



## Prevalence and clinical correlates of chronic kidney disease among hospital admissions in KwaZulu-Natal: A cross-sectional retrospective laboratory data analysis.

*Mpilonhle Masuku, Khethiwe Nomcebo Bhengu\**

*Department of Biomedical Sciences, Faculty of Applied and Health Science, Mangosuthu University of Technology, Durban, South Africa.*

Page | 1

### Abstract

#### Background:

Chronic kidney disease (CKD) is a non-communicable disease that causes a significant global health burden yet is commonly underdiagnosed among hospitalised patients, particularly in acute care facilities. Timely diagnosis is crucial in preventing disease progression and poor prognosis due to complications.

#### Aim:

This study estimated the prevalence of CKD among hospital admissions and assessed its relationship with clinical diagnoses and ward distribution, laboratory parameters in a referral hospital in South Africa.

#### Methods:

A retrospective observational analysis was conducted using laboratory records from RK Khan Hospital in KwaZulu-Natal. Patients with documented serum creatinine levels and estimated glomerular filtration rates (eGFRs) were included. CKD was defined as  $eGFR < 60 \text{ mL/min/1.73 m}^2$ , calculated using either the MDRD or CKD-EPI equations. Demographic data, ward allocation, clinical diagnoses, and laboratory parameters were analysed descriptively.

#### Results:

Analysis of the complete dataset ( $n=56$ ) revealed that 39 patients (69.6%) met the criteria for CKD ( $eGFR < 60 \text{ mL/min/1.73m}^2$ ). The highest prevalence was observed in the 45–59 age group (40%). The study population had a mean age of 47.5 years (range, 19-64 years). Admissions were primarily to the Intensive Care Unit (57.1%), followed by the outpatient and emergency departments. Among CKD patients, the most common comorbid diagnoses were pneumonia and septicaemia. Severe renal impairment ( $eGFR < 30 \text{ mL/min/1.73m}^2$ ) was present in 28.6% of cases, and frequent electrolyte disturbances, including hyperkalaemia and metabolic acidosis, were observed.

#### Conclusion:

CKD is notably prevalent among hospitalized patients, particularly those admitted with infectious diseases or critical illnesses. These findings underscore the importance of systematic surveillance of renal function in acute care settings.

#### Recommendations:

The integration of standardized CKD screening protocols into routine hospital care may help mitigate disease progression and improve clinical outcomes.

**Keywords:** *chronic kidney disease, hospital admissions, prevalence, estimated Glomerular Filtration Rate, KwaZulu-Natal, referral hospital*

**Submitted:** November 21, 2025 **Accepted:** December 01, 2025 **Published:** March 01, 2026

**Corresponding author:** *Khethiwe Nomcebo Bhengu*

**Email:** [BhenguKN@mut.ac.za](mailto:BhenguKN@mut.ac.za)

*Department of Biomedical Sciences, Faculty of Applied and Health Science, Mangosuthu University of Technology, Durban, South Africa*



## Introduction

Chronic kidney disease (CKD) is defined as persistent abnormalities in the kidney structure or function that can persist for more than three months, with health implications. CKD contributes to increased morbidity, mortality, and healthcare expenditure (Levey *et al.*, 2003). It can be diagnosed using a criterion that includes an estimated glomerular filtration rate (eGFR <60 ml/min/1.73 m<sup>2</sup>), albuminuria, or structural abnormalities detected via imaging or histology (Levey *et al.*, 2005). CKD is a major and escalating global public health concern, affecting approximately 9.1% of the population worldwide, with increasing prevalence in low- and middle-income countries due to limited access to early detection and treatment (Bikbov, C. A. Purcell, *et al.*, 2020).

In sub-Saharan Africa, the burden is significantly higher due to a combination of infectious diseases such as HIV and tuberculosis and non-communicable conditions, such as hypertension and diabetes mellitus (Muiru *et al.*, 2020). In South Africa, the CKD burden is intensified by high rates of hypertension, diabetes mellitus, and HIV infection, limited access to renal replacement therapy, and systemic challenges in many public sector facilities (Assaram, Mashamba-Thompson, and Magula, 2018; Avila-Danguillecourt, Moodley, and Makinga, 2018). Despite its clinical significance, CKD remains underdiagnosed, particularly in hospital settings where acute illnesses often mask underlying chronic conditions (Pretorius *et al.*, 2020). Although serum creatinine and estimated glomerular filtration rate (eGFR) assessments are standard, systematic screening and documentation of CKD during hospital admissions are inconsistent (Phalane, Fourie, and Schutte, 2018).

This diagnostic gap is concerning, as early detection and management of CKD can slow disease progression and reduce cardiovascular risk (Thomas and Davies, 2023). In referral hospitals, patients frequently present with acute illnesses that may reveal previously undiagnosed CKD or represent acute or chronic kidney injury (Avila-Danguillecourt, Moodley, and Makinga, 2018). Understanding CKD prevalence and its clinical context in hospitalized populations is essential for developing targeted screening protocols, optimizing resource allocation, and improving outcomes.

Recent evidence from Tanzania highlights the growing burden of CKD among people living with HIV (PLWH), particularly those on tenofovir disoproxil fumarate (TDF)-based second-line antiretroviral therapy (ART). A study by

Mugusi *et al.* (2025) found that 22% of PLWH on TDF-based regimens had reduced eGFR, and nearly one-third exhibited renal calcinosis, calculi, and nephritis on imaging. Patients on atazanavir/ritonavir (ATV/r) were significantly more likely to have smaller kidney volumes and renal pathology compared to those on lopinavir/ritonavir (LPV/r), underscoring the nephrotoxic potential of certain ART combinations (Mugusi *et al.*, 2025).

Moreover, identifying clinical conditions and ward settings most associated with CKD can inform risk stratification and guide clinical decision-making (Assaram, Mashamba-Thompson, and Magula, 2018). In South Africa, data on CKD prevalence among hospital admissions are limited, particularly from referral institutions in KwaZulu-Natal, which serve diverse populations with unique epidemiological profiles. RK Khan Hospital, a referral centre in Durban, serves a large catchment area and offers a valuable setting for investigating CKD prevalence patterns. The findings may inform evidence-based recommendations for renal function screening in acute care settings and contribute to improved clinical outcomes for patients with kidney disease. Therefore, this study aimed to determine the prevalence of CKD among hospital admissions at RK Khan Hospital and to explore associations between CKD and clinical diagnoses, ward distribution, and laboratory parameters.

## Methodology

### Study Design and Setting

This was a retrospective cross-sectional study that utilized laboratory data from the National Health Laboratory Service (NHLS) within the eThekweni Municipality District, South Africa. The data originated from specimens processed for RK Khan Hospital, a referral facility serving a diverse urban and peri-urban population in Durban.

### Data Source and Collection

Laboratory data were extracted from the NHLS database and the Academic Affairs Research Management System (AARMS). The analysis focused on records from NHLS facilities for the period from December 1, 2022, to December 1, 2023. The review and extraction of records took place between June 22, 2025, and September 9, 2025. Eligible participants were adults aged 18 to 65 years, of all genders, who had undergone renal function testing. The dataset included demographic information (age), ward location at time of specimen collection, clinical diagnoses,



and biochemical parameters, including serum creatinine, eGFR, electrolytes, and glucose levels.

### Study Population

Patients with incomplete laboratory results were excluded from analyses that required full datasets for accurate interpretation, such as eGFR calculation, electrolyte profiling (sodium, potassium, chloride, and bicarbonate), and severity stratification of renal impairment. However, these patients were retained for descriptive statistics where partial data, such as age, sex, or ward allocation, were available.

### Definitions and Measurements

CKD was defined according to KDIGO guidelines as eGFR < 60 mL/min/1.73m<sup>2</sup> (Levey *et al.*, 2005). The severity of CKD was classified as:

- Stage 3a: eGFR 45-59 mL/min/1.73m<sup>2</sup>
- Stage 3b: eGFR 30-44 mL/min/1.73m<sup>2</sup>
- Stage 4: eGFR 15-29 mL/min/1.73m<sup>2</sup>
- Stage 5: eGFR < 15 mL/min/1.73m<sup>2</sup>

eGFR was calculated using both the Modification of Diet in Renal Disease (MDRD) and the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equations. For this analysis, the MDRD formula was primarily used for CKD classification, consistent with local laboratory reporting practices.

Electrolyte abnormalities were defined as:

- Hyponatremia: sodium < 135 mmol/L
- Hyperkalemia: potassium > 5.0 mmol/L
- Metabolic acidosis: bicarbonate < 22 mmol/L
- Hypocalcemia: calcium < 0.85 mmol/L
- Hyperphosphatemia: phosphate > 1.45 mmol/L
- Hyperglycemia: random glucose > 11.1 mmol/L

### Data Analysis

Descriptive statistics were calculated for all variables. Continuous variables were expressed as means with

standard deviations or ranges as appropriate. Categorical variables were presented as frequencies and percentages. The prevalence of CKD was calculated as the proportion of patients with eGFR < 60 mL/min/1.73m<sup>2</sup>. Clinical diagnoses were grouped into categories (e.g., infectious diseases, cardiovascular conditions, unspecified observations) for analysis. Ward distribution was analyzed to identify high-prevalence areas. Data were analyzed using Microsoft Excel and presented in tables and figures.

### Ethical Considerations

Ethical approval was obtained from the Mangosuthu University of Technology (MUT) Research Ethics Committee on 20 January 2025 (Reference: RD5/26/25). In addition, authorization to access and utilize patient laboratory data was granted by the NHLS and the AARMS national manager on 21 June 2025 (Permission Reference: PR2556740). Patient laboratory requisition numbers were used as unique identifiers in place of personal information to ensure confidentiality.

### Results

A total of 56 patient admissions with complete laboratory data were included in the analysis. The mean age of patients was 47.5 years (SD ± 12.8), ranging from 19 to 64 years. There were 39 (69.6%) who met the CKD criteria with eGFR < 60 mL/min/1.73m<sup>2</sup> using the MDRD formula. Stratification by CKD stage revealed that 16 patients (28.6%) exhibited severe renal impairment (eGFR < 30 mL/min/1.73 m<sup>2</sup>), corresponding to CKD stages 4 and 5. An additional 23 patients (41.1%) were classified as having moderate CKD (stages 3a and 3b), with eGFR values ranging from 30 to 59 mL/min/1.73 m<sup>2</sup>. The remaining 17 patients (30.4%) demonstrated preserved renal function, with eGFR values ≥ 60 mL/min/1.73 m<sup>2</sup>. Table 1 presents the demographic and clinical characteristics of the study population.

**Table 1: Demographic and clinical characteristics of the study population (N = 56).**

Characteristic	Value (n)	Percentage (%)
<b>Age (years)</b>		
Mean ± SD	47.5 ± 12.8	
Range	19 - 64	
<b>CKD Status</b>	n	(%)
CKD present (eGFR <60)	39	69.6%



Normal renal function (eGFR ≥60)	17	30.4%
<b>CKD Severity Classification</b>	<b>n</b>	<b>(%)</b>
Stage 3a (eGFR 45-59)	12	21.4%
Stage 3b (eGFR 30-44)	11	19.6%
Stage 4 (eGFR 15-29)	9	16.1%
Stage 5 (eGFR <15)	7	12.5%
Normal (eGFR ≥60)	17	30.4%

### Ward Distribution and Location Analysis

The distribution of patients across different hospital wards revealed important patterns in the prevalence of CKD. Table 2 demonstrates that the Intensive Care Unit (ICU) accounted for most admissions (32 cases, 57.1%), with a remarkably

high CKD prevalence of 75% among ICU patients. Medical outpatient departments and emergency services also showed elevated CKD rates. The clustering of CKD cases within the ICU highlights both the underlying severity of illness in this patient population and the complex, bidirectional interplay between critical illness and renal dysfunction

**Table 2: Distribution of Patients by Ward Location and CKD Status**

Ward/ Department	Total Cases n (%)	CKD Cases n (%)	CKD Prevalence
Intensive Care Unit	32 (57.1%)	24 (61.5%)	75.0%
Medical OPD	8 (14.3%)	5 (12.8%)	62.5%
Casualty/Emergency	7 (12.5%)	5 (12.8%)	71.4%
Medical & Surgical Wards	6 (10.7%)	3 (7.7%)	50.0%
Other Departments	3 (5.4%)	2 (5.1%)	66.7%
<b>Total</b>	<b>56 (100%)</b>	<b>39 (100%)</b>	<b>69.6%</b>

### Clinical Diagnoses and Disease Patterns

Analysis of clinical diagnoses revealed that infectious diseases were the most common presenting complaints

among patients with CKD. Table 3 categorizes the primary diagnoses, showing that pneumonia (with or without concurrent septicaemia) and septicaemia alone accounted for more than half of all CKD cases.

**Table 3: Distribution of Clinical Diagnoses Among Patients with CKD (N=39)**

Diagnostic Category	Number of patients (n)	% of CKD Patients
<b>Infectious Diseases</b>		
Pneumonia (alone or with septicaemia)	15	38.5%
Septicaemia	5	12.8%
Meningitis (suspected)	2	5.1%
<b>Subtotal - Infections</b>	<b>22</b>	<b>56.4%</b>
<b>Cardiovascular/ Metabolic</b>		
Hypertension/Heart failure	3	7.7%
Diabetes complications	2	5.1%
<b>Subtotal - CVS/Metabolic</b>	<b>5</b>	<b>12.8%</b>
<b>Observation/Unspecified</b>	<b>8</b>	<b>20.5%</b>



<b>Other Conditions</b>	4	10.3%
<b>Total</b>	<b>39</b>	<b>100%</b>

### Laboratory Parameters and Biochemical Findings

Analysis of laboratory parameters revealed significant differences between patients with CKD and those with normal renal function. Table 4 presents mean values for key biochemical markers in both groups. The analysis of laboratory parameters revealed significant differences between patients with CKD and those with normal renal

function. Table 4 presents mean values for key biochemical markers in both groups. The CKD group demonstrated markedly elevated creatinine levels (285  $\mu\text{mol/L}$  vs. 65  $\mu\text{mol/L}$ ) and correspondingly reduced eGFR (32  $\text{mL/min/1.73 m}^2$  vs. 98  $\text{mL/min/1.73 m}^2$ ). Significant abnormalities were also observed in bicarbonate, calcium, and phosphate levels, reflecting the metabolic complications of advanced CKD.

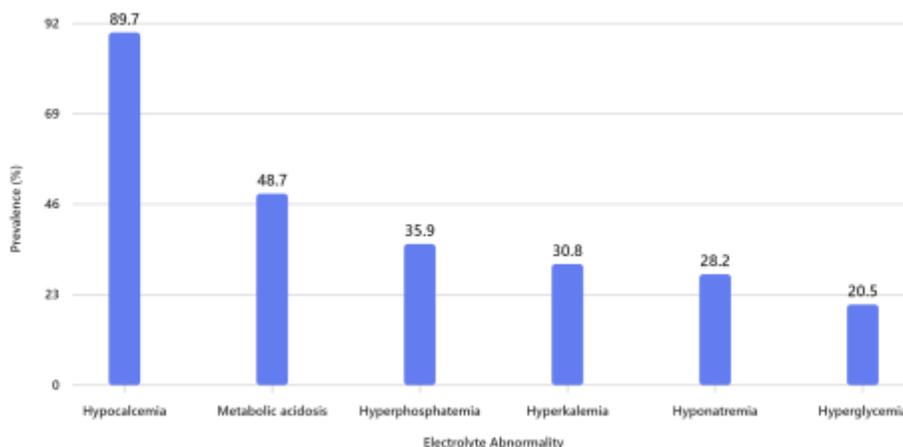
**Table 4: Renal Function and Electrolyte Parameters Comparison**

Parameter	CKD Group (n=39) Mean $\pm$ SD	Normal Function (n=17) Mean $\pm$ SD	p-value*
<b>Renal Function Markers</b>			
Creatinine ( $\mu\text{mol/L}$ )	285 $\pm$ 198	65 $\pm$ 14	<0.001
eGFR ( $\text{mL/min/1.73m}^2$ )	32 $\pm$ 18	98 $\pm$ 28	<0.001
<b>Electrolytes</b>			
Sodium (mmol/L)	136 $\pm$ 6	139 $\pm$ 3	0.05
Potassium (mmol/L)	4.5 $\pm$ 0.9	4.2 $\pm$ 0.5	0.18
Chloride (mmol/L)	102 $\pm$ 5	103 $\pm$ 2	0.42
Bicarbonate (mmol/L)	20 $\pm$ 5	25 $\pm$ 3	<0.01
<b>Mineral Metabolism</b>			
Calcium (mmol/L)	0.73 $\pm$ 0.09	0.82 $\pm$ 0.06	<0.01
Phosphate (mmol/L)	1.45 $\pm$ 0.68	1.02 $\pm$ 0.24	<0.05
Random glucose (mmol/L)	6.4 $\pm$ 2.8	6.1 $\pm$ 2.1	0.68

*\*p-values are indicative based on clinical significance*

### Electrolyte Abnormalities and Metabolic Complications

The prevalence of electrolyte abnormalities was remarkably high among CKD patients, as shown in Figure 1. These findings have important clinical implications for patient management and outcomes.



**Figure 1. Prevalence of Electrolyte and Metabolic Abnormalities in CKD Patients (N=39).**

Hypocalcaemia was the most prevalent abnormality, affecting nearly 90% of patients. Metabolic acidosis and hyperphosphatemia were present in 48.7% and 35.9% of cases, respectively. Life-threatening hyperkalaemia was observed in 30.8% of patients. These findings highlight the necessity of regular monitoring and prompt management of electrolyte imbalances in this vulnerable population.

### Longitudinal Case Study

A longitudinal case analysis was conducted on one patient (unique ID: 182549797) who provided serial laboratory measurements over a 33-day ICU admission. This 41-year-old individual exhibited persistent severe CKD throughout hospitalization, with serum creatinine levels ranging from 384 to 544  $\mu\text{mol/L}$  and eGFR consistently between 10 and 16  $\text{mL/min/1.73 m}^2$ , indicative of Stage 5 CKD. The primary clinical diagnosis was pneumonia complicated by septicaemia. This case demonstrates the chronic nature of advanced CKD during episodes of acute critical illness and highlights the management challenges faced in resource-limited settings where dialysis access may be constrained.

### Discussion

#### CKD Prevalence and Severity

The present study identified a notably high prevalence of CKD among hospitalized patients at RK Khan Hospital, with 69.6% meeting diagnostic criteria. This figure substantially exceeds global and regional estimates for the general population, which typically range from 10 to

15% (Bikbov, C. Purcell, *et al.*, 2020; Thomas and Davies, 2023). These findings are consistent with international evidence indicating that hospitalized individuals, particularly those in acute care settings, exhibit markedly higher rates of renal dysfunction compared to community-based cohorts (Levey *et al.*, 2005; Mugusi *et al.*, 2025). In contrast, South African community studies report CKD prevalence between 14–18% suggesting that the elevated rates observed in our cohort may reflect the referral nature of the hospital, selection bias toward patients with severe illness, and the high proportion of ICU admissions (Assaram, Mashamba-Thompson, and Magula, 2018).

Severity stratification revealed that nearly one-third of patients (28.6%) had advanced renal impairment (eGFR < 30  $\text{mL/min/1.73 m}^2$ ), corresponding to CKD stages 4 and 5. These patients are at heightened risk for acute decompensation, cardiovascular complications, and may require renal replacement therapy (Thomas and Davies, 2023). The distribution of severity, illustrated in Table 1, suggests that many individuals present with advanced CKD at the time of hospital admission, potentially reflecting delayed diagnosis or inadequate screening in primary care settings. Similar patterns have been documented in other sub-Saharan African contexts, where limited access to routine healthcare and laboratory monitoring contributes to late-stage presentation (Avila-Danguillecourt, Moodley, and Makinga, 2018; Mugusi *et al.*, 2025).



### Electrolyte and Metabolic Complications

The high prevalence of electrolyte abnormalities observed in this CKD cohort Figure 1 reflects advanced disease stages and inadequate biochemical control. Hyperkalemia (30.8%), metabolic acidosis (48.7%), and hyperphosphatemia (35.9%) are clinically significant, as they markedly increase the risk of cardiac arrhythmias, bone mineral disorders, and cardiovascular mortality (Levey *et al.*, 2005; Thomas and Davies, 2023). The finding that nearly half of patients exhibited metabolic acidosis is particularly concerning, given its established role in muscle catabolism, bone demineralization, and acceleration of CKD progression (Mugusi *et al.*, 2025).

Hypocalcemia was almost universal (89.7%), reflecting disturbances in mineral metabolism characteristic of advanced CKD. This abnormality, in conjunction with hyperphosphatemia, creates a biochemical environment conducive to secondary hyperparathyroidism and renal osteodystrophy, complications that impair quality of life and elevate mortality (Assaram, Mashamba-Thompson, and Magula, 2018; Avila-Danguillecourt, Moodley, and Makinga, 2018). These findings emphasize the need for comprehensive biochemical monitoring and timely interventions, including calcium supplementation and phosphate binder therapy, in hospitalized CKD patients.

Additionally, dysglycemia was documented in 20.5% of cases, suggesting a substantial overlap with diabetes mellitus, consistent with the growing burden of non-communicable diseases in South Africa. Diabetic nephropathy remains a leading cause of CKD in the region, and its coexistence with advanced kidney disease dramatically increases cardiovascular risk and mortality (Thomas and Davies, 2023; Mugusi *et al.*, 2025). Comparative laboratory analyses (Table 4) further illustrate the metabolic derangements typical of CKD, with marked differences in creatinine, eGFR, bicarbonate, calcium, and phosphate levels relative to patients with normal renal function.

### Clinical Implications and Healthcare System Considerations

The findings of this study have significant clinical and policy implications. First, they emphasise the importance of routine renal function screening for all hospital admissions, particularly in high-risk areas such as ICUs and emergency departments. Current practice often identifies CKD only when patients present with acute complications rather than

through proactive screening (Mugusi *et al.*, 2025). Implementing standardized admission protocols that include serum creatinine measurement and eGFR calculation could enable earlier detection and timely intervention.

Second, the results support the adoption of structured protocols for managing CKD-related complications in hospitalized patients. These should encompass vigilant monitoring of electrolytes, acid-base balance, fluid status, and medication dosing adjustments. Many commonly prescribed drugs require dose modification in renal impairment, and failure to adjust dosing is associated with adverse drug events and prolonged hospital stays (Thomas and Davies, 2023). The high prevalence of severe electrolyte abnormalities observed in this cohort highlights the need for prompt correction to prevent life-threatening complications. Third, the substantial burden of CKD among admitted patients necessitates stronger integration between hospital-based care and community nephrology services. Patients diagnosed during hospitalization require structured follow-up, optimization of blood pressure and glycemic control, counselling on nephrotoxin avoidance, and timely referral to nephrology specialists when indicated (Mugusi *et al.*, 2025). Establishing post-discharge CKD clinics and leveraging telemedicine could enhance continuity of care and reduce readmission rates.

From a health system perspective, these findings emphasize the considerable resource demands posed by CKD and the need for adequate nephrology services, including dialysis capacity. The concentration of advanced CKD cases in ICUs suggests that many patients may require acute renal replacement therapy during critical illness. Strategic resource allocation and capacity planning are essential to ensure timely and appropriate care for this high-risk population (Avila-Danguillecourt, Moodley, and Makinga, 2018).

### Generalizability of Findings

The current study findings are clinically significant; however, their generalizability is limited to similar hospital-based settings. The observed CKD prevalence of 69.6% far exceeds population-based estimates (10–15%) and South African community prevalence (14–18%) (Bikbov *et al.*, 2020; Assaram *et al.*, 2018). This discrepancy likely reflects the referral nature of the hospital, selection bias toward severely ill patients, and the high proportion of ICU admissions. Therefore, these results cannot be extrapolated to the general population or primary care settings. However, they are broadly consistent with international evidence



showing higher CKD rates among hospitalized and critically ill patients (Levey et al., 2005; Mugusi et al., 2025). Thus, the findings may be generalizable to other tertiary hospitals in South Africa and similar resource-limited contexts where late-stage CKD presentation is common.

### **Comparison with Existing Literature**

The observed CKD prevalence of 69.6% among hospitalized patients in this study is consistent with reports from other low and middle-income countries, where elevated CKD rates have been documented in acute care settings (Bikbov, C. Purcell, et al., 2020; Mugusi et al., 2025). However, this prevalence exceeds figures reported in many high-income regions, which may reflect differences in disease stage at presentation, underlying risk factor profiles, and patterns of healthcare access. The predominance of infectious diagnoses among CKD patients aligns with epidemiological trends in African settings, where infections remain a leading cause of hospitalization (Assaram, Mashamba-Thompson, and Magula, 2018).

The severity distribution in our cohort, with 28.6% of patients classified as having stage 4 or 5 CKD, suggests later presentation compared to hospitalized populations in developed countries, where earlier stages of CKD are more commonly observed (Thomas and Davies, 2023). This disparity likely reflects systemic challenges, including limited primary care screening, delayed referral pathways, and socioeconomic barriers to early healthcare access, factors that are well-documented across sub-Saharan Africa (Mugusi et al., 2025).

### **Conclusion**

This study demonstrates a strikingly high prevalence of CKD among hospitalized patients in a referral South African hospital, with nearly 70% exhibiting impaired renal function and over one-quarter presenting with severe renal impairment. The concentration of CKD cases in the ICU (75%) and among patients admitted for infectious diseases demonstrates the complex interplay between acute illness and chronic kidney dysfunction. The severity profile, with a substantial proportion of patients in stages 4 and 5, suggests delayed diagnosis and missed opportunities for early intervention within primary care settings.

The significant burden of CKD-related complications observed, most notably near-universal hypocalcaemia (89.7%), frequent metabolic acidosis (48.7%), and clinically relevant hyperkalaemia (30.8%), highlights the need for

comprehensive biochemical monitoring and guideline-directed management during hospitalization. These metabolic derangements pose considerable risks for adverse outcomes and demand immediate corrective measures to prevent life-threatening complications.

The study findings emphasise the urgent need for systematic renal function screening protocols for all hospital admissions, particularly in high-risk environments such as ICUs and emergency departments. Early identification of CKD during hospitalization offers opportunities for intervention, prevention of complications, and timely referral to specialist care. The integration of automated eGFR reporting, clinical decision support systems, and standardized management pathways could substantially improve CKD recognition and treatment in acute care settings.

From a health system perspective, addressing the CKD burden requires the development of integrated care pathways that link hospital-based management with community-level chronic disease programs. This includes establishing structured referral systems to nephrology services, creating post-discharge CKD clinics, and strengthening primary care capacity for screening and monitoring. Given the high prevalence of advanced CKD requiring costly interventions such as dialysis, upstream investment in prevention and early detection strategies is likely to be more cost-effective in the long term.

Ultimately, tackling the CKD epidemic in South Africa demands coordinated efforts across the continuum of care from primary prevention and early detection to optimized inpatient management and structured long-term follow-up. Policymakers, hospital administrators, and clinicians must collaborate to ensure adequate resources, workforce training, and system-level reforms aimed at reducing the substantial clinical and economic burden of CKD documented in this study.

This study has several notable strengths. First, it utilized objective laboratory data, reducing reliance on self-reported measures and enhancing diagnostic accuracy. The comprehensive analysis of multiple biochemical parameters, including renal function markers and electrolytes, allowed for a detailed characterization of CKD-related complications. Additionally, the inclusion of ward-level data facilitated the identification of high-risk clinical areas, such as intensive care units and emergency departments. By incorporating patients from multiple hospital departments, the study provides a representative snapshot of CKD burden within a referral care setting.



However, several limitations must be acknowledged. The retrospective design inherently restricts causal inference and precludes assessment of temporal relationships between CKD and associated clinical conditions (Levey and Coresh, 2012). The relatively small sample size ( $n = 56$ ) and single-centre nature of the study may limit external validity and generalizability to other healthcare settings, although RK Khan Hospital serves a large and diverse urban catchment area typical of South African referral hospitals. Gender-specific analyses were not feasible due to incomplete sex-disaggregated data, despite well-documented gender differences in CKD epidemiology and outcomes (Bikbov, C. Purcell, et al., 2020).

Another important limitation was the inability to reliably distinguish chronic kidney disease from acute kidney injury in many cases, as longitudinal creatinine measurements and baseline renal function were not consistently available. This distinction is clinically significant because it influences prognosis and management strategies (Thomas and Davies, 2023). Although one patient provided serial measurements over a 33-day ICU admission, offering insight into chronicity, such longitudinal data were rare.

Furthermore, proteinuria, a key component of CKD staging according to KDIGO guidelines, was not systematically captured in the dataset, thereby limiting accurate risk stratification (Levey *et al.*, 2005). The twelve-month study period offers only a cross-sectional view of CKD prevalence and may not accurately reflect seasonal or temporal variations. Finally, the absence of detailed comorbidity profiles, medication histories, and long-term outcomes from laboratory records constrained the ability to fully characterize the CKD population or evaluate prognostic implications.

### **Recommendations and Future Research Directions**

Future research should prioritize prospective study designs with longitudinal follow-up to better characterize CKD progression, differentiate AKI from CKD, and assess patient outcomes following hospital discharge. Such designs would enable evaluation of temporal relationships and causal pathways, which are not possible in retrospective analyses (Levey *et al.*, 2005). Larger, multicenter studies encompassing diverse healthcare settings, including rural and urban hospitals, as well as district and referral facilities, are essential to improve generalizability and to explore contextual factors influencing CKD prevalence and severity

across different levels of care (Bikbov, C. Purcell, et al., 2020).

Further investigation into CKD awareness among healthcare providers and patients is warranted, as low awareness remains a major barrier to early detection and effective management in sub-Saharan Africa (Mugusi *et al.*, 2025). Studies examining structural and socioeconomic barriers to screening in primary care, as well as the cost-effectiveness of hospital-based renal function screening programs, would provide critical evidence to inform policy and resource allocation (Ashrafi *et al.*, 2024). Additionally, research should explore innovative strategies such as point-of-care testing and telemedicine interventions to enhance early diagnosis and continuity of care in resource-limited settings (Avila-Danguillecourt, Moodley, and Makinga, 2018)

### **Acknowledgements**

The authors would like to thank the National Health Laboratory Services for partnering with Mangosuthu University of Technology, which enabled the current study to be conducted. The authors would also like to acknowledge Ms Nokukhanya Thembane for her advice and cordial support.

### **Conflict of interest**

The author declares no conflict of interest.

### **Author Biography**

Mpilonhle Masuku is a registered Bachelor of Health Science in Medical Laboratory Science at Mangosuthu University of Technology, majoring in Clinical Pathology. She is a dedicated and motivated student who, together with her group, received an award for the best presentation during the Laboratory Practice 1 student presentations for their work titled "Anaemia of Chronic Diseases".

Khethiwe Nomcebo Bhengu is a Medical Laboratory Scientist/ Technologist, Lecturer, specializing in Clinical Pathology from Mangosuthu University of Technology. Before her academic appointment, she served as laboratory manager for the Biomedical Science department's training laboratory, which received accreditation from the Health Professions Council of South Africa (HPCSA) for its training programs. Her research focuses on infectious diseases, immunology, sexually transmitted infections, and non-communicable diseases. ORCID: <https://orcid.org/0000-0003-2393-3519>



### Author contributions

MS collected, cleaned, and analysed the data and wrote the first draft of the manuscript. KNB conceptualized and supervised the work. KNB supervised all the research stages, reviewed the manuscript, and provided mentorship.

### Abbreviations

**AARMS:** Academic Affairs Research Management System  
**AKI:** Acute Kidney Injury  
**ART:** antiretroviral therapy  
**ATV/r:** Patients on atazanavir/ritonavir  
**CKD:** Chronic Kidney Disease  
**CKD-EPI:** Chronic Kidney Disease Epidemiology Collaboration  
**ESRD:** End-Stage Renal Disease  
**eGFR:** Estimated Glomerular Filtration Rate  
**HIV:** Human Immunodeficiency Virus  
**ICU:** Intensive Care Unit  
**KDIGO:** Kidney Disease: Improving Global Outcomes  
**LPV/r:** Lopinavir/ritonavir  
**MDRD:** Modification of Diet in Renal Disease  
**NHLS:** National Health Laboratory Services  
**OPD:** Outpatient Department  
**PLWH:** People living with HIV  
**NCDs:** Non-Communicable Diseases  
**SD:** Standard Deviation  
**TDF:** tenofovir disoproxil fumarate

### Funding support

No funding was received to conduct this research project.

### Data

#### Availability

Data will not be made available to maintain confidentiality.

### References

1. Ashrafi, S.A. *et al.* (2024) "Disparities in healthcare access experienced by Hispanic chronic kidney disease patients: a cross-sectional analysis," *Journal of Health, Population, and Nutrition*, 43(1), p. 18. Available at: <https://doi.org/10.1186/S41043-024-00508-4>.
2. Assaram, S., Mashamba-Thompson, T.P., and Magula, N.P. (2018). "Risk factors and comorbidities associated with changes in renal function among antiretroviral treatment-naïve

adults in South Africa: A chart review," *Southern African Journal of HIV Medicine*, 19(1). Available at:

3. Avila-Danguillecourt, N., Moodley, A.A., and Makinga, P. (2018) "Prevalence and outcomes of central venous catheter-related bacteraemia in HIV-infected versus non-HIV-infected patients undergoing haemodialysis treatment for end-stage kidney disease," *Southern African journal of HIV medicine*, 19(1). Available at: <https://doi.org/10.4102/SAJHIVMED.V19I1.770>.
4. Bikbov, B., Purcell, C., *et al.* (2020) "Global, regional, and national burden of chronic kidney disease, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017," *The Lancet*, 395(10225), pp. 709–733. Available at: [https://doi.org/10.1016/S0140-6736\(20\)30045-3](https://doi.org/10.1016/S0140-6736(20)30045-3).
5. Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification, and Stratification," *Annals of Internal Medicine*, 139(2). Available at: <https://doi.org/10.7326/0003-4819-139-2-200307150-00013>.
6. Levey, A.S. *et al.* (2005) "Definition and classification of chronic kidney disease: A position statement from Kidney Disease: Improving Global Outcomes (KDIGO)," *Kidney International*, 67(6), pp. 2089–2100. Available at: <https://doi.org/10.1111/j.1523-1755.2005.00365.x>.
7. Levey, A.S. and Coresh, J. (2012) "Chronic kidney disease," *The Lancet*, 379(9811), pp. 165–180. Available at: [https://doi.org/10.1016/S0140-6736\(11\)60178-5](https://doi.org/10.1016/S0140-6736(11)60178-5).
8. Mugusi, S.F. *et al.* (2025) "Kidney disease among adults on tenofovir-based second-line antiretroviral therapy in Dar es Salaam, Tanzania," *Southern African Journal of HIV Medicine*, 26(1), p. 8. Available at: <https://doi.org/10.4102/SAJHIVMED.V26I1.1640>.
9. Muir, A.N. *et al.* (2020) "The epidemiology of chronic kidney disease (CKD) in rural East Africa: A population-based study," *PloS one*, 15(3). Available at: <https://doi.org/10.1371/JOURNAL.PONE.0229649>.



**Student's Journal of Health Research Africa**  
**e-ISSN: 2709-9997, p-ISSN: 3006-1059**  
**Vol.7 No. 3 (2025): March 2026 Issue**  
**<https://doi.org/10.51168/sjhrafrica.v7i3.2239>**  
**Original Article**

10. Phalane, E., Fourie, C.M.T. and Schutte, A.E. (2018) "The metabolic syndrome and renal function in an African cohort infected with human immunodeficiency virus," *Southern African journal of HIV medicine*, 19(1). Available at: <https://doi.org/10.4102/SAJHIVMED.V19I1.813>.
11. Pretorius, M. *et al.* (2020) "The influence of haemodialysis on CD4+ T-cell counts in people living with human immunodeficiency virus with end-stage kidney disease," *Southern African Journal of HIV Medicine*, 21(1). Available at: <https://doi.org/10.4102/SAJHIVMED.V21I1.1125>.
12. Thomas, K.L. and Davies, M. (2023) "Survival outcomes of HIV-positive adults on peritoneal dialysis at Helen Joseph renal unit," *Southern African Journal of HIV Medicine*, 24(1), p. 6. Available at: <https://doi.org/10.4102/SAJHIVMED.V24I1.1471>.

**PUBLISHER DETAILS:**

**Student's Journal of Health Research (SJHR)**  
**(ISSN 2709-9997) Online**  
**(ISSN 3006-1059) Print**  
**Category: Non-Governmental & Non-profit Organization**  
**Email: [studentsjournal2020@gmail.com](mailto:studentsjournal2020@gmail.com)**  
**WhatsApp: +256 775 434 261**  
**Location: Scholar's Summit Nakigalala, P. O. Box 701432,**  
**Entebbe Uganda, East Africa**

