AWARENESS OF CHRONIC KIDNEY DISEASE, ITS PREDICTORS AND SELF MANAGEMENT BEHAVIOURS AMONG HIGH RISK PATIENTS IN KENYATTA NATIONAL HOSPITAL.

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A RESEARCH DISSERTATION SUBMITTED TO THE UNIVERSITY OF NAIROBI SCHOOL OF PUBLIC HEALTH IN PARTIAL FULFILMENT OF REQUIREMENTS FOR THE AWARD OF MASTER OF PUBLIC HEALTH.

DECLARATION OF ORIGINALITY

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I thank God, for enabling me this far. I thank my family for their constant support, my supervisors and lecturers for their invaluable help and support and my friends for their encouragement.

SUPERVISORS' APPROVAL

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TABLE OF CONTENTS

LIST OF ABBREVIATIONS

CKD   Chronic Kidney Disease

CAPD   Continuous Ambulatory Peritoneal Dialysis

CME   Continuing Medical Education

CVD   Cardiovascular Disease

DM   Diabetes Mellitus

ESRD   End Stage Renal Disease

GFR   Glomerular Filtration Rate

eGFR   Estimated Glomerular Filtration Rate

HTN   Hypertension

HIV   Human Immunodeficiency Virus

ISN   International Society of Nephrology

IFKF   International Federation of Kidney Foundations

K/DOQI   Kidney Dialysis Outcome Quality Initiative

NKF   National Kidney Foundation

RRT   Renal Replacement Therapy

SPSS   Statistical Package for Social Sciences

OPERATIONAL DEFINITIONS

Awareness	General knowledge of CKD, its risk factors, consequences and understanding of individual risk and CKD status
Adequate level of awareness	If one is able to answer five or more questions out of a total score of nine in the awareness of CKD section.
Inadequate level of awareness	If one is able to answer less than five questions out of a total score of nine in the awareness of CKD section.
High risk groups	Patients with either Diabetes or cardiovascular disease or both
Diabetic	Self-report to have diabetes or on treatment and on follow up in the clinic to control blood sugar levels.
Cardiovascular diseases	Self-report of heart or blood pressure problem or on treatment and on follow up in the clinic for heart problems or high blood pressure.
Selected self-management behaviors'	This will include the smoking avoidance, physical exercise and avoidance of chronic NSAID use.
Chronic NSAID use	This will be defined by a "yes" or "No" answer to "Are you currently taking any of the following drugs at least two times each week (a list of NSAIDs will be provided).
Physical activity	The number of times one engages in exercise or manual activity that results to a sweat and lasts for at least 30 minutes, none, occasional(less than three times a week), frequent (more than three times a week).
Tobacco Avoidance	This will be defined by a Yes or No answer to the question" Do you smoke cigarettes even occasionally?"
Medical follow up visits	This will be defined by a "No" response to "In the past six months could you have missed any appointments in the clinic related to diabetes or cardiovascular disease management?"

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Background

Chronic kidney disease (CKD) is a common and growing problem worldwide. Despite the high worldwide CKD prevalence and the discovery of effective measures to prevent or slow its progression this disease still remains a "silent" epidemic with worldwide limited knowledge on the CKD process and low levels of awareness of CKD in the general population (Coresh et al 2005). In Kenya, a high prevalence (43.3 percent) of late presentation of CKD patients to hospital was noted in 2008(Kilingo 2009).

Methods

This was a descriptive cross sectional study among a population at high risk of developing CKD attending the outpatient cardiac and diabetic clinics at the Kenyatta National Hospital. Data was collected using a questionnaire to assess awareness of CKD, and selected self-management behaviors among them. A total of 215 clients were selected using the Proportionate Stratified random sampling method. Data was analyzed using SPSS version 20.0. Dependent variable was presented as a median and mode. Independent variables were presented in frequencies and percentages. Associations and differences between the dependent and independent variables were examined using Chi square test. Predictor variables that had significant association with the dependent variable were further subjected into logistic regression analysis to adjust for potential confounders. The level of significance was set at $\leq$ 0.05.

Results

Overall only 98 (45.6%) of the respondents were adequately aware of CKD. A high percentage 158(73.5%) had heard about kidney disease and most 151(70.2%) also reported to have undergone a kidney function test. However, there was limited knowledge noted on CKD. The function of the kidney was the only well-known fact about CKD. 140 (65.1%) of the respondents were aware of the function of the kidney. There was no statistical difference in level of awareness of CKD between those attending the diabetes clinic versus those who attended the cardiovascular clinic. There was a statistically significant relationship between level of education (p=0.009) and monthly income (p=0.044) with awareness of CKD.

Conclusion

Overall the findings indicate that the clients attending the Cardiac and Diabetic Outpatient Clinic at the Kenyatta National Hospital are inadequately informed on CKD and its complications. A higher level of education and higher income are significantly associated with adequate awareness of CKD. There was no statistically significant relationship between their selected self-management behaviors and the level of CKD awareness.

Recommendations

Medical practitioners should provide tailored CKD educational programs to clients at risk. The hospital administration should incorporation with the medical practitioners provide avenues of disseminating CKD information to the rest of the population at risk seeking healthcare services in other avenues such as inpatient care. An elaborate qualitative study is needed to explore the role of screening in CKD prevention.

CHAPTER ONE

1.0 Introduction

Chronic kidney disease (CKD) is a progressive syndrome in which the kidneys lose their ability to filter blood, concentrate urine, excrete wastes, and maintain electrolyte balance. Over the course of years, there is loss of kidney function in CKD up to a limitation that is insufficient to maintain life. This is commonly referred to as End Stage Renal Disease (ESRD). Patients at this last stage of CKD require renal replacement therapy either in form of a kidney transplant or dialysis to sustain life (Mayo Clinic 2013).

Chronic kidney disease is a common and growing problem worldwide. The highest nationwide prevalence of CKD was reported in Japan at 20 percent (Imai et al 2008) followed by The United States of America at 13.1 percent (Coresh et al 2005) and Australia at 11.2 percent (Chadban et al 2003). In Europe, a prevalence of 8.1 percent was reported in Switzerland and 7.2 percent in the Netherlands (Zhang et Rothenbacher 2008). In Africa, the estimation of the burden of CKD is difficult due to limited representative national surveys and a lack of national registries. Screening done to at risk patients attending selected healthcare sites in the city of Kinshasa, Congo revealed a CKD prevalence of thirty-six percent (Sumaili et al 2009) whereas a study done on a general Nigerian population revealed a CKD prevalence of 10.4 percent (Afolabi et al 2006).

To date, there has been no study done in Kenya to determine the prevalence of CKD but ESRD prevalence carried out in sub Saharan Africa showed that Kenya was ranked the fourth country with a prevalence of 15.6 per million population (Bamgboye 2006). According to the latest World Health Organization WHO data published in April 2011 Kidney disease Deaths in Kenya have reached 2,912 or 0.92 % of total deaths. The age adjusted Death Rate is 19.59 per 100,000 of population and CKD has become the 14th leading cause of mortality in Kenya (World life expectancy 2011).

The prevalence of CKD is expected to steadily increase partly due to the increased prevalence of non-communicable diseases such as hypertension, diabetes and obesity and also due to greater exposure to environmental toxins, infections such as HIV and increased use of medications that could cause kidney damage (Jha 2004, Alebiosu 2010).

According to Levey et al 2010, a large percentage of the patients may die even before reaching kidney failure as there is an eight to tenfold increase in deaths related to heart diseases among CKD populations.

Moreover, the socio economic impact of CKD and its complications are considerable due to its enormous financial cost and loss of productivity associated with advanced kidney disease in many developed nations but the situation is worse in most developing countries where ESRD constitutes a 'death sentence. This is because renal replacement therapy is often unavailable or unaffordable resulting to nearly one million people dying each year in developing nations (Barsoum 2006).

Coresh et al 2005 states that "despite the high worldwide CKD prevalence, this disease still remains a silent epidemic". There is limited knowledge on the CKD process and low levels of awareness of CKD in the general population". In Kenya, despite CKD prevalence remaining unknown, there has been a notable increase in the ESRD patients reporting to the hospitals. Late presentation to the nephrologist was noted among patients visiting the renal clinic at Kenyatta National Hospital (KNH). 42(43.3 %) of the clients being reviewed for the first time by a nephrologist in the renal clinic were in CKD Stage 4 and 5. Most of these patients were either diabetic 41(42.7%) or hypertensive 36(37.5%).They attributed their late presentation to financial difficulties, lack of awareness of presence of disease and limited knowledge on seriousness of CKD (Kilingo 2009).

This study aimed at establishing the level of awareness of CKD amongst the high risk population in the outpatient cardiac and diabetic clinics in Kenyatta National Hospital, the predictors of their awareness and their selected self-management behaviors in relation to CKD prevention.

1.1 Background

The increase in the prevalence of CKD and ESRD is a global challenge (Dirks et al 2005, Hamar et El Nahas 2006) with the prevalence of CKD at an estimated 8-16 percent worldwide (Jha et al 2013). According to 2010 Global Burden of Disease study, chronic kidney disease rose from 27th in the list of causes of total number of global deaths in 1990 to 18th in 2010 (Lozano et al 2013).

CKD has apparently remained a 'silent' epidemic (Ritz et Bakris 2010) even amongst the health professionals with most physicians being unaware of the magnitude of the problem (Perazella

2003) until recently. This has been due to lack of a universal definition or classification system until recently.

Kidney disease was previously defined by its end stage whereby patients needed replacement therapy or a kidney transplant. This led to many CKD patients missing out on early identification and treatment. The priority of management was typically starting the patient on dialysis or undertaking a kidney transplant thereby not laying emphasis on the slowing of the kidney disease or managing other diseases that accompany it (Perazella 2003).

According to Barsoum 2006, the attention that is now being paid to CKD is attributable to five factors: the rapid increase in its prevalence, the enormous cost of treatment, the realization that kidney failure is only a tip of the iceberg of the disease, the knowledge of its increasing risk to heart related diseases and deaths and the discovery of effective measures to prevent or slow its progression.

Despite the discovery of effective measures to prevent or slow the progression of CKD, awareness levels have remained low among those at risk. Simple blood and urine tests can be used to detect chronic kidney disease and screening is advised for those patients who are diabetic, hypertensive, 60 years or older and or have a family history of CKD or kidney failure (CDC 2019)

Certain behaviors have been linked to CKD progression and are certainly important to determine especially among those at high risk. Cigarette smoking was shown to be associated with augmented progression of renal function decline in severe essential hypertension (Regalado 2000). Toyoma et al 2010 in a study that studied physical activity among patients with cardiovascular diseases and CKD noted improved renal function through improved lipid metabolism brought about by the physical activity. Access to health care is an important component in every disease management as this is where the interaction between the medical practitioner and the patient takes place. Individuals who perceived difficulty to access health care had greater CKD awareness (Shah et al 2011). Further exploration is needed in our local set up.

There is need to determine the awareness level of CKD amongst our population that is at risk and also determine the extent of self-management behaviors in the selected behaviors that have been proven effective in previous studies.

CHAPTER TWO: LITERATURE REVIEW

2.1 Chronic Kidney Disease

The National Kidney Foundation, K/DOQI Clinical Practice Guidelines for Chronic Kidney Disease 2002 defines CKD as structure or function abnormalities of the kidney which are manifested by either pathological abnormalities, abnormalities in urine and blood or abnormalities in imaging tests. This should have occurred for three or more months. It can also be defined by a test derived from blood called Glomerular Filtration Rate (GFR) being less than $60ml/min/1.73m^2$ for three or more months with or without the kidney damage mentioned above.

The risk factors for chronic kidney disease and ESRD include race, diabetes mellitus, hypertension, autoimmune disorders (e.g., systemic lupus erythematosus), and systemic infections. Others include infections on parts of the kidneys, urinary tract disorders, family history of CKD, and use of nephrotoxic medications, tobacco and older age (National Kidney Foundation 2002).

CKD has five stages, Stage 1,2,3,4 and 5. Stage 1 and 2 are asymptomatic and considered as early stages, Stage 3 has a few nonspecific symptoms. Stage 4 and 5 are the late stages and have specific symptomatic. CKD is irreversible at every stage and the final stage which is Stage 5 is also referred to as End Stage Renal Disease (CDC 2019). At this stage treatment is aimed at treating complications and replacing renal function via dialysis or kidney transplantation. There are several complications that result from kidney failure such as anemia and deranged levels of minerals in the blood such as potassium, calcium which can be fatal. These are treated as they arise or prevented during hemodialysis. Other interventions include diet modifications such as salt, fluid, protein and fat restriction; exercise, weight maintenance and psychological interventions (Taskapan et al 2005).

2.2 Awareness of Chronic Kidney Disease

According to the Free Dictionary by Farlex the word "Awareness" means having knowledge or cognizance. It means having knowledge gained through one's own perceptions or by means of information. In Chronic Kidney disease, awareness is broadly categorized as community or patient level of awareness and provider level of awareness. Patient level CKD awareness

includes general knowledge of CKD, its risk factors, consequences and understanding of individual risk and CKD status (Platinga et al 2010).

Chronic Kidney disease is a growing public health problem worldwide with annual growth rate of eight percent (Alebiosu 2005). This is partly attributed to the rise in prevalence in some of its risk factors such as hypertension and diabetes. The global prevalence of diabetes among adults has risen from 4.5% in 1980 to 8.5% by 2014 (Sarwar et al 2014). According to the Ministry of Public Health in Kenya 2010, the prevalence of diabetes was at 3.3% with an estimated 60% of cases that are undiagnosed. Diabetes has been reported to account for 40 percent of the new cases of chronic kidney disease in America (NKF 2019). Hypertension is also a public health concern in Kenya with a high prevalence of 24.5% [95%CI: 22.6–26.6]. Only 15.6% [95%CI: 12.4–18.9] were aware of the hypertension (Mohammed et al 2018). There being no active screening for these diseases, a risk of undiagnosed cases and late presentation is a common phenomenon.

Despite the alarming rise in the risk factors for CKD, awareness of chronic kidney disease remains low and the majority of persons with CKD especially those in the early stages may be unaware of their disease due to its silent and unremarkable symptoms (Coresh et al 2005, Minutolo et al 2008). Persons who have been screened regularly and identified to have early stage CKD have been noted to have little understanding of their diagnosis or the importance of treatment (Platinga et al 2008).

2.2.1 Phases of CKD awareness

According to Platinga et al 2010 awareness of CKD among patients occurs in phases and the phases are dependent. The awareness of CKD status is dependent on understanding of individual risk which in turn depends on general knowledge of CKD. Moreover, failure to achieve adequate levels of awareness at each phase precludes becoming aware at the next phase. The converse of achieving adequate knowledge does not guarantee the next phase of awareness this is because various other factors may still prevent the patient from understanding information they have been exposed to and from taking the right measures to improve on their self-care and ultimately their outcomes.
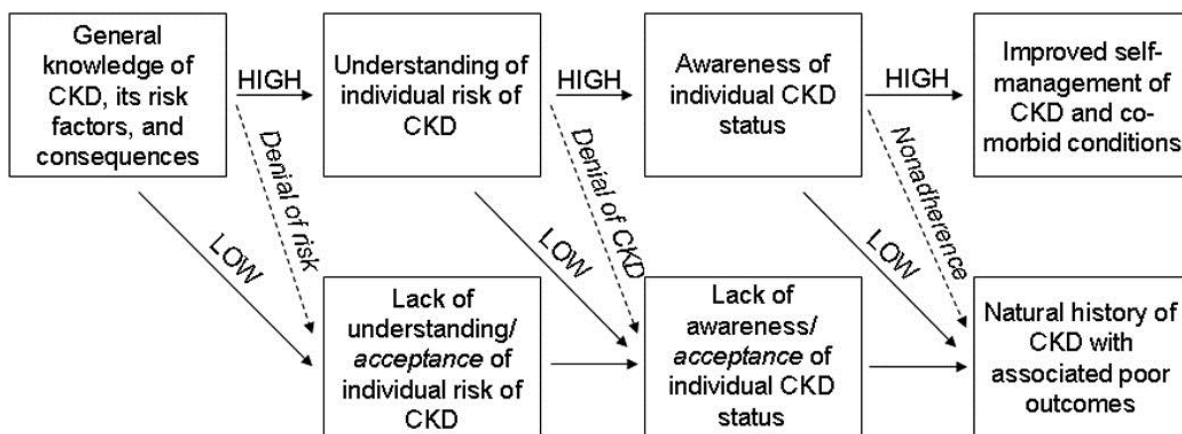
Figure 1: Potential path to awareness and associated outcomes for the CKD patient. **Dashed arrows: show possible psychosocial effects on awareness, understanding and outcomes.**

Source: Platinga et al 2010

On the other hand, Provider awareness of CKD includes general understanding of CKD, its risk factors and associated complications/ consequences and knowledge on patient management strategies to slow CKD progression (Platinga et al 2010).

Disease prevention can only be achieved if we are able to understand what the disease is all about. This means that we should be able to understand its causes, risk factors, symptoms and how to detect it.

2.2.2 Awareness of CKD status on previously screened individuals.

Several studies have been conducted across different nations to determine awareness on CKD among different populations. Some have focused on awareness of one's CKD status and others have been concerned with the general awareness and knowledge on the CKD disease process. Few studies have tackled all levels of awareness of CKD on one population. Awareness levels have been shown to vary across different parts of the world depending on the phase of awareness being investigated and the population being studied.

Awareness of CKD status among those who have been screened is key in enabling the patient understand their individual risk and allow them to actively find out and implement measures to prevent occurrence or progression of CKD. In the United States of America, a screening program targeting the high risk population was started in 2000. The high risk population which entails diabetics, hypertensive and those with a family history of Kidney disease are screened,

made aware and educated with an aim of preventing or delaying complications. 7,853 patients were assessed on their awareness on CKD by a "yes or no" answer to the question" Have you ever been told by a doctor or health care professional that you have a failing kidney?". The awareness level was low with 738 (9.4%) of the individuals being aware, even among the diabetics (Whaley et al 2009).

In Taiwan 2002, a sub sample of three hundred and eighty-nine participants from a previous National Health Interview Survey (NHIS) population was randomly selected and data collected was used to analyze the relationship between serum creatinine levels and awareness of CKD. Low level of awareness of CKD was reported with only 31(8%) among those with CKD stage 3, (Hwang et al 2006). One of the reasons pointed out to be associated with low levels of awareness was low levels of awareness of CKD among primary care physicians. Only 6 (6.1%) out of 99 patients who had undergone periodical health checkups including kidney function were informed of having kidney problems. The low awareness rates in earlier stages could also be linked with lack of or non-specific symptoms compared to the later stages.

This could indicate an inability of CKD identification based on laboratory reports by the primary care physicians (Hsu et al 2006). Patients with chronic diseases such as diabetes and hypertension were not knowledgeable about their kidney condition despite being under the care of specialists on a regular basis. This was noted to be persistent even when the kidney function of some patients deteriorated which clearly indicated that the specialists in Taiwan may also not have been paying attention to the patients' renal function.

Similarly, a population based screening study was also conducted in Henan, China to quantify the prevalence of CKD and identify the associated risk factors among 4,156 residents over forty years old. Approximately 436 (10.49%) of the subjects had at least one indicator of kidney damage (albumin in urine, blood in urine or reduced kidney function measured by blood test e GFR) but only 392(9.5%) were aware of CKD status (Shan et al 2010).

African Americans have been shown to be four times more at risk of CKD than whites. CKD prevalence for African Americans was 20 percent (N=3431) in a cross-sectional study that was carried out on an observational cohort in the Jackson Heart Study in Mississippi (Flessner et al 2009). Awareness of CKD in the study was defined by a "yes" response to the question "Have you ever been told by a doctor or health care professional that you have kidney disease?" and /or self-report of being on dialysis therapy. Only 108 (15.8%) of those with CKD were aware of their disease. CKD awareness was notably associated with CKD severity. Awareness

increased in each advancing stage but also the presence of diabetes, hypertension, CVD, high cholesterol, lower physical activity score, increasing waist girth and age were all independently associated with CKD. CKD progressively decreased with increase in annual income, increase in physical activity score and an education level beyond primary school.

The study in its entire nature was able to conclusively determine the CKD prevalence utilizing the recommended guidelines for CKD definition. It was possible to definitely determine those aware of their disease however an in depth interrogation of the awareness level of CKD was not possible.

On a wider scale, the National Health and Nutrition Examination Survey in the US was carried out among 2992 adults with CKD stages 1 to 4. CKD awareness rates was determined over 3 surveys between1999-2000, 2001-2003, 2003-2004. Awareness rates was shown to have improved over time however, remained low in those with CKD stage 3 i.e. 4.7% [95% confidence interval {CI}, 2.6%-8.5%], 8.9% [95% CI, 7.1%-11.2%], and 9.2% [95% CI, 6.1%-13.8%] for 1999-2000, 2001-2002, and 2003- 2004, respectively; P=0.04, adjusted for age, sex, and race). Persons with risk factors for CKD (protein in urine, diabetes, hypertension and male sex were more likely to be aware of their stage 3 disease (Platinga et al 2008).

Similarly, in Kinshasa, an annual screening for CKD and its risk factors (hypertension, diabetes and obesity was carried out on five hundred and twenty-seven adults in churches, schools and industrial sites. Using estimated GFR the CKD prevalence was found to be 189 (36 %) but only 63(12 %) were aware of their diagnosis (Sumaili & Cohen 2010).

In Europe, a study conducted in 2012 amongst these First Nations Canadians to determine the prevalence and risk factors for albumin in urine revealed similar findings. Twenty percent of the sample population of four hundred and eighty-three residents had albuminuria. Among these only 26(5.3%) percent were aware of any degree of renal disease (Zacharias et al 2012). End stage renal disease (ESRD) caused by diabetes or other conditions has been shown to be more common among the Canadians First Nations people.

There is need for more concerted efforts to increase awareness among patients and health care providers (Platinga et al 2008). Better awareness and understanding CKD in both groups will lead to better management of CKD and thus lead to prevention and slowing of the progression of CKD, prevent complications and reduce cardiovascular related outcomes (Sarnak et al 2003).

2.2.3 Awareness of CKD disease process

General understanding of CKD mainly focusing on the CKD disease process has been studied worldwide among general public, at high risk groups and CKD patients.

A cross sectional study carried out in Singapore sought to determine the knowledge level of CKD. This was conducted among the general public seeking primary health care at three different public health centers. A self-administered questionnaire was used to collect data and the respondents were considered to have an average overall knowledge of CKD if they scored at least the median score i.e. >= 4 points. A score of ≥4 and < 4 were treated as dependent dichotomous variables and chi square was used to evaluate the associations with each demographic variable during bivariate analysis. Multiple logistic regression analysis was carried out to adjust for potential confounders for the demographic variables that were significantly associated in the bivariate analysis (p-value < 0.05). Only 65(4.5%) out of 1435 respondents knew that early kidney disease could present without any symptoms or complaints and 278 (19.4 %) correctly answered that CKD could not be cured with medication (Chow et al 2012).

There were some limitations noted in this study. A convenience sample was used i.e. general public respondents who sought treatment at health care centers and therefore not a true representative of the general population per se. Selection bias is a possibility as those participants who volunteered could be more involved in their self-management thus resulting in a higher level of knowledge of CKD as compared to the general public (Chow et al 2012). The study managed to depict the association between CKD knowledge and socio-demographic factors but other factors were not included in the study.

More importantly, the study was able to point out important issues about CKD knowledge in this population. The fact that there was low knowledge on the risk factors for CKD and not knowing that early CKD can present asymptomatically would lead to a low level of perceived susceptibility even among the high-risk population (Chow et al 2012).

Another study on the general populace was conducted to determine the awareness levels of CKD in Nigeria. A cross-sectional study was carried out in the Ogun State University Teaching Hospital and its environment. Medical and Nursing workers were excluded. A sample size of 455 was calculated and there was a response rate of 91.2 percent. Awareness of kidney diseases in the study focused on general knowledge which sought to determine their knowledge on the anatomy and physiology of the kidney and also the risk factors, modalities of treatment and

frequency of herbal drugs use. Low awareness was demonstrated especially on prevalence, causes and symptoms of CKD. Most of the study population was in their fourth decade of life and 308 (68.5%) did not know the function of the kidneys. Despite chronic renal failure being the third most prevalent cause of medical admission with a high case fatality rate of fifty-five percent, most respondents believed it was a rare disease in their environment (Alebiosu 2002).

The study sought in depth understanding of kidney disease and also whether the population was aware of the looming epidemic and poor prognosis of CKD in the hospital. The questions were quite elaborate and were able to pinpoint the gaps and misconceptions around the disease. However clinical history was not taken and therefore it was not possible to deduce whether those with risk factors such as chronic illnesses associated with CKD could have been more knowledgeable or not. Overall the study population was able to diversify its study population to include bank workers, market women and artisans working in the Ogun University and exclusion of medics. It was able to make the sample be a representative of the general population.

In Australia, a nested study to determine the awareness of CKD, its risk factors amongst diabetics on a 5 year follow up for Diabetes, Obesity and Lifestyle revealed low awareness levels on CKD. Only 77 (9%) of 852 respondents identified diabetes as a risk factor and 26 (3%) identified hypertension as a risk factor (White et al 2008). Recall of kidney function testing was done by asking the question "Has a doctor or health care worker ever tested your kidney function, outside of the AusDiab study?", 272 (31.9%) replied "yes"; 33 (3.9%) said "yes", but only during pregnancy; 228 (26.8%) were uncertain, indicating they had undergone an unspecified blood, urine or imaging test; and 319(37.4%) replied that they had never had their kidney function tested.

Further to knowing the risk factors to CKD, the status of kidney function is an important point of discussion to enable persons to engage in positive healthy behaviors.

2.2.4 Awareness of CKD status and CKD disease process
A few studies have managed to determine awareness on CKD by more than one phase. An example is University of Pennsylvania Medical Center study conducted amongst patients who had a diagnosis of stage 3 or 4 CKD in 2010. It sought to assess knowledge regarding risk factors that contribute to progression of CKD and mortality and methods to slow progression of CKD. Self-administered questionnaires were distributed and self-reported levels of creatinine, glucose and blood pressures were also collected for two hundred and twenty-nine

patients. In analysis both linear and ordinal regression were used to evaluate independent predictors of higher overall knowledge score (Tan et al 2010).

Majority of the participants (204) 89.1% knew that they had CKD but almost five percent denied having CKD despite being in a renal clinic. Hypertension and Diabetes were chosen most frequently as factors increasing risk of CKD. Other risk factors like obesity, family history of CKD, smoking, African American race and male sex were less commonly identified as risk factors. 160 (70%) of the participants believed that glucose control, blood pressure control, control of protein in urine and smoking control were effective in slowing the progression of CKD. More than eighty-seven percent of the respondents thought that CKD increased risk for heart attacks, stroke, vascular diseases and death.

The study sought to determine awareness by asking the question "Do you have kidney disease or have you ever had kidney disease?" as opposed to the previous study whereby one was asked" Have you ever been told that you have a failing kidney?" This question was more straightforward. The subjects were not only tested whether they knew their status but also pertinent information on prevention, risk and complications was obtained.

However, the study results could not be generalized to the whole Pennsylvania since the sample was from only two renal clinics and selection bias could have been introduced as the sample was obtained from those willing and therefore, could have been more knowledgeable (Tan et al 2010).

2.2.5 Impact of CKD awareness on Healthcare
Low levels of awareness diminishes the health care systems efforts to effectively identify and engage patients with underlying CKD to implement measures in early stages that could slow disease progression or reduce cardiovascular risk (Shah et al 2012).

One may argue why the urgency of making patients aware of CKD yet many die before they progress to a more severe stage of CKD and many are already being treated for diabetes and/or hypertension. First and foremost, there are many compelling reasons as to why patients would benefit. There is evidence that early appropriate treatment (medications for hypertension control, lipid lowering and blood glucose control) could slow the progression of CKD. Secondly those at risk will be able to avoid medication exposures that could influence progression including over the counter non-steroidal anti-inflammatory agents and contrast agents used in imaging tests. Awareness might also make patients more vigilant with adherence

to dietary recommendations such as lower salt and sugar as well as other lifestyle changes (Platinga et al 2008).

Third but not least, lack of awareness has had significant repercussions with unrecognized kidney disease resulting in lost opportunities for aggressive treatment and prevention of complications and consequently lead to poor outcomes in both kidney disease and kidney failure (Perazella 2003).

2.3 Factors associated with patient CKD level of awareness

Awareness can be attributed to either or both individual factors and system factors. At the individual level reported awareness of disease can be limited to patient understanding and denial or another factor can be lack of screening or diagnostic testing on the health care provider's part thereby preventing detection.

At the systems level, access to physicians on the part of patients and suitable practice environments for physicians (i.e. access to and remuneration for diagnostic testing) can either enable or act as barriers to preventive practice (Zacharias et al 2012).

2.3.1 Demographic factors

In the observational cohort of the Jackson Heart Study, Out of 3431 participants, awareness of CKD was higher i.e. seventeen percent among older participants i.e. sixty years and older, and thirteen percent among those between twenty one to thirty nine years old (Flessner et al 2009). Awareness was defined by a "yes" response to the question "Have you ever been told by a doctor or a healthcare professional that you have a kidney disease?" and or self-report of being on dialysis therapy. There were no differences in awareness rates among the male and female participants.

Among patients with CKD stage three and four attending renal clinics in Pennsylvania, younger age [Coefficient -0.04, standard error (0.01), p value=0.003] and presence of a college education [Co efficient 1.08, standard error (0.34), p value = 0.002] were the only independent predictors of knowledge of CKD risk factors after adjustment for socio demographic factors and co morbidities (Tan et al 2010).

2.3.2 Socio economic factors

Older participants who had below primary level education, a monthly household income of less than two thousand dollars who were nonprofessionals were more likely to have lower knowledge levels on chronic kidney disease in Singapore (Chow et al 2012).

Similarly, in the Pennsylvania study that sought to determine the patient perception on risk factors for CKD and its complications among those with CKD stage 3 and 4, younger age and the presence of a college degree were the only independent predictors of knowledge of CKD risk factors (Tan et al 2010).

2.3.3 Clinical factors

Participants with diabetes, hypertension, those who had spoken to a medical professional or their family about kidney disease, those who knew that a family history of kidney disease is a risk factor and who had been tested for CKD were more likely to perceive themselves at increased risk (Waterman et al 2008).

Similarly, awareness rate was noted to increase progressively with decline in kidney function in South China. Subjects with diabetes and hypertension were also noted to have a higher awareness rate compared to subjects who had only hypertension or diabetes (Chen et al 2009). Likewise, in the observational cohort of the Jacksons heart study, the awareness rate for participants with CKD stages four and five was higher at 41(65.9 percent) compared to those in stage 3 CKD at 51(17.6 %), (Flessner et al 2009).

In the United States of America, National Health Assessment and Nutrition Examination surveys on awareness on CKD among persons with CKD stages 1 to 4 from 1999-2004 revealed having protein in urine, or being hypertensive or diabetic was significantly associated with greater awareness among persons with CKD stage 3 after adjustment for age, sex and race (Platinga et al 2008).

Likewise, in an ongoing nationwide free screening program in the United States (KEEP) cohort study, participants who were unaware of CKD status were less likely to have albumin in urine, diabetes, hyperlipidemia or cardiovascular disease (Shah et al 2012).

2.3.4 System factors

In 2004 the Chronic Kidney Disease Initiative identified 19 barriers to improving CKD treatment. These included noninsurance, underinsurance, unstructured medical care systems,

lack of patient awareness of risks associated with CKD and lack of coordination among care providers (Parker et al 2004). These factors may lead to poor access to healthcare and a resultant increase in ESRD incidence and later initiation of dialysis.

In the KEEP cohort study there was no independent association between health insurance status and CKD awareness and participants who reported that obtaining medical care was difficult were more likely to be aware of having CKD (Shah et al 2012).

Similar findings were reported in the observational cohort in the Jackson Heart Study (Flessner et al 2009) and the USA National Health and Nutrition Survey (NHANES) 1999-2004(Platinga et al 2008). However, there was a trend toward greater awareness among participants who had a routine site for primary care and thus access to a routine primary care was suggested to be a more important determinant than health insurance. There was no significant relationship between availability of health insurance or prescription drug coverage, type of health insurance and odds of awareness. However, those who reported extreme or somewhat difficulty in obtaining medical care were more likely to be aware of having CKD. It will be imperative to determine whether the system factors could be predictors of CKD awareness in our local setting where insurance cover is not a benefit for all.

Finally, low awareness levels on CKD have been reported despite presence of multiple markers in the US National Health and Nutrition Survey data 1999-2008.This has been attributed to a low level of provider screening, poor recognition of CKD among the clinicians or ineffective communication by the providers who appropriately recognize CKD (Tuot et al 2011).

2.4 Self-Management behaviors in Chronic Kidney Disease.

Over the years, the number of chronically ill patients has continually increased thus posing a great strain to the existing health care systems which seek to address their many and unique needs. This has necessitated the introduction of care that must be carried out by the patients themselves (Marks et al 2005, Bodenheimer et al 2002). It has been backed up by the fact that a range of positive health outcomes have been associated with patient self-management (Lorig et al 2001). However, the patient self-management has to be interdependent with the health care provision for the positive outcomes to be realized. Chronic Kidney Disease did not receive much attention in the past as cases were being managed mostly when patients were already in End Stage Renal Disease (ESRD).

According to the National Kidney Foundation's Kidney Disease Outcome Quality Initiative (KDOQI) Clinical Practice Guidelines on Hypertension and Antihypertensive Agents in 2007, patient self-management has been defined as the ability and willingness of a patient to establish and maintain appropriate behavior regarding diet, physical activity, medicines, self-monitoring and medical follow up visits in regards to hypertension and chronic kidney disease.

Self-management behavior has been linked to the degree to which patients have confidence in their ability to do what needs to be done in order to achieve the outcomes they are seeking also called perceived self-efficacy. In 2008, a study was conducted on the self-management behaviors of patients with chronic kidney disease it was found that perceived self-efficacy was positively associated with better communication with caregivers, partnership in care, self-care activities and. It was a more consistent correlate of self-management behavior than were either demographic or health characteristics. The study proposed that self-management would be fostered by supporting self-efficacy and which would consequently improve patient outcomes (Curtin et al 2008).

In this study, there was a focus on the high risk populations who already had a chronic condition that predisposed them to kidney problems and we sought to know if their awareness on CKD, its prevention and complications was associated with their self-management behaviors.

2.5 Awareness of CKD and Self-management behavior.

Knowledge of chronic kidney disease underpins the success of disease prevention as described by the health belief model (Hochbaum 1958). Lack of adequate knowledge that CKD can present asymptomatically in the early stages and basic knowledge on the risk factors would result in low level of perceived susceptibility even among the high risk population. Not being aware that CKD cannot be cured with medications could also affect the level of perceived seriousness of CKD in an individual (Chow et al 2012).

According to Wright et al 2011, there are two entities of knowledge on CKD; perceived knowledge and objective knowledge of CKD. The two entities interact and bring about four possibilities of patients. All the four possibilities have different levels of risk for poor outcomes due to the different capacities to participate in self-management behaviors.

The high perceived/ high objective group would have the lowest risk as they would be able to self-manage without any difficulties. The low perceived/high objective group would need reassurance from health providers so as to apply their objective knowledge in self-care

otherwise if left unattended they would have a risk of poor outcomes by not being confident enough to engage in self-care behaviors. Among those with a low perceived knowledge, those who also have low objective knowledge are less likely to manage themselves well leading to a higher risk of poor outcomes. The fact that they are self-aware of their low levels of knowledge could also increase their communication with health care providers and thus mitigate the overall risks of poor outcomes. The group with highest risk of poor outcomes would be the high perceived/ low objective knowledge. This is because of their confidence yet they are uninformed which would cause them to make poor health decisions and thus expose them to a higher risk to poor health outcomes. Perceived and objective CKD knowledge are likely to impart risk modifying behavior in different ways and merit equal attention (Tuot et al 2011).

Additionally, in past studies it has been demonstrated that there is no significant relationship between the perception of being well informed and factual knowledge regarding common medications, cancer screenings and common surgeries (Sepucha et al 2010). This in effect suggests that perceived knowledge is not a reliable assessment of actual CKD knowledge (Tuot et al 2011).

Perception of risk has also been linked to self-management behavior. A low perceived susceptibility to CKD was illustrated in a cross sectional study conducted on 195 patients who were on follow for hypertension in Maryland. Forty-four percent of the participants had uncontrolled blood pressure whereas forty-two percent had uncontrolled diabetes. Among these only twenty percent felt "very likely" to develop CKD and one third were very concerned about developing CKD. Female participants with low health literacy levels had lower perceived susceptibility to CKD compared to males and also with participants with higher health literacy (Boulware et al 2009).

Similarly, the Mexican Americans have a six times higher incidence of ESRD from diabetic nephropathy than whites yet fifty-three percent of diabetic relatives who presented with a high urinary albumin /creatinine ratio (>=0.03) were unaware of having diabetic nephropathy. This group was not aware of the risk factors for chronic kidney disease and therefore was not likely to go for screening (Arar et al 2003).

Awareness, treatment and control of high cholesterol levels have been noted to be poor in CKD populations (Collins et al 2010). These patients are thus predisposed to a higher risk of cardiovascular events which increase exactly when high cholesterol treatment and control are lowest.

Actual knowledge on CKD was shown to have influenced the perceived risk of patients in the United States of America in a study which aimed to link knowledge and screening rates for CKD. A sample population of two thousand and seventeen African Americans from 7 states was sampled using a random digit dialing telephone survey. Only 23.5 percent were screened for CKD in the last year. Despite 43.7 percent of them having a risk factor only 2.8 percent reported that CKD was a top health concern. There was poor knowledge overall and most participants did not perceive it as an important health problem and hence explaining their lack of seeking to be tested (Waterman et al 2008). However, this study cannot be generalized to the whole African American population since most respondents were female from urban areas and the response rate was low at forty-two percent.

In 2013, a study was conducted in the United States of America to examine whether a person's awareness of his/her CKD status is associated with self-reported healthy behaviors and risk reduction targets. Self-reported health behaviors thought to influence risk of adverse health outcomes were obtained during an interview and these included current tobacco use, chronic NSAID use and physical activity (Tuot et al 2013).

Among 1852 adults assessed on healthy behaviors, tobacco avoidance had the highest prevalence at 89.4 percent while frequently physical activity had the lowest prevalence at 24 percent with non-significant differences between those aware and unaware of their CKD. Awareness of CKD was not associated with participation in healthy behaviors but after adjustment for co-morbid conditions and CKD severity those who were aware of their CKD were more likely to report avoidance of tobacco (Tuot et al 2013).

In other studies, awareness on CKD was linked to positive outcomes. A case in Taiwan of a quasi-experimental study illustrates this. The study aimed at evaluating the effects of intervention healthcare programs for early stages of chronic kidney disease on patient's knowledge about health and behavior, so as to delay deterioration in their kidney function. The control group was handed out kidney healthcare brochures and booklets but the experimental group would in addition to these also receive independent one to one healthcare coaching sessions for a total of three sessions.

A pretest was done including a questionnaire and physiological and biological examination. A post test was conducted after three months and six months of each case. A comparison analysis done using the paired t test showed that there was an improvement in health knowledge and behavior in both groups and an increase in their scores but the increase in their scores was more

significant for the experimental group. The study time only lasted nine months thus not allowing enough time to investigate further and it also included only out patients in a certain regional hospital in Taiwan thus the results cannot be generalized to all patients with early kidney disease (Yang et al 2013).

Similarly, in Korea, the effect of World Kidney Day campaign on the awareness of CKD and risk factors was evaluated amongst 57,178 people who had undergone a routine health check. The average awareness was 3.1 percent and increased with progressing CKD stage. The awareness increased from 1.1 percent to 5.8 percent after the campaign. The participants were further divided into the CKD aware and unaware groups. Awareness that diabetes and hypertension were risk factors was higher in the CKD aware group also levels of systolic blood pressures and serum cholesterol were lower in the CKD aware group. Although the levels of awareness on CKD were still undesirably low this is an indicator of what further knowledge can contribute to (Chin et al 2009).

Studies done on self-management behaviors have previously been focused on patients who already have been diagnosed with CKD and thus the need to explore these behaviors in the high risk population as a preventive measure. Moreover, current data on factors associated with level of awareness on patients is sparse and not without limitations and there is need to investigate more and determine the effect of awareness on healthy behaviors, a potential mediator between awareness and improved health outcomes (Tuot et al 2013).

Figure 2: Conceptual Framework

Predictors of awareness on chronic kidney disease

| **Demographic factors**

Age

Gender

Marital status | **Clinical factors**

Co morbid illnesses

Lifestyle factors | **Socio-economic factors**

Income

Level of education | **System factors**

Access to testing

Cost

Health education |

Awareness on chronic Kidney Disease

Self-Management Behaviors

- Chronic NSAID use
- Physical activity
- Smoking cessation
- Medical appointments
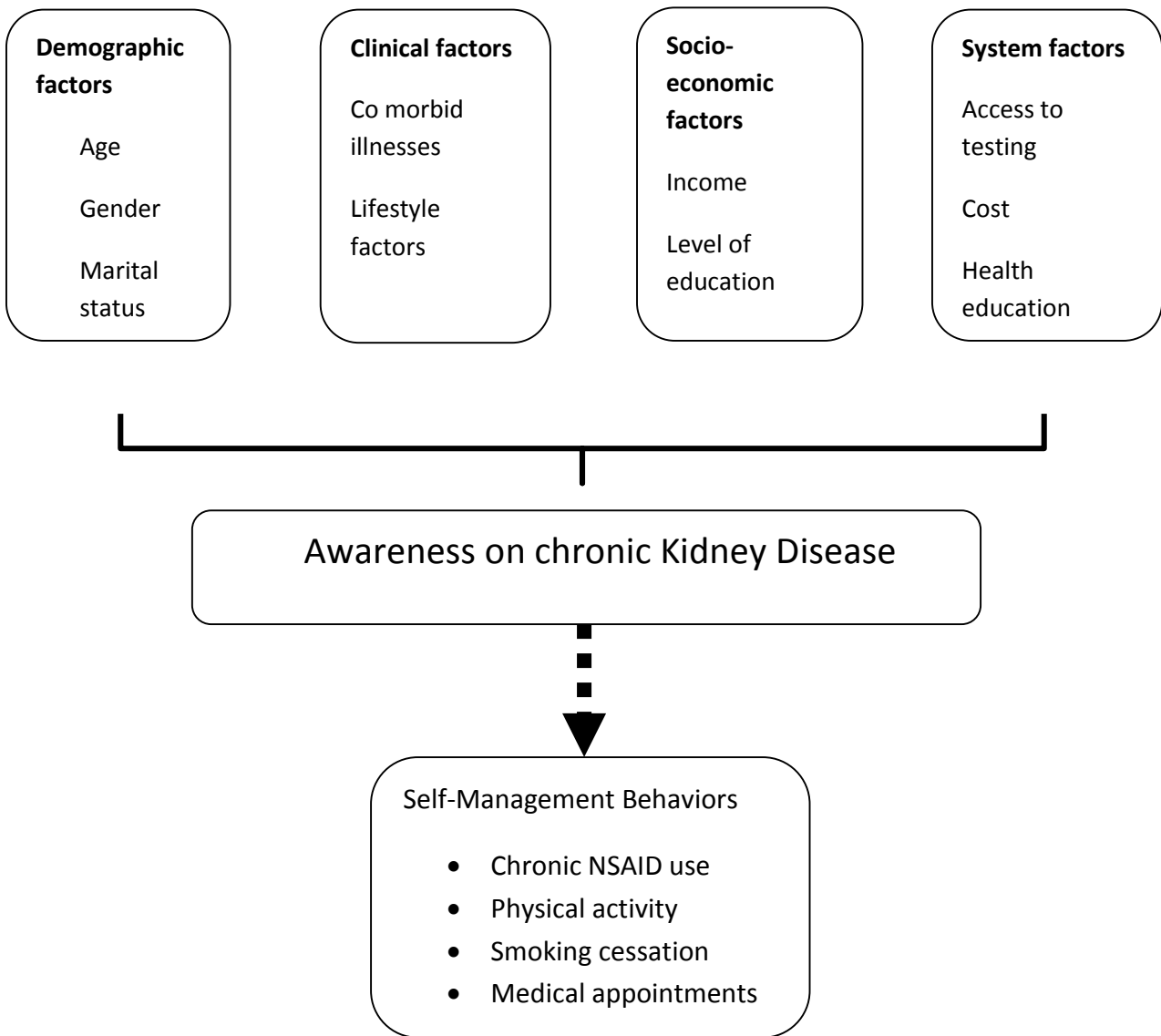
PROBLEM STATEMENT

The pattern of disease burden in the twenty first century has significantly shifted towards chronic diseases. Both morbidity and mortality of chronic diseases are rising, escalated by the increasing prevalence of pandemic health problems such as diabetes mellitus (DM) and cardiovascular diseases (CVD). The epidemics of cardiovascular disease, obesity, diabetes and cancer have all received much attention but by contrast chronic kidney disease has remained largely a 'silent epidemic. This has been attributed to the global health community's focus on infectious diseases and lack of awareness (Nugent et al 2011).

Chronic Kidney Disease (CKD) is a key determinant of the poor health outcomes of major Non Communicable Diseases (NCDs) and one potential outcome is end stage renal disease (ESRD) which requires costly renal therapy. Despite compelling evidence that early detection and treatment of CKD using readily available inexpensive therapies can slow or prevent progression to ESRD and other poor outcomes (Couser et al 2011), low awareness on CKD has been reported in several studies globally and the knowledge on the CKD process is still limited (Stenvinkel 2010).

According to the latest World Health Organization data published in April 2011, Kidney diseases Deaths in Kenya have reached 2,912 or 0.92 % of total deaths. The age adjusted Death Rate is 19.59 per 100,000 of population and CKD has become the 13th leading cause of mortality in Kenya (World life expectancy 2011).

Moreover, Kilingo 2009 reported a high prevalence (43%) of late presentation among 97 CKD patients at the Kenyatta Hospital. The reasons for late presentation of CKD patients included; lack of awareness of the presence of kidney disease, lack of information on the seriousness of the disease prior to referral, lack of money to meet their health needs and use of alternative treatment. Majority of these participants were either diabetic or hypertensive.

This study therefore aims at to determine the awareness level of CKD among the high risk groups and factors associated with awareness of CKD. It also aims at establishing whether a relationship exists between the awareness on CKD and self-care behaviors in this group.

JUSTIFICATION

The incidence and prevalence of CKD has been consistently on the rise globally (Lozano et al 2013). Unlike other chronic illnesses, CKD has remained a silent epidemic with low levels of awareness of CKD among both the general and the high risk populace (Ritz et Bakris 2010).

Chronic kidney disease is an outcome of chronic diseases and infectious diseases. In sub-Saharan Africa, including Kenya much effort has been put in combating infectious diseases such as Malaria, HIV and childhood infections but there has also been compelling evidence of a rise in non-communicable diseases such as diabetes, hypertension and obesity.

Most of the patients 97(43.3%) of the patients presenting as referrals at the renal clinic in Kenyatta National Hospital for the first time were in stage 4 and 5 CKD. 41(42.7%) were diabetic and 36 (37.5%) were hypertensive (Kilingo 2009).

Previous studies have focused on patients' knowledge of CKD among those already diagnosed with CKD or even undergoing dialysis but no study has been done on the persons at risk. It is crucial that the level of awareness of CKD and its predictors is explored among persons at high risk. This is because with the compelling evidence that early detection and treatment of CKD using readily available inexpensive therapies can slow or prevent progression to ESRD. Effective measures can be introduced at an opportune time with an aim to reduce the poor outcomes.

Self-management when interdependent with health care provider has been proven to produce positive health outcomes among patients with chronic diseases (Lorig et al 1999). It is important to determine self-management behaviors among those at high risk in regard to prevention of CKD and also establish whether awareness of CKD has a role in their self-management behavior.

The findings will contribute towards strategy formulation and improvement in the management of these chronic diseases with an aim to reduce the occurrences of poor outcomes such as disabilities, loss of productivity, financial constraints on families, societies and the government.

RESEARCH QUESTION

1. What is the level of awareness of CKD amongst clients with cardiovascular disease or diabetes attending the Kenyatta National Hospital Outpatient Clinics?
2. What are the predictors of awareness of CKD?
3. What are their selected self-management behaviors?

Broad Objective

- To determine the level of awareness of CKD, the predictors and selected self-management behaviors among clients with either cardiovascular disease or diabetes or both attending the Kenyatta National Hospital Outpatient Clinics.

Specific objectives

- To document the socio demographic, system and clinical characteristics and selected self-management behavior of the clients with either a cardiovascular disease or diabetes attending the Kenyatta National Hospital Outpatient Clinics.
- To determine level of awareness on CKD of the clients with either a cardiovascular disease or diabetes attending the Kenyatta National Hospital Outpatient Clinics.
- To establish whether there is a relationship between awareness of CKD and socio demographic factors, system factors, clinical factors and selected self-management behaviors among the clients with either a cardiovascular disease or diabetes attending the Kenyatta National Hospital Outpatient Clinics.

Hypotheses

- There is no association between awareness of CKD on one part and socio demographic factors, system factors, clinical factors, selected self-management behavior on the other part, of the clients with either a cardiovascular disease or diabetes attending the Kenyatta National Hospital Outpatient Clinics.

CHAPTER 3: METHODOLOGY

3.1 Study design

It was a descriptive cross sectional that was conducted to determine the level of awareness of CKD among clients with either a cardiovascular disease or diabetes attending the Kenyatta National Hospital Outpatient Clinics. The study also sought to determine the predictors of awareness level of CKD and their selected self-management behaviors.

3.2 Study Site

The study was conducted at the Kenyatta National Hospital (KNH) which is located about 3km from the city center. KNH was selected purposively as it is currently the largest national referral, teaching and research hospital in Kenya and is the second largest hospital in Africa. It has a staff capacity of 6,000 and a bed capacity of 1,800.

KNH has 50 wards, 22 outpatient clinics, 24 theatres (including 16 specialized theatres) and an Accident and Emergency department. KNH has a total bed capacity of 1800 and 209 of these are located in the private wing. A wide range of diagnostic services are offered such as laboratory, imaging and endoscopy are offered among other specialized treatment. On a given day the hospital hosts between 2,500 to 3,000 patients and on average the hospital caters for over 80,000 inpatients and over 500,000 outpatients annually.

The diabetic clinic was set up twenty-six years ago in the Kenyatta National Hospital and it operates on all week days. The clinic is run by two clinical officers and three nurse educators and the clinic has close links with other departments such as the eye clinic and obstetric clinic (Kenyatta National Hospital 2014).The cardiac clinic is situated within the medical outpatient clinic and it operates on a twice weekly basis.

3.3 Study population

The study population comprised of consenting adults with either a cardiovascular disease or diabetes attending the Kenyatta National Hospital Outpatient Clinics.

3.3.1 Inclusion criteria

- Adult patients (above 18 years) attending the outpatient diabetes clinic.
- Adult patients (above 18 years) attending the outpatient cardiac clinic.
- Patients who had been diagnosed with diabetes for more than six months.

- Patients who had been diagnosed with a cardiovascular disease for more than six months.
- Patients who consented to participate in the study.

3.3.2 Exclusion criteria

- Patients less than eighteen years of age.
- Patients who were either too sick or mentally handicapped.

3.4 Sample size

The sample size was calculated using the formula (Varkveiser et al 1991)

n=$\underline{z^2pq}$

$\quad$ d^2

Where:

n: is the desired sample size

z: is the normal standard deviate which in this study will be 1.96

p: is the prevalence of level of awareness amongst the general populace, CKD populations and diabetic populations to CKD, which ranges from 3 % to 15.8 %(The highest level was used at **15.8 %)**

Q: is 1-p=1-0.158

m: is the margin of error which will be at 5 %(0.05)

Therefore, in this study the sample size was:

n=1.96^2*0.158*0.842/0.05^2=204.43

n=204

Contingency for recording error

n+5%=204*1.05=214.2

Sample size =214 clients.

The sample size for each stratum was calculated in consideration to the population of diabetics seen in the diabetes clinic over the past one year versus the population of clients with cardiovascular diseases seen in the cardiac clinic.

Sample size =214.

3.5 Sampling method

Proportionate Stratified random sampling method was used to select participants until the sample size was attained.

Proportion of diabetic patients in the sample size= (8912/21,751*214) =87.68=88

Proportion of patients with cardiovascular diseases in the sample size = (12,839/21751*214) =126.31=126

a) Number of diabetic patients =88
b) Number of patients with cardiovascular diseases=126

Data collection was over duration of five weeks i.e. from 9th February 2015 to 11th March 2015.

	Outpatient Diabetic Clinic	**Outpatient cardiac clinic**
Clinic days	Monday, Tuesday, Thursday, Friday	Tuesday, Wednesday
Total number of sessions in data collection period	12	8
Average number of booked outpatients in a session	30 in Mini Clinic. 65 in Main Clinic	40 in Mini clinic 120 in Main Clinic
Sample size required from strata	88	126

The number of booked patients was determined and divided by the number of participants required on a daily basis to determine the K. A random number was picked between 1 and K to select the first client and K was then added subsequently to the first random number to get the second number until each session ended. The population per session varied each day as number of attending clients was not always equal to the booked patients.

3.6 Research Instruments

A questionnaire consisting of both open and close ended questions was formulated. It was divided into five sections with a total of 36 questions. Awareness of chronic kidney disease section was partly adopted from Kidney Disease Knowledge Survey that had undergone face and content validity, content saturation and readability prior to use (Chow et al 2012). This was combined with the universal question of awareness on CKD" Have you been informed by your doctor that you have failing kidneys/ have you had your kidney function tested?" This was in an effort to comprehensively determine awareness level in both phases. The selected self-management behaviors section included the positive behaviors associated with prevention of CKD as listed in the KDQI guidelines as well as adoption from the questionnaire used by Tuot et al 2013 in the study on Healthy behaviors, risk reduction targets and awareness on CKD. A pilot study was conducted amongst patients attending the Mbagathi District Hospital diabetic and cardiac clinics. The questionnaire was thereafter modified to ease understanding among the participants prior to data collection

3.7 Data collection procedures

I (the principal investigator) and two research assistants introduced ourselves to the study participants and acknowledge our interest in conducting a research study aimed at providing information to all stakeholders on ways to prevent or slow progress of kidney disease. We acknowledged their participation and role in the study. The study participants were informed that all information given would be handled with utmost confidentiality and anonymity would be maintained. They were also informed that they could stop participation at any point during data collection without any penalties. They were taken through the consent form so as to be conversant with their rights, any benefits or risks and were allowed to ask any questions appertaining to the study for clarity on their role before signing the consent form (Appendix 1). The study participants were briefed that they would be required to fill out a questionnaire in the privacy of a secluded place within the clinic. Upon agreement, consent was obtained and the participants directed to the study room. All the participants were educated on what CKD is, the risk factors and prevention measures soon after the completion of questionnaire.

3.8 Variables

The Dependent variable in this study was level of awareness of CKD.

The level of awareness on CKD was determined by a score after answering questions on general CKD awareness, individual CKD status and knowledge on CKD.

The independent variables were as listed:

I. Demographic characteristics: Age (less than 40 years old, 40 to 60 years and above 60 years), gender, residence (within Nairobi, Outside Nairobi.

II. Clinical factors: Co morbidities as self-report on any as reported by the participant i.e. hypertension, diabetes, self-report on duration of illness in years

III. Socio economic factors; marital status (single, married, separated/divorced or widowed), educational level (Primary, Secondary, College or no formal education), income level (Less than KES.10, 000, KES.10, 000 to KES.29, 999, KES.30, 000 and above), employment status (self-employed, employed, unemployed, retired).

IV. System factors; Insurance coverage (medical expenses incurred by the government or private organization- this would be derived from the question on mode of payment), access to hospital (self-report of difficulties in accessing care), affordability of health care (self-report of challenges in affording to pay for medical care-appointments, tests and drugs).

V. Selected Self-management behaviors; physical activity (none, occasional being less than 3 times per week and frequent being three or more times per week), keeping of medical appointments (self-report of missing an appointment in the past six months), Chronic NSAIDs use (self-report of use of listed drugs twice or more in a week) and tobacco avoidance (self-report of tobacco use even if occasional).

- Physical activity was determined by the question" How many times per week do you engage in intense activity, enough to work up a sweat?" Answers were categorized into three groups: none, occasional (1-3 times per week) and frequent (>3 times per week).

- Chronic NSAID use was defined by a "Yes" response to "Are you currently taking any of the following drugs at least two times each week (a list of NSAID drugs was provided).

- Tobacco avoidance was defined by a "No" response to "Do you smoke cigarettes, even if occasionally?"

- Keeping Medical appointment was defined by a "No" response to "In the past six months could you have missed any of the medical appointments in the clinic?"

3.9 Minimization of errors and biases

A pilot study was conducted amongst clients with either cardiovascular disease or diabetes attending the Mbagathi District Hospital Outpatient Clinic. The questionnaire was refined using feedback from the respondents prior to data collection. The questionnaire was provided in two languages (English and Swahili) to suite the participants' preference, improve comprehension and ensure accuracy in data collection.

Two research assistants of medical background were recruited to assist with data collection. They were trained on how to introduce the study to the participants observing all the preset standards. They were taken through the questionnaire for comprehension and accuracy in data collection.

Contingency error was calculated and used to increase the sample size to cater for non-response.

3.10 Data management and analysis

Frequency and Percentages were calculated for participant characteristics in each group (diabetic and Cardiovascular group) i.e. their socio demographic, clinical system characteristics and their engagement in selected self-management behaviors.

Frequencies and Percentages were also calculated for all participant characteristics on the different levels of awareness (general awareness, self-report on having undergone a kidney function, awareness on the CKD status and knowledge on CKD).

The Overall CKD awareness was calculated using descriptive statistics whereby an overall score was generated out of the possible nine related questions i.e. mean, mode and median.

Chi square tests were performed to determine any associations between the overall CKD awareness and the outcome variables. By treating $>= 5$ and <5 scores as dependent dichotomous variable, chi square was used to evaluate associations with each independent variable. Logistic regression analysis was carried out to adjust for potential confounders for variables that showed significant association in the chi-square test. Statistical analysis was performed using SPSS version 20.0 and the level of statistical significance was set at a p-value < 0.05.

3.11 Ethical considerations

Ethical clearance was obtained from the Kenyatta National Hospital and the University of Nairobi Ethics Research and Standards Committee. The Hospital administration was contacted to give permission for the study to be conducted.

An informed consent was sought prior to filling in of the questionnaires and all participants were given a one on one session on what is kidney disease, the risk factors to CKD, the prevention measures and depending on the knowledge gaps were informed more about CKD by the principal investigator and the research assistants.

3.12 Limitations

Actual CKD status could not be established and therefore reliance on recall of information by the participants.

3.13 Dissemination of results

The research findings from the study was compiled, written and presented to the relevant stakeholders for examination purposes, publication and abstract presentation for scientific use. The results will be presented to the management of Kenyatta National Hospital to aid the healthcare team in the management and the prevention of CKD amongst the high risk groups. The results will also be forwarded to the Ministry of Health to help in policy and strategy formulations in programs aimed at preventing or reducing Kidney failure.

CHAPTER 4: RESULTS

4.1 Participant Characteristics

4.1.1 Socio demographic and economic characteristics

A total of 215 respondents fully participated in the study. Majority of them (43.7%) were aged 40-60 years, female (71.6%), married (73.8%) and Christian (96.7%). 57.3% of the respondents resided within Nairobi (Table 1).

Fourteen (6.5%) of the participants had no formal education whilst the majority 82 (38.1%) had attained a secondary level of education. Retirees constituted 25.7% of the sample population while those who were unemployed accounted for a fifth of the population 55 (21 %). Out of the 105 participants who were either self-employed or employed, majority (38.1%) reported to be earning a household monthly income between KES 10, 000 - KES 29,999 followed closely by those who earned less than KES 10,000 (37.3%). Only 9(8.6%) of those who were either employed or self-employed had a household monthly income of KES.50, 000 and above (Table 2).

Table 1: Distribution of respondents by demographic characteristics

Characteristic	Number	Percentage %
Age (years)	**n=215**	
< 40	42	19.5
40-60	94	43.7
> 60	79	36.7
Gender	**n=215**	
Male	61	28.4
Female	154	71.6
Marital status	**n=214**	
Single	32	15.0
Married	158	73.8
Separated/Divorced/ Widowed	24	11.2
Religion	**n=214**	
Christian	208	96.7
Muslim	7	3.3
Residence	**n=211**	
Within Nairobi	121	57.3
Outside Nairobi	90	42.7

Table 2: Distribution of respondents by Socio economic characteristics

Characteristic	Number	Percentage (%)
Level of education	**n= 215**	
Primary education	76	35.3
Secondary education	82	38.1
College education	43	20.0
No formal education	14	6.5
Status of employment	**n=214**	
Self Employed	66	30.8
Employed	48	22.4
Unemployed	45	21.0
Retired	55	25.7
Monthly income (KES)	**n=204**	
None	99	48.5
Less than KES10,000	34	16.7
KES10,000 to KES 29,999	40	19.6
KES 30,000 to KES 49,999	22	10.8
KES 50,000 to KES 69,999	3	1.5
KES 70,000 and above	6	2.9

4.1.2 Clinical characteristics

Almost half, 102(47.9%), respondents self-reported the presence of other comorbidities. The most common comorbidities reported by those attending the diabetic clinic was hypertension (69%) and arthritis (33%) among those attending the cardiovascular clinic (Figures 2&3). Most participants i.e. 75(35.2 %) reported to have suffered either from the cardiovascular disease or diabetes for 2-5 years as shown in Table 3.

Table 3: Distribution of respondents by clinical characteristics

Characteristic	Frequency	Percentage (%)
Duration of illness	**n=213**	
<1 year	14	6.6
2-5 years	75	35.2
6-10 years	50	23.5
More than 10 years	74	34.7
Presence of other illness	**n=213**	
Yes	103	47.9
No	110	51.2
Patient Group	**n=215**	
Cardiovascular	126	58.6
Diabetes	89	41.4
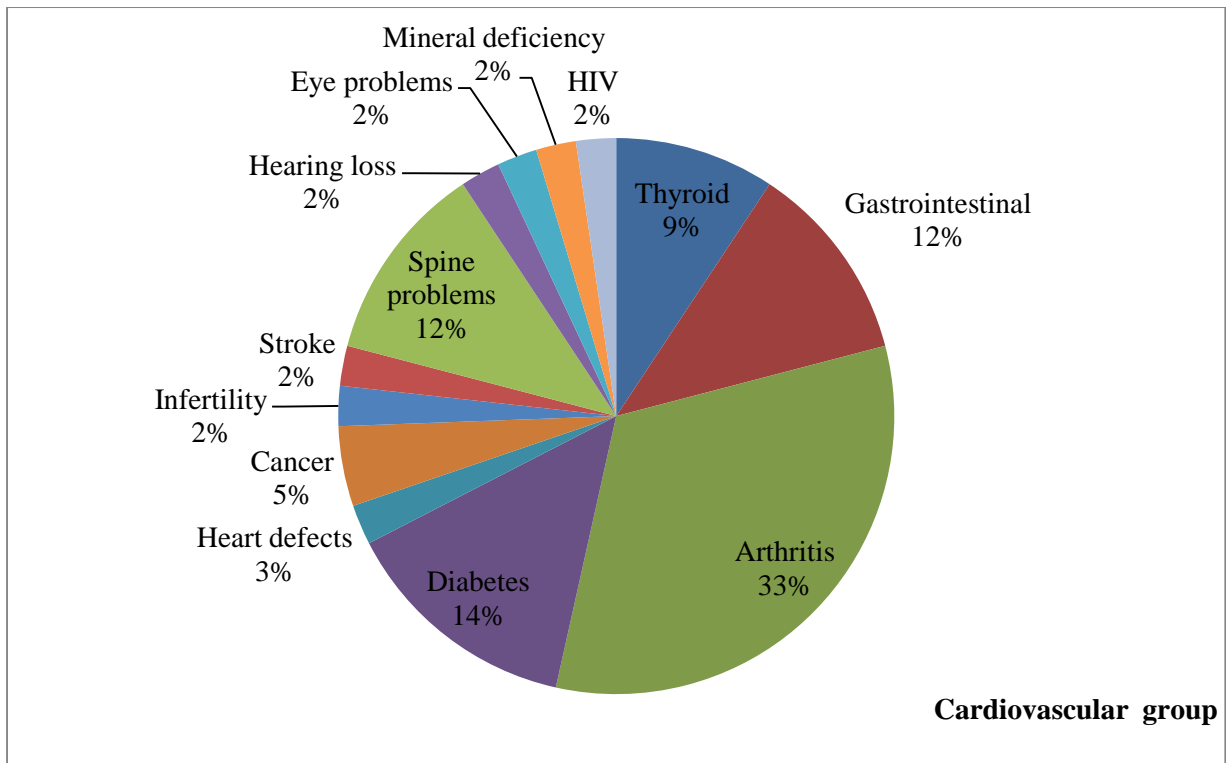
Figure 3: Distribution of other illnesses in the cardiovascular group
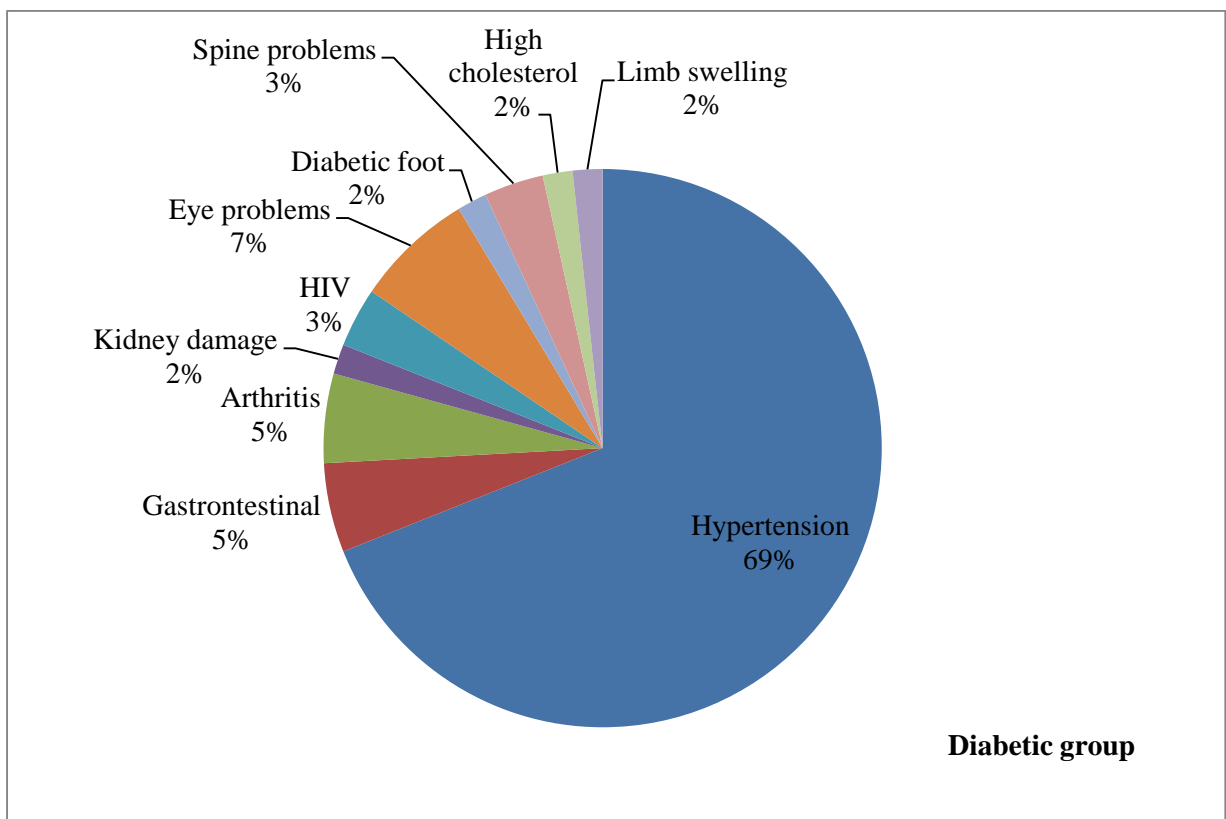
Figure 4: Distribution of other illnesses in the Diabetic group

4.1.3 System related characteristics

Kenyatta National Hospital has an overall medical clinic which covers all clients with medical illnesses who require follow up. In the main clinic, specific illness clinics are run on scheduled days. The cardiac clinic which encompasses all patients with hypertension or heart disease is run twice in a week while the diabetic clinic is run on four days in a week and one day secluded for health education.

Majority 83 (39.7%) of the patients' attending both clinics had a twice a year scheduled appointments followed by quarterly appointments 58 (27.8%) as illustrated in Figure 4.
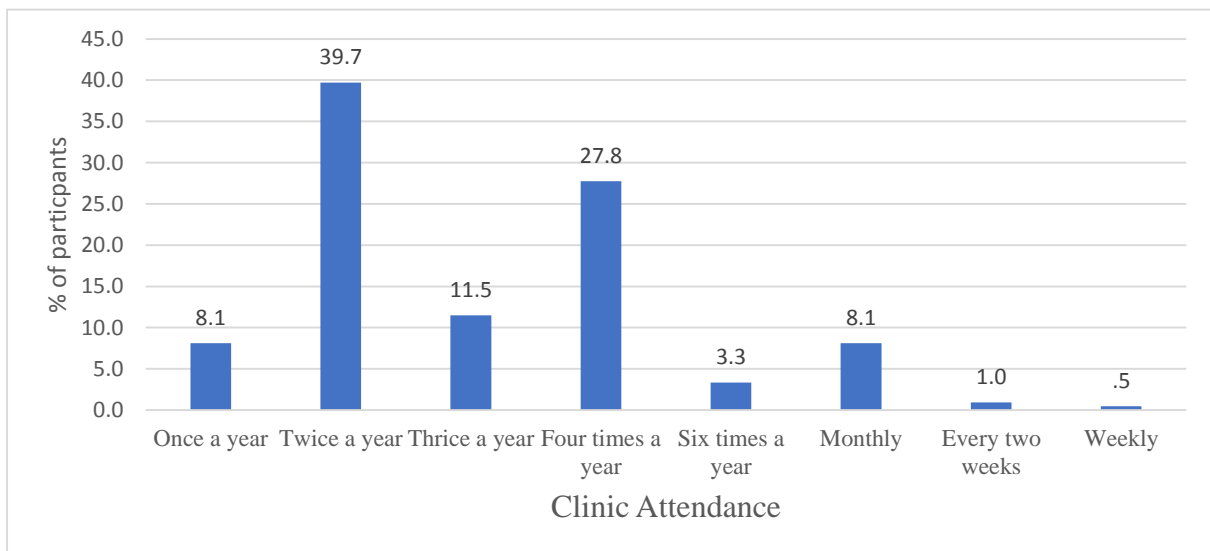
Figure 5: Distribution of respondents by clinical attendance

Most patients, 179 (84.4%) did not miss their clinic appointments. Among those who had missed, 8 (24.2%) did not indicate and were not able to remember how many times they had missed.

Twenty nine (87.8%) gave explanations for missing their appointments. 13(43.8%), were not available either due to work or engagement in other family responsibilities such as taking care of a sick relative. 5(15.6%) missed because they could not afford either the costs of the appointments or the drugs and tests that would ensue after the appointment.

Another 4(12.5%) missed either due to transport problems as a result of high costing or difficulty in accessing transport or arriving late at the clinic. 3(9.4%) of the respondents did not attend because they had either lost their appointment card or test results. 4 (12.1%) participants did not provide a reason for missing the clinic appointment as illustrated in Figure 5.
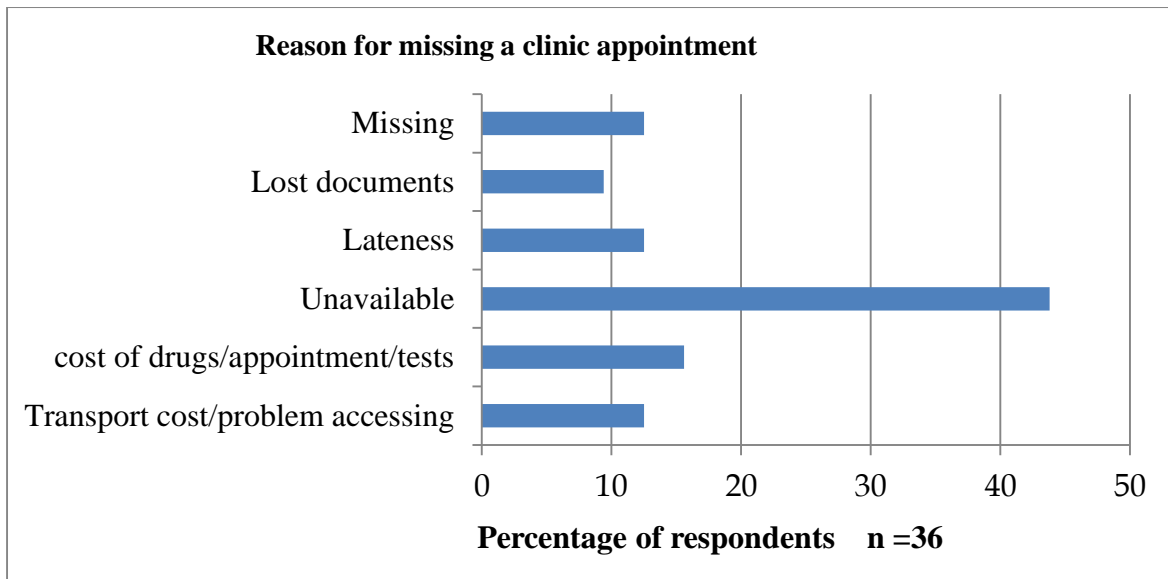
Figure 6: Distribution of respondents by reason for missing a clinic appointment

The mode of payment for clinic attendance, drugs and tests was mainly through cash. Only 26 (12 %) participants were using an insurance cover which was mainly NHIF and one respondent 1 (1%) used their Credit Card to pay for the services and medications and one respondent fee was waived by the social services department as illustrated in Figure 6.
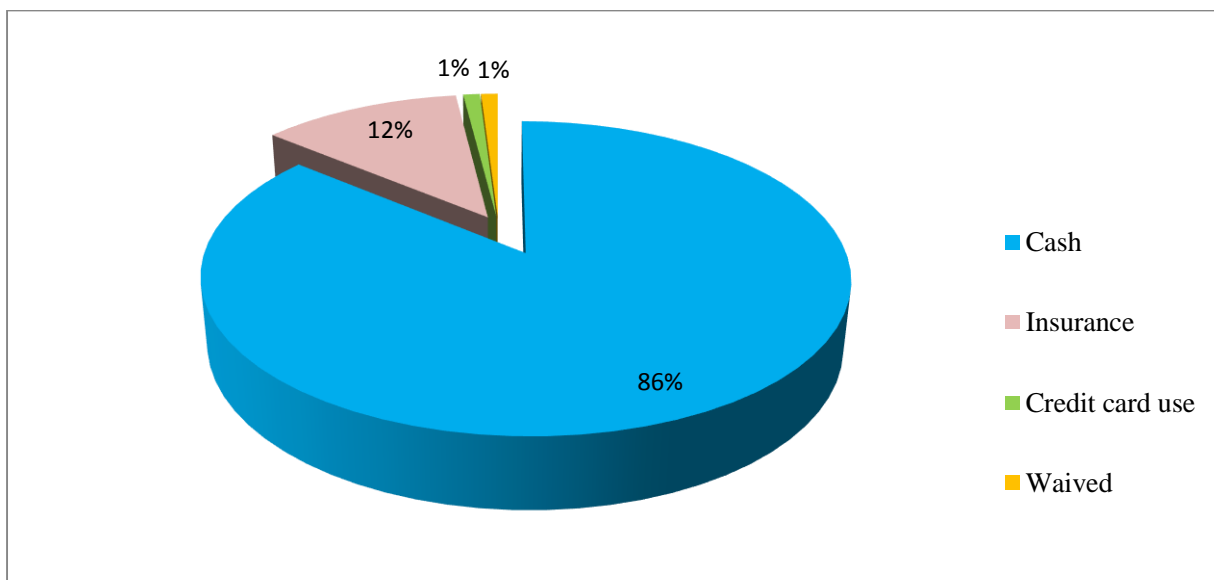
Figure 7: Distribution of respondents by mode of payment

4.2 Awareness of Chronic Kidney Disease among High Risk Patients

4.2.1 General awareness on chronic kidney disease

Overall 158 (73.5 %), of the respondents responded to the affirmative to the question" Have you ever heard of kidney disease?" The most common source of information about CKD was from the medical practitioners at 67 (42.4%) while the least source of CKD information was from school 2 (1.3%).
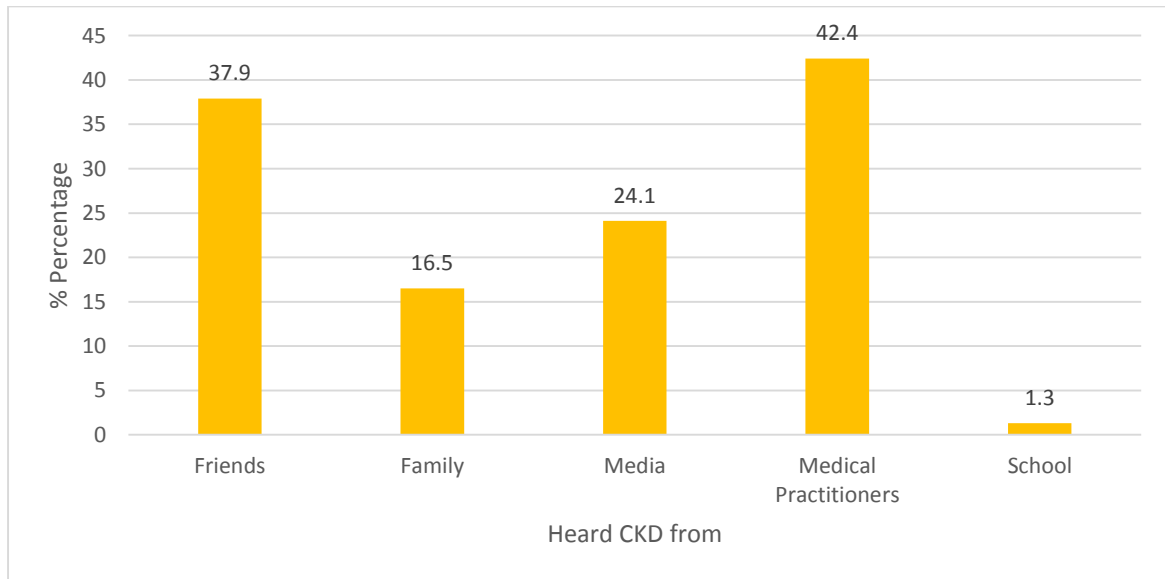
Figure 8: Distribution of respondents by source of kidney disease information

Having heard about CKD was associated with higher level of education level (x^2 11.557, df 1, p 0.027) and being diabetic ((x^2 4.281, df 3, p 0.009) as shown in Table 4.

Table 4: Distribution of respondents by prior exposure to information on kidney disease

Characteristic	Heard of CKD		Chi Square	
Patient group	**Yes (%)**	**No (%)**	**statistic(df)**	**P-value**
Cardiac	86(63.8)	40(31.7)	4.281(1)	0.027*
Diabetes	72(80.9)	17(19.1)		
Level of education				
Primary	53(69.7)	23(30.3)	11.557(3)	0.009*
Secondary	57(69.5)	25(30.5)		
College	40(90.3)	3(7.7)		
No formal education	8(57.1)	6(42.9)		

4.2.2 Individual CKD status

The study sought to determine the whether respondents knew the status of their kidneys by asking them whether they had undergone a kidney function test and the findings. 151(70.2%) of the respondents answered "Yes" to the question "Have you been tested for kidney function?" 3 respondents were not sure. Most 146 (96.7%), reported to have done it as a result of advice from the doctor or nurse at the clinic.

However, 69(32%) of the total respondents did not know their results. Among those who knew their results a response of "good", "not so good" or "kidney disease" was elicited. There was no mention of values or the degree of function as shown in Figure 8.

■ Good/ Normal ■ Not so good/Kidney Disease ■ Don't Know, Cant remenber ■ Missing
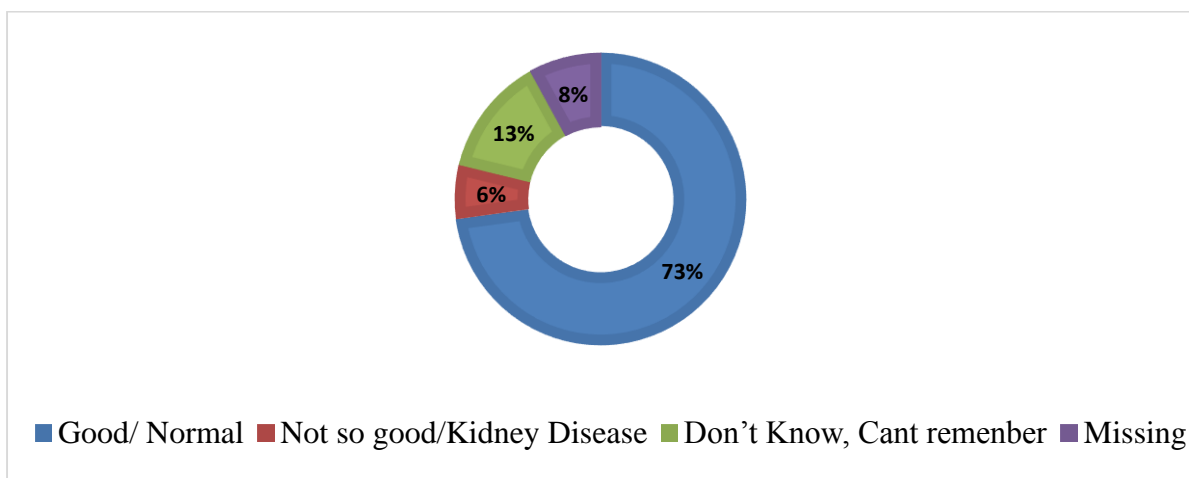
Figure 9: Distribution of Kidney Function Test Results

Among those who had not undergone the kidney function test, 39(63.8%) were not aware of the test while 5(8.6%) of them could not afford. 4(6.9%) had never thought about it while 1(1.7%) of them did not find it necessary as they had no symptoms indicating kidney failure.

Participants from the diabetic clinic were more likely to have undergone a kidney function test x^2(1, n=215) =17.499, p<0.001) as illustrated in Table 5.

Table 5: Distribution of respondents by Kidney Function Test done

Characteristic	Kidney Function Test done		Chi Square	
Patient group	**Yes (%)**	**No (%)**	**statistic(df)**	**P-value**
Cardiac	74(60.2)	49(39.8)	17.499(1)	0.000*
Diabetes	77(86.5)	12(13.5)		

4.2.3 Awareness of facts about chronic kidney disease

This section consisted of seven questions about kidney disease intended to assess the respondents' knowledge on the Anatomy, Physiology, Etiology, presentation, Progression, Resources available and Treatment.

The function of the kidney answered correctly by most 140 (65.1%) participants. However, 16(7.4%) knew that kidney disease is common, preventable, irreversible and has earlier stages prior to dialysis. Only 8(3.7%) knew that kidney disease can be present without any symptoms as shown in Figure 9.
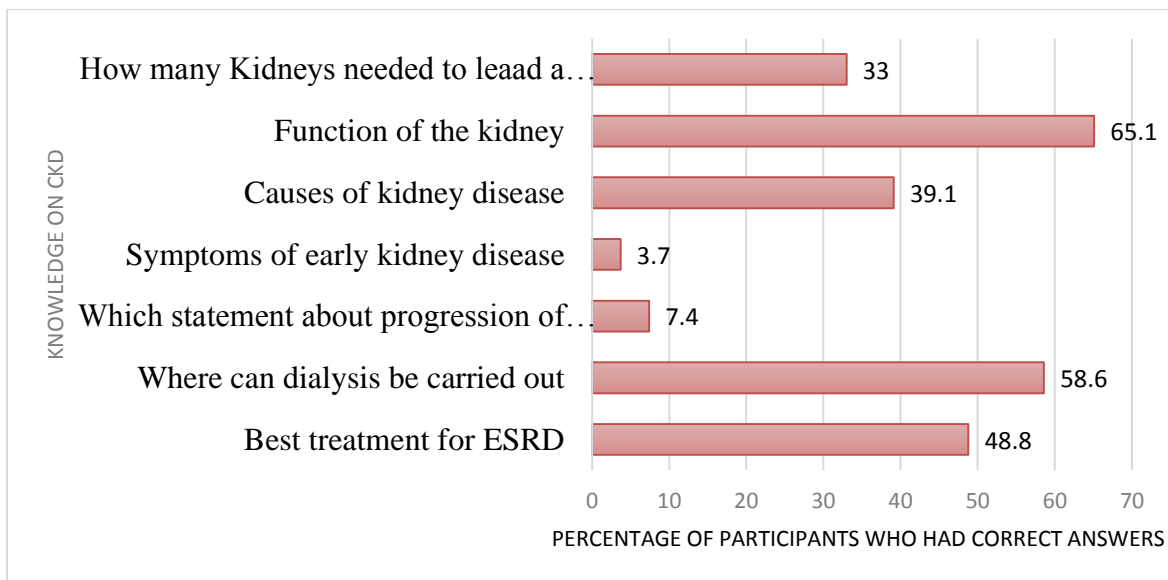
Figure 10: Percentage distribution of respondents who gave correct answers to the kidney knowledge questions

4.2.4 Overall awareness levels among the respondents

The overall level of awareness among the respondents was determined by a summation of scores from the general awareness, self-awareness and knowledge on kidney disease questions.

One point was awarded if the respondent had heard about kidney disease, one point if the respondent had undergone a kidney function test and one point awarded for a correct response to each of the seven kidney knowledge questions resulting to a maximum score of nine and a minimum score of zero.

A respondent was considered to have an adequate level of awareness if they scored at least 5 points out of a maximum 9 points. The median score was 4 points and the mode was 6 points.

The highest score attained among the respondents was 8 points and only 6 (2.8%) of them attained it while 12 (5.6%) of the respondents had a score of 0 points. Only 97 (45.6%) of the respondents had an adequate level of awareness on CKD i.e. had an overall score of 5 and above out of a possible 9 as shown in Figure 10.
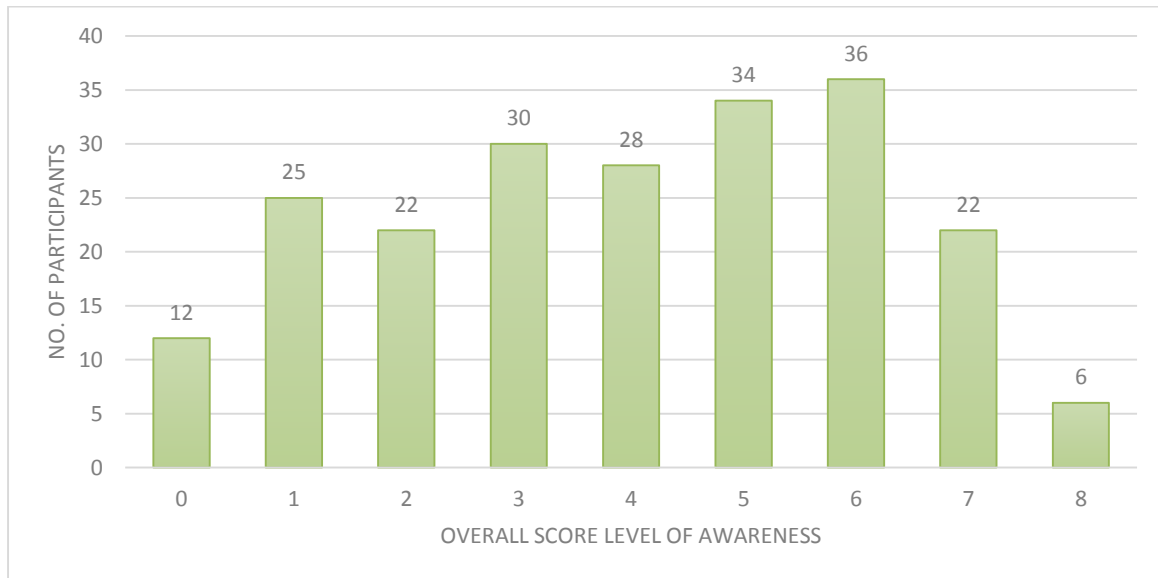
Figure 11: Frequency distribution of respondents' overall awareness scores

4.3 Self-Management behaviors among the respondents

Most of the respondents 177(82.3%) participated in physical exercise as part of their self-management with 129(72.9%) of them engaging in physical activity three or more times in a week. The most common exercises included walking among 131(73.9%) of the respondents and 138(78.2%) reported to be involved in house chores/gardening.

Most 18(42%) participants who did not participate in physical activity did not provide a reason as to why they did not. 13(34%) of the participants cited illness and general body weakness), 3(8%) were recuperating from surgery, 3(8%) were fatigued and 2(5%) cited old age. One (3%) participant had stopped due to change in work environment.

Non-Steroidal Anti Inflammatory Drugs (NSAIDS) use more than twice a week was prevalent amongst a fifth i.e. 45(20.9%) of the participants and only 7(3.3%) of the respondents were smokers as illustrated in Figure 11.
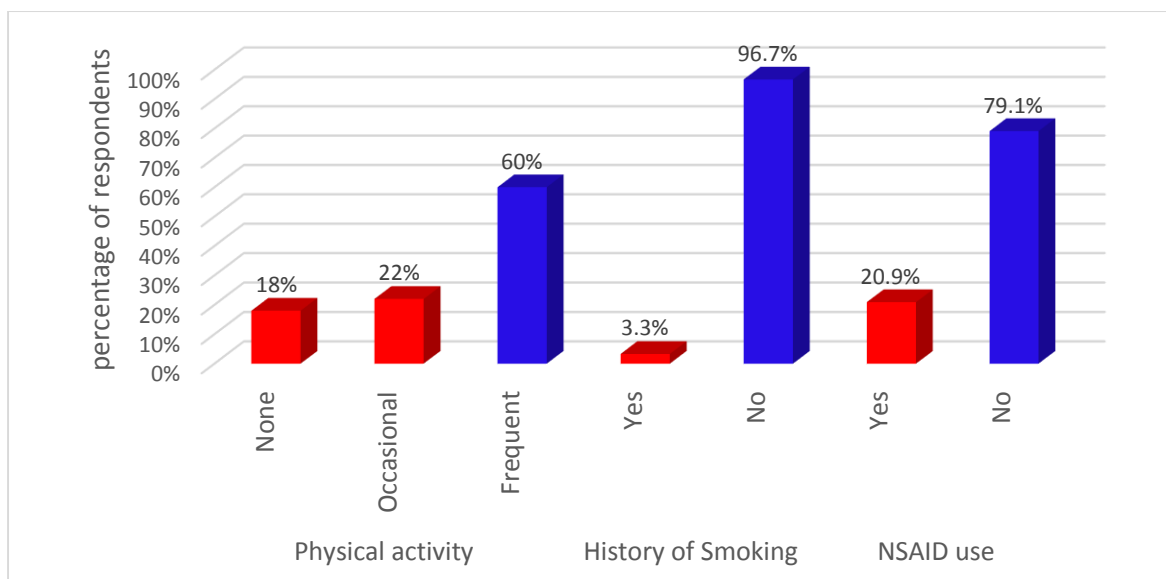
Figure 12: Frequency Percentage distribution of self-management behavior among the respondents

4.4 Predictors of Awareness of Chronic Kidney Disease.

4.4.1 Demographic variables

There was a significant relationship between awareness of CKD and residence (x^2 = 3.170, df=1, p=0.050) with 51.2 % of those were adequately aware of CKD living in Nairobi However, there was no difference in awareness of CKD across the age(x^2 = 5.228, df=2, p=0.073) and gender (x^2 = 2.490, df=1, p=0.077) of the participants as illustrated in Table 6.

Table 6: Relationship between awareness of CKD and demographic variables (n=215).

Characteristic	Level of awareness		Test statistic (Chi square)	
	Inadequate (%)	Adequate (%)	Statistic(df)	P-value
Age				
< 40 years	21(50.0)	21(50.0)	5.228 (1)	0.073
40-60 years	45(47.9)	41(52.1)		
>60 years	51(64.6)	28(35.4)		
Gender				
Male	28(45.9)	33(54.1)	2.490 (1)	0.077
Female	88(57.8)	65(42.2)		
Residence				
Within Nairobi	59(48.8)	62(51.2)	3.170 (1)	0.050*
Outside Nairobi	55(61.1)	35(38.9)		

4.4.2 Socio economic variables

Significant associations were also observed between awareness of CKD and each of the factors: marital status level of education ((x^2 = 31.486, df =3, p< 0.000), status of employment ((x^2 = 16.105, df =3, p=0.001) and monthly income (x^2 = 10.882, df=2, p=0.004). Those who had college education, were employed and had a monthly income kshs.30, 000 or more were more likely to have adequate level of awareness of CKD as shown on Table 7.

Table 7: Relationship between level of awareness on CKD and Socio economic variables

Characteristic	Level of awareness		Test statistic (Chi square)	
	Inadequate (%)	Adequate (%)	Statistic(df)	P-value
Marital status n=215				
Single	18(56.2)	14(43.8)	5.047(2)	0.080
Married	80(50.6)	78(49.4)		
Separated/Divorced/Widowed	18(75.0)	6(25.0)		
Level of Education n=215				
Primary education	54(71.1)	22(28.9)		
Secondary education	41(50.0)	41(50.0)	31.486(3)	<0.001*
College education	10(23.3)	33(76.7)		
No formal education	12(85.7)	2(14.3)		
Status of employment n=214				
Self Employed	35(53.0)	31(47.0)	16.105(3)	0.001*
Employed	15(31.2)	33(68.8)		
Unemployed	31(68.9)	14(31.1)		
Retired	35(63.6)	20(36.4)		
Monthly income (KES) n=204				
Less than Kshs.10,000	22(64.7)	12(35.3)	10.882(2)	0.004*
KES 10,000 – KES 29,999	16(40.0)	24(60.0)		
KES 30,000 and above	8(25.0)	24(75.0)		
Religion n=215				
Christian	113(54.3)	94(45.7)	Fischer's exact	1.000
Muslim	4(57.1)	3(42.9)		

4.4.3 Clinical variables

On the other hand, the duration of illness, presence of co morbidities and being diabetic or having a cardiovascular condition did not have a significant relationship with awareness of CKD (p values were > 0.05) as illustrated in Table 8.

Table 8: Relationship between level of awareness on CKD and clinical variables (n=215).

Characteristic	Level of awareness		Test statistic (Chi square)	
	Inadequate (%)	Adequate (%)	Statistic(df)	P-value
Duration of illness				
Less than 1 year	7(50.0)	7(50.0)	1.208(3)	0.751
2-5 years	43(57.3)	32(42.7)		
6-10 years	29(58.0)	21(42.0)		
More than 10 years	37(50.0)	37(50.0)		
Presence of other illness				
Yes	57(55.3)	46(44.7)	0.062(1)	0.456
No	59(53.6)	51(46.4)		
Patient Group				
Cardiac	74(58.7)	52(41.3)	2.281(1)	0.085
Diabetic	43(48.3)	46(51.7)		

4.4.4 System variables

Similarly, the respondents' clinic attendance, mode of payment for consultations, tests and treatment did not have a significant relationship with awareness of CKD among the respondents (p values were> 0.05) as illustrated on Table 9.

Table 9: Relationship between level of awareness on CKD and system variables (n=215).

Characteristic	Level of awareness		Test statistic (Chi square)	
	Inadequate (%)	Adequate (%)	Statistic(df)	P-value
Clinic attendance n=209				
Once a year	8(47.1)	9(52.9)	4.417(4)	0.352
Twice a year	43(51.8)	40(48.2)		
Thrice a year	17(70.8)	7(29.2)		
Four times a year	33(56.9)	25(43.1)		
Six times a year or more	12(44.4)	15(55.6)		
Missed appointments n=212				
Yes	17(51.5)	16(48.5)	0.117(1)	0.438
No	98(54.7)	81(45.3)		
Mode of Payment n=215				
Cash	107(90.7)	83(85.6)	0.884(1)	0.230
Insurance/ Credit Card	11(9.3)	14(14.4)		

4.4.5 Selected Self-management behaviors

There was no significant statistical difference between participants who were adequately aware and those who were inadequately aware of CKD in their self-management behaviors. (P values were >0.05) as illustrated on Table 10.

Table 10: Relationship between level of awareness on CKD and selected self-management behaviors

Characteristic	Level of awareness		Test statistic (Chi square)	
	Inadequate (%)	Adequate (%)	Statistic(df)	P-value
Physical exercise n=215				
Yes	93(52.5)	84(47.5)	1.421(1)	0.156
No	24(63.2)	14(36.8)		
Smoking				
Yes	2(28.6)	5(71.4)	Fishers exact	0.250
No	115(55.3)	93(44.7)		
NSAID use				
Yes	26(59.1)	18(40.9)	0.574(1)	0.279
No	88(52.7)	79(47.3)		

4.4.6 Regression Analysis

A binary logistic regression was carried out on the factors that had shown significant associations with the dependent dichotomous variable i.e. overall awareness level (Inadequate < 5 and adequate >=5 points) the relationship between level of awareness of CKD and residence, level of education, employment status and monthly income.

The logistic regression model was statistically significant $x^2(8) = 25.811$, p=0.001. The model explained 29% Nagelkerke R^2 of the variance in level of awareness of CKD and correctly classified 72.6% of cases.

Regression analysis revealed having college education [Odds Ratio (OR) 6.914, 95% Confidence Interval (CI) 1.635, 29.238, p =0.009] and earning a monthly income KES. 30,000 and more [Odds Ratio (OR) 3.489, 95% Confidence Interval (CI) 1.036, 11.751, p=0.044] were more likely to have adequate awareness of CKD as illustrated in Table 11.

Table 11: Logistic regression analysis, adjusted for demographic variables and socio economic variables with p< 0.005

	B(Co-efficient)	Std. Error	Sig.	Odds Ratio(OR	95% C.I. for OR	
					Lower	Upper
Constant	-0.962	.479	0.065	0.382		
Residence						
Within Nairobi	**Ref**					
Outside Nairobi	-0.055	0.479	0.908	0.946	0.370	2.419
Level of Education						
Primary	**Ref**		0.046			
Secondary	0.513	0.576	0.373	1.671	0.540	5.171
College	1.934	0.736	**0.009***	6.914	1.635	29.238
No formal education	-0.241	1.355	0.859	0.785	0.055	11.187
Employment status						
Self Employed	**Ref**		0.918			
Employed	0.194	0.471	0.680	1.215	0.483	3.056
Retired	-20.967	28288.211	0.999	0.000	0.000	
Income level						
Less than KES. 10,000	**Ref**		0.118			
KES.10,000 -29,999	0.351	0.400	0.527	1.420	0.478	4.218
KES.30,000 and above	1.250	4.067	**0.044***	3.489	1.036	11.751

DISCUSSION

Characteristics of the Respondents

Our study population which constituted 215 participants was semi urban. Majority (43.7%) were aged between 40 to 60 years, married (73.8%) female (71.6%) and Christians (96.7%).

National survey in Kenya revealed diabetes was more prevalent between the ages 45-54 years (Mohammed et al 2018). Another surveillance done in Kenya to determine cardiovascular risk revealed men in the 45–54 years' age range and women above 64 years to have the greatest proportion of more than two cardiovascular risk factors in Kenya (Bloom field 2014). This would explain the high proportion of participants being less than 40 years old.

According to Kenya Bureau of Statistics 2019, the married population is estimated at 33%, however, the highest age group according to Kenya Demographics Profile 2018 is young between 0 and 19 years. This age group does not lie in the marriage bracket. The, participants in this study are mainly aged between 40- 60 years and would more likely be married as compared to the national population. The predominant religion in Kenya is Christianity at 84.6% followed by Islam at 11%. The over representation of Christian and under representation of Islam would be due to concentration of the Muslim community away from the location of the health facility and they therefore might be seeking care from nearby health facilities.

The female gender was also overrepresented in comparison to demographic characteristics as shown in World Data Atlas in 2015 whereby the male to female ratio for Kenya was 0.987: 1. Determinants of health seeking behavior in Nairobi slum revealed females are more likely to seek out professional health care compared to their male counterparts, co efficient estimate -2.70 and being male decreases the likelihood of visiting public facilities relative to self-treatment. Other determinants such as quality of service and waiting time were noted. However, this could explain why more females presented to the clinics for health care service.

Most 139 (64.6%) had suffered hypertension, cardio vascular disease or diabetes for less than ten years and 119 (55.3%) reported to have other co morbidities. Of note is 61(69%) of those attending diabetic clinic were hypertensive. Clinic attendance was good 179 (84.4%) and 185 (86%) paid for their consultations, tests and drugs by cash. Majority 177(82.3%) of the respondents engaged in frequent physical exercise and only 7(3.3%) were smokers. However, 45(20.8%), n=214 were noted to be frequently using Non-Steroidal Anti Inflammatory Drugs (NSAIDs).

The participants were generally mature with reasonable education and had a long duration of their illness. The participants would be expected to be more aware of CKD as a likely complication and prevention strategies if programs to improve their awareness were put in place.

Awareness on Chronic Kidney Disease

The study revealed 98(45.6%) of the participants had adequate level of awareness of CKD. This implies that every alternate participant was inadequately aware of CKD. The median score was 4 out of a maximum of 9 points.

CKD awareness was based on three phases and differed in each phase. It aimed at determining their general awareness of CKD existence, whether they knew their CKD status by self-report and it also delved deeper to determine their understanding on CKD.

General awareness on CKD

The question on general awareness has only been posed among general public but not in any study targeting the at high risk groups. In Nigeria, residents of a rural community were asked if they had heard of kidney disease before and only 186 (33%) said "yes" with 110 (59.3%) from the media and 66(35.3%) from health workers (Oluyombo 2016). However, the general awareness among at high risk groups is expected to be higher than the public due to the regular follow up of these individuals by medical practitioners.

In this study 158 (73.5%) of the respondents had heard about kidney disease. The most common source of CKD information was from the medical practitioners 67 (42.4%). This suggests that CKD information has mainly been shared through clinic visits and other ways e.g. media and school curriculum need to be explored. 34 (27%) of clients in the cardiac clinic were less than 40 years old and 40 (45 %) of those attending the diabetic clinic were between forty and sixty years. The use of social media and television programs for the young adults and radio programs for the middle aged population would be new ventures to incorporate.

Awareness of Individual status

The second phase was to find out awareness on the individual CKD status among the respondents. This was determined by eliciting a self-report on whether a participant had undergone any test for their kidney function. 151 (70.2%) reported to have undergone the blood kidney function test. 109 (72.8%) of the respondents reported that they had been informed by the clinicians that their results were good but none could recall the values of the results. 5 (6%) of the respondents all from the diabetic clinic reported a degree of kidney disease while 32 (21.2%) did not know their results. Responses elicited to determine the status of the participants' kidneys were either stated as "good", "not very good" or "bad".

Previous studies have defined awareness of individual CKD status by a "yes" answer to the question" Have you ever been told by a doctor or health care professional that you have a failing kidney?" (Platinga et al 2010, Tout et al 2013)

The United States of America National Kidney Foundation (NKF) implemented the Kidney Early Evaluation Program (KEEP) for the detection of kidney disease among high risk individuals, defined as presence of diabetes mellitus or hypertension, or having a first-order relative with diabetes, hypertension, or kidney disease. Out of 7,853 participant, 2042(26%) had CKD and only 184(9%) of those with CKD were aware (Whalley Conell et al 2008). Similarly, of 2,615 participants, only 157(6%) of the study participants taken up from a larger study in regards to stroke with CKD were aware of their CKD status (Tuot et al 2013).

A nested cross sectional survey on participants in the Australian Diabetes Obesity and Lifestyle Study (AusDiab) were assessed on their recall of kidney function testing. Only 271(31.9%) of the respondents recalled having it done. 319(37.4 %) reported to have never had a kidney function test done. 228(26.8%) were uncertain, indicating they had undergone an unspecified blood, urine or imaging test (White et al 2008). This indicates that there could have a limitation in communication of the specific tests and calls for clinicians to be specific during patient education and care.

In this study, the recall of kidney test was higher compared to Ausdiab Study; this could well indicate that participants are informed of any investigations they undergo during follow up.

Knowledge of CKD

The general awareness on CKD and self-report on individual CKD status was adequate among the respondents i.e. 157(72.8%). However, when respondents were tested on their understanding of CKD, only 98(45.6%) had adequate level of awareness.

In this study, only one question out of the seven knowledge questions was answered correctly by more than half of the respondents. 142(66.3%) knew the function of the kidney compared to 1,187(82.7%) in Singapore (Chow et al 2012) and 130(55%) in Malaysia (Ng et al 2016).

Only 84(39.1%) of the respondents knew at least one cause of kidney disease. Out of a total 84 responses, the most common causes selected were diabetes (79%) and hypertension (63%). Other risk factors such as inherited conditions (26%), urinary tract infections (30%) and Malaria (14%) were least selected. This was similar to a study done among patients attending University of Pennsylvania medical center with a diagnosis of CKD. Hypertension and Diabetes were chosen most frequently as factors increasing risk of CKD (Tan et al 2010).

Only 8(3.7%) of the respondents knew that early kidney disease can be present without any symptoms. Of note is that the most common response given was presence of swelling or edema 38(31%) as a sign of early kidney disease whereas it is a specific sign of late stage. This is very risky as that would impede early recognition and treatment of CKD. It also correlates with the late presentation of CKD patients to the nephrologist at the Kenyatta National Hospital (Kilingo 2009).

Five statements on kidney disease were provided for the respondents to select the incorrect statement. Out of 215 respondents, only 15(7.4%) knew that kidney disease cannot be cured by medications.

Similarly, in Singapore, among patients attending primary care centers, only 64(4.5%) knew that early kidney disease could present without any symptoms or complaints and 278(19.4%) correctly answered that CKD could not be cured by medications (Chow et al 2012). The overall mean score for CKD knowledge was 3.44±1.53 out of a maximum 7 points.

This needs to be addressed as lack of basic knowledge of risk factors for developing CKD and that early CKD can present asymptomatically results into a low level of perceived susceptibility even among the high risk population (Chow et al 2012). This often leads to late presentation which negatively affects patients' outcome (Alasia et al 2012).

None of the participants identified that dialysis could be done both at a health facility and home. This response can be attributed to the fact that peritoneal dialysis which is carried out at home is rare in Kenya compared to the developed countries where it's the most preferred mode of dialysis. The respondents who identified the dialysis center were therefore considered to be knowledgeable on the question. 126(58.6%) said that dialysis can only be done at the health center and 105(48.8%) knew that kidney transplant was the best medical treatment for end stage kidney failure. There is therefore need for more awareness on CKD across all the knowledge domains.

A before and after cross sectional analysis of a public health campaign effect on awareness of CKD in a Canadian province revealed an increase in the awareness of CKD from 7% to 25% among 802 participants (Ryz et al 2015).

Predictors of Awareness on CKD

Demographic factors

The education status of the respondents had a significant relationship on the overall awareness of CKD (p< 0.01; Table 10). The respondents with college education were 6.9 times more likely to have an adequate level of awareness on CKD [OR 6.914(CI 1.635-29.238), p=0.009. Similar associations have been described between the level of education on awareness and knowledge has been shown in Singapore (Chow et al 2012), Malaysia (Ng et al 2016), Tanzania (Stanifer et al 2016) and Nigeria (Oluyombo 2017).

Educational attainment has been shown to influence health literacy which in turn influences awareness and knowledge on chronic illnesses (Tan et al 2010). A high level of education facilitates good communication between care givers and patients and patients end up being better involved in their management (Walker et al 2013). Therefore, provision of quality formal education will impact on health literacy and consequently influence awareness on CKD.

Socio economic Factors

There was a significant association of the monthly income of the respondents on the overall awareness on CKD (p< 0.05; Table 10).

According to the Institute of Economic Affairs 2009, the middle income earners were categorized as those earning between KES 49,656 to KES 67,380 per month. The participants were classified into low income earners i.e. a monthly earning less than KES 50, 000, middle

income earners i.e. monthly earning of KES 50,000 to 69,999 and high income earners as those with a monthly earning KES 70,000 and more. Only 3(1.5%) participants were middle income earners and 6(2.9%) were high income earners. Chi square test would be violated if same categories were used to test for associations. Collapse of tables was done to achieve at least 10 participants in each cell thus analysis was compared across those who had a monthly earning less than KES 10,000, KES 10,000 to 29, 999 and those earning KES 30,000 and above.

Respondents who earned a monthly income of KES 30,000 and above were 3.5 more likely to have an adequate level of awareness on CKD [OR 3.489(CI 1.036-11.751), p=0.009. Similar associations have been shown in Malaysia (Ng et al 2016) and Singapore (Chow et al 2012).

The Singaporean study revealed that professionals, younger respondents and those earning a higher monthly income were more likely to have better knowledge. These findings were consistent with the study done in Malaysia (Ng et al 2016).

Clinical factors

Being in the cardiac or diabetic group, duration of illness or presence of other illnesses was not significantly associated with level of awareness on CKD (p values were >0.05). Similarly, in Malaysia, respondents who had diabetes, hypertension or CKD and its complications were not significantly associated with better knowledge scores (Ng et al 2016).

However, knowledge surveys done in Hong Kong, Iran and among African Americans revealed higher knowledge among respondents with diabetes or hypertension (Chow et al 2014, Roomizadeh et al 2014, and Waterman et al 2008). In Australia, there was a significantly higher awareness of the relationship between diabetes and CKD among patients with diabetes mellitus (White et al 2008).

In one perspective, the health personnel may not have communicated about kidney disease and its associated risk factors. On the other hand, participants may not have been able to have good communication with the health professionals due to time factor or individual factors such as health literacy. This is worth exploring in further studies.

System factors

There was no relationship between clinic attendance, mode of payment for services and the overall awareness of CKD (p> 0.05). Similarly, in the observational cohort in Jackson Heart study (Flessner et al 2009 and USA National Health and Nutrition Survey (NHANES) 1999-

2004 (Platinga et al 2008), there was no association between health insurance status and CKD awareness. There was no significant relationship between availability of health insurance or prescription drug coverage, type of health insurance and odds of awareness.

In this study most respondents 179(84.4%) did not miss their clinic appointments. Among those who missed an appointment 15.6% attributed the missing to high cost of treatment/ tests. The situation on cost of service could be different now due to the recent nationwide rollout of the National Hospital Insurance Fund (NHIF). 12.5% of those who missed an appointment had problems accessing transport due to distance or cost of transport. Proper medical care systems can be used to link such individuals to a primary care site nearer to them.

Awareness of CKD and Self-Management Behaviors'

Generally, the respondents reported good self-management behaviors. Only 7(3.3%) of the respondents were smokers, however other modes of tobacco exposure should have been elicited. 45(20.8%), had been taking NSAIDs medications at least twice a week and majority 157(72.9%) had regular exercises. The participants mainly engaged in manual work such as house chores, gardening and walking. Moreover, the clinic appointments were few at an average of three per year. There was no significant association between the health behaviors' and level of awareness on CKD in the current study.

These findings were similar in study amongst 2615 participants with CKD drawn from data collected for follow for patients in the stroke belt of United States of America. The overall prevalence of healthy behaviours ranged from 24.0% (frequent physical activity) to 89.4% (tobacco avoidance). CKD awareness was not associated with tobacco avoidance, NSAID avoidance or increased physical activity. After adjustment for co-morbid conditions and CKD severity, those who were aware of their CKD were more likely to report avoidance of tobacco [AOR=1.82, (95% CI 1.02–3.24)], Tuot et al 2014.

The respondents' self-management behaviors practices are usually encouraged among those with diabetes and Hypertension, cardiac diseases in an effort to have good blood sugar and blood pressure control. NSAIDs were not used as most respondents relied on the doctor's prescription but majority did not know the adverse effects of NSAIDs.The patient-provider interaction may thus be the most important unmeasured confounder in this study.

In Nigeria 318 (70%) of the participants did not believe that NSAIDs could adversely affect the kidneys. (Oluyombo et al 2017). Furthermore, those who were aware of kidney disease still indulged in alcohol intake and use of skin lightening creams.

Whereas adequate awareness encouraged adopting of lifestyle modifications and better management of risk factors (Tan et al 2010), denial of CKD or its risk factors leading to non-adherence are some of the possible psychological challenges that need to be addressed in an effort to prevent the natural progression and eventually poor outcome of CKD (Platinga et al 2008).

Implications to Public Health

First and foremost, there is compelling evidence that early appropriate treatment (medications for hypertension control, lipid lowering and blood glucose control) could slow the progression of CKD. This provides an opportunity to screen those at risk and start them on early treatment and also educate those at risk to effect healthy behaviors which would prevent or delay the onset of CKD (Shah et al 2012).

Secondly those at risk will be able to avoid medication exposures that could influence progression including over the counter non-steroidal anti-inflammatory agents and contrast agents used in imaging tests. Awareness might also make patients more vigilant with adherence to dietary recommendations such as lower salt and sugar as well as other lifestyle changes (Platinga et al 2008).

Low levels of awareness on CKD diminish the health care systems efforts to effectively identify and engage patients with underlying CKD (Perazella 2003).

This in effect leads to increase in CKD prevalence and consequently ESRD. ESRD is not only unaffordable for most patients but also diminishes the quality of life for those on dialysis. Kidney transplant which is considered best treatment for ESRD is not only expensive but also requires lifelong medication to avoid rejection of the implanted kidney.

Implementation of screening programs for high risk groups and increase in public awareness and health care provider awareness will ensure maximum seizing of opportunities to healthy behavior, reduction in poor outcomes and reduced cost implications to the health care system at large.

Study Strengths

This study had strengths in that the sample population was stratified to include the major high risk groups to CKD. The CKD awareness was broadly defined thus allowing determination of CKD awareness in three phases. The overall awareness of an individual was therefore not limited to having heard about CKD but delved deeper to individual awareness of CKD status and understanding of the CKD.

Study Limitations

A few limitations were also noted in this study. This was a cross sectional nature and thus causal inferences cannot be drawn. Furthermore, the study may also have been subject to reporting bias whereby participants may be reluctant to answer truthfully or more likely to report seemingly desirable information and recall bias where respondents unknowingly answered incorrectly due to inaccuracies of memory. To reduce these biases, we used interviewers who had a medical background and could speak and translate to Swahili language and the interviews were conducted in private. The results of this study show an overall inadequate level of awareness especially on the understanding of CKD process among the high risk groups to CKD attending the outpatient medical clinics at the Kenyatta National Hospital. However, there is some basic knowledge which can be built on to improve awareness and understanding of CKD and thus help in adopting of lifestyle modifications and better management of risk factors.

CONCLUSION

Our findings revealed that there was inadequate level of awareness on CKD. The participants did not clearly understand their CKD status and the report could not be verified by definitive tests. Participants had very low scores on risk factors; disease progression and prevention aspects of CKD. Deeper understanding on causes would change their perception of risk. Furthermore, aspects on CKD prevention will act as a key precursor in the efforts to prevent CKD or slow its progression in those identified to be in the early stages.

Participants with a higher level of education and higher level of income were more likely to have adequate awareness on CKD. Higher level of education enables an individual to obtain health information in various different forms, understand it and be able to make appropriate health or medical care decisions. On the other had higher income enables access to health care and subsequent health information. The Kenyan government has embarked on implementation of free primary education in an effort to improve the literacy levels which should be able to empower the citizens to access further education subsequently improve their economic power. However, at an institutional level education programs and health campaigns should focus on the groups that are less likely to be aware of CKD and formulate tailored materials and tools that will effectively communicate.

Interestingly, the participants had good self-management behaviors in regard to clinic attendance, physical exercise, cigarette smoking avoidance despite inadequate levels of awareness on CKD. However, NSAID use is still prevalent in 20.8% of the population. The positive practices could be as a result of the health education sessions geared towards the control of the primary disease which some overlap with CKD preventive measures. The use of NSAID could be attributed to management of other co morbidities such as arthritis or reliance on over the counter buys for pain management.

As research has demonstrated there is inadequate level of awareness in CKD among the at high risk population at the Kenyatta National Hospital and there is no relationship between awareness on CKD and selected self-management behaviors.

RECOMMENDATIONS

1. The clinicians (Physicians, Nurses and Dietician) at KNH should provide CKD prevention educational programs to clients tailored to clients' health literacy level with an aim to incorporate the at risk population in CKD prevention.

   Health education program should entail creating awareness on the CKD status and the relationship between self-management behaviors and positive outcomes.

2. The Director Clinical Services and Director Nursing Services at KNH should provide avenues for disseminating CKD information to the rest of the population at risk of CKD. These would include hospitalized patients with a diagnosis of hypertension, diabetes, infections affecting the kidney, urinary tract infections and Human Immunodeficiency Virus (HIV).

3. Further studies should include a qualitative research to determine the role of screening in CKD prevention and management.

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APPENDIX 1: PARTICIPANT'S CONSENT FORM

TITLE: AWARENESS OF CHRONIC KIDNEY DISEASE, ITS PREDICTORS AND SELF MANAGEMENT BEHAVIORS AMONG HIGH RISK PATIENTS IN KENYATTA NATIONAL HOSPITAL.

Researcher's statement

Hello, My name is Winifred Wanjala, a post graduate student at the University of Nairobi, School of Public Health, pursuing a Master's degree in Public Health.

I intend to carry out a study on "**Awareness of chronic Kidney disease**, **its predictors and self-management behaviors among outpatients visiting the cardiovascular and diabetic clinics"** as part of my course requirement. My supervisors are Prof. Joyce Olenja and Dr. Peter Njoroge.

The purpose of this consent form is to provide you the information you will need to help you decide whether to be in the study or not. Please read the form carefully. You may ask questions about the purpose of the research, what I will ask you to do, the possible risks and benefits, your rights as a volunteer and anything else about the research or this form that is not clear. After responding to all your questions you can decide if you want to participate in the study or not. You may refuse to participate in the study and you are free to withdraw from this study at any time without any penalty or loss of benefits to which you are otherwise entitled to.

The study has no monetary or material benefits. Your participation in the study is on voluntary basis and will not result in any physical or psychological harm. There will be no penalty if you decide to withdraw from the study. In case you decide to participate in the study you will be required to fill out a questionnaire which will take about 15 minutes which you will be guided through. You are free to ask any question about the study at any time.

As an individual after completion of the questionnaire, you will have a one on one session with the researcher and will have an overview discussion on chronic kidney disease and measures of prevention.

The information collected will aid in better understanding the gaps in the knowledge about kidney disease and help to draw conclusions on need to implement strategies aimed at reduction in the poor health outcomes associated with chronic kidney disease.

You will not be required to write any of your personal particulars on the questionnaire and the information you provide will be kept confidential and remain anonymous. The questionnaires will remain under lock and key and only the researcher and the supervisors will access them. Your participation will be highly regarded.

Information dissemination plan

The results of this study will be presented to the management of the outpatient diabetic and cardiovascular clinics at KNH, the management of Kenyatta National Hospital and Kenyatta National Hospital Research Department to aid in improvement in the management of patients at risk and those with chronic kidney disease with an aim of improving their overall health outcomes. The participant's particulars will not be included or identified as the results will be in data form.

Please contact the following persons if you have any questions or concerns about the content of this study; Researcher: Winifred Wanjala of the University of Nairobi, telephone number: 0721364691 or email at winnie.wanjala093@gmail.com as well as the Chairperson, KNH/UoN-ERC, Professor A.N. Guantai; Tel:2726300 Ext: 44102, Fax: 0725272; Email: uonknherc@uonbi.ac.ke.

Participant's Statement

I have read the foregoing information, and I have had the opportunity to ask questions about it and any questions I have asked have been answered clearly and to my satisfaction.

I do therefore agree voluntarily to participate in the study and understand that I have a right to withdraw from the study at any time without in any way attracting any penalties.

Participants signature………………………. Date………………………………….

Name of the Researcher: Winifred Wanjala

Witness signature……………………………… Date……………………………….

APPENDIX II: QUESTIONNAIRE

This questionnaire forms part of a Masters of Public Health (MPH) Project on Awareness on Chronic Kidney Disease. The information collected will be treated confidentially and you will not be required to identify yourself by name. To participate you must be above eighteen years old and must have had diabetes for over six months.

Please answer questions as completely and clearly as possible by ticking or writing the responses (as the case may be) in the spaces provided.

Section A: Demographic characteristics

Please tick as appropriate.

1. How old are you?
   - ☐ Less than 40 years
   - ☐ 40-60 years
   - ☐ Above 60 years

2. What is your gender?

   - ☐ Male
   - ☐ Female

3. What is your marital status?

   - ☐ Single
   - ☐ Married
   - ☐ Separated/Divorced
   - ☐ Widowed

4. What is your Religion?

   - ☐ Christian
   - ☐ Muslim

   Other (indicate)…………………………………

5. How far did you get with your education?

   - ☐ Primary level
   - ☐ Secondary level
   - ☐ College education
   - ☐ No formal education

6. What is your employment status?

   - ☐ Self employed
   - ☐ Employed

☐ Unemployed

☐ Retired

7. What is your monthly income?

☐ Less than 10,000

☐ 10,000- 29,999

☐ 30,000- 49,999

☐ 50,000-69,000

☐ Above 70,000

8. Where do you live?

☐ Within Nairobi

☐ Outside Nairobi

Section B: Clinical characteristics

9. How long have you had diabetes **(for diabetic clinic**)/how long have you had cardiovascular disease (for **cardiac clinic**)?

☐ Less than 1 year

☐ 2-5 years

☐ 6-10 years

☐ More than 10 years

10. Do you suffer from any other disease apart from Diabetes **(for diabetic clinic)**or you suffer from any other disease apart from cardiovascular disease (**for cardiac clinic**)?

☐ Yes

☐ No

11. If yes indicate which ones? ....

Section C: System issues

12. How often do you attend this clinic? ....

13. In the past six months could you have missed any of the medical appointments in the clinic?

☐ Yes

☐ No

14. If **Yes** how many have you missed…………..

15. What was/were the reasons for you missing an appointment? (Tick all the appropriate choices)

☐ Transport cost/ problem accessing transport

☐ Cost of appointment/tests/ drugs

Others
specify……………………………………………………………………………………………
……………………

16. During the clinic visits how do you usually make your payments for consultation and treatment? (Tick all appropriate choices)

☐ Paying cash
☐ Using an insurance cover
☐ Using a Credit card
☐ No payment

Section D: Awareness of Chronic Kidney Disease

17. Have you heard about Kidney disease? (**Aware 1, 1 point if yes**)

☐ Yes
☐ No

18. Where did you hear it from? (Tick all appropriate choices)

☐ Friends
☐ Family
☐ Media e.g. newspapers, television, radio, books etc.
☐ Doctor or Nurse in this clinic

Others specify……………………………………………………………

19. Have you been tested for kidney function? (**Aware 2, 1 point if yes**)

☐ Yes
☐ No

20. If **yes**, please indicate what the results were in the space provided …………………….

 If **No,** please go to 21.

21. Why did you test?

☐ Advised by my doctor or nurse during clinic visits
☐ Read from literature that it is important

 Others specify……………………………………………….

22. If you answered **No** in question 19, please indicate why you have not been tested?

☐ Not aware that kidney function can be tested

☐ Test was expensive.

Others specify……………………………………………….

23. Do you know how many kidney(s) a person needs to lead a normal life? (Tick only one choice) (**Aware 3, 1 point if correct**)

☐ One (√)
☐ Two
☐ I don't know

24. What do you think the function of the kidney is in a human body is? (Tick only one choice) (**Aware 4, 1 point if correct**)

☐ To break down food.
☐ To produce substances that break down fats.
☐ To filter waste products in the blood. (√)
☐ I don't know.

25. Do you know what may cause kidney disease? (Tick all the appropriate choices)

 (**Aware 5, 1 point if correct**)

☐ High blood pressure (√)
☐ Diabetes (√)
☐ Inherited conditions (√)
☐ Urinary infections (√)
☐ Malaria (√)
☐ All of the above (√)
☐ I do not know

26. Do you know any symptom(s) of early kidney disease that might progress to kidney failure? (Tick appropriate choice) (**Aware 6, 1 point if correct**)

☐ Bubbles in the urine
☐ Back pain
☐ Blood in the urine
☐ Can present without any symptoms/complaints (√)
☐ All of above
☐ I don't know

27. Please read through the statements below and tick one statement about kidney disease that is incorrect :(**Aware 7, 1 point if correct**)

☐ Kidney disease is common
☐ Kidney disease can be prevented
☐ Kidney disease can be cured by medications. (√)

- ☐ A person is said to have kidney disease when he/she needs dialysis.
- ☐ None of the above
- ☐ I don't know

28. Do you know where dialysis treatment can be carried out? (Tick only one choice)

(Aware 8, 1 point if correct)

- ☐ In a dialysis center or at home($\sqrt{}$)
- ☐ Only in a dialysis center
- ☐ Only at home
- ☐ I don't know

29. Do you know what the best medical treatment for end stage kidney failure is? (Tick only one choice) **(Aware 9, 1 point if correct**)

- ☐ Medication
- ☐ Dialysis
- ☐ Kidney transplant ($\sqrt{}$)
- ☐ I don't know

Section E: Selected Self-management behaviors'

30. In the past six months could have you participated in exercise that leads you to break into a sweat?

- ☐ Yes
- ☐ No

  If your answer is **No**, please go to question 33.

31. If yes how many times did you exercise in a week? (Tick only one choice)

- ☐ Less than three times a week

- ☐ Three or more times a week

32. Please indicate what kind of exercise(s) you engage in? (Tick all the appropriate choices)

- ☐ Walking

- ☐ Jogging

- ☐ Gardening/House chores

Others specify…………………………………………………………

33. If you answered **No** in question 30, could you please indicate why do not exercise? (Write in your response in the space provided.)

…………………………………………………………………………………………………

…………………………………………………………………………………………………

34. Do you smoke even if it is occasional?

☐ Yes

☐ No

35. Please indicate if you have been currently using any of the medicines listed below at least twice a week (**BRUFEN, OLFEN, VOLTAREN, AIRTAL OR CATAFLAM?**)

☐ Yes

☐ No

<div align="center">

THANK YOU!

</div>

APPENDIX III: CRITERIA FOR SCORING LEVEL OF AWARENESS OF CKD

17. Have you heard about Kidney disease? (**Aware 1, 1 point if yes**)

  ☐ Yes
  ☐ No

19. Have you been tested for kidney function? (**Aware 2, 1 point if yes**)

  ☐ Yes
  ☐ No

23. Do you know how many kidney(s) a person needs to lead a normal life? (Tick only one choice) (**Aware 3, 1 point if correct**)

  ☐ One (√)
  ☐ Two
  ☐ I don't know

24. What do you think the function of the kidney is in a human body is? (Tick only one choice) (**Aware 4, 1 point if correct**)

  ☐ To break down food.
  ☐ To produce substances that break down fats.
  ☐ To filter waste products in the blood. (√)
  ☐ I don't know.

25. Do you know what may cause kidney disease? (Tick all the appropriate choices)

 (**Aware 5, 1 point if correct**)

  ☐ High blood pressure (√)
  ☐ Diabetes (√)
  ☐ Inherited conditions (√)
  ☐ Urinary infections (√)
  ☐ Malaria (√)
  ☐ All of the above (√)
  ☐ I do not know

26. Do you know any symptom(s) of early kidney disease that might progress to kidney failure? (Tick appropriate choice) (**Aware 6, 1 point if correct**)

  ☐ Bubbles in the urine
  ☐ Back pain
  ☐ Blood in the urine
  ☐ Can present without any symptoms/complaints (√)
  ☐ All of above
  ☐ I don't know

27. Please read through the statements below and tick one statement about kidney disease that is <u>incorrect</u>:(**Aware 7, 1 point if correct**)

- ☐ Kidney disease is common
- ☐ Kidney disease can be prevented
- ☐ Kidney disease can be cured by medications. (√)
- ☐ A person is said to have kidney disease when he/she needs dialysis.
- ☐ None of the above
- ☐ I don't know

28. Do you know where dialysis treatment can be carried out? (Tick only one choice)

(**Aware 8, 1 point if correct**)

- ☐ In a dialysis center or at home (√**)**
- ☐ Only in a dialysis center
- ☐ Only at home
- ☐ I don't know

29. Do you know what the best medical treatment for end stage kidney failure is? (Tick only one choice) (**Aware 9, 1 point if correct**)

- ☐ Medication
- ☐ Dialysis
- ☐ Kidney transplant (√)
- ☐ I don't know

Total score	**9**
Adequate level of awareness	**>=5**
Inadequate level of awareness	**<5**

APPENDIX IV: HEALTH EDUCATION

What is chronic kidney disease?

Chronic kidney disease means the kidneys have been damaged by conditions, such as diabetes, high blood pressure or glomerulonephritis. As a result, the kidneys are less able to do their jobs in helping to maintain health.

When your kidneys are not working well, wastes can build to high levels in your blood and make you feel sick. Even before that, you may develop complications like high blood pressure, anemia (low blood count), weak bones, poor nutritional health and nerve damage. Kidney disease also makes you more likely to develop heart and blood vessel disease. These problems may happen slowly, over a long period of time, often without symptoms may eventually lead to kidney failure requiring dialysis or a kidney transplant to maintain life if no action is taken.

The good news is research has shown evidence that CKD can be prevented or treated by early detection and adherence to treatment and healthy lifestyle (http://www.kidney.org).

What should I do?

Everyone who has high blood pressure, heart disease or diabetes has an increased chance of developing CKD. You should ask your doctor about having the following tests:

- A blood test for creatinine, a waste product in the blood from muscle breakdown. This will be used to determine your level of kidney function.
- A urine test for protein. Persistent protein in the urine is a sign of kidney damage.
- A urine test to check for red blood cells and white blood cells. This is a sign of infection in urine.

At follow-up visits, your doctor will check:

- Your blood pressure
- Blood test to check your kidney function
- Your urine protein level

A treatment plan should be developed especially for you by your doctor to

- To lower your blood pressure to less than 130/80
- To control your blood glucose if you have diabetes.

- To keep kidney disease from getting worse
- To lower your chance of getting heart disease.

To help reach these goals, you will need a combination of lifestyle changes, such as following a healthier diet and exercising more and taking medications (http://www.kidney.org).

What kinds of changes will I need to make to my diet?

Cut back on table salt, foods rich in salt, sugar, fats and cholesterol. Carbohydrates should only be 50-60 percent of your daily calories.

Will I need to make other changes in my lifestyle?

Yes. The following steps can also help you reach your treatment goals:

- Lose weight if you are overweight.
- Exercise at a moderate level for 30 minutes a day on most days of the week. Always check with your doctor before starting an exercise program.
- Cut back on alcohol (no more than two drinks a day for men and one drink a day for women).
- Stop smoking if you are a smoker.

What about medications?

Your target blood pressure is below 130/80. Be sure to take your medications exactly as prescribed by your doctor. Report any side effects to your doctor right away. It may be possible to switch you to another medication.

 Do not stop taking any of your medications on your own without letting your doctor know and following up to check your blood pressure. Even though you are feeling well, uncontrolled high blood pressure could still damage vital organs like the heart and kidneys (http://www.kidney.org).

APPENDIX V: KNH-UON-ERC-Approval letter

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355

KNH/UON-ERC
Email: uonknh_erc@uonbi.ac.ke
Website: www.uonbi.ac.ke

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/318   Link:www.uonbi.ac.ke/activities/KNHUoN   22nd September   2014

Wanjala Winifred Namumbi
School of Public Health
College of Health Sciences
University of Nairobi

Dear Winifred

Research proposal - Awareness on chronic kidney disease, its predictors and self management behaviours among high risk patients in Kenyatta National Hospital   (P231/04/2014)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 22nd September 2014 to 21st September 2015.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website **www.uonbi.ac.ke/activities/KNHUoN.**

Protect to Discover

Yours sincerely

PROF.M.L. CHINDIA
SECRETARY, KNH/UON-ERC

c.c.   The Principal, College of Health Sciences, UoN
         The Deputy Director CS, KNH
         The Chair, KNH/UoN-ERC
         The Assistant Director, Health Information, KNH
         The Director,School of Public Health, UoN
         Supervisors: Prof. Joyce Olenja, Dr. Peter Njoroge

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APPENDIX VI: TURNITIN ORIGINALITY REPORT

Master by Elisha Karan Similarity by Source from Master (Master) 10/7/2019

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Word Count: 23394

Paper text:

AWARENESS OF CHRONIC KIDNEY DISEASE, ITS PREDICTORS AND SELF MANAGEMENT BEHAVIOURS AMONG HIGH RISK PATIENTS IN KENYATTA NATIONAL HOSPITAL. WINIFRED WANJALA H57/68548/2011 0721364691 A RESEARCH DISSERTATION SUBMITTED TO THE UNIVERSITY OF NAIROBI SCHOOL OF PUBLIC HEALTH IN PARTIAL FULFILMENT OF REQUIREMENTS FOR THE AWARD OF MASTER OF PUBLIC HEALTH. i DECLARATION OF ORIGINALITY https://www.turnitin.com/newreport_printview.asp?eq=1 &eb=1 &esm=-1 &0id=11860 19485&sid=0&n=0&m=0&svr=35&r=22.66386770707837841... 1/39

Dr. Peter Njoroge, MBChB, MPH (Nairobi)

School of Public Heath,

College of Health Sciences,

University of Nairobi

Signed…………………………………………Date…………………………………………