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Original Research Article

Patterns of Malignancies in a Tertiary Health Facility in Benue State, North-Central Nigeria: A Three-year Retrospective Analysis, 2023–2025

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Abstract: ***Background*:** Cancer is an expanding cause of morbidity and mortality worldwide, with a growing share of the burden occurring in low- and middle-income countries. In sub-Saharan Africa, deficiencies in population-based registration, pathology, imaging, screening, and treatment access continue to limit cancer control. Hospital-based data, while not population-representative, remain useful for characterizing local service demand and identifying priority cancer types. ***Objective*:** To describe the demographic and site-specific pattern of malignancies and factors associated with female cancer presentation at the Federal University of Health Sciences Teaching Hospital (FUHSTHO), Otukpo, Benue State, Nigeria, from January 2023 to December 2025. ***Methods*:** This three-year retrospective hospital-based descriptive study included histologically confirmed malignancies and clinically diagnosed malignancies supported by radiological evidence where histology was unavailable. Cancer records were identified from the Hospital Cancer Registry and Medical Records Department using ICD-10 codes C00–C97. Age, sex, residence, and primary cancer site were extracted. Categorical variables were summarized using frequencies, percentages, and 95% confidence intervals. Binary logistic regression was used to examine demographic factors associated with female cancer presentation. Analyses were performed in IBM SPSS Statistics version 26. ***Results*:** Of 160 cancer records identified, 145 were eligible for analysis after exclusion of 5 duplicate and 10 incomplete records. Females accounted for 91 cases (62.8%) and males for 54 (37.2%), giving a female-to-male ratio of 1.7:1. Most cases occurred among adults aged 35–64 years (87/145; 60.0%), followed by those aged ≥65 years (40/145; 27.6%). Among males, prostate cancer was the leading recorded malignancy (16/54; 29.6%), followed by lung cancer (5/54; 9.3%) and acute myeloid leukemia (4/54; 7.4%). Among females, breast cancer (33/91; 36.3%) and cervical cancer (17/91; 18.7%) together accounted for 55.0% of female cases. In adjusted analysis, age 35–64 years (AOR 3.46; 95% CI 1.52–7.88; p=0.003) and residence in Otukpo LGA (AOR 2.14; 95% CI 1.12–4.09; p=0.021) were associated with female cancer presentation; the estimate for age ≥65 years was of borderline statistical significance (AOR 2.41; 95% CI 0.99–5.84; p=0.051). ***Conclusion*:** The hospital cancer case mix was dominated by breast and cervical cancers among females and prostate cancer among males, with most cases occurring in middle-aged and older adults. These findings support strengthened cancer registration, evidence-based early detection, diagnostic capacity, and oncology referral pathways. Because the study is hospital-based, the results should not be interpreted as population incidence or prevalence estimates for Benue State.

Keywords: Cancer Epidemiology, Benue State, Nigeria, Breast Cancer, Cervical Cancer, Prostate Cancer, Hospital-Based Study.

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INTRODUCTION

Cancer is a major and increasing global health problem. GLOBOCAN 2022 estimated almost 20 million new cancer cases and 9.7 million cancer deaths worldwide, with the annual number of new cases projected to rise substantially as populations grow and age [1]. The burden is increasingly consequential in low- and middle-income settings where prevention, screening, diagnostic, treatment, and palliative-care systems are often constrained.

Sub-Saharan Africa is experiencing a particularly rapid epidemiological transition. Approximately 801,000 new cancer cases and 520,000 cancer deaths were estimated in the region in 2020, with female breast and cervical cancers together accounting for a major share of the burden [2]. The Lancet Oncology Commission on cancer in sub-Saharan Africa has emphasized the need for stronger surveillance, pathology, imaging, radiotherapy, workforce development, financing, and locally responsive cancer-control systems [3].

In Nigeria, GLOBOCAN 2022 estimated 127,763 new cancer cases and 79,542 cancer deaths. Breast, prostate, and cervical cancers were among the leading cancers nationally [4]. Nigeria's National Strategic Cancer Control Plan 2023–2027 identifies prevention, early detection, diagnosis and treatment, data management and research, palliative care, and survivorship as priorities [5]. Nevertheless, high-quality population-based cancer registration remains geographically limited, making careful use of hospital-based and regional registry data important for service planning.

Population-based registry data from Ibadan and Abuja have demonstrated strong sex-specific patterns, with breast and cervical cancers predominating among women and prostate cancer among men [6]. More recent Abuja registry data similarly identified breast and cervical cancers as the leading cancers among females and prostate cancer as the leading cancer among males [7]. Studies from North-Central Nigeria, including Benue, Jos, and Ilorin, also report substantial burdens of breast, cervical, and prostate cancers [8–10].

The present study therefore aimed to characterize the demographic distribution and leading cancer sites among patients managed at FUHSTHO, Otukpo, between 2023 and 2025, and to examine demographic factors associated with female cancer presentation. The study was designed to provide hospital-level evidence for planning and hypothesis generation rather than population incidence estimates.

METHODOLOGY

Study Design and Setting

This was a three-year retrospective hospital-based descriptive study of malignancies diagnosed at FUHSTHO from 1 January 2023 to 31 December 2025. FUHSTHO is a tertiary referral hospital in Otukpo, Benue State, North-Central Nigeria, providing specialist surgical, medical, radiological, pathological, and oncology-related services.

Study Population and Eligibility

All patients with a diagnosis of malignancy during the study period were eligible. Cases were identified from the Hospital Cancer Registry and Medical Records Department using ICD-10 codes C00–C97. Eligible records included histologically confirmed malignancies or, where histology was unavailable, a clinical diagnosis supported by radiological evidence, with complete information on age, sex, and primary cancer site. Duplicate records, benign tumors, and records lacking core demographic or diagnostic information were excluded. All eligible records were included; therefore, no sampling procedure was applied.

Data Collection and Variables

A structured data-extraction proforma was used to obtain age in years, sex, LGA of residence, date of diagnosis, and primary cancer site. Age was categorized a priori as 0–14, 15–34, 35–64, and ≥65 years. Primary cancer site was coded using ICD-10.

Statistical Analysis

Data were entered in Microsoft Excel and analyzed using IBM SPSS Statistics version 26. Categorical variables were summarized using frequencies and percentages with 95% confidence intervals. The observed sex distribution was compared with an equal-distribution null hypothesis using a chi-square goodness-of-fit test. For the multivariable analysis, sex was coded female=1 and male=0. Binary logistic regression examined associations of age group and residence with female cancer presentation. Adjusted odds ratios (AORs), 95% confidence intervals (CIs), and two-sided p-values were reported, with $p<0.05$ considered statistically significant. Because all participants were already cancer cases, the regression estimates describe factors associated with being a female rather than male cancer case within the hospital sample and should not be interpreted as etiologic risk factors for cancer development.

STROBE Reporting

The manuscript was prepared with reference to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for observational studies [11]. Participant identification, exclusions, and final inclusion are summarized in Figure 1.

Ethical Considerations

Ethical approval was obtained from the FUHSTHO Health Research Ethics Committee (FUHSTHO/HREC/2026/04). Patient identifiers were removed before analysis. Informed consent was waived because the study involved retrospective review of existing records.

RESULTS

During the three-year study period, 160 cancer records were identified from the Hospital Cancer Registry and Medical Records Department. Fifteen records (9.4%) were excluded: 5 duplicate entries and 10 records with incomplete core demographic or diagnostic information. The final analytic dataset therefore comprised 145 unique eligible cancer cases, representing 90.6% of all records initially identified. No additional exclusions were made after eligibility assessment (Figure 1).

Cancer records identified from Hospital Cancer Registry and Medical Records Department (n = 160)
Excluded (n = 15): duplicate records (n = 5); incomplete core data (n = 10)
Final analytic sample (N = 145)

Figure 1: STROBE flow of cancer records

Figure 1 demonstrates a straightforward record-selection process with a relatively small proportion of exclusions. The principal reasons for exclusion were duplication and incomplete core information; importantly, the final sample size used in all subsequent descriptive and regression analyses was 145.

Sex Distribution

Female cancer cases predominated in the study population. Of 145 eligible cases, 91 were female (62.8%; 95% CI 54.4–70.6) and 54 were male (37.2%; 95% CI 29.4–45.6), corresponding to a female-to-male ratio of approximately 1.7:1. Under a null hypothesis of equal numbers of male and female cases, 72.5 cases would have been expected in each sex category. The observed distribution differed significantly from this expectation (χ^2=9.44, df=1, p=0.002), indicating that the excess of female presentations in this hospital dataset was unlikely to be due to random variation alone (Table 1).

Table 1: Sex distribution of cancer cases (N=145)

Sex	Observed n	Expected n	Percentage (%)	95% CI
Male	54	72.5	37.2	29.4–45.6
Female	91	72.5	62.8	54.4–70.6
Total	145	145.0	100.0	—

The approximately 25.6-percentage-point difference between female and male case proportions is clinically and service-planning relevant, because it implies a greater demand for diagnostic and treatment pathways for cancers that disproportionately affect women. However, this hospital-based sex distribution should not be interpreted as a population incidence ratio.

Age Distribution

Cancer cases were strongly concentrated in middle-aged and older adults. Patients aged 35–64 years constituted 87 of 145 cases (60.0%; 95% CI 51.6–67.9), making this group by far the largest age stratum. A further 40 cases (27.6%; 95% CI 20.5–35.7) occurred among patients aged ≥65 years. In contrast, 15 cases (10.3%; 95% CI 5.9–16.5) occurred among those aged 15–34 years and only 3 cases (2.1%; 95% CI 0.4–5.9) were recorded in children aged 0–14 years. Thus, 127 of 145 cases (87.6%) occurred among adults aged ≥35 years, underscoring the predominance of cancer presentations in later adulthood within this hospital population (Table 2).

Table 2: Age distribution of cancer cases (N=145)

Age group	Observed n	Percentage (%)	95% CI
0–14 years	3	2.1	0.4–5.9
15–34 years	15	10.3	5.9–16.5
35–64 years	87	60.0	51.6–67.9
≥65 years	40	27.6	20.5–35.7
Total	145	100.0	—

The age pattern indicates that the service burden falls predominantly on adults in the economically productive and older age groups. The very small number of childhood cancers must be interpreted cautiously because referral pathways to pediatric oncology services

and case ascertainment may differ from those for adult malignancies.

Pattern of Cancer among Males

Among the 54 male cancer cases, prostate cancer was the leading individually recorded malignancy, accounting for 16 cases (29.6%; 95% CI 17.9–43.6). Lung cancer was the second most frequently listed site with 5 cases (9.3%; 95% CI 3.1–20.3), followed by acute myeloid leukemia with 4 cases (7.4%; 95% CI 2.1–17.9). Oral cavity and esophageal cancers each accounted for 3 cases (5.6%). The remaining 23 male cases (42.6%) were classified under other sites in the source summary and could not be reliably disaggregated without the underlying individual-level cancer-site data (Table 3).

Table 3: Leading cancer sites among males (n=54)

Cancer site	Observed n	Percentage (%)	95% CI
Prostate	16	29.6	17.9–43.6
Lung	5	9.3	3.1–20.3
Acute myeloid leukemia	4	7.4	2.1–17.9
Oral cavity	3	5.6	1.2–15.4
Esophagus	3	5.6	1.2–15.4
Other sites	23	42.6	29.2–56.8
Total	54	100.0	—

Prostate cancer alone accounted for nearly one in three male malignancies, and its count was more than three times that of the next individually reported male cancer site. This concentration supports prioritization of urologic diagnostic capacity while recognizing that the large "other sites" category limits a complete ranking of all male cancers.

Pattern of Cancer among Females

Among the 91 female cancer cases, breast cancer was the leading malignancy with 33 cases (36.3%; 95% CI 26.6–47.0), followed by cervical cancer with 17 cases (18.7%; 95% CI 11.3–28.1). Together, breast and cervical cancers accounted for 50 of 91 female cancers (55.0%), meaning that more than one in every two female cancer presentations involved one of these two sites. Esophageal cancer accounted for 5 cases (5.5%), while leukemia and gallbladder cancer each contributed 4 cases (4.4%). A further 28 cases (30.8%) were grouped as other sites in the available summary dataset (Table 4).

Table 4: Leading cancer sites among females (n=91)

Cancer site	Observed n	Percentage (%)	95% CI
Breast	33	36.3	26.6–47.0
Cervix	17	18.7	11.3–28.1
Esophagus	5	5.5	1.8–12.4
Leukemia	4	4.4	1.2–10.9
Gallbladder	4	4.4	1.2–10.9
Other sites	28	30.8	21.6–41.3
Total	91	100.0	—

The predominance of breast and cervical cancers creates a clear service-planning signal: female oncology demand at FUHSTHO is heavily influenced by two cancer types for which organized awareness, timely diagnostic evaluation, HPV vaccination, and evidence-based screening or early-detection strategies can materially affect outcomes. The grouped "other sites" category, however, prevents a complete site-by-site description of the remaining female burden.

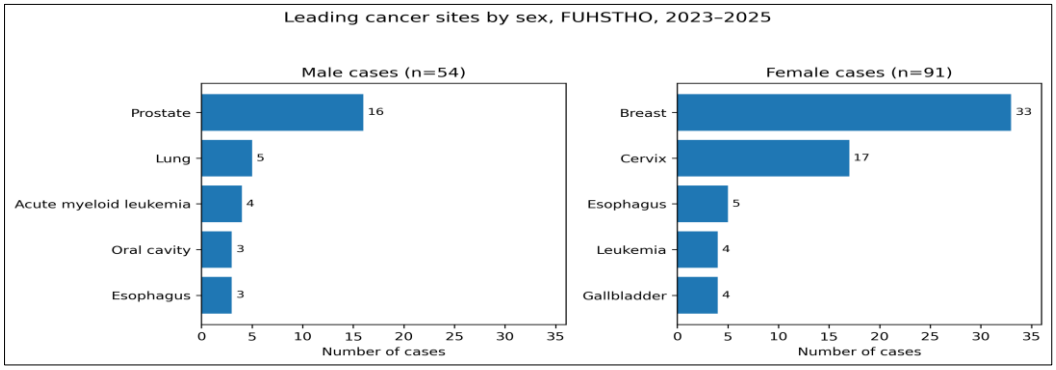

Figure 2: Leading individually reported cancer sites by sex among registered cancer cases at FUHSTHO, 2023–2025

Figure 2 visually reinforces the marked sex-specific cancer pattern. Prostate cancer was the dominant individually reported male malignancy (16 cases), whereas breast cancer (33 cases) and cervical cancer (17 cases) clearly dominated among females. The figure deliberately presents male and female site distributions in separate panels to prevent biologically inappropriate cross-sex attribution. It also excludes the aggregated "other sites" category because the underlying component diagnoses were not available for valid disaggregation.

Factors Associated with Female Cancer Presentation

In the multivariable logistic regression model, age and residence showed differential associations with being a female rather than a male cancer case. Compared with patients aged 15–34 years, those aged 35–64 years had 3.46 times the adjusted odds of being female cancer cases (AOR=3.46; 95% CI 1.52–7.88; p=0.003). Patients aged ≥65 years had 2.41 times the adjusted odds, although the confidence interval included unity and the association narrowly missed the conventional threshold for statistical significance (AOR=2.41; 95% CI 0.99–5.84; p=0.051). Residence in Otukpo LGA was independently associated with approximately two-fold higher odds of female cancer presentation compared with residence outside Otukpo (AOR=2.14; 95% CI 1.12–4.09; p=0.021) (Table 5).

Table 5: Multivariable logistic regression of factors associated with female cancer presentation (N=145)

Variable	B	SE	AOR	95% CI	p-value
Age 35–64 years	1.24	0.42	3.46	1.52–7.88	0.003
Age ≥65 years	0.88	0.45	2.41	0.99–5.84	0.051
Residence: Otukpo LGA	0.76	0.33	2.14	1.12–4.09	0.021
Constant	−0.91	0.38	0.40	—	0.017

Reference Categories:

Age 15–34 years and residence outside Otukpo LGA. AOR, adjusted odds ratio; CI, confidence interval. The available regression summary did not provide a coefficient for the 0–14-year group; no estimate was imputed.

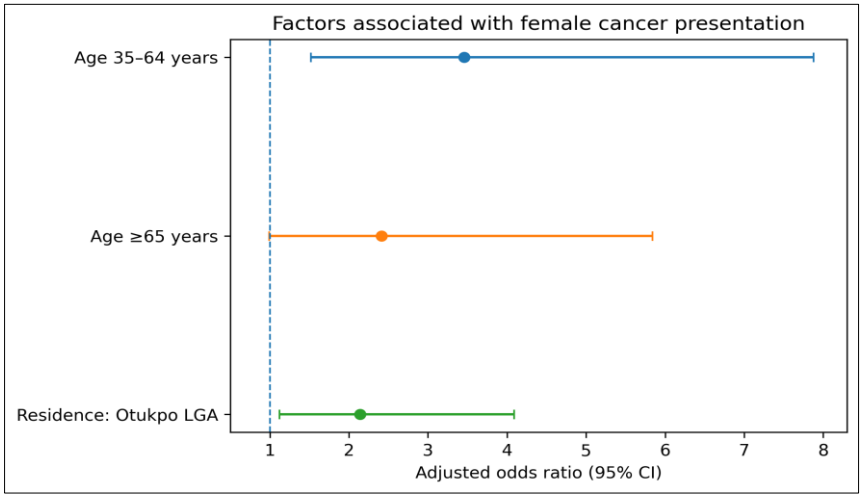

Figure 3: Forest plot of adjusted associations with female cancer presentation

Figure 3 summarizes the magnitude and precision of the adjusted associations. The estimate for age 35–64 years lies clearly to the right of the null value (AOR 1.0), with a confidence interval that does not cross unity, indicating a statistically significant association. The estimate for Otukpo residence is also statistically significant. By contrast, the lower confidence limit for age ≥65 years is 0.99, visually illustrating the borderline nature of this association. These estimates characterize the demographic composition of female versus male cancer cases and do not establish causal risk factors for cancer occurrence.

DISCUSSION

This study provides recent hospital-based evidence on the pattern of malignancies presenting to a tertiary health facility in Benue State. Three findings are especially important. First, females constituted almost two-thirds of the hospital cancer cases. Second, the burden was concentrated in adults aged 35 years and above. Third, the leading cancer sites were strongly sex-specific, with breast and cervical cancers dominating among females and prostate cancer among males. These patterns are broadly consistent with Nigerian and sub-Saharan African cancer epidemiology, while also reflecting the referral, diagnostic, and service characteristics of FUHSTHO.

The female predominance observed in this study (62.8%; female-to-male ratio 1.7:1) is striking but not unique. Population-based registry data from Ibadan and Abuja previously showed that roughly two-thirds of

registered cancers occurred in females, with breast and cervical cancer contributing substantially to that pattern [6]. Similarly, the Abuja Cancer Registry reported 61.0% of cancers among females between 2009 and 2016 [7]. At the local level, Eke and colleagues reported a female predominance among histologically diagnosed cancers at Benue State University Teaching Hospital, Makurdi, with 59 of 102 cancers occurring in women [8]. The convergence of these observations with the present study suggests that the female predominance at FUHSTHO is plausible and is likely influenced by the high burden of breast and cervical cancers. Nevertheless, unlike population-based registries, the present hospital series cannot establish sex-specific incidence in the surrounding population.

The concentration of 60.0% of cases in the 35–64-year age group and a further 27.6% among those aged ≥65 years is consistent with the strong age dependence of cancer. Global cancer estimates show increasing cancer burden with population ageing [1], while Abuja registry data documented substantial cancer occurrence among women aged 30–69 years and men aged 50–69 years [7]. The present pattern is also compatible with the age profile reported in Nigerian tertiary-hospital series, where cancer burden tends to peak in middle and later adulthood [10-12]. From a health-system perspective, this age distribution is important because it combines high clinical need among older adults with substantial disease burden among economically productive adults. The low proportion of childhood cancers in this dataset should not be interpreted as low childhood cancer incidence in Benue State, because pediatric referral pathways and incomplete capture by a general hospital registry may have reduced ascertainment.

Breast cancer accounted for 36.3% of female cases and was the leading female malignancy. This is consistent with Nigerian population-based data: the Abuja Cancer Registry recorded breast cancer as the commonest female malignancy, with an age-standardized incidence rate of 73.0 per 100,000, and breast plus cervical cancer accounted for 61.2% of female cancers [7]. Earlier Ibadan and Abuja registry analyses similarly identified breast cancer as a leading cancer among Nigerian women [6]. Local evidence from Makurdi also documented a substantial burden of breast cancer in Benue State [8]. At the international level, GLOBOCAN 2022 identifies female breast cancer as one of the most commonly diagnosed cancers worldwide [1], while the sub-Saharan African review by Bray and Parkin found breast cancer to be the most common cancer in many countries in the region [2]. Thus, the prominence of breast cancer at FUHSTHO is consistent across local, national, regional, and global evidence.

The importance of breast cancer in this hospital series is amplified by the well-described problem of late presentation in Nigeria. A 2025 systematic review and meta-analysis of Nigerian studies found that advanced-stage breast cancer remained highly prevalent, with approximately 82% of cases classified as late stage in the recent two-stage analysis [13]. Contemporary Nigerian institutional data have also highlighted major diagnostic and treatment challenges [14]. Although stage was not captured in the present study and no inference about late presentation can be made from these data, the wider Nigerian literature indicates that strengthening breast awareness, prompt diagnostic evaluation, pathology turnaround, imaging, and referral pathways is likely to be clinically important.

Cervical cancer was the second leading female malignancy, accounting for 18.7% of female cases. This finding aligns with Nigerian registry data showing cervical cancer as a major contributor to the national female cancer burden [6, 7], and with sub-Saharan African estimates in which cervical cancer remains one of the dominant cancers among women [2]. The finding has direct prevention implications because cervical cancer is highly amenable to primary prevention through HPV vaccination and secondary prevention through screening and treatment of precancerous lesions. Nigeria introduced HPV vaccination into routine immunization in 2023, initially targeting millions of girls aged 9–14 years [15]. Sustained vaccination coverage, together with context-appropriate screening and treatment pathways, is therefore particularly relevant to Benue State.

Among males, prostate cancer accounted for 29.6% of cases and was the leading individually recorded malignancy. This pattern closely mirrors Nigerian population-based and tertiary-hospital evidence. Jedy-Agba and colleagues identified prostate cancer as the leading male cancer in Nigerian registry data [6], while the Abuja Cancer Registry reported prostate cancer as the most common male malignancy with an ASR of 47.6 per 100,000 [7]. In North-Central Nigeria, the JUTH cancer registry in Jos found prostate cancer to be the most common male cancer across successive periods from 1996 to 2018 [9]. Similarly, a 2011–2020 review from the University of Ilorin Teaching Hospital found prostate cancer to be the leading male malignancy, accounting for roughly four in ten male cancers [10]. The present finding therefore shows strong regional concordance. It supports strengthening urologic evaluation and diagnostic pathways, while avoiding the mistaken interpretation that the hospital proportion represents population prevalence.

The presence of lung cancer, acute myeloid leukemia, oral cavity cancer, esophageal cancer, leukemia, and gallbladder cancer among the individually reported secondary sites demonstrates that the local burden is not limited to the three dominant cancers. However, 42.6% of male cancers and 30.8% of female cancers were grouped under “other sites” in the available summary dataset. This is an important limitation because it obscures the full ranking and may understate clinically significant cancers such as colorectal, liver, ovarian,

endometrial, lymphoid, and other malignancies. Improving registry completeness and site-level coding is therefore a priority for subsequent analyses and for meaningful comparison with regional cancer registries.

The multivariable findings require careful interpretation. Age 35–64 years and residence in Otukpo LGA were associated with being a female rather than male cancer case. These associations do not mean that middle age or Otukpo residence causes cancer in women. Instead, they likely reflect the composition of the hospital caseload, including the concentration of breast and cervical cancers in adult women and the possibility that proximity to FUHSTHO influences referral and health-care utilization. Geographic access, cost, diagnostic availability, and referral pathways are recognized challenges in Nigerian cancer care [16]. The Otukpo association may therefore be partly a service-access phenomenon rather than a biological effect.

The findings should also be interpreted in the wider African health-system context. The Lancet Oncology Commission has emphasized that cancer control in sub-Saharan Africa is constrained by shortages in diagnostics, treatment infrastructure, workforce, financing, and surveillance [3]. The present study illustrates one component of that challenge: a tertiary hospital is seeing a concentrated burden of cancers for which timely pathology, surgery, chemotherapy, radiotherapy referral, prevention, and longitudinal follow-up are essential. Strengthening local hospital-based registration while linking it to high-quality population-based surveillance would improve both service planning and epidemiological accuracy.

Strengths and Limitations

This study has several strengths. It used three years of recent data, drew cases from both the Hospital Cancer Registry and Medical Records Department, reported sex-specific cancer patterns, and applied multivariable analysis while explicitly limiting causal interpretation. The corrected figures are internally consistent with the tabulated data and avoid inappropriate attribution of sex-specific cancers.

The limitations are equally important. The single-centre hospital-based design is subject to referral, access, and selection bias and cannot provide population incidence or prevalence estimates. The sample size was modest, resulting in wide confidence intervals for several site-specific estimates. Cancer stage, histologic subtype, treatment, survival, socioeconomic factors, reproductive factors, tobacco and alcohol exposure, infection status, and other etiologic variables were not available. In addition, a substantial proportion of cases was grouped as “other sites,” preventing complete site-specific comparison. Finally, the regression outcome was sex among cancer cases rather than cancer occurrence, so the AORs should be interpreted only as associations with female presentation within this dataset.

CONCLUSION

The cancer case mix at FUHSTHO from 2023 to 2025 was characterized by a predominance of female patients, concentration of cases among adults aged 35–64 years, and clear sex-specific leading cancer sites. Breast and cervical cancers accounted for more than half of female malignancies, while prostate cancer was the leading individually reported male malignancy. These findings are concordant with evidence from Benue State, other North-Central Nigerian tertiary hospitals, Nigerian population-based registries, and broader sub-Saharan African cancer patterns. The results support strengthened cancer registration, HPV vaccination and cervical screening, breast cancer early-detection and diagnostic pathways, urologic oncology capacity, pathology and imaging services, and coordinated referral for definitive oncology care. Population-based and multicentre studies are needed to establish representative cancer incidence and outcome patterns in Benue State.

Recommendations

1. Strengthen the FUHSTHO hospital cancer registry using standardized ICD-O/ICD coding, complete site disaggregation, basis-of-diagnosis fields, stage at diagnosis, treatment, and outcome variables.
2. Expand evidence-based cervical cancer prevention through sustained HPV vaccination, screening, timely evaluation of abnormal results, and treatment of precancerous lesions.
3. Strengthen breast cancer awareness, clinical evaluation, imaging, pathology turnaround, multidisciplinary care, and referral pathways, with emphasis on reducing diagnostic delay.
4. Improve urologic assessment and diagnostic capacity for prostate cancer while using risk-informed, evidence-based approaches to early detection rather than indiscriminate screening.
5. Strengthen pathology, radiology, oncology, surgery, palliative care, and radiotherapy referral networks, and improve financial and geographic access to cancer services.
6. Develop multicentre and population-based cancer surveillance in Benue State to permit valid estimation of incidence, mortality, stage distribution, and survival.

Declarations

Ethics approval and consent to participate: Ethical approval was obtained from the FUHSTHO Health Research Ethics Committee (FUHSTHO/HREC/2026/04). Informed consent was waived because this was a retrospective review of existing records.

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Competing Interests: The authors declare no competing interests.

Authors' Contributions: All authors contributed to study conception, data collection, analysis, interpretation, and manuscript development.

Data Availability: Data supporting the findings are available from the corresponding author upon reasonable request and subject to applicable ethical and institutional requirements.

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