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An Overview of the current state of cancer diagnosis and treatment in sub-Saharan Africa

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ABSTRACT

Background: *Cancer incidence and mortality are increasing rapidly in Sub-Saharan Africa (SSA), with 801,392 new cases and 520,158 deaths reported in 2020. Despite global advancements in oncology, SSA faces critical challenges in timely diagnosis, treatment access, and workforce capacity.*

Objective: *This review synthesises recent evidence on cancer diagnosis and treatment in SSA, highlighting epidemiological patterns, infrastructural gaps, systemic barriers, and emerging innovations.*

Methods: *A narrative review of literature published over the past 10 years (2015–2025) was conducted using PubMed, Scopus, and African Journals Online. Data from GLOBOCAN, WHO, and regional studies were integrated, with emphasis on diagnostic modalities, treatment capacity, and national initiatives.*

Results: *Most cancers in SSA present at advanced stages (>70–90%) due to limited screening, delayed referrals, and cultural barriers. Radiotherapy infrastructure is critically inadequate, with only 24.4% of the population living within 2 hours of a facility, and chemotherapy availability is hindered by cost and supply chain weaknesses. Workforce shortages, lack of universal health coverage, and poor cancer registry data exacerbate these challenges. However, progress is noted in hypo-fractionated radiotherapy adoption, expansion of regional cancer centres, and public-private partnerships. AI-assisted diagnostics and mobile oncology initiatives show promise but remain nascent.*

Conclusion: *Cancer care in SSA is characterised by late-stage diagnosis, under-resourced treatment services, and systemic inequities. Strengthening cancer registries, scaling diagnostic and treatment infrastructure, adopting cost-effective therapies, expanding workforce training, and fostering research collaborations are critical to improving outcomes.*

Keywords: *Access to Care, Cancer, Chemotherapy, Diagnosis, Disparities, Health Systems Challenges, Liquid biopsy, Oncology, Pathology, Radiotherapy, Sub-Saharan Africa, Treatment.*

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Introduction

The global burden of cancer is rising, with low- and middle-income countries (LMICs), particularly in SSA, bearing an increasing share[1]. While cancer incidence in SSA is currently lower than in high-income regions, mortality rates are significantly higher, reflecting profound disparities in access to timely diagnosis and effective treatment[2,3]. Projections indicate a near doubling of cancer incidence in Africa by 2040, driven by demographic changes, urbanisation, and lifestyle shifts[4]. The rising burden threatens fragile health systems already strained by infectious diseases. Effective cancer diagnosis and management are paramount for improving survival and quality of life.

The objective of this review is to provide a comprehensive overview of the current state of cancer care in SSA, focusing on epidemiology, diagnostic and therapeutic capabilities, systemic challenges, ongoing initiatives, research gaps, and future directions, with a focus on evidence from the past decade.

Epidemiological Overview

Cancer incidence and mortality in SSA exhibit distinct patterns. Common cancers include infection-associated malignancies like cervical (caused by HPV), liver (associated with HBV/HCV), and Kaposi sarcoma (HHV-8), alongside breast and prostate cancers[5,6]. Age-standardized incidence rates (ASIRs) for cervical cancer in SSA are among the highest globally, while prostate cancer incidence and mortality are rising rapidly,[7,8]. Breast cancer, often presenting at younger ages and more advanced stages than in high-income countries, is a leading cause of cancer death among women [9]. Significant regional disparities exist; East Africa has high rates of Oesophageal cancer, while Southern Africa reports higher rates of lung and colorectal cancers[10,11]. Late-stage diagnosis is pervasive, contributing to mortality rates often exceeding 70% for many common cancers, compared to less than 50% in high-resource settings[11,12]. Cancer registries, essential for planning, remain sparse and under-resourced, leading to significant underestimation of the true burden[14] (Figure 1)

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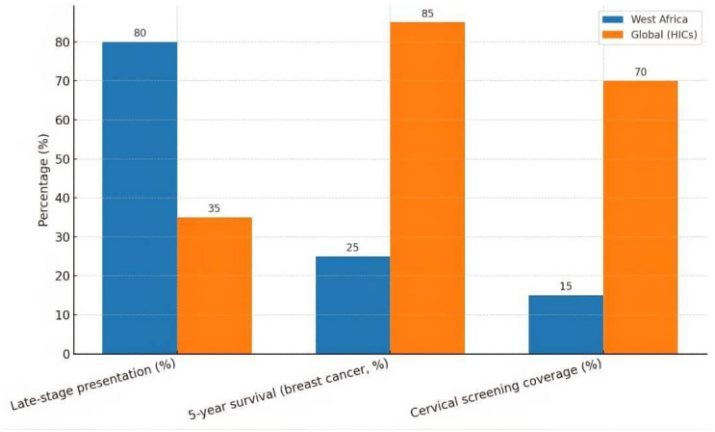

Figure 1: Comparison of cancer burden and care: West African Vs Global

Data are based on recent estimates from GLOBOCAN 2020 and peer-reviewed studies comparing West African and global cancer indicators, including late-stage presentation rates, 5-year survival outcomes, and cervical cancer screening coverage. Values are approximate averages derived from regional studies and WHO/IAEA reports.

Current Diagnostic Landscape

Diagnostic Modalities: Access to essential diagnostic tools is severely limited. Basic imaging (X-ray, ultrasound) is more available. Still, access to computed tomography (CT) is restricted, and magnetic resonance imaging (MRI) and positron emission tomography (PET) are scarce outside major referral centres [15,16]. Histopathology services are centralized in urban areas; immune histo chemistry (IHC), crucial for subtype classification (e.g., breast cancer), is often unavailable or unreliable[17]. Tumour marker testing (e.g., PSA, CA-125) is inconsistently accessible. Molecular diagnostics (PCR, next-generation sequencing - NGS) and liquid biopsies remain largely confined to research settings or a few specialised laboratories due to cost, infrastructure requirements, and lack of expertise[18,19].

Access and Utilisation: A stark urban-rural divide exists. Rural populations face immense barriers, including distance to facilities, transportation costs, and lack of awareness[20]. Delayed presentation is a critical issue, driven by low health literacy, cultural beliefs, fear, stigma, and reliance on traditional medicine[21]. Consequently, 60-80% of patients present with advanced (Stage III/IV) disease [22]. Cost remains a prohibitive factor for many diagnostics, compounded by insufficient infrastructure (reliable electricity, water) and critical shortages of trained personnel (pathologists, radiologists, radiographers, laboratory technicians) [23,24] (Figure 2).

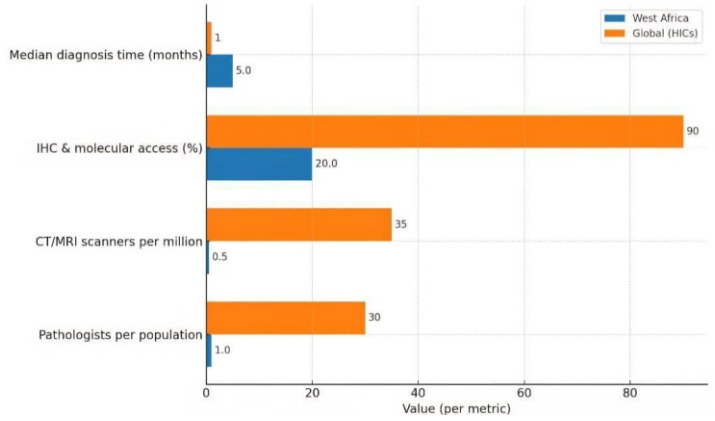

Figure 2: Comparison of Diagnostic Capacity: West Africa vs Global Benchmarks

Values are illustrative averages based on estimates from GLOBOCAN 2020, WHO Global Health Observatory, and recent peer-reviewed studies on diagnostic capacity in West Africa compared with high-income countries. Indicators include pathologist density, imaging availability, access to molecular diagnostics, and average diagnostic delays.

Cancer Treatment Modalities

Surgery: Surgical oncology services are concentrated in tertiary centres. While essential for solid tumours, access is limited by shortages of trained surgical oncologists, anesthesiologists, operating theatre capacity, inadequate postoperative care, and blood bank deficiencies [25,26]. Safety and quality standards vary considerably.

Radiotherapy: Radiotherapy, required for approximately 50% of cancer patients, is severely under-resourced. Many SSA countries lack any radiotherapy facilities; the region has less than 10% of the needed machines[27,28]. Existing centres face chronic challenges: machine breakdowns due to ageing equipment, lack of maintenance engineers, power fluctuations, shortages of radioisotopes, and insufficient medical physicists and radiation therapists[29,30]. This results in long waiting times and compromised treatment schedules.

Chemotherapy: Access to essential cytotoxic drugs is inconsistent. Affordability is a major barrier, exacerbated by importation costs, taxes, and mark-ups[31]. Supply chain weaknesses lead to stockouts, while concerns about drug quality and counterfeit products persist[32]. Supportive care drugs (e.g., anti-emetics, growth factors) are often unavailable or unaffordable[33].

Targeted and Immunotherapies:Access to targeted therapies (e.g., trastuzumab for HER2+ breast cancer) and immunotherapies is scarce outside of private practice or specific research/compassionate use programs due to exorbitant costs (often exceeding annual incomes) and infrastructure demands for administration and monitoring[34,35]. Participation in global clinical trials offering newer agents is limited[36].

Palliative Care: Integration of palliative care into national health systems is inadequate. Regulatory barriers, inadequate training, and misconceptions about opioid use[37,38] severely restrict access to oral morphine and other essential pain relief medications. Holistic end-of-life care services are scarce, especially outside major cities[39] (Figure 3).

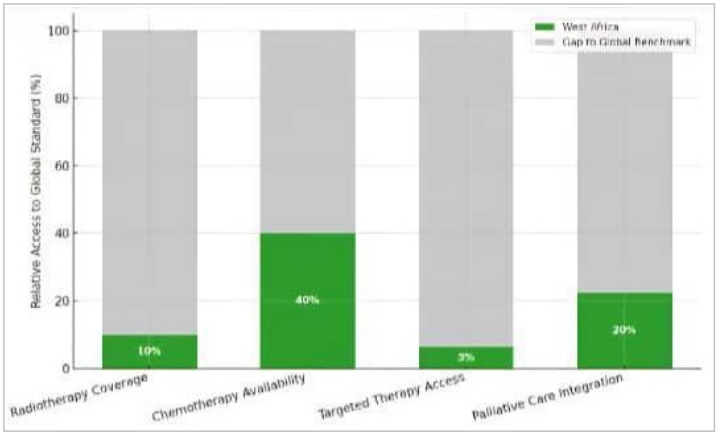

Figure 3: Cancer Treatment Gaps: West Africa vs Global Benchmarks

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Values reflect estimated access to key cancer treatment modalities in West Africa relative to global benchmarks (100%). Data are based on the WHO Global Health Observatory, IAEA radiotherapy reports, and regional studies on chemotherapy and palliative care availability. The "gap" segment highlights the shortfall compared to international standards.

Health System Challenges:

The delivery of cancer care by SSA nations is hindered by inherent shortcomings within the health system.

Labour Deficiencies: Severe shortage of qualified oncology professionals, including medical, clinical, and radiation oncologists, pathologists, radiologists, oncology nurses, chemists, and allied health personnel. The emigration of skilled individuals to high-income nations exacerbates capacity depletion [40,41].

Insufficient infrastructure: Insufficient facilities, inconsistent power and water supply, inadequate sanitation, and limited maintenance capabilities hinder service delivery [42].

Fragmented referral pathways result in unclear, ineffective systems that cause delays, duplication, and patient loss to follow-up[43].

Financial obstacles: Significant out-of-pocket costs for diagnosis and treatment are disastrous for numerous families. The absence of universal health coverage (UHC) or insufficient integration of cancer services into health insurance plans constitutes a significant barrier [44,45].

Inadequate Data Systems: Population-based cancer registries encompass only a limited segment of the population. The absence of comprehensive data impedes planning, resource distribution, and progress assessment [46,47](Table 1).

Table: Health System and Workforce

Parameter	West Africa	Global (HICs)	Sources
Oncology specialists (per 100k)	<0.2	2–5	40,41
Cancer registries	Patchy, often hospital-based	Comprehensive population-based	43
Health expenditure per capita	<USD 100–150	>USD 4,000 in many HICs	44-47
UHC coverage for cancer	Limited (few services covered)	Broad coverage, including advanced care[44,45]	

Ongoing Initiatives and Innovations:

Efforts are underway to address the cancer burden: National Cancer Control Programs (NCCPs): Numerous SSA nations have formulated NCCPs; nevertheless, execution and financing continue to pose significant obstacles [48].

Public-Private Partnerships (PPPs) & International Support:Partnerships with NGOs (e.g., African Organisation for Research and Training in Cancer - AORTIC), international agencies (WHO, IAEA Programmed of Action for Cancer Therapy - PACT, Union for International Cancer Control - UICC), and private entities aim to build capacity, provide equipment, and support training[49,50].

The IAEA has been instrumental in supporting radiotherapy centres[51].

Innovations: Mobile health units for screening,such as cervical cancer using VIA, telepathology/tele-radiology consultations, and tele-oncology for specialist advice, are being piloted to bridge geographic gaps[52,53].

Centres of Excellence: Establishment of regional centres (e.g., Butaro Cancer Centre in Rwanda, Uganda Cancer Institute, Inkosi Albert Luthuli Central Hospital in South Africa) aims to provide comprehensive care and training hubs[54,55].

Research Gaps and Future Directions

Significant research gaps hinder progress:

Local Data: Need for high-quality, population-specific epidemiological, genomic, and clinical outcomes data to inform tailored interventions[56].

Implementation Research findings: Research on effective models for delivering affordable, scalable cancer care in resource-constrained settings is crucial[57].

Capacity Building: Investment in training African cancer researchers and strengthening local research institutions is essential[58].

Clinical Trials Inclusion: Strategies to increase SSA participation in global clinical trials, ensuring relevance of new therapies to the regional context[59].

Prevention and Early Detection: Prioritising research and implementation of cost-effective prevention (vaccination - HPV, HBV) and early detection strategies (e.g., screening for cervical, breast, colorectal cancers)[60,61].

Survivorship: Understanding and addressing the unique needs of cancer survivors in SSA is an emerging priority[62].

Recommendations

Addressing the cancer crisis in SSA requires multi-faceted, sustained action:

Enhance Data Systems - Invest in and expand high-quality, population-based cancer registries for precise burden assessment and monitoring[63].

Expand Access to Diagnostics: Scale up essential diagnostics (ultrasound, basic pathology, strategically placed CT) through innovative financing, task-shifting, and public-private partnerships. Prioritise reliable supply chains for reagents and consumables[64].

Improve Treatment Access: Increase radiotherapy capacity through strategic planning, sustainable financing, and international support (e.g., IAEA). Ensure a reliable supply and affordability of essential chemotherapy drugs. Explore mechanisms for sustainable access to select targeted therapies where clinically impactful[65,66l].

Build and Retain Workforce: Substantially increase investment in training surgical oncologists, oncologists, pathologists, radiologists, oncology nurses, and allied health professionals. Implement strategies for retention, including competitive remuneration and career development opportunities. Utilise task-shifting/sharing where appropriate and safe[67,68].

Enhance Palliative Care: Integrate palliative care into national health policies and NCCPs. Remove regulatory barriers to opioid access and train healthcare workers in pain management and palliative care[69].

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Foster Regional Collaboration: Promote knowledge sharing, resource pooling (e.g., specialist training, rare diagnostic tests), and harmonised policies across SSA countries. Strengthen regional bodies like AORTIC[70].

Integrate Cancer into UHC and SDGs: Prioritise inclusion of essential cancer prevention, diagnosis, treatment, and palliative care services within national UHC benefit packages, aligned with Sustainable Development Goal (SDG) 3.4 on reducing premature NCD mortality[71,72].

Prioritise Prevention and Early Detection: Scale up HPV and HBV vaccination. Implement and evaluate context-appropriate, cost-effective screening programs for cervical, breast, and other high-burden cancers. Invest in public awareness campaigns[73,74].

Conclusion

Cancer diagnosis and management in Sub-Saharan Africa face severe challenges, including weak health systems, limited infrastructure, workforce shortages, inadequate access to medicines and technologies, and late-stage presentations, all driving high mortality. Although progress has been made through national cancer control plans, innovations, and international collaborations, urgent and sustained investment is needed. Achieving equitable cancer care will require Africa-led strategies, stronger health systems, an expanded oncology workforce, functional registries, and integration of cancer services into universal health coverage to prevent devastating human and economic consequences.

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