

Multidomain chronic kidney disease knowledge and associated factors among adults attending a nephrology clinic in Nigeria: identifying gaps for patient intervention to improve outcomes

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Research Article

Keywords: Chronic kidney disease, CKD knowledge, Health literacy, Patient education, Self-management, Nigeria

Posted Date: September 17th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10584347/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background

Chronic kidney disease (CKD) knowledge is fundamental to effective self-management, treatment adherence, and slowing disease progression. However, evidence describing overall and domain-specific CKD knowledge among adults with CKD in sub-Saharan Africa remains limited. This study assessed overall and domain-specific CKD knowledge and identified factors associated with adequate CKD knowledge among Nigerian adults receiving specialist nephrology care.

Methods

A hospital-based cross-sectional study was conducted among 304 adults with CKD attending the nephrology outpatient clinics of Lagos University Teaching Hospital, Nigeria. Participants were selected using systematic random sampling. CKD knowledge was assessed using validated 24-item Gheewala CKD Knowledge Questionnaire, which evaluates general CKD knowledge, kidney function, CKD symptoms, CKD risk factors, and diagnostic tests. Good CKD knowledge was defined as overall CKD score of $\geq 60\%$. Multivariable logistic regression was used to identify independent predictors of adequate CKD knowledge.

Results

The mean CKD knowledge score was $36.8 \pm 13.3\%$. Overall, only 27 (8.8%) demonstrated good knowledge. The subject's domain specific CKD knowledge are: diagnostic tests (48.3%), CKD symptoms (44.1%), general CKD knowledge (35.4%), CKD risk factors (31.7%), and kidney function (28.9%). Only higher educational attainment independently predicted adequate CKD knowledge.

Conclusion

Overall and domain-specific CKD knowledge are poor among Nigerian adult CKD patients. The integration of structured, literacy-sensitive CKD education into routine nephrology care is imperative for the improvement kidney health outcomes in this population.

Introduction

Chronic kidney disease (CKD) is a major non-communicable disease affecting 10% of the global population and represents a growing public health concern worldwide [1, 2]. The burden is disproportionately higher in low- and middle-income countries (LMICs), where late diagnosis, limited access to healthcare, and low health literacy contribute to delayed recognition and suboptimal management [1–4]. In sub-Saharan Africa and Nigeria, CKD prevalence has been reported to range from 12.2% to 16.5% and 12.6% to 26%, respectively, underscoring the magnitude of the problem in this region [5, 6]. The disease imposes

substantial clinical and socioeconomic challenges due to its associated morbidity, mortality, and high cost of treatment, particularly in resource-constrained settings [7].

Disease-specific knowledge (DSK) refers to an individual's understanding of a disease, including its causes, symptoms, diagnostic processes, treatment options, and self-care practices, as well as the ability to access and apply relevant health information [8]. While adequate DSK is essential for effective self-management and improved health outcomes, poor knowledge is associated with delayed diagnosis, poor adherence, increased hospitalization, and higher healthcare costs [9–13].

Evidence from both high-income countries (HICs) and low- and middle-income countries (LMICs) indicates that many individuals with CKD have inadequate disease-specific knowledge, particularly regarding disease aetiology, progression, treatment, and self-management [14–16]. However, reports from LMICs remain sparse, and most studies have reported only the overall CKD knowledge scores with limited assessment of specific CKD knowledge domains. Consequently, CKD knowledge in areas such as kidney function, CKD risk factors, diagnostic tests, and symptoms remain poorly characterized.

To our knowledge, this is the first Nigerian study to comprehensively assess CKD knowledge across all five domains using the validated 24-item Gheewala CKD Knowledge Questionnaire. The most extensive Nigerian study by Okoro et al. [17] evaluated general CKD knowledge, kidney function, and CKD symptoms but did not evaluate CKD risk factors and diagnostic tests as independent knowledge domains. Thus, there remain important gaps in the domain specific knowledge of CKD patients in Nigeria.

A detailed assessment of all DSK domains is imperative for the identification of specific knowledge gaps as this will provide a backdrop for the design of targeted interventions to improve patient outcomes. This study, therefore, aimed to assess the overall and domain-specific CKD knowledge, as well as its determinants, among patients attending the Lagos University Teaching Hospital, Idi-Araba, Lagos, Nigeria.

Methods

This was a cross-sectional study of adults with CKD attending the Lagos University Teaching Hospital between June and September, 2025. This study was approved by the Health Research and Ethics Committee (HREC), College of Medicine, University of Lagos (CMUL/HREC/04/25/1842). The minimum required sample size was calculated using Cochran's formula for a single population proportion with finite population correction [18], assuming a finite population of 960, a 95% confidence level ($z = 1.96$), a 5% margin of error, and an assumed proportion of 50%. The minimum sample size was 275; after allowing for a 10% incomplete response rate, 304 adults with CKD were recruited. Adults with CKD (aged ≥ 18 years) attending the Lagos University Teaching Hospital who consented were recruited into the study using a systematic random sampling. The first participant was randomly selected, and thereafter, every 3rd eligible participant attending the nephrology clinics during the study period was recruited, until the sample size was reached. Eligible participants with unstable clinical conditions such as unresolved sepsis, acute pulmonary oedema, acute stroke, heart failure with New York Heart Association Class III or IV symptoms, and known liver cirrhosis were excluded.

Socio-demographic data such as age, gender, ethnicity, religion, highest level of education attained, marital status, employment status, and average monthly income were obtained from participants by trained interviewers. The participants' CKD aetiology and CKD stage were obtained from their hospital records. CKD staging and classification were based on the Kidney Disease: Improving Global Outcomes (KDIGO) 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease [19].

A validated and pre-tested chronic kidney disease (CKD) knowledge questionnaire developed by Gheewala et al. in 2018 [20] was used to assess the patients' CKD knowledge. The instrument consists of 24 items with five domains: i) general CKD knowledge (3 items), ii) kidney function (6 items), iii) CKD diagnostic tests (4 items), iv) CKD risk factors (6 items), and v) CKD signs and symptoms (5 items). Items concerning stress, female sex, and faecal testing served as distractor items designed to identify misconceptions and distinguish true knowledge from guessing [20]. Each item had three response options ("True", "False", or "I don't know"), with one correct response for each item (either 'True' or 'False'). A correct response was scored as one point, while incorrect or "don't know" responses were scored as zero. The maximum raw score obtainable by each participant for CKD knowledge ranged from 0 to 24. These raw scores were divided by 24 and converted to percentages. Domain-specific scores were calculated by summing all correct responses within each domain, dividing by the maximum obtainable score for that domain, and then converting the results to percentages. Bloom's criteria [21] were used to categorize the overall knowledge scores: 80–100% (score of 19–24), 60–79% (score of 14–18), and < 60% (score < 14) were categorized as adequate, moderate and poor knowledge, respectively.

Statistical Analysis:

Data were analyzed using IBM SPSS Statistics version 22 (IBM Corp., Armonk, NY, USA). The distribution of the data was assessed for normality using visual inspection of histograms and the Shapiro–Wilk test. Continuous variables were summarized as means $\pm$ standard deviations (SD), and categorical variables were presented as frequencies and percentages. All study variables were examined for completeness before analysis. There were no missing data for the variables included in the analysis; therefore, complete-case analysis was performed without the need for data imputation. Responses to CKD knowledge items were scored dichotomously (correct = 1, incorrect = 0), with total scores ranging from 0 to 24. The overall CKD knowledge categorized according to Bloom's criteria was dichotomized to poor knowledge (< 60%) and good knowledge ($\geq$ 60%) [22]. For regression analyses, participants with moderate (60–79%) and adequate (80–100%) CKD knowledge were combined into a single "good knowledge" category ($\geq$ 60%) because only five participants achieved the "adequate" category (80–100%), resulting in insufficient outcome events for stable multivariable modelling. Bivariate associations between CKD knowledge (poor vs good) and socio-demographic/clinical factors were evaluated with chi-square or Fisher's exact tests as appropriate. Variables with a p-value < 0.20 in the bivariate analysis were included in the multivariable logistic regression model to identify independent predictors of adequate CKD knowledge while adjusting for potential confounders.

Because only 27 participants demonstrated good CKD knowledge (the outcome event), the multivariable model was intentionally restricted to a limited number of predictors to reduce the risk of model overfitting. Candidate variables were selected on the basis of both clinical relevance and bivariate associations ($p < 0.20$), while age and sex were retained irrespective of statistical significance because of their established clinical importance. This parsimonious modelling strategy was adopted to improve the stability and interpretability of the regression estimates. Before model fitting, multicollinearity among the independent variables was assessed using variance inflation factors (VIFs), with values < 5 considered indicative of acceptable collinearity. Model calibration was evaluated using the Hosmer–Lemeshow goodness-of-fit test, and overall model performance was assessed using the Nagelkerke pseudo- R^2 and classification accuracy. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were obtained from multivariable logistic regression for educational level, employment status, and CKD stage. Statistical significance was set at $p < 0.05$.

Results

A total of 304 CKD patients were enrolled in the study. The mean age of the study population was 53.5 ± 16.3 years. There were 160 males (52.6%). Approximately two-thirds of the participants (72.4%, $n = 220$) were married, while more than half (52.9%, $n = 161$) had a tertiary education. Most of the participants (64.5%, $n = 196$) were gainfully employed, and nearly half of the participants (46.4% $n = 141$) earned less than ₦100,000 (72 USD) per month. Table 1 summarizes the sociodemographic characteristics of the study population. Hypertension was the leading reported cause of CKD among study participants ($n = 190$, 62.5%). Figure 1 shows the aetiology of CKD in the study population.

Table 1
Socio-demographic characteristics of the study population *Others include Efik, Idoma, Ibibio, Ijaw, Ebira, and Togolese.

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	< 40	56	18.4
	40–60	175	57.6
	> 60	73	24.0
Sex	Female	144	47.4
	Male	160	52.6
Ethnicity	Yoruba	141	46.4
	Igbo	104	34.2
	Hausa/Fulani	43	14.1
	Others*	16	5.3
Educational level	None	9	3.0
	Primary	16	5.3
	Secondary	118	38.8
	Tertiary	161	52.9
Marital status	Single	56	18.4
	Married	220	72.4
	Divorced	12	3.9
	Widowed	16	5.3
Employment status	Employed	196	64.5
	Retired	68	22.4
	Unemployed	40	13.2
Average monthly income	< ₦100,000	141	46.4
	₦100,000–₦500,000	105	34.5
	Nil	58	19.1
Religion	Christianity	248	81.6
	Islam	56	18.4

*Others include Efik, Idoma, Ibibio, Ijaw, Ebira, and Togolese.

Approximately half of the study participants (50.6%, n = 154) had stage 3 CKD, while 3.3% (n = 10) had stage 1 CKD, 21.4% (n = 65) had stage 2 CKD, 5.9% (n = 18) had stage 4 CKD, and 18.8% (n = 57) had stage 5 CKD. Most (69.4%, n = 211) of the subjects had CKD diagnosed ≥ 1 year before this study, while the others (n = 93, 30.6%) had CKD diagnosed < 1 year before this study.

The overall CKD knowledge of the participants was poor, with a percentage score of $36.8 \pm 13.3\%$; with 91.2% (n = 277) of the participants scoring $< 60\%$, while 8.8% (n = 27) scored $\geq 60\%$. The responses of the study participants to the individual items in the questionnaire are summarized in Table 2. Figure 2 illustrates the percentage scores across the five CKD knowledge domains. Among the five domains, knowledge of CKD diagnostic tests was highest (48.3%), whereas kidney function demonstrated the lowest score (28.9%). Table 3 shows the association between participants' overall CKD knowledge and sociodemographic and clinical characteristics.

Table 2
The response of subjects to the individual items in the CKD knowledge questionnaire

CKD knowledge domain	Item	Correct responses n (%)
General CKD Knowledge	Total domain score	323/912 (35.4)
	People can live with one kidney	86 (28.3)
	Herbal supplements treat CKD (incorrect statement)	123 (40.5)
	Certain medications can help slow CKD progression	114 (37.5)
Kidney Function	Total domain score	528/1824 (28.9)
	Kidneys make urine	169 (55.6)
	Kidneys clean blood	105 (34.5)
	Kidneys regulate blood sugar	92 (30.3)
	Kidneys regulate blood pressure	79 (26.0)
	Kidneys break down protein	29 (9.5)
	Kidneys maintain bone health	54 (17.7)
Diagnostic Tests for CKD	Total domain score	587/1216 (48.3)
	Blood test for kidney assessment	221 (72.7)
	Urine test	88 (28.9)
	Fecal test (incorrect statement)	136 (44.7)
	Blood pressure monitoring	142 (46.7)
CKD Risk Factors	Total domain score	579/1824 (31.7)
	Diabetes mellitus	92 (30.3)
	Being female (incorrect statement)	29 (9.5)
	High blood pressure	170 (55.9)
	Heart problems	72 (23.7)
	Stress	114 (37.5)
	Obesity	102 (33.6)
Symptoms of CKD	Total domain score	670/ 1520 (44.1)
	Water retention	231 (76.0)
	Fever (atypical)	35 (11.5)

CKD knowledge domain	Item	Correct responses n (%)
	Nausea/vomiting	143 (47.0)
	Loss of appetite	147 (48.4)
	Fatigue	114 (37.5)

Table 3
Association between overall CKD knowledge and sociodemographic and clinical characteristics

Variable	Category	Poor knowledge n (%)	Good knowledge (≥ 60%) n (%)	p-value (Bivariate)	Adjusted OR (95% CI)	p-value (Multivariable)
Sex	Male	144 (90.0)	16 (10.0)	0.412		
	Female**	133 (92.4)	11 (7.6)			
Age group (years)	< 40	49 (87.5)	7 (12.5)	0.215		
	40–60	159 (90.9)	16 (9.1)			
	> 60**	69 (94.5)	4 (5.5)			
Marital status	Married	201 (91.4)	19 (8.6)	0.641		
	Unmarried**	76 (90.5)	8 (9.5)			
Ethnicity	Yoruba	128 (90.8)	13 (9.2)	0.758		
	Igbo**	95 (91.3)	9 (8.7)			
	Hausa/Fulani	40 (93.0)	3 (7.0)			
	Others	14 (87.5)	2 (12.5)			
Religion	Christianity	226 (91.1)	22 (8.9)	0.533		
	Islam**	51 (91.1)	5 (8.9)			
Education	None/Primary	24 (96.0)	1 (4.0)	< 0.001*	0.04 (0.01– 0.15)	< 0.001*
	Secondary	112 (94.9)	6 (5.1)		0.18 (0.06– 0.53)	0.002*
	Tertiary**	141 (87.6)	20 (12.4)		1.00	
Employment status	Employed	176 (89.8)	20 (10.2)	0.038*	1.00	
	Retired	65 (95.6)	3 (4.4)		0.56 (0.18– 1.72)	0.310
	Unemployed**	36 (90.0)	4 (10.0)		0.38 (0.12– 1.19)	0.097

*Variables with $p < 0.20$ at bivariate analysis, together with age and sex (included a priori because of clinical relevance) were entered into the multivariable logistic regression model. ** = reference category; OR = odds ratio; CI = confidence interval. * $p < 0.05$*

Variable	Category	Poor knowledge n (%)	Good knowledge (≥ 60%) n (%)	p-value (Bivariate)	Adjusted OR (95% CI)	p-value (Multivariable)
Monthly income	< ₦100,000	130 (92.2)	11 (7.8)	0.487		
	≥ ₦100,000**	94 (89.5)	11 (10.5)			
	Nil	53 (91.4)	5 (8.6)			
CKD stage	Early (Stages 1–2)**	72 (86.7)	11 (13.3)	0.011*	1.00	
	Advanced (Stages 3–5)	205 (92.8)	16 (7.2)		0.71 (0.21–2.41)	
Variables with $p < 0.20$ at bivariate analysis, together with age and sex (included a priori because of clinical relevance) were entered into the multivariable logistic regression model. ** = reference category; OR = odds ratio; CI = confidence interval. * $p < 0.05$						

In the bivariate analysis, educational attainment ($p < 0.001$), employment status ($p = 0.038$) and CKD stage ($p = 0.011$) were significantly associated with CKD knowledge. After adjustment for age, sex and other covariates, only educational attainment remained independently associated with good CKD knowledge. Compared with participants with tertiary education, those with no formal/primary education (aOR = 0.04, 95% CI: 0.01–0.15; $p < 0.001$) and secondary education (aOR = 0.18, 95% CI: 0.06–0.53; $p = 0.002$) had significantly lower odds of good CKD knowledge.

Discussion

Overall, CKD knowledge among adults receiving specialist nephrology care was poor, with marked variation across knowledge domains. Kidney function and CKD risk factors were the least understood areas, while higher educational attainment was the only independent predictor of good CKD knowledge after adjustment. By evaluating five distinct domains—general CKD knowledge, kidney function, symptoms, risk factors, and diagnostic tests—rather than relying solely on an overall knowledge score, this study provides the most comprehensive assessment of CKD knowledge among Nigerian adults receiving specialist nephrology care. The multidomain approach identified specific educational priorities that would not have been apparent from a composite knowledge score alone, thereby providing clinically relevant evidence to guide interventions in patient care such as education.

The prevalence of poor CKD knowledge observed in this study is consistent with previous evidence from Nigeria and other LMICs [17, 23]. Okoro et al. reported that 64.5% of Nigerian adults with CKD had poor disease knowledge [17]. Similarly, nearly 90% of Filipino patients scored below 60% on a CKD knowledge assessment before participating in an educational intervention [23]. Together, these findings suggest that inadequate CKD knowledge as a pervading challenge across resource-limited settings, likely reflecting low health literacy and health-system constraints that limit structured patient education [12].

Although patients in high-income countries generally demonstrate better CKD knowledge than those in LMICs, important gaps remain even in specialist nephrology settings. Studies by Wright et al. and Devraj et al., both conducted in specialist nephrology clinics in the United States, reported mean CKD knowledge scores of approximately 66% among patients receiving specialist nephrology care, which was substantially higher than our findings observed in the index study [24, 25]. These differences probably reflect better access to multidisciplinary CKD care, structured educational programmes, and patient support services in the better-resourced health systems [26]. Nevertheless, the pervading of knowledge deficits across healthcare settings suggests that routine nephrology care alone may be insufficient to optimize disease-specific knowledge, underscoring the importance of integrating specific educational approaches that are responsive to patients' health literacy needs [26, 27].

The low CKD knowledge observed in this study is likely multifactorial in origin. CKD is often asymptomatic in its early stages; this may reduce disease awareness and delay appreciation of disease severity [19]. Patients with limited formal education may also find it difficult to understand kidney physiology, disease progression, and treatment recommendations [12, 26]. In addition, heavy clinic workloads, limited consultation time, and competing clinical priorities in resource-limited settings may reduce opportunities for adequate patient education, with clinical encounters often focusing on immediate medical management rather than deeper disease understanding [28]. These factors together may explain why patients demonstrate poor CKD knowledge despite regular specialist follow-up.

Higher educational attainment was the only independent predictor of good CKD knowledge after adjustment for potential confounders in the index study. This finding is consistent with previous evidence showing that formal education improves health literacy and patients' ability to understand complex medical information and engage in effective self-management [12, 24–27]. Education likely enhances both functional understanding of written and spoken health information and the confidence needed to ask questions, interpret test results, and apply advice to daily care. These findings support the need to tailor CKD education to the literacy level of patients with lower educational attainments.

CKD Knowledge varied substantially across the five assessed domains, with diagnostic tests (48.3%) and CKD symptoms (44.1%) demonstrating relatively higher scores than general CKD knowledge (35.4%), CKD risk factors (31.7%), and kidney function (28.9%). Although diagnostic tests and symptoms were comparatively better understood, knowledge remained inadequate across all domains. The relatively better performance in diagnostic tests and symptoms may reflect repeated exposure to laboratory investigations and symptom assessment during clinic visits [29]. However, repeated exposure may increase familiarity with these investigations without necessarily improving understanding of their clinical purpose or implications. Patients may therefore comply with recommended investigations while remaining unaware of how test results inform treatment decisions and monitoring of disease progression.

By contrast, knowledge of kidney function and CKD risk factors was particularly poor. These deficits are clinically important because they may limit patients' understanding of disease progression, reduce treatment adherence, and weaken ability to control modifiable risk factors [19]. Differences in assessment instruments complicate direct comparisons with previous studies. Okoro et al. used a modified version of

the Kidney Disease Knowledge Survey developed by Wright et al., which primarily evaluates general CKD knowledge, kidney function, symptoms, treatment, and disease progression, but did not include dedicated domains for CKD risk factors or diagnostic tests [17]. In contrast, the Gheewala questionnaire used in the present study provides a broader multidomain assessment by explicitly evaluating knowledge of CKD risk factors and diagnostic tests in addition to general CKD knowledge, kidney function, and symptoms. Despite these methodological differences, general CKD knowledge (35.4% versus 33.8%) and CKD symptoms (44.1% versus 44.3%) were similar between the two studies, suggesting persistently low disease-specific knowledge among Nigerian adults with CKD. However, the knowledge of kidney function was lower in the present study (28.9% versus 39.9%). Although these comparisons should be interpreted cautiously, educational attainment, health literacy, and previous exposure to kidney education are recognized determinants of CKD knowledge and may partly explain the lower kidney-function scores observed in this cohort [12, 24, 27]. Consequently, understanding of basic kidney physiology remains an important educational priority among Nigerian adults with CKD.

To our knowledge, this is the first Nigerian study and one of the few studies in sub-Saharan Africa to evaluate CKD risk factors and diagnostic tests as independent knowledge domains using the validated Gheewala questionnaire [20]. This broader assessment identified educational priorities that would not have been recognized from overall knowledge scores alone and provides a stronger evidence base for designing patient intervention strategies. The pattern of responses within the kidney function domain further illustrates important gaps in understanding. Although more than half of participants correctly recognized that the kidneys produce urine, only about one-quarter understood their role in blood pressure regulation, while misconceptions regarding blood glucose regulation remained common, consistent with observations by Okoro et al. [17]. These findings are clinically significant because hypertension and diabetes are leading causes of CKD and major determinants of disease progression. This is more so in the population we studied where hypertension and diabetes mellitus were the underlying aetiologies of CKD in three quarters of the subjects studied. Limited understanding of these relationships may reduce appreciation of blood pressure and glycaemic targets and undermine adherence to lifestyle modification and pharmacological therapy [12, 30–32].

For nephrologists, identifying specific knowledge deficits may enable more targeted counselling during routine consultations and prioritize educational content that addresses misconceptions most likely to influence self-management and adherence. Integrating structured, literacy-sensitive CKD education into routine nephrology care may therefore improve disease-specific health literacy and support more informed patient participation in long-term CKD management.

Strengths and limitations:

This study has several strengths. To our knowledge, it is the first Nigerian study to comprehensively evaluate five domains of CKD knowledge. The use of a validated instrument, systematic random sampling, a relatively large sample, complete data capture, and multivariable logistic regression strengthened the methodological rigour and reliability of our findings.

Nevertheless, several limitations should be acknowledged. The cross-sectional design precludes causal inference, while the single-centre setting and inclusion of patients already receiving specialist nephrology care may limit generalizability to CKD patients in the community and other patients who are yet to access specialist services. Although a validated questionnaire was used, responses may have been influenced by recall or social desirability bias. In addition, the relatively small number of participants with good CKD knowledge limited the number of variables that could be included in the multivariable logistic regression model, although a parsimonious modelling strategy was adopted to minimize the risk of overfitting. Health literacy, previous CKD education, and cognitive function were not assessed and may have influenced knowledge levels. Future multicentre longitudinal studies incorporating these factors are needed to better understand determinants of CKD knowledge and evaluate the effectiveness of educational interventions.

Conclusion

CKD knowledge among Nigerian adults receiving specialist nephrology care is sub-optimal, particularly regarding kidney function and CKD risk factors. Higher educational attainment was the only independent predictor of good CKD knowledge. These findings support the integration of structured, literacy-sensitive CKD education into routine nephrology and primary healthcare services to improve disease-specific health literacy, promote informed self-management, and strengthen patient-centred kidney care.

Declarations

Acknowledgements:

The authors sincerely thank the patients with CKD who participated in the study

Ethics approval and consent to participate:

Ethical approval was obtained from the appropriate Health Research and Ethics Committee, and informed consent to participate was obtained from all participants. This study was performed in accordance with the principles of the Declaration of Helsinki.

Authors' Information:

Not applicable

Consent for publication: Not applicable.

Competing interests: The authors declare that they have no competing interests.

Authors' contributions:

Conceptualisation: RWB; study design: RWB, OKA; data collection: RWB; data analysis and interpretation: RWB, OKA, LTW, SIO; manuscript writing and review: RWB, OKA, LTW, SIO. All authors read and approved the final manuscript.

Funding: There was no external funding for this research.

Availability of Data statement:

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Figures

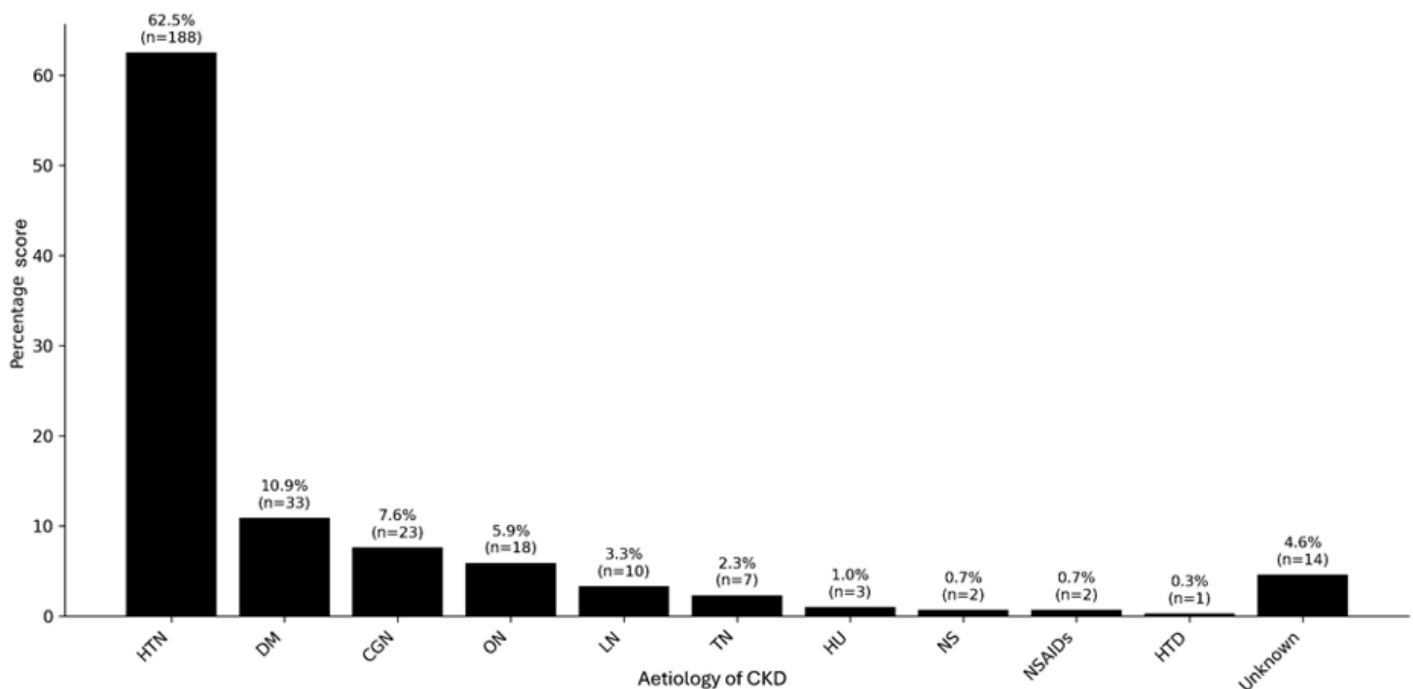


Figure 1

The etiology of chronic kidney disease in the study participants

NB: HTN Hypertension, DM diabetes mellitus, CGN Chronic glomerulonephritis, ON Obstructive nephropathy, LN Lupus nephritis, TN Toxic nephropathy, HU Hyperuricaemia, NS Nephrotic syndrome, NSAIDS Non-steroidal anti-inflammatory drugs, HTD hyperthyroidism

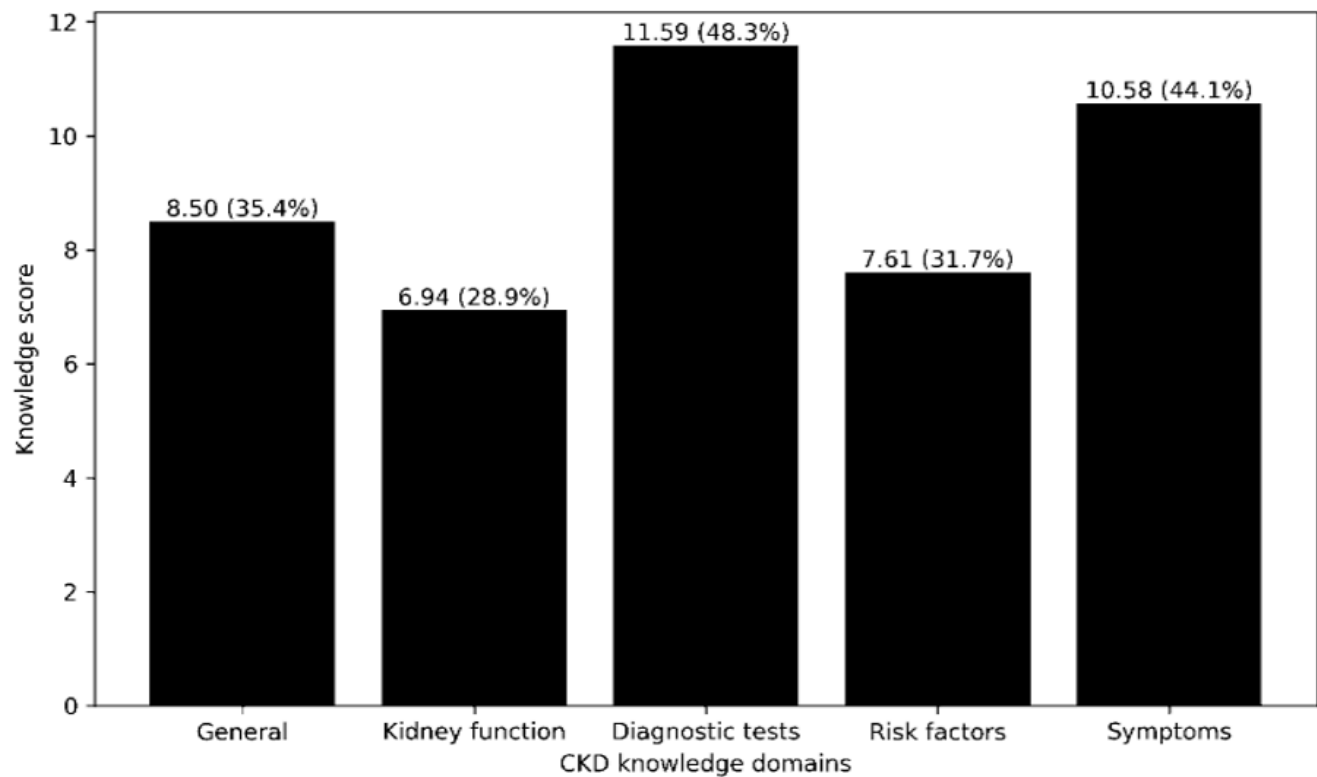


Figure 2

Percentage scores across the five CKD knowledge domains.