

Transperineal Ultrasound-Guided Prostate Biopsy at National Social Insurance Fund Hospital, Essos Yaoundé: Initial Experience from a Resource-Limited Setting

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How to cite this paper: Yisa, H.K., Kepdip, A.F. and Foe, C.E. (2026) Transperineal Ultrasound-Guided Prostate Biopsy at National Social Insurance Fund Hospital, Essos Yaoundé: Initial Experience from a Resource-Limited Setting. *Open Journal of Urology*, 16, 416-426.

<https://doi.org/10.4236/oju.2026.169042>

Received: July 30, 2026

Accepted: September 27, 2026

Published: September 30, 2026

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Abstract

Background: Prostate cancer is the most frequently diagnosed malignancy and a leading cause of cancer-related mortality among men in sub-Saharan Africa. Transperineal ultrasound-guided prostate biopsy (TPUS-Bx) has emerged as a safer alternative to the traditional transrectal approach, offering significantly lower infectious complication rates and improved sampling of the anterior prostate. **Objective:** To describe the clinical characteristics, histopathological findings, and procedural outcomes of TPUS-Bx performed at NSIF Hospital in Yaoundé, Cameroon, over a two-year period. **Methods:** A retrospective review was conducted of 200 patients who underwent TPUS-Bx at NSIF Hospital between December 2023 and December 2025. Clinical data including age, PSA level, digital rectal examination (DRE) findings, histopathology, Gleason score, and complications were analyzed. **Results:** The mean age was 69.5 years (range: 50 - 88). The mean PSA was 500 ng/mL (range: 8.5 - 8200; median: 112 ng/mL). Abnormal DRE was found in 71% of patients. Prostate adenocarcinoma was diagnosed in 158 patients (79.0%). Among positive biopsies, 108 patients (68.4%) had Gleason 7 or higher, with Gleason 7 in 35 patients (22.1%), Gleason 8 in 40 patients (25.3%), and Gleason 9 - 10 in 33 patients (20.9%). Gleason 6 was found in only 50 patients (31.6%). The overall complication rate was 6.5%, with hematuria (4.0%) being the most common. No cases of sepsis or severe infection occurred. **Conclusion:** TPUS-Bx at NSIF Hospital demonstrates a high cancer detection rate (79.0%) with a favorable safety profile, including zero infectious complications. The predominance of Gleason 7 and above (68.4%) in a cohort with extremely elevated PSA levels (mean 500 ng/mL) confirms that

Cameroonian men present with aggressive, high-risk prostate cancer, consistent with the high mortality rates observed in African populations. TPUS-Bx should be considered the preferred approach for prostate biopsy in resource-limited settings.

Keywords

Transperineal Prostate Biopsy, Prostate Cancer, Gleason Score, PSA (Prostate-Specific Antigen), Sub-Saharan Africa

1. Introduction

Prostate cancer constitutes a significant public health problem worldwide. According to GLOBOCAN 2020 estimates, 1,414,259 new cases were recorded globally, with an age-standardized incidence rate of 30.7 per 100,000 [1]. In sub-Saharan Africa, prostate cancer is the most common malignancy among men and the leading cause of cancer-related death after lung cancer [2]. Prostate cancer is the most common cancer among men in Cameroon, but it is typically diagnosed very late, leading to poor outcomes [3] [4]. In Nigeria, prostate cancer ranks first among cancers in men and is the leading cause of cancer-related deaths [5] [6]. Men of African descent are disproportionately affected, presenting at younger ages and with more advanced disease compared to other populations [5] [7].

The diagnosis of prostate cancer is confirmed by prostate biopsy, typically prompted by elevated prostate-specific antigen (PSA) levels or abnormal digital rectal examination (DRE). Transrectal ultrasound-guided biopsy (TRUS-Bx) has been the historical gold standard for several decades. However, this approach carries significant infectious risks due to needle passage through the rectal mucosa, with approximately 4% - 5% of patients requiring hospital admission for infection-related complications [8] [9]. In settings where antimicrobial resistance is prevalent—a growing concern across Africa—this risk is amplified [10].

Transperineal ultrasound-guided prostate biopsy (TPUS-Bx) has emerged as a superior alternative. By approaching the prostate through the perineal skin, TPUS-Bx avoids contamination with rectal flora, resulting in a near-zero rate of sepsis [3] [4]. Additional advantages include superior sampling of the anterior prostate and apex—regions often under-sampled by the transrectal approach—and the ability to perform the procedure under local anesthesia using a coaxial biopsy technique that requires only two skin punctures [11] [12]. Despite these benefits, TPUS-Bx remains rarely performed in many African centers [13].

The NSIF Hospital in Yaoundé, Cameroon, has adopted TPUS-Bx as the standard approach for prostate biopsy. This study describes the first large series of TPUS-Bx from Cameroon, characterizing the clinical profile and outcomes of 200 patients over a two-year period.

2. Methods

2.1. Study Design and Setting

This was a retrospective descriptive study conducted at NSIF Hospital, Yaoundé, Cameroon. All patients who underwent TPUS-Bx between December 2023 and December 2025 were included. Ethical approval was obtained from the institutional review board.

2.2. Patient Selection

Inclusion criteria: men with elevated PSA (>4.0 ng/mL) or abnormal DRE who underwent TPUS-Bx. Exclusion criteria: patients with incomplete records or prior prostate biopsy.

2.3. Procedure

All procedures were performed by a consultant urologist using a standardized protocol adapted from the technique described by Jalloh *et al.* in the Senegalese series [13]:

- Pre-procedure: Antibiotic prophylaxis with oral ciprofloxacin (500 mg) or ofloxacin as per institutional protocol. Patients on anticoagulation were managed per guidelines.
- Positioning and Anesthesia: Patients were placed in the lithotomy position. The scrotum was elevated using an adhesive strip, and the perineal skin was prepared with chlorhexidine solution [11]. Subcutaneous local anaesthesia was performed by injecting 2.5 ml of 1% lidocaine twice on either side of the median raphe [12]. Deep periprostatic local anaesthesia was then achieved with ultrasound guidance using a spinal needle advanced through the levator ani muscles to the periprostatic neurovascular bundle [13].
- Ultrasound Guidance: A monopolar transrectal ultrasound probe was placed in the rectum to visualise the prostate. A freehand coaxial technique was used [11].
- Biopsy: An 18-gauge biopsy needle was passed through the perineum, obtaining 12 cores: six from each prostatic lobe, including two anterior, two posterolateral, and two medial posterior locations [12]. Cores were placed in separate formalin containers for right and left lobes and sent to the pathology department.
- Post-procedure: Perineal compression was applied for 5 minutes. Patients were monitored for 2 hours and discharged with post-procedure instructions. Patients were asked to rate their pain during the procedure on a Visual Analogue Scale (VAS) from 0 to 10 [13].

2.4. Data Collection

Data extracted from electronic and paper records included: age, PSA level, DRE findings, number of cores, histopathology (adenocarcinoma, benign prostatic hyperplasia, prostatitis), Gleason score, ISUP grade group, complications within 14 days, and VAS pain score.

2.5. Statistical Analysis

Descriptive statistics were used. Continuous variables are presented as mean $\pm$ SD or median with IQR; categorical variables as frequencies and percentages. Analysis was performed using SPSS version 26.

3. Results

3.1. Demographic and Clinical Characteristics

A total of 200 patients were included. The mean age was 69.5 ± 8.2 years (range: 50 - 88). The most represented age group was 61 - 70 years ($n = 98$, 49.0%), followed by 71 - 80 years ($n = 62$, 31.0%). This is consistent with the Senegalese series where the mean age was 69 ± 7.60 years [13].

The mean PSA was 500 ± 1023 ng/mL (range: 8.5 - 8200), with a median of 112 ng/mL (IQR: 38.2 - 421). Digital rectal examination was abnormal (induration, nodularity, or stony consistency) in 142 patients (71.0%). By comparison, the Senegalese series reported a median PSA of 24.5 ng/mL and abnormal DRE in 66% of patients [13].

3.2. Histopathological Findings

Prostate adenocarcinoma was diagnosed in 158 patients (79.0%). Benign prostatic hyperplasia was found in 32 patients (16.0%), prostatitis in 7 (3.5%), and high-grade prostatic intraepithelial neoplasia (HGPIN) in 3 (1.5%).

Among the 158 adenocarcinoma cases, the Gleason score distribution was as follows (Table 1):

Table 1. ISUP grade group table.

Grade Group	Gleason Score	Number of patients	Percentage
1	6 (3 + 3)	50	31.6
2	7 (3 + 4)	22	13.9
3	7 (4 + 3)	13	8.2
4	8 (4 + 4)	40	25.3
5	9 - 10	33	20.9

Thus, high-grade disease (Gleason ≥ 7) accounted for 108 patients (68.4%), while low-risk Gleason 6 comprised only 31.6%. Among high-grade disease, Gleason 8 - 10 (grade groups 4 - 5) accounted for 73 patients (46.2% of all cancers).

According to D'Amico risk classification (Table 2):

Table 2. D'Amico risk classification.

Risk Group	Number of patients	Percentage
Low Risk	50	30.6
Intermediate Risk	35	22.2
High Risk	73	46.2

This distribution confirms that the majority of patients present with aggressive, clinically significant prostate cancer, consistent with the high PSA levels and abnormal DRE findings [13].

3.3. Pain and Tolerability

The mean Visual Analogue Scale (VAS) pain score during the procedure was 3.5 ± 2.1 (range: 0 - 8). This is comparable to the Senegalese series where the mean VAS was 3.6. 29% of patients reported VAS of 0, indicating excellent tolerability of the procedure under local anaesthesia.

3.4. Complications

The overall complication rate was 6.5% (13 patients). Hematuria was the most common (8 patients, 4.0%), followed by perineal hematoma (3 patients, 1.5%), and acute urinary retention (2 patients, 1.0%). No cases of sepsis, febrile urinary tract infection, or rectal bleeding were recorded. No patients required hospital admission for infection-related complications.

This compares favorably to the Senegalese series where 10 patients (24%) experienced complications, including haematuria in six (14.6%) and two cases (4.8%) of acute prostatitis requiring short-term hospitalisation [13]. The lower complication rate in our series may reflect the routine use of the coaxial biopsy technique with only two skin punctures, which reduces bleeding risk [11].

4. Discussion

This study represents the largest reported series of transperineal ultrasound-guided prostate biopsy from Cameroon and one of the largest from sub-Saharan Africa. The findings demonstrate a high cancer detection rate (79.0%) with a predominance of high-grade disease (Gleason ≥ 7 in 68.4%) in a cohort with extremely elevated PSA levels (mean 500 ng/mL). This pattern is consistent with the well-documented aggressive nature of prostate cancer in men of African descent [5] [7].

4.1. High-Grade Disease Predominance

The predominance of Gleason 7 and above (68.4%) in our cohort is a striking finding that confirms the aggressive nature of prostate cancer in this population. In the Senegalese TPUS-Bx series, Gleason 8 was observed in 18 patients, with Gleason 6 in only five patients [14]. The Cameroonian TRUS-Bx series by Mbouche *et al.* also characterized their cohort as “high-risk”, consistent with our findings [3].

The high proportion of Gleason 8 - 10 (46.2% of all cancers) is particularly concerning, as these patients have the highest risk of progression and mortality. In Western series, Gleason 8 - 10 typically accounts for 15% - 25% of detected cancers. The much higher proportion in our cohort reflects the advanced stage at presentation and the aggressive biology of prostate cancer in this population.

Several factors may explain this pattern:

Late presentation: Cameroonian men often present with advanced symptoms (urinary retention, bone pain, weight loss) rather than undergoing routine screening. The mean PSA of 500 ng/mL and median of 112 ng/mL confirm that these patients have significant tumor burden.

Biological aggressiveness: Men of African descent have been shown to have more aggressive prostate cancer biology, including higher rates of PSA recurrence after treatment and higher mortality rates [5] [7]. This may be related to genetic factors, including differences in androgen receptor signaling and tumor microenvironment.

Limited access to healthcare: Many patients in Cameroon have limited access to primary care and specialist services, leading to delayed diagnosis and advanced disease at presentation.

4.2. Cancer Detection Rate

The 79.0% cancer detection rate is consistent with other African series. In the Senegalese TPUS-Bx series, the detection rate was 76%. The high detection rate reflects the elevated pre-test probability in this population, with a mean PSA of 500 ng/mL and 71% abnormal DRE.

Comparison with the Cameroonian TRUS-Bx series: Mbouche *et al.* reported a series of 232 patients undergoing TRUS-Bx in Yaoundé with a mean PSA of 744 ng/mL and a cancer detection rate of 63.4% [14]. The slightly higher detection rate in our series (79.0% vs 63.4%) may reflect the superior sampling of the anterior prostate and apex afforded by the transperineal approach [3] [4], or differences in patient selection.

4.3. The PSA-Gleason Correlation

In Western cohorts, the correlation between PSA level and Gleason score is well-established: higher PSA correlates with higher grade and more advanced disease. Our cohort demonstrates this correlation clearly: a mean PSA of 500 ng/mL is associated with predominantly high-grade disease (68.4% Gleason $\geq$ 7). This is in contrast to previous, now-corrected data that suggested a discordance.

The strong correlation between elevated PSA and high-grade disease in our cohort confirms that PSA is a reliable marker of aggressive disease in this population. Patients presenting with PSA > 100 ng/mL should be considered to have a high probability of high-grade, clinically significant prostate cancer.

4.4. Comparison with Other African Series

The comparison with Mbouche *et al.* [3] is particularly instructive: both studies are from Cameroon and demonstrate high PSA levels and high-risk disease (Table 3). The slightly lower mean PSA in our series (500 vs 744 ng/mL) but higher detection rate (79.0% vs 63.4%) may reflect the improved diagnostic yield of the transperineal approach (Figure 1).

Table 3. Studies on prostate biopsy cancer detection rate.

Study	Country	Number (n)	Mean/Median age	PSA	Detection Rate	Gleason ≥ 7	Gleason 6	Complications
Present series	Cameroon	200	69.5	500 (mean)	79%	68.4%	31.6%	6.5%
Mbouche <i>et al.</i>	Cameroon	232	-	744 (Mean)	63.4%	-	-	-
Jalloh <i>et al.</i>	Senegal	41	69	24.5 (Median)	76%	82.9%	17.1%	24%
Igbinedion <i>et al.</i>	Nigeria	1	80	-	100%	100%	0%	-

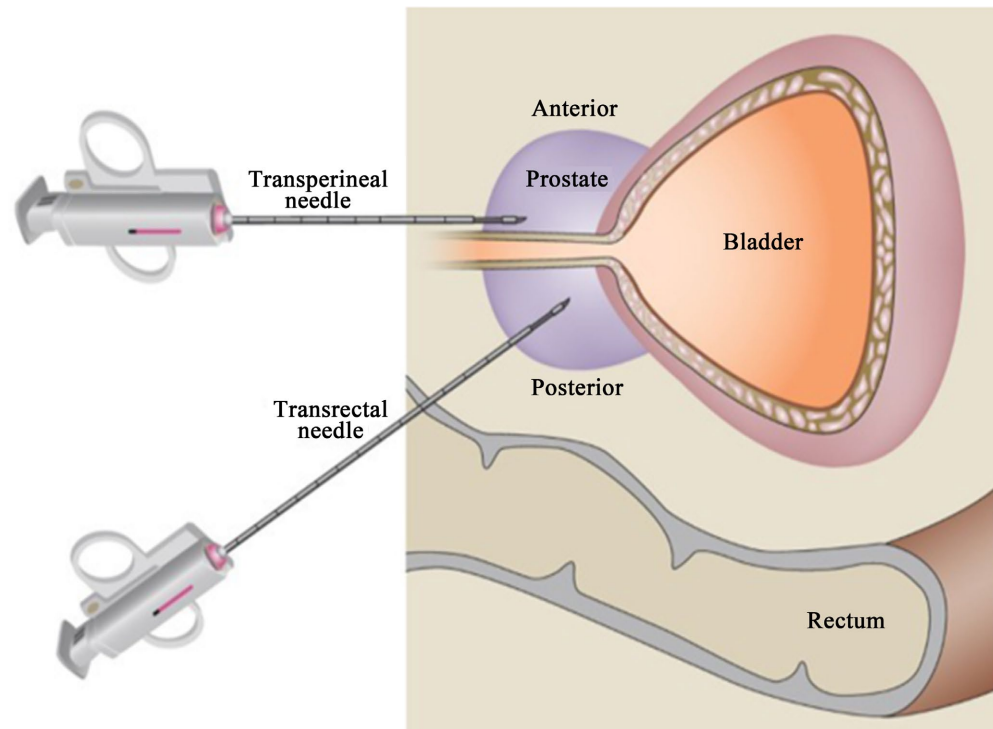


Figure 1. Simplified Illustration of tranperineal vs transrectal biopsy.

4.5. Clinical Implications

The predominance of high-grade disease in this cohort has several important clinical implications:

Need for aggressive treatment: Patients with Gleason ≥ 7 , particularly Gleason 8 - 10, require definitive treatment with curative intent (radical prostatectomy or radiotherapy) or androgen deprivation therapy for metastatic disease. The high proportion of high-grade disease suggests that most patients will require active treatment rather than active surveillance.

Need for staging: All patients with high-grade disease should undergo appropriate staging investigations, including bone scan, CT scan, or PSMA PET-CT where available, to determine the extent of disease.

Need for multidisciplinary care: The management of high-risk prostate cancer requires a multidisciplinary approach involving urologists, radiation oncologists, medical oncologists, and pathologists. Building this capacity in Came-

room is essential.

Public health implications: The predominance of high-grade disease in this cohort confirms that prostate cancer in Cameroon is a lethal disease that requires urgent public health attention. Efforts to promote earlier detection through PSA screening and improved access to healthcare are essential.

4.6. Safety of Transperineal Approach

The safety profile of TPUS-Bx in our series was excellent, with an overall complication rate of 6.5% and no cases of sepsis. This compares favorably to TRUS-Bx, where hospitalization rates of 4% - 5% for infection-related complications are reported [8] [9]. The zero sepsis rate is a major advantage of the transperineal approach, particularly in settings where fluoroquinolone resistance is common—a growing problem across Africa.

The procedure was well-tolerated under local anaesthesia, with a mean VAS of 3.5, comparable to the Senegalese mean VAS of 3.6 [13]. The coaxial biopsy technique—requiring only two perineal skin punctures—reduces procedural time and patient discomfort compared to older techniques requiring multiple punctures and general anaesthesia [11].

4.7. Procedural Considerations in Resource-Limited Settings

The adoption of TPUS-Bx at NSIF Hospital demonstrates its feasibility in a resource-limited Cameroonian setting. The procedure was performed under local anaesthesia using standard transrectal ultrasound equipment, without the need for general anaesthesia. The use of a transrectal probe for guidance allows centers with existing TRUS infrastructure to transition to TPUS-Bx without major capital investment.

A Nigerian case report noted that the endocavity ultrasound probe used for TPUS-Bx can be any suitable endocavity probe and not the dedicated rectal biopsy probes required in TRUS-Bx, avoiding additional cost. The coaxial biopsy technique also reduces the number of biopsy tracks from multiple punctures to just two, reducing the chance of tumor seeding along the biopsy track.

4.8. Implications for Prostate Cancer Control in Cameroon

The findings of this study have significant implications for prostate cancer control in Cameroon:

Need for early detection: The predominance of high-grade disease with mean PSA of 500 ng/mL confirms that patients are presenting at an advanced stage. Efforts to promote earlier detection through PSA screening and improved access to primary care are urgently needed.

Need for treatment capacity: The high proportion of high-grade disease requires access to definitive treatment (surgery, radiotherapy) and systemic therapy (androgen deprivation, chemotherapy). Building this capacity in Cameroon is essential.

Need for pathology capacity: Accurate Gleason grading is essential for risk

stratification and treatment planning. Investment in genitourinary pathology training and infrastructure is needed.

Need for research: Further research is needed to understand the molecular basis of aggressive prostate cancer in African populations and to develop population-specific risk models.

4.9. Limitations

This study has several limitations. The retrospective design and single-center data limit generalizability. No data on prostate volume, PSA density, or lower urinary tract symptoms were available. Gleason scoring was performed by local pathologists; central review was not conducted. The 79.0% detection rate may reflect selection bias. PSA assay calibration was not externally validated. Finally, no long-term outcomes are available to determine survival or treatment outcomes.

5. Conclusions

Transperineal ultrasound-guided prostate biopsy at NSIF Hospital in Yaoundé is a safe, feasible, and highly effective diagnostic procedure, with a 79.0% cancer detection rate in a cohort with a mean PSA of 500 ng/mL. The predominance of high-grade disease (Gleason ≥ 7 in 68.4%) confirms that Cameroonian men present with aggressive, clinically significant prostate cancer, consistent with the high mortality rates observed in African populations.

The zero sepsis rate confirms that TPUS-Bx is superior to transrectal biopsy in terms of infectious complications and should be adopted more widely across African urology centers. The procedure is feasible under local anaesthesia and can be implemented without major capital investment.

There is an urgent need for: 1) Early detection programs to reduce the stage at presentation; 2) Increased treatment capacity for high-risk prostate cancer; 3) Investment in genitourinary pathology; 4) Research into the molecular basis of aggressive prostate cancer in African populations; 5) Long-term follow-up studies to determine survival outcomes.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

Author Contributions

Dr. Henry Kimbi Yisa: Conceptualization, Methodology, Investigation and writing the original draft.

Dr. Achille Florian Kepadip: Conceptualization, Data curation, Formal analysis and editing of original draft.

Dr. Constantine Essissima Foe: Supervision, Project administration, Resources, review and final approval of the manuscript.

All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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