DOI: https://doi.org/10.67579/njo.2026.e7abhcw2

PATTERN OF CANCERS AMONG PATIENTS MANAGED AT THE ONCOLOGY CLINIC OF JOS UNIVERSITY TEACHING HOSPITAL: A RETROSPECTIVE REVIEW

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Citation: Maurice NN, Sirisena AUI. Pattern of Cancers among Patients Managed at The Oncology Clinic of Jos University Teaching Hospital: A Retrospective Review. *Niger J Oncol* 2026;2(2):78- 90

ABSTRACT

Background: Plateau State, Nigeria, has a long history of tin and columbite mining, resulting in elevated environmental concentrations of naturally occurring radioactive materials (NORMs), including uranium, thorium, and radon, as well as contamination by carcinogenic heavy metals. Although direct epidemiological evidence linking mining-related radiation exposure to cancer incidence remains limited, the established carcinogenic effects of ionising radiation justify investigating cancer patterns among patients attending Jos University Teaching Hospital (JUTH), the major tertiary referral centre serving Plateau State and neighbouring communities.

Methods: This retrospective descriptive study reviewed medical records of patients managed at the Oncology Clinic of JUTH. Data on age, sex, cancer diagnosis, and place of residence were extracted and analysed using descriptive statistics to determine the distribution and pattern of cancers.

Results: A total of 624 cancer patients were reviewed, with ages ranging from 7 to 95 years. Females accounted for 452 (72.4%) cases and males 172 (27.6%), giving a female-to-male ratio of approximately 3:1. Cervical cancer was the most common malignancy (27%), followed by breast (17%), head and neck (12%), and skin, bone, and soft-tissue cancers (10.9%). Ovarian and endometrial cancers accounted for 6.0% and 5.3% of cases, respectively, while prostate, colorectal, gastric, liver, pancreatic, lung, lymphoma, bladder, renal, testicular, uterine, vulvar, central nervous system, and rectal cancers each represented less than 5% of cases. Testicular cancer had the youngest mean age at diagnosis (17.00 ± 1.41 years), whereas gastric cancer had the highest (65.17 ± 13.79 years). Most patients (79%) resided in Plateau State, predominantly in Jos North (31%) and Jos South (30%), with cervical cancer predominating across most local government areas.

Conclusion: The predominance of cancer cases from mining-affected areas highlights the need for strengthened cancer surveillance, expanded screening, and comprehensive environmental and epidemiological studies to clarify the contribution of mining-related radiation exposure to cancer occurrence and guide targeted cancer control interventions.

Keywords: Mining-related radiation, Cancer surveillance, Oncology Clinic, Jos University Teaching Hospital, Retrospective review, Cancer distribution, Cervical cancer.

INTRODUCTION

Cancer remains a significant public health challenge globally, with low- and middle-income countries bearing a disproportionate share of the burden.[1] Cancer development, or carcinogenesis, is a multifaceted process involving genetic mutations, environmental exposures, chronic inflammation, and epigenetic modifications. Understanding these mechanisms is crucial for developing effective prevention and treatment strategies.

Plateau State, particularly the Jos metropolis, has experienced decades of extensive tin and columbite mining, resulting in elevated environmental concentrations of naturally occurring radioactive materials (NORMs), including uranium, thorium, and their decay products such as radon.[2] Chronic exposure to ionising radiation from these sources, together with contamination from carcinogenic heavy metals such as lead, cadmium, and arsenic, has raised concerns about increased cancer risk among residents of mining-affected communities.[3] Ionising radiation induces DNA damage through direct interaction with genetic material and the generation of reactive oxygen species, leading to chromosomal abnormalities, genetic mutations, and malignant transformation.[3,4] In addition, prolonged inhalation of radon and thoron has been associated with an increased risk of lung cancer, while field measurements in mining areas of Jos North and Jos South have consistently reported background radiation levels and annual effective doses that exceed internationally recommended public exposure limits.[5,6] Although population-based epidemiological evidence directly linking radiation exposure to cancer incidence in Plateau State remains limited, the well-established carcinogenic effects of ionising radiation, combined with persistent environmental contamination from mining activities, provide a strong biological and public health basis for concern.[7] Given that Jos University Teaching Hospital serves as the major tertiary referral centre for Plateau State and neighbouring regions, investigating the pattern and distribution of cancers among patients presenting to the hospital is essential for identifying disease trends, generating evidence on potential environmental influences, and informing future cancer prevention, surveillance, and public health interventions in mining-affected populations.

Recent studies have highlighted the prevalence of specific cancer types within the JUTH patient population. Prostate cancer, for instance, has been identified as one of the most common malignancies among men in the region. A retrospective review of patients diagnosed with prostate cancer at JUTH between January 2014 and December 2017 revealed that the age range of affected individuals was 41 to 100 years, with a median age of 67.9 years. The peak incidence occurred in the 71-80-year age group, accounting for 41.4% of cases. Notably, all patients presented

with lower urinary tract symptoms at the time of diagnosis, and a significant proportion had metastatic disease, underscoring the advanced stage at presentation.[8]

Cervical cancer also constitutes a major health concern among women in the region. An analysis of cervical cancer cases diagnosed at JUTH over a ten-year period reported that these malignancies accounted for 92.4% of all gynecologic cancers. Patients' ages ranged from 18 to 85 years, with a mean age of 51.12 years and a peak occurrence in the fifth decade of life. The predominant histological type was squamous cell carcinoma, comprising the majority of cases.[9]

Head and neck cancers, though less prevalent, present unique challenges in the JUTH context. A study focusing on these malignancies highlighted that squamous cell carcinoma was the most common histological subtype, accounting for 37.2% of cases. The study also noted that a significant number of patients had a history of smoking and alcohol consumption, which are established risk factors for head and neck cancers.[9]

The financial burden of cancer treatment in Nigeria is substantial, often leading to significant distress for patients and their families. The high cost of treatment, coupled with limited health insurance coverage, exacerbates the challenges faced by cancer patients.[10] This financial strain underscores the need for comprehensive health insurance schemes that adequately cover cancer care, as well as the importance of public health initiatives aimed at cancer prevention and early detection.

In response to the growing cancer burden, JUTH has undertaken various initiatives to enhance cancer care and awareness. The Department of Oncology at JUTH commemorated World Cancer Day with an awareness campaign aimed at educating patients and the general public on cancer prevention, detection, and treatment. The event featured sensitisation sessions led by a multidisciplinary team, providing insightful talks and practical demonstrations on key aspects of cancer care.

Despite these efforts, significant challenges persist in cancer care delivery at JUTH and across Nigeria. The limited availability of radiotherapy equipment and the shortage of specialised healthcare professionals are critical barriers to effective treatment. Addressing these issues requires concerted efforts from governmental bodies, healthcare institutions, and international partners to invest in healthcare infrastructure, training, and policy reforms that prioritise cancer care.

The demographic and clinical profiles of cancer patients at JUTH mirror national patterns, characterised by a high prevalence of late-stage diagnoses and substantial financial barriers to treatment. Addressing these challenges requires proactive interventions, including enhanced early detection programs, more affordable treatment options, and widespread patient education to improve outcomes. Continuous research and monitoring of patient trends are crucial for shaping policy decisions and optimising resource allocation for cancer care in Nigeria. This study analyses data from the Oncology Clinic at JUTH, sorting patient distribution across various local government areas of

Plateau State and neighbouring states, while examining cancer types and age demographics to provide valuable insights into regional cancer burden.

The objective of this study was to determine the demographic, geographic, and histopathological patterns of cancers among patients managed at the Oncology Clinic of Jos University Teaching Hospital and to provide baseline evidence to inform cancer surveillance, prevention, and control strategies in Plateau State, Nigeria.

MATERIALS AND METHODS

This study was a retrospective cross-sectional review of medical records of patients managed at the Oncology Clinic of Jos University Teaching Hospital (JUTH). The Department of Radiation and Clinical Oncology at JUTH is relatively new and currently provides chemotherapy services, with plans to expand to comprehensive oncology care in the near future. In addition, the hospital has an established surgical oncology team that provides surgical management for cancer patients, including referrals from Plateau State and neighbouring states.

Before commencing this study, ethical clearance was secured from the JUTH Health Research Ethics Committee (NHREC/JUTH/05/10/22) for access to cancer patients' medical records in the database of the Oncology Clinic. Key details, including gender, age, cancer type, and residential location, were extracted from this database. Only records containing all four pieces of information were included, while those with missing data were excluded. The informed consent of patients does not arise in this study since it was a retrospective review. The data collected from 624 patients who attended the JUTH Oncology Clinic from July 2023 to July 2025 were systematically organised in Microsoft Excel, with each of the 21 identified cancer types assigned to separate sheets. For the data analysis, such as descriptive statistics and Chi-Square test of independence, IBM SPSS (Version 22) software was used, while the bar charts were drawn using the Microsoft Excel software package.

RESULTS

The minimum and maximum values of ages, as well as the mean age and gender of the patients presented at JUTH Oncology Clinic for each of the 21 different cancer types, were determined and tabulated in Table 1.

Table 1: Age and Gender Distribution of Cancer Patients at JUTH Oncology Clinic

Type of Cancer	Minimum Age (years)	Maximum Age (years)	Mean Age ± S.D. (years)	No. of Male Patients (M)	No. of Female Patients (F)	Total
Breast	18	95	50.12 ± 12.91	5	96	**101**
Cervical	28	86	55.73 ± 11.55	0	153	**153**
Ovarian	13	80	44.84 ± 15.93	0	37	**37**
Prostate	50	79	62.87 ± 16.08	21	0	**21**
Gastric	51	84	65.17 ± 13.79	2	4	**6**
Skin+Bone+S/ Tissue	9	80	44.44 ± 18.93	38	30	**68**
Head & Neck	7	86	46.25 ± 17.06	57	38	**95**
Colorectal	21	80	48.48 ± 19.15	11	16	**27**
Hepatocellular	33	80	50.75 ± 15.19	6	6	**12**
Pancreatic	45	74	59.00 ± 13.74	4	0	**4**
Cns	26	64	39.20 ± 15.68	3	2	**5**
Lung	35	83	53.46 ± 11.17	12	14	**26**
Endometrial	20	88	56.70 ± 12.68	0	33	**33**
Choriocarcinoma	22	49	31.33 ± 9.83	0	12	**12**
Bladder	48	70	56.00 ± 12.17	1	2	**3**
Lymphoma	22	80	57.38 ± 19.20	6	2	**8**
Rectal	42	59	50.50 ± 12.02	1	1	**2**
Uterine	36	59	43.50 ± 10.66	0	4	**4**
Renal	35	44	40.33 ± 4.73	3	0	**3**
Testicular	16	18	17.00 ± 1.41	2	0	**2**
Vulvar	42	51	46.50 ± 6.36	0	2	**2**
Grand Total				172	452	**624**

($\chi^2 = 259.96$, $p < 0.001$ between the gender and type of cancer)

The association between cancer type and gender was examined using the chi-square test of independence. The analysis demonstrated a statistically significant association between gender and type of cancer diagnosed ($\chi^2 = 259.96$, df = 20, $p < 0.001$). This finding indicates that the distribution of cancer types differed significantly between male and female patients attending the Oncology Clinic of JUTH. Female-specific cancers, particularly cervical cancer (153 cases), breast cancer (96 cases), ovarian cancer (37 cases), endometrial cancer (33 cases) and choriocarcinoma (12 cases) were observed exclusively or predominantly among females. Likewise, prostate and testicular cancers occurred exclusively among males. Other types of cancers were found in both sexes, but with varying distributions.

The age distribution of cancer patients at the Jos University Teaching Hospital (JUTH) Oncology Clinic ranged from 7 to 95 years. The youngest patient was a 7-year-old diagnosed with head and neck cancer, while the oldest was a 95-year-old with breast cancer. Pediatric and adolescent cases were also recorded, including a 9-year-old with skin/bone/soft tissue cancer, a 13-year-old with ovarian cancer, an 18-year-old with breast cancer, and two cases of testicular cancer in 16- and 18-year-old males.

Across cancer types, the mean age was lowest for testicular cancer (17.00 ± 1.41 years) and highest for gastric cancer (65.17 ± 13.79 years). Cervical cancer was the most prevalent (153 cases), followed by breast cancer (101), head and neck cancer (95), skin/bone/soft tissue cancer (68), ovarian cancer (37), and endometrial cancer (33). Rectal, testicular, and vulvar cancers were the least common, with only two cases each. Among the 624 patients with complete records, 452 (72.4%) were female, and 172 (27.6%) were male, indicating a significant female predominance.

Fig. 1 shows the distribution of these 624 cancer patients by their residential locations.

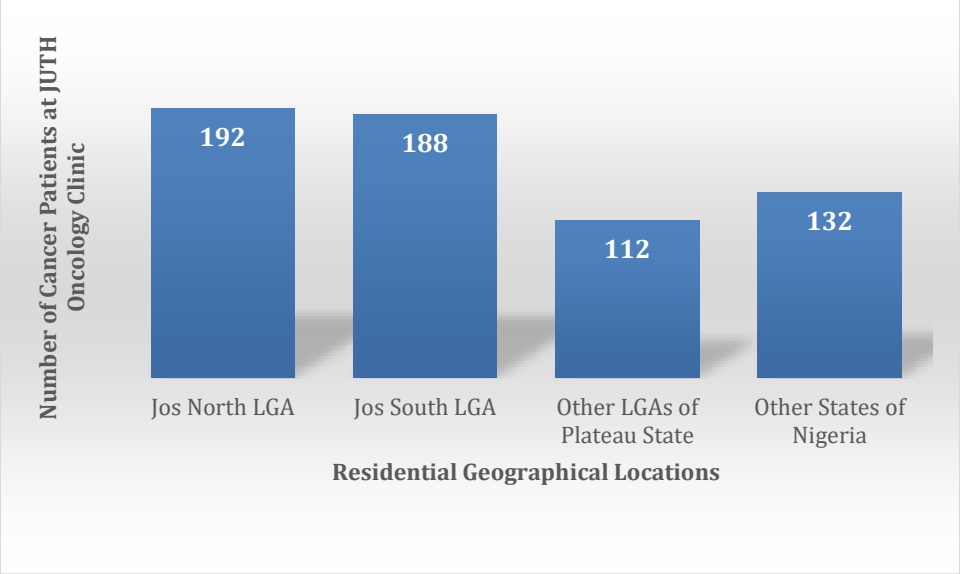


Figure 1: Distribution of 624 Cancer Patients Selected for this Study by their Residential Locations

Our findings indicate that approximately 79% of the 624 cancer patients included in this study, who attended the Oncology Clinic at the Jos University Teaching Hospital (JUTH), resided within Plateau State. Of these, the highest proportions were from Jos North (31%) and Jos South (30%) Local Government Areas, representing the largest patient turnout at the clinic. The remaining 18% of Plateau-based patients were distributed across 15 other LGAs within the state. Conversely, 21% of the patients resided in other states across Nigeria but sought Oncology care at JUTH.

Cancer cases at the Jos University Teaching Hospital (JUTH) Oncology Clinic were classified into 21 diagnostic groups, encompassing a broad spectrum of malignancies, including breast, cervical, choriocarcinoma, endometrial, uterine, ovarian, bladder, renal, testicular, prostate, gastric, colorectal, hepatocellular, pancreatic, skin/bone/soft-tissue, head and neck, lymphoma, lung, central nervous system (CNS), vulvar, and rectal cancers. The distribution of patients across these cancer types in Plateau State and other states is presented in Figure 2.

Among these, cervical cancer was the most prevalent, accounting for 25% (153 cases) of all patients treated at the clinic. Notably, 123 of these cases (80%) were residents of Plateau State, highlighting a substantial local burden of cervical cancer. Breast cancer was the second most common malignancy, representing 16% (101 cases) of all patients, with 84 cases (83%) originating from within the state. Head and neck cancers ranked third, comprising 15% (95 cases) of total patients, of whom 75 (79%) were Plateau State residents.

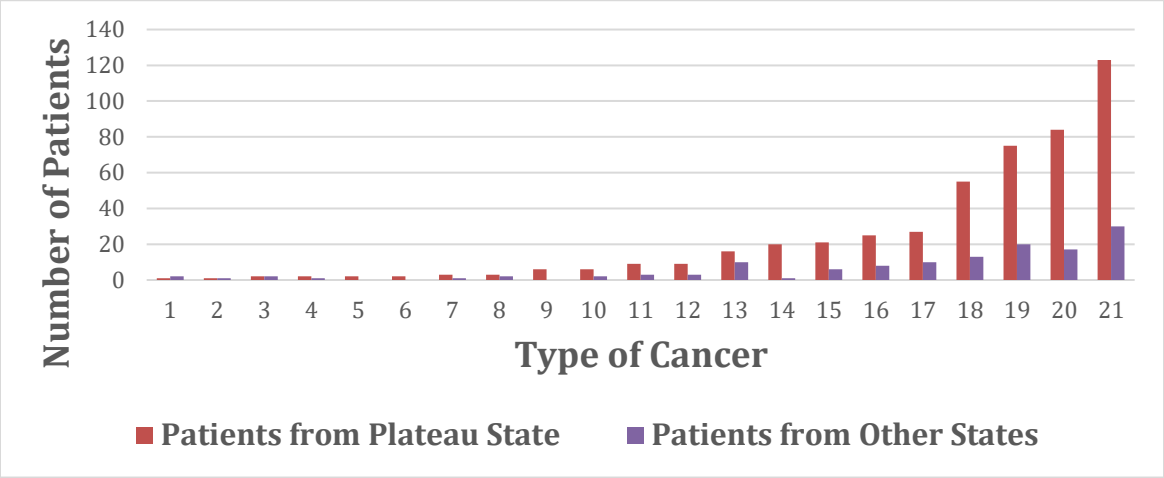


Figure 2: Distribution of Cancer Patients at JUTH Oncology Clinic according to Type of Cancer among Plateau State and other States

Type of Cancer: 1. Renal 2. Rectum 3. Uterine 4. Bladder 5. Testicular 6. Vulvar 7. Pancreatic 8. CNS 9. Gastric 10. Lymphoma 11. Choriocarcinoma 12. Hepatocellular 13. Lung 14. Prostate 15. Colorectal 16. Endometrial 17. Ovarian 18. Skin, Bone, Soft Tissue 19. Head & Neck 20. Breast 21. Cervical

Our study also recorded 68 cases (11%) of skin/bone/soft-tissue cancers, with the majority of 55 patients (81%) residing within Plateau State. Ovarian and endometrial cancers were likewise notable, accounting for 6% and 5% of the total patient population, respectively. Other cancer types were observed in smaller proportions, each contributing less than 5% of total cases, thereby exerting a relatively minimal overall impact in this study. The distribution of cancer patients

residing in Jos North, Jos South, and other Local Government Areas of Plateau State by cancer type is illustrated in Figures 3, 4, and 5, respectively.

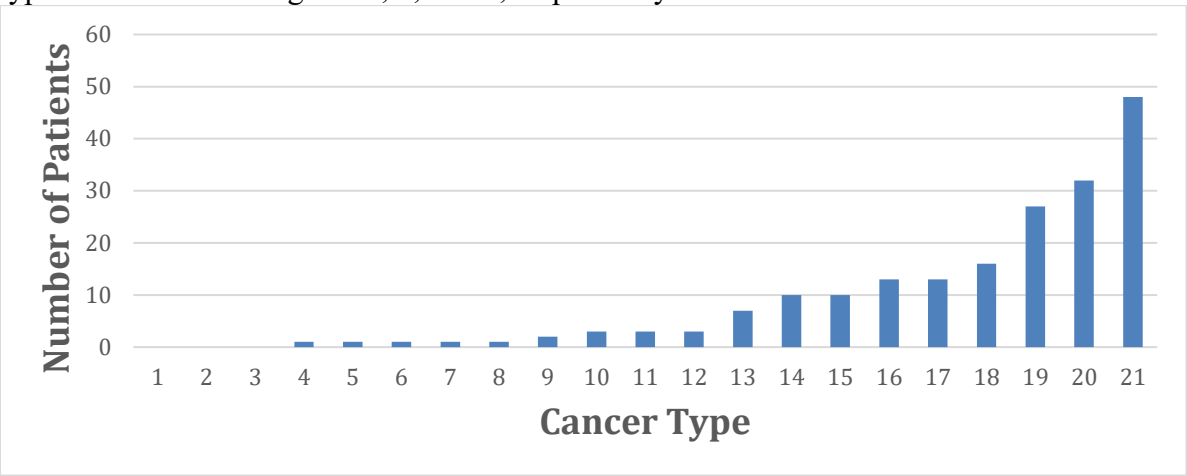


Figure 3: Distribution of Cancer Patients Residing in Jos North LGA at JUTH Oncology Clinic
Cancer Type: 1, Uterine 2. Bladder 3. Rectal 4. Renal 5. Testicular 6. Pancreatic 7. CNS 8. Vulvar 9. Lymphoma 10. Choriocarcinoma 11. Gastric 12. Hepatocellular 13. Lung 14. Endometrial 15. Prostate 16. Ovarian 17. Colorectal 18. Skin, Bone, Soft Tissue 19. Head & Neck 20. Breast 21. Cervical

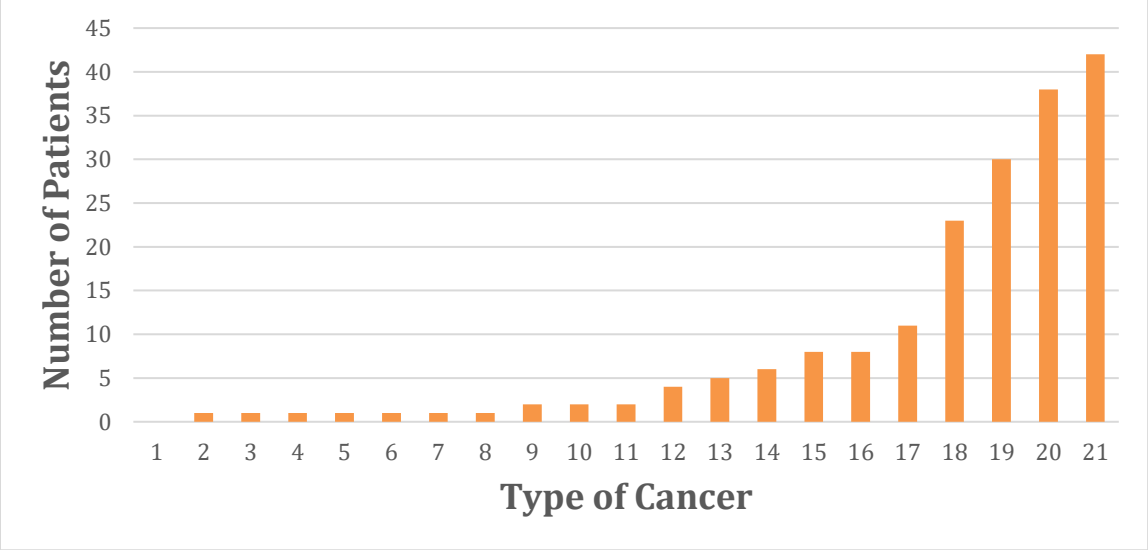


Figure 4: Distribution of Cancer Patients Residing in Jos South LGA at JUTH Oncology Clinic.
Types of Cancer: 1. Renal 2. Choriocarcinoma 3. Testicular 4. Gastric 5. Pancreatic 6. Lymphoma 7. Vulvar 8. Rectal 9. Uterine 10. Bladder 11. CNS 12. Hepatocellular 13. Colorectal 14. Lung 15. Ovarian 16. Prostate 17. Endometrial 18. Skin, Bone, Soft Tissue 19. Head & Neck 20. Cervical 21. Breast

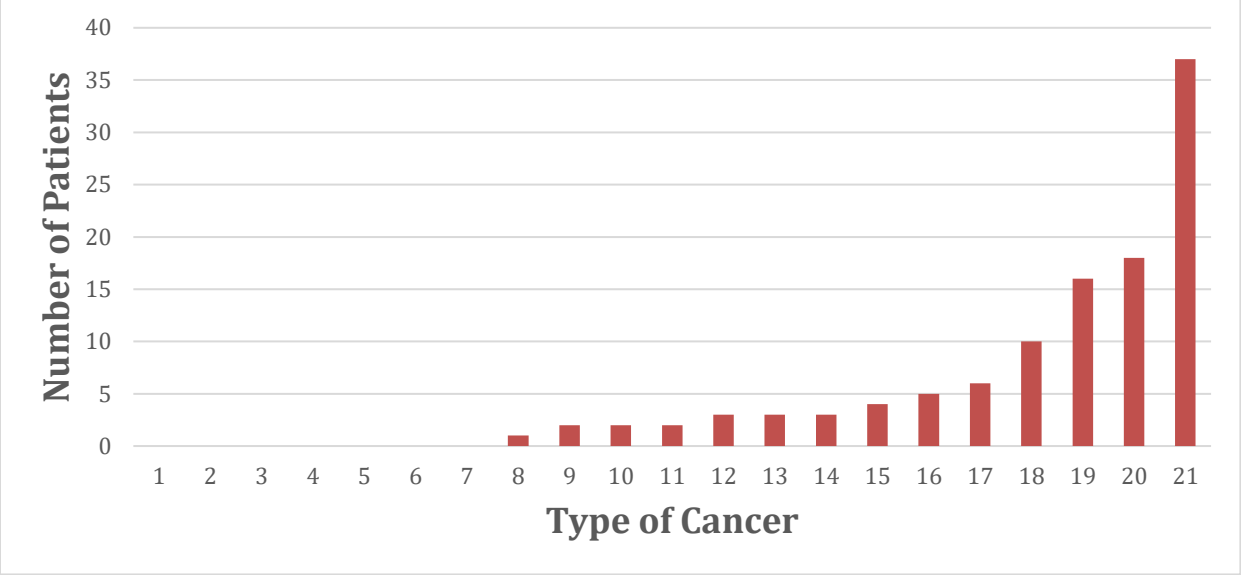


Figure 5: Distribution of Cancer Patients Residing in Other LGAs of Plateau State at JUTH Oncology Clinic

Type of Cancer: 1. Uterine 2. Bladder 3. Renal 4. Testicular 5. CNS 6. Vulvar 7. Rectal 8. Pancreatic 9. Prostate 10. Gastric 11. Hepatocellular 12. Colorectal 13. Lymphoma 14. Lung 15. Endometrial 16. Choriocarcinoma 17. Ovarian 18. Breast 19. Skin, Bone, Soft Tissue 20. Head & Neck 21. Cervical

Our analysis revealed distinct cancer patterns among patients from different LGAs in Plateau State who were attended to at the Oncology clinic of JUTH. In Jos North, the most prevalent cancers (in descending order) were cervical, breast, head & neck, skin/bone/soft-tissue, ovarian, and colorectal. In contrast, patients from Jos South were most commonly diagnosed with breast, cervical, head & neck, and skin/bone/soft tissue cancers. Among patients from the other 15 LGAs, cervical cancer remained the most prevalent, followed by head & neck, skin/bone/soft-tissue, and breast cancer. This pattern underscores cervical cancer as the leading cancer type across all LGAs in Plateau State among those seeking treatment at the JUTH Oncology Clinic. Furthermore, our findings highlight a significant gender disparity, with female cancer patients outnumbering males at a ratio of approximately 3:1. This mphasizes the urgent need for gender-focused cancer awareness, screening, and treatment strategies in the region.

DISCUSSION

These findings align with broader trends in Nigeria, where tertiary cancer centres report increasingly diverse age distributions among patients.[10] For example, in the North-East

geopolitical zone, children aged 0–14 and adolescents aged 15–19 accounted for 73% and 27% of pediatric cancers, respectively, with a median age of diagnosis at 10.5 years.[11] Our data similarly underscores the vulnerability of young populations in certain regions.

Examining mean ages by cancer type, testicular (17.00 ± 1.41 yrs) and gastric cancer (65.17 ± 13.79 years) exhibited expected early- and late-onset patterns, respectively. Such age distributions were also observed in historical registry reviews at JUTH, where breast and cervical cancers were detected primarily in middle-aged adults: a study from 2006–2015 reported a mean cervical cancer age of 51.1 ± 12.6 yrs.[12] Oncological patterns in the region appear consistent across decades and corroborate our findings.

In terms of cancer type distribution, cervical cancer topped the list (25%), followed by breast (17%), head and neck (15%), and skin/bone/soft-tissue cancers (9%). This mirrors earlier registry data from 1987–2014, where cervical, breast, prostate, liver, and lymphoma were the most common cancers reported in the state[13]. More recent JUTH registry data from 1996–2018 confirmed cervical cancer's enduring dominance, with cases rising to over 23% of gynecologic malignancies.[14]

Our study in JUTH Oncology Clinic also identified 68 cases (10.9%) of skin/bone/soft-tissue cancers, with the majority of the patients (81%) residing in Plateau State. These cancers, though less commonly reported in national statistics, remain clinically significant due to their complex presentations and treatment demands. Ovarian and endometrial cancers accounted for 6.0% and 5.3% of cases, respectively, aligning with findings from other Nigerian studies that place these malignancies among the most common gynaecological cancers after cervical cancer.[14]

Other cancer types, such as uterine, bladder, renal, testicular, prostate, gastric, colorectal, hepatocellular, pancreatic, lymphoma, lung, CNS, vulvar and rectal, each contributed less than 5% of total cases observed in the Oncology Clinic of JUTH. Although numerically fewer, these malignancies are clinically important and often associated with late presentation and poor outcomes, necessitating specialised attention in future oncological planning.

Geographically, 79% of JUTH cancer patients hailed from Plateau State, predominantly from Jos North (31%) and Jos South (30%), reaffirming JUTH's role as the central referral centre for the region. Our analysis revealed distinct cancer patterns across these local government areas (LGAs). In Jos North, cervical, breast, head & neck, skin/bone/soft-tissue, ovarian, and colorectal cancers were most prevalent. In Jos South, the leading types included breast, cervical, head & neck, and skin/bone/soft-tissue cancers. Among the remaining 15 LGAs, cervical cancer again topped the list, followed by head & neck, skin/bone/soft-tissue, and breast cancer. This consistent trend highlights the widespread burden of cervical cancer across the state and emphasises the need for regionally customised intervention strategies.

Furthermore, the study highlighted a striking gender disparity, with female cancer patients (452) outnumbering males (172) by a ratio of approximately 3:1. This is attributable to the high incidence of female-specific cancers like cervical, breast, ovarian, and endometrial malignancies. Prior studies from Plateau and other Nigerian regions have documented similar findings, reinforcing the need for

gender-focused cancer awareness, screening, and treatment strategies.[15]

Implications and Recommendations

Age-Inclusive Screening and Early Detection

The involvement of children and adolescents in cancer statistics, particularly with head, neck, ovarian, and testicular cancers, necessitates the incorporation of pediatric and adolescent-specific cancer surveillance programs.

Comprehensive Cervical Cancer Control

With cervical cancer representing over a quarter of cases, intensified efforts in HPV vaccination, public education, and affordable screening services are critical. Despite over 16,000 Pap smear screenings at JUTH between 2007 and 2017, coverage remains suboptimal.[16]

Expanded Focus on Skin/Bone/Soft Tissue and GI Cancers

The rising burden of these malignancies in Plateau State calls for improved diagnostic tools, histopathologic support, and surgical oncology resources in the region.

Targeted Female Health Interventions

Given the overwhelming proportion of female patients, enhanced public health funding toward women's cancer care, including gynecologic oncology, reproductive health education, and post-treatment support, is urgently needed.

Regional Resource Optimisation

The clustering of cases in Jos North and South suggests the need to decentralise oncology services, expand outreach programs, and upgrade diagnostic capacity in peripheral LGAs.

Strengthening Cancer Registry and Research

Integration of hospital-based data with national cancer registries will help bridge data gaps, ensuring more representative surveillance and informing future health policy decisions.

Limitations

This study, based on clinical records of the Oncology Unit at JUTH, may not fully capture the cancer burden in areas with limited access to healthcare. Selection bias toward patients able to reach a tertiary centre may skew the geographic and clinical distributions presented. Moreover, we were not able to obtain current cancer patient data from other hospitals in Jos for a comparative study, and hence, the findings are limited only to Jos University Teaching Hospital.

CONCLUSION

This study provides a comprehensive overview of cancer patient demographics, cancer type distribution, and geographic patterns at the Oncology Clinic of Jos University Teaching Hospital (JUTH). The findings underscore several critical realities shaping cancer care in the North Central region of Nigeria.

Cervical cancer emerged as the most prevalent malignancy, accounting for more than a quarter of all cases and affecting women across almost all local government areas of Plateau State. Breast, head and neck, and skin/bone/soft-tissue cancers were also significantly represented.

Moreover, our findings reveal a pronounced gender imbalance, with women comprising nearly 72% of all cancer patients, a trend driven largely by the high incidence of female-specific cancers.

Geographically, Jos North and Jos South LGAs contributed the largest share of patients, reflecting their proximity to the hospital and possibly higher health-seeking behaviour in urban settings. Nevertheless, patients from across the state and neighbouring regions also accessed care at JUTH, reinforcing its role as a regional oncology referral centre.

The study's insights point to several urgent needs: early cancer detection initiatives, improved access to affordable treatment, targeted awareness campaigns, particularly for cervical and breast cancers and enhanced oncology capacity across Plateau State. Special attention must be given to adolescent and young adult patients, who often present with rare or aggressive cancers.

Additionally, the high concentration of cases in a few urban LGAs suggests a need for decentralising cancer care, expanding diagnostic services to rural areas, and strengthening data collection through robust cancer registries. These measures, if implemented, would support more equitable and effective cancer control across the state and the wider Nigerian population.

In conclusion, the cancer patient profile at JUTH reflects national and regional oncology trends but also highlights critical gaps in prevention, early detection, and access to care. Addressing these challenges will require coordinated action from public health authorities, policymakers, and healthcare providers to reduce the burden of cancer and improve outcomes for affected individuals across Nigeria.

Declarations

Conflict of Interest

The authors declare that there is no conflict of interest.

Funding Declaration

This research received no financial support from any funding agency, commercial organisation, or research grant.

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