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Treatment patterns, care delays and outcomes in advanced cervical cancer: study protocol for a mixed retrospective and prospective single-centre cohort in South Africa

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To cite: Achilonu O, Ayeni O, Adeleke M, *et al*. Treatment patterns, care delays and outcomes in advanced cervical cancer: study protocol for a mixed retrospective and prospective single-centre cohort in South Africa. *BMJ Open* 2025;**15**:e105299. doi:10.1136/bmjopen-2025-105299

► Prepublication history for this paper is available online. To view these files, please visit the journal online (https://doi.org/10.1136/bmjopen-2025-105299).

Received 18 May 2025
Accepted 14 October 2025

Check for updates

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ABSTRACT

Introduction Cervical cancer (CaCx) is a leading cause of cancer-related deaths among women in South Africa, often presenting at advanced stages and requiring chemoradiotherapy. In South Africa, the burden is disproportionately high among women living with HIV, with limited access to radiotherapy further compounding treatment challenges. Despite this documented disparity, limited data exist on patients in a South African context. This protocol describes the research methodology to assess patterns of care, treatment delays, interruptions and survival outcomes in patients with advanced CaCx, addressing an urgent need for local data in low-income and middle-income countries to provide evidence-based improvements in care.

Methods and analysis The Cervical Cancer Cohort at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH-CCC), initiated in 2023, is a mixed retrospective and prospective single-centre study investigating the characteristics, challenges and outcomes of patients with advanced CaCx. It includes women aged ≥18 years with a histopathological diagnosis of stage IB3–IVA CaCx treated at CMJAH Radiation Oncology. The retrospective component covers data from September 2018 to August 2023. Data collection is complete and the team is currently conducting quality control. The prospective component began in October 2023 and aims to enrol participants over 2 years, with follow-up for up to 3 years. The study is ongoing, and an extension for continued enrolment beyond September 2025 is being sought. Participants provide baseline data on demographics, socioeconomic status, cultural influences and healthcare access, with updates every 3 months. When necessary, the next of kin provides follow-up information. The study aims to inform strategies to improve outcomes and reduce the CaCx burden in South Africa.

Ethics and dissemination Ethics approval for this study was obtained from the Human Research Ethics Committee (Medical) at the University of the Witwatersrand in Johannesburg, South Africa, with an ethical clearance certificate (MM221001 MED22-09-085). The results will be widely distributed through presentations at national and international conferences and published in peer-reviewed open-access journals, ensuring wide access to the results.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study is conducted at Charlotte Maxeke Johannesburg Academic Hospital, a major teaching and referral hospital in Gauteng, which ensures access to a large and diverse patient population, enhancing the study's generalisability and relevance to public healthcare settings in South Africa.
⇒ The retrospective and prospective longitudinal cohort design captures historical and real-time data, providing a comprehensive understanding of CaCx trends.
⇒ The study investigates population disparities, disease burden and healthcare access, identifies key risk factors and evaluates treatment-related morbidity from chemotherapy and radiotherapy to guide targeted interventions.
⇒ The study will generate essential data on clinical presentation, tumour histology, treatment and outcomes, addressing a key knowledge gap in CaCx public health policy for screening, prevention and treatment in South Africa and the region.
⇒ The hospital-based study does not capture women's experiences seeking care exclusively from traditional or spiritual healers.

BACKGROUND

Cervical cancer (CaCx) is the fourth most common cancer diagnosed among women worldwide and is the leading cause of cancer morbidity and mortality. In 2022 alone, there were an estimated 661 127 new cases and over 348 189 deaths globally, with 90% occurring in low-middle and middle-income countries (LMICs).[1–3] This presents a significant public health challenge, disproportionately affecting women in LMICs. Persistent infection with

high-risk human papillomavirus (HPV) types is the primary cause of CaCx.[4] Despite strong evidence for preventative interventions in reducing CaCx, the scarcity of programmes for HPV vaccination and cervical screening in LMICs, alongside limited access to medical facilities, especially in rural areas, contributes significantly to the burden and poor outcomes of CaCx.[4–6]

Several risk factors have been associated with CaCx, including HIV, parity, smoking, alcohol consumption, contraceptive use, age, education level and number of sexual partners.[7] HIV increases the risk of CaCX progression. Women with HIV had approximately a threefold increased risk of developing CaCx in their lifetime compared with women without HIV.[8] This elevated risk is partly due to HIV's effect on the immune system, which increases the acquisition and persistence of HPV, the primary causative agent of CaCx.[9]

CaCx is largely preventable and highly treatable, with favourable outcomes when detected early. In 2020, the WHO introduced the Global Strategy to accelerate the elimination of CaCx as a public health issue by 2030.[10 11] This strategy aims to reduce the incidence to <4 cases per 100 000 women. To achieve this, the Global Strategy outlines three key targets, known as the '90-70-90' goals, to be reached by 2030: 90% of girls should be fully vaccinated against HPV by age 15, 70% of women should undergo high-performance screening by age 35 and again by age 45, 90% of women diagnosed with pre-cancerous lesions should receive treatment and 90% of those with invasive cancer should receive proper management.

In LMICs, patients with CaCx often present with advanced disease stages, requiring advanced-stage disease treatment with chemotherapy and radiotherapy.[12 13] The Fédération Internationale de Gynécologie et d'Obstétrique (FIGO) staging system is commonly used to classify the extent of CaCx, guiding treatment decisions.[14 15] However, many regions have limited access to cancer treatment services, particularly radiotherapy, because of equipment maintenance, quality control, staff shortages and high procurement costs.[13 16] The Lancet Oncology Commission reports that <50% of sub-Saharan African countries have access to external beam radiotherapy (EBRT) and brachytherapy, which are essential for the curative treatment of certain stages of CaCx.[13 17] This radiotherapy gap significantly affects patient outcomes in the region.[16] LMICs are undergoing an epidemiological transition marked by increased urbanisation and a shift from communicable to non-communicable diseases (NCDs), including cancers. This shift has led to rising NCD rates, straining healthcare systems that are often unprepared to manage the dual burden of infectious diseases and NCDs.[18 19]

In South Africa, CaCx is the second most common cancer diagnosed among women and a leading cause of cancer deaths among women aged ≥15 years. Approximately 11 000 new cases are diagnosed each year, with about half of these cases resulting in death.[20] A significant proportion of CaCx cases in South Africa are linked to HPV infection, particularly strains HPV-16 and HPV-18, which are responsible for about 64.2% of invasive cases.[20] Additionally, women with HIV infection contribute to >63% of the new cases of CaCx in South Africa[21] and have an approximately three times higher risk of developing cervical pre-cancer and cancer than women without HIV infection.[22]

Despite increasing HPV vaccination and regular screening in South Africa, the uptake remains low, especially in rural and underserved areas. Socioeconomic status, education and access to healthcare services can significantly influence screening rates, often leading to late-stage diagnoses.[23 24] Managing patients with advanced CaCx has become increasingly complex because of long-term care needs and the need for coordinated efforts among healthcare providers.[25 26] Addressing these challenges required establishing clinical cohort data repositories to enable easy access to clinical information, thereby assessing trends and the effectiveness of interventions to improve patient care quality and foster research. Collaboration between clinicians, researchers and policymakers is essential to ensure the effectiveness of such initiatives.

This study aims to describe patient pathways to diagnose, characterise treatment patterns and evaluate outcomes while exploring potential barriers to care, including treatment delays and reasons for treatment non-completion. It will also estimate all-cause survival and establish a curated database that could support future research on CaCx in similar settings. The findings are expected to provide context-specific insights that may inform national and international efforts to improve outcomes for patients with advanced CaCx.

By combining retrospective and prospective components, the study is designed to examine system- and patient-level factors that may contribute to delays, compliance, toxicity and outcomes and to evaluate their associations with survival. This dual approach is anticipated to strengthen our ability to assess the timeliness and completeness of care, as well as evolving healthcare barriers and patient-centred factors that could influence prognosis. To our knowledge, this will be among the first prospective investigations in Johannesburg to systematically capture detailed socio-demographic, clinical, treatment and HIV-related data on women with advanced CaCx in a high-HIV, resource-constrained setting. Ultimately, the study may generate evidence to guide targeted strategies for improving CaCx care in LMICs.

Objectives

The primary objective is to estimate overall survival (OS) and identify demographic, clinical and treatment-related factors associated with OS in patients with advanced CaCx. Secondary objectives are to (i) estimate disease-free survival (DFS) and characterise recurrence patterns; (ii) characterise treatment patterns (initial modality, delays and overall treatment time), protocol-concordant completion and interruptions, treatment-related toxicity and patient-reported barriers to diagnosis and treatment;

(iii) evaluate the associations of treatment patterns, delays, compliance, toxicity and patient-reported barriers with OS and DFS; and (iv) describe the demographic and clinical profile of the cohort.

METHODS AND ANALYSIS

Study design and setting

The Cervical Cancer Cohort at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH-CCC) is an ongoing mixed-method, hospital-based study with retrospective and prospective components. The retrospective component, initiated in 2023, involves data collection spanning 5 years (September 2018 to August 2023). Data collection for this component is complete, and the study team is currently focused on data cleaning and quality control. The prospective component, also initiated in 2023, began enrolling participants in October 2023 for a planned 2-year period ending in September 2025, with post-enrolment follow-up for up to 3 years. The prospective study remains active, and the study team is applying for an extension to continue enrolment beyond the initial 2-year timeline.

The study is conducted through the Radiation Oncology Department at CMJAH, a major teaching hospital and referral centre for multiple public hospitals and clinics in Gauteng and surrounding provinces. Gauteng, the most populous province in South Africa, has a population of 15.8 million (25.1% of the national total) as of 2024, with a median age of 27 years.[27] The population is 84.6% black, 10.0% white, 2.9% coloured and 2.2% Indian or Asian. Despite having 24.9% medical aid coverage, 75.1% of residents rely on public healthcare, placing immense pressure on the province's infrastructure.[28] CMJAH, one of only two public hospitals in Gauteng with radiation oncology services, manages approximately 500 CaCx cases annually referred for chemo-radiation.[29]

Prospective study participant inclusion/exclusion

The eligibility and exclusion criteria for the prospective study are detailed in table 1. Confidentiality and anonymity are ensured throughout the study, and participants may withdraw at any time.

Enrolment procedures and follow-up

Patients newly diagnosed with advanced CaCx and referred for radiotherapy (with or without chemotherapy) are recruited during their initial consultation and staging visit by the study team. Eligible patients are informed about the study in a private setting, with assistance from an on-site translator if needed. Patients interested in participating provide written consent, which the University of the Witwatersrand Ethics Committee has approved. The consent covers all study procedures, including baseline and follow-up interviews, blood sample collection and use of biopsy specimens and medical record data. Follow-up interviews are conducted every 3–6 months after baseline to assess patient well-being and treatment-related side effects and screen for recurrence of symptoms.

Loss to follow-up is the inability to trace a participant for 12 months or longer, with an anticipated rate of 5%–10%. With the patient's consent, additional contact details from a close relative or friend are obtained to minimise attrition, and regular telephone follow-ups are made. In cases of death, the next of kin is contacted to provide the date, cause of death and details of the effect on the family, following WHO verbal autopsy guidelines.

Study participants are referred from a network of hospitals and healthcare facilities to the Radiation Oncology Department at CMJAH. Referral sources include the Chris Hani Baragwanath Academic Hospital, Rahima Moosa Hospital, Edenvale Hospital, Pholonsong Hospital and private healthcare providers. These facilities typically provide primary care or initial oncology services and refer patients requiring advanced treatments, such as radiation therapy, to CMJAH. Most of these hospitals are located in close proximity to CMJAH within the Gauteng province (figure 1), facilitating timely referrals and access to specialised oncology services across the region.

Treatment protocol

Patients in the prospective cohort are managed according to the *National Comprehensive Cancer Network* guidelines for CaCx. For women with locally advanced disease, the standard of care consists of EBRT to the pelvis, delivered concurrently with cisplatin-based chemotherapy (40 mg/

Table 1 Eligibility and exclusion criteria for the prospective study

Inclusion criteria	Exclusion criteria
1. Histopathological diagnosis of advanced cervical cancer (stage IB3–IVA, classified according to FIGO 2018) 2. Aged ≥18 years 3. Referred to the Radiation Oncology Department for treatment from October 2023 onwards 4. Registered assessment consultation case record from referring hospital 5. Able to provide written informed consent 6. Available for follow-up	1. No histopathological confirmation of CaCx 2. Vaginal bleeding from other pelvic malignancies (eg, bladder, endometrial and ovarian) 3. Declined or unable to provide informed consent 4. Recurrent cervical cancer previously treated for the same diagnosis 5. Planned relocation outside follow-up area

CaCx, cervical cancer; FIGO, International Federation of Gynaecology and Obstetrics.

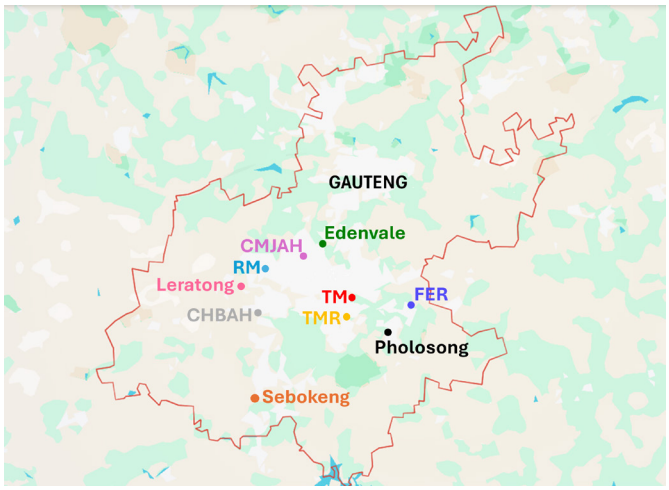


Figure 1 Geographic locations of referring public hospitals for patients recruited in the prospective study. FER, Far East Rand Hospital; RM, Rahima Moosa Mother and Child Hospital; TM, Tambo Memorial Hospital; TMR, Thelle Mogoerane Regional Hospital.

m^2 weekly), followed by intracavitary brachytherapy.[30] However, in our centre, we are giving cisplatin 80 mg/m^2 every 3 weeks due to resource constraints and high patient volume. Radiotherapy is typically delivered over 5–6 weeks, with a total EBRT dose of 45–50.4 Gy in 25–28 fractions, and brachytherapy administered to point A to achieve a combined equivalent dose in 2 Gy fractions of 80–86 Gy.

Chemotherapy is omitted for patients deemed poor candidates for concurrent chemoradiation due to baseline laboratory abnormalities, renal impairment, poor performance status or HIV-associated immunosuppression (CD4 count<200 cells/μL). These patients receive EBRT and brachytherapy alone. Newly diagnosed women living with HIV are referred for immediate initiation of antiretroviral therapy before commencing cancer treatment to optimise immune function and treatment tolerance. Treatment-related toxicity will be graded using the Radiation Therapy Oncology Group/European Organisation for Research and Treatment of Cancer criteria.[31]

Prospective data collection

Data collection for the prospective study began in October 2023. Information is being gathered through a structured baseline questionnaire and a review of medical records. Variables collected include sociodemographic factors, medical history, barriers to care, family cancer history, treatment details, post-treatment follow-up and vital status (table 2). Baseline clinical staging is assigned according to the FIGO 2018 classification system,[15] using available clinical, radiological and histopathological findings. In addition, detailed journey to care information is being collected from patient narratives and medical records, including dates of first symptom onset, first health facility visit, diagnostic investigations, histological confirmation and treatment initiation. This allows for the calculation of patient, diagnostic and treatment intervals, as well as the

Table 2 Variables for retrospective and prospective studies

Item	Variables
Socio-demographic	Age, education level, employment status, income and social support
Personal history	Smoking, HIV status, viral load, CD4 count, BMI, performance status (ECOG/KPS), previous cervical cancer screening, HPV genotype, blood (FBC, creatinine, pre-treatment haemoglobin, white blood cell count and platelet)
Disease characteristics	Symptoms, histology (eg, squamous, adenocarcinoma, adenosquamous, small cell), grade and stage
Treatment details	Treatment intent, prescribed treatment (eg, radical CCRT and radical RT), type of radiotherapy (eg, EBRT alone and EBRT with brachytherapy), total radiation dose, fractionation, dose per fraction, technique, boost and planned treatment (eg, surgery and traditional healer use)
Dates	Date of first consultation, date of CT simulation, date of initiation and completion of treatment, date of discharge, date of follow-up and date of death
Barriers to care	Journey to diagnosis, symptom onset, time to access care, initial healthcare consultations, number of visits before diagnosis, cancer knowledge and attitudes toward treatment
Radiotherapy	Radiotherapy type (radical or salvage), details of external radiotherapy (XRT machine used, dose and technique), brachytherapy (type, dose details, imaging used, initiation and completion details)
Chemotherapy	Chemotherapy details (eg, agent used, dose and frequency)
Treatment duration	Initiation and completion of radiotherapy, overall treatment time and delays/breaks
Post-treatment follow-up	Recurrence status, follow-up dates, follow-up type (in-person or telephonic), follow-up status, signs of recurrence, complications, performance status, routine blood tests (eg, haemoglobin and CEA)
Vital status	Vital status (eg, alive, deceased and unknown)

BMI, body mass index; CCRT, concurrent chemoradiation therapy; CD4, cluster of differentiation 4; CEA, carcinoembryonic antigen; EBRT, external beam radiation therapy; ECOG/KPS, Eastern Cooperative Oncology Group and Karnofsky Performance Status; FBC, full blood count; RT, radiation therapy; XRT, X-ray therapy.

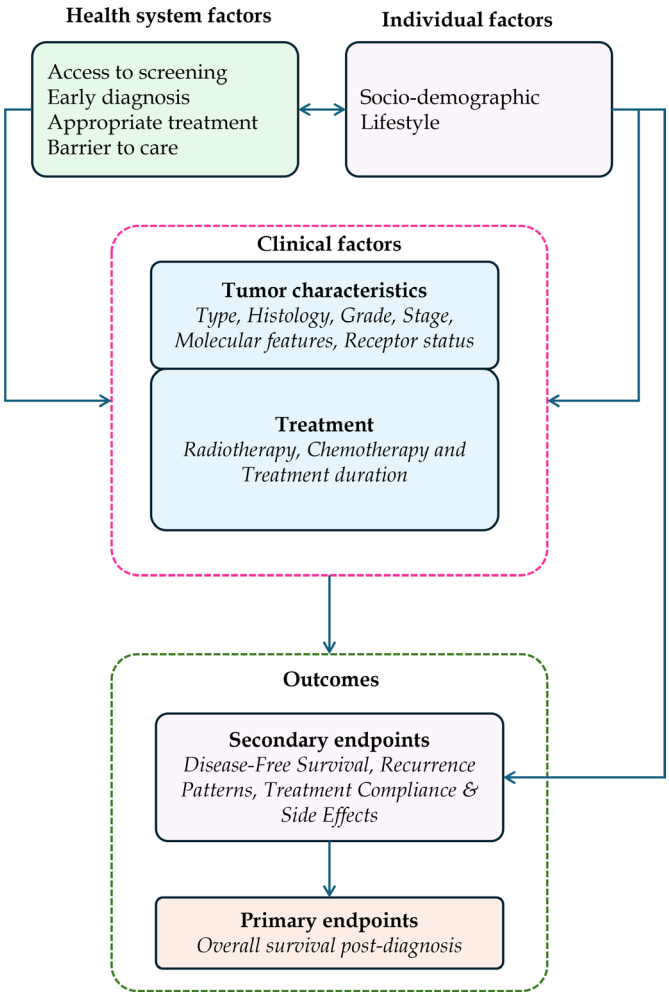


Figure 2 Pathways under investigation for OS and Key milestones in Women's Journey with Cervical Cancer in the study area.

identification of barriers and delays at the patient, health system and contextual levels.

Follow-up occurs 3–6 months post-intervention, in which subsequent treatments, complications, disease recurrence and OS were recorded. Outcomes are assessed through history taking and clinical examinations. Based on the study's conceptual framework, factors influencing survival may have either a direct or an indirect effect. Direct factors are expected to include tumour characteristics and treatment specifics, whereas indirect factors may involve socio-demographic characteristics and access to care, which can affect diagnosis timing and treatment accessibility (figure 2).

Retrospective study participant inclusion/exclusion

All patients who met the criteria listed in table 3 are eligible for the retrospective study.

Retrospective data collection

For the retrospective component, data from medical records are extracted for all patients with advanced CaCx treated in the radiation oncology department from September 2018 to August 2023. Collected variables include demographic information, clinical presentation, tumour characteristics and treatment details (table 2). Baseline clinical staging was retrospectively assigned or confirmed according to the FIGO 2018 classification system, based on available clinical, radiological and histopathological findings. Additional medical record reviews capture comprehensive treatment data covering external radiotherapy, brachytherapy, chemotherapy and treatment duration, with dates, doses, toxicities, compliance and interruptions. figure 3 provides an overview of the methodology detailed in the subsequent sections.

Data management and analysis strategy

All data, whether baseline, retrospective or prospective, is stored in the Wits University RedCap system, a Health Information Portability and Accountability Act-compliant web-based application designed for building and managing secure online databases. Data is captured using electronic case report forms within RedCap,[32] ensuring standardised data entry with built-in validation rules to minimise errors. Each data entry is timestamped, and changes are tracked to maintain data integrity. Regular data cleaning processes are performed to identify and correct inconsistencies, ensuring high data quality. Data access is limited to the research team and authorised collaborators, and data sharing will be conducted following institutional policies and ethical guidelines.

Sample size calculation

One of the primary objectives of this study is to develop a multivariable survival model to assess factors influencing 3-year survival in patients with advanced CaCx (FIGO 2018 stage IB3–IVA), using retrospective medical record data

Table 3 Eligibility and Exclusion Criteria for the Retrospective Study

Inclusion criteria	Exclusion criteria
1. Histologically confirmed stage IB3–IVA cervical cancer (FIGO 2018). 2. Women aged≥18 years. 3. Diagnosed and/or treated at CMJAH Radiation Oncology between September 2018 and August 2023. Medical records available with key data (demographics, clinical details, treatment and outcomes).	1. Non-cervical primary cancer or metastatic disease to the cervix (ie, not primary cervical cancer). 2. Managed entirely outside CMJAH during the study window. 3. Missing key data required for analysis (eg, diagnosis, stage, treatment dates or outcomes).

CMJAH, Charlotte Maxeke Johannesburg Academic Hospital ; FIGO, Fédération Internationale de Gynécologie et d'Obstétrique.

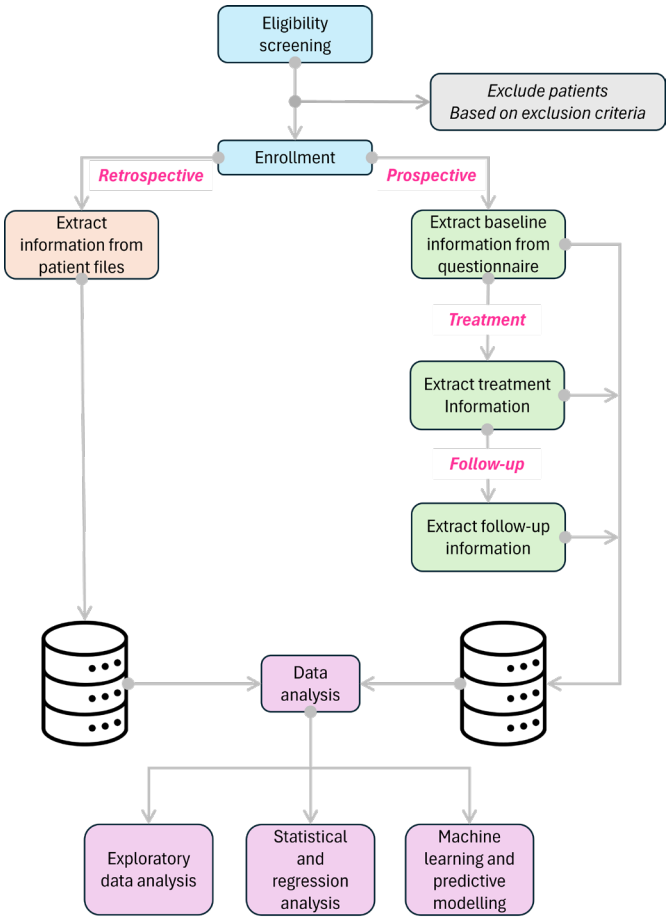


Figure 3 Study design and methodology.

and prospective follow-up of newly diagnosed patients. Based on registry data from sub-Saharan Africa, the estimated 3-year survival rate is approximately 45% (55% mortality),[13] ensuring an adequate number of events for robust statistical modelling. Applying the events-per-variable rule[33] and assuming inclusion of 10 predictors with a requirement of at least 20 events per predictor, a minimum of 200 events is needed to ensure statistical stability, precision and generalisability of the survival estimates. With an expected event rate of 55%, the required sample size for the survival analysis is: $\frac{200}{0.55} \approx 364$ participants. For the planned multivariable logistic regression models, the rule proposed by Bujang *et al*[34] was applied, which recommends a minimum sample size, as follows: n=100 + (50×number of predictors) = 100 + (50×10) = 600 participants. To satisfy both modelling approaches, allow for internal validation and account for potential loss to follow-up and missing data, the final target sample size is set at a minimum of 600 participants. This exceeds the minimum required for the survival model and provides adequate power for the planned logistic regression analyses.

Statistical analysis plan

Exploratory data analysis will be performed to describe the demographic and clinical characteristics of patients diagnosed with advanced CaCx. Continuous variables will be summarised using the mean and SD, median and range, or IQR, as appropriate. Correlation analysis will be applied to assess relationships between continuous variables.[35] Analysis of variance or independent t-tests will be used for normally distributed continuous variables. At the same time, non-parametric tests such as the Kruskal–Wallis and Mann–Whitney U tests will be applied for non-normally distributed data. Categorical variables will be presented as frequencies and percentages, with associations between two independent categorical variables assessed using the $\chi 2$ test or Fisher's exact test if $\chi 2$ assumptions are violated.

The journey to diagnosis will be assessed from unstructured patient narratives obtained at baseline and from medical records. Narratives will be processed using a natural language processing (NLP) approach to extract standardised variables,[36] including first symptom, symptom onset date, first healthcare contact, number and type of facilities visited, referral steps, diagnostic tests performed and dates of diagnosis confirmation and treatment initiation. From these variables, time intervals will be computed for patient delay (symptom onset to first healthcare contact), diagnostic delay (first contact to histological confirmation) and treatment delay (diagnosis to initiation of treatment). The extracted variables will be analysed descriptively. The structured variables generated from the NLP process will be incorporated into regression models to evaluate their association with survival and other study outcomes.

To examine the effect of independent variables on categorical outcomes, this study will employ logistic regression alongside machine learning (ML) algorithms such as support vector machines, extreme gradient boosting and extra trees.[37 38] For continuous outcome variables, predictive models will be developed using traditional regression techniques, such as linear regression and ML algorithms, including gradient boosting and random forests. To enhance the interpretability and transparency of these models, we will integrate model-agnostic explanation techniques, including local interpretable model-agnostic explanations (LIME) and SHapley additive exPlanations (SHAP).[38] LIME provides local explanations by approximating the model's behaviour near individual predictions, offering insights into specific decision-making processes. Conversely, SHAP offers global interpretability by assigning consistent and theoretically grounded importance values to each feature across all predictions, thereby explaining the overall influence of each predictor on the model's output. Integrating these standard and advanced techniques, coupled with LIME and SHAP, will improve the transparency and trustworthiness of our predictive models.

The study will also assess the effects of various factors on the survival of patients with CaCx, using standard and advanced survival models such as Cox proportional hazards and parametric survival techniques.[39 40] Assumptions underlying traditional models will be thoroughly

assessed and reported, with significance levels set at 5%. To assess the progression and mortality of CaCx, multistate survival regression modelling will be employed. This approach allows for the analysis of transitions between various disease states (figure 3), facilitating a detailed understanding of patient pathways and survival outcomes.[41] Comprehensive modelling approaches will be applied to all developed models, and a rigorous evaluation of the model fit will be conducted and documented.

Patient and public involvement

Patients and/or the public are not involved in the design, conduct, reporting or dissemination plans of this study.

ETHICS AND DISSEMINATION

Ethics approval for this study was obtained from the Human Research Ethics Committee (Medical) at the University of the Witwatersrand in Johannesburg, South Africa, with an ethical clearance certificate (MM221001 MED22-09-085). On completion, all anonymised primary and processed data will be made available on request and approval to ensure transparency and facilitate further research. We plan to disseminate findings of major public health importance to research communities primarily through traditional channels such as scientific conferences, abstracts and peer-reviewed publications. To reach the broader public and local communities, we will use mass media platforms including radio, newspapers and television. For policy-making bodies in South Africa, such as the National Department of Health and the South African Medical Research Council, dissemination will take place through written reports and policy briefs. In addition, we will deliver webinars and organise workshops to support broader engagement and knowledge translation.

DISCUSSION

This study addresses a critical gap in country-specific data on CaCx in South Africa, particularly in the context of advanced disease and high HIV prevalence. By combining retrospective and prospective methods, the study is expected to yield a more complete and accurate understanding of treatment patterns, delays and survival outcomes in patients with advanced CaCx. This dual approach enables exploration of both historical trends and evolving challenges in accessing and completing treatment in resource-constrained environments.

A major strength of this study lies in its design: a hospital-based, single-centre cohort study that facilitates comprehensive clinical data collection within a defined catchment area. The study will prospectively describe clinical presentation, demographics, risk factors, treatment and outcomes stratified by population group, making it the first of its kind in Johannesburg, South Africa. Unlike prior research that relied on secondary data sources such as reimbursement claims, laboratory records or national registries, this study generates granular, patient-level data across different disease stages and age groups. In a setting with one of the highest global HIV prevalence rates, it is also the first prospective investigation to systematically capture detailed clinical, laboratory and treatment information on women with advanced CaCx, including HIV-related parameters, cancer progression patterns and treatment outcomes. This integrated dataset will enable comprehensive analyses of how HIV status, treatment modifications and clinical characteristics influence disease control and survival in this high-burden, underresearched population. This depth of information is critical for developing targeted interventions and informing healthcare policy tailored to the local context.

Several limitations should be considered. The CMJAH serves an urban population in Gauteng Province; as such, the findings may not be generalisable to rural or less densely populated settings with different healthcare access profiles. The study does not currently include genetic risk profiling, which could limit the ability to identify molecular subtypes or biologically distinct disease patterns. Although a 3-year follow-up period has been planned, this may not be sufficient to capture long-term outcomes such as metastasis or late recurrence; however, efforts are underway to secure funding to extend follow-up. In addition, the cohort is restricted to patients with locally advanced disease, which limits insights into early-stage detection and management.

Looking ahead, there are plans to expand this study to other hospitals within the Academic Hospital Complex and beyond. Doing so will enable the establishment of a larger CaCx-specific research infrastructure, supporting future studies, building research capacity and informing comprehensive cancer control strategies across sub-Saharan Africa.

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Contributors DR and SG conceptualised the original idea for the study. MJ, OAA, DM and DR led the design of the core study. MJ provided funding support for the ongoing data collection. OA drafted the manuscript. MA, SS, OAA, DM, MS, MJ, WCC

and HM reviewed and provided input on the manuscript. All authors contributed to the development of the current study design, critically revised the manuscript and approved the final submitted version. DR is the guarantor.

Funding This study was funded by the National Cancer Institute of the National Institutes of Health (R01 Grant Number CA192627). It was also supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH commissioned by the Research Networks for Health Innovations in sub-Saharan Africa Funding Initiative of the German Federal Ministry of Education and Research Germany. It was further supported by the Developing Excellence in Leadership, Training and Science in Africa (DELTAS Africa) grant made by the Alliance for Accelerating Excellence in Science in Africa (AESA) in partnership with the Wellcome Trust and the UK Foreign, Commonwealth and Development Office. OA, MA, DR and DM were supported by the UCL-Wits Bilateral Partnership Development Seed Fund 2023/24. We would like to thank the participants of the CCCMJAH study and the staff of the Radiation Oncology Department for their contributions. This paper describes the views of the authors and does not necessarily represent the official views of the funders.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

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