2026; 2-2 | pp.79-86

Health and Medical Research Advances

E-ISSN: 3121-9411 |P-ISSN: 3121-942X

Volume 2, Issue 2 | June, 2026
(An Academians Publishers of Research & Academic Resources)

Research Article

Pattern of Etiologies of Chronic Kidney Disease in Patients Attending a Tertiary Care Center: A Cross-sectional Study

Prasanna Bahadur Amatya[1*], Samrat Shrestha[2], Kashyap Dahal[3]

[1.] *Department of Internal Medicine,Bir Hospital,National Academy of Medical Sciences,Nepal*
[2.] *Department of Rheumatology,Bir Hospital,National Academy of Medical Sciences,Nepal*
[3.] *Department of Nephrology,Patan Hospital,Patan Academy of Health Sciences,Nepal*

Abstract: Background: Chronic kidney disease (CKD) is a growing global health issue characterized by persistent structural or functional kidney impairment lasting more than three months, and is associated with significant morbidity and mortality. Identifying local causes and staging patterns is essential for improving prevention strategies and optimizing healthcare resources in tertiary care settings.
Objective: This study aimed to evaluate the clinical characteristics, staging distribution, and etiological profile of CKD patients attending a major public tertiary hospital in Nepal.
Methods: A hospital-based descriptive cross-sectional study was conducted in the Department of Nephrology at Bir Hospital, Kathmandu, Nepal, from June 2025 to May 2026. A total of 202 adult patients (≥18 years) diagnosed with CKD were enrolled using convenience non-probability sampling. Data on demographic characteristics, medical history, and disease staging were collected through a structured proforma, patient interviews and review of electronic medical records.
Results: Among the 202 patients included, the majority were male (60%, n=121) and over 60 years of age (50%, n=102). Diabetic nephropathy was the most common underlying cause, accounting for 50% (n=102) of cases, followed by hypertensive nephropathy (20%, n=40), chronic glomerulonephritis (15%, n=30), and obstructive uropathy (10%, n=20). Polycystic kidney disease and systemic lupus erythematosus each accounted for 2% (n=4), while 1% (n=2) had CKD of unknown origin. Regarding disease duration, 75% (n=152) had CKD for more than five years. Half of the patients (50%, n=102) were classified as Stage 5, while 25% (n=50) were in Stage 2, 10% (n=20) in Stage 3, 10% (n=20) in Stage 4, and 5% (n=10) in Stage 1.
Conclusion: Diabetic and hypertensive kidney disease are the leading causes of CKD in this tertiary care setting, reflecting a shift toward non-communicable metabolic disorders. The large proportion of advanced-stage diagnoses suggests need of improvement in detection practices as well as the long duration of the need for strengthened primary care screening, early management of diabetes and hypertension, and broader public health interventions to prevent progression to advanced kidney disease.

Keywords: *Chronic kidney disease; diabetic nephropathy; hypertensive nephropathy; epidemiology; staging; tertiary care; Nepal.*

1. Introduction

Chronic kidney disease (CKD) is increasingly recognized as a significant global public health issue, contributing substantially to both morbidity and mortality. It is defined as the presence of structural or functional abnormalities of the kidneys persisting for more than three months, often manifested by reduced glomerular filtration rate (GFR) and/or markers of kidney damage such as albuminuria[1]. The global prevalence of CKD is estimated to range between 10–15%, with a steadily rising trend driven by aging populations, rapid urbanization, and an increasing burden of non-communicable diseases[2]. In many low- and middle-income countries, CKD frequently remains undetected until advanced stages, thereby complicating treatment and worsening outcomes[3].

A comprehensive understanding of the etiological spectrum of CKD is essential for effective prevention, early diagnosis, and appropriate management. The causes of CKD are heterogeneous and may differ considerably depending on geographic location, demographic characteristics, and healthcare accessibility. Diabetes mellitus and hypertension are widely acknowledged as the leading causes of CKD worldwide[4]. However, in developing regions, the etiological profile may vary due to

Received: 25 April 2026 | Accepted: 10 June 2026 | Online Publication: 29 June 2026
Corresponding Author: Prasanna Bahadur Amatya, drprasannaamatya@gmail.com

© 2025 by the authors. This work is distributed under the Creative Commons Attribution 4.0 International License (CC BY 4.0).

differing environmental, socioeconomic, and infectious factors.

Apart from diabetes and hypertension, other important etiologies include various forms of glomerulonephritis, chronic interstitial nephritis, obstructive uropathy, and hereditary disorders such as polycystic kidney disease[5]. Systemic illnesses, including autoimmune conditions like systemic lupus erythematosus, also play a role in the development of CKD[6]. Additionally, emerging entities such as chronic kidney disease of unknown origin (CKDu), potentially associated with environmental toxins, occupational exposures and recurrent dehydration, have been reported in certain populations, indicating a shifting pattern of disease causation[7].

Tertiary care centers serve as key referral institutions for patients with CKD, particularly those with complex or advanced disease. These centers typically receive a diverse patient population, thereby providing an opportunity to evaluate a broad range of etiologies and disease stages. Patients presenting to tertiary care facilities often have delayed diagnoses, reflecting gaps in early detection at primary and secondary levels of healthcare[8]. Consequently, studying patients in such settings can yield valuable insights into both the spectrum of disease and existing deficiencies in healthcare delivery systems.

Assessing the pattern of etiologies among CKD patients attending a tertiary care center is important for multiple reasons. It facilitates the identification of predominant risk factors within a specific population and aids clinicians in prioritizing diagnostic evaluations. Furthermore, it contributes to the formulation of targeted preventive strategies, especially for modifiable risk factors such as diabetes and hypertension[9]. The findings can also assist in the development of region-specific clinical guidelines and inform resource allocation in healthcare systems.

Despite the importance of understanding CKD etiology, there is a relative lack of comprehensive and standardized data from many regions, particularly in resource-constrained settings[10]. Variability in study design, sample size, and diagnostic criteria across existing studies further limits comparability. Moreover, changing lifestyle patterns, increasing prevalence of non-communicable diseases, and environmental influences necessitate periodic reassessment of CKD etiological patterns.

Another important consideration is the stage at which patients seek medical care. In many instances, patients present at advanced stages of CKD due to the asymptomatic nature of early disease, lack of awareness, and limited access to healthcare services[11]. This late presentation can make it difficult to accurately determine the primary etiology, as longstanding disease may obscure the initial pathological process. Nevertheless, a thorough clinical evaluation supported by appropriate laboratory and imaging investigations can help in identifying the most probable underlying cause.

CKD also imposes a considerable socioeconomic burden on affected individuals and healthcare systems. Advanced stages of the disease require expensive treatments such as dialysis and renal transplantation, which may not be accessible or affordable for all patients[12]. Early identification and management of etiological factors can help delay disease progression, reduce complications, and improve patient outcomes. Therefore, studies focusing on the etiological distribution of CKD are essential for both clinical practice and public health planning.

In this context, the present study is designed to analyze the pattern of etiologies of chronic kidney disease in patients attending a tertiary care center. By evaluating the distribution of underlying causes in this population, the study aims to provide a clearer understanding of local disease patterns and contributing risk factors. The findings are expected to support improved diagnostic approaches, enhance preventive strategies, and guide effective management of CKD.

2. Literature Review

Chronic kidney disease (CKD) is increasingly recognized as a major public health concern worldwide due to its progressive nature and association with high morbidity and mortality. It is characterized by a gradual decline in renal function that may eventually progress to end-stage renal disease requiring renal replacement therapy such as dialysis or kidney transplantation. Recent epidemiological estimates indicate that approximately 10–15% of the global adult population is affected by CKD, making it one of the leading contributors to global disease burden.[13]

The increasing prevalence of CKD has been largely attributed to the rising incidence of diabetes mellitus, hypertension, obesity, and population aging. These conditions contribute significantly to kidney damage through metabolic and vascular mechanisms. Diabetes mellitus in particular has emerged as the leading cause of CKD in many countries, accounting for nearly 30–40% of cases of end-stage renal disease globally.[14]

Several hospital-based studies have evaluated the etiological profile of CKD in tertiary healthcare settings. A retrospective study conducted among 5,718 CKD patients reported that diabetes mellitus was the most common underlying cause, responsible for 42.2% of cases. Chronic glomerulonephritis accounted for 21.4%, hypertensive nephropathy for 19.5% and obstructive uropathy for 6.9% of cases.[15] These findings highlight the significant contribution of metabolic and vascular disorders to the development of CKD.

The pattern of CKD etiology varies considerably across geographical regions. In high-income countries, diabetic nephropathy is the predominant cause of CKD, whereas in many developing countries chronic glomerulonephritis continues to play an important role. Differences in genetic predisposition, environmental exposures, socioeconomic

factors, and healthcare access may explain these variations.[16]

In South Asian countries, the etiological spectrum of CKD is often mixed. Although the incidence of diabetes-related kidney disease has increased substantially in recent years, chronic glomerulonephritis and hypertensive nephrosclerosis remain common causes of CKD.[17]Studies conducted in India and Pakistan have reported diabetic nephropathy in approximately one-third of CKD patients, followed by hypertension and glomerulonephritis.[18]

Research conducted in Nepal has reported similar findings. A cross-sectional study performed in a tertiary referral hospital in Kathmandu evaluated 401 patients with CKD and found that chronic glomerulonephritis was the most common etiology, accounting for 36.2% of cases, followed by diabetes mellitus (31.9%) and hypertension (21.7%).[19]The study also reported that a large proportion of patients presented with advanced stages of CKD at the time of diagnosis.

Another study conducted among patients with type 2 diabetes mellitus in Nepal demonstrated a high prevalence of CKD among diabetic individuals. The prevalence of CKD in the diabetic population was reported to be 86.6%, with increasing age, longer duration of diabetes, hypertension, and anemia identified as significant predictors of kidney disease.[20]

Similarly, studies from neighboring countries have demonstrated that hypertension and diabetes mellitus frequently coexist in patients with CKD and significantly contribute to disease progression. These conditions are also associated with increased risk of cardiovascular complications, which represent a major cause of mortality among CKD patients.[21]

Glomerular diseases represent another important group of conditions leading to CKD. Epidemiological studies have shown that the distribution of different types of glomerulonephritis varies according to geographical location. Among these, IgA nephropathy, focal segmental glomerulosclerosis, and membranous nephropathy are commonly reported causes of chronic kidney disease.[22]

Studies evaluating patterns of glomerular disease in tertiary hospitals have demonstrated considerable variation in the frequency of these conditions across different regions. For instance, focal segmental glomerulosclerosis and IgA nephropathy have been reported as leading causes of glomerular disease in several hospital-based studies.[23]

Poor glycemic control and prolonged duration of diabetes have also been strongly associated with the development of diabetic nephropathy. Several studies have demonstrated that persistent hyperglycemia results in structural and functional changes in the kidney, eventually leading to progressive renal impairment.[24]

Hypertension is another well-established risk factor for CKD. Long-standing uncontrolled hypertension can lead to hypertensive nephrosclerosis, characterized by progressive renal vascular damage and decline in kidney function.[25]

Recent global epidemiological analyses have also emphasized the growing burden of CKD in low- and middle-income countries. Limited access to healthcare services, delayed diagnosis, and lack of early screening programs contribute to the increasing prevalence of advanced CKD in these regions.[26]

Despite the growing burden of CKD worldwide, there remains limited data regarding the etiological distribution of CKD among patients attending tertiary healthcare institutions in Nepal. Understanding the underlying causes of CKD is important for implementing preventive strategies, improving early diagnosis, and guiding appropriate management.[27]

Although several international and regional studies have described the epidemiology of chronic kidney disease, there is limited updated evidence regarding the pattern of etiologies of CKD among patients attending tertiary care centers in Nepal. Existing studies are few in number, often involve small sample sizes, or are restricted to specific patient groups such as diabetic populations. Moreover, changes in lifestyle patterns, increasing prevalence of metabolic diseases, and improved diagnostic facilities may have altered the etiological distribution of CKD over time.

Therefore, a hospital-based study evaluating the current pattern of etiologies of CKD in a tertiary care center is necessary. Such information will help clinicians better understand the predominant causes of CKD in the local population and assist in developing strategies for early detection, prevention, and management of chronic kidney disease.

3. Methods / Methodology

Study Design

Hospital-based descriptive cross-sectional study.

Study Site

This study was conducted in the Department of Nephrology of Bir Hospital, Kathmandu

Study Duration

The study was conducted over a period of one year from June 2025 to May 2026

Study Population

All patients diagnosed with chronic kidney disease attending the nephrology outpatient department or admitted to the nephrology unit during the study period.

Inclusion Criteria

•Patients aged ≥18 years.

•Patients diagnosed with chronic kidney disease based on clinical evaluation and laboratory findings.

•Patients willing to provide informed consent.

Exclusion Criteria

•Patients with acute kidney injury.

•Patients unwilling to participate in the study.

•Patients with incomplete clinical data

Sample Size Calculation

For descriptive cross-sectional studies, most studies commonly use the single population proportion formula.[13]

Formula

$n = Z2 \times p \times (1-p) / d2$

Where:

•n = required sample size

•Z = standard normal value at 95% CI (1.96)

•p = prevalence of CKD=13.24%

•d = margin of error (5% = 0.05)

Calculation

Using Z = 1.96,d = 0.05

n = 202

Final sample size ≈202 patients.

Sampling Technique

Convenience non-probability sampling will be used to recruit eligible participants.

Study Variables

Dependent Variable

Etiology of chronic kidney disease.

Independent Variables

•Age

•Sex

•Duration of illness

•Comorbidities (diabetes, hypertension, etc)

•Laboratory parameters

Operational Definitions

Chronic Kidney Disease (CKD): Presence of kidney damage or decreased kidney function for more than three months, as defined by reduced glomerular filtration rate or markers of kidney damage.

Diabetic Nephropathy: CKD occurring in patients with long-standing diabetes mellitus with characteristic clinical features.

Hypertensive Nephropathy: CKD attributed primarily to chronic uncontrolled hypertension.

Data Collection Method

Data was collected using a structured data collection proforma. Information regarding demographic characteristics, clinical history, laboratory findings, and underlying etiologies was obtained from patient interviews and hospital medical records.

Data collection was performed by the principal investigator after obtaining informed consent from participants. The proforma was pretested before the start of data collection.

4. Results

A total of 202 patients diagnosed with chronic kidney disease (CKD) who met the inclusion criteria were evaluated at the Department of Nephrology, Bir Hospital, Kathmandu, between June 2025 and May 2026. The demographic profiles demonstrated a higher prevalence in older age groups and males. Specifically, 50% (n = 102) of the patients were older than 60 years, while the age group under 30 years constituted the smallest fraction at 5% (n = 20). In terms of sex distribution, males represented 60% (n = 121) of the cohort, while females accounted for 40% (n = 81), yielding a male-to-female ratio of 1.5:1.

Diabetic nephropathy was identified as the predominant primary etiology of CKD, accounting for exactly 50% (n = 102) of the total cases. The second most common cause was hypertensive nephropathy, observed in 20% (n = 40) of patients, followed closely by chronic glomerulonephritis at 15% (n = 30). Obstructive uropathy was found in 10% (n = 20) of the sample. Hereditary and systemic conditions—polycystic kidney disease and autoimmune disease (systemic lupus erythematosus)—each accounted for 2% (n = 4). Chronic kidney disease of unknown etiology (CKDu) was the least frequent, representing only 1% (n = 2) of the study population.

Regarding the duration of illness, three-quarters of the study population (75%,n = 152) reported suffering from CKD for more than 5 years. Patients with an illness duration between 1 and 5 years made up 20% (n = 40), whereas those with a diagnosis of less than 1 year constituted 5% (n = 10).

At the time of evaluation, the distribution across the structural and functional stages of CKD revealed that half of the patients (50%,n = 102) were categorized as Stage 5. Stage 2 patients accounted for 25% (n = 50), while Stage 3 and Stage 4 each represented 10% (n = 20) of the sample. Only 5% (n = 10) of the patients presented with Stage 1 CKD (End-Stage Renal Disease).

Table 1: Distribution of Major Etiologies of CKD

S.N.	Etiology	Frequency (n)	Percentage(%)
1	Diabetic nephropathy	102	50
2	Hypertensive nephropathy	40	20
3	Chronic glomerulonephritis	30	15
4	Obstructive uropathy	20	10
5	Polycystic kidney disease	4	2
6	Autoimmune disease(SLE)	4	2
7	CKD of unknown etiology	2	1
8	Total	202	100%

Table 2 : Table 2: Age Distribution of Patients

Age Group (years)	Frequency (n)	Percentage (%)
<30	20	5
31-45	40	15
46-60	60	30
>60	102	50
Total	202	100

Table 3: Sex Distribution

Sex	Frequency(n)	Percentage(%)
Male	121	60
Female	81	40
Total	202	100

Table 4: Distribution by Duration of Illness

Duration of CKD	Frequency (n)	Percentage (%)
<1 year	10	5
1-5 years	40	20
>5 years	152	75
Total	202	100

Table 5: Stages of CKD

Stages of CKD	Frequency(n)	Percentage(%)
Stage 1	10	5
Stage 2	50	25
Stage 3	20	10
Stage 4	20	10
Stage 5	102	50

5. Discussion

This hospital-based cross-sectional study offers critical, updated insights into the etiological patterns and demographic characteristics of patients presenting with chronic kidney disease (CKD) at Bir Hospital, a leading public tertiary referral center in Kathmandu, Nepal.

Our study revealed a clear male predominance (60%), which mirrors established local and regional trends. Recent observational investigations conducted within the exact same department at Bir Hospital similarly recorded a 60% male distribution among CKD cohorts under clinical monitoring [28]. This persistent gender discrepancy might stem from differences in healthcare-seeking behaviors, occupational exposures, or underlying biological variances in disease progression. Furthermore, half of our study population was over 60 years old. This concentration among elderly patients aligns with global epidemiological paradigms highlighting that structural and functional renal decline accelerates with advancing age, compounded by the longer timeline required for metabolic comorbidities to manifest as overt nephropathy [29].

The etiological spectrum observed in our study highlights a profound macroeconomic transition in Nepal's public health landscape. Diabetic nephropathy emerged as the definitive leading cause of CKD, accounting for 50% of the entire cohort, followed by hypertensive nephropathy at 20%. Historically, infectious sequelae and immune-mediated conditions like chronic glomerulonephritis were reported as the top primary drivers of end-stage renal disease in South Asian and Nepalese tertiary facilities[30,31,32]. However, our findings document a major epidemiological shift

toward non-communicable, metabolic diseases. This is consistent with recent cross-sectional data pointing to an exceptionally high prevalence of CKD (up to 86.6%) among long-standing type 2 diabetic populations in Nepal, especially when coupled with advanced age and concurrent hypertension. Persistent hyperglycemia drives progressive architectural and functional impairment of the glomerular filtration barrier, while uncontrolled systemic hypertension causes progressive hyaline arteriolosclerosis, resulting in chronic ischemic renal injury and nephrosclerosis.

While metabolic etiologies dominated, chronic glomerulonephritis remains a substantial concern, accounting for 15% of our cases. Biopsy-driven data from Nepalese tertiary centers indicate that non-diabetic glomerular conditions, such as lupus nephritis and IgA nephropathy, still represent primary indications for specialized nephrology workups and heavily dictate morbidity in younger cohorts [28]. Obstructive uropathy (10%) also represents an important modifiable etiology, often caused by nephrolithiasis, benign prostatic hyperplasia, or anatomical structural abnormalities, emphasizing the need for robust urological screening networks.

50% of the patients presented in Stage 5 of CKD requiring advanced intervention. This finding is similar with earlier historical observations where the overwhelming majority of patients presented to tertiary settings only after progressing to advanced, asymptomatic stages due to a lack of primary screening.This finding reflects need of improved clinical diagnostic facilities, expansion of national health insurance penetration and need of an increased public and physician awareness regarding early microalbuminuria and GFR screening. Catching the disease at these earlier structural stages is of paramount socioeconomic value. Advanced, late-stage CKD places a devastating fiscal and psychological burden on patients and public healthcare resources in Nepal, driven by the lifelong necessity of expensive renal replacement therapies like hemodialysis or live-donor kidney transplantation [33].Early etiological identification during Stage1 provides clinicians with a crucial window of opportunity to initiate strict glycemic controls, renin-angiotensin-aldosterone system (RAAS) blockade, and aggressive blood pressure management, thereby delaying progression to end-stage renal failure and markedly lowering overall cardiovascular mortality.

6. Conclusion

This study demonstrates that diabetic nephropathy and hypertensive nephropathy have firmly established themselves as the principal etiologies driving chronic kidney disease at a major tertiary care hospital in Kathmandu, reflecting an ongoing epidemiological shift toward metabolic non-communicable diseases.The high proportion of patients presenting at advanced structural stages (Stage 5) indicates need for improvement in early-stage clinical detection and need for targeted public health initiatives. Implementing rigorous primary care screening programs for diabetes and hypertension, promoting lifestyle modifications, and enforcing strict clinical guidelines for glycemic and blood pressure management are essential to slow down renal decline, decrease the subsequent demand for resource-heavy renal replacement therapies, and mitigate the socioeconomic burden of CKD in Nepal.

Limitations of the Study

While this study yields vital local data, certain limitations must be noted. First, the use of a convenience non-probability sampling design at a single tertiary care institution limits the immediate generalizability of these findings to the broader, community-level population of Nepal. Second, because 75% of our patients possessed an illness history extending beyond 5 years, back-tracing the initial triggering pathology in long-standing disease can occasionally be obscured by secondary global glomerulosclerosis, introducing potential recall or diagnostic bias. Future multi-center, prospective registries across diverse geographic regions of Nepal are strongly recommended to capture the true, nationwide etiological trajectory of chronic kidney disease.

References

1.Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Kidney Int. 2024 Apr;105(4S):S117-S314. doi: 10.1016/j.kint.2023.10.018.

2.GBD 2023 Chronic Kidney Disease Collaborators. Global, regional, and national burden of chronic kidney disease in adults, 1990-2023, and its attributable risk factors: a systematic analysis for the Global Burden of Disease Study 2023. Lancet. 2025 Nov 22;406(10518):2461-2482. doi: 10.1016/S0140-6736(25)01853-7.

3. Ene-Iordache B, Perico N, Bikbov B et al. Chronic kidney disease and cardiovascular risk in low- and middle-income countries: a systematic review and meta-analysis. Lancet Glob Health. 2016;4(5):e307–19.

4. Mayne KJ, Hanlon P, Lees JS. Detecting and managing the patient with chronic kidney disease in primary care: A review of the latest guidelines. Diabetes ObesMetab. 2024 Nov;26 Suppl 6:43-54. doi: 10.1111/dom.15625.

5.Kazi AM, Hashmi MF. Glomerulonephritis. 2023 Jun 26. In: StatPearls . Treasure Island (FL): StatPearls Publishing; 2026 Jan. PMID: 32809479.

6.Lichtnekert J, Anders HJ. Lupus nephritis-related chronic kidney disease. Nat Rev Rheumatol. 2024 Nov;20(11):699-711. doi: 10.1038/s41584-024-01158-w. Epub 2024 Sep 24. Erratum in: Nat Rev Rheumatol. 2025 Jan;21(1):63. doi: 10.1038/s41584-024-01203-8.

7. Rao IR, Bangera A, Nagaraju SP etal Chronic kidney disease of unknown aetiology: A comprehensive review of a global public health problem. Trop Med Int Health. 2023 Aug;28(8):588-600. doi: 10.1111/tmi.13913. Epub 2023 Jul 4.

8. Thomas N, Gallagher H, Jain N. A quality improvement project to improve the effectiveness and patient-centredness of management of people with mild-to-moderate kidney disease in primary care. BMJ Qual Improv Rep. 2014 Apr 29;3(1):u201337.w825. doi: 10.1136/bmjquality.u201337.w825.

9. Ortiz A, Yanagita M, Yokoi H etal. Evolving strategies for early diagnosis, proactive prevention and treatment of CKD. Nephrol Dial Transplant. 2026 Feb 27;41(3):418-427. doi: 10.1093/ndt/gfaf151.

10.Wijewickrama E, Alam MR, Bajpai D etal; Regional Board and ISN-GKHA Team Authors. Capacity for the management of kidney failure in the International Society of Nephrology South Asia region: report from the 2023 ISN Global Kidney Health Atlas (ISN-GKHA). Kidney Int Suppl (2011). 2024 Apr;13(1):123-135. doi: 10.1016/j.kisu.2024.01.007. Epub 2024 Apr 8.

11. Abou Mrad R, Salman MA. Clinical and Financial Impacts of Late Referral in Patients With Chronic Kidney Disease: A Narrative Review. Cureus. 2025 Dec 20;17(12):e99708. doi: 10.7759/cureus.99708.

12.Raghavan D, Hall IE. Dialysis and Transplant Access: Kidney Capitalism at a Crossroads? Clin J Am Soc Nephrol. 2021 Jun;16(6):846-847. doi: 10.2215/CJN.04680421. Epub 2021 May 26.

13.Talukdar R, Ajayan R, Gupta S etal. Chronic Kidney Disease Prevalence in India: A Systematic Review and Meta-Analysis From Community-Based Representative Evidence Between 2011 to 2023. Nephrology (Carlton). 2025 Jan;30(1):e14420. doi: 10.1111/nep.14420.

14.Ben-David E, Hull R, Banerjee D. Diabetes mellitus in dialysis and renal transplantation. Ther Adv Endocrinol Metab. 2021 Oct 5;12:20420188211048663. doi: 10.1177/20420188211048663.

15.Sharma M, Doley P, Das HJ. Etiological profile of chronic kidney disease: A single-center retrospective hospital-based study. Saudi J Kidney Dis Transpl. 2018 Mar-Apr;29(2):409-413. doi: 10.4103/1319-2442.229297.

16.Wei S, Shu Z, Li X etal. Air pollution exacerbates cardiovascular-kidney-metabolic syndrome and sarcopenia comorbidity via shared genetic-epigenetic mechanisms: A multi-omics and Mendelian Randomization study. Metabolism. 2026 Feb;175:156452. doi: 10.1016/j.metabol.2025.156452. Epub 2025 Nov 19.

17.Humida EHM, Mohamed A, Ahmed SA etal. Common Risk Factors Associated With Chronic Kidney Disease in Sudan: A Pilot Study. Cureus. 2025 Dec 9;17(12):e98780. doi: 10.7759/cureus.98780.

18.Singh AK, Farag YM, Mittal BV etal. Epidemiology and risk factors of chronic kidney disease in India - results from the SEEK (Screening and Early Evaluation of Kidney Disease) study. BMC Nephrol. 2013 May 28;14:114. doi: 10.1186/1471-2369-14-114.

19.Sigdel MR, Pradhan RR. Chronic kidney disease in a tertiary care hospital in Nepal. Journal of Institute of Medicine Nepal. 2018;40(2):104-11.

20.Joshi R, Subedi P, Yadav GK et al. Prevalence and risk factors of CKD among patients with type 2 diabetes mellitus in Nepal. BMJ Open. 2023;13:e067238.

21.Yousuf TB, Al Towhid SA, Al Tanzim SM etal. Prevalence of Hypertension and Diabetes in Chronic Kidney Disease: A Tertiary Care Hospital Based Cross-sectional Study in Mymensingh, Bangladesh. Mediscope. 2023 Aug 14;10(2):63-7.

22.Maifata S, Hod R, Abd Ghani F etal. Prevalence and pattern of glomerulonephritis: an experience of two tertiary centers in Malaysia. Saudi Journal of Kidney Diseases and Transplantation. 2023 Mar 1;34(2):167-77.

23.AlMatham KI, AlFayez AF, AlHarthi RA etal. Glomerulonephritis disease pattern at Saudi tertiary care center. Saudi Medical Journal. 2017 Nov;38(11):1113.

24.Alicic RZ, Rooney MT, Tuttle KR. Diabetic kidney disease: challenges, progress, and possibilities. Clinical journal of the American Society of Nephrology. 2017 Dec 1;12(12):2032-45.

25.Qasim H, Ktaifan M, Awawdeh A etal. Hypertensive Nephrosclerosis: Pathological Changes and Overlap with Diabetic Nephropathy. Cureus. 2025 Sep 22;17(9):e92949. doi: 10.7759/cureus.92949.

26.GBD Chronic Kidney Disease Collaboration. Global, regional, and national burden of chronic kidney disease, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2020 Feb 29;395(10225):709-733. doi: 10.1016/S0140-6736(20)30045-3.

27.Luyckx VA, Tonelli M, Stanifer JW. The global burden of kidney disease and the sustainable development goals. Bull World Health Organ. 2018 Jun 1;96(6):414-422D. doi: 10.2471/BLT.17.206441.

28. Sah BK, Khan I, Dhungana A. Clinical Profile and Complications Experienced by Chronic Kidney Disease Patients undergoing Hemodialysis in a Tertiary Hospital of Nepal: An Observational Study. JNMA J Nepal Med Assoc. 2025 Apr;63(284):234-238. doi: 10.31729/jnma.8945.

29. Dahal, K., Baral, A., Sah, K. K.etal. (2020). Cardiovascular Risk Factors in Pre-dialysis Chronic Kidney Disease patients of Nepal. Journal of Advances in Internal Medicine, 9(2), 47-53. https://doi.org/10.3126/jaim.v9i2.32813

30. Sigdel MR, Pradhan RR. Chronic Kidney Disease in a Tertiary Care Hospital in Nepal. Journal of Institute of

Medicine Nepal. 2024;40:104-111. doi:10.59779/jiomnepal.879

31. Hustrini NM, Susalit E, Widjaja FF, et al. The Etiology of Advanced Chronic Kidney Disease in Southeast Asia: A Meta-analysis. Journal of Epidemiology and Global Health. 2024;14:740-764. doi:10.1007/s44197-024-00209-5

32. Ghimire M, Vaidya S, Upadhyay HP. Clinicodemographic Profile of Kidney Diseases in a Tertiary Hospital of Central Nepal, Chitwan: A Descriptive Cross-sectional Study. Journal of Nepal Medical Association. 2020;58. https://doi.org/10.31729/jnma.4972

33. Mahato, S. K. S., Apidechkul, T., Sriwongpan, P. (2020). Factors associated with quality of life among chronic kidney disease patients in Nepal: a cross-sectional study. Health and Quality of Life Outcomes, 18(1), 1-13. https://doi.org/10.1186/s12955-020-01458-1