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Original Research Article

Patterns of skin cancers at Federal Medical Centre, Makurdi, Benue State, North Central Nigeria: a 10-year retrospective study

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ABSTRACT

Background: Skin cancers are increasingly recognized as a public health concern in Nigeria. Their patterns of occurrence often differ from global trends. Understanding these variations is essential for prevention, early diagnosis, and planning. This study assessed the clinicopathologic patterns of skin cancers at the Federal Medical Centre, Makurdi, Benue State, over a ten-year period.
Methods: A retrospective review was conducted on 96 patients diagnosed with skin cancers from 2014 to 2023. Demographic characteristics, tumor type, anatomical site, and year of diagnosis were obtained from medical records. Data were analyzed using statistical package for the social sciences (SPSS) version 23 and presented as proportions. A year-trend graph illustrated temporal patterns, while chi-square analysis tested associations, with significance set at $p<0.05$.
Results: The mean age at diagnosis was 45.34±20.17 years, with females accounting for 64.6% of cases. Squamous cell carcinoma (SCC) (33.3%) and malignant melanoma (MM) (28.1%) were the predominant histologic types, while basal cell carcinoma (BCC) was uncommon (4.2%). Among children aged 4-14 years, rhabdomyosarcoma (Rms) constituted 37.5% of tumors, and Kaposi sarcoma (Ks) represented 5.2%. A steady rise in incidence was observed, peaking in 2020. Chi-square analysis showed no significant association between gender and cancer type ($p=0.334$) or age and cancer type ($p=0.098$).
Conclusions: Skin cancers occurred more frequently in younger individuals and women. The high melanoma burden, SCC, and late presentation highlight the need for stronger public awareness, integration of skin cancer screening into primary care and HIV services, and improved cancer registry systems to enhance early detection and outcomes.

Keywords: Skin cancers, Basal cell carcinoma, Squamous cell carcinoma, Makurdi, Malignant melanoma

INTRODUCTION

Skin cancers encompassing melanoma and non-melanoma skin cancers (NMSCs) such as BCC and SCC are among the most common malignancies worldwide and present a growing public-health challenge.[1] Globally, skin cancers rank among the most frequently diagnosed malignancies, with non-melanoma cases numbering in the millions annually and melanoma exceeding 330,000 new cases each year.[2,3] Incidence is highest in fair-skinned populations of Australia, New Zealand, North America, and Northern Europe due to high UV exposure and genetic susceptibility.[4]

While melanoma accounts for the majority of skin-cancer-related mortality, NMSCs impose substantial morbidity,

healthcare costs, and functional disability. Globally, skin-cancer incidence is rising due to aging populations, cumulative ultraviolet (UV) exposure, environmental factors, and improved detection and reporting systems.[2,5,6] Early detection programs and improved reporting systems have increased observed rates, whereas underreporting remains a challenge in low- and middle-income countries due to limited pathology infrastructure.[5]

In Africa, overall skin-cancer prevalence is lower due to protective skin pigmentation; however, it remains a significant cause of morbidity, particularly among high-risk subgroups.[7] SCC predominates, often arising from chronic ulceration, scars, burns, or albinism. Environmental, socioeconomic, and behavioral factors such as high sun exposure, outdoor occupations, inadequate sun protection, and poor access to healthcare, exacerbate risk and delay diagnosis.[8] Immunosuppression from HIV/AIDS further increases vulnerability to Ks and SCC.[9] Cultural beliefs, limited dermatology services, and low awareness compound late presentation, contributing to advanced-stage disease and poor outcomes.

In Nigeria, hospital-based series indicate SCC as the most prevalent skin malignancy, followed by melanoma and BCC.[10,11] Peak incidence typically occurs between the fourth and sixth decades of life, with male preponderance reported in most series.[12,13] High-risk populations include persons with oculocutaneous albinism (OCA), who lack melanin protection and often develop aggressive, early-onset SCC.[10,14] Chronic ulcers, scars, exposure to petroleum products, HIV infection, and outdoor occupations further elevate risk.[7,15] Late presentation is common, resulting in advanced lesions at diagnosis and poorer outcomes.[16] Despite these findings, national cancer registry coverage remains incomplete, limiting the accuracy of population-level estimates. Data from North-Central Nigeria including Benue, Kogi, Kwara, and Niger States mirror national patterns but are fewer in number. Retrospective reviews from tertiary hospitals such as Benue State University Teaching Hospital, Makurdi, report SCC as leading histologic type, followed by melanoma.[17,18] Community surveys indicate low awareness of skin-cancer risk factors, delayed presentation, and barriers to early detection.[19] Benue State, with its largely agrarian population and high environmental UV exposure, represents a region of particular interest where comprehensive, up-to-date data are lacking.

Clinically, skin cancers present as persistent nodules, ulcers, or pigmented lesions, often affecting sun-exposed areas such as the face, neck, scalp, and extremities. In persons with albinism, lesions commonly occur on the head and neck. Histopathologically, SCC exhibits keratin pearls and dysplastic squamous cells, BCC demonstrates nests of basaloid cells with peripheral palisading, and melanoma shows malignant melanocytes with varying pigmentation.[5] Ks presents with spindle-cell vascular proliferation in HIV-positive patients.[20]

Despite multiple institutional reports, substantial gaps remain in the epidemiologic understanding of skin cancer in North-Central Nigeria, particularly in Benue State. Existing studies are often retrospective, single-centre, and limited by small sample sizes, incomplete staging, and lack of outcome data.[10,17] There is limited information on the distribution of skin cancers. These gaps hinder evidence-based planning for prevention, early detection, resource allocation, and clinical management tailored to the local population.

A systematic, contemporary audit of skin cancers in Benue State is necessary. This will enhance clinical care by providing detailed data on age at presentation, histologic distribution, anatomical sites at presentation, thus improving diagnostic suspicion and referral pathways. The study can guide public-health interventions by identifying high-risk populations, informing sun-protection campaigns, screening programs, and awareness initiatives. The study can also support health-system planning by generating evidence for resource allocation in dermatology, oncology, surgery, and pathology services. By comparing local data with national and global patterns, the study will contextualize the epidemiology of skin cancer in Benue state within broader trends.

This study is aimed at exploring the clinicopathologic patterns of skin cancers seen at a tertiary hospital in Benue State, North-Central Nigeria, over a 10-year period, and to compare these findings with national and global trends.

METHODS

Study setting

This study was performed at Federal Medical Centre Makurdi, Benue State, Nigeria. which is a 400-bed tertiary health facility. The medical centre has a pathology department with three pathologists, of whom two are anatomic pathologists. Department has a histopathology laboratory and maintains a histology register for all the histological slides. The histological slides are reviewed by the anatomic pathologists, who make the histological diagnosis of malignancies. Medical records department keeps detailed patient demographic and clinical data.

Study design

A retrospective descriptive study was conducted. The histo-pathological record of 96 patients managed for malignancies from January 2014 to December 2023 were retrieved from the histology register Pathology Department All primary skin cancers seen within the study period were then extracted from the records determine the relative frequency of skin cancers

Study population

All patients who were histologically diagnosed with skin malignancy within the study period and whose records are

retrievable from both the histopathology and medical records departments.

Inclusion criteria

All patients with a histologically confirmed diagnosis of skin cancer (SCC, BCC, melanoma, Ks, adnexal tumours, etc.) with records containing adequate demographic, clinical, and histologic details were included in study.

Exclusion criteria

Cases with incomplete or missing records preventing accurate data extraction were excluded from study.

Sampling method and sample size

All eligible and accessible cases meeting the inclusion criteria within the study period were included using a total enumeration (census) approach since the total number of skin cancer cases was expected to be relatively small.

Study tool

A structured data-extraction form was designed to collect: Patient demographics (age, sex), tumour details (anatomic site, histologic type, stage at presentation if available) and year of diagnosis.

Data analysis

Collected data was coded and entered into SPSS version 23 (IBM Corp., Amork, NY, USA) for analysis. Frequencies, percentages, means, and standard deviations summarized demographic and tumour characteristics. Chi-square tests were used to explore associations between categorical variables (e.g., sex vs. histologic type). Year-by-year trend analysis graph was used to show changes in pattern or frequency across the study period. Results were presented in tables, charts, and graphs.

RESULTS

The average age of patients was 45.34±20.17 years, with the largest groups being 55-64 years (20.8%) and 45-54 years (15.6%). Younger age categories like 4-14 years and ≥75 years each made up 7.3% of the total. Females represented the majority at 64.6%, while males accounted for 35.4%. Across the years, 2020 had the highest number of cases, representing 25% of the total, followed by 2022 (11.5%). Other years, like 2015 and 2017, showed lower frequencies, at 6.3% and 7.3%, respectively (Table 1).

The most prevalent cancer type was SCC, accounting for 33.3% of cases. MM followed closely at 28.1%, with Others contributing 14.6%. Rms and Ks each made up 9.4% and 5.2%, respectively. BCC and df had the lowest frequencies, each representing 4.2% and 5.2% of the total cases.

The distribution of cancer types by anatomical site shows that the most common site of occurrence was the lower limb, accounting for 55.2% of cases, followed by the trunk (13.5%) and upper limb (12.5%). Other sites with notable frequencies include the scalp (6.3%) and groin (3.1%). Less frequent sites include the face, scapular, and lip, each contributing 2.1% or 1.0% of cases. Other sites such as axillar, neck, others, and preauricular account for 1.0% each (Table 3).

The chart shows a notable difference in the number of cancer cases between females and males. There are significantly more cases in females than in males. For females, SCC is by far the most common type of cancer, making up the largest share of the cases. Other cancer types, like MM and Ks, also contribute to the overall distribution, but the cases are more evenly spread across various types. For males, while SCC remains the most frequent cancer, the number of male cases is lower than the female cases. The distribution of cancer types in males follows a similar pattern to that of females, but the proportions for each cancer type are smaller. Overall, the chart illustrates that females have a higher frequency of cancer cases, with SCC being the predominant cancer type in both genders.

The analysis of cancer cases over the years from 2014 to 2023 shows a general increase in the number of diagnoses. Notably, there was a sharp rise in cases in 2020, which may be attributed to increased awareness and disruptions in healthcare caused by the COVID-19 pandemic. However, some years, such as 2017 and 2021, showed lower numbers, indicating fluctuations in cancer diagnoses that may be linked to various external factors. Overall, the trend indicates a steady rise in skin cancer cases, particularly in the more recent years of 2022 to 2023.

The analysis of skin cancer cases from 2014 to 2023 reveals a general increase in diagnoses over the years, with some fluctuations. Notably, 2020 saw a significant peak, likely due to increased awareness and disruptions caused by the COVID-19 pandemic. Conversely, years like 2017 and 2021 experienced temporary declines, which may reflect factors such as healthcare access or reporting variations.

The trend shows consistent growth towards 2022-2023, possibly due to improved data collection and increased healthcare access.

Among females, SCC had a higher proportion (78.1%) compared to males (21.9%). MM was also higher among females (59.3%), compared to 40.7% among males. In contrast, BCC showed higher proportion among males (75.0%). There was no statistically significant relationship between gender and cancer types (p=0.312).

The distribution of cancer types by age shows that SCC is most common across all groups, with the highest proportion in the 15-24 years group (72.7%). MM is also

prevalent, particularly in the 35-44 years (44.4%) and 55-64 years (30%) groups. Rms is more common in younger groups, such as 4-14 years (37.5%). The chi-square test (p=0.098) indicates no statistically significant relationship between age categories and cancer types (Table 5).

The distribution of cancer types across years reveals that SCC is the most common cancer type, with the highest frequency observed in 2020 (37.5%) and 2018 (62.5%). MM was most prevalent in 2020 (12.5%) and 2022 (45.5%). Rms peaked in 2020 (29.2%), while Ks and others had lower frequencies.

The chi-square test result (Chi-square=72.33, p=0.049) suggests a statistically significant relationship between year and cancer types, indicating that the distribution of cancer types varies significantly over time.

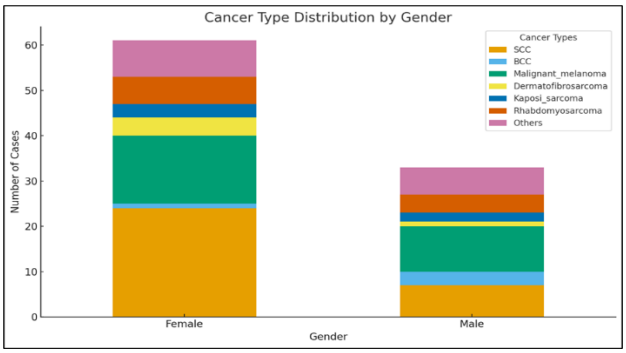

Figure 1: Cancer type distribution by gender.

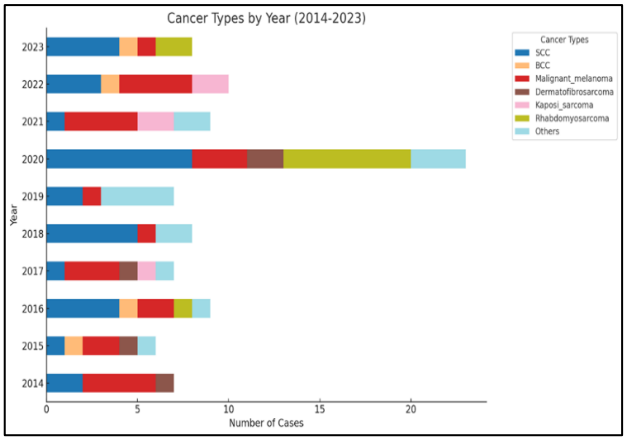

Figure 2: Cancer distribution by year.

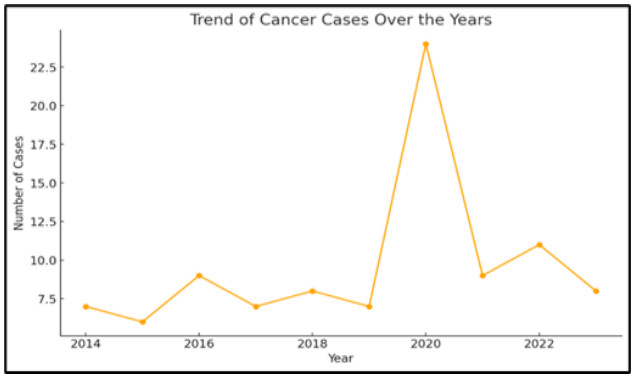

Figure 3: Trend of cancer cases over the years.

Table 1: Sociodemographic characteristics of the patients.

Variables	N	Percentage (%)
Age category (in years)		
Mean 45.34±20.17		
4-14	8	8.3
15-24	11	11.5
25-34	8	8.3
35-44	18	18.8
45-54	15	15.6
55-64	20	20.8
65-74	9	9.4
≥75	7	7.3
Gender		
Male	34	35.4
Female	62	64.6
Years		
2014	7	7.3
2015	6	6.3
2016	9	9.4
2017	7	7.3
2018	8	8.3
2019	7	7.3
2020	24	25.0
2021	9	9.4
2022	11	11.5
2023	8	8.3

Table 2: Distribution of cancer types.

Variables	Mean age (in years)	N	Percentage (%)
SCC	40.40±18.42	32	33.3
BCC	46.00±18.13	4	4.2
Df	42.40±26.33	5	5.2
Ks	48.60±13.67	5	5.2
MM	54.33±14.41	27	28.1
Rms	31.56±23.25	9	9.4
Others	47.86±26.38	14	14.6
Total		96	100

Table 3: Anatomic distribution of the cancers.

Anatomic site	N	Percentage (%)
Lower limb	53	55.2
Trunk	13	13.5
Upper limb	12	12.5
Scalp	6	6.3
Groin	3	3.1
Face	2	2.1
Scapular	2	2.1
Lip	1	1.0
Axillar	1	1.0
Neck	1	1.0
Others	1	1.0
Preauricular	1	1.0
Total	96	100

Table 4: Association between cancer type and gender.

Variables	Gender, N (%)		Test-statistic	P value
	Male	**Female**		
SCC	7 (21.9)	25 (78.1)	Fisher exact: 6.941	0.312
BCC	3 (75.0)	1 (25.0)		
Df	1 (20.0)	4 (80.0)		
Ks	2 (40.0)	3 (60.0)		
Mm	11 (40.7)	16 (59.3)		
Rms	4 (44.4)	5 (55.6)		
Others	6 (42.9)	8 (57.1)		

Table 5: Association between cancer type and age category.

Age category (in years)	SCC, N (%)	BCC, N (%)	Df, N (%)	Ks, N (%)	Mm, N (%)	Rms, N (%)	Others, N (%)	Total
4-14	1 (12.5)	0 (0.0)	1 (12.5)	0 (0.0)	0 (0.0)	3 (37.5)	3 (37.5)	8
15-24	8 (72.7)	1 (9.1)	1 (9.1)	0 (0.0)	0 (0.0)	1 (9.1)	0 (0.0)	11
25-34	4 (50.0)	0 (0.0)	0 (0.0)	1 (12.5)	1 (12.5)	1 (12.5)	1 (12.5)	8
35-44	6 (33.3)	1 (5.6)	0 (0.0)	1 (5.6)	8 (44.4)	0 (0.0)	2 (11.1)	18
45-54	5 (33.3)	0 (0.0)	2 (13.3)	1 (6.7)	4 (26.7)	1 (6.7)	2 (13.3)	15
55-64	6 (30.0)	2 (10.0)	0 (0.0)	2 (10.0)	6 (30.0)	3 (15.0)	1 (5.0)	20
65-74	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (66.7)	0 (0.0)	3 (33.3)	9
≥75	2 (28.6)	0 (0.0)	1 (14.3)	0 (0.0)	2 (28.6)	0 (0.0)	2 (28.6)	7
Total	32 (33.3)	4 (4.2)	5 (5.2)	5 (5.2)	27 (28.1)	9 (9.4)	14 (14.6)	96 (100)

*Chi square-54.220, p=0.098

Table 6: Association between cancer type and year of diagnosis.

Years	SCC, N (%)	BCC, N (%)	Df, N (%)	Ks, N (%)	MM, N (%)	Rms, N (%)	Others, N (%)	Total, N (%)
2014	2 (28.6)	0 (0)	1 (14.3)	0 (0)	4 (57.1)	0 (0)	0 (0)	7 (7.3)
2015	1 (16.7)	1 (16.7)	1 (16.7)	0 (0)	3 (50)	0 (0)	0 (0)	6 (6.3)
2016	4 (44.4)	1 (11.1)	0 (0)	0 (0)	2 (22.2)	1 (11.1)	1 (11.1)	9 (9.4)
2017	1 (14.3)	0 (0.0)	1 (14.3)	1 (14.3)	3 (42.9)	0 (0.0)	1 (14.3)	7 (7.3)
2018	5 (62.5)	0 (0.0)	0 (0.0)	0 (0.0)	1 (12.5)	0 (0.0)	2 (25.0)	8 (8.3)
2019	2 (28.6)	0 (0.0)	0 (0.0)	0 (0.0)	1 (14.3)	0 (0.0)	4 (57.1)	7 (7.3)
2020	9 (37.5)	0 (0.0)	2 (8.3)	0 (0.0)	3 (12.5)	7 (29.2)	3 (12.5)	24(25.0)
2021	1 (11.1)	0 (0.0)	0 (0.0)	2 (22.2)	4 (44.4)	0 (0.0)	2 (22.2)	9 (9.4)
2022	3 (27.3)	1 (9.1)	0 (0.0)	2 (18.2)	5 (45.5)	0 (0.0)	0 (0.0)	11(11.5)
2023	4 (50.0)	1 (12.5)	0 (0.0)	0 (0.0)	1 (12.5)	1 (12.5)	1 (12.5)	8 (8.3)
Total	32 (33.3)	4 (4.2)	5 (5.2)	5 (5.2)	27 (28.1)	9 (9.4)	14 (14.6)	96 (100)

*Chi square-72.33, p=0.049

DISCUSSION

The findings of this study offer a compelling and clinically significant epidemiological profile of skin cancers in Benue state, Nigeria. It reveals patterns in age, gender, histopathology, and temporal trends that are both distinct from global norms and deeply reflective of the local health landscape. The average age at diagnosis of 45.34±20.17 years shows a younger presentation compared to high-income countries, where the median age for melanoma exceeds 65 and nonmelanoma skin cancers typically occur after the seventh decade.[3] This earlier onset aligns with emerging evidence from Sub-Saharan Africa, where a bimodal distribution is evident: a peak in childhood associated with sarcomas such as Rms and a second peak in middle adulthood dominated by SCC and MM.[19] In our cohort, Rms constituted 37.5% of cases among children aged 4-14 years, a finding consistent with recent Nigerian studies that report a disproportionately high burden of pediatric soft tissue sarcomas, often linked to infectious triggers, delayed diagnosis, and limited access to specialized oncology care.[21,22] The concentration of adult cases in the 45-54 and 55-64 year age groups further corroborates regional data from Ibadan, Enugu, and Port Harcourt, which identify midlife as the period of highest incidence, likely due to cumulative exposure to chronic inflammation, trauma, and environmental carcinogens in the absence of robust primary prevention.[23,24]

A clinically important observation is the female predominance, with women accounting for 64.6% of all skin cancer cases. This contrasts sharply with global patterns, where men are consistently at higher risk for most skin cancers, primarily due to occupational sun exposure, lower rates of sun protection use, and differences in healthcare-seeking behavior.[25,26] Female preponderances have also been reported in other studies. Eze et al in a multicenter analysis of over 1,200 cases from Southeast Nigeria, reported a female-to-male ratio of 1.5:1 and Bello et al in Kano found similar trend.[13,15] This disparity is likely multifactorial. Women in Nigeria are more likely to seek medical attention for the dermatological concerns probably due to cosmetic reasons. Despite this clear gender differences, there was no statistically significant association between gender and cancer type (p=0.334). This suggests that the underlying drivers of skin cancer in Nigeria are not gender-specific biological factors but may be shared environmental, socioeconomic, and healthcare access determinants.

The histopathological profile distinguishes Nigeria's skin cancer burden from that of Western nations. SCC was the most prevalent type (33.3%), followed closely by MM (28.1%), while BCC was less common (4.2%). This pattern depicts skin cancer epidemiology in Africa and contrasts with global data, where BCC accounts for approximately 80% of nonmelanoma skin cancers due to intense UV exposure in fair-skinned populations.[6] The low occurrence of BCC in our cohort is consistent with the protective effect of higher melanin content against UV-induced DNA damage, a well-documented phenomenon in dermatological literature.[14,27] The high prevalence of SCC is consistent with other studies from Nigeria.[12,15] The 5.2% prevalence of Ks may illustrate the complex interplay of infection, immunosuppression from HIV, and trauma in this setting. Ks, in particular, remains a significant burden, as confirmed by Agabi et al who found it to be the third most common skin cancer among HIV-positive patients in Jos, highlighting the enduring impact of the HIV epidemic on cancer epidemiology despite advances in antiretroviral therapy.[20]

The temporal trend of increasing diagnoses from 2014 to 2023, with a pronounced peak in 2020, requires cautious interpretation. While the global COVID-19 pandemic caused widespread disruption to cancer screening and treatment services, resulting in delayed presentations and advanced disease in many countries, the spike in our study may require further studies.[28] It is plausible that initial lockdowns and fears of hospital exposure created a backlog of patients who presented with advanced disease later in 2020. However, this surge may also reflect a genuine increase in case ascertainment, driven by intensified public health campaigns and improved

diagnostic infrastructure. The subsequent dip in 2021 may represent a temporary lull, while the sustained rise in 2022-2023 suggests a true increase in burden, likely fueled by an aging population, urbanization, and rising exposure to environmental carcinogens such as polycyclic aromatic hydrocarbons from traffic and indoor combustion.[8] This trend is corroborated by a recent report from Lagos University Teaching Hospital, which documented a 38% increase in skin cancer diagnoses between 2019 and 2022, attributing part of the rise to expanded community sensitization and improved biopsy services.[29]

The lack of statistical significance in association between age and cancer type (p=0.098) may reflect the inherent limitations of retrospective, single-centre data with small subgroup sizes, particularly in the youngest and oldest age groups. The non-significant p values serve as a reminder that statistical significance is not always synonymous with clinical importance, especially in resource-limited settings where sample sizes are constrained.

CONCLUSION

In conclusion, this study explores the pattern of skin cancer presenting in a tertiary health centre in Benue State, North Central, Nigeria. There was high incidence of SCC and MM. The low incidence of BCC and the high burden of Ks and Rms further distinguish it from global profiles. The increasing incidence, accentuated by 2020 peak, signals growing public health crisis that is both a consequence of and a challenge to country's evolving healthcare system. To address this, Nigeria must move beyond reactive case management and invest in targeted, culturally appropriate public education campaigns that empower communities to recognize early signs of acral melanoma and chronic ulcer transformation. Integrating skin cancer screening into HIV clinics, diabetic foot care programs, and primary care settings is imperative. Finally, establishment of robust, nationwide cancer registry system, supported by initiatives like global initiative for cancer registry development, is necessity to accurately measure the burden, evaluate interventions, and ultimately save lives. Such context-specific, evidence-based strategies can Nigeria hope to mitigate the rising tide of skin cancer.

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