PREVALENCE AND FACTORS ASSOCIATED WITH OCCURRENCE OF CHRONIC KIDNEY DISEASE AMONG PATIENTS AT KAMPALA INTERNATIONAL UNIVERSITY TEACHING HOSPITAL

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A RESEARCH REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF MEDICINE AND BACHELOR OF SURGERY AT KAMPALA INTERNATIONAL UNIVERSITY- WESTERN CAMPUS

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DECLARATION

I, **Shariff Hassan Mohammed,** declare that this research report is being done under supervision. It and has never been presented to any institution for any award. However authors whose work has been quoted have been acknowledged.

Signature: …….…….

Date: ……..**24TH SEPTEMBER 2018**……

APPROVAL

I **DR. KAEM SHIR ALI AHMED** hereby approve that this thesis entitled "Prevalence and Factors Associated with Occurrence of Chronic Kidney Disease among Patients at Kampala International University Teaching Hospital" is being carried out by the above mentioned candidate under my supervision.

Signature: ……...……

Date: …… **3RD OCTOBER 2018…….**

DEDICATION

I dedicate this research to my parents Mrs Alwiya Ahmed and Mrs. Safiya Hussein Albeity for their tireless efforts to make me what I am today.
The work is also devoted to my brothers and sister most especially Alwi M. Shariff, Mahsen M. Shariff and Faiza M. Shariff for the moral support granted to me throughout my study.

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My special appreciation also goes to my fellow classmates for the moral support and encouragement they had been so instrumental in occasioning.

I am grateful for all your participation.

LIST OF ACRONYMS AND ABBREVIATONS

KIU:	Kampala International University
AIDS:	Acquired Immune Deficiency Syndrome
HIV:	Human Immunodeficiency Virus
CKD:	Chronic kidney disease
HIV- AN:	Human Immunodeficiency Virus- Associated Nephropathy
Cd;	Cadbium
U:	Uranium
BMI:	Body mass index
HTN:	Hypertension

LIST OF DEFINITIONS

Acute kidney injury: Shall be defined as kidney disease that completely resolves within 3 months.

Chronic kidney disease: Progressive loss in kidney function over a period of three months or more. Previously known as Chronic Renal Failure.

Hypertension: Systolic BP ≥140mmHg and /or Diastolic BP ≥90mmHg.

Diabetes Mellitus: Shall be defined as a fasting blood sugar ≥7mmol/l or a random blood sugar ≥11.1mmol/l on finger prick test or a patient on treatment for diabetes mellitus either using insulin, oral hypoglycemic agents or dietary control.

End stage renal disease: Final stage of chronic kidney disease in which the kidneys no longer function well enough to meet the needs of daily life.

Renal replacement therapy: Therapy that replaces the normal blood filtering function of the kidneys. Used when kidneys are not functioning well.

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ABSTRACT

Background: Chronic kidney disease (CKD) is a major public health problem worldwide, due to its epidemic proportions and the associated cardiovascular morbidity and mortality. However, data on the burden of CKD among patients attending hospitals in Uganda are still limited. The aim of this study was to determine the prevalence and risk factors associated with CKD among patients presenting at the Kampala International University Teaching Hospital (KIUTH).

Methods: In this retrospective study, we reviewed data of 100 patients who presented at the medicine ward from June 2016 to June 2017. Data were descriptively and inferentially analyzed using SPSS version 18.

Results: From June 2016 to June 2017, a total of 100 who patients presented at the medicine ward with history of kidney disease. Of these patients, 89 (89%) was included in this study, 46(52%) of them were female.
Among them 39(44%) had hypertension, 27(30%) had diabetic mellitus, 9 (10%) had chronic glomerulonephritis, 7(8%) had hypertension and diabetes mellitus, 2(2%) had HIV/AIDS, and 2(2%) had hepatitis B.

Conclusion: CKD was common among patients presenting in our hospital and is associated with high cardiovascular risk. To that end, patients should be thoroughly evaluated to identify and correct causes of their kidney disease, and efforts should be put in place for early detection and screening as well as advocacy on risk factors for CKD development in Uganda.

CHAPTER ONE
INTRODUCTION

This chapter introduces background of the study, problem statement, study objectives and research questions and consists of justification of the study and the conceptual background. Chronic Kidney Disease (CKD) includes a spectrum of diseases including nephritic syndrome, kidney failure, congenital kidney malformation, polycystic kidney disease, renal cyst, diabetic nephropathy, lupus nephropathy and other several disease mediated nephropathies. (*Babua, et al.2015*)

1.1 Background

CKD is now recognized as a common condition that elevates the risk of cardiovascular disease as well as kidney failure and other complications (*Cailhol et al., 2011*) According to *Stanifer et al., (2014),* earlier stages of CKD are defined based on the combination of kidney damage (most often quantified using albuminuria) and decreased kidney function (quantified as Glomerular Filtration Rate (GFR) estimated from the serum creatinine concentration)

Recent innovations in science have provided a rigorous basis for estimating CKD prevalence including laboratory assessment of albuminuria and serum creatinine allowing for identification and staging of CKD. However, in sub Saharan Africa these innovations are yet to take root (*Babua, et al., 2015*)

There has been a recent report that the number of people with CKD in Uganda is on the rise. The increase in prevalence of CKD is partly explained by the increase in a number of CKD risk factors, including an aging population and an increase in the proportion of individuals with obesity, diagnosed diabetes, and hypertension (*Kalima et al., 2015*)

The proportion of minority poor populations has also been reported with increased incidence of CKD; this could be as a result of chronic infections like HIV in this population. (*Kalyesubula et al., 2017*)

1.2 Problem statement

Globally the incidence and prevalence of CKD is not well documented possibly because of low diagnosis index especially in developing countries where resources are poor with low quality and trained staff and yet the risk factors of the disease are eminent in this population (*Mokdad et al., 2017*)

Recent survey suggests that the prevalence of CKD in the sub Saharan Africa is high and has increased between 2000 and 2010 to 13%, while awareness of kidney disease among the general public remains very low. The increasing prevalence of diagnosed diabetes and hypertension has contributed to this increase, which may propagate to higher rates of complications and kidney failure requiring dialysis or transplantation. (*Abitbol et al.2016*)

In Uganda today, there are no well incidence and prevalence studies done so far and yet the numbers of people dying from the disease continue to escalate (*Lunyera, et al., 2016*). This research will therefore attempt to provide information and close this knowledge gap

1.3 Study objective

1.3.1 General objective

The purpose of the study is to determine prevalence and factors associated with occurrence of chronic kidney disease among patients in Kampala International University- Teaching Hospital (KIU-TH)

1.3.2 Specific Objectives

i. To determine the prevalence of chronic kidney diseases among patients presenting KIU- TH from June 2016 to June 2017
ii. To find out the chronic renal disease associated comorbidities among patients presenting KIU– TH between June 2016 to June 2017
i. To determine the social demographic factors associated with patients of chronic renal disease at KIU-TH between June 2016 to June 2017

1.4 Research questions

ii. What is the prevalence of chronic kidney diseases among patients presenting at KIU- TH from June 2016 to June 2017

iii. What are the chronic kidney disease associated co morbidities among patients presenting at KIU- TH between June 2016 to June 2017

iv. What are the social demographic factors associated with patients of chronic kidney disease at KIU- TH between June 2016 to June 2017

1.5 Scope of the study

1.5.1 Time Scope

The study will include data of patients from June 2016 to June 2017.

1.5.2 Geographical scope

The study was carried out at KIU- TH in South West Uganda.

1.5.3 Content scope

The study was focused on prevalence, co morbidities and social demographic factors associated with chronic kidney disease.

1.6 Justification of the study

Chronic kidney disease is a burden to the patient and to the economic development of the country in terms of management. Understanding the prevalence, co morbidities and social demographics associated would

i. Assist the Health care professionals to understand better issues involved in regards to management

ii. The results would be used as a benchmark for progress of kidney diseases

1.7 Conceptual Frame Work

Social demographic factors

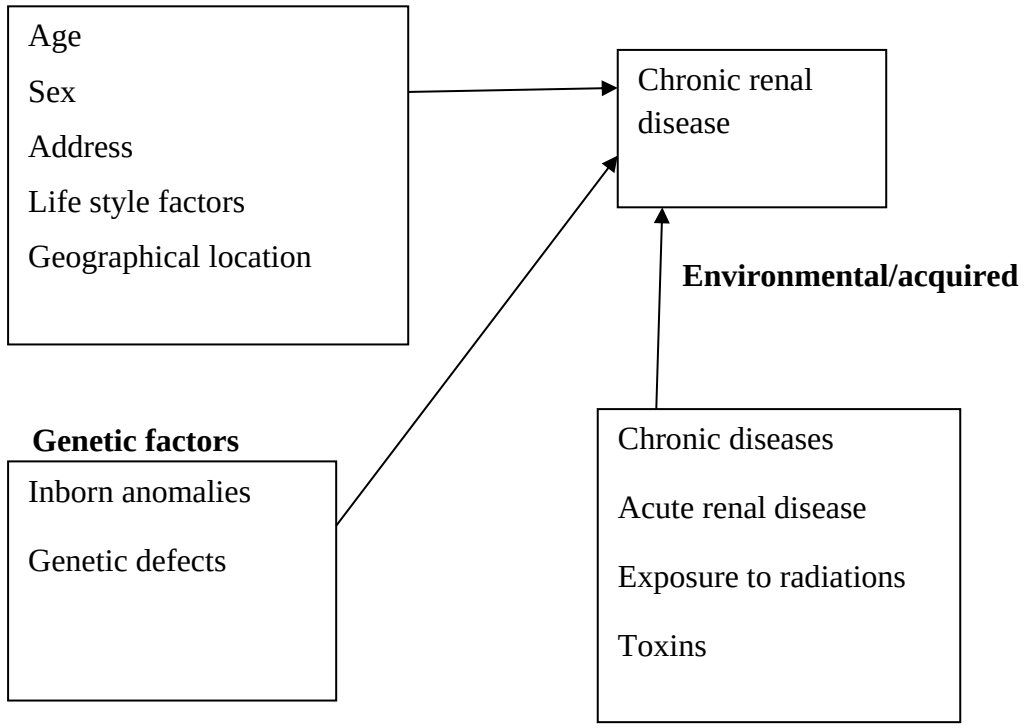


Fig 1: Conceptual framework (Source: Developed from Okumbe (1998))

The framework shows the relationship that exists in different risk factors and the event of developing chronic kidney disease. The relation is many to one and indicates those multifactorial events required to cause kidney disease and even maintain it to its chronicity.

CHAPTER TWO
LITERATURE REVIEW

2.0 INTRODUCTION

This chapter looks at what other researchers have done in different parts of the world and compares their findings to the theme of the study.

2.1 Prevalence of CKD

Globally, the burden of CKD is most pronounced in low- and middle-income countries (LMICs). This particularly as a result of rapid urbanization in LMICs, making most of the citizens in these countries at a risk of numerous environmental toxins, high infectious disease burdens and increasing rates of non-communicable diseases especially CKD (*Stanifer et al., 2016*)

According to *Mills et al., (2015),* chronic kidney disease is a main risk factor for end stage renal disease, cardiovascular disease, and premature death. A systematic literature review was done to estimate the prevalence of CKD and its burden worldwide, it was found out that, the age-standardized global prevalence of CKD stages 1–5 in adults aged 20 and older was 10.4% in men and 11.8% in women (11.2–12.6%). This consisted of 8.6% in men (7.3–9.8%) and 9.6% in women (7.7–11.1%) in high-income countries, and 10.6% in men (9.4–13.1%) and 12.5% in women (11.8–14.0%) in low- and middle-income countries.

In the same study, it was reported that, the total number of adults with CKD was 225.7 million (205.7–257.4 million) men and 271.8 million (258.0–293.7 million) women. This consisted of 48.3 million (42.3–53.3 million) men and 61.7 million (50.4–69.9 million) women in high-income countries, and 177.4 million (159.2–215.9 million) men and 210.1 million (200.8–231.7 million) women in low- and middle-income countries. It was then concluded that CKD is an important global-health challenge, especially in low- and middle-income countries and that national and international efforts for prevention, detection, and treatment of CKD are desirable to reduce its morbidity and mortality worldwide. *Mills et al., 2015*),

According to *Brück et et al., (2016),* states that the estimation of CKD prevalence is important in the prevention and management of the population at risk using the best possible interventional methodologies, *Brück et al., (2016),* estimated CKD prevalence in European adult general population and investigated international variation in CKD prevalence by age, sex, and presence of diabetes, hypertension, and obesity. Data was collected from 19 general-population studies from 13 European countries. CKD stages 1–5 was defined as eGFR<60 ml/min per 1.73 m^2, as calculated by the CKD-Epidemiology Collaboration equation, or albuminuria >30 mg/g, and CKD stages 3–5 was defined as eGFR<60 ml/min per 1.73 m^2. CKD prevalence was age- and sex-standardized to the population of the 27 Member States of the European Union (EU27).the researchers found considerable differences in both CKD stages 1–5 and CKD stages 3–5 prevalence across European study populations.

From *Brück et al (2016)* study the results included, the adjusted CKD stages 1–5 prevalence which varied between 3.31% in Norway and 17.3% in northeast Germany. The adjusted CKD stages 3–5 prevalence varied between 1.0% (95% CI, 0.7% to 1.3%) in central Italy and 5.9% (95% CI, 5.2% to 6.6%) in northeast Germany. The variation in CKD prevalence stratified by diabetes, hypertension, and obesity status followed the same pattern as the overall prevalence. The conclusion that can be drawn from these results is that, there is extensive difference in CKD prevalence among the presented countries therein; due to factors other than the prevalence of diabetes, hypertension, and obesity.

The prevalence of chronic kidney disease in some countries is still high, the data reviewed in a paper published in 2015, showed that, from national registry, there were 275,242 subjects who received maintenance dialysis treatment in Japan in 2007 and 286,406 in 2008. From other registry, there were 10,013 subjects who had functional kidney graft in Japan in 2007 and 11,157 in 2008. Consequently, there were 285,255 ESKD subjects who required RRT as of Dec 31, 2007, and 297,563 ESKD subjects who required RRT as of Dec 31, 2008 in Japan. (*Yamagata et al., 2015*)

According to *Yamagata et al.,(2015),*The mean age of dialysis patients on Dec 31, 2007 was 64.9 years old (males, 64.2 years old; females, 66.0 years old). The mean age of KT patients who had a functional renal graft on Dec 31, 2007 was 43.7 years old (males, 44.2 years old; females, 42.8 years old). As a result, the mean age of ESKD patients in Japan on Dec 31, 2007 was 64.2 years old (males, 63.4 years old; females, 65.1 years old).

The most common primary kidney disease of dialysis patients was chronic glomerulonephritis (40.4 %), while 33.4 % of the patients had diabetic nephropathy, 6.5 % nephrosclerosis, and 3.4 % polycystic kidney disease, as of Dec 31, 2007, in Japan. In KT patients who had a functional graft on Dec 31, 2007, in Japan, 58.7 % of cases had chronic glomerulonephritis, 5.0 % diabetic nephropathy, 1.1 % nephrosclerosis, and 2.5 % polycystic kidney disease. Consequently, in terms of the primary kidney disease of ESKD patients on Dec 31, 2007, in Japan, 41.0 % of cases were chronic glomerulonephritis, 32.4 % diabetic nephropathy, and 6.3 % nephrosclerosis. Hence from these results it seems that glomerulonephritis seems to be more prevalent is Asians countries. (*Yamagata et al., 2015*)

Hooi et al., (2013) did a population-based study, this was conducted to determine the prevalence of chronic kidney disease in West Malaysia to assist the health implementers better manage health-care planning. A sample of 876 individuals, representative of 15,147 respondents from the National Health and Morbidity Survey 2011, of the non-institutionalized adult population (over 18 years old) in West Malaysia was studied. The study employed the following indicators; Glomerular filtration rate (eGFR) (CKD-EPI equation); albuminuria and stages of chronic kidney disease were derived from calibrated serum creatinine, age, gender and early morning urine albumin creatinine ratio were also estimated. (*Hooi et al., 2013*)

The prevalence of chronic kidney disease in this group (West Malaysia) as 9.07%. An estimated 4.16% had stage 1 chronic kidney disease (eGFR>90 ml/min per 1.73 m^2 and persistent albuminuria), 2.05% had stage 2 (eGFR 60–89 ml/min per 1.73 m^2 and persistent albuminuria), 2.26% had stage 3 (eGFR 30–59 ml/min per 1.73 m^2), 0.24%

had stage 4 (eGFR 15–29 ml/min per 1.73 m^2), and 0.36% had stage 5 chronic kidney disease (eGFR<15 ml/min per 1.73 m^2). Only 4% of respondents with chronic kidney disease were aware of their diagnosis. Risk factors included increased age, diabetes, and hypertension. It was thus concluded that, chronic kidney disease in West Malaysia is common and, therefore, warrants early detection and treatment in order to potentially improve outcome. (*Hooi et al., 2013*)

In sub-Saharan Africa, the prevalence of CKD in several countries may approximate or exceed that of many high-income countries. The data is not enough and the little that is available lacks consistency and reliability, many community-based surveys from Senegal, Ghana, Democratic Republic of Congo and Tanzania have now demonstrated prevalence estimates ranging from 5 to 17% concurrent with very low awareness. However, these high prevalence estimates alone fail to highlight the extent of the CKD burden in this impoverished region with most of the countries unable to provide access to renal replacement therapies (RRTs), and lack of preparedness in managing the cardiovascular consequences of CKD with a multiplied effect of HIV in these patients (*Stanifer et al., 2016)*

In Uganda the prevalence studies are so scanty and the fact that this country is one the most rapidly developing leaves a lot to be desired, HIV pandemic, HIVAN rapid change in life styles abundance of non-communicable diseases such as diabetes, cardiovascular illness and the long time poorly diagnosed immune mediated diseases posse a great risk for CKD. Many drugs for chronic diseases including antiretroviral medications are partially or completely eliminated by the kidney that makes more susceptible to failure (*Naicker et al., 2015*)

2.2 Social demographic factors associated with patients of chronic renal disease

In population based epidemiologic studies, obesity has been shown to be associated with new onset of CKD and increased rate of progression to kidney failure in individuals with existing primary kidney disease. A cohort of 2585 patients were followed for 20 years in a study of predictors of new onset kidney disease, the odds ratio for new onset of chronic kidney disease was 1.23 per one standard increase in

BMI43. Increased BMI has also been shown to increase the risk of progression of existing kidney disease, Obese individuals with CKD have a higher rate of decline in glomerular filtration rate and progress faster to end-stage renal disease (Eknoyan, 2011).Worldwide, diabetes mellitus is the most common cause of chronic kidney disease, but in some regions other causes, such as herbal and environmental toxins, are more common (*Jha et al., 2013*)

Another common but less diagnosed co morbidity is depression, a meta-analysis was performed to find the prevalence of depression among CKD patients on dialysis and patients with earlier stages of CKD and kidney transplant recipients. Findings revealed that 39% of dialysis patients experience depressive symptoms when any assessment tool is considered and 23% had an interview-based diagnosis of depression similar to those reported in a smaller meta-analysis in 23 studies in adults with CKD stage 5D in which the prevalence of depression or depressive affect was 38.5%. (*Palmer et al., 2013*)

One study was also done to describe chronic kidney disease of unknown etiology ,a cross sectional study was conducted to determine the risk factors of CKD, the results showed that The age-standardised prevalence of CKD was 12.9% (95% confidence interval [CI] = 11.5% to 14.4%) in males and 16.9% (95% CI = 15.5% to 18.3%) in females. Severe stages of CKD were more frequent in males (stage 3: males versus females = 23.2% versus 7.4%; stage 4: males versus females = 22.0% versus 7.3%; $P < 0.001$). The risk was increased in individuals aged >39 years and those who farmed (Chena cultivation) (OR [odds ratio] = 1.926, 95% CI = 1.561 to 2.376 and OR = 1.195, 95% CI = 1.007 to 1.418 respectively, $P < 0.05$). The risk was reduced in individuals who were male or who engaged in paddy cultivation (OR = 0.745, 95% CI = 0.562 to 0.988 and OR = 0.732, 95% CI = 0.542 to 0.988 respectively, $P < 0.05$). (*Jayatilake et al., 2013*)

In another study to find the social demographic characteristics of patients with chronic kidney disease, it was shown that, there was a family history of kidney disease in parents or siblings in 20% of individuals with CKD. Certain group of individuals with

CKD had a history of ischemic heart disease and/or cerebrovascular disease, a group of patients had a history of long-term use of herbal medicines for hypertension, some participants had a history of long-term use of aspirin; and 0.6% had a history of long-term use of analgesics. Being male reduced the risk of CKD and being older than 39 years increased the risk of CKD (*Wanigasuriya et al.2011*)

In one national study done in India it was reported that, the mean age of onset of the disease was 50.1 ± 14.6 years, with M: F ratio of 70:30. Patients from North Zone were younger and those from the East Zone older and this shows how the disease can be geographically distributed. Diabetic nephropathy was the commonest cause (31%), followed by CKD of undetermined etiology (16%), chronic glomerulonephritis (14%) and hypertensive nephrosclerosis (13%). About 48% cases presented in Stage V; they were younger than those in Stages III-IV. Diabetic nephropathy patients were older, more likely to present in earlier stages of CKD and had a higher frequency of males; whereas those with CKD of unexplained etiology were younger, had more females and more frequently presented in Stage V. Patients in lower income groups had more advanced CKD at presentation. Patients presenting to public sector hospitals were poorer, younger, and more frequently had CKD of unknown etiology. (*Rajapurkar et al., 2012*)

In another study, the mean age of the population with the diseases was 35.64 ± 8.72 years with a range of 18–76 years of which 2244 (66.04%) were males and 1154 (33.96%) females and according to this statistics it seems that the diseases is more prevalent in males for reasons yet to be determined. Assessment of obesity in the same study using Body Mass Index (BMI) showed that 979 (28.81%) overweight subjects (BMI >23), and 735 (21.63%) were obese (BMI >25). Using WHR, 1941 (57.12%) subjects had truncal obesity (>0.9 for males and >0.8 for females). HTN was found in 447 subjects (13.15%). Only 52 (1.53%) were found to be diabetic. Three hundred and eight (9.06%) subjects had hypercholesterolemia (serum cholesterol >200 mg/dL).a conclusion basing on this statistic is that these risks are also prevalent in people in Uganda and therefore, there is an urgent need to look for them in patients presenting at KIU TH for better interventions to be implemented. (*Varma et al., 2010*)

Patients with CKD were older, more likely to be male, more likely to have a high school diploma, more likely to be urban, less likely to have a low income, more likely to be overweight or obese, to have diabetes, hypertension and cardiovascular disease than patients without CKD.

The most common risk factors and other characteristics among the subjects diagnosed with CKD are hypertension (64.5%), anemia (40.7%) and diabetes (31.6%). Anthropometric measures (except height), blood pressure, hemoglobin, random and fasting blood glucose are always significantly altered (*Singh et al., 2013*)

2.3 Co morbidities of CKD

According to *Soni et al. (2010)* study, they found out that, hypertension is both a cause and a complication of CKD, and is a well-established risk factor for CKD progression. Furthermore, CKD and hypertension are independent risk factors for cardiovascular disease, the latter being recognized as a leading contributor to global burden of disease. Anemia is also highly prevalent in patients with CKD and is associated with adverse clinical outcomes.

Chronic kidney disease–mineral and bone disorder (CKD-MBD) is a common morbidity reported in patients with CKD and is an upcoming health care concern.(CKD-MBD) is associated with secondary hyperparathyroidism (HPT), mineral abnormalities and increased risk of cardiovascular disease. In CKD, there is a decreased in phosphate excretion with resultant suppression of vitamin D synthesis that aggravates bone morbidities especially seen in patients with chronic kidney diseases (*Shalhoub et al 2012*)

According to *Couser et al. (2011)*, chronic kidney disease is a key determinant of the poor health outcomes of major Non Communicable Diseases (NCDs). CKD is associated with an eight- to tenfold increase in cardiovascular mortality and is a risk multiplier in patients with diabetes and hypertension. Milder CKD (often due to diabetes and hypertension) affects 5–7% of the world population and is more common

in developing countries and disadvantaged and minority populations. Early detection and treatment of CKD using readily available, inexpensive therapies can slow or prevent progression to End Stage Renal Disease (ESRD).

According to *Jha et al., (2013),* 10% of the populations have evidence of renal dysfunction, the biomarkers of CKD (proteinuria, eGFR) are easy and relatively inexpensive to detect, and one of these, proteinuria, emerges early in the evolution of generalized vascular disease which can be detected if there is enough resources however the failure of most developing countries to detect the disease in the patients at the early stages has led to progression into ESRD that may require dialysis. Patients with CKD may complicate with cardiovascular mortality, kidney-disease progression, acute kidney injury, cognitive decline, anemia, mineral and bone disorders, and fractures

According to *Carrero et al., (2013),* Protein-energy wasting (PEW) has also been identified as co morbidity among patients presenting with CKD, this is although due to insufficient food intake as result of poor appetite and dietary restrictions. Uremia-induced alterations such as increased energy expenditure, persistent inflammation, acidosis, and multiple endocrine disorders that render a state of hyper metabolism leading to excess catabolism of muscle and fat this further exacerbate the situation. In addition, comorbid conditions associated with CKD like poor physical activity, frailty, and the dialysis procedure per se further contribute to PEW.

Muscle wasting is considered the best marker of protein-energy wasting in end-stage renal disease increased muscle atrophy is more common in female dialysis patients and associated with inflammation, poor nutritional and anthropometric status, as well as a 3-fold increased 4–6 year mortality (*Carrero et al., 2008*).

A cross-sectional study was conducted in patients undergoing prevalent hemodialysis (n = 223; 127 M; $\bar{x} \pm$ SD age: 66 ± 14 y). Anthropometric markers of body composition, handgrip strength, and nutritional and inflammatory status were measured results showed that, poor appetite was associated with a longer vintage time, increased

inflammation (higher serum concentrations of interleukin 6 and C-reactive protein), and a worse nutritional status (lower serum concentrations of insulin-like growth factor I, albumin, urea, and creatinine). (*Carrero et al., 2007*).

It seems that patients with HIV diseases tend to have CKD and this, in most of the cases tend to progress rapidly or slowly to end stage renal failure usually requiring dialysis, in one study, two hundred and twenty-five (3.3%) persons with HIV in the study population progressed to CKD during 21 482 person-years follow-up, an incidence of 1.05 per 100 person-years follow-up [95% confidence interval (CI) 0.91–1.18]; median follow-up was 3.7 years (interquartile range 2.8–5.7). (*Mocroft et al., 2010*).

As previously noted that anemia is one of the co morbidities, one study also reported the same however there other anemia related complications that patients may present with as a result of reduced synthesis of erythropoietin. Anemia in CKD is associated with cognitive impairment, sleep disturbances, CKD progression, cardiovascular co morbidities, and higher mortality. Direct healthcare costs are higher in CKD patients with anemia than in those without, and quality of life issues (e.g., fatigue, reduced productivity) are common (*Stauffer et al., 2014*).

In the aging population, CKD is more pronounced than other age categories with high prevalence, it's also an important public health problem that is characterized by poor health outcomes and very high health care costs. CKD is a major risk multiplier in patients with diabetes, hypertension, heart disease and stroke - all of which are key causes of death and disability in older people (*Tonelli et al., 2014*).

CKD can be restricted to certain geographical areas regardless of common risk factors of hypertension and diabetes. In one study, Population screening was carried out using a multistage sampling technique and it was indicated that the point prevalence of CKD with uncertain etiology is about 2–3% among those above 18 years of age. Drinking water collected from high-prevalent and non-endemic regions was analyzed for their trace and ultra-trace element contents, including the nephrotoxic heavy metals Cd and U. The results indicated that the affected regions contain moderate to high levels of

fluoride. The Cd contents in drinking water, rice from affected regions and urine from symptomatic and non-symptomatic patients were much lower indicating that Cd is not a contributing factor for CKD with uncertain etiology in Sri Lanka. Although no single geochemical parameter could be clearly and directly related to the CKD etiology on the basis of the elements determined during this study, it is very likely that the unique hydro geochemistry of the drinking water is closely associated with the incidence of the disease (*Chandrajith et al., 2011*)

CHAPTER THREE
METHODOLOGY

3.0 Introduction

This chapter explores the methods that were used in carrying out this study. It explains the design, population, setting, sample size determination, exclusion and inclusion criteria, data analysis techniques and dissemination methods for the results, it also discusses the ethical considerations

3.1 Research design

Descriptive retrospective study design was used. The rationale is that, this design collects data on the study population at a single point in time to examine the relationship between the dependent variable, independent variable and other variables of interest.

It therefore provides a snapshot of key information variables related to the characteristic under measurement at a given point in time and therefore is particularly useful in informing the planning and allocation of health resources for better outcome in a particular setting like the hospital under the study.

3.2 Study population

The study will target records of patients above 18 years diagnosed of chronic renal disease followed up at the clinics and those admitted at Kampala International University- Teaching Hospital(KIU- TH) from June 2016 to June 2017.The estimated number as per hospital records is about 200 patients

The study was conducted in KIU- TH. The hospital is located in the heart of Bushenyi municipality about 320 kilometers from Kampala the capital city of Uganda. It is a teaching hospital serving about 12 district in the region. The hospital has a clinic where patients above 18 years with renal diseases are managed

3.3 Sampling technique

Purposive Simple random technique was used to select the files. This is a non-probability technique that is used especially when the sample size is small. Files was checked for consistency and those with complete information was considered.

3.4 Sample size

The sample size was determined by using the Keish and Leslie (1965) formula as below:

N= Z2PQ/D2

Where:

N is the sample size required

Z^2 is the abscissa of the normal curve that cuts off an area at the tails (1– equals the desired confidence level, e.g., 95%),

pis the estimated proportion of an attribute that is present in the population (40%), *Mokdad et al, 2017*

Dis the desired level of precision (0.05)

Q= 1-P

N= {(0.95)2 * 0.4*0.6}/ {0.05* 0.05}

N= **86.64 patients**

100 files was used

The total sample size of files that was included in the study is 100 files

3.5 Data process

3.5.1 Pre-testing

The research instrument was pre-tested for validity and reliability from Kampala International University Teaching Hospital as it is where the researcher comes from. KIU- TH is a teaching hospital with a much higher turnover of patients.

3.5.2 Data Collection procedure

With the check list, the records department was approached and the renal, diabetes and hypertension files was requested, sorted and organized, those that meet the inclusion criteria was used to collect the data

3.5.3 Data management

The check list was kept out of reach of non-members of this research report by pass wording the collected data. The soft copy was password protected to avoid access by unauthorized people. Data was entered into Epidata version 3.1, cleaned, coded, edited and exported to SPSS version 18 for analysis.

3.5.4 Data analysis

Univariate analysis was performed using SPSS version 18. Results was displayed in tables, graphs and charts.

3.5.5 Inclusion criteria

Records of patients in outpatient attendances and those being followed up from June 2016 to June 2017 with chronic renal disease was included.

3.5.6 Exclusion criteria

i. Files of patients with acute renal disease will not be included.
ii. Files with incomplete results shall not be included.

3.6 Definition of variables

3.6.1 Dependent variable:

Prevalence and social demographic factors.

3.6.2 Independent variable

Chronic renal disease

3.7 Research instrument

Data was collected using a check list that shall be structured to pick that data that was able to fulfill the objectives. The instrument was filled in the space provided.

3.8 Ethical Considerations

Approval was sought from the Institutional Review Board and ethics committee of KIU. The approval to carry out research was obtained from the Hospital Executive Director of KIU- TH before data is collected. Data was coded to ensure privacy and confidentiality to the patient's data .Before data collection, the objectives of the study was fully explained to the patient to ensure his/her permission.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.0 Introduction

A total of 100 files were reviewed in the study. The results were represented in accordance with the specific objectives of the study using percentages, tables and charts.

4.1 Demographic and other characteristics of the Study Population

A total of 100 files were reviewed containing data of patients who presented at the KIUTH medicine department from June 2016 to June 2017. Of these files, 11 (11%) were excluded from this study due to incomplete records, and the remaining 89 (89%) files were used in this study. The median age of the study population was 36 years, over half 46(52%) were female, more than half 51(57%) were classified as obese, and about a third 31(35%) reported having a history of smoking. A small percentage of the study population was living with HIV 4(5%) or hepatitis B 2(2%) (Table1).

Table 1: Baseline characteristics of patients who presented at the Kampala International University Teaching Hospital Medical department (n=89)

Characteristic	**Proportion (%) or Median [IQR]**
Sex	
Male	43(48)
Female	46(52)
Age, in years	36 [6–88]
Marital status	
Never married	26(29)
Married	35(39)
Divorced	15(17)
Widow	14(16)

Smoking status (ever)	
No	58(65)
Yes	31(35)
Obesity (BMI) kg/m2	27.1 [17.3–36.8]
HIV status	
Positive	4(5)
Negative	85(95)
Hepatitis	
Positive	2(2)
Negative	87(98)
Abbreviations: BMI, body mass index; IQR, interquartile range.	

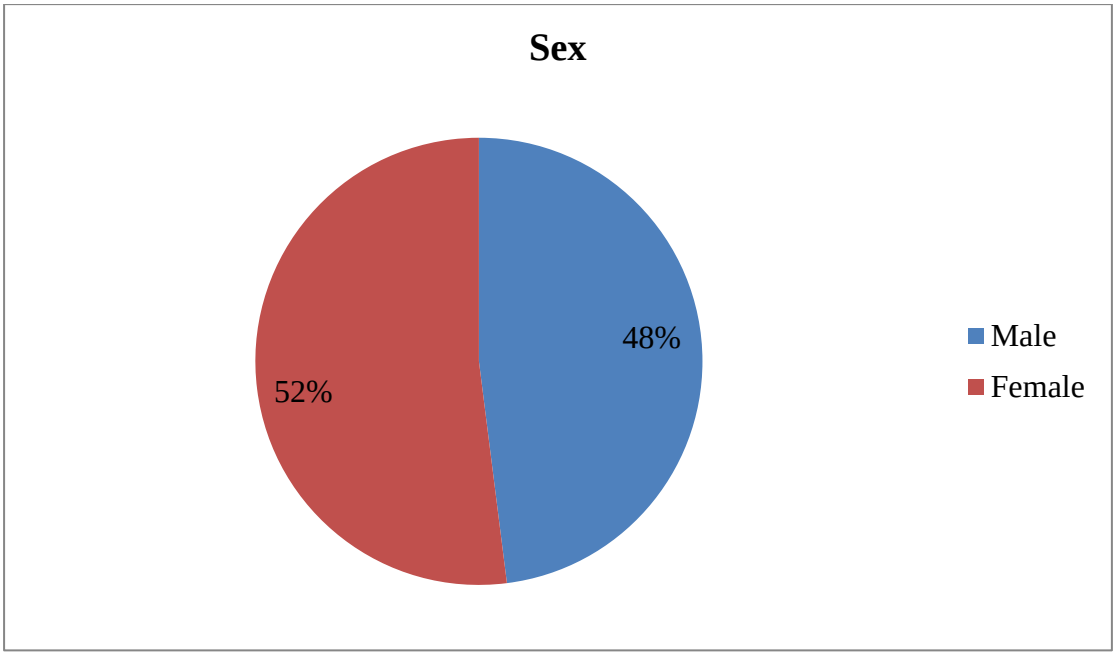


Fig 2: Sex characteristics of Patients

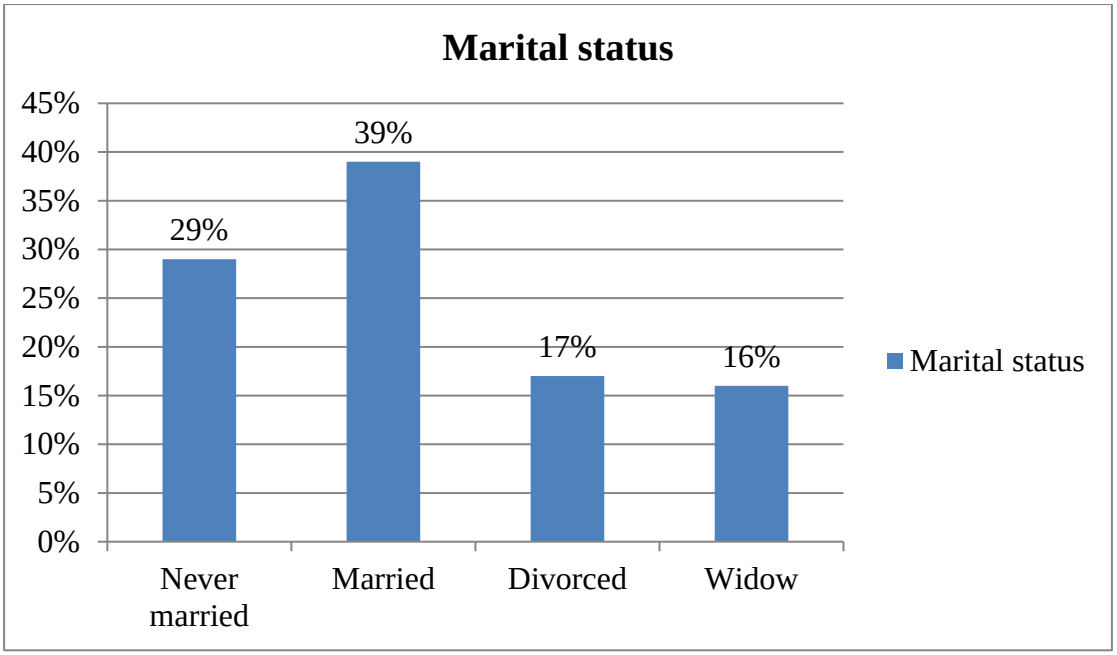


Fig 3: Marital status characteristics of patients

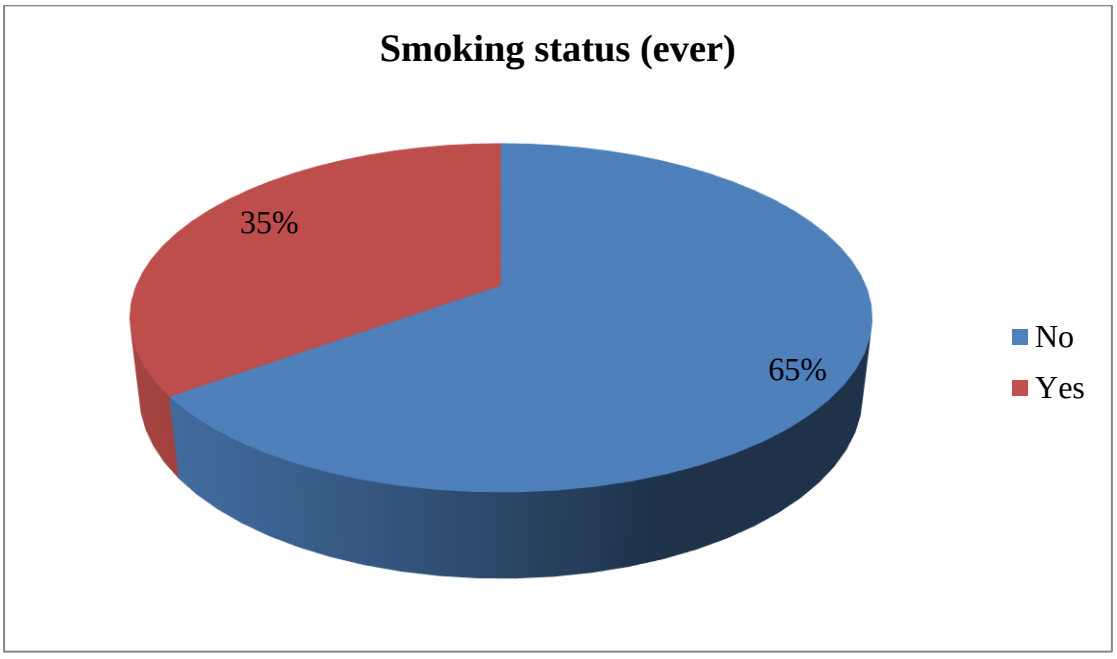


Fig 4: Smoking status (ever) characteristics of patients

4.2 Factors associated with CKD

Out of the 89 patients 39(44%) had hypertension, 27(30%) had diabetes mellitus, 9 (10%) had chronic glomerulonephritis, and 7(8%) had both hypertension and diabetes mellitus, while 4(5%) and 2(2%) were associated with HIV/AIDS and hepatitis B, respectively (Table 2).

Table 2: Risk factors of chronic kidney disease among patients who presented Kampala International University Teaching Hospital Medical department (n=89)

Medical Condition	Number (%)
Hypertension	39(44)
Diabetes mellitus	27(30)
Chronic glomerulonephritis	9(10)
Both hypertension and diabetes mellitus	7(9)
HIV/AIDS	4(5)
Hepatitis	2(2)
Abbreviation: CKD, chronic kidney disease.	

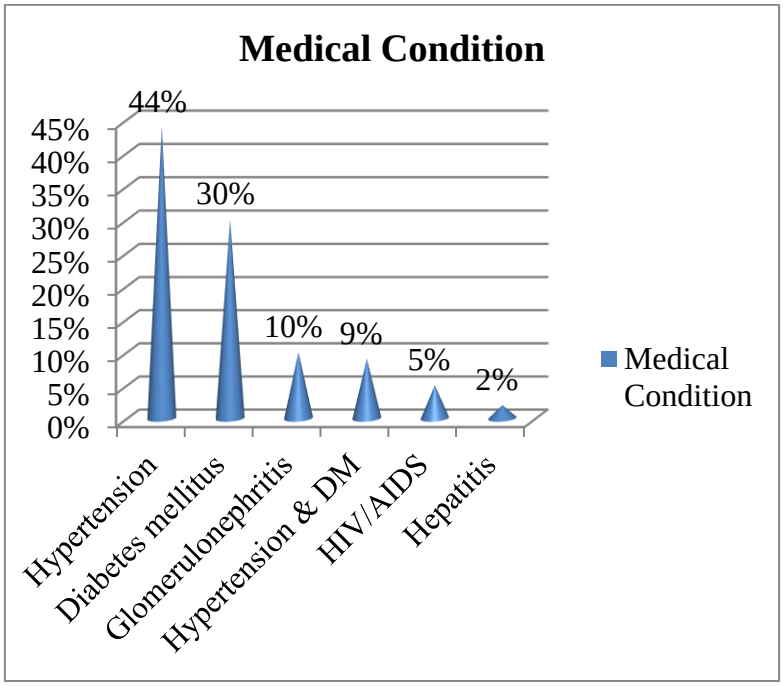


Fig 5: Risk factors of chronic kidney disease among patients

CHAPTER FIVE

DISCUSSION OF RESULTS CONCLUSIONS AND RECOMMENDATIONS

5.0 INTRODUCTION

This chapter presents the discussion of the results of the findings from the study. The discussion is presented in two parts as demographic characteristics of the study population and in accordance with the independent variable of the study.

5.1 DISCUSSION

The prevalence of hypertension in this study was similar to the high prevalence of hypertension in other studies on patients with CKD. These include a study of 100 patients with CKD at the University of Nigeria teaching hospital, in which the prevalence of hypertension was found to be 85.2% at the first nephrology consultation (Ulasi II AE, *Ijoma CK, et al. 2006*). A similarly high prevalence of hypertension, at 72.6%, was found in Albanian patients with CKD (*Mondo CK et al 2013*). These findings show that there is a high burden of hypertension in CKD patients, regardless of the different patient populations studied. These figures are however four times those of the general population, where hypertension prevalence was at 20% (*Wamala J, et al 2009*).

The available studies from sub-Saharan Africa however cannot determine with certainty whether hypertension is a cause or effect of CKD due to various limitations, such as study design, lack of histological data for participants, as well as late presentation of patients.

The prevalence of diabetes in this study was higher than the 16.1% prevalence found among CKD patients in a Ugandan study (*Christopher Babua et al 2015*). The difference in prevalence is probably due to dissimilarity of study settings as well as dissimilarities in characteristics of study participants (e.g. age, race). However the prevalence of diabetes in this study was about seven times the national prevalence of 4% in 2006 (*Wasswa H. 2006*) and 2.9% in 2011 (*Mondo CK et al 2013*). This higher prevalence of diabetes among patients with CKD compared with the general population may reflect the significance of diabetes as an etiological factor for CKD in Uganda.

We observed the prevalence of HIV/AIDS of 5% to be similar to that in the general population (7.2%) (UNAIDS 2012), and HIV is a risk factor for CKD. This makes our study population different from those in Western countries with less incidence of HIV, suggesting that HIV/AIDS could be an emerging 'non-traditional' risk factor for CVD.

This study was conducted in a hospital in western part of Uganda and, as such, the results are limited to patients in the central part of Uganda. Despite the limited generalizability, this information could provide insight to strategies for improving the management of patients who present with CKD in hospitals. The strengths of this study were that our hospital uses both paper-based and electronic medical records, which allowed the recording and collection of patients' health related information in real time. The study data were obtained from handwritten medical records and then cross checked with the electronic records. Any discrepancies were reviewed and verified to ensure the validity of data.

5.2 CONCLUSIONS

CKD was common among patients presenting in our hospital and is associated with high cardiovascular risk. This study demonstrated the common occurrence of cardiovascular risk factors among CKD patients attending a Ugandan national referral hospital.

5.3 RECOMMENDATIONS

To that end, patients should be thoroughly evaluated to identify and correct the causes of their disease. As CKD is regarded as an accelerator of cardiovascular risks and an independent risk factor for cardiovascular events and eventually death, efforts should be put in place for early detection and screening as well as advocacy on risk factors for CKD development in Uganda.

REFERENCES

1. Abitbol, C. L., &Moxey-Mims, M. (2016). Chronic kidney disease: Low birth weight and the global burden of kidney disease. Nature reviews. Nephrology, 12(4), 199.
2. Babua, C., Kalyesubula, R., Okello, E., Kakande, B., Sebatta, E., Mungoma, M., & Mondo, C. (2015). Pattern and presentation of cardiac diseases among patients with chronic kidney disease attending a national referral hospital in Uganda: a cross sectional study. BMC nephrology, 16(1), 126.
3. Brück, K., Stel, V. S., Gambaro, G., Hallan, S., Völzke, H., Ärnlöv, J. & Brenner, H. (2016). CKD prevalence varies across the European general population. Journal of the American Society of Nephrology, 27(7), 2135-2147.
4. Cailhol, J., Nkurunziza, B., Izzedine, H., Nindagiye, E., Munyana, L., Baramperanye, E., & Bouchaud, O. (2011). Prevalence of chronic kidney disease among people living with HIV/AIDS in Burundi: a cross-sectional study. BMC nephrology, 12(1), 40.
5. Carrero, J. J., Chmielewski, M., Axelsson, J., Snaedal, S., Heimbürger, O., Bárány, P. &Qureshi, A. R. (2008). Muscle atrophy, inflammation and clinical outcome in incident and prevalent dialysis patients. Clinical nutrition, 27(4), 557-564.
6. Carrero, J. J., Qureshi, A. R., Axelsson, J., Avesani, C. M., Suliman, M. E., Kato, S. & Lindholm, B. (2007). Comparison of nutritional and inflammatory markers in dialysis patients with reduced appetite. The American Journal of Clinical Nutrition, 85(3), 695-701.
7. Carrero, J. J., Stenvinkel, P., Cuppari, L., Ikizler, T. A., Kalantar-Zadeh, K., Kaysen, G. & Ter Wee, P. (2013). Etiology of the protein-energy wasting syndrome in chronic kidney disease: a consensus statement from the International Society of Renal Nutrition and Metabolism (ISRNM). Journal of Renal Nutrition, 23(2), 77-90.
8. Chandrajith, R., Nanayakkara, S., Itai, K., Aturaliya, T. N. C., Dissanayake, C. B., Abeysekera, T. & Koizumi, A. (2011). Chronic kidney diseases of uncertain etiology in Sri Lanka: geographic distribution and environmental implications. Environmental geochemistry and health, 33(3), 267-278.

9. Christopher Babua, Robert Kalyesubula, Emmy Okello, Barbara Kakande, Elias Sebatta, Michael Mungoma, Charles Kiiza Mondo (2015). Cardiovascular risk factors among patients with chronic kidney disease attending a tertiary hospital in Uganda. Journal of Africa • Volume 26, No 4, July/August 2015
10. Couser, W. G., Remuzzi, G., Mendis, S., &Tonelli, M. (2011). The contribution of chronic kidney disease to the global burden of major non-communicable diseases. Kidney international, 80(12), 1258-1270.
11. Eknoyan, G. (2011). Obesity and chronic kidney disease. Nefrologia, 31(4), 397-403.
12. Hooi, L. S., Ong, L. M., Ahmad, G., Bavanandan, S., Ahmad, N. A., Naidu, B. M. & Yusoff, M. F. M. (2013). A population-based study measuring the prevalence of chronic kidney disease among adults in West Malaysia. Kidney international, 84(5), 1034-1040.
13. Jayatilake, N., Mendis, S., Maheepala, P., & Mehta, F. R. (2013). Chronic kidney disease of uncertain etiology: prevalence and causative factors in a developing country. BMC nephrology, 14(1), 180.
14. Jha, V., Garcia-Garcia, G., Iseki, K., Li, Z., Naicker, S., Plattner, B. & Yang, C. W. (2013). Chronic kidney disease: global dimension and perspectives. The Lancet, 382(9888), 260-272.
15. Kalima, N. A., Gabriel, B. K., Muhindo, R., & Muyingo, A. (2015). Chronic kidney disease in patients admitted to the medical ward of Mbarara Regional Referral Hospital in southwestern Uganda: Prevalence and associated factors. International Journal of Medicine and Biomedical Research, 4(2), 107-116.
16. Kalyesubula, R., Nankabirwa, J. I., Ssinabulya, I., Siddharthan, T., Kayima, J., Nakibuuka, J. & Hricik, D. (2017). Kidney disease in Uganda: a community based study. BMC nephrology, 18(1), 116.
17. Lunyera, J., Stanifer, J. W., Ingabire, P., Etolu, W., Bagasha, P., Egger, J. R. & Kalyesubula, R. (2016). Prevalence and correlates of proteinuria in Kampala, Uganda: a cross-sectional pilot study. BMC research notes, 9(1), 97.
18. Mills, K. T., Xu, Y., Zhang, W., Bundy, J. D., Chen, C. S., Kelly, T. N. & He, J. (2015). A systematic analysis of worldwide population-based data on the

global burden of chronic kidney disease in 2010. Kidney international, 88(5), 950-957.

19. Mocroft, A., Kirk, O., Reiss, P., De Wit, S., Sedlacek, D., Beniowski, M. & Euro SIDA Study Group. (2010). Estimated glomerular filtration rate, chronic kidney disease and antiretroviral drug use in HIV-positive patients. Aids, 24(11), 1667-1678.
20. Mokdad, A. H.et al (2017). Diabetes mellitus and chronic kidney disease in the Eastern Mediterranean Region: findings from the Global Burden of Disease 2015 study. International Journal of Public Health, 1-10.
21. Mondo CK, Otim MA, Akol G, Musoke R, Orem J. The prevalence and distribution of non-communicable diseases and their risk factors in Kasese district, Uganda. Cardiovascular J Afr 2013; 24: 52–57.
22. Naicker, S., Rahmania, S., & Kopp, J. B. (2015). HIV and chronic kidney disease. Clinical nephrology, 83 (Suppl 1), S32.
23. Palmer, S., Vecchio, M., Craig, J. C., Tonelli, M., Johnson, D. W., Nicolucci, A. & Strippoli, G. F. (2013). Prevalence of depression in chronic kidney disease: systematic review and meta-analysis of observational studies. Kidney international, 84(1), 179-191.
24. Rajapurkar, M. M., John, G. T., Kirpalani, A. L., Abraham, G., Agarwal, S. K., Almeida, A. F. & Pisharody, R. (2012). What do we know about chronic kidney disease in India: first report of the Indian CKD registry. BMC nephrology, 13(1), 10.
25. Samb, B., Desai, N., Nishtar, S., Mendis, S., Bekedam, H., Wright, A. & Adshead, F. (2010). Prevention and management of chronic disease: a litmus test for health-systems strengthening in low-income and middle-income countries. The Lancet, 376(9754), 1785-1797.
26. Shalhoub, V., Shatzen, E. M., Ward, S. C., Davis, J., Stevens, J., Bi, V. & Tsai, M. M. (2012). FGF23 neutralization improves chronic kidney disease–associated hyperparathyroidism yet increases mortality. The Journal of clinical investigation, 122(7), 2543.
27. Singh, A. K., Farag, Y. M., Mittal, B. V., Subramanian, K. K., Reddy, S. R. K., Acharya, V. N. & Issacs, R. (2013). Epidemiology and risk factors of chronic

kidney disease in India–results from the SEEK (Screening and Early Evaluation of Kidney Disease) study. BMC nephrology, 14(1), 114.

28. Soni, R. K., Weisbord, S. D., & Unruh, M. L. (2010). Health-related quality of life outcomes in chronic kidney disease. Current opinion in nephrology and hypertension, 19(2), 153.
29. Stanifer, J. W., Jing, B., Tolan, S., Helmke, N., Mukerjee, R., Naicker, S., & Patel, U. (2014). The epidemiology of chronic kidney disease in sub-Saharan Africa: a systematic review and meta-analysis. The Lancet Global Health, 2(3), e174-e181.
30. Stanifer, J. W., Muiru, A., Jafar, T. H., & Patel, U. D. (2016). Chronic kidney disease in low-and middle-income countries. Nephrology Dialysis Transplantation, 31(6), 868-874.
31. Stauffer, M. E., & Fan, T. (2014). Prevalence of anemia in chronic kidney disease in the United States. PloS one, 9(1), e84943.
32. Tonelli, M., & Riella, M. (2014). Chronic kidney disease and the aging population. Journal Brasileiro de Nefrologia, 36(1), 1-5.
33. Ulasi II AE, Ijoma CK, et al. Left ventricular hypertrophy in African Black patients with chronic renal failure at first evaluation. Ethn Dis 2006; 16: 859–864.
34. UNAIDS 2012. Global Report 2012: AIDS info. http://www.unaids.org/ en/dataanalysis/datatools/aidsinfo/
35. Varma, P. P., Raman, D. K., Ramakrishnan, T. S., Singh, P., &Varma, A. (2010). Prevalence of early stages of chronic kidney disease in apparently healthy central government employees in India. Nephrology Dialysis Transplantation, 25(9), 3011-3017.
36. Wamala J, Karyabakabo Z, Ndungutse D, Guwatudde D. Prevalence factors associated with hypertension in Rukungiri District, Uganda: A community-based study. Afr Health Sci 2009; **9**(3): 153–160.
37. Wanigasuriya, K. P., Peiris-John, R. J., &Wickremasinghe, R. (2011). Chronic kidney disease of unknown etiology in Sri Lanka: is cadmium a likely cause. BMC nephrology, 12(1), 32.

38. Wasswa H. Uganda struggles to cope with rise in diabetes incidence. *Br Med J* 2006; 333 (7570): 672.
39. Yamagata, K., Yagisawa, T., Nakai, S., Nakayama, M., Imai, E., Hattori, M. & Akiba, T. (2015). Prevalence and incidence of chronic kidney disease stage G5 in Japan. Clinical and experimental nephrology, 19(1), 54-64.

APPENDIX I: INFORMED CONSENT FOR THE RECORDS ASSISTANT

I, Shariff Hassan Mohamed a student carrying out research entitled Prevalence and factors associated with occurrence of chronic kidney disease among patients attending KIU TH between June 2016 to June 2017

This is an academic research and the objectives of this research include; determining the prevalence of chronic renal disease June 2016-june 2017, finding social demographic characteristics of patients with chronic renal disease and finding out the complications associated with chronic kidney disease that were documented

Declaration of records assistant

I understand the implications of this research and here allow the student collect the data

Signature……

Date ……

Records assistant

APPENDIX II: QUESTIONNAIRE

Check list number_____/2017

Section A: patient's bio data (to be filled by writing in the space provided)

1. Age of patient_____
2. Gender _____
3. Marital status_____
4. Level of education_____
5. Occupation _____
6. Next of kin(relationship)_____
7. Family type_____
8. Number of admissions_____
9. Address(district)_____
10. Sub-county _____
11. Parish _____
12. Ethnicity_____
13. Date of diagnosis_____
14. Weight at diagnosis_____
15. Height at diagnosis_____
16. BMI at diagnosis_____

Section B: Prevalence

1. Total number of patients with kidney disease admitted between June 2016 to June2017……
2. Total number of patients with chronic kidney disease admitted between June 2016 to June 2017……
3. State the causes of CKD documented in the files

   _____
4. Quote the duration of the disease

   _____
5. State the regular or irregular treatment of the disease documented

   _____
6. Was the patient put on dialysis or not

A. Yes

B. No

7. If yes, how long was the dialysis? _____

8. If yes in 6 above also state the complications from dialysis

_____

Section C: Comorbidity

1. Please tick the comorbidity that was associated with CKD

A. Atherosclerolosis ⬭

B. SLE ⬭

C. Renal mass ⬭

D. Prolonged UTI ⬭

E. Nephrolithiasis ⬭

F. Hydronephrosis ⬭

G. Nephrotoxic drugs (specify ⬭

H. Others

specify……..

2. Primary diagnosis

A. Diabetes

B. Hypertension

C. Acute or chronic glomerulonephritis

D. Polycystic kidney disease

E. Others

specify……

3. State the number of dialysis session_____

4. Period since diagnosis of AKI or ESRO_____

5. Note any other co morbidity that was documented in the files in the space below

_____

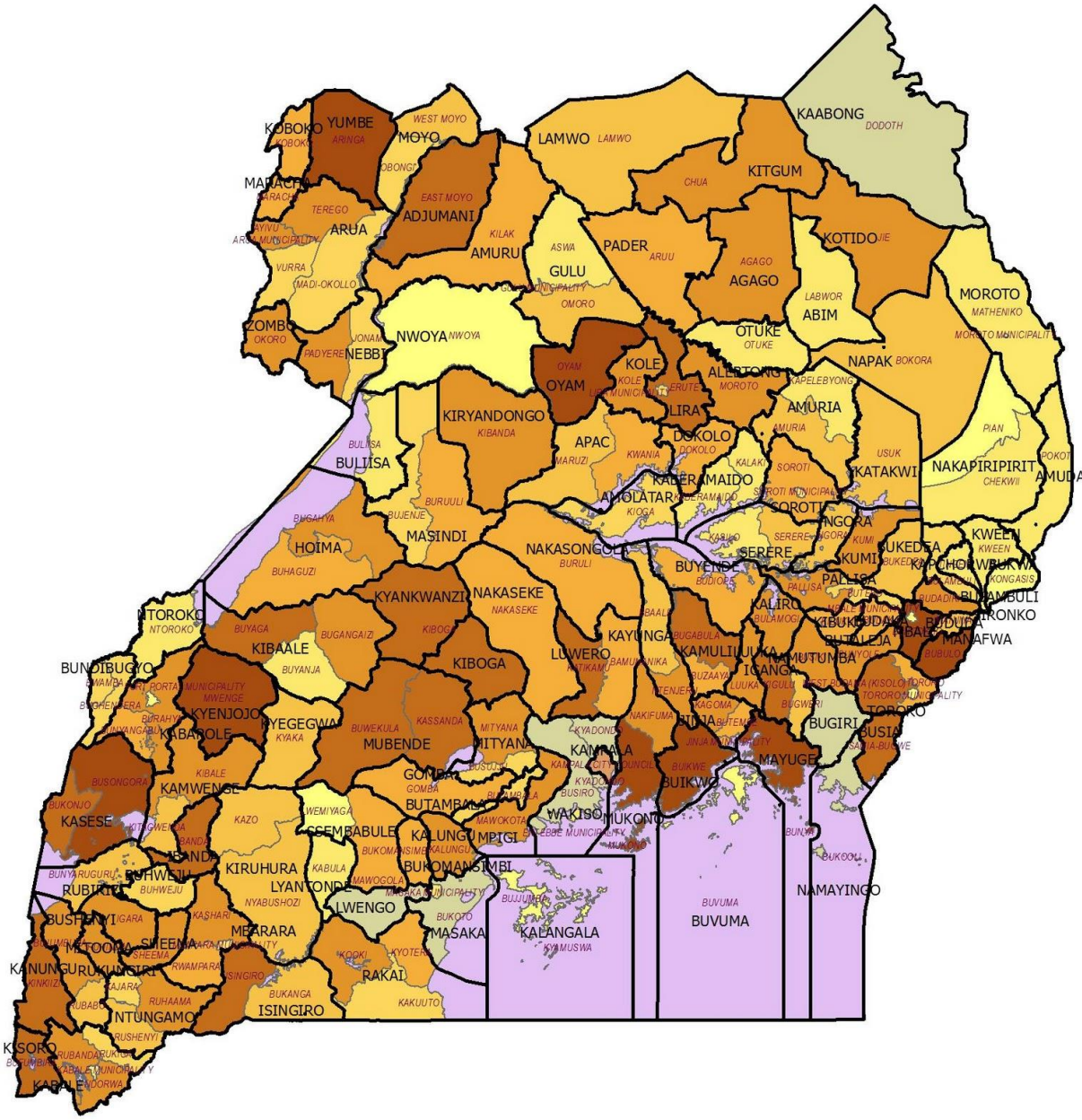
APPENDIX III: WORK PLAN

ACTIVITY	TIME FRAME 2017				RESPONSIBLE PERSON(S)
	September	**October**	**November -December**	**February– April 2018**	
Topic identification and approval					Supervisor/Lecturer Researcher
Report writing					Supervisor Researcher
Data collection					Researcher / Research Assistants
Data analysis and report writing					Data analyst Researcher / Supervisor
Dissemination of information					Researcher

APPENDIX IV: BUDGET

ACTIVITY	ITEM	QUANTITY	UNIT PRICE	TOTAL
Report writing	Stationary Typing Printing	2 reams 1	15,000 50,000	30,000 50,000 30,000
Data collection tools	Questionnaires Pens	150 10	300 500	45,000 5,000
Transport				60,000
Data collection	Two assistants		35,000	70,000
Data processing	Typing of dissertation Printing dissertation	1 3	20,000 50,000	20,000 150,000
TOTAL				**460,000**

APPENDIX IV: MAP OF UGANDA



APPENDIX V: MAP OF ISHAKA MUNICIPALITY