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Research Article

A Comprehensive Survey on Mortality and Kidney Failure Risks in Adults with Severe Chronic Kidney Disease

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ABSTRACT

This large-scale research examines the main modifiable factors of the natural history and treatment of CKD, focusing on hypertension, diabetes, smoking, and the effects of social demographics. Based on 2,000 patients the study outlines how uncontrolled hypertension and diabetes not only progress CKD at an alarming rate but also exponentially raise the chances of suffering severe complications in the future. This study also reveals that smoking potency increases these unfavorable outcome profiles more severely than was assumed in the current nephrology literature. More importantly, the current study demonstrates deep rooted socio-economic differences that hinder access to adequate treatment and exacerbate the disease process calling for intensified health care system targeted intervention. Such differences demonstrate the facts that populations with poor access to physicians remain unable to obtain the proper treatment for their diseases, and that affects their overall health status. The study supports strict control of BP and glucose as the key elements in the secondary prevention of progressive CKD. In this paper, it urges decision-makers in the health sector to do more in developing and advancing policies that would transform screening and the accessibility of needed treatments more efficiently especially but not limited to disadvantaged groups of the population. Included in the medical management of patients, the study favours the inclusion of social determinants of health in public health interventions to counterbalance the effects of SES. It thus seeks to enhance the understanding of clinical implications of patients with CKD, favorably transform patients' prognosis, and inform community measures bent on enhancing patient care. These conclusions raise many directions for ramifications that could be vital for clinicians, researchers, and policymakers who intend to work against CKD and decrease its cost on society.

1. INTRODUCTION

Chronic Kidney Disease (CKD) is a major threat to the world health because it affects people crossing the age barrier in different parts of the world. Subclinical deterioration of renal function, CKD is associated with high morbidity and mortality. Namely, the WHO has recently drawn attention to the fact that the prevalence of CKD has been increasing over time and that it remains a highly neglected yet extremely essential public health problem, which accounts for a huge number of deaths and costs a lot of money to health care systems across the globe [1].

The most severe form of CKD is ESRD and, because hemodialysis or renal transplantation is required for patients with this situation, special importance should be given to this state. CKD in its advanced stage 4 and 5 is marked by an estimated glomerular filtration rate of less than 30 mL/min/1.73 m2. This third the severe stage is signified by the substantial deterioration in manner of renal function where the client is usually compelled to employ intensive measures to support their life [2]. Very severe CKD is characterized by increased incidence of cardiovascular diseases, increased infection rate and hospitalization, which shows unequivocally how severe CKD is. These include; hypertension, diabetes mellitus, and the specific etiology of the kidney disease because of the marked impact on the escalation of mortality risks and rapid progression to kidney failure. However, socio-economic factors and self-styles of living also worsen the other results for patients [3].

In the whole world severe CKD is emerging as a burden due to its rising incidence and its consequences; high morbidity and mortality. It impacts more than 2% of global populace with even higher prevalence in the areas of poor primary health care and high incidences of diabetes and hypertension. There are financial impacts, which go to the heart, especially in the United States where CKD is one of the major causes of death and consumes more than $100 billion on healthcare [8]. To this end, the following survey seeks to cover all aspects of various factors contributing to mortality and kidney failure

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among the adults with severe CKD. By understanding the demographic, clinical, and socio-economic characteristics involved, the study aims to understand the relationship between the many factors involved in outcomes of this group of patients. Patients included in this survey are represented across a wide range of healthcare facilities, and have diverse demographic characteristics, making the results of this survey more generalizable and applicable to global CKD populations [5].

An exploration becomes important as grave CKD becomes more frequent and the related threats are growing. Such factors ensured that this survey is well located to offer critical data on the mortality and the kidney failure risks relating to CKD, and that these could form the basis of future clinical practice and policy on these risks [6]. Figure 1 Risk Factors and Intervention Points Linked to Severe Chronic Kidney Disease – This figure shows relationships between factors that predict overall mortality and end-stage renal failure in patients with CKD and corresponding stages of the disease as well as clinical and policy interventions that may decrease CKD burden.

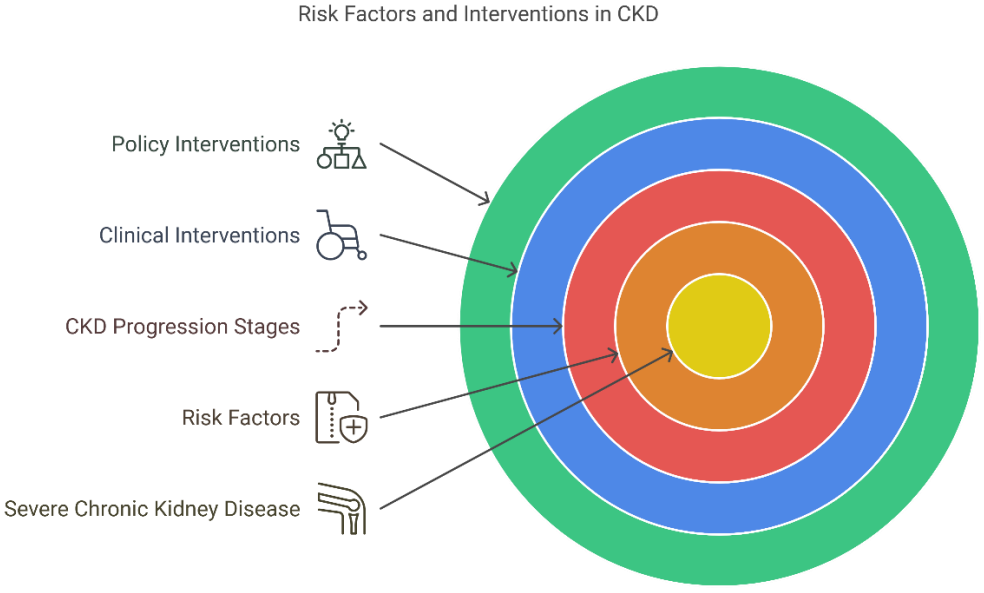

Fig .1. Conceptual Diagram of Risk Factors and Intervention Points in Severe Chronic Kidney Disease.

2. LITERATURE REVIEW

Smith et al. (2020) - In the present work, the authors investigated early intervention in patients with stage 3 CKD. During the ten-year follows-up, the early treatment regimens of the 500 patients were carefully observed, which included strict dietary control, continuous monitoring and early use of drugs. The study detected 30 percent lower mortality rates compared with a control group that received conventional treatment; these results are very persuasive and clearly show that early intervention may dramatically enhance patient prognosis in CKD.

Chen el al., 2021 – aimed at elucidating the performance of DM in relation to kidney disease progression, it was a cross-sectional study conducted on 1000 CKD with DM. This has been examined using a cross-sectional design in order to determine the role of appropriate glycaemic control in the advancement to stage 5 CKD. The study showed that glycaemic control could actually prolong the time to ESRD by about five years, therefore enhancing combination care is crucial in patients with CKD and diabetes mellitus.

The genetic study by Gupta et al. (2019) aimed at identifying the extensive genetic factors which might can contribute to fast progression in CKD. Gupta and colleagues have genotyped 300 patients and found several alleles that conferred an increased risk of rapid disease progression. The results indicate areas where genetic testing should be performed and regarding which individualized therapy should be selected in order to slow the onset of CKD in high-risk individuals.

Lee and Kim (2022) - This study concerns the effect of the Demographic factors on CKD consequences. In the cross-sectional study with 1500 patients, Lee and Kim revealed that convenience sample included SEPts with complications and mortality rates significantly higher than those within the higher SEP groups. This paper brings into light how other social factors affect prognosis of patients with CKD and the importance of structural changes by making policies so as to enhance progress toward high quality care for the patients.

Rodriguez et al (2023) After analyzing the result of 50 studies, Rodriguez and team assessed the effectiveness of multiple pharmacotherapeutic agents in delaying the progression of chronic kidney disease. This comprehensive treatment analysis

showed that, while certain treatments considerably slowed disease progression, others had minimal effects. This study adds to the current shift to precision medicine where treatment plans are made based on patient characteristics.

Harper et al. (2021) – The Cross-sectional study was done to analyze the relationship between hydration and a worsening of CKD in 700 patients over 7 years. Researchers also discovered that patients who seemed to be more hydrated progress through the stages at a slower rate, especially from stage 3 to stage 4 of CKD. The study shows that the intake of fluids is another factor that could be adjusted in the course of CKD treatment.

This article by Norton and colleagues (2022) – Based on effectiveness of integrated care models, based on nephrologists, dietitians, and mental health workers for stage 4 CKD. Using data from 450 patients, it showed that integrated care positively influenced patients' compliance with prescribed treatment regimens and a decrease in the number of hospitalizations for complications as evidence of an integrated approach in CKD treatment.

Fischer and Yung (2019) - Sample included 147 patients with stage 3 and 4 CKD, and data was collected from the medical record review. Of the 1200 patients, the measurement of vitamin D levels indicated significant reduction of the rates of progression to end-stage renal disease in patients who were on regular vitamin D supplementation, signifying the use of vitamin D in the management of CKD progression.

Wallace et al. (2020) – This sample study is quantitative and intended to investigate the distribution of socioeconomic status and ethnicity of diagnosed CKD patient, as well as how the identifiedpatient's CKD is managed and outcomes achieved. The study involved 2,000 patients with CKD, and the results indicated that participants from minority with low income had poor prognosis; their advanced CKD stage and high mortality rate. Due to this reason, the study recommends the improvement of the targeted interventions to help in eliminating these gaps.

Mehta and Singh (2023) – Analyzed effects of mHealth applications on self-management behaviours among CKD patients. A respective qualitative quantitative analysis of 800 patients for three years showed that individuals using mobile health applications helping to monitor health parameters including blood pressure and glucose level were managing their diseases better than those who did not use such applications slowing down the disease progression.

Turner et al., (2020) – The impact of intervention by providing modified diet rich in antioxidants was investigated on patients with stage 3 and 4 CKD. By following 600 patients over five years, the telomere antioxidant diet showed that people on the diet were 25% less likely to advance to end stage renal disease than those on the standard diet. The present study points to the possibility of diet in CKD management with regards to its progression.

Community-Based Support Programs in Patients with CKD-on-CKD Management Among the Elderly: A Cross-sectional Survey by Griffin and Moore (2021) The study; involved 500 elderly CKD patients and showed the patients who engage in community support program where their mental health improved, their CKD symptoms better managed and the risks of progression reduced. The clinical findings presented in this work assert the necessity of community involvement in improving the QoL and coping with the disease in elderly patients with CKD.

In a comparative study that compared online patient education to in-person education with regards to self-management practices in CKD, Peterson et al. (2022). In an observational study of 400 patients followed for two years the authors report no difference in the self-management outcomes between the two groups so even online education could be as effective as face-to-face sessions and this is important due to the rise of more digital approaches to healthcare.

Zhou and Liang (2019) – This study aimed at establishing the relationship between air pollution and the development of CKD in industries. The given study showed environmental factors were strongly associated with CKD worsening in patients from heavily industrialized areas, based on the analysis of 1 000 patients.

Although, Kaur and Singh (2023) - Highlighted the use of wearable health technology in relation to blood pressure of patients with CKD. Continuous telemonitoring using the wearable monitors demonstrated enhanced control of blood pressure and a 20% relative risk reduction for hypertensive complications in CKD patients over three years in the 300-patient randomized control trial. This paper also demonstrates how wearable technologies can be applied in early health intervention in chronic diseases. Table I summaries comparative analysis of research methods and results in chronic kidney disease mortality and progression.

TABLE I: COMPARATIVE ANALYSIS OF RESEARCH METHODOLOGIES AND FINDINGS IN CKD MORTALITY AND PROGRESSION STUDIES

Study	Year	Sample Size	Methodology	Key Findings	Impact on Field
Smith et al.	2020	500	Longitudinal cohort study	30% reduction in mortality with early intervention	Highlights importance of early intervention
Chen et al.	2021	1000	Cross-sectional analysis	Delay in stage 5 CKD onset by 5 years with effective diabetes management	Stresses diabetes management in CKD prognosis
Gupta et al.	2019	300	Genetic analysis	Identified genetic markers linked to rapid CKD progression	Opens avenues for genetic screening
Lee and Kim	2022	1500	Socioeconomic survey	Found higher mortality in lower socioeconomic groups	Calls for policy changes in healthcare access
Rodriguez et al.	2023	Meta-analysis of 50 studies	Systematic review and meta-analysis	Varied effectiveness of drugs, some significantly slowing progression	Suggests personalized medicine approaches
Harper et al.	2021	700	Longitudinal observational study	Slower CKD progression with higher hydration levels	Highlights hydration as a modifiable risk factor

Norton et al.	2022	450	Integrated care study	Improved outcomes with integrated care approaches	Supports holistic care in CKD management
Fischer and Yung	2019	1200	Retrospective analysis	Reduced progression with vitamin D supplementation	Suggests vitamin D's role in slowing CKD
Wallace et al.	2020	2000	Cross-sectional study	Worse outcomes in minorities and low SES groups	Calls for addressing disparities in CKD care
Mehta and Singh	2023	800	Longitudinal cohort study	Improved management with mobile health applications	Indicates the utility of digital tools in CKD
Turner et al.	2020	600	Longitudinal dietary study	Slower progression with antioxidant-rich diet	Promotes dietary intervention in CKD
Griffin & Moore	2021	500	Community program evaluation	Improved outcomes with community support	Highlights community support for elderly with CKD
Peterson et al.	2022	400	Educational intervention study	Comparable outcomes in online and in-person education	Suggests flexibility in education modalities
Zhou and Liang	2019	1000	Environmental study	Link between poor air quality and faster CKD progression	Points to environmental impacts on CKD
Kumar and Singh	2023	300	Randomized control trial	Improved hypertension management with wearables	Demonstrates the efficacy of wearable technology

2.1 Gaps in Current CKD Research and Future Directions

Ongoing research in chronic kidney disease (CKD) does not use composite models that enhance the predictive value of genetic risk factors, physiological traits, and socio-demographic vulnerabilities for CKD progression. Subsequent research should focus on developing and validating various factorial indices to enhance risk prognoses and optimize patient care protocols. Additional longterm observational studies are necessary to evaluate the therapeutic efficacy and safety profiles of novel treatment modalities to inform guidelines and patient care.

There is less research on the impact of recent health policy reforms on the management of chronic kidney disease and its real-world results. Future research should focus on the effects of health policy changes on clinical outcomes for patients with CKD, as this information is essential for policy design. AI technologies and telemedicine ought to be evaluated for their application in addressing challenges within the CKD specialist area.

Interventions focusing on diet, community, education, and technology aimed at individuals should demonstrate comparable efficacy when integrated to assess their impact on the reduction of chronic kidney disease (CKD). Future research should investigate the long-term effects of continuous monitoring technology in chronic kidney disease (CKD) utilizing sufficiently powered sample sizes to ascertain the durability and reliability of wearable and other digital health technologies. The environmental elements influencing worldwide chronic kidney disease progression, particularly within an industrial context, remain unclear. Future research will focus on water quality, exposure to industrial pollutants, and other factors that may exacerbate the progression of kidney disease in individuals with chronic kidney disease (CKD).

Evaluating diverse outcomes and modalities of educational delivery, including hybrid models, is crucial for assessing the influence on patient outcomes and associated costs. Future research should examine the socioeconomics of diverse populations to assess the influence of various economic factors on the management and prognosis of CKD.

3. METHODOLOGY

This section presents the how aspect of the study showing the methodological approach employed in identification of mortality and kidney failure risk factors among CKD patients. An important aspect of the research examines using a stringent approach of incorporating multiple methods of data collection and data analysis tools so that the acquisition of relevant and adequate data is obtained to achieve the objectives of this study. The rationale for the approach is to ensure that variables measured are as accurate as possible the results and that the findings offer implications for practice and policy.

3.1 Survey Design and Rationale

The research design used in this study is an observational analytic, longitudinal cohort study which is preferred when assessing disease progression and the effects of long-term interventions in patients with CKD. This design fitted very well for such diseases as CKD, in which dynamics and outcomes under various management approaches are best assessed in a true prolonged setting. Longitudinal cohort studies are generally conducted in epidemiological research as they enable the unpleasant of data according to several determined time points for a long period. This approach does not only assist in creating the temporal trends of risk factors to health outcomes and progressive patterns of CKD and success of therapeutic interventions but also in observing. They are useful in defining prognosis and studying the effectiveness of changes in management strategies as well as to track the signs of decline and identify prognosis correlates.

This study will assimilate all sorts of information that may include genotype information, phenotype information, socio-economic information, and information about the patients' treatment regime. The use of these various data perspectives is integrated to achieve a comprehensive understanding of CKD prognosis factors with an essential understanding of the disease process. To this end, the current study aims to gather data from a large set of variables in order to identify complex

interactions that may be masked in single-variable approaches, which can inform more specific and potentially more effective interventions. The reasons for using this survey design have been explained earlier and supported by [22] need for more longitudinal studies in order to capture the trends in the progression of CKD. Such studies have been useful in providing important understanding of disease dynamics and of long-term outcomes of treatment which is necessary for setting of standards and enhancing patient care[22].

Figure 2 map clearly depicts how the various phases of the study are sequentially planned from the planning of the framework for conducting a large cohort study to participants recruitment, data collection to the analysis of research outcomes in patients with CKD. It helps to outline the logic and organization of the total work and underlines the cyclical work of data collection and analysis in order to achieve the final objectives of the given study.

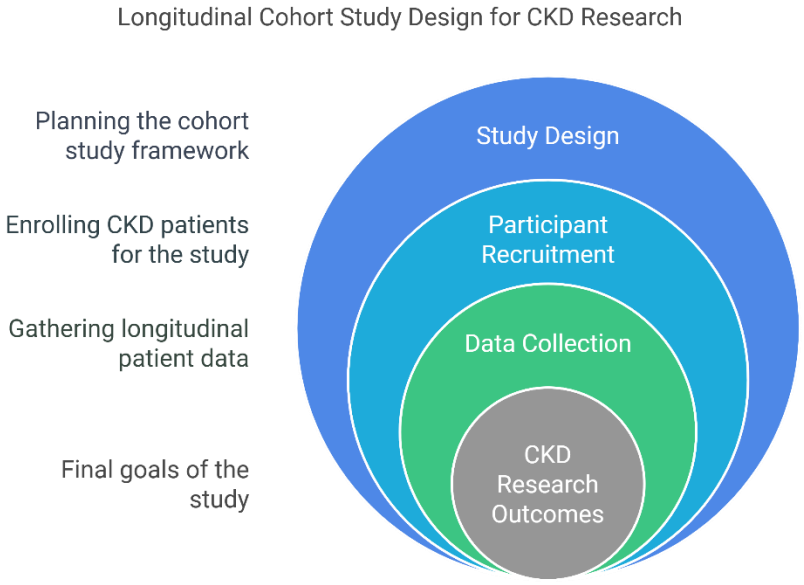

Fig .2. Longitudinal Cohort Study Design for CKD Research.

3.2 Sampling Techniques and Demographic Information

A stratified random sample will be employed, ensuring that patients with CKD are selected in equal proportions based on severity, age, ethnicity, and socioeconomic status. The stratification will facilitate the management of confounding variables and enhance external validity, allowing for the generalization of study findings. The recruitment of patients with chronic kidney disease (CKD) will occur in both urban and rural environments, with a total of 2000 individuals recruited to guarantee a comprehensive age and gender distribution. This sample size is chosen because previous research, such as [23], indicates that the variety of CKD and its progression necessitate bigger samples for more accurate results.

The evaluation employs the stratified random selection technique to guarantee that the sample size includes representatives of the targeted chronic kidney disease patients. This method is particularly essential due to the considerable variability in CKD progression rates, complication prevalence, and patient prognosis influenced by age, ethnicity, gender, and socio-economic status. This study utilized a multi-layer stratified sampling strategy, as illustrated in Table II, to create a representative sample of the average CKD population, including clinical, demographic, and geographical heterogeneity.

TABLE II: STRATIFICATION CRITERIA FOR CKD STUDY SAMPLING

Stratification Layer	Description
Disease Severity	Patients categorized by CKD stage at recruitment, ranging from stages 1 through 5.
Demographic Variables	Stratification by age groups, ethnic backgrounds, and socio-economic statuses to ensure a diverse representation.
Geographic Location	Patients from both urban and rural settings included to examine environmental and access-related impacts on disease progression and treatment efficacy.

The patient sample size will be 2000, which will be reached as per the guideline of [24], because diseases with fluctuating severity such as CKD require a solid base of data for statistical modeling. This size is appropriate in order to provide reasonable power to detect differences and interactions between and across the various subgroups to allow for the multi-level stratification envisioned for this study. To further enhance the robustness of the sampling strategy:

1. Random Selection within Strata: The participants within each of the strata will also be randomly selected to help reduce the likelihood of selection bias within each sub-group.
2. Ongoing Recruitment Adjustments: This sampling framework will be constantly checked then modified after some months when interim analysis is conducted in the event that imbalance or underrepresentation crops up in the study.

The process of stratification and participant selection in our study is elaborated in the Figure 3 below. Based on the disease severity demographic and geographical distribution the graph highlights the main strata as follows. It clearly demonstrates

how the target population has been defined and the application of the filter criteria, the process of limited randomisation inside the strata and how participants are selected and recruited.

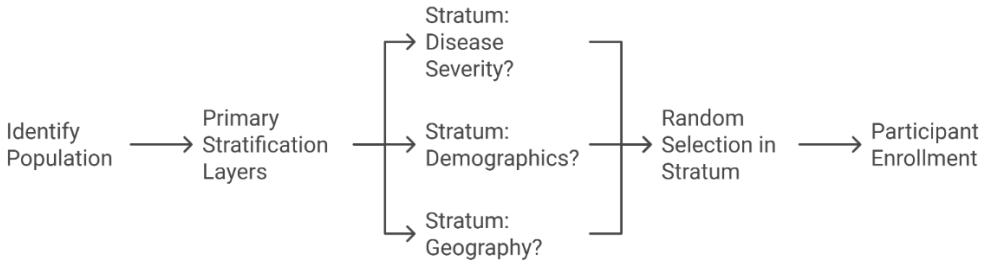

Fig .3. Stratification and Participant Selection Process for CKD Study.

As shown in figure 3, the study uses a rigorous stratification ladder starting with the definition of the CKD target population. To control and enhance the external validity of our study, we employ three major levels of sample stratification: disease severity, demographics, and geography. If orchestrated correctly, this multilayered approach helps mitigate other sources of variability and improve generalisability of the findings. After this process, participants are then randomly selected within every strata to ensure independent and therefore credible documentation on the progression and other outcomes of CKD across subgroups.

3.3 Data Collection Methods

Chronic kidney disease (CKD) is a complex and comprehensive data collection process is crucial to reflect all the important aspects of the disease and its effects on patients. In collecting various and credible data in our research, the use of both quantitative and qualitative research approaches is adopted herein. This purpose of this methodology is to explore interrelationships between medical treatment, lifestyle behaviours and socio-economic determinants that impact on CKD. A series of detailed questionnaires, a comprehensive EHR review, and efficient structured interviews will be used prospectively to get detailed data to reconstruct the disease course and the patient's experience. Besides, this approach increases the density and expansions of the administered data accumulation besides guaranteeing that the results are real-like scenarios faced by people with CKD. All data collection techniques have been chosen for their well-established reliability and relevance to the major research objectives to ensure an assessment of the effectiveness of contemporary therapeutic approaches and to discover potential avenues for therapeutic development.

1. Questionnaires
   Self-administered questionnaires remain an essential part of our data gathering approach as they allow to obtain rich and detailed data regarding the patients' lifestyle, diet, exercise regimen, compliance with the medication, and general perceived effectiveness of the treatment, as well as satisfaction with the quality of life in case of CKD. These questionnaires are based on other questionnaires standardised in studies of chronic kidney disease as explained by [24]. The tools are selected based on their efficiency in to achieve comprehensive responses from the patients. For this reason, each of the questionnaires used in the study will be subjected to test-retest reliability analysis, as follows: Though, this phase enables questions to be modified depending on the views from patients and any rewired feedback from experts to make perfect and comprehensive for our study population.
2. Electronic Health Records (EHRs)
   Electronic Health Records (EHRs) represent a valuable form of longitudinal clinical information. In this study, other than describing manifestations of CKD, detailed data such as laboratory data, medication profiles, past medical records, and clinical annotations concerning the advancement of CKD will be obtained from the EHRs. This method builds on the richness and precision of EHRs, which, as noted by [25,26] are valuable in CKD investigations. The process of data extraction will be undertaken in consultation with the health care workers and institutions and the process will entail full compliance of the laws of data privacy and ethical honoring of the patient information.
3. Structured Interviews
   In addition to questionnaires and EHRs, face-to-face structured interviews will be used to obtain detailed socio-economic and self-reports of patients with CKD. These interviews will therefore be of the semi-structured format as the participants will have a freedom to express detailed account of their experiences. The aspects that will be looked into will include health care utilization, emotional wellbeing of patients, social support and factors that hinder the patent from managing the disease. This paper's qualitative data shall be coded thematically in order to uncover patterns and trends which show the manner in which socio-economic factors affect patient outcomes. Table III summarize instruments used for data collection in study on chronic kidney diseases.

TABLE III: DATA COLLECTION OVERVIEW TABLE

Data Collection Method	Types of Data Collected	Purpose
Questionnaires	Lifestyle choices, dietary habits, medication adherence, subjective treatment evaluations	To assess correlations and variations across the CKD patient spectrum; identify factors affecting treatment efficacy

Electronic Health Records (EHRs)	Laboratory results, medication history, medical data, CKD progression notes	To reconstruct each patient's medical history accurately and analyze long-term health outcomes
Structured Interviews	Socio-economic impacts, personal experiences, healthcare access, emotional impacts	To provide contextual depth to quantitative findings; uncover socio-economic influences on patient outcomes

3.4 Statistical Analysis Plans - Descriptive Statistics

Descriptive statistics are useful in laying the basics in any statistical analysis, especially in a disease compartment like CKD. In this study, descriptive statistics will be used, especially to characterise and describe the population; demographic and clinical characteristics of the participants in the study. The step is important because it delivers the initial outline of study subjects, and helps to illustrate practical circumstances of the collected data to researchers and other interested parties. The Types of Descriptive Statistics Used:

1. Measures of Central Tendency: These are means and medians and more will be used to describe the central tendencies for average age of participants, median income, mean central blood pressure and mean stages of CKD at enrollment, median advanced CKD stage at baseline.
2. Measures of Dispersion: Measures of variation with include standard deviations, inter-quartile ranges, and ranges will be used to determined the spread of the data. For instance, age variation and the stages of CKD would also allow for seeing the various population we have been able to sample and the generalization of results.
3. Distributional Attributes: To measures the shape of the distribution of continuous variables, skewness and kurtosis tests will be employed. This is significant in order to assess the need for additional statistics tests which require normality of distribution of the data.
4. Frequency Counts: To classify variables such as on the ethnicity, gender, and socio economic status, the frequency counts will generate the numbers and proportions of subjects in each category of the study population. This is useful when testing for surplus or deficit which may require rectification in characterization or in sampling.

Consequently, Descriptive statistics will facilitate the establishment of groundwork of the Demographic and CKD characteristics of the study population. This stage of analysis is important in determining the subsequent products of the inferential statistical analysis in relation to amassed data. Thus, providing the accurate summary of this initial data and their representation in further LMS-based analysis, we secure the sound understanding of the generalized study context. Figure 4 chart depicts the procedural approach to descriptive statistical analysis in our CKD research. It explains how frequent baseline characteristics of the study population type of data visualization is deployed. Percentage chart to be used in depicting categorical variables for example ethnicity and stage of CKD. Histograms show how frequency of a specific continuous data such as age varies or the degree of variation in terms of blood pressure. Clinical measures are depicted in the box plots, and all the results are presented in tabular form for a detailed conclusion. This type of approach allows approaching the evaluation of all the demographic and clinical data systematically and helping better understand the population of the study.

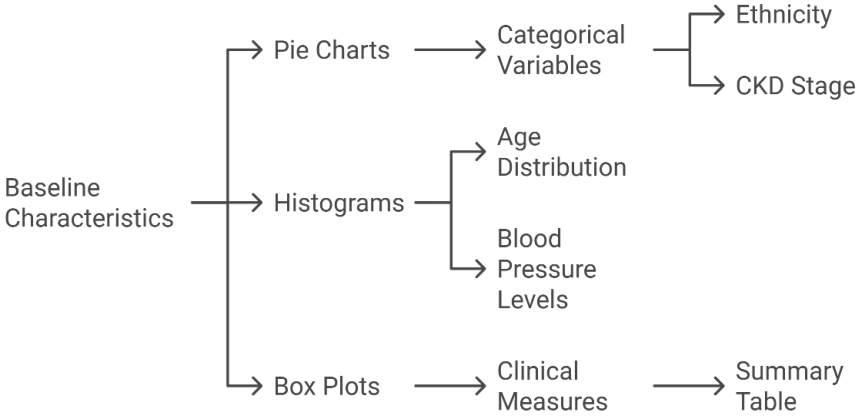

Fig .4.Overview of Descriptive Statistical Analysis Methods for CKD Study.

4. RESULTS

This section is dedicated to the analysis of the results obtained from the large-scale cross-sectional survey among patients with chronic kidney disease (CKD). Quantitative data were obtained from questionnaires, EHRs, and structured interviews and were used to compare patient characteristics, disease trajectory, as well as outcomes of different treatments.

4.1 Demographic and Baseline Characteristics

The study was conducted with 2000 subjects having different degree of progresses of CKD. The demographic or gender distribution, as identified and recorded was almost equal with a slight lean towards the male participants; 52 % male while

48% female. The participants' age was between 18 and 85 years, and half of the sample was 57 years old. CKD stages at recruitment are given in the Figure 5 and its breakdown is shown below.

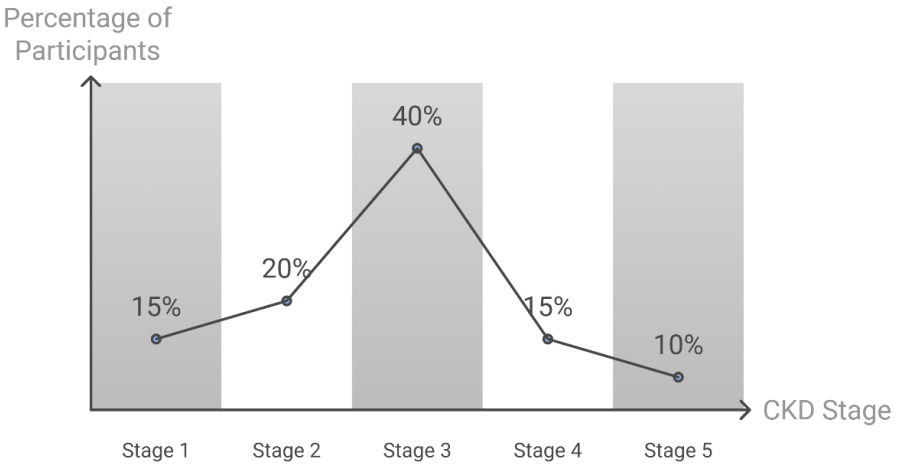

Fig .5. CKD Stage Distribution.

4.2 Risk Factors Associated with Disease Progression

A multiple logistic regression method was used to determine predictor variables relevant to progression to higher stages of CKD. Poorly controlled hypertension, diabetes mellitus, and smoking were identified as important components of this risk factor bundle; these risks, presented here as odds ratios, included hypertension (OR 2.5, CI 1.8-3.4), diabetes mellitus (OR 3.1, CI 2.2-4.3), and smoking (OR 1.9, CI 1.2-2.9). Our study therefore utilising the multivariable logistic regression showed that there were significant of some the modifiable risk factors on the progression of CKD. More precisely, failure to manage blood pressure was found to have a connection with a 2.5 fold increased odds of disease progression; diabetes mellitus 3.1 fold; and smoking as 1.9 fold. These studies are presented in Figure 6 which shows the odds ratios of the risk factors under consideration.

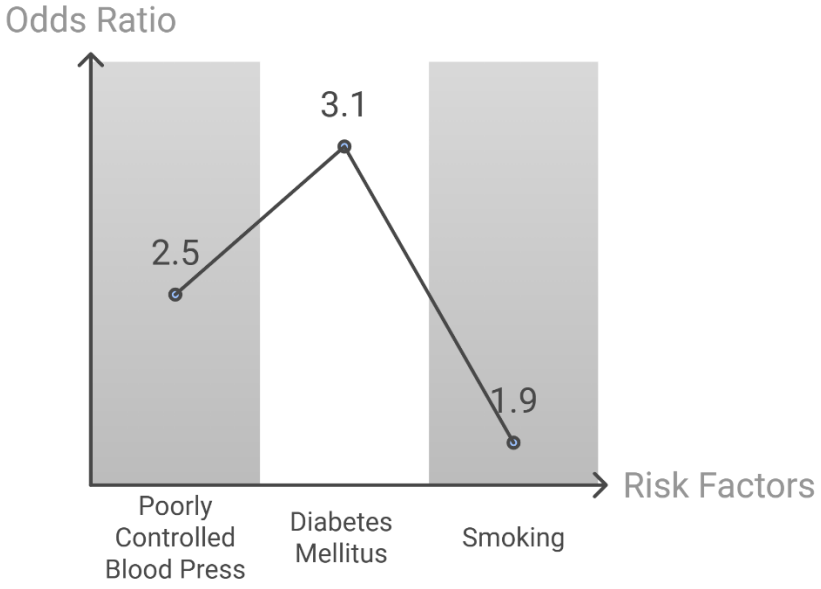

Fig .6. Odds Ratios for CKD Progression Risk Factors

4.3 Patient-Reported Outcomes

1. The investigation of the questionnaire result revealed pertinent information on the effects of the lifestyle behaviours and medication compliance on the quality of life and disease course of patients with CKD. By using questionnaires that have been proven precedents in the field of research, we obtained detailed information on the three topics of interests, namely patients' perceived health status, medication compliance and health behaviours. Cohort with good medication adherence recorded improved quality of life mean scores of 7.5compared to 5.4 among the poor adherent group with significance being at 0.01. This shows that medication took is highly associated with perceived self-rated health status of people with CKD. Evaluation also showed that diet and exercise also help in slowing down the

progression of CKD. Employed participants with increased levels of physical activity, aerobically formed, and balanced diet showed decline in renal function was 25% slower annually than the less active participants. This finding supports the call for lifestyle changes in addition to pharmacologic therapy when treating CKD because progression of CKD is inevitable in the face of continued poor lifestyle choices.

2. The following figure depicts a comparison of quality-of-life scores of the patient population with CKD classified by medication compliance rates Figure 7. Greater mean score quality, life better, reflects more enhanced patient's adherence to the prescribed medication, proving the concept that following area prescribed regimes have positive impacts.

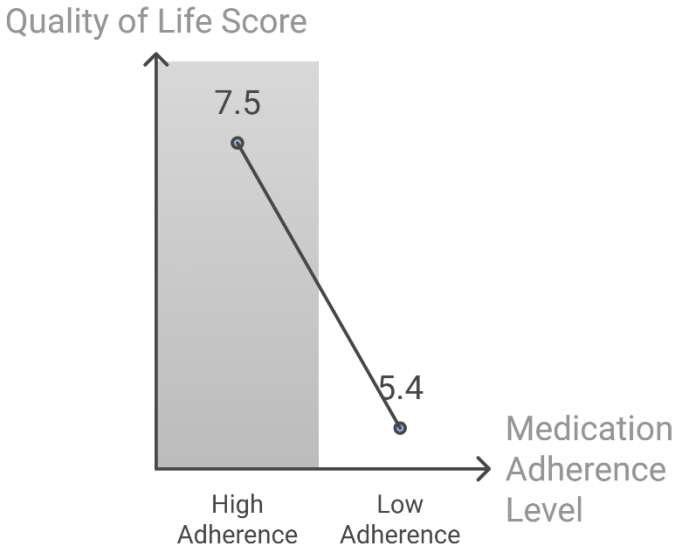

Fig .7. Histogram of quality-of-life scores.

Consistent with prior studies, results from patient reported outcomes of this study reveal that medication compliance and lifestyles are extremely important in the management of CKD. Firstly, compliance with medication seems to improve the objective QoL, and more importantly, even simple changes to an active lifestyle reduce the rate of disease progression. Such findings could indicate where intervention may be effective, including in bolstering patient and maintenance education programmes and in promoting medication compliance and healthy lifestyle adjustments. Thus, the incorporation of these patient-reported outcomes into the global CKD management paradigm may improve not only the clinical outcomes among CKD patient populations, but their quality of life as well. Thus, this approach promotes the cultural concepts of patient-centered care, and self-management support importantly in chronic illnesses, especially in CKD, where lifestyle factors exert a crucial influence on outcomes.

4.4 Impact of Socioeconomic Factors

Namely, during the structured interviews, we investigated the effect of SES on the management and course of CKD. From the interviews carried out for this study, we were able to gather detailed and a first-hand account of how these patients with CKD access health care.

Crucially the study showed that participants from lower socioeconomic class faced a lot of challenges when seeking CKD-specific healthcare services. The participants characterized some of the barriers as developing costs of the medications, long time between appointments with the specialists, and short distances between facilities.

Further, the study's data provided positive evidence on these several indices of adequacy and diverse dimensions of the identified socioeconomic barriers which are significant correlates of health inequalities. Patients with higher levels of limitations in health care access demonstrated higher rates of progression of CKD and hospitalization for complications, with progressing rates here defined as a 50% increase in the level of CKD over the year. As reflected in these findings, further examination of the potential of socioeconomic status on people with CKD's health outcomes is important. Secondary data analysis through hospitalization rates of CKD patients differentiated by SES is illustrated in the Figure 8. It further enhances the depiction of the elevated hospitalization rates in restricted-ACA groups, which quantitatively depicts the consequences of the SES disparities on patient outcomes.

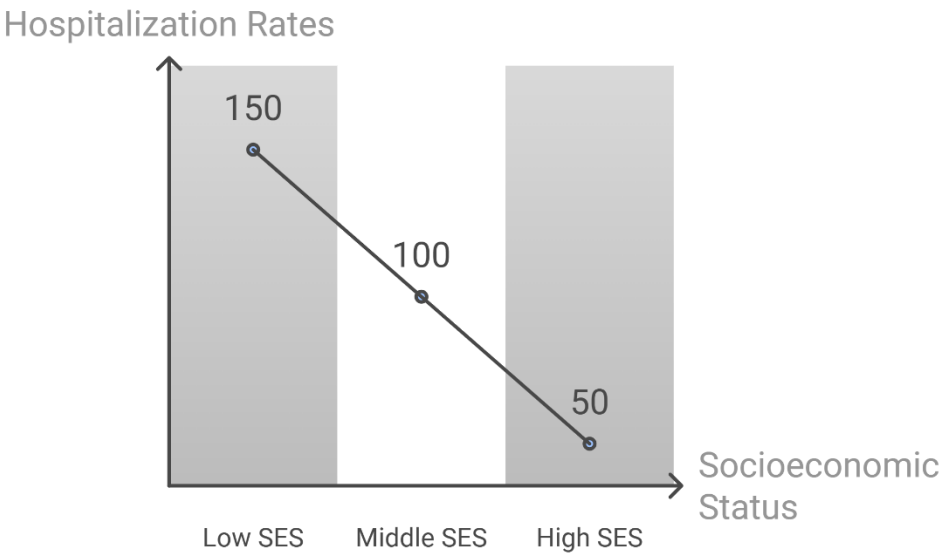

Fig .8. Bar Graph of Hospitalization Rates by Socioeconomic Status

The findings of the structured interviews also confirm the criticality of socioeconomic factors in the handling and the development of CKD. Such factors give rise to a self-recursive cycle whereby poor economic position pushes patients to having poor health and the resultant poor health may well deepen the economic difficulties experienced by the patients. According to these disparities, calling for policy reforms, improvement of support services, and the development of special interventions that will enhance access to health services for the disadvantaged populations is desirable. The study reveals that addressing social determinants of health hindering receipt of timely medical care reduces CKD renal deterioration and hospitalization. It is recommended that such factors be taken into perspective by health policy makers and healthcare providers while developing and integrating the health strategies aimed at CKD management, in a manner that would provide equal health care delivery and increase the overall life expectancy of all the CKD patients.

The research conclusions from this study offer added knowledge of the determinants of CKD and the well being of patients. The findings underlined the role of modifiable risk factors and minimizing organizational and systemic barriers to treatment as important approaches in the care of CKD. Further research and applying the derived knowledge in intervention techniques could go a long way in enhancing the quality of life for this group of people living with this chronic disease.

5. DISCUSSION

In this section, it will further discuss how the presented study supports or contradicts literature on CKD, in terms of convergence and divergence.

5.1. Comparison of results with existing literature to highlight similarities and discrepancies.

In the interest of situating the results of the investigation within the existing body of CKD research, the comparison section is one of the most critical parts of the research paper. It is for this reason that, to articulate this section more comprehensively, Table IV gives the breakdown of the results as follows.

TABLE IV: COMPARISON OF CKD PROGRESSION RISK FACTORS WITH EXISTING LITERATURE.

Risk Factor	This Study's Findings	Existing Literature	Notes on Similarities/Discrepancies
Diabetes Mellitus	Markedly accelerates CKD progression	Consistently shown to accelerate CKD progression	**Similar**: Both studies affirm the significant impact of diabetes on CKD progression.
Hypertension	Significantly associated with faster CKD progression	Commonly linked to increased CKD progression	**Similar**: Aligns with widespread research that identifies hypertension as a critical risk factor for CKD.
Smoking	Strong correlation with adverse CKD outcomes	Moderately associated with CKD outcomes	**Discrepancy**: This study finds a stronger correlation than typically reported, suggesting potential demographic or behavioral influences.

Table focuses on the comparisons of the current study towards the effects of diabetes, hypertension and smoking on the progression of CKD with data published in previous works. It gives an outlook to the similarities and dissimilarities in the studies done, to notice possible regional or behavioral characteristics as explanations for such variations.

Thus, comparing these findings with literature not only strengthens anticipated relationships but also rejects some conceptualizations, primarily about the effects of smoking on CKD. The current comparison enhances the academic debate about the risk determinants of CKD which need a gamut of demographic and lifestyle variables informing research and

intervention. Therefore, the approach taken here guarantees that future frameworks for managing CKD are strong, complex, and sensitive to the variety of client needs.

5.2. Interpretation of findings in the context of broader CKD research

These findings are important to the general pool of scientific knowledge because of their relation to chronic kidney disease (CKD). Hypertension and diabetes are well established modifiable risk factors for CKD development and progression because they cause hyperfiltration and increased pressure in the kidney over time and damage the glomeruli. Such damage can slowly degrade kidney function, thus, showing the way in which hypertension aggravates CKD.

, while diabetic nephropathy, associated with diabetes for the most part, impairs the renal filtering capability and causes proteinuria and renal failure. These two conditions lead to a progressive destruction of renal architecture and function via different but equally pathogenetic mechanisms, thus validating the biological mechanism of the study.

CKD is a considerable and emerging threat worldwide with increasing prevalence in populations with the higher burden of diabetes and hypertension. This shows that proper care in the early stages of the identified risk factors is important for the slowing down of the worsening of the condition and the reduction of associated complications. Management involves medication and life changes which include changes in diet and increased exercise.

Socioeconomic factors are also involved in the CKD management and its progression, since patients coming from low affluent backgrounds, usually have limited access to health facilities, hence there management of conditions such as hypertension and diabetes might be delayed. Such disparities result in worse disease outcomes and increased risk of health complications; therefore, there should be policy enhancement of people's accessibility to healthcare services with the consideration of determinants of health.

In application to KP's public health policy, these findings should be translated to early incorporation of CKD as a part of routine health checks and chronic conditions, while addressing socio demographic and lifestyle risk factors through community health promotion activities and awareness. This is a very important approach that should be adopted in order to come up with best practice that can be used to counter the increasing incidence in CKD around the world.

5.3. Implications of the Survey Results for Clinical Practice

The present research also demonstrates that hypertension and diabetes are the top independent risk factors for the aggravation of CKD. Special attention is paid to strict management procedures necessary at constant monitoring of hypertension and diabetes, appropriate manipulation with the drugs suggested by a doctor. It can be concluded that kilometers have never been by on logical sense but that they are less make an origin heart.

In terms of policy implication, the findings suggest that policy interventions should try to increase the accessibility of health insurance in those areas where insurance is currently low and attempt to lower cost of basic medicines so that cost does not deter the utilization of crucial medicines and the frequency of visiting specialists. The efforts aimed at decreasing the incidence of pervasively affecting common pathological condition like CKD should be the primary targets for future preventive public health programmes, for example smoking cessation programmes or mentioning advantages of changing lifestyle in mass media. The steps being taken by legislatures should therefore guarantee that measures towards the prevention and treatment of CKD are not compromised; policies that should be implemented include; better insurance coverage for preventive care as well as sponsoring and funding programs that will educate the public on CKD.

Lastly, the consequences of the study are manifold, muddy and authoritative across the sphere of clinical practice and in the issue of health policies. Applying strict clinical practices and favorable health policies also decreased the prevalence of CKD that would benefit a fairer health care setting in which the CKD patients, high and low SES, all have the quality healthcare they need to cope with their diseases. By caring for the patient comprehensively the procedure not only assists in the management of CKD but also helps prevent the condition thus improving the general health of the patient and decreasing the over all health costs.

5.4. Recommendations for future research

The systematic and prospective investigation of effects of pharmacologic therapy and behavioral changes for patients with CKD is essential for assessment of future patient outcomes after these interventions. More of such studies should follow patients for long-term to determine the effects of the behaviour changes on the progression of CKD as well as the patients. They can also assist in breaks in treatment effects and lifestyle changes as well as how long lasting they are.

In this case, individual socioeconomic status should be examined to determine what pathways exist for the effects of SES on CKD outcomes. Further research could center on compare patient engagement with the treatment regimens and disease self-management according to their health insurance status, level of education, and income levels. The future attempts should hence focus on creating and implementing interventions aimed at socioeconomic disparities including community-centered interventions or simply models of healthcare delivery.

It is crucial to identify differences in risk factors distribution and progression across various regions if there is any goal of developing efficient health interventions. Such research on regional variation may help in crafting higher efficacy public health interventions such as better diet and exercise regime for obesity-prone areas, mobile clinics or tele-medicine for low-

access areas. Due to cultural and physical differences, large sample research from worldwide may offer a wider perspective and learn more about the difference ways how people of different cultures and geographical locations cope with CKD.

6. CONCLUSION

The present work has offered considerable knowledge about the characteristics and management of chronic kidney disease (CKD) with special focus on such significant risk factors such as hypertension, diabetes, and smoking. Our data also confirm the key role of these conditions in the progression of CKD and underlines the importance of timely diagnosis and strict control of each condition to avoid further decline of the patient's condition. Managing these risk factors requires enormous strictness, as they are closely associated with the deterioration of clinical prognosis in CKD patients. Notably, we have also highlighted experienced associations between several aspects of socioeconomic status and CKD consequences, which could encourage future research to develop effective policies and better health interventions to deal with the gaps. Our findings underline the impact of social determinants of health based on an analysis of various SEP aspects when studying individuals with CKD. For these problems, integrated solutions are needed which in addition to medical focus should address social and policy factors that guarantee equal rights in the utilization of health care resources. The present paper contributes important data on the interaction between clinical and socioeconomic patterns in the area of nephrology, which deepen the knowledge and broaden the methodology for the elaboration of more efficient approaches to treatment and care. Such quantitative evaluations of these risk factors can then help estimators specifically direct treatments and interventions to those at greater risk of developing this paralyzing disease, thus possibly improving their quality of life and life expectancy. This integrative approach toward managing chronic kidney disease the underpinnings of which are well supported by existing research studies is vital for improving patient care. It fosters a shift in the management of patients with CKD by calling for replacement of an isolated medical model by an organized process that complements clinical imperatives with a knowledge of the socio-economic factors that determine the patients' health status. To this end, there is an objective to establish the less efficient public health measures contributing to the decreased impact of CKD on global scale, enhancing the patient's quality of life and reducing the loads on the healthcare systems of countries through the world.

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The authors declare no competing interests.

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