International Journal of Clinical Urology
2026, Vol. 10, No. 1, pp. 96–102
https://doi.org/10.11648/j.ijcu.20261001.27

Research Article

Epidemiology and Histopathology of Primary Urological Cancers in Chad, Sub-Saharan Africa

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Abstract

Introduction: Urogenital cancers are a heterogeneous group of tumors affecting the kidneys, bladder, prostate, testicles, and penis. In developing countries, late diagnosis and limited resources complicate management, leading to high morbidity and mortality rates. This study aims to describe the epidemiological and histopathological profile of urogenital cancers in Chad in order to guide prevention and care strategies. Methodology: This is a retrospective, descriptive, and analytical study conducted in the pathology department of the La Renaissance University Hospital, the only referral center in the country, between January and December 2025. All histologically confirmed cases of urogenital cancer were included. The data collected included sociodemographic, clinical, and histopathological characteristics, which were analyzed using Excel. Results: Of the 1,117 samples examined, 251 were of urogenital origin and 85 were diagnosed as malignant tumors. The mean age of patients was 66.8 ±13.3 years, with a predominance of males (94.1%). The prostate was the most commonly affected organ (77.6%), followed by the bladder (20%) and kidney (2.4%). Prostate adenocarcinoma was the predominant histological type (100% of prostate cancers), with 56.3% being high grade. Bladder cancers were mainly urothelial, and kidney cancer was represented by nephroblastoma. Conclusion: Urogenital cancers in Chad are dominated by aggressive prostate cancer. The lack of a national registry and technical limitations complicate management. The implementation of a national strategy integrating screening, registry, diagnostic reinforcement, and specialized training is essential to reduce mortality and anticipate the future burden.

Keywords

Epidemiology, Histopathology, Urological Cancers, Chad, Africa

1. Introduction

Urogenital cancers are a heterogeneous group of tumors affecting the kidneys, upper urinary tract, bladder, prostate, testicles, and penis [1]. Globally, their distribution and incidence vary considerably between regions, influenced by genetic, environmental, and socioeconomic factors [2]. They are a major

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Received: 10 April 2026; **Accepted:** 3 May 2026; **Published:** 15 June 2026

public health problem, posing difficulties in diagnosis and adequate treatment in developing countries [3]. In sub-Saharan Africa, for example, they are often diagnosed at a locally advanced or metastatic stage [4], with a significant impact on morbidity and mortality [3]. This is due to limited diagnostic capabilities, delayed consultation, and the absence of comprehensive registries, which complicate the accurate assessment of their frequency, distribution by age and sex, and histological profile [5]. Epidemiological and histological data on these urological cancers are available in developed countries with cancer registries [6]. In sub-Saharan Africa, the available data on urogenital cancers are limited to hospital statistics [4]. However, a better understanding of these characteristics is essential to guide screening strategies, improve therapeutic management, and plan appropriate health policies [5]. In this context, this study aims to describe the epidemiological and histopathological profile of urogenital cancers in Chad, highlighting the frequency of different types of cancer, their sociodemographic characteristics, and the most common histological type. These data will help fill current gaps and serve as a basis for prevention, screening, and improvement programs for urological cancer care in the country.

2. Methodology

Following institutional approval, this retrospective, descriptive, and analytical study was conducted in the pathology department of La Renaissance University Hospital. This is the only referral service in Chad, a country in Central Africa, which began operating on January 1, 2025, and receives samples from other hospitals and clinics throughout the country. It covered all cases of urogenital cancer diagnosed between January and December 2025. All patients with primary cancer of the urogenital tract were included, regardless of their origin, as confirmed by pathological examination. Incomplete files or those with insufficient information on the histological type were excluded to ensure the quality and reliability of the data. The data collected from the department's records and histological examination reports covered epidemiological parameters (age, sex, and city or region of origin of the sample), clinical parameters (reason for sampling, organ involved), type of sample and examination result (biopsy, surgical specimen, endoscopic resection, final result (cancer or not), histological type, tumor grade, presence of specific elements such as necrosis, vascular or perineural invasion, and whether immunohistochemistry was performed. Additional information, if deemed relevant, was also collected. For data collection, a standardized collection form created using Google Forms was used to record the following information in a consistent manner. The samples, consisting of biopsies or surgical specimens, were fixed in 10% buffered formalin and processed using conventional histology techniques, with classification in accordance with World Health Organization (WHO) recommendations. The data entered were analyzed arithmetically using Excel. Quantitative variables will be expressed as mean ± standard deviation or median with interquartile range depending on the distribution of the data, and qualitative variables as numbers and percentages. A simple bivariate analysis was performed on age, sex, organ involved, and histological type.

3. Results

Analysis of the prevalence and monthly variation of urological tumors

During the study period, 1,117 samples were examined, 251 of which were of urogenital origin, representing 22.5% of all samples. Of the 251 samples, 85 were diagnosed as tumors, corresponding to 33.9% of all urogenital samples analyzed. The distribution of the number of monthly urological tumor analyses showed variation during the study period, with the number fluctuating between 4 and 15 cases per month, as shown in Figure 1.

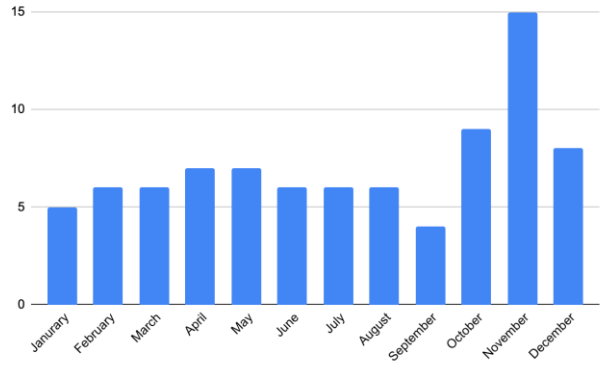

Figure 1. *Monthly distribution of urological tumor analyses.*

Analysis of epidemiological and histopathological data for urological cancers

The average age of patients was 66.8 ± 13.3 years, ranging from 2 to 88 years. The most represented age group was over 70 years (n=37; 43.5%). The population was predominantly male, with 80 men (94.1%) and 5 women (5.9%), giving a male-to-female ratio of 16. In 98.8% of cases, samples came from the same city (N'Djamena). In terms of the type of facility sending samples, public facilities accounted for 67.1%. The most frequently affected organ was the prostate, accounting for 77.6% of cases (n = 66), while kidney involvement was rare (2.4%, n = 2). Of the total number of patients (n=85), the main indication for sampling was elevated PSA and/or a prostate abnormality detected by digital rectal examination, found in 54 patients, or 63.5%. The most common type of sample taken was a biopsy, performed in 57 patients, or 67.1%. Histological analysis of the samples showed that prostate adenocarcinoma was the most common type of tumor, found in 64 patients (75.3%). Among the prostate adenocarcinoma cases

identified (n=64), 36 cases (56.3%) were high grade with perineural invasion present in 34 cases (53.1%). The epidemiological and histological data are summarized in Table 1.

Table 1. *Epidemiological and histopathological characteristics of urological cancers.*

Parameter		Number (n)	Percentage (%)
Epidemiological Data			
Total patients		85	100
Mean age (years)		66.8	
Age group (years)	< 40	7	8.2
	40–49	3	3.5
	50–59	7	8.2
	60–69	31	36.5
	≥ 70	37	43.5
Sex	Male	80	94.1
	Female	5	5.9
City of origin	N'Djamena	84	98.8
	Abéché	1	1.2
Type of referring facility	Public	57	67.1
	Private	28	32.9
Histopathological Data			
Most affected organ	Kidney	2	2.4
	Bladder	17	20
	Prostate	66	77.6
Type of specimen	Biopsy	57	67.1
	Endoscopic resection	24	28.2
	Surgical specimen	4	4.7
Main histological type	Prostate adenocarcinoma	66	77.6

Data analysis by organ type

Prostate cancer: Prostate cancer was the most common urological cancer, accounting for 77.6% of all urogenital cancers diagnosed during the study period. The average age of patients with prostate cancer was 69.7 ± 8.9 years. The indication for sampling was elevated PSA in 78.8% of cases. The type of sample was mainly a prostate biopsy (89.4%). Cancer was discovered in resection chips in 6 patients (9.1%) and in one patient (1.5%) during analysis of the surgical specimen from a prostate adenomectomy. Adenocarcinoma was the only histological type identified (n = 66; 100%). Of these 66 cases, 27 (40.9%) were low grade, 21 (31.8%) were high grade, and 18 (27.3%) were very high grade.

Bladder cancer: Bladder cancer ranked second among urological cancers (n=17, 20%). The average age of patients was 60.2 ± 18.7 years, with a predominance of males (n=13; 76.5%), giving a sex ratio of 3.25. It was the most common urological cancer in women in our study population, with 4 out of 5 cases (80%). Hematuria was the main symptom (88.2%). The most common histological type was urothelial carcinoma (n=1; 94.1%) with muscle infiltration in 8 patients (47.1%) and vascular invasion in 4 (23.5%).

Kidney cancer: Kidney cancer ranked third among urological cancers, accounting for 2.4% (n=2). The average age of patients was 30 years with a sex ratio of 1: 1. Nephroblastoma was the only histological type (n=2, 100%). Samples were taken from surgical specimens following nephrectomy.

4. Discussion

These results highlight the epidemiological and histopathological profile of urogenital cancers in Chad, particularly the pre-dominance of prostate tumors and the high frequency of high-grade adenocarcinomas. The following discussion will focus on these characteristics, comparing them with data available in African and international literature and analyzing the associated socio-demographic, clinical, and histological factors.

Epidemiological data

In this study, it was noted that urogenital cancers most often occur in people aged 50 and over (the average age was 66.8 years) with a sex ratio heavily skewed towards men. According to data in the literature, urological cancers are diseases mainly diagnosed in older people and occur mainly in men [7, 8]. This observation has been confirmed by various sub-Saharan studies. Ouattara et al [8] in Benin in 2012 reported in an epidemiological study of urological cancers in hospitals that the average age of patients (n=158) was 62.89 years, with a sex ratio of 1/10 in favor of men. In a study on the epidemiology and treatment of primary urological cancers conducted in Burkina Faso by Ouedraogo et al [9] in 2019, the average age of patients was 58.9 years with a sex ratio of 4.5 in favor of men. In 2023 in Senegal, Kouka et al [10] reported similar results. This observation is valid in the Maghreb, as confirmed by the study conducted by Salah et al [11] in Algeria in 2015, where the average age of patients was over 50 in 90.51% of cases and the sex ratio was in favor of men. Despite the consistency of observations regarding average age and sex ratio in most studies, the incidence of urological cancers varies considerably from one country to another, and even from one region to another. In Cameroon, the prevalence reported by Mokake et al [12] was 5%. In Burkina Faso, urogenital cancers account for 15.1% of all diagnosed cancers [13] and 16.4% in Togo [3]. In our study, the prevalence of urogenital cancers

was 22.5%. In sub-Saharan Africa, the available data on urogenital cancers are limited to hospital statistics [4]. Limited diagnostic capabilities, delayed consultation, and the absence of comprehensive registries complicate the accurate assessment of their frequency, distribution by age and sex, and histological profile [5].

Histological data

With the exception of the Algerian study conducted by Salah et al [11], which found bladder cancer to be the most common urogenital cancer, all of the above-mentioned studies [2, 7-10, 12, 13] report that prostate cancer is the most common urogenital cancer in their populations. In the present study, prostate cancer was the most common urological cancer, followed by bladder and kidney cancer. The study published by Ouattara et al [8] in Benin made a similar observation.

Prostate cancer: Prostate cancer is the second most common cancer in men worldwide (after lung cancer) and is the fifth leading cause of cancer death worldwide. The incidence of prostate cancer increases with age [14]. African American men have higher incidence rates and more aggressive forms of prostate cancer than white men [15], which may be explained by genetic factors [16]. The incidence and mortality of PCa vary significantly across geographical regions, influenced by factors such as genetic pre-disposition, access to care, lifestyle, and participation in screening programs [14]. These findings highlight the importance of improving healthcare infrastructure in these countries in order to alleviate the growing burden of prostate cancer [17]. In the sub-Saharan context, tumor stage and grade are higher. This suggests that prostate cancer is underdiagnosed and/or underreported in men in sub-Saharan Africa [18]. To reduce this burden, screening is strongly recommended from age 45 onwards for men with a family history of the disease and for African-American men [15]. A pan-African study based on a survey of African urologists conducted by Modern Urology For Africa concluded that the diagnosis and management of prostate cancer in Africa face major challenges: late diagnosis, insufficient staff, inadequate health infrastructure, and limited treatment options. Strengthening technical skills through continuing education, improving infrastructure, and promoting collaboration between health centers are essential steps in reducing the burden of prostate cancer in sub-Saharan Africa [19]. In previous African studies from Côte d'Ivoire [20], Tanzania [21], Cameroon [22], and Senegal [23], the average age at diagnosis was over 60 years. Compared to Western studies [24], the average age observed in Africa is high. This could reflect delayed diagnosis. In this study, the main reason for performing biopsies was elevated PSA levels. Jalloh et al [24] reported that elevated PSA levels were noted in 8.5% of their patients, whereas histological diagnosis of prostate cancer was made on the basis of prostate biopsies in 92% of patients.), transurethral resection of the prostate (TURP) in 13 patients (5.2%), and prostate adenomectomy in 7 patients (2.8%). Acinic adenocarcinoma was the histological type observed in all our patients, with a predominance of ISUP IV in 65 patients (26.42%), followed by groups I and III in 63 (25.61%) and 55 patients (22.36%), respectively [24]. In a Cameroonian study, PSA was above 4 ng/ml in 88% of patients [25]. In terms of histological type, adenocarcinoma was either the only type identified or the predominant type in the majority of studies on prostate cancer [26-28].

Bladder cancer: Bladder cancer is the most common tumor of the urinary tract and the ninth most commonly diagnosed cancer worldwide [29], representing a major public health problem with geographical disparities [30]. Ninety-nine percent of cases occur in people aged 55 and over, with smoking and certain occupational exposures being the main risk factors [29, 31]. Diagnosis is based on cystoscopy and medical imaging [30]. In Africa, a Bayesian systematic review estimated a cumulative incidence of 7.0 (95% CI: 5.8–8.3) per 100,000 men and 1.8 (1.2–2.6) per 100,000 women, higher in North Africa [32]. In Tanzania, 69% of cases involved men (ratio 2.2: 1), with a mean age of 58.45 years, 71% of whom were farmers [33]. In Kenya, the mean age was 61.84 years, with 68.9% of cases involving men and 51.1% involving transitional cell carcinomas [34]. In Senegal, the average age was 62.37 ± 13.96 years, with a sex ratio of 1.63, and urothelial carcinoma accounted for 79.5% of cases [35]. In Egypt, from 2001 to 2010, the average age rose from 41 ± 11.2 to 52 ± 8.6 years, the sex ratio from 5.6: 1 to 4.2: 1, and the incidence of associated bilharzia from 80% to 50%, with an increase in transitional cell carcinomas (from 20% to 66%) and a decrease in squamous cell carcinomas (from 73% to 25%) [36]. A review of 23 African studies showed that bladder cancer remains predominantly squamous cell carcinoma in most regions [37]. Radical cystectomy with urinary diversion remains the standard treatment for invasive or squamous cell carcinomas, but in sub-Saharan Africa, late diagnosis, lack of surgical expertise, and inadequate perioperative care limit its application, resulting in lower morbidity and survival rates. The high prevalence of squamous cell carcinoma associated with schistosomiasis, disparities in multidisciplinary care, and the burden of comorbidities further complicate treatment [38]. In Chad, current observations show a mean patient age of 60.2 years, with a predominance of males and urothelial carcinoma.

Kidney cancer: Globally, kidney cancer ranks sixth among men and ninth among women. Incidence rates of kidney cancer increase steadily with age, peaking around age 75 [39]. Worldwide, about half of all cases are diagnosed before age 65 [40]. The incidence of kidney cancer is twice as high in men as in women [41]. The main risk factors for kidney cancer include smoking, excess weight, high blood pressure, diabetes, certain occupational and environmental exposures, and rare genetic predispositions. Certain lifestyle factors, such as alcohol consumption, physical activity, and vitamin D levels, may have a protective effect, but the data remain limited and sometimes contradictory [42]. In a review of 11 articles from sub-Saharan Africa, the authors [43] noted a mean age of 47.4 years (range 15-83 years) in the pooled data analysis, with a

predominance of renal masses in women (57.2%). Histo-logically, renal cell carcinoma was the most common histological type of cancer, with a subtype dominated by clear cell carcinoma (61.6%). In this study, nephroblastoma was the only histological type.

Limitations of the study

The limitations of this article are mainly due to its retrospective nature and reliance on data from a single referral center, which limits its national representativeness, especially for rural areas. The sample size (85 cases) limits the analysis of rare cancers. Despite this, the study provides new data on urological cancers in Chad and can serve as a basis for other large-scale and much more focused studies.

5. Conclusion

Urogenital cancers represent a growing public health challenge in Chad, a country undergoing demographic and epidemiological transition, with a landscape dominated by prostate cancer diagnosed at an aggressive stage. The absence of a national cancer registry and the inadequacies of both diagnostic and therapeutic technical facilities are major obstacles to optimal care. The implementation of a national strategy to combat urological cancers, incorporating targeted screening, data collection through a registry, diagnostic reinforcement, specialized training, and the organization of structured care pathways, appears essential. Investing in urological oncology today means reducing premature mortality among men tomorrow, improving patients' quality of life, and anticipating an oncological burden that is set to grow in the coming decades.

Abbreviations

WHO	World Health Organization
PSA	Prostate-Specific Antigen
CI	Confidence Interval
TURP	Transurethral Resection of the Prostate
ISUP	International Society of Urological Pathology
n	Nombre
%	Pourcentage
PCa	Prostate Cancer

Author Contributions:

Saleh Abdelkerim Nedjim: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing

Sadissou Gambobo: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Resources, Validation, Writing – review & editing, Formal analysis

Mahamat Ali Mahamat: Data curation, Investigation, Methodology, Resources, Writing – review & editing

Abbas Ouya Raphaël: Data curation, Investigation, Resources

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Conflicts of Interest

The authors declare no conflicts of interest.

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