing a drop in screening despite high incident cases. Fortunately, in 2024, there was a return to screening with SFM and a significant number of screened cases, indicating a renewed focus on breast cancer detection and potentially improved outcomes as shown in Table 4. Although there was increase in screened cases in certain years, the lack of screening in some years despite high incident cases suggests systemic failures in healthcare. The study also found a significant gap between breast cancer cases and screenings at D

Hospital, with an average of 31.38 incidence cases and only 3.86 screened cases. Despite this gap, there is a strong positive correlation between the number of breast cancer cases and the number of screening cases as shown in Table 4 and Figure 8, suggesting that increased awareness or incidence may lead to more screening efforts.

CONCLUSION

The outcomes highlight the essential requirement for improved public awareness and greater accessibility to screening methods, which ought to be considered a vital public health concern. The variable trends observed in the incidence of cases in relation to screenings imply potential systemic shortcomings among breast cancer patients that require additional scrutiny. The predominant screening methodology employed is SFM, which possesses certain limitations and, therefore, should be supplanted with the recommended approaches. It is essential to implement strategic enhancements to ensure that the escalating incidence of breast cancer is adequately addressed through sufficient screening initiatives, ultimately promoting earlier detection and improved health outcomes for at-risk populations. This investigation emphasizes the critical importance of effective screening protocols and awareness campaigns in alleviating the impact of breast cancer within at-risk populations, while simultaneously advocating for sustained efforts to address the disparity between incidence and screening rates in Benue State

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