KNOWLEDGE, ATTITUDES AND PRACTICES ON MEASURES TO RETARD DISEASE PROGRESSION AMONG CHRONIC KIDNEY DISEASE PATIENTS AT KENYATTA NATIONAL HOSPITAL

A dissertation submitted in part fulfillment of the requirements for the Degree of Master of Medicine in Internal Medicine of the University of Nairobi

By

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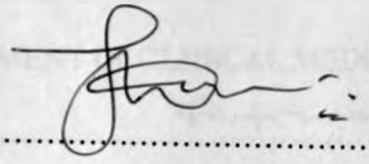
DECLARATION

This dissertation is my original work and has not been submitted for a degree in any other university



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DEDICATION

I dedicate this work to my parents Mr. and Mrs. D.M. Mutiso for their mentorship, encouragement and prayers.

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I thank God for giving me life, good health, strength and peace of mind.

I would like to sincerely thank my supervisors Prof. Kayima and Prof.Amayo for their unrelenting support, constructive criticism and guidance throughout the stages of this study.

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ABBREVIATIONS

ACE	-	Angiotensin converting enzyme
CKD	-	Chronic kidney disease
CRIOS	-	CKD renalsoft informatics observational study
CVD	-	Cardiovascular disease
eGFR	-	Estimated glomerular filtration rate
ESRD	-	End stage renal disease
GFR	-	Glomerular filtration rate
HD	-	Haemodialysis
K/DIGO	-	Kidney Disease Improving Global Outcomes
K/DOQI	-	Kidney Disease Outcome Quality Initiative
KNH	-	Kenyatta National Hospital
LVH	-	Left ventricular hypertrophy
MDRD	-	Modification of diet in renal disease
NKF	-	National kidney foundation
PPI	-	Pre-dialysis psychoeducational intervention

PTH	-	Parathyroid hormone
rHuepo	-	Recombinant human erythropoietin
RRT	-	Renal replacement therapy
SHO	-	Senior house officer
SSA	-	Sub-Saharan Africa
UoN	-	University of Nairobi
USA	-	United States of America
WHO	-	World Health Organization

ABSTRACT

Background: Chronic Kidney Disease (CKD) is a global public health problem and is considered a worldwide epidemic. There is an increase in the incidence and prevalence of CKD in developing countries. CKD is associated with significant morbidity and decreased life expectancy. Educational interventions aimed at empowering patients are successful in CKD management and they prolong time to end stage renal disease (ESRD) and impact on the choice of renal replacement therapy. There are evidence based measures that retard the progression of CKD and knowledge acquisition of these measures by patients prolongs time to renal replacement therapy.

Objective: The aim of the study was to determine the knowledge, attitudes and practices on measures to retard disease progression among CKD patients at KNH.

Design and setting: This was a cross sectional descriptive survey carried out at the KNH renal clinic.

Patients and methods: Patients with CKD on follow up in the KNH renal clinic for 3 months or more and with an estimated glomerular filtration rate of < 60ml/min/1.73 m^2 were screened for eligibility and recruited upon signing an informed consent. Patients' socio-demographics, clinical information and weight were captured in a study proforma. Investigations done included serum urea and creatinine. Glomerular filtration rate was estimated using the corrected Cockroft and Gault formula. CKD patients were staged according to the Kidney Disease Outcomes Quality Initiative (K/DOQI) staging criteria. A pretested and semi-structured knowledge, attitude and practice questionnaire containing open and closed ended questions was used to collect data.

Results: 110 patients with CKD were recruited into the study. There were 66 males (60%) and 44 females (40%) with a male to female ratio of 1.5:1. The age range was 18 to 80 years with a mean of 54.75 years. When patients were asked to rate their level of knowledge on etiology, symptoms, progression and treatment of CKD, 70.9 % reported

having very little/ no knowledge. Regarding the measures that retard the progression of CKD, 70% had not been informed of these measures by a health worker. Majority thought that compliance to medication (40%) and eating a healthy diet (37.3%) would retard the progression of CKD. Twenty four point five percent mentioned prayers and 19.1% mentioned leading a stress free life. Regarding the well studied measures 35.5% mentioned blood pressure control, 12.7% mentioned blood glucose control. Very few mentioned dietary protein restriction (5.5%), smoking cessation (2.7%) and proteinuria control (0.9%). None of the patients mentioned prevention of hyperphosphatemia and correction of anemia. Majority (75.5%) thought that CKD was likely to regress with most of the study participants (70.0%) being courageous /unafraid about their illness. Majority (87.3%) had informed their family members/ friends about their kidney disease with most (84.5%) keeping their clinic appointments as required. More than half (55.5%) were not seeking explanation from the doctors about the blood and urine tests that are routinely done for all patients. Sixty four point five percent of the patients were adherent to medication with only 16.4% using non-prescription medication. Regarding practices, majority of the study participants (89.1%) were not smoking. A significant proportion (82.7%) had reduced their salt intake with a similar proportion doing regular exercises. Only half of the study participants had reduced their protein intake. Younger patients were knowledgeable compared to the older patients and the difference was statistically significant (p=0.004).Patients with medical insurance were also knowledgeable compared to those without (p=0.017).A longer duration of follow up was associated with knowledge on CKD (p=0.004).We did not find a significant association between the attitudes and practices sought for with age, gender, level of education, medical insurance status, duration of follow up and stage of CKD. From the qualitative data, the need for health education was the main recurring theme mentioned by the study participants.

Conclusion: This study demonstrated that the majority of the patients had limited knowledge on the etiology, symptoms, progression and measures to retard progression of CKD. The qualitative arm of the study demonstrated the need for a health education programme for CKD patients at the KNH renal clinic.

1.0 LITERATURE REVIEW

1.1 INTRODUCTION

Chronic kidney disease (CKD) is increasingly recognised as a global public health problem. There is now convincing evidence that CKD can be detected using simple laboratory tests and that treatment can prevent or delay complications of decreased kidney function and retard the progression of kidney disease [1].

There is an increasing incidence and prevalence of patients with kidney failure requiring replacement therapy, with poor outcomes and high cost. There is an even higher prevalence of patients in earlier stages of CKD, with adverse outcomes such as kidney failure, cardiovascular disease and premature death [2].

CKD management is consuming a huge proportion of health care finances in developed countries; it is contributing significantly to morbidity and mortality in developing ones. The epidemiological characteristics of CKD in Sub-Saharan Africa (SSA) are strikingly different from those observed in other regions. Although middle-aged and elderly individuals are predominantly affected in developed countries, in SSA, CKD mainly affects young adults in their economically productive years, with hypertension and infection-related chronic glomerulonephritis as the major causes. Morbidity and mortality are high because most affected individuals cannot access renal replacement therapy. Other contributory factors for this dismal picture include late presentation, limited renal replacement therapy and its unaffordability, absence of kidney disease prevention programs and the poor literacy levels [3].

Chronic diseases are now the leading causes of death worldwide. The World Health Organization (WHO) estimates that there were approximately 58 million deaths worldwide in 2005, with 35 million attributed to chronic disease. In developed countries and lower-middle-income developing nations, CVD and cancer were the leading causes

of death. In low-income developing countries, infections remained the leading cause of death, but chronic non-communicable diseases were on the rise. The WHO report called for governments to provide leadership in addressing the projected continued increase in deaths due to chronic diseases [4,5].

The Kidney Disease Outcomes Quality Initiative (K/DOQI) of the National Kidney Foundation (USA) established a definition and classification of CKD, which has become accepted by the international nephrology community.

CKD is defined as evidence of structural or functional kidney abnormalities (abnormal urinalysis, imaging studies, or histology) that persist for at least three months, with or without a decreased GFR (as defined by a GFR of less than 60 mL/min per 1.73 m^2). The most common manifestation of kidney damage is persistent albuminuria, including microalbuminuria or decreased GFR, with or without evidence of kidney damage [6].

Kidney damage in many kidney diseases can be ascertained by the presence of albuminuria, defined as albumin-to-creatinine ratio >30 mg/g in two of three spot urine specimens. GFR can be estimated from calibrated serum creatinine and estimating equations, such as the Modification of Diet in Renal Disease (MDRD) Study equation or the Cockcroft-Gault formula. Kidney disease severity is classified into five stages according to the level of GFR (stage I=GFR>90mL/min/1.73m^2, II GFR=60-89mL/min/1.73m^2, III GFR=30-59mL/min/1.73m^2, IV GFR=15-29mL/1.73m^2 and stage V GFR<15mL/min/1.73m^2 or End stage renal disease [6].

CKD is an important cause of cardiovascular disease and several studies have demonstrated the following: i) in the presence of an increased Serum Creatinine or a decreased GFR, morbidity and mortality because of CVD are markedly increased and vascular degradation is accelerated; (ii) the process of cardiovascular damage starts very early during progression in well-defined CKD, long before the dialysis stage is reached; (iii) the link between kidney dysfunction and CVD is an important global epidemiological entity with an extent comparable to the link observed between CVD and diabetes mellitus; (iv) apart from traditional cardiovascular risk factors, nontraditional

factors specifically related to kidney failure per se, are very likely to play a causative role; and(v) adequate preventive measures against CVD should be started early during the natural history of kidney dysfunction [7].

The mortality rate of patients with ESRD remains high and it is estimated to be as high as 24% per year in the United States of America (USA) .Several studies have demonstrated an increased risk of death in dialysis patients and suboptimal delivered doses of dialysis, malnutrition and non renal co morbidity. The health care cost of treating such patients exceeds 8 billion US dollars annually [8]. There is no local data on the mortality rate and economic impact of ESRD.

1.2 HEALTH EDUCATION AND KNOWLEDGE ON CKD

The education of patients with renal disease focuses on the inevitability of reaching end-stage renal disease (ESRD) and requiring renal replacement therapy. Established education programs begin the process during the late stages of CKD or after the patient reaches ESRD which should not be the case.

Uremic symptoms negatively influence the patients' ability to learn and make decisions about their health care. Late referrals to nephrologists and patient educators often occur when the patient is physiologically compromised. Early education for the pre-ESRD patient has the potential to improve the quality of patient satisfaction, delay the onset of renal replacement therapy and increase cost-effectiveness.

Despite more than two decades experience in the treatment of ESRD patients, there are relatively few reports in the literature about early education or pre-ESRD education. The available reports describe programme innovations and methods and offer some limited evaluative data and recommendations. Access to patients and lack of reimbursement are significant barriers to expansion of this field. These barriers present the nephrology community with challenges in offering patients optimum treatment and participation in treatment decisions and alternatives. Early patient education is an essential component that can contribute significantly to slowing the progression of renal disease [9].

Levin et al reported the results of a multidisciplinary pre-dialysis education programme conducted in Canada. Thirty-seven patients referred to a multidisciplinary clinic-based education programme were compared with a concurrent cohort of 39 patients who received individualized patient care from a nephrologist. In patients who had participated in pre-dialysis education, there were improvements in control of blood pressure, calcium, phosphate and a significant reduction in the need for urgent dialysis (13% *vs.* 35%, $P < 0.05$). These outcomes were also achieved with significant cost-savings [10].

In a retrospective study conducted in USA, Ifuda et al reviewed the outcomes of 139 patients who had been commenced on dialysis between 1990 and 1994 in a metropolitan New York hospital. Stratification was done according to whether they had received pre-dialysis care and education from a nephrologist (43% of cohort), nonnephrologist physician (45%) or who had received no predialysis medical care (12%). Patients who had a period of pre-dialysis care by a nephrologist had a significantly reduced rate of decline in creatinine clearance [11].

Devins et al reported the results of a multicentre randomised controlled trial (RCT) in Canada in which 297 pre-dialysis patients received either usual care or pre-dialysis psychoeducational intervention (PPI), consisting of a 90 minute educational slide presentation which covered aspects of normal kidney function, changes in CKD, information about nutritional and medication treatment of CKD and options for renal replacement therapy. Patients were followed up every 3 weeks by a 10 minute phone call, during which illness-related developments were reviewed. Usual care encompassed the usual exchange of information and treatments provided by the patients' renal physicians. Time to dialysis was significantly extended in the PPI group (17.0 *vs* 14.1 months, $P < 0.001$). Knowledge acquisition predicted time to dialysis treatment and patients in the PPI group demonstrated more illness-related knowledge. Patients whose primary illness coping mechanism was avoidance of threat-related information (blunting) demonstrated a shorter time to dialysis in the usual care treatment group, but PPI extended the time to dialysis in this patient subpopulation [12].

Binik et al studied the quality of life in 204 pre-ESRD patients with deteriorating renal function. Patients were randomly assigned to either an enhanced or a standard education programme. The enhanced education condition consisted of a specially prepared slide-lecture show concerning kidney diseases and their treatment that was delivered by a trained research assistant. The standard education condition consisted of whatever educational procedures were routinely available at the participating hospital. Individuals in the enhanced education condition survived without dialysis an average of 4.6 months longer than those in the standard education group. This effect was not attributable to physical differences between the groups, to cohort effects, to delays in contacting the patients, or to when or where they were identified [13].

The CKD Renalsoft Informatics Observational Study (CRIOS) was a prospective observational study designed to identify trends in practice patterns and outcomes in CKD patients in the United States of America. One of the goals of this study was to examine the perceived knowledge and education of CKD patients concerning therapeutic options for ESRD. Of the 2295 patients enrolled in the CRIOS study, 823 completed education assessment questionnaires. Of these 823 patients, clinical data and CKD stage identification were available for 749 patients; of these, there were 676 patients that were CKD stage 3–5. All analyses used data from these 676 patients. When patients were asked about their general level of knowledge concerning their kidney disease, only 23% of patients reported having a great deal or extensive knowledge; 35% reported having very limited or no knowledge about their kidney disease[14].

1.3 MEASURES TO RETARD PROGRESSION OF CKD

End-stage renal disease is a social and economic threat worldwide. In this context, any medical intervention that may prevent the progression of chronic kidney disease becomes extremely important. Improving the cardiovascular status is another major objective in the management of this population because cardiovascular disease is the leading cause of morbidity and mortality among dialysis patients. Moreover, this is only the tip of the iceberg, because many patients die before reaching end-stage renal disease. Today, several interventions are available to delay the progressive loss of renal function and/or prevent the development of cardiovascular disease, but we are still far from being satisfied.

These interventions include low protein diets, correction of calcium-phosphate disorders and anemia, blood pressure and proteinuria control, and smoking cessation. Other interventions, such as the administration of lipid-lowering agents, are emerging as particularly promising therapeutic approaches. Growing attention has been paid to polytherapeutic approaches to chronic kidney disease, in order to control different causal factors involved in progression and reduce them as much as possible. However, larger prospective, controlled, randomised clinical trials are needed to demonstrate their actual usefulness. All the interventions are likely to be more effective if instituted as early as possible in the course of the disease, because it has been widely demonstrated that early and regular nephrologic care is associated with decreased morbidity and mortality [15].

Tan et al conducted a study at Penn-Presbyterian Medical Center, University of Pennsylvania in the United States of America (USA) between October 2007 and April 2008. A self-administered questionnaire, based on a literature search of past knowledge assessment studies was developed There were 5 sections in the questionnaire: 1) basic knowledge of personal health; 2)perceptions of factors increasing the risk of CKD; 3) knowledge of therapies to slow CKD progression; 4) perceptions of CKD increasing the risk of other medical conditions; and 5) demographic information. The questionnaire was completed by 229 participants. A majority of the subjects thought that all of the methods

inquired about (glucose control, proteinuria control, blood pressure control, smoking control, and taking ACE inhibitors or ARBs) were effective in slowing the progression of CKD. Glucose control (89.5%) was the most recognized effective therapy for slowing the progression of CKD. Smoking control (79.5%) and use of renin-angiotensin system inhibitors (63.8%) were the least likely to be identified as effective in slowing the progression of CKD [16].

1.3.1 Blood pressure control

Hypertension is a well-established cause of chronic kidney disease and is a common complication of CKD. The pathophysiology of hypertension is complex and multifaceted. The concurrence of hypertension and kidney disease increases the chance of progression of CKD and risk for complications such as left ventricular hypertrophy (LVH), retinopathy and malignant hypertension [17, 18].

Hypertension is an important risk factor for progression of CKD irrespective of its cause and effective blood pressure lowering is beneficial in slowing the decline of kidney function. Best clinical results were observed when adequate blood pressure control was achieved at an early stage of renal insufficiency [19, 20].

Antihypertensive agents of almost any therapeutic class may be appropriate but Angiotensin-converting enzyme (ACE) inhibitors have been particularly effective in slowing progression of renal insufficiency in patients with and without diabetes mellitus by reducing angiotensin II effects on renal haemodynamics, local growth factors, and glomerular permselectivity [21-25].

Non-dihydropyridine calcium channel blockers were also shown to retard progression of renal insufficiency in patients with type 2 diabetes mellitus. Recently, angiotensin receptor blockers (Irbesartan, Valsartan and Losartan) have been shown to have renoprotective effect in diabetic nephropathy and the effect is independent of the reduction in blood pressure [26-30].

Early detection and effective treatment of hypertension to desired levels is essential to retard the progression of CKD. The benefit of aggressive blood pressure control is most pronounced in patients with a urinary protein concentration of >3 g/24-hr. These benefits are seen in patients with both diabetic and nondiabetic renal disease [19, 31, 32].

1.3.2 Reducing proteinuria

Pharmacologic interventions that reduce urinary protein excretion also limit progressive decline in renal function in both diabetic and non-diabetic proteinuric glomerulopathies. Angiotensin blockade with ACE-inhibitors or angiotensin receptor blockers have clearly shown that at comparable levels of blood pressure control, these agents are more effective than conventional antihypertensive agents in reducing proteinuria, GFR decline and progression to ESRD [26-30,33-35].

1.3.3 Glycaemic control in diabetes mellitus

Diabetes is a highly prevalent cause of CKD and accounts for a large part of growth of CKD and ESRD. Glycemic control blunts the renal complications of diabetes mellitus. The Diabetes Control and Complications Trial (DCCT) conclusively demonstrated that meticulous control of blood glucose in type 1 diabetes reduced the development of microalbuminuria in 35% of patients [36]. Similar findings were shown in type 2 diabetes in the United Kingdom Prospective Diabetes Study (UKPDS) [37]. Other studies in a parallel fashion suggested that glycemic control could reduce the progression of diabetic kidney disease [38-40].

1.3.4 Smoking cessation

In a retrospective German study, smoking was found to be an independent risk factor for development of ESRD in men with diagnosed kidney disease [41]. Smoking, hypertension and vascular disease were strong predictors of elevated serum creatinine in non-diabetics older than 65 years [42]. In patients with CKD, smoking has been associated with higher plasma von Willebrand's factor and triglycerides that are likely to contribute to the increase in cardiovascular morbidity and mortality in these patients. Therefore, cessation of smoking should be strongly recommended to patients with renal disease.

1.3.5 Preventing hyperphosphatemia and secondary hyperparathyroidism

Hyperparathyroidism appears to be one of the earliest manifestations of renal disease as a response to impaired renal function. Increased parathyroid hormone (PTH) levels have been demonstrated when the GFR falls below 60 to 80 mL/min. Minor changes in bones have been demonstrated in patients with a GFR of as high as 60 mL/min and 87% of patients had abnormal bone histology with GFR between 20-59 mL/min [43,46].

Progression of CKD occurs from chronic tubulointerstitial inflammation caused by increases in single-nephron filtered load of phosphate, calcium phosphate product in the tubular lumen and by precipitation of calcium phosphate in the tubules and interstitium. This is facilitated by reduced concentration of citrate in the tubular fluid [47].

In a study of 246 human renal biopsies, elevated tissue calcium levels were found to exist early in renal disease. Renal calcium content correlated significantly with serum creatinine and serum phosphorus, but not with serum calcium. Calcium deposits could be identified in renal biopsies from patients with serum creatinine <132 mmol/L (1.5 mg/dL), indicating that renal calcification begins early in the course of kidney disease. The severity of renal calcification was closely related to hyperphosphatemia and Calcium-phosphate product. This finding supports the hypothesis that phosphate-

mediated renal calcification is an important factor that may influence the rate of kidney disease progression [48].

Hence, it is recommended to reduce the exposure of kidney to calcium phosphate precipitation by modest dietary phosphate restriction and administration of phosphate binders, preferably using calcium-free phosphate binders to avoid calcium load [49].

Dietary phosphorus should be restricted before GFR falls below 40 mL/min and before the development of hyperphosphatemia. The use of vitamin D supplements during pre-ESRD phase is controversial because of concern that it may lead to progression of CKD. Calcitriol should be used with vigilance to prevent development of elevated calcium-phosphate product, hypercalcemia and over-suppression of PTH. Lower doses of Calcitriol 0.25 m g/day is safe and provides adequate suppression of PTH [50- 52].

1.3.6 Addressing anaemia

Anemia of CKD is normochromic and normocytic and is invariably present and begins early, when GFR falls below 30-35% of normal. This is primarily due to decreased erythropoietin (EPO) production by the failing kidney but other concomitant factors should be considered in the evaluation of anemia in patients with CKD [53].

Anemia decreases both oxygen delivery and protection against oxidative stress and may favor tubular obstruction secondary to interstitial fibrosis. Hypoxia and oxidative stress probably stimulate the production of extracellular matrix by fibroblasts, increasing fibroblasts and creating a vicious cycle.

Treatment of anemia with recombinant human erythropoietin (rHuepo) improves quality of life and reduces cardiovascular complications. Earlier concerns that rHuepo may worsen hypertension and adversely affect the course of progression in CKD patients have been dispelled, and there is increasing evidence that prevention or correction of anaemia may have favourable effects on progression of CKD in addition to reducing the risk of left ventricular hypertrophy and other cardiovascular complications [54].

Jungers et al demonstrated that treatment of anaemia with rHuepo in predialysis CKD patients slows the progression of renal failure [55].

1.3.7 Dietary protein restriction

Dietary protein restriction may be beneficial by preventing glomerular hyperperfusion and hypertension and compensatory hypertrophy and by reducing the intrarenal formation of angiotensin II and thromboxane. Low-protein diets reduce the generation of nitrogenous wastes and inorganic ions that cause many of the clinical and metabolic disturbances characteristic of uremia. Low-protein diets can diminish the ill effects of hyperphosphatemia, metabolic acidosis, hyperkalemia and other electrolyte disorders.

Recently, the results of Modification of Diet in Renal Disease (MDRD) study have been reexamined using correlational analyses based on achieved protein intake rather than on the intention to treat. Secondary analysis suggested that a lower protein diet retards the progression in both moderate and advanced renal disease [56].

2.0 STUDY JUSTIFICATION

CKD is a worldwide public health problem associated with an increasing incidence and prevalence of patients with renal failure requiring renal replacement therapy and most of these patients will die before renal replacement therapy (RRT) is initiated.

The cost of RRT is high and a significant number of patients cannot afford it and for those who can afford, the facilities for dialysis are limited and so are transplant services.

Studies have shown that educational interventions in patients with CKD prolong time to end stage renal disease, impact on the choice of RRT and improve survival on dialysis.

This study will identify the knowledge, attitudes and practices on measures to retard progression of chronic kidney disease among patients with CKD and this will influence our public health policy on chronic conditions like CKD.

3.0 RESEARCH QUESTION

What is the knowledge, attitudes and practices on measures to retard disease progression of patients with chronic kidney disease at the KNH renal clinic?

4.0 OBJECTIVES

4.1 BROAD OBJECTIVE

To determine the knowledge, attitudes and practices on measures to retard disease progression and associated factors among patients with CKD at the KNH renal clinic.

4.2 SPECIFIC OBJECTIVES

1. To determine the knowledge, attitudes and practices on measures to retard disease progression among patients with CKD.

2. To determine the association between the knowledge, attitudes and practices on measures to retard disease progression with age, gender, level of education, medical insurance status, duration of follow up and stage of CKD.

5.0 STUDY DESIGN AND METHODOLOGY

5.1 STUDY DESIGN

Cross-sectional descriptive study.

5.2 STUDY SETTING

Renal outpatient clinic of the Kenyatta National Hospital.

5.3 STUDY POPULATION

Patients diagnosed with CKD and on follow up for three months or more at the KNH renal clinic.

5.4 STUDY DURATION

March – June 2011.

5.5 PATIENT SELECTION

5.5.1 Inclusion Criteria

- Patients with Chronic Kidney Disease with GFR less than 60ml/min/1.73m^2.
- Age above 18 years.
- Patients who sign an informed consent.

5.5.2 Exclusion Criteria

- Patients who have had renal transplantation.
- Patients on hemodialysis or peritoneal dialysis.
- Patients known to have active psychosis, dementia or cognitive impairment.

5.6 SAMPLE SELECTION AND SIZE

5.6.1 Sampling Procedure

Consecutive sampling was used to recruit patients with CKD at the KNH Renal Clinic over a period of 4 months, until the desired sample size was achieved.

5.6.2 Sample Size Determination

The sample size was calculated using the following method:

$$N = \frac{z^2 \times p(1-p)}{d^2}$$

N=minimum sample size required

z=confidence interval at 95% (standard value of 1.96)

p=estimated prevalence from the CRIOS study [14] =23%

d=margin of error (0.08)

$$N = \frac{(1.96)^2 \times 0.23(1-0.23)}{(0.08)^2}$$

The minimum sample size for this study was 106 CKD patients; however we managed to recruit 110 patients.

5.7 CASE DEFINITION

5.7.1 Chronic Kidney Disease (CKD)

A chronic kidney disease patient was considered when the estimated GFR was less than 60ml/min/1.73m^2 at the time of recruitment with evidence of a previous estimated GFR of less than 60ml/min/1.73m^2 at least three months prior to the recruitment into the study.

5.7.2 Stages of CKD according to the US National Kidney Foundation and the Kidney Disease Outcomes Quality Initiative (K/DOQI)

Stage 1: Kidney damage (pathological abnormalities or markers of damage including abnormalities in blood or urine tests or in imaging studies) with normal or raised glomerular filtration rate.

Stage 2: Glomerular filtration rate 60-89 ml/min/1.73m^2 with evidence of kidney damage

Stage 3: Glomerular filtration rate 30-59 ml/min/1.73m^2

Stage 4: Glomerular filtration rate 15-29 ml/min/1.73m^2

Stage 5: End-stage renal disease; glomerular filtration rate < 15ml/min/1.73m^2

5.8 SCREENING AND RECRUITMENT

Screening entailed assessment of eligibility by reviewing patients' files.

All patients' files with a documented diagnosis of CKD and a result of serum creatinine from the KNH Renal laboratory at least three months prior to the study visit were screened for eligibility.

The patients whose estimated GFR was less than 60ml/min/1.73m^2 for a period of three months or more were enrolled. The GFR was estimated using the corrected Cockroft and Gault formula [57]. Patients who met the inclusion criteria were informed of the study and requested to fill the consent form.

Once consent was given, demographic and socio-economic history was derived through direct questioning of the patient and information recorded on a study proforma. Further history was taken concerning their illness and a thorough physical examination was performed.

2mls of heparinised whole blood was drawn from the ante-cubital fossa for serum urea and creatinine except for those with the results of the same done in the KNH renal lab within a duration of one week prior to recruitment. Once the serum creatinine results were availed, the glomerular filtration rate was estimated using the corrected Cockroft and Gault formula [57] thus:

$$\text{GFR (mL/min)} = \frac{[140 - \text{age in years} \times \text{weight in kilograms}] \times \text{constant}}{\text{Plasma creatinine in micromoles per litre}}$$

Constant=1.23 in males and 1.04 in females

Patients who had an estimated GFR of less than 60mL/min/1.73m^2 were recruited into the study. The knowledge, attitudes and practices questionnaire was then administered. All patients with CKD were booked for follow up in the KNH renal clinic as appropriate in consultation with the nephrologists and those with ESRD were counseled on the various forms of RRT. For those in the Pre-ESRD stage, appropriate measures were undertaken in consultation with the nephrologists with the aim of retarding the progression of CKD.

5.9 CLINICAL METHODS

An investigator administered study proforma (see appendix 2) and knowledge, attitudes and practices questionnaire (see appendix 3) were used to collect data from the recruited patients.

Using the study proforma, the principal investigator obtained socio demographic data that included age, gender, marital status, county of residence, medical insurance status and occupation. The primary diagnosis was derived from the patients' files and the information collected from the medical records was corroborated through history. Kidney disease history was obtained and a physical examination was carried out. Weight was determined by a good quality bathroom scale with the participants in light clothing and without shoes.

5.10 LABORATORY METHODS

Serum urea and creatinine assays were performed at the KNH Renal laboratory using random clinical chemistry analyser RA 1000(Technicon instruments, USA). Creatinine was assayed using alkaline picrate reaction and urea assayed using enzymatic kinetic method. The results of the laboratory investigations were then entered into a study proforma.

5.11 QUALITY ASSURANCE

The recommended procedures for specimen collection, preparation and storage were followed to minimise pre-analytical errors. To ensure quality was maintained, the

laboratory tests were carried out only in the KNH renal lab. The results were analysed after daily calibration using standard calibration methods and materials and tests assayed against controls. The renal laboratory carries out both internal and external quality control.

5.12 QUESTIONNAIRE ADMINISTRATION

A semi-structured questionnaire containing open and closed ended questions to determine the knowledge, attitudes and practices on measures to retard progression of chronic kidney disease was used to collect data.

The questionnaire was interviewer administered by either the principal investigator (PI) or one research assistant.

The research assistant who is a registered clinical officer was trained by the PI on how to administer the questionnaire over a period of 3 weeks.

Each of the questions in the questionnaire was read and interpreted in a comprehensible manner to each and every recruited patient.

The answers that the patients gave were written in the questionnaire in the way they were provided.

For patients who could not understand English, the Swahili version of the questionnaire (see appendix 4) was used and the answers provided were then translated back to English.

The questionnaire was pre-tested for clarity, suitability and practicability through a pilot study of twenty patients at the renal clinic after ethical approval and before the study commenced.

Interview conversations were tape recorded and later transcribed verbatim.

5.13 DEFINITION OF VARIABLES

Independent variables: Age, gender, level of education, medical insurance status, duration of follow up and stage of CKD.

Dependent variables: Knowledge, attitudes and practices on measures to retard disease progression.

5.14 DATA MANAGEMENT AND ANALYSIS

To ensure quality (reliability and credibility) of the data, each questionnaire was provided with a unique study serial number to prevent duplication of data collection.

All data collected was entered into a password protected computer database using Microsoft access computer software and the open-ended responses such as the knowledge on the measures to retard progression of kidney disease were synthesized then coded prior to entry into the database. Statistical analysis was done using statistical package for social scientists (SPSS) version 17 after cleaning and verification.

Some of the open-ended questions were coded and categorised into themes. The emerging themes were presented as qualitative data. Any unique responses from the patients were reported verbatim.

The socio-demographic characteristics and the laboratory parameters were summarised into means/medians for continuous data and proportions for categorical data. The knowledge, attitudes and practices on measures to retard progression of chronic kidney disease were summarised and presented using proportions. Data summaries were presented using tables, graphs and pie charts.

The knowledge, attitudes and practices on measures to retard progression of chronic kidney disease were the dependent variables and they were tested for association with patients' characteristics using Pearson Chi-Square test for categorical variables and Student's t test or Mann Whitney U test for continuous variables. All statistical tests were interpreted at 5% level of significance (95% confidence interval).

6.0 ETHICAL CONSIDERATIONS

The study was undertaken after approval by the Department of Clinical Medicine and Therapeutics, University of Nairobi and the Kenyatta National Hospital Scientific and Ethical Review Committee.

The objectives and purposes of the study were clearly explained to eligible participants in a language suitable to them prior to inclusion into the study.

Only patients who gave informed consent were enrolled.

Patients were free to withdraw during the study period without discrimination.

Information gathered from the study participants was kept confidential.

The study results were disseminated to health care providers to aid in patient care.

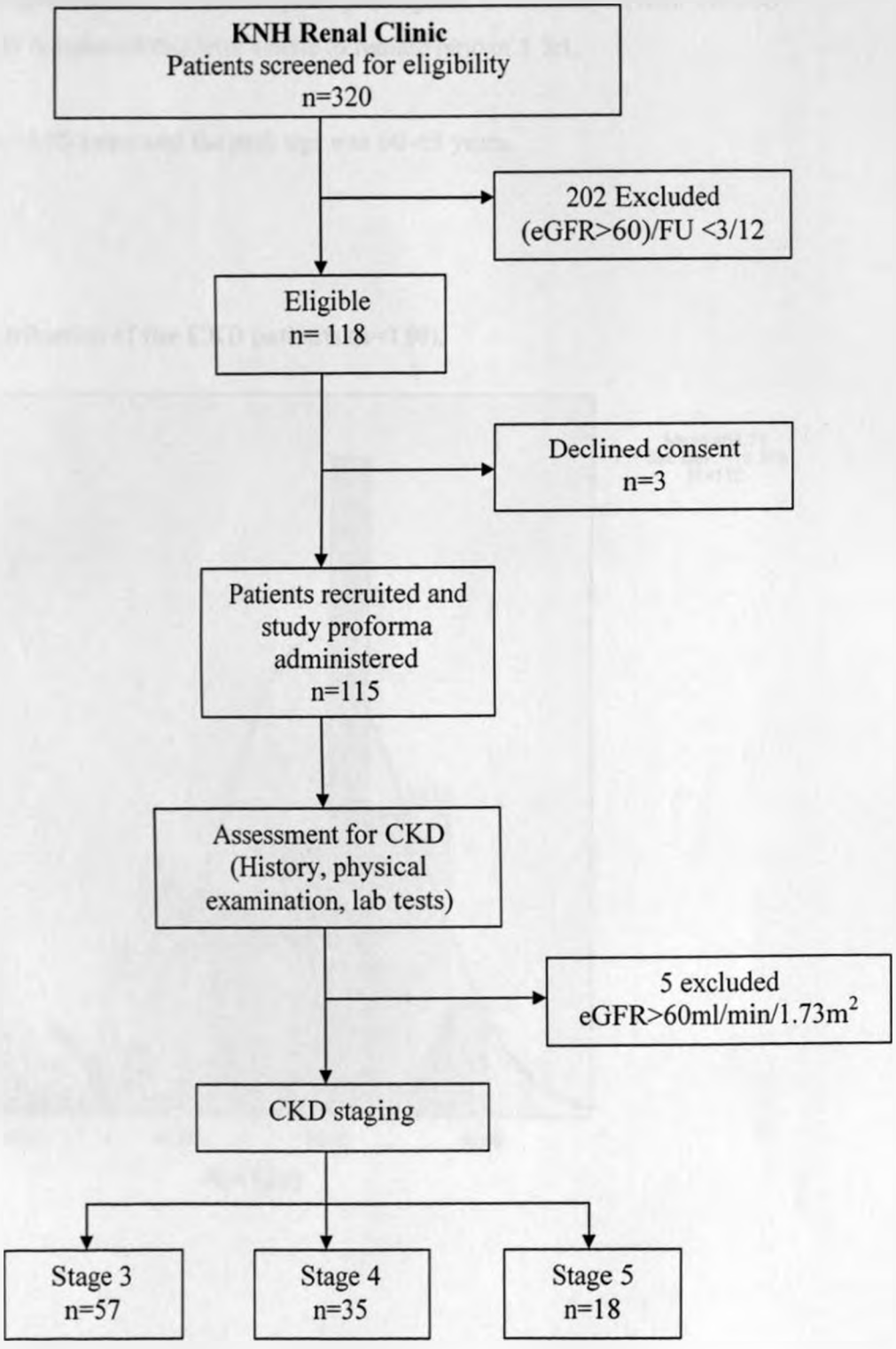
7.0 STUDY FEASIBILITY

The renal clinic runs once a week, every Friday morning except on public holidays. Approximately 80 patients are seen every week. Of these, 75% have CKD and this translates to about 50 patients. It was possible to recruit 110 patients within 4 months.

RESULTS

Figure 1: Patient recruitment flow chart for the CKD patients

110 patients were recruited between March and June 2011.



Baseline characteristics of the CKD patients

110 CKD patients aged between 18 and 82 years participated in the study. There were 66 males (60%) and 44 females (40%) with a male to female ratio of 1.5:1.

The mean age was 54.75 years and the peak age was 60-65 years.

Figure 2: Age distribution of the CKD patients (n=110).

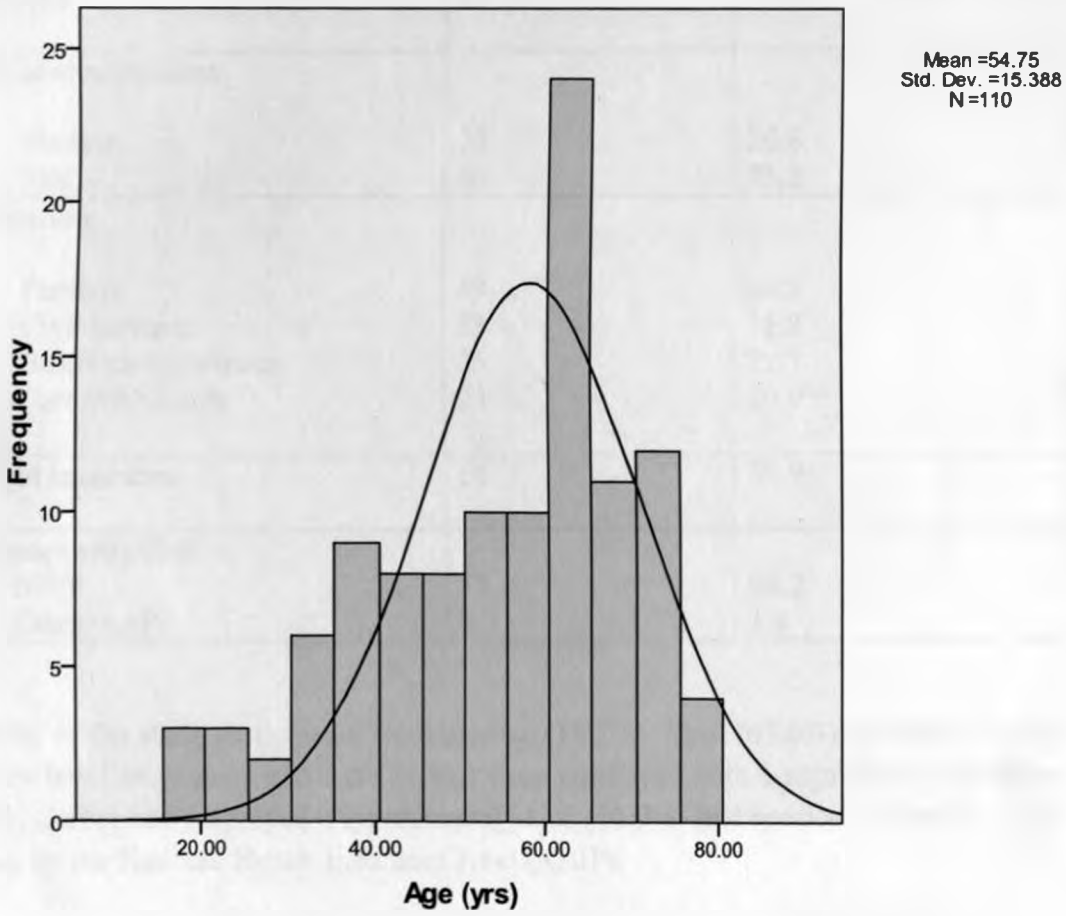
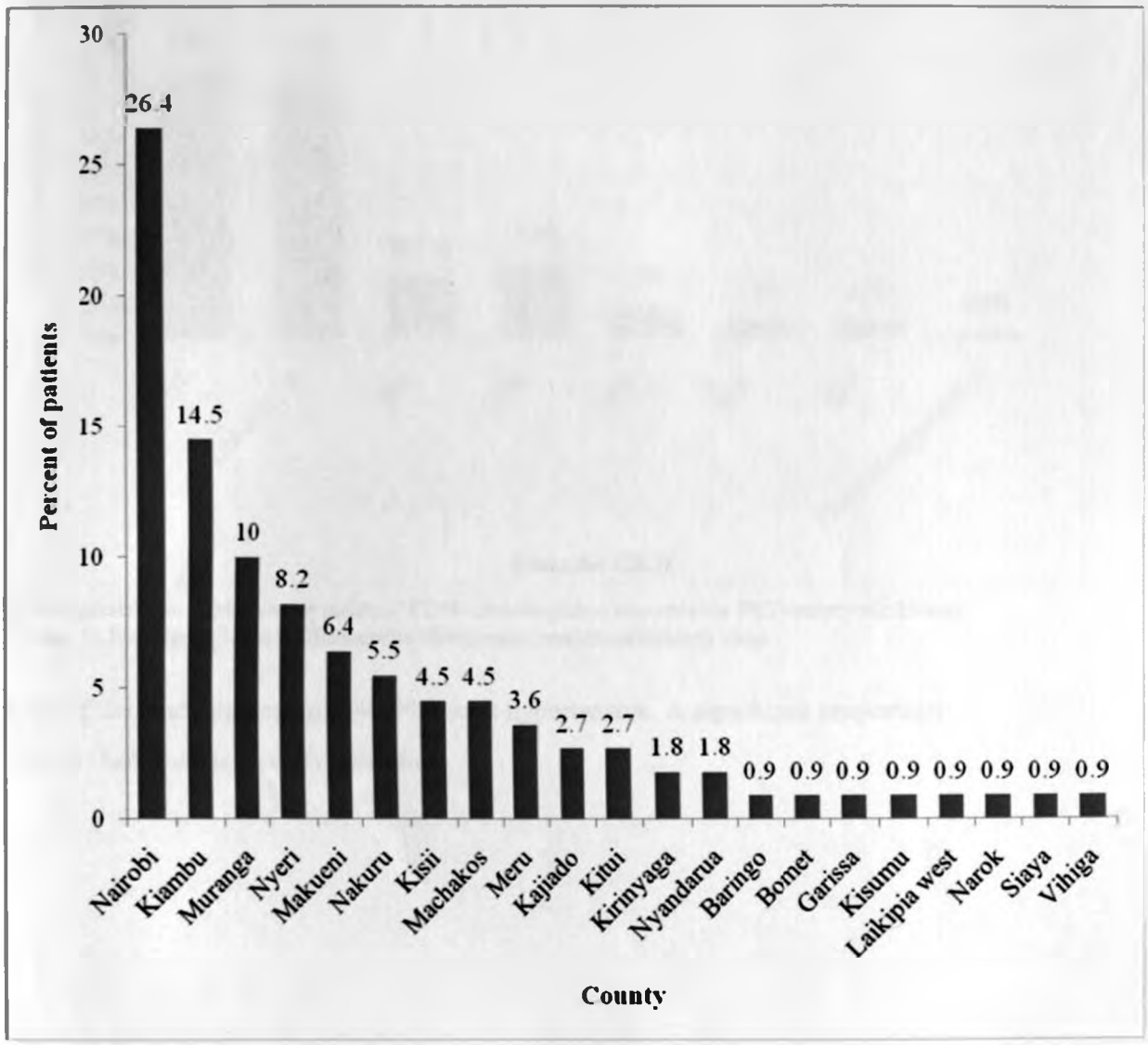


Table 1: Socio-demographic characteristics of the CKD patients

Variable	n=110	
	Frequency	**Percentage**
Marital status		
Single	14	12.7
Married	86	78.2
Divorced	3	2.7
Widowed/widower	7	6.4
Level of education		
No formal education	11	10.0
Primary	29	26.4
Secondary	43	39.1
College/university	27	24.5
Employed	82	74.5
Form of employment		
Formal	22	26.8
Self	60	73.2
Occupation		
Farmers	49	44.5
Civil servants	13	11.8
Businessmen/women	25	22.7
Casual labourers	23	20.9
Medical insurance	56	50.9
Insurance specified		
NHIF	55	98.2
Other-AAR	1	1.8

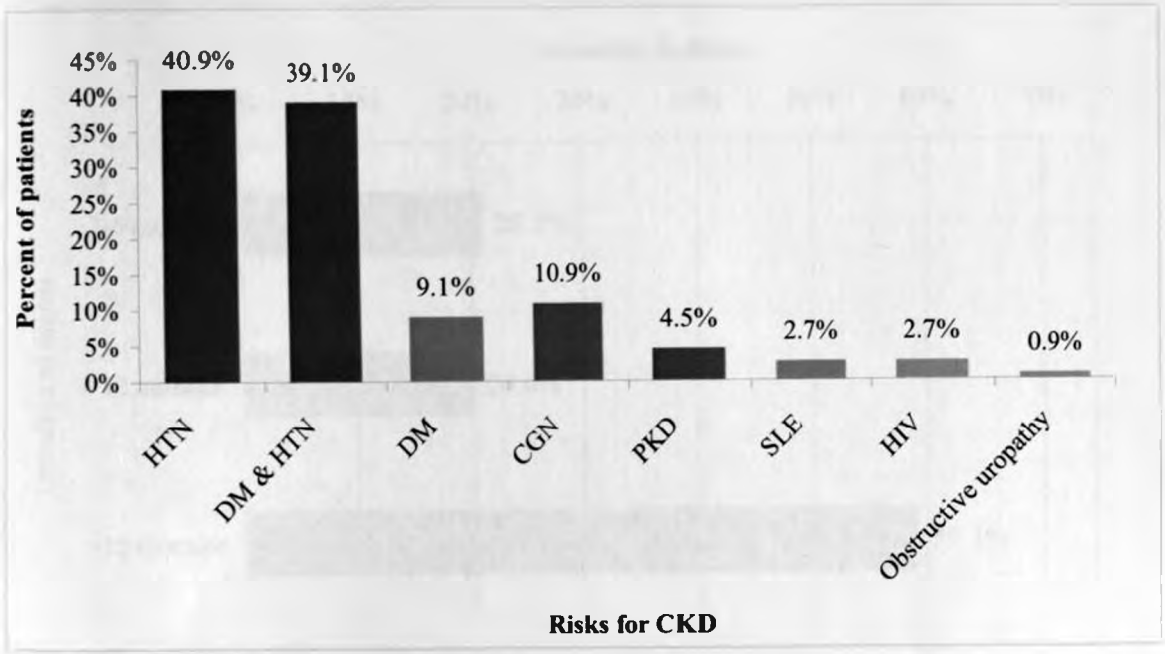
Majority of the study participants were married (78.2%). Most (63.6%) had attained post primary level of education. Most (74.5%) were employed with a significant proportion (73.2%) being self employed. Approximately half (50.9%) had medical insurance cover mainly by the National Health Insurance Fund (NHIF).

Figure 3: County of residence of the study participants (n=110)



Most of the study participants were from Nairobi, Kiambu, Muranga and Nyeri counties. None of participants came from the coastal region.

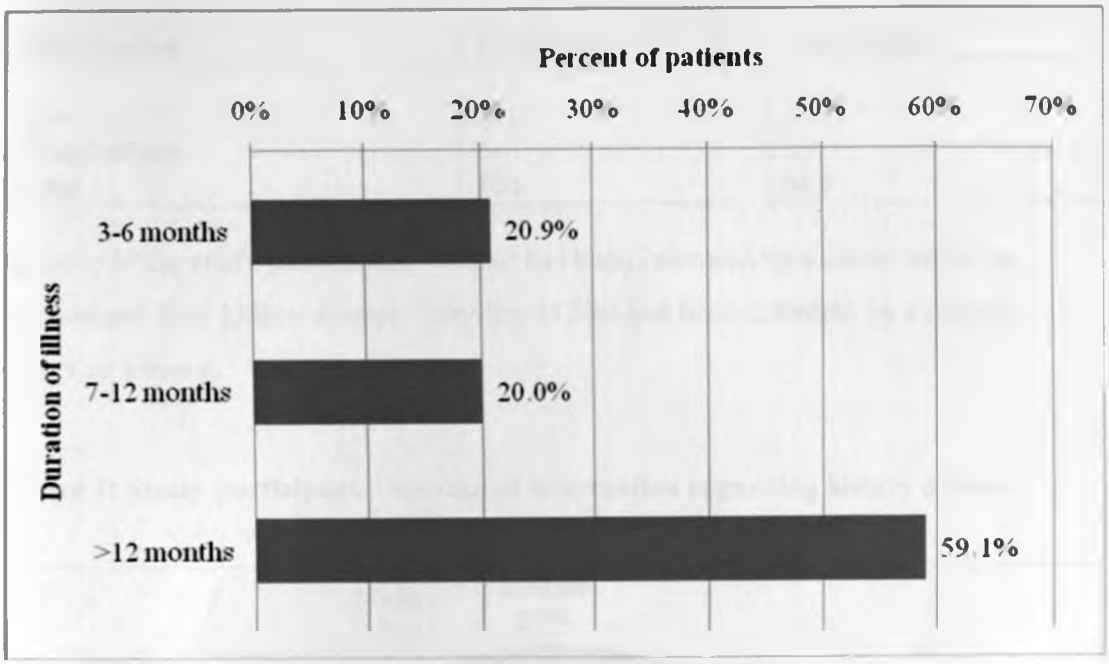
Figure 4: Primary disease/predisposing risk to CKD in the study population



HTN-hypertension DM-diabetes mellitus CGN- chronic glomerulonephritis PKD-polycystic kidney disease SLE-systemic lupus erythematosus HIV-human immunodeficiency virus

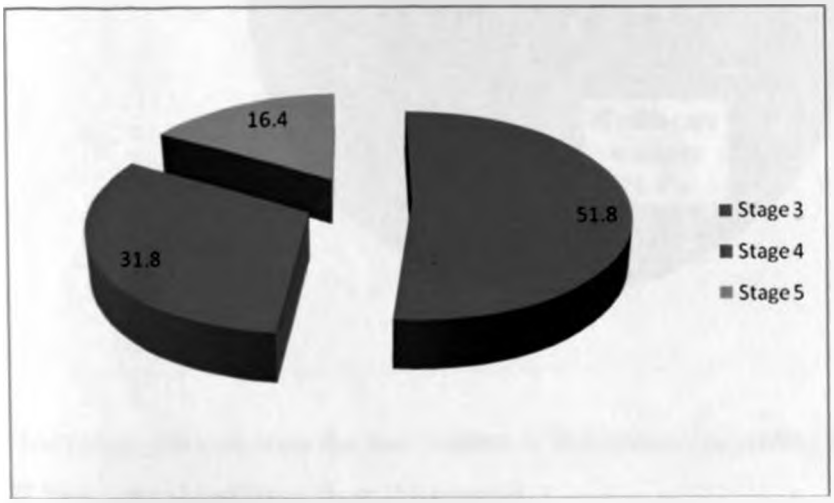
Most of the study participants (40.9%) were hypertensive. A significant proportion (39.1%) had diabetes and hypertension.

Figure 5: Duration (months) of follow up in the KNH renal clinic (n=110)



Majority of the study participants (59.1%) had been on follow up in the renal clinic for more than one year. The median duration of follow up was 24 months with an inter-quartile range of 8.5 to 48 months.

Figure 6: Staging of the CKD patients (n =110)



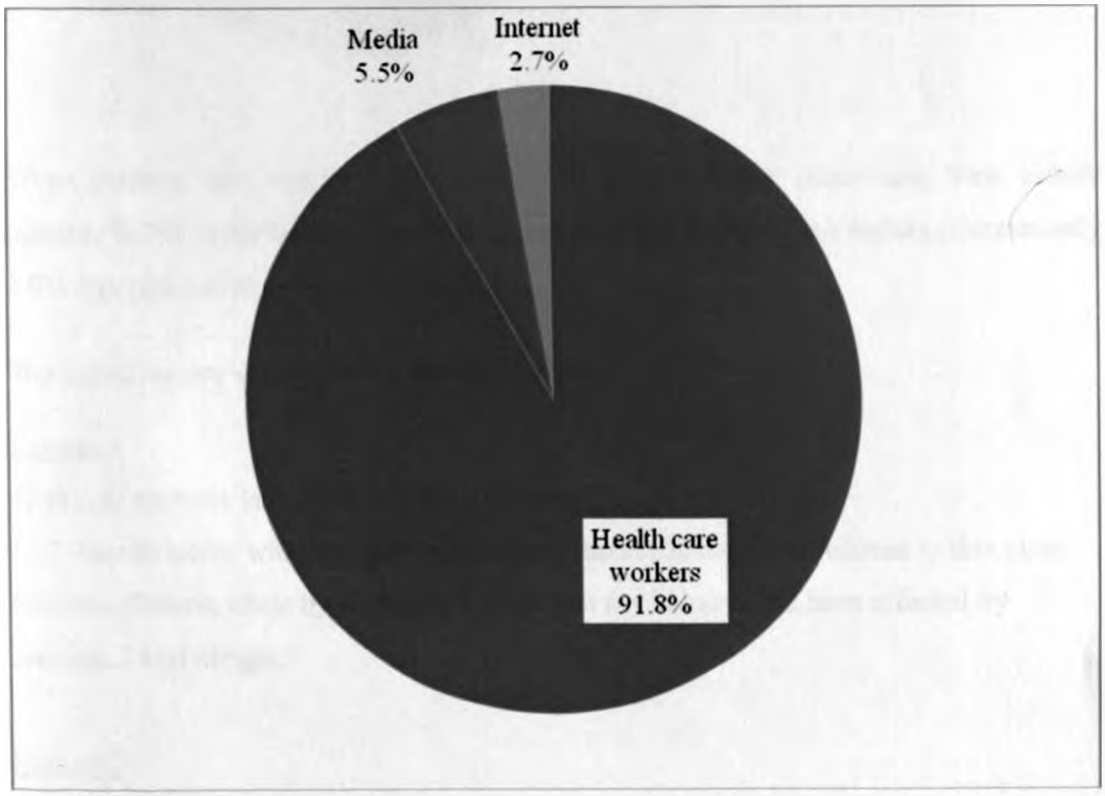
Most of the study participants (51.8%) were in CKD stage 3 with only 16.4% being in CKD stage 5.

Table 2: Response to the question; who informed you about your kidney disease?

Health worker	Frequency	Percentage
Nurse	2	1.8
Clinical officer	4	3.7
Doctor	104	94.5

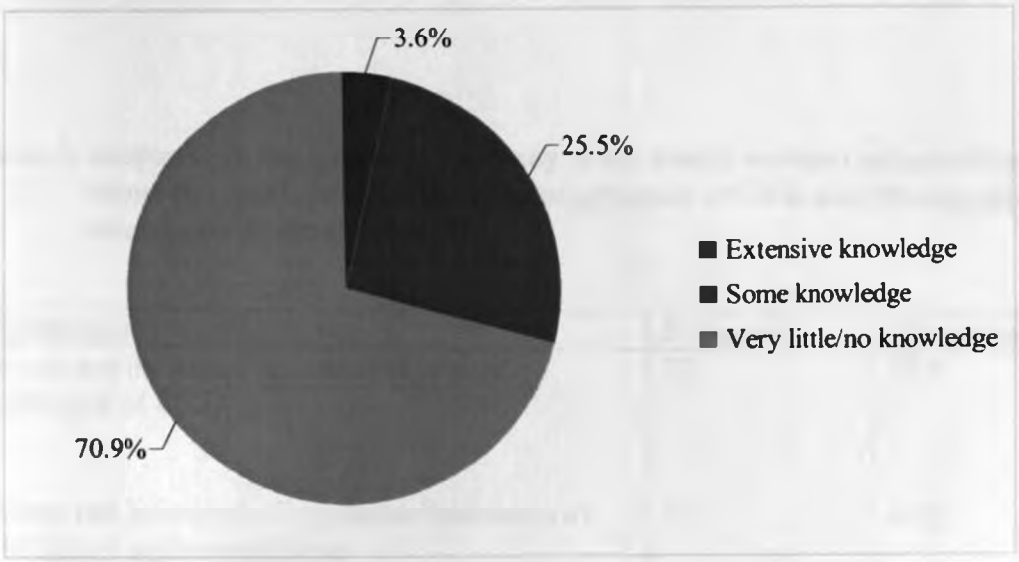
Majority of the study participants (94.5%) had been informed by a doctor about the diagnosis of their kidney disease. Very few (5.5%) had been informed by a clinical officer or a nurse.

Figure 7: Study participants' sources of information regarding kidney disease



Healthcare workers were the main source of information regarding kidney disease. Only 2.7% sought information from the internet.

Figure 8: Response to the question; how would you rate your level of knowledge regarding your kidney disease (probes: etiology, symptoms, progression and treatment) (n=110)



When patients were asked to rate their level of knowledge concerning their kidney disease, 70.9% reported having very little /no knowledge about their kidney disease; only 3.6% reported having extensive knowledge.

The following are excerpts from selected patients:

Excerpt 1

42 yr old business lady from Muranga County

"...I want to know what a patient with kidney disease feels. I was referred to this clinic from the diabetic clinic by doctors who said that my kidneys had been affected by diabetes. I feel alright. "

Excerpt 2

50 yr old male farmer from Kiambu County

".. I have been coming to this clinic for the past three years...I want to know the cause of my kidney disease. No one seems to explain why I have a kidney problem. "

Patients' beliefs regarding the cause of their illness

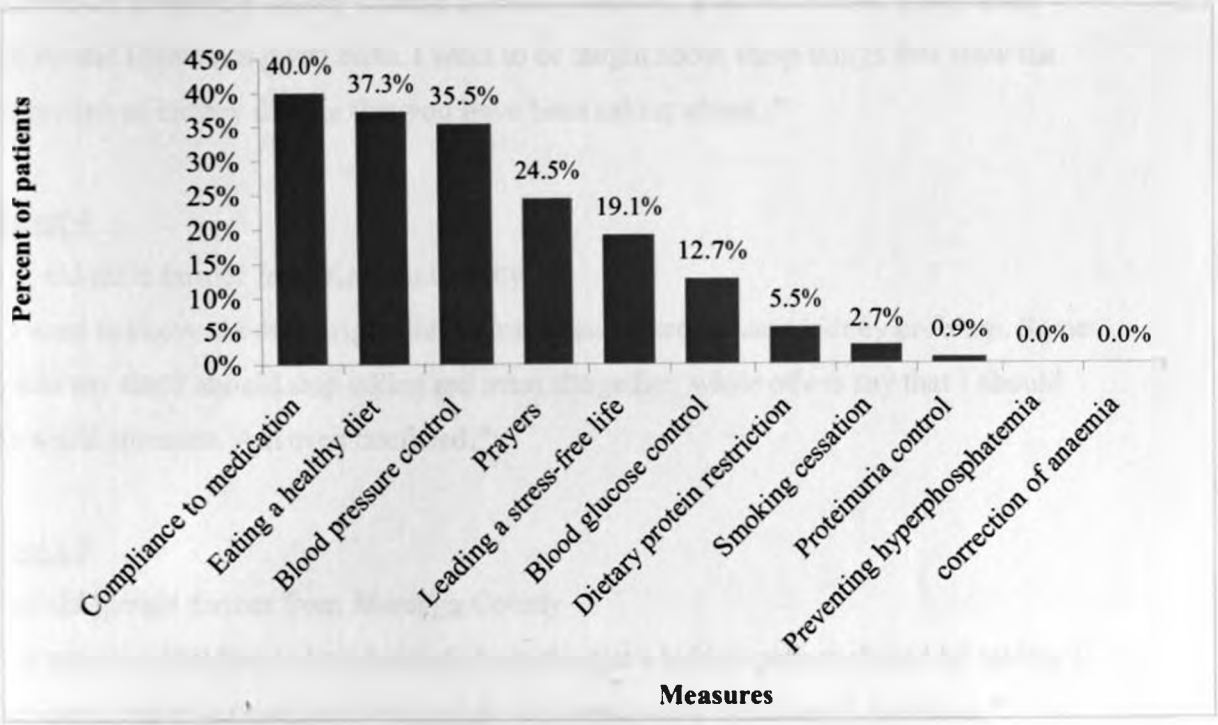
It emerged that patients believed the cause of their illness to be due to stress, diets rich in fats, salt and sugar and use of alcohol. Some patients did not know that diabetes and hypertension are associated with kidney disease. A few patients believed that witchcraft and sexually transmitted infections were the cause of their illness.

Table 3: Response to the question; have any of the health workers informed you about the measures that slow the progression of CKD and the supportive treatments of renal failure?

Information	Frequency	Percentage
Patients **not** informed on measures to slow progression of CKD	77	70.0
Patients **not** informed of supportive treatments of renal failure eg.haemodialysis	67	60.9

When the study participants were asked whether they had been informed about the measures that retard the progression of CKD and the supportive treatments of renal failure, 70% had not been informed about the measures that retard the progression of CKD while 60.9% had not been informed about the supportive treatments of renal failure.

Figure 9: Measures that retard progression of CKD according to the study participants' knowledge



Majority of the study participants thought that compliance to medication (40%) and eating a healthy diet (37.3%) would retard the progression of CKD. Regarding the well studied measures, majority of the study participants (35.5%) thought that blood pressure control would retard the progression of CKD.12.7% mentioned blood glucose control. Very few mentioned dietary protein restriction (5.5%), smoking cessation (2.7%) and proteinuria control (0.9%). None of the study participants mentioned prevention of hyperphosphatemia or correction of anaemia.

The following are excerpts from selected patients:

Excerpt 3

28 yr old female secretary from Nairobi County

" ..Since I started coming to this clinic 2 years ago, I have not been informed on the things to do so that my kidney disease does not worsen…I am afraid that I may need dialysis and I have not given birth. I want to be taught about these things that slow the progression of kidney disease that you have been asking about.."

Excerpt 4

55 yr old male farmer from Kajiado County

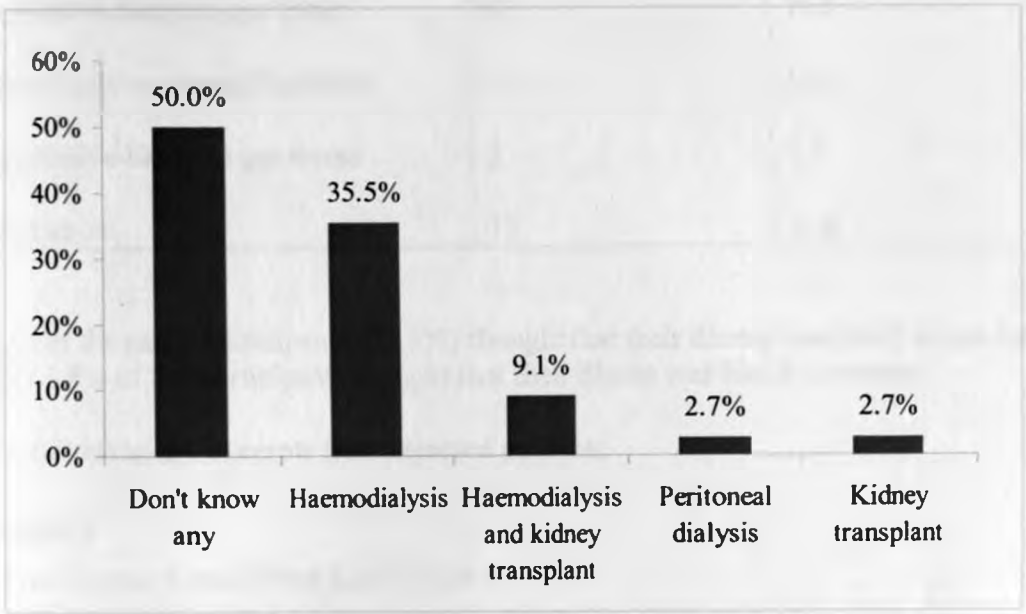
" ..I want to know about the right diet to use when someone has a kidney problem. Some doctors say that i should stop taking red meat altogether, while others say that I should take small amounts. Am even confused."

Excerpt 5

60 yr old female farmer from Muranga County

" ...I want my children to be educated about the diet a kidney patient should be taking. I also want them to be taught how to handle me because my condition is sensitive."

Figure 10: Study participants' knowledge of supportive treatments of renal failure



Majority of the study participants (50%) did not know any form of renal replacement therapy; 35.5% had knowledge of hemodialysis. Only 2.7% had knowledge of peritoneal dialysis.

The following are excerpts from selected patients:

Excerpt 6

48 yr old male teacher from Kisumu County

"...I want to know more about dialysis. I also heard through the television about kidney transplantations being done at KNH. Please tell me more.... "

Excerpt 7

34 yr old female casual laborer from Nairobi County

"..I am scared about dialysis. I know of a friend who died after dialysis. Do you think I will need dialysis in the future? "

Table 4: Study participants' beliefs on the progression of their kidney disease (n=110).

Belief	Frequency	Percentage
Regressive-likely to get better	83	75.5
Static-likely to remain the same	12	10.9
Progressive-likely to get worse	2	1.8
Don't know	13	11.8

Most of the study participants (75.5%) thought that their illness was likely to get better. Only 1.8% of the participants thought that their illness was likely to worsen.

The following are excerpts from selected patients:

Excerpt 8

48 yr old male farmer from Kisii County

"....Will I recover from my kidney disease? Ever since I started coming to this clinic 6 months ago, I have noticed a lot of improvement. "

Excerpt 9

38 yr old teacher from Nyandarua County

"...I want to find out if I will recover from my kidney disease. Sometimes I feel good, other days I feel bad. "

Table 5: Study participants' perceptions of their kidney disease (n=110)

Feeling	Frequency	Percentage
Scared/worried	24	21.8
Indifferent	9	8.2
Courageous/unafraid	77	70.0

Majority of the study participants (70%) were courageous when they were asked about their perceptions regarding their kidney disease.

The following are excerpts from selected patients:

Excerpt 10

46 yr old businesslady from Kiambu County

"..I have faith that I will be cured if I follow the instructions that doctors give me. "

Excerpt 11

55 yr old male farmer from Bomet County

" I am grateful to the doctors in this clinic for the treatment they have given me. I know that I will recover from this kidney problem."

Excerpt 12

41 yr old prison warden from Nairobi County

" ..I am scared that my kidney problem will keep worsening. What should I do to prevent this? "

Excerpt 13

42 yr old male farmer from Makueni County

" I have lost hope in medical treatment because when I come to the clinic, doctors tell me that my creatinine levels are rising. I am ready to die. "

Majority of the study participants 96(87.3%) had informed their family members/friends about their kidney disease.

The ones who had not gave the following reasons:

Table 6: Reasons for not informing family members/friends about their kidney disease (n=14)

Reason	Frequency	Percentage
I don't want them to worry about my disease	11	78.6
It is my problem and no one else should know about it	2	14.3
I wanted to confirm first	1	7.1

The main reason given by most patients (78.6%) for not informing their family members or friends about their kidney disease is that they did not want them to worry about their disease.

Most of the study participants 93(84.5%) were keeping their clinic appointments all the time.

The ones who did not gave the following reasons:

Table 7: Reasons for not keeping clinic appointments (n=17)

Reason	Frequency	Percentage
Lack of Money	8	47.1
I usually have other commitments	7	41.2
I forget	1	5.9
The waiting time is too long	1	5.9

The main reason given for not keeping clinic appointments by most of the patients (47.1%) was lack of money.

The following are excerpts from selected patients:

Excerpt 14

55 yr old businessman from Garissa County

"...Is it possible to transfer me to Garissa hospital because I come from far and the fare is too high? I think the doctors there can also treat my disease. "

Excerpt 15

35 yr old female teacher from Nakuru County

"..There are very few doctors in this clinic and the waiting time is too long. Can you do something about it?"

More than half of the study participants, 61(55.5%) were not seeking explanation of the blood (kidney function) and urine test results that are routinely done for all patients in the renal clinic.

The reasons given for not seeking explanation of results were as follows:

Table 8: Reasons for not seeking explanation of laboratory results (n=61)

Reason	Frequency	Percentage
Doctors are always in a hurry	30	49.2
Am scared of the doctors	20	32.8
Doctors are unfriendly	5	8.2
I am scared of the results	2	3.3
I understand the meaning of results	2	3.3
I usually forget	1	1.6
I don't bother	1	1.6

The main reason given by most study participants (49.2%) for not seeking explanation of laboratory results is that the doctors are always in hurry. A significant proportion (32.8%) also said that they were scared of the doctors.

Below is an excerpt from a selected patient:

Excerpt 16

29 yr old female office messenger from Nairobi County

" What is the purpose of coming to this clinic every 3 months only to be punctured and not to be told about the lab results? "

Table 9: Number of pills being taken in a day by the study participants

Number of pills	n=110	
	Frequency	Percentage
<5	55	50.0
5-10	53	48.2
11-20	2	1.8

Below is an excerpt from a selected patient:

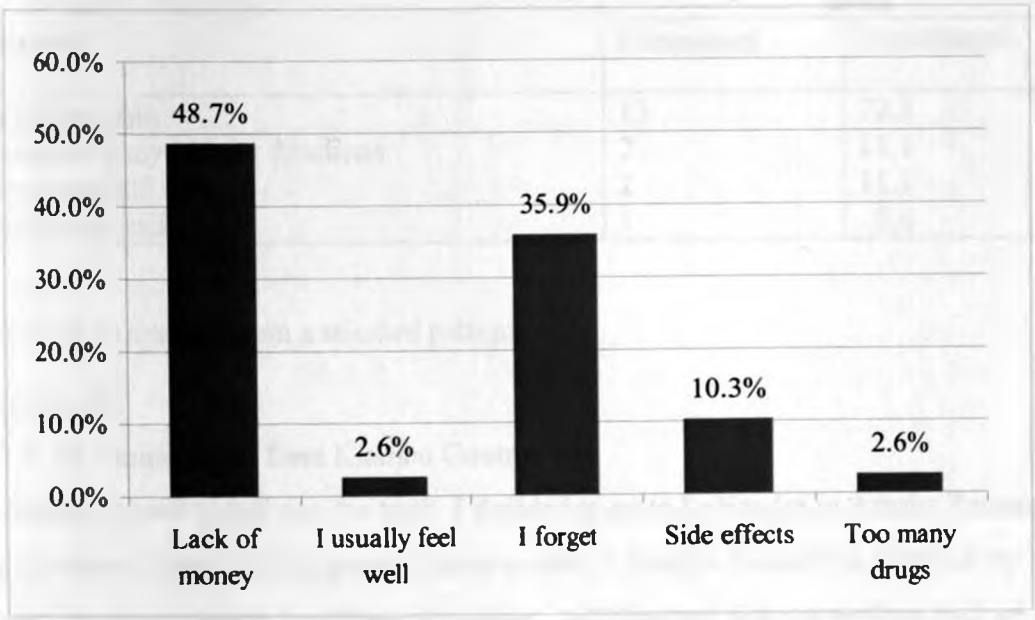
Excerpt 17

20 yr old male university student from Nairobi County

"...For how long will I continue using medication because the tablets are too many and I sometimes forget to take them? "

Majority of the study participants 71 (64.5%) were taking their medication all the time. However, 39 (35.5%) were not. The reasons given for non-adherence were as follows.

Figure 11: Reasons for non-adherence to medication



The main reasons for non-adherence were lack of money (48.7%) and forgetfulness (35.9%).

Majority of the study participants (83.6%) were not using non-prescription medication.

Table 10: Non-prescription drugs being used by the patients (n=18)

Medications	n=18	
	Frequency	Percentage
Analgesics	13	72.3
Herbs	2	11.1
Supplements	2	11.1
Antibiotics	1	5.6

Majority of the patients (72.3%) who were using non-prescription drugs were self medicating themselves with analgesics.

Table 11: Reasons for using non-prescription drugs (n=18)

Reasons	n=18	
	Frequency	Percentage
To relieve pain	13	72.3
To improve my kidney functions	2	11.1
Dryness of the skin	2	11.1
Am usually sick	1	5.6

Below is an excerpt from a selected patient:

Excerpt 18

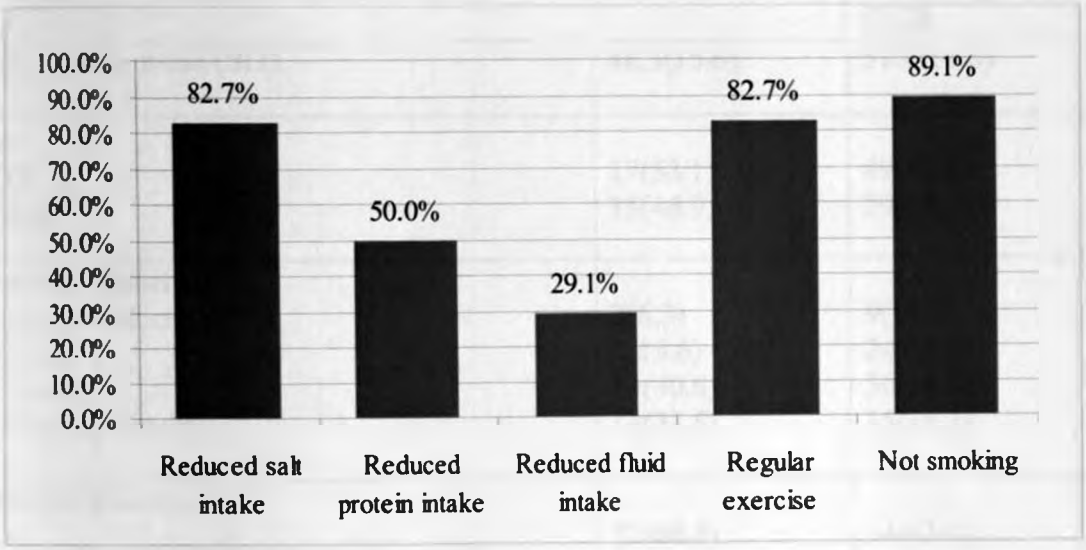
51 yr old businessman from Kiambu County

P: Doctor, I have to tell you the truth. I decided to go to Loliondo(in Arusha Tanzania) in March where I was given a glass of herbs to take. I thought I would be cured of my kidney problem but my condition got worse....my face and feet are swollen and am also vomiting. If I knew I would not have gone to Loliondo.

Q: Why did you decide to go to Loliondo for these herbs?

P: I have a friend who has high blood pressure. He went to Loliondo and he told me that he had been cured. So I decided to go there for my cure.

Figure 12: Percentage of patients practicing the measures that retard the progression of CKD



Regarding practices, majority of the study participants (89.1%) were not smoking. A significant proportion (82.7%) had reduced their salt intake with a similar proportion doing regular exercises. Only half had reduced their protein intake. Very few (29.1%) had reduced their fluid intake.

Table 12: Socio-demographic characteristics of the patients with knowledge compared to those without knowledge on CKD

Variable	With knowledge on CKD	Without knowledge on CKD	P value
Age in years, mean (SD)	48.3(15.6)	57.4(14.6)	0.004
Sex			
Male	17(53.1)	49(62.8)	0.346
Female	15(46.9)	29(37.2)	
Level of education			
No formal education	2(6.3)	9(11.5)	0.142
Primary	5(15.6)	24(30.8)	
Secondary	13(40.6)	30(38.5)	
College/university	12(37.5)	15(19.2)	
Medical insurance			
Yes	22(68.8)	34(43.6)	0.017
No	10(31.3)	44(56.4)	
Duration of follow up (months), median (IQR)	36.0(8.0-90.0)	24.0(7.0-36.0)	0.004
CKD stage			
Stage 3	19(59.4)	38(48.7)	0.397
Stage 4	10(31.3)	25(32.1)	
Stage 5	3 (9.4)	15(19.2)	

Younger patients were knowledgeable on CKD compared to the older patients and the difference was statistically significant (p=0.004).

Patients with medical insurance were also knowledgeable compared to those without (OR 2.8, 95% CI 1.2-6.8, P=0.017)

A longer duration of follow up was associated with knowledge on CKD (p=0.004)

Table 13: Socio-demographic characteristics of the patients who kept clinic appointments compared to those who did not.

Variable	Kept appointments all the time	Did not keep appointments	P value
Age in years, mean (SD)	55.1(15.1)	52.7(17.0)	0.555
Gender			
Male	56(60.2)	10(58.8)	0.914
Female	37(39.8)	7(41.2)	
Level of education			
No formal education	10(10.8)	1(5.9)	0.370
Primary	22(23.7)	7(41.2)	
Secondary	36(38.7)	7(41.2)	
College/university	25(26.9)	2(11.8)	
Medical insurance			
Yes	49(52.7)	7(41.2)	0.383
No	44(47.3)	10(58.8)	
Duration of follow up in months, median (IQR)	24.0(8.5-36.0)	36.0(9.0-72.0)	0.177
CKD stage			
Stage 3	49(52.7)	8(47.1)	0.676
Stage 4	30(32.3)	5(29.4)	
Stage 5	14(15.1)	4(23.5)	

There were no statistically significant differences in the socio-demographic characteristics of the patients who kept clinic appointments and those who did not.

Table 14: Socio-demographic characteristic of the patients who are scared/feel indifferent about their disease compared to those who are courageous about their illness.

Variable	Scared/indifferent about the illness	Courageous about the illness	P value
Age in years, mean (SD)	51.7(15.6)	56.1(15.2)	0.175
Sex			0.107
Male	16(48.5)	50(64.9)	
Female	17(51.5)	27(35.1)	
Level of education			0.989
No formal education	3(9.1)	8(10.4)	
Primary	8(24.2)	21(27.3)	
Secondary	14(42.4)	29(37.7)	
College/university	8(24.2)	19(24.7)	
Medical insurance			0.934
Yes	17(51.5)	39(50.6)	
No	16(48.5)	38(49.4)	
Duration of follow up in months, median (IQR)	24.0(8.0-33.0)	24.0(9.0-48.0)	0.253
CKD stage			
Stage 3	19(57.6)	38(49.4)	0.266
Stage 4	7(21.2)	28(36.4)	
Stage 5	7(21.2)	11(14.3)	

There were no statistically significant differences in the socio-demographic characteristics of the patients who were scared /indifferent about their disease and those who were courageous.

Table 15: Socio-demographic characteristics of the patients who seek explanation of lab results compared to those who do not.

Variable	Seek explanation of test results	Do not seek explanation of test results	P value
Age in years, mean (SD)	54.5(15.0)	54.9(15.9)	0.899
Sex			0.931
Male	29(59.2)	36(60.0)	
Female	20(40.8)	24(40.0)	
Education			
No formal education	5(10.2)	6(10.0)	0.199
Primary	14(28.6)	15(25.0)	
Secondary	14(28.6)	28(46.7)	
College/university	16(32.7)	11(18.3)	
Medical insurance			
Yes	28(57.1)	28(46.7)	0.276
No	21(42.9)	32(53.3)	
Duration of follow up in months, median (IQR)	24.0(12.0-36.0)	24.0(6.0-54.0)	0.845
CKD stage			
Stage 3	26(53.1)	30(50.0)	0.748
Stage 4	14(28.6)	21(35.0)	
Stage 5	9(18.4)	9(15.0)	

There were no statistically significant differences in the socio-demographic characteristics of the patients who were seeking explanation laboratory results and those who were not.

Table 16: Socio-demographic characteristics of adherent compared to non-adherent patients

Variable	Adherent	Non-adherent	P value
Age in years, mean (SD)	56.0(14.2)	52.4(17.2)	0.240
Sex			
Male	44(62.0)	22(56.4)	0.569
Female	27(38.0)	17(43.6)	
Level of education			
No formal education	7(9.9)	4(10.3)	0.460
Primary	21(29.6)	8(20.5)	
Secondary	24(33.8)	19(48.7)	
College/university	19(26.8)	8(20.5)	
Medical insurance			
Yes	36(50.7)	20(51.3)	0.954
No	35(49.3)	19(48.7)	
Duration of follow up in months, median (IQR)	24.0(8.0-36.0)	24.0(9.0-60.0)	0.692
CKD stage			
Stage 3	37(52.1)	20(51.3)	0.642
Stage 4	24(33.8)	11(28.2)	
Stage 5	10(14.1)	8(20.5)	

There were no statistically significant differences in socio-demographic characteristics of the adherent and non-adherent patients.

Table 17: Socio-demographic characteristics of the patients who had reduced their salt intake compared to those who had not.

Variable	Reduced salt intake	Did not reduce salt intake	P value
Age in years, mean (SD)	55.0(15.5)	53.7(15.2)	0.755
Sex			
Male	54(59.3)	12(63.2)	0.757
Female	37(40.7)	7(36.8)	
Level of education			
No formal education	8(8.8)	3(15.8)	0.357
Primary	24(26.4)	5(26.3)	
Secondary	34(37.4)	9(47.4)	
College/university	25(27.5)	2(10.5)	
Medical insurance			
Yes	46(50.5)	10(52.6)	0.869
No	45(49.5)	9(47.4)	
Duration of follow up in months, median (IQR)	24.0(8.0-48.0)	18.0(9.0-48.0)	0.938
CKD stage			
Stage 3	49(53.8)	8(42.1)	0.550
Stage 4	27(29.7)	8(42.1)	
Stage 5	15(16.5)	3(15.8)	

There were no statistically significant differences in the socio-demographic characteristics of the patients who had reduced their salt intake and those who had not.

Table 18: Socio-demographic characteristics of the patients who had reduced their protein intake compared to those who had not.

Variable	Reduced protein intake	Did not reduce protein intake	P value
Age in years, mean (SD)	54.7(13.7)	54.8(17.0)	0.971
Sex			
Male	33(60.0)	33(60.0)	1.000
Female	22(40.0)	22(40.0)	
Level of education			
No formal education	5(9.1)	6(10.9)	0.058
Primary	9(16.4)	20(36.4)	
Secondary	23(41.8)	20(36.4)	
College/university	18(32.7)	9(16.4)	
Medical insurance			
Yes	28(50.9)	28(50.9)	1.000
No	27(49.1)	27(49.1)	
Duration of follow up in months, median (IQR)	24.0(9.0-48.0)	24.0(8.0-48.0)	0.869
CKD stage			
Stage 3	32(58.2)	25(45.5)	0.183
Stage 4	13(23.6)	22(40.0)	
Stage 5	10(18.2)	8(14.5)	

There were no statistically significant differences in the socio-demographic characteristics of the patients who had reduced their protein intake and those who had not.

There was a trend towards reduction in protein intake among patients who attained tertiary education compared to the others.

DISCUSSION

Patient education programs and patient knowledge have a positive impact on medical outcomes and are critical in chronic kidney disease. We report on the first local study to assess knowledge, attitudes and practices on measures to retard disease progression among 110 chronic kidney disease patients conducted in the renal outpatient clinic of a tertiary referral teaching hospital, KNH which is run by nephrologists and medical residents.

The socio-demographic characteristics of our study participants do not differ significantly from other studies done among CKD patients at this institution in the recent past. The male predominance in our study reflects the gender bias in the etiologic background of chronic kidney disease as males have been reported to have increased risk for the development of CKD [58]. Most (63.6%) had attained post primary education which is expected because the study area is urban.

We noted that 70.9% of the study participants had very little or no knowledge regarding the etiology, symptoms, progression and treatment of their kidney disease. This is probably because health care workers do not provide information about chronic kidney disease. There are no regional studies for comparison. Western countries have reported higher levels of knowledge on CKD and this may be due to the presence of health education programs for CKD. In the CKD Renalsoft Informatics Observational Study (CRIOS) study which was carried out in the USA and Canada to find out the perceived knowledge about CKD and ESRD therapies among CKD patients, only 35% of the respondents reported having very limited or no knowledge on kidney disease [14].

Only 30% had been informed on the measures to retard progression of CKD. This low figure could be due to the fact that the patients who come to the renal clinic are many (between 80-100 in each clinic visit), there are few doctors and the clinic time is limited. The consequence of this is that doctors have to hurry up to clear the queue. This in turn means that few patients will be informed on these measures.

Majority of the study participants thought that compliance to medication (40%) and eating healthy diet (37.3%) would retard the progression of CKD. Very few mentioned dietary protein restriction, smoking cessation and proteinuria control. None of the patients mentioned prevention of hyperphosphatemia and correction of anemia. Tan et al in a study conducted in Pennsylvania, USA found out that majority of the patients thought that all of the methods inquired about (glucose control, proteinuria control, blood pressure control, smoking control, and taking ACE inhibitors or ARBs) were effective in slowing the progression of CKD. Glucose control (89.5%) was the most recognized effective therapy for slowing the progression of CKD followed closely by blood pressure control (87.8%). Smoking cessation (79.5%) and use of renin-angiotensin system inhibitors (63.8%) were the least likely to be identified as effective in slowing the progression of CKD [16]. The high level of knowledge in Tan et al's study could be due to the fact that the questionnaire was self administered by the patients. In addition, the patients were provided with various options and all they needed to do was tick next to the measure indicated if they thought it would retard the progression of CKD. In our study, the question was open-ended and the participants had to tell us the measures that they thought would retard the progression of CKD. The other reason for the low level of knowledge on the measures to slow the progression of CKD could be due to the lack of a well structured health education program in KNH.

Our study showed that majority (50%) of the patients did not know any form of renal replacement therapy. A total 35% had knowledge of hemodialysis, 2.7% had knowledge of peritoneal dialysis with a similar proportion having knowledge of kidney transplantation. It is noteworthy that knowledge of peritoneal dialysis and renal transplantation was lower than knowledge of hemodialysis. This suggests that peritoneal dialysis and renal transplantation are either not presented to patients or are presented to patients in a manner in which they are not able to process the information. In the CRIOS study, 35% of patients had no knowledge of any therapeutic modality for end stage renal disease. A total 57% of patients reported having knowledge of hemodialysis, 43% had knowledge of continuous ambulatory peritoneal dialysis, 34% had knowledge of automated peritoneal dialysis and 44% had knowledge of transplantation [14].

Our finding of 75.5% of patients believing that the course of their renal disease is likely to be regressive suggests that our patients do not have information that CKD is a progressive illness whose end point is end-stage renal disease and this could have an implication on adherence to medication. Only 2 patients thought that their illness was likely to be progressive and these were health care workers. This stresses the point that we need to educate our patients about their CKD.

There was a low percentage (21.8%) of patients who were worried about their kidney disease with the majority being courageous (prepared to face the disease). This could be due to the fact that most of the patients thought their renal disease was likely to regress and were therefore optimistic. Our findings do differ with those of the CRIOS study where kidney disease was a source of worry for the patients studied [14].

It was noted that most of the study participants (87.3%) had informed their family members about their kidney disease. We should take advantage of this and educate both the patients and their family members about CKD in general and the measures that retard the same since patients rely on their family members for comfort and financial support. The few who had not informed their family members said that they did not want them to worry about their kidney disease.

More than half of the study participants (55.5%) were not seeking explanation of the blood (kidney function) and urine test results that are routinely done for all patients in the renal clinic. The main reasons for this were that the doctors are always in a hurry, the patients are scared of the doctors and that the doctors are unfriendly. We need to develop strategies to impart this important information to patients in the busy clinic because these are important physiological parameters. It is important that CKD patients know their estimated glomerular filtration rates in the same manner a patient with diabetes should know his/her glucose levels in order to prevent progression of disease.

Majority (83.6%) were not using non-prescription medication. Analgesics, herbs and supplements were the non-prescription drugs being used by 16.4% of the patients. We should educate our patients about the consequences of using analgesics because of the

risk of analgesic nephropathy and therefore progression of CKD. The use of herbs and supplements should be discouraged because of the potential for drug interactions.

We found relatively high levels of adherence, with 64.5% of the patients adherent to medication. Achieng et al in a study titled adequacy of blood pressure control and level of adherence with antihypertensive therapy at general medical outpatient clinics in KNH found that only 31.8 % of the patients studied were adherent to anti-hypertensives [59] . The disparity between the two studies could be due to the fact that these were different patient populations and that they used the hill bone hypertension compliance sub- scale which was not the case in our study. The main reasons for non- adherence in our study were lack of money, forgetfulness and side effects. Our findings were similar to those of Achieng et al [59] .

We also found out that half of the participants had not reduced their protein intake. This is probably because health care workers provide information on the negative effects of smoking, the importance of exercising and reducing salt intake, forgetting about the importance of informing patients about reduction of protein intake.

In our study we also determined the association between the knowledge, attitudes and practices on measures to retard the progression of CKD with age, gender, level of education, availability of medical insurance, duration of follow up and stage of CKD. Our study findings did show a significant association between knowledge on CKD and age. Patients who were younger (mean age of 48 years) were more knowledgeable than the older ones (mean age of 57.4 years) [P=0.004]. This could be because younger patients are more inquisitive and information seeking compared to the older ones. We also found a significant association between knowledge on CKD and medical insurance. The study participants who had medical insurance were likely to be knowledgeable on CKD (OR 2.8, 95% CI 1.2-6.8, P=0.017). There was a trend towards reduction in protein intake amongst patients with tertiary education (P=0.058). We found a significant association between knowledge on CKD and the duration of follow up. Study participants who had been on follow up for a longer duration of time (median, 3 years) were likely to be knowledgeable compared to those who were on follow up for a shorter time (median, 2

years) [P=0.004]. This could be because of the longer exposure with health care providers.

From the qualitative data, we found out that the study participants were in need of health education on measures to slow the progression of their renal disease. Patients also wanted to know the aetiology, symptoms and prognosis of their renal disease. This highlights the importance of a structured health education programme at the KNH renal clinic to inform patients about the causes of CKD, clinical features of renal disease, the recommended diet for CKD patients and the various well studied measures of retarding the progression of CKD.

A number of patients were concerned about the prolonged waiting time at the clinic with some even asking when they would stop attending the clinic because of the long distances they have to cover from upcountry to Nairobi. We need to develop strategies to decongest the renal clinic either by creating more nephrology clinics at KNH or decentralizing renal services to the various counties.

Patients also expressed their need for more information on the various modes of renal replacement therapy. CKD is a progressive disease and end- stage renal disease is inevitable. Early patient education on the various end-stage renal therapies, their advantages and disadvantages is critical before they become uraemic so that they are able to make informed decisions.

CONCLUSIONS

This study demonstrated that majority of the patients had limited or no knowledge on the etiology, progression and measures to retard progression of CKD.

Majority had not been informed about the measures that slow the progression of CKD.

Majority of the patients were adherent to clinic appointments, regular exercises and salt restriction. Only half had reduced their protein intake.

RECOMMENDATIONS

1) There is need to establish a well structured health education program for CKD patients at the KNH renal clinic.

2) There is need to inform health workers about the importance of educating patients.

STUDY LIMITATIONS

The results obtained may not be generalisable to all patients with CKD in Kenya.

Response bias as the questionnaire was interviewer administered.

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APPENDICES

Appendix 1: Screening questionnaire

AN ASSESSMENT OF KNOWLEDGE, ATTITUDES AND PRACTICES ON MEASURES TO RETARD PROGRESSION OF CHRONIC KIDNEY DISEASE AMONG CKD PATIENTS AT KNH

Screening number.....

Date.....

Weight.....

Previous serum creatinine (micromole/l).....

Calculated GFR ml/min/1.73m^2.....

Duration of follow up.....

If less than 3 months, do not recruit

ELIGIBILITY

Are you willing to participate in this study?

Yes=1 No=2 [ ]

Appendix 2: Study proforma

Serial Number..... ID Number.....

Hospital Number.....

SOCIO-DEMOGRAPHIC DATA

1) Age (yrs) .....

2) Sex (M=1, F=2)[ ]

3) Marital Status [ ]

(1=Single, 2= Married, 3=Divorced, 4= Widowed/widower)

4) County of residence.....

5) Telephone number.....

6) Highest education attained [ ]

1=No formal education, 2= Primary, 3= Secondary, 4= College/University

7) Occupation.....

8) Are you employed? Yes [ ] No [ ]

i) If yes, is it: a) Formal employment [ ]

b) Self employment [ ]

ii) If no what is the source of your livelihood.....

9) Do you have medical insurance cover?

Yes [ ] No [ ]

i) If yes, is it a) NHIF [ ]

b) Other.....

KIDNEY DISEASE HISTORY (tick appropriately)

10) What are the patient's complains at enrollment?

a) No complains [ ]
b) Reduced urine output [ ]
c) Blood in urine [ ]
d) Hesitancy [ ]
e) Nausea/vomiting [ ]
f) Facial swelling [ ]
g) Leg swelling [ ]
h) Malaise [ ]
Other (specify).....

11) Documented or known primary disease or predisposing risk to CKD?

a) Diabetes mellitus [ ]

b) Hypertension [ ]

c) Chronic glomerulonephritis [ ]

d) SLE [ ]

e) Hepatitis B [ ]

f) Obstructive uropathy [ ]

g) Polycystic kidney Disease [ ]
h) HIV [ ]

PHYSICAL EXAMINATION

12) General examination: a) Pallor [ ] b) Jaundice [ ] c) Facial edema [ ]
d) Pedal edema [ ] e) Anasarca [ ] f) Wasting [ ]

g) Weight (Kg).....

13) Laboratory Results

a) Creatinine (umol/l).....

b) BUN (mmol/l).....

14) Estimated GFR by cockcroft- Gault equation (mL/min).....

15) CKD stage.....

Appendix 3: Knowledge, Attitudes and Practices on measures to Retard Progression of Chronic Kidney Disease Questionnaire

Serial number.....I.D number..... (As per the study proforma)

1) What do you believe you are suffering from?

.....

.....

2) What is the cause of your illness?

.....

.....

3) Have any of the health workers informed you that you have kidney disease?

Yes [ ] No [ ]

If yes, who informed you?

Nurse [ ] Clinical Officer [ ] Doctor [ ] Others specify.....

4) For how long have you been on follow up in the KNH renal clinic?

.....months (enter a value between 1 and 12)

. ..... years (enter a value greater than 1)

5) What is the source of your information regarding kidney disease?

a) Health care providers [ ]

b) Media [ ]

c) Internet [ ]

d) Others specify.....

.....

6) In general, how would you rate your level of knowledge about your kidney disease?

Probes (aetiology, symptoms, progression and treatment)

a) Extensive knowledge [ ]

b) Some knowledge [ ]

c) Very little/no knowledge [ ]

7) What do you believe the course of your illness is likely to be?

a) Regressive-likely to get better [ ]

b) Static-likely to remain the same [ ]

c) Progressive-likely to get worse [ ]

d) Don't know [ ]

8) What is your perception about your kidney disease?

a) Scared/worried [ ]

b) Indifferent [ ]

c) Courageous/unafraid [ ]

d) Others.....

9) Have any of the health workers informed you about the measures to retard/slow the progression of your illness?

Yes [ ] No [ ]

10) What measures according to your knowledge can retard/slow the progression of your illness?

.....

.....

.....

11) Have any of the health workers informed you about the supportive treatments of renal failure?

Yes [ ] No [ ]

12) Which supportive treatments of renal failure do you know?

a) Haemodialysis [ ]

b) Continuous Ambulatory Peritoneal Dialysis [ ]

c) Kidney transplant [ ]

d) I don't know any [ ]

13) Have you informed any of your family members/friends that you have kidney disease?

Yes [ ] No [ ]

If no, why haven't you informed your family members or friends about your kidney disease?

.....

.....

.....

14) In the last one year what has been the frequency of keeping your clinic appointments?

a) All the time [ ]

b) Not all the time [ ]

If not all the time, what are some of the reasons you may have had to miss your appointments?

a) Lack of money [ ]

b) Am usually not sick[ ]

c) I usually have other commitments [ ]

d) I forget [ ]

e) Prolonged waiting time [ ]

f) Other reasons, please specify.....

15) In the last one year, have you been routinely undergoing blood (kidney function) and urine tests when you visit the clinic?

Yes [ ] No [ ]

If yes, do you ask the doctor to explain the results?

Yes [ ] No [ ]

If no, why don't you ask the doctor to explain the results?

.....

.....

16) Do you inform other practitioners that you have an underlying kidney problem?

Yes [ ] No [ ]

17) How many pills do you take in a day for the management of your illness?

a) Less than 5 [ ]

b) 5 – 10 [ ]

c) 10-20 [ ]

d) More than 20 [ ]

18) In the last 3 months what proportion of prescribed medication have you been taking?

a) 100% of the time [ ]

b) Less than 100% of the time [ ]

If not all the time, what could be the reason(s)?

a) Lack of money [ ]

b) Am feeling well [ ]

c) I forget [ ]

d) Side effects [ ]

e) The drugs are too many [ ]

f) Other reasons?

.....

.....

19a) Do you take any other medication apart from the ones prescribed by the doctor?

Probes: herbs, supplements, analgesics

Yes [ ] No [ ]

b) If yes, what are these medications?

.....

.....

c) Why do you take these medications?

.....

.....

20) Have you changed your diet since you were informed of your kidney disease?

Yes [ ] No [ ]

If no, what may be some of the reasons?

.....

.....

21) Have you reduced your salt intake?

Yes [ ] No [ ]

If no, what may be some of the reasons?

.....

.....

22) Have you reduced your protein intake?

Yes [ ] No [ ]

If no, what may be some of the reasons?

.....

.....

23) Have you reduced your fluid intake?

Yes [ ] No [ ]

If no, what may be some of the reasons?

.....

.....

24) Do you do regular exercises?

Probes: jogging, swimming, brisk walking

Yes [ ] No [ ]

If no, what may be some of the reasons?

.....

.....

25) Do you smoke?

Yes [ ] No [ ]

26) At the end of the interview, the patient will be given 5 minutes to talk freely about their kidney disease (they can make comments, ask questions or raise concerns about their care)

.....

.....

.....

.....

.....

.....

Appendix 4: Swahili version of the questionnaire

HUJAJI KUHUSU UJUZI, MTAZAMO NA UTENDAKAZI KULINGANA NA MAONI YA MHOJIWA

Nambari ya hojaji.....Nambari ya kitambulisho.....(kulingana na profoma ya somo)

1) Unaamini unaugua nini?

.....

.....

2) Ni nini kiini cha ugonjwa wako?

.....

.....

3) Je, wafanyi kazi wowote wa kiafya wamekujuza kuwa unaugua ugonjwa wa figo?

Ndio[ ] La[ ]

Ikiwa ndio, nani alikujuza?

Muuguzi[ ] Ofisa wa kimatibabu[ ] Daktari[ ] Wengine wataje.....

4) Ulijuzwa lini una shida ya figo?

.....miezi iliyopita

.....miaka iliyopita

5) Ulipata wapi habari kuhusu ugonjwa wa figo?

a) Wanaotoa huduma za afya [ ]

b) Vyombo vya habari [ ]

c) Mtandao[ ]

d)Kwingine taja

.....

.....

6) Kwa ujumla, utakadiria vipi kiwango chako cha ujuzi kuhusiana na huu ugonjwa wa figo? (kuhusu-kisababisho, dalili, maendelezo na matibabu)

a) Kiwango juu [ ]

b) Kadiri [ ]

c) Kidogo sana [ ]

7) Je, unaamini hatima ya ugonjwa wako ni ipi?

a) Uwezekano wa kupata nafuu [ ]

b) Hakuna mabadiliko [ ]

c) Unaweza kuzorota zaidi [ ]

8) Hisia zako ni zipi kuhusiana na ugonjwa wa figo?

a) Unaogofya [ ]

b) Sijali [ ]

c) Ujasiri [ ]

d) Zingine [ ]

9) Je, kuna wafanyikazi wowote wa kiafya ambao wamekujuza kuhusu njia za Kupunguza kuzidi kwa ugonjwa huu wako?

Ndio [ ] La[ ]

10) Ni njia zipi kulingana na ujuzi wako zinazoweza kupunguza kuzidi kwa ugonjwa huu wako?

.....

.....

11) Je, kuna mfanyikazi yeyote wa kiafya aliyekujuza kuhusu matibabu mengineyo kusaidia kutofanya kazi kwa figo?

Ndio [ ] La [ ]

12) Ni matibabu mengineyo yapi ya kusaidia kutofanya kazi kwa figo unayojua?

a) Haemodialysis [ ]

b) Peritoneal dialysis [ ]

c) Kidney transplant [ ]

d) Sijui [ ]

13) Je, umejuza yeyote katika famalia yako/rafiki yako kuwa una ugonjwa wa figo?

Ndio [ ] La [ ]

Ikiwa la, mbona haujamjuza yeyote katika familia yako/ rafiki yako kuwa una ugonjwa wa figo?

.....

.....

.....

.....

14) Kwa huo mwaka mmoja umepita umehudhuria kliniki mara ngapi?

a) Kila wakati [ ]

b) Sio kila wakati [ ]

Ikiwa si kila wakati, kuna sababu zipi ambazo zilisababisha kukosa kuhudhuria Kliniki yako?

a)Ukosefu wa pesa [ ]

b) Mimi huwa si mgonjwa [ ]

c) Huwa na shuguli zingine [ ]

d) Kusahau [ ]

e) Kungojea kwa muda mrefu [ ]

d) Sababu zinginezo, zitaje.....

15) Kwa mwaka mmoja uliopita, umekuwa ukifanyiwa utafiti wa damu (utenda Kazi wa figo) na mkojo unapohudhuria kliniki?

Ndio [ ] La [ ]

Ikiwa ndio, je unauliza daktari akuelezee kuhusu matokeo ?

Ndio [ ] La [ ]

Ikiwa la, kwa nini haumwulizi?

.....

16) Je, unawajuza madaktari wengine kwamba una tatizo la figo?

Ndio [ ] La [ ]

17) Unameza tembe ngapi kwa siku ili kuudhibiti ugonjwa wako?

a) Chini ya 5 [ ]

b) 5-10 [ ]

c) 10-20 [ ]

d) Zaidi ya 20 [ ]

18) Kwa miezi 3 iliyopita, ni asilimia gani ya dawa ulizopewa umekuwa ukimeza?

a) Asilimia mia moja ya wakati [ ]

b) Chini ya asilimia mia moja [ ]

Ikiwa si kila wakati, toa sababu?

a)Ukosefu wa fedha [ ]

b)Naendelea kupata nafuu [ ]

c)Nasahau [ ]

d)Zinanidhuru [ ]

e)Dawa ni nyingi sana [ ]

f)Sababu zinginezo zitaje.....

19) a)Unatumia dawa zinginezo tofauti na ulizopewa na dakatari?

Ndio [ ] La [ ]

b) Ikiwa ndio, ni dawa zipi?

.....

c) Toa sababu za kutumia dawa hizi?

.....

20) Umewahi kubadilisha lishe tangu ujuzwe kuhusu ugonjwa huu wa figo?

Ndio [ ] La [ ]

Ikiwa la, toa sababu zako

.....

21) Umepunguza kiwango cha chumvi unachotumia?

Ndio [ ] La [ ]

Ikiwa la, toa sababu zako

.....

22) Umepunguza kiwango cha proteini unachotumia?

Ndio [ ] La [ ]

Ikiwa la, toa sababu zako

.....

23) Umepunguza kiwango cha vinywaji unavyotumia?

Ndio [ ] La [ ]

Ikiwa la, toa sababu

.....

24) Unafanya mazoezi mara kwa mara?

Ndio [ ] La [ ]

Ikiwa la, toa sababu

.....

25) Unavuta sigara?

Ndio [ ] La [ ]

26) Una maoni yoyote yale au swali lolote kuhusiana na ugonjwa wa figo ?

.....

.....

.....

.....

Appendix 5: Consent explanation form

My name is Dr.John K.Mutiso. I am a postgraduate student from the department of Internal Medicine, University of Nairobi. I am conducting a study entitled:

KNOWLEDGE, ATTITUDES AND PRACTICES ON MEASURES TO RETARD DISEASE PROGRESSION AMONG CHRONIC KIDNEY DISEASE PATIENTS AT KENYATTA NATIONAL HOSPITAL.

Purpose of the study

The study is about getting to know the knowledge, attitudes and practices on measures to slow the progression of chronic kidney disease among patients with kidney disease at KNH. The study is being conducted at this hospital with assistance from staff and permission from the hospital administration.

What does the study involve?

If you consent to be included in the study, the following shall be carried out:

1. Filling of a study proforma about socio-demographic and kidney disease history.
2. Physical examination which will include weight and blood pressure measurements
3. Drawing of 2mls of venous blood to determine urea and creatinine levels. This will help in the estimation of the glomerular filtration rate.
4. A questionnaire to assess the knowledge, attitudes and practices on measures to retard progression of chronic kidney disease will be administered.

Are there any risks involved?

Slight pain when the blood sample is being drawn.

Will I benefit from this study?

Yes. Once the results of this study are analysed, we will be able to make suggestions on whether there is a need to institute health education packages to our patients in KNH. This will help in slowing the progression of chronic kidney disease.

Can I withdraw from the study?

Your participation in this research is voluntary .You are also free to terminate the interview and withdraw from the study at any time.

If you have any questions/clarifications you can contact the following:

Dr.John Mutiso
P.O.Box 19676
Nairobi.
Telephone: 0720-224984

Prof.J.Kayima
Department of clinical medicine and therapeutics
University of Nairobi
P.O.Box 19676,
Nairobi.

Prof E.Amayo
Department of clinical medicine and therapeutics
University of Nairobi
P.O.Box 19676
Nairobi.

The Chairman of the Ethical and Review Committee
Kenyatta National Hospital
020-2726300/0722-829500/0733-606400 ext.44102

Appendix 6: Consent form

I .....consent to participate in the study on the assessment of knowledge, attitudes and practices on measures to retard progression of chronic kidney disease. I do this with the full understanding of the purposes of the study and the procedures involved which include filling out a study questionnaire and having a sample of my blood drawn(2mls) for assessment of urea and creatinine, all of which have been explained to me by Dr.John Mutiso /his assistant.

I understand that I am free to either agree or refuse to participate in the study and this shall not interfere with my medical care.

Having agreed on the above I voluntarily agree to participate in the study.

SIGNED.....

THUMBPRINT.....

WITNESS.....

DATE.....

Investigator's statement.

I the investigator have educated the research participant on the purpose and implication of this study.

Signed: ..... Date: .....