COMPLIANCE WITH HEMODIALYSIS TREATMENT AMONG END STAGEKIDNEY DISEASE PATIENTS IN NYERI COUNTY, KENYA.

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

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ABBREVIATIONS AND ACRONYMS

AKF	American Kidney Fund
CKD	Chronic Kidney Disease
ESKD	End Stage Kidney Disease
HD	Hemodialysis
KMTC	Kenya Medical Training College
KNH	Kenyatta National Hospital
NCD	Non-Communicable Diseases
SPSS	Satisfied Package for Social Science
USA	United States of America
USRDS	United States Renal Data System
WHO	World Health Organization
IDH	Intra dialytic Hypotension
RRT	Renal Replacement Therapy

DEFINITION OF TERMS

Chronic Kidney Disease	Progressive decline of kidney function over months or years, eventually resulting to end stage kidney disease.
Compliance	Extent to which end stage renal disease patients adhere to hemodialysis treatments
Dialysis	A process of purifying blood done by exchanging solute in a solution across semi permeable membrane
Dependent variable	Attendance of two hemodialysis session in a week each lasting for hours.
End stage kidney disease	Decreasing level of glomeruli filtration rate accompanied by signs and symptoms of kidney failure that necessitate renal replacement therapy for survival.
Renal Replacement therapy	Involves the replacement of the renal function by therapy modalities which are peritoneal dialysis, hemodialysis and renal transplant.
Hemodialysis	The removal of certain element from the body by virtue of the diffusion through a semi permeable membrane of hemodialysis machine.
Institutional factors	Health system components associated with hemodialysis treatment such as distance to hospital, health information and resources.
Harambee	Kenyan tradition of community self-help fundraise events
Patient factors	Demographics, namely; age, level of education, economic status and social support
Therapy factors	Aspects of hemodialysis treatment such as duration on being on hemodialysis therapy, side effects of hemodialysis and depression

Intra-dialytic hypotension	It is a systolic blood pressure of less than 90mmHg and intra- dialytic decline of more than 30mmHg
Young Patients	End stage renal disease patients undergoing hemodialysis between the age of 18-39 years
Older Patients	End stage renal disease patients undergoing hemodialysis above 60 years

ABSTRACT

The number of End Stage Kidney Disease (ESKD) patients on hemodialysis (HD) globally has become a public health concern. Compliance with hemodialysis recommendation aids to improve health outcomes and prevent complications. However, non-compliance to hemodialysis among ESKD patients has been a major problem. The purpose of the study was aimed at describing the level of compliance with hemodialysis and the associated factors among ESKD patients in three selected dialysis centers in Nyeri County. A descriptive cross-sectional study, utilizing quantitative research method and targeting 80 participants was done. Census method was used to recruit the study participants. Data was collected through administration of a questionnaire and analyzed by use of computer software, statistical package for the social science (SPSS) version 24. Descriptive statistics was used to determine the level of compliance to hemodialysis. Inferential statistics was used to determine factors associated with compliance to hemodialysis. SPSS version 24 was used in data analysis.The study findings revealed that compliance with hemodialysis treatment was 53%. The findings showed that there was significant association between compliance and; marital status, x^2 (2, N=30) = 5.151, p =0.029, income, x^2 (4, N=12) = 11.322, p =0.045, and number of hospital admissions, x^2 (3, N=I) = 38.069, p =0.0001. Shortened hemodialysis,(aOR = 5.5, p = 0.002) and waiting time for two hours prior to start their hemodialysis session (aOR =4.11, p =0.005) were independent predictors of noncompliance with hemodialysis treatment.Despite opening new hemodialysis centers in Nyeri County to increase availability and accessibility of hemodialysis services, compliance still remains a major challenge among patients. Shortening of hemodialysis sessions, low economic status, inadequate machines and failure to repair machines when they break down were major barriers to hemodialysis compliance. Therefore, adequate resource allocation should be considered when opening new hemodialysis centers.

CHAPTER ONE: INTRODUCTION

1.1 Background

End Stage Kidney Disease (ESKD) is a global issue affecting people of all ages and social classes. It is a known rising health concern worldwide and needs constant care that is costly to patients (Kereu, et al., 2017). It is roughly calculated that by 2030, more than 70% of patients with ESKD will be living in developing countries such as those in Sub-Saharan Africa (Somji et al., 2020). The global estimate prevalence of Chronic Kidney Disease (CKD) is 13.4% and the patients with ESKD requiring renal replacement therapy (RRT) is between 4,902 and 7.083 million (Lv & Zhang, 2019). In Kenya, four million people are estimated to be having CKD (Ministry of Health, (MOH) 2017).

In ESKD patients, dialysis is the main treatment that can increase life expectancy and enhance quality of life (Nagasawa et al., 2018). Successful management of ESKD patients on hemodialysis (HD) is anchored on the lifetime dedication of patients to the treatment regimen (Naderifer et al., 2018). However, poor compliance of patients has an adverse effect on hemodialysis (HD) outcome (Ibrahim et al., 2015).

ESKD patients on dialysis encounter financial difficulties related to the disease burden. A study done by Riang et al. (2017) in Kenya revealed that, most of ESKD patients are unemployed or low income earners. This reduces chances of ensuring adequate income and affects their health negatively as they are not able to meet the financial obligations that come with ESKD treatment regimes such as hemodialysis.

In South Africa, non-compliance to hemodialysis arise from low social economic status (World Health Organization, (WHO) 2018). The capacity of CKD patients to perform duties and earn adequate income is adversely influenced by ESKD as the illness interferes with their work negatively and hence do not support their families financially (Chironda & Bhengu,2016).

Non-compliance to HD is familiar among ESKD patients and the consequence is poor health outcome (Murali et al., 2019). In ESKD population, research has shown that non-compliance is common due to patient's therapy and health related factors (Chironda & Bhengu, 2016). A study done in Eygpt revealed that, the most critical adjustable key elements in improving patient outcome is ensuring patient comply to HD. Alashker et al. (2015)

Compliance to dialysis refers to undertaking two to three sessions in a week. The session should last four to five hours each without skipping or rescheduling the prescribed session Duong et al. (2015). Compliance is an important element of successful management of ESKD patients as dialysis prolong patient life and enhance quality of life. Non-compliance among ESKD patients on HD leads to hospitalization (Cohen & Kimmel, 2018). It also leads to poor patient outcome and overwhelmed health care system (Mukakaragwa et al., 2018).

In Kenya, the burden of non-communicable diseases (NCD) is high accounting for 50 percent of hospital admissions and 55 percent of all deaths. Rural settings have the highest number of patients with NCD (MOH 2017). Many factors that have influenced the rise of NCD include increased lifespan, modernization, globalization, poverty and changing lifestyles (Freiberg et al., 2016). Among the NCD some like diabetes mellitus complicate to ESKD (Mukakarangwa et al., 2018).

1.2 Problem Statement

Compliance with HD prescription among ESKD patients plays an important role in their management (Nagasawa et al., 2018). However, non-compliance to HD has continued to impact negatively on the care of ESKD patients resulting with unprecedented increase in morbidity and mortality (Ibrahim et al., 2015).

Most research studies have shown that non-compliance with HD among EKSD patients leads to negative patient outcome. These comprise an increase in the risk of complications like persistent anemia, brain malfunction, heart failure, inadequate production of white blood cells, unrestrained bleeding, low immunity, poor bone structure and lungs complications (Chironda & Bhengu, 2016; Duong et al., 2015)). The non-compliance has also been linked to increased hospitalization and increased mortality rate (Tohme et al., 2017).S

A descriptive cross-sectional survey done in Rwanda revealed that non-compliance to HD affect adversely on ESKD treatment and patient's outcome. This is observed in huge burden on health care systems especially in the management of complications and increased workload in HD units (Mukakaragwe et al., 2018; Duong et al., 2015). Ibrahim et al. (2015) demonstrated that non-compliance to HD among ESKD patients contributes to malnutrition.

Various factors have been associated to the non-compliance to HD. Studies have shown that long distance travel to dialysis centers, knowledge deficit of patients on dialysis, financial instability, and adverse effects experienced during the treatment negatively affect compliance to HD (Kilonzo et al., 2018; Mukakarangwa et al., 2018).

There is limited evidence of studies done on compliance with HD among ESKD patients in Kenya and especially in Nyeri County where non-communicable diseases have been reported to be on the rise. In Nyeri County Referral Hospital, eight to ten ESKD patients undergoing HD are admitted every month. This study therefore aimed at describing the level of compliance with HD among ESKD patients and associated factors in Nyeri County. This will provide useful data in developing guidelines for management of patients on HD.

1.3. Research Questions

i. What patient factors are associated with compliance to hemodialysis among end stage kidney disease patients in Nyeri County.

ii. What therapy factors are associated with compliance to hemodialysis among end stage kidney disease patients in Nyeri County.

iii. What institutional factors are associated with compliance to hemodialysis among end stage kidney disease patents in Nyeri County.

1.4 Research Objectives

The study was guided by the following objectives

1.4.1 Broad Objectives

To establish the level of compliance with hemodialysis treatment among end stage kidney disease patients in Nyeri County as per the topic.

1.4.2. Specific Objectives

1. To determine the level of compliance with hemodialysis among end stage kidney disease patients in Nyeri County.

2. To establish patient factors associated with compliance to hemodialysis among end stage kidney disease patients in Nyeri County.
3. To identify therapy factors that influence compliance with hemodialysis among end stage kidney disease patients in Nyeri County.
4. To determine institutional factors associated with compliance hemodialysis among end stage kidney disease patients in Nyeri County.

1.5. Significance of the Study

The findings of this study are intended to provide benefits to the National and County governments, community and health care system as a whole and in- depth understanding of HD and factors related to its compliance. The findings will inform the development and implementation of interventions which are cost effective in national and county gorvement and the health care systems in order to improve compliance level with hemodialysis.

The result of the study will equip practicing nurses with adequate knowledge on compliance to HD in ESKD patients and hence improve nursing practice. Also, more areas for future nursing research that will have positive impact on compliance to HD among ESKD patients will be generated. Finally, the findings will bring to limelight the plight of these patients and have an influence on Nyeri county administration and other stakeholders to ensure compliance to HD.

1.6 Theoretical Framework

The theoretical frame work for this study was anchored on Goal attainment theory. The theory was developed by Imogene King, a nurse in 1981. The theory describes a

dynamic interpersonal relationship in which a person grows and develops to attain certain life goals. (Smith & Maryth, 2015).

Imogene theory is grounded on four main fundamentals that ensure goals are attained. In order to reach optimal health, there must be some form of an interaction between nurse and the patient. The interaction is achieved through sharing information and setting goals mutually. If there is interaction accuracy among the two; nurse and the patient, accurate transaction will occur and the goals will be attained.

The theory has three interacting systems; personal, interpersonal and social systems. She considered a patient as a person who is a social being and is an open system interacting constantly with the environment. Thus, a person system has body, image, time, space, perception, self-growth and development and able to learn and cope. The interpersonal system includes; interaction, communication, transaction, roles and stress. Social systems entail organization, power, authority, status and decision making (Smith & Maryth, 2015).

The researcher therefore incorporates the three systems to the three factors related to hemodialysis compliance, where the goal attainment is hemodialysis compliance. Personal systems represented individual (patient) factors; Interpersonal systems represented therapy factors while social systems represented institutional factors. The independent variables of the study comprise of patient factors, therapy factors and hospital factors while the dependent variable is hemodialysis compliance.

The researcher anticipates that the renal professional's team by interacting with ESKD patients through sharing health information effectively, enhanced growth and development thus attains the goal, the main goal being preservation of patient's health.

The patients should be encouraged to talk about their concerns on their illness, their fears and worries linked to their terminal illness. This creates a suitable environment for informed decision making, setting goals, exploring means towards achieving these goals.

1.7 Conceptual Framework

The researcher views social systems as epicenter in the goal attainment of ESKD patient's health. The system aids the nurse to accomplish their caring roles and achieve their professional expectations in the hospital. It also helps them to discover better options that will help ESKD patients to sustain their health in order to perform in their roles.

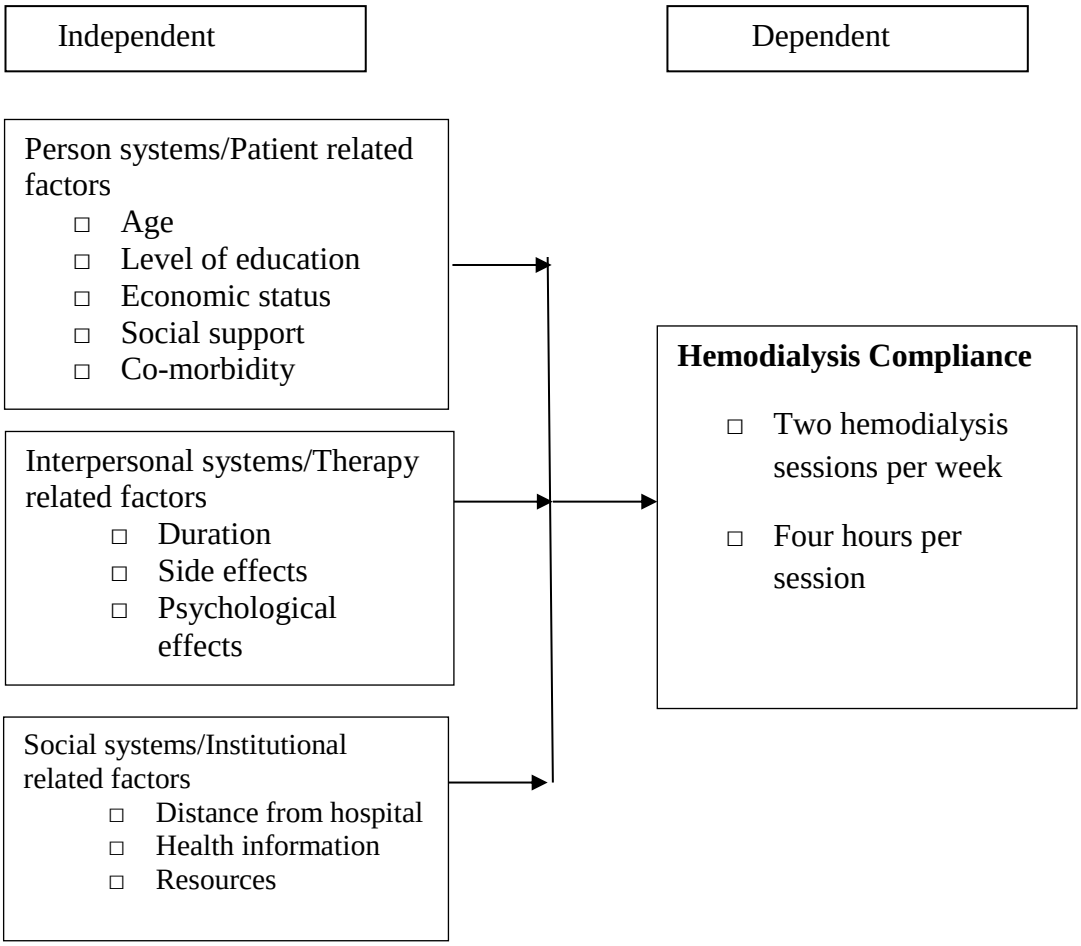

Figure 1.1: Conceptual Framework Source (Chege, Githemo & Onsongo 2020)

The conceptual framework shows that compliance to hemodialysis is determined by Patients, Therapy and Institutional factors. The compliance to hemodialysis is influenced by the three stated factors. When there is positive or negative change among the independent variables, the impact of the change is reflected on the compliance level in the same manner.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of related literature on compliance with hemodialysis among end stage kidney disease patients (ESKD). The review focuses on patients, therapy and Institutional factors that influence compliance with hemodialysis among ESKD patients. The gaps in the literature are also identified.

End stage kidney disease is a global issue involving people of all ages and social economic classes. The prevalence of this disease is increasing like other non communicable illnesses such as metabolic and heart diseases. It is a common and morbid disease that affects patient's quality and length of life. Hemodialysis remains the main treatment modality for ESKD that can increase life expectancy and enhance quality of life (Gupta et al., 2021).

2.2 Level of compliance to hemodialysis

There have been different levels of HD compliance across different regions. Studies have shown that the level of HD compliance among ESKD patients on maintenance HD has been found to be low with approximately half of the patients being non compliant (Kilonzo et al., 2021 ; Chiroda & Bhengu, 2016) . Multiple studies have demonstrated that non-compliance ranges between 36% and 68.7% (Nakao et al., 2016; Mukakaragwa et al., 2018; Ibrahim et al., 2015).

A Vietnam study pointed out that compliance with HD among ESKD patients is undertaking three to four sessions weekly and each session lasting approximately four hours. It also remains a major obstacle in the management of ESKD patients (Duong et al., 2015). Compliance with HD prescription among ESKD patients plays

an important role in their management and help to improve their health outcome andprevent complications (Nagasawa et al., 2018).

Non-compliance with HD among ESKD patients has been a major problem worldwide, leading to negative patient's outcome (Murali et at., 2019). A Kenyan study pointed out that non compliance wiSSth HD among ESKD patients is deemed as missing a session on HD in a month or shortening by ten minutes in a session in a month (Riang et al., 2017). Missing HD sessions affects a big percentage of patients on maintenance HD Lal et al. (2019). It has been associated with increased mortality while shortening is associated with ESKD related hospitalization (Tohme et al., 2017).

2.3 Patient factors associated with compliance to hemodialysis among end stage kidney Disease

2.3.1 Age

Age has been identified to influence hemodialysis. A systematic review of literature to highlight the factors contributing to non-compliance in ESKD revealed that young patients are less compliant to HD unlike older patients (Chironda & Bhengu., 2016). The American Kidney Foundation Resources stated that, over 50% of young patients shorten their dialysis sessions than the older patients (AKF, 2018). Young patients regard themselves physically healthier than older patients leading to missing HD sessions (Som et al., 2017; 2018; Samji et al., 2018).

A systematic review done in Rwanda emphasized that older patients were more compliant to HD than younger patients. This has been associated with aged persons being better organized in their life and can accommodate any charge that may arise

unlike young persons who regard themselves safe to adverse health outcomes (Chironda & Bhengu, 2016). Also, elderly persons have a greater concern with death, thus follow their treatment regimen to avoid it (Nakao et al., 2016).

2.3.2 Level of Education

ESKD affects both highly and less educated people (Mukakarangwa., 2018). Research studies have shown that tertiary level of education can result to improved compliance to HD. A study conducted in Greece on adherence to therapeutic regime in adult patient undergoing hemodialysis revealed that the higher the education level, the higher the compliance (Alikari et al., 2018). Studies have demonstrated that patients with higher education level understand the significance and the usefulness of the therapy while low level of education has been found to contribute to lower the levels of comprehension resulting to non-compliance to HD.

Another study done in Greece demonstrated that advanced academic education has better quality of life and high standard of living. This gives them contentment, wellness and a high quality life. This is in terms of quality health, good job and eventually rewarding income. With good source of income, HD compliance is intensified (Ramilitiana et al., 2016).

2.3.3 Economic Status

Multiple studies have demonstrated that economic status of ESKD patients undergoing HD greatly impacts on compliance. The treatment of ESKD patients is costly, despite health insurance being the payer of HD sessions. Patients are expected to meet the cost for some pharmaceuticals and laboratory investigations. They also require transportation fee to the renal centers. This makes the disease intolerable to the patients (Kustimah et al., 2019).

A Tanzanian study pointed out that, the high cost of treatment among ESKD patients is a major challenge to them Mereno et al. (2017). In most of the developing countries patients supply most of the monetary resources for hemodialysis unlike in advanced countries where the cost of HD is provided by the government. This makes HD treatment unavailable to patients in developing countries due to insufficient resources thus influencing compliance negatively (Atapour et al., 2015).

A study done in Greece on the incidences of chronic renal failure reported that, the high cost of treatment has been a major barrier to compliance to HD. Patients have to pay from their pockets for treatment which is difficult because majority of the patient's population are low income earners. This makes it impossible for patients to attend all HD sessions resulting with non-compliance (Ramitiliana et al., 2016),

2.3.4 Social Support

A systematic review of literature by Chironda and Bhengu. (2016) on factors contributing to non-compliance among CKD patients revealed that living with terminal illness needs emotional support to help make the changes required to endure. Peer coaching has been identified to be helpful to patients with kidney disease and in life time dialysis while peer mentorship has high impact in assisting ESKD patients to cope and adapt with dialysis and therefore increase HD compliance.

Another study done in Greece revealed that, social support influence HD compliance. Involvement of patients in activity networks, incorporation in physical activities and involvement in educational programs can assist ESKD patients to create new gratifying relationships. This leads to achievement of social appreciation hence averting social isolation which is associated to non-compliance with HD (Alexopoulou et al., 2016).

Lack of adequate support is sometimes a hindrance to compliance with HD treatment. Patients with inadequate assistance were probably more likely to miss or shorten the duration of HD session (Alikari et al., 2018). A Brazilian study pointed out that, family support is an important factor in ensuring compliance with dialysis regimen by individuals with ESKD. The family unit as well as close friends and neighbors who act together to provide social support to the person on dialysis encourages the patients and this leads to more compliancy than those with inadequate social support (Nakao et al., 2016).

2.3.5 Co-morbidity

Co-morbidity is an important factor in determining compliance to HD. Patients with other chronic illnesses often exhibits non-compliance to HD. In United State Renal Data System revealed that ESKD is most commonly a result of hypertension, diabetes mellitus, glomerulonephritis and cystic kidney disease (USRDS, 2020).

A systematic review on epidemiology of end stage kidney disease patients demonstrated that patients also suffer from other chronic illnesses such as hypertension and diabetes mellitus. These patients with co-morbidity are on medication to treat their chronic illnesses. This causes side effects such as nausea, vomiting and headache, which are similar to those of hemodialysis treatment. The side effects ranges from minimal to severe. The side effects are aggravated at times when the patient is on HD session making the session to be terminated prematurely thus shortening the session (Gupta et al., 2021).

2.4 Therapy factors associated with hemodialysis

2.4.1 Duration of Hemodialysis

Duration of HD in term of years is one of the factors that have been reported to have an influence on compliance. Studies have reported that ESKD patients being on HD for a longer period of time leads to compliance unlike patients who have been on a shorter duration of time. A study done in Turkey on non-adherence in HD patients revealed that prolonged period of time being on HD leads to higher level of compliance. This was associated to great knowledge acquired over the years the patient has been on dialysis and thus more likely to be compliant than the new patient (Ozen et al., 2019).

A study done in USA reported that life supporting dialysis treatment for ESKD needs many weekly treatments on a set schedule. Patients on HD treatment below five years are non-compliant because they shorten their dialysis sessions or miss them altogether. These patients shorten hemodialysis sessions than the prescribed period in contrast to those who have been on dialysis for more than five years or longer period in time (American kidney foundation (AKF), 2018).

However, a study done in Pakistan on non-compliance with hemodialysis and related factors among end stage renal disease patients revealed that, patients who have been on hemodialysis for a prolonged period of time were non-compliant to HD. This being attributed to massive social support given to the patient who has just started HD. The support leads to more compliance unlike those who have been on the regime for a longer period of time, thus receiving inadequate social support (Lal et al., 2019).

2.4.2 Side Effects

In a systemic review of literature by Chironda and Bhengu. (2016) to highlight the factors contributing to non- compliance in CKD patients, the findings showed that, the adverse effects of hemodialysis impact on compliance. These adverse effects included muscle cramps, intra-dialytic hypotension (IDH) and chest pain. The age of the patient, prevailing health issues such as metabolic diseases, heart conditions and patient's level of compliance together with complicated medical regimes leads to a higher recurrence and seriousness of adverse effects (Probhakar et al., 2015).

A study by Alashkers et al. (2015) in Egypt to determine prevalence and barriers of patient's adherence to dialysis treatment as well as its consequences among ESKD patient revealed that, patients who encounter intra-dialytic hypotension (IDH) are probably non-compliant to HD and it is a greater cause of ESKD patient's morbidity. IDH occurring during HD session does not only cause discomfort such as muscle cramps but also reduces efficacy of HD (Kilonzo et al., 2021).

Probhakar et al.,(2015) in a study on spectrum of intra-dialytic complications during hemodialysis and its management revealed that, IDH follows high ultra-filtration flow, high dialysate temperature, inadequate dialysate sodium, antihypertensive drugs, autonomic malfunction and poor cardiac reserve. Muscle cramp occurs following extreme ultra-filtration and low dialysate sodium while chest pains are linked to dialysate mediated reactions.

2.4.3 Psychological effect

Depression has been found to be the most typical psychological complication of HD. According to Kutismah et al. (2019) on a study done in Indonesia revealed that patients with an illness that causes future ill health or even death suffer from mental

burden such as anxiety depression. HD has been associated with psychological and emotional challenges among ESKD patients. (Combes et al., 2015).

An Egyptian study pointed out that depression is known to act negatively on patient's social economic and psychological health. Patients who have been on HD and have been diagnosed with depression are likely to be non-compliant to HD (Alashker et al., 2015). Studies have revealed that depression attributes to high number of deaths annually, recurrent hospitalization, low compliance to medication and poor quality of life amid ESKD patients. Therefore depression has been identified as a risk factor to non compliance to HD, as it increases the risk of skipping HD sessions (Ibrahim et al., 2015; Goh & Griva, 2018).

2.5 Institutional factors associated with compliance

2.5.1 Distance to and from the Hospital

Location of HD centers contributes to HD compliance. A study done in Kenya on determinants of adherence to hemodialysis frequency among patients with end stage kidney disease demonstrated that, distance to the hospital greatly affect compliance to HD. Transportation problem was identified as the most common cause of skipping scheduled HD sessions and also late appearance for HD sessions (Kilonzo et al., 2021).

The same study emphasized that those rural patients mostly have to travel further than those in urban centers for their health care services. The long travel time may have notable implications for patient's health outcomes. This reduces treatment compliance and thus poor quality of life resulting to increased mortality. Also, patients who live

far from HD centers encounter more economic burden due transportation cost, and this reduces accessibility to HD centers (Alashker et al., 2015).

2.5.2 Health information knowledge

Lack of adequate health information has been demonstrated to influence HD compliance negatively. Studies have shown that many people with advanced renal diseases lack adequate understanding on their management (Parvan et al., 2015). A cross-sectional study done in Palestine on assessing adherence to diet, fluid, medication and HD session revealed that, patients shorten their HD sessions because they have never been educated on significance of complying to their HD sessions, thus non-compliance results. (Naalweh et al., 2017)

Sufficient training of patient on HD would be of great significance. In a study conducted in Iran showed that patients who have been trained adequately successfully follow the treatment regime of RRT and reduce side effects associated with HD resulting to high level of compliance Bahramnezhad et al. (2015). Insufficient health knowledge is related to more hospitalization, substantial use of emergency care and less compliance to HD (Alikari et al., 2018).

AKF, (2018) reports that, an inefficient linkage among patients and renal professionals is the main contributing factor to non-compliance to HD. Lack of inadequate time to communicate health information to patients impacts negatively to HD compliance. Giving realistic information would encourage compliance to HD. This information should be customized towards addressing issues that the patients and their families find important and should be in a simple language that the patient can understand (Naalweh et al., 2017).

Another study done in Iran on “Can addressing family education improve adherence of therapeutic regime in hemodialysis patients?” revealed that education is important in ESKD management and it assists them to make informed decisions. Together with their significant others, they should be provided with education on possible benefits, dangers and outcomes of HD (Asgari et al., 2015). Involvement of family members in their treatment plan reduces complications and thus improves compliance Bahramnezhad et al. (2015).

2.5.3 Resources

Resource availability has had influence on HD compliance. This has been researched and discussed extensively. A descriptive cross-sectional study done in Rwanda revealed that shortening of HD session was associated with the mechanical problems of the HD machines which occurs when the session is ongoing making the patient to be disconnected before the prescribed hours are over Mukakaragwa et al. (2018). Insufficient number of HD machine interferes with service delivery causing psychological stress which may result to skipping or missing HD session (Mugi et al., 2021).

The main hindrance to access HD was pinpointed as being insufficient resources. Skilled man power has been inadequate in renal centers. The shortage of nurses, nephrologists and vascular surgeons are among the barriers that have been pointed out. Lack of qualified medical staff at each level of care delivery affects quality of care provided to the consumers of the services at these delivery points. Poor quality of service delivery may lead to patients shortening their sessions and at times waiting for long hours to access HD services resulting to HD non- compliance (Nobahar & Tamadon, 2016).

2.6 Summary and gaps identified

According to this review of literature, many studies have been done on compliance with maintenance hemodialysis treatment. These studies have been done extensively in developed countries with little being done in developing countries including Kenya. A major gap has been noted in countries with insufficient resources and particularly with few HD centers. Non-compliance to maintenance HD has remained a big challenge to ESKD population impacting on their health and quality of life.

Past studies on compliance with maintenance HD treatment have left knowledge gaps which this study seeks to address. Majority of existing studies were conducted in developed countries leaving out developing countries. The finding of this study can be generalized to a population with similar characteristics.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents a detailed outline of how the study was carried out. It describes the research design, procedure and techniques that were used to identify, select, collect, process and analyze data concerning HD compliance among ESKD patients. The target study population and study area has been explained. The sampling method and sample size has been clearly stated. The study variables have been identified and ethical consideration clearly stated.

3.2 Study Design

The study was a descriptive cross-sectional survey. It utilized quantitative research method to determine factors related to HD compliance among ESKD patients. This design was preferred because data was collected at one point in time in a patient population with similar characteristics with hemodialysis being the key factor. In addition, the method deals with quantifying and analyzing numerical data to obtain information and make statistical inferences about the population of interest and in this case hemodialysis patients.

3.3 Study Area and Setting

The study was done in Nyeri County. Nyeri County is located in Central region of Kenya. It covers 3337.10 Km^2 and has a population of 693, 558. The county had five dialysis centers at the time of the study; Nyeri County referral hospital dialysis center, (public owned), Outspan hospital and Nyeri dialysis centre (private owned), TumuTumu hospital and Mathari hospital dialysis centers (faith based).

3.4 Study Population

The study population comprised of all ESKD patients who were undergoing hemodialysis in three selected dialysis centers in Nyeri County among the five HD centers. The study had targeted all the five centers but due to reasons beyond the researcher's control, the study was carried out in only three centers. The three centers were selected to represent private, public and religious institutions. Nyeri County referral hospital (level five) attends to 30 ESKD patients while Tumutumu and Outspan hospitals dialysis centers (both level four) attend to 25 ESKD patients each.

Table 3.1 Study population

Name of Dialysis center	**Number of End stage kidney disease patients per institution**
Nyeri county Referral Hospital (lever five)	30
Outspan Hospital (lever 4)	25
Tumutumu Hospital (lever 4)	25
Total	80

3.5 Sampling/ Sampling Method

3.5.1 Sample size determination

When the population is known Yamane, formula is appropriate to use in order to identify the lowest size of the desired sample.

If Confidence interval of the study is 95% then the margin level of an error is 0.05.

Minimum size of the sample was calculated as below

$$n=N / (1 + Ne^2)$$

where;

n= sample size

N= accessible population (80)

e= margin of error (0.05)

By substitution;

$n = 80/ (1 + [80 \times 0.05^{2]})$

n=80/ (1 + [80x 0.0025])

n=80/1.2=66.666

n= ~ 67 respondents

The minimum sample size for the study was 67 patients. However, the study targeted the entire population of 80.

3.5.2 Sampling procedure

The research used census sampling method to select study participants from hemodialysis centers. All ESKD patients in the three selected dialysis centers who fulfilled the inclusive criteria were included in the study in order to achieve the minimum required sample size. The three centers were Nyeri County Referral Hospital with 30 ESKD, Outspan hospital with 25 ESKD patients and Tumutumu hospital with 25 ESKD patients totaling to a population of 80 participants.

3.5.3 Inclusive and Exclusive Criteria

3.5.3.1 Inclusive Criteria

Patients diagnosed with ESKD for more than three months and have been on HD for more than three months. Those were able to provide informed consent to take part in the study.

3.5.3.2. Exclusive Criteria

Patients who were critically ill and unable to communicate and those with cognitive dysfunction did not participate in the study.

3.6 Study Variables

3.6.1 Dependent Variables

Compliance with hemodialysis treatment among ESKD patients was the dependent variable. Compliance was indicated by undergoing two HD sessions per week and each HD session lasting four hours.

3.6.2 Independent Variables

The independent variables in this study comprised of patient factors, therapy factors and Institutional factors. Patient factors included; Age, Level of education, economic status, social support and co-morbidity. Therapy factors included; duration, Side effects and psychological effects.

Institutional factors included; Distance to and from the hospital, health information and resources.

3.7 Data Collection Method

3.7.1 Study Tool

Data was collected using a semi- structured questionnaire comprising of both open and closed ended questions. It took fifteen minutes to fill it. Questionnaire was generated based on literature review of known factors influencing compliance. The questionnaire was self- administered and interviewer administered. A questionnaire was used because a lot of information can be collected on factors related to HD compliance among ESKD patients and also ensures confidentiality of the information

obtained. The questionnaire was pre-tested prior to data collection to test for reliability and validity of the study tool.

3.7.2 Pretesting

A pretest was conducted prior to collection of data. Pretesting is the method of evaluating whether questionnaire illicit the intended questions and is understood by those individuals who are likely to respond to them (Hilton, 2015). In this study, a pretest was conducted at Kirinyaga county referral hospital renal unit.

Mugenda and Mugenda. (2010) recommend that the sample in the pre-test in cross sectional surveys should be equal to 10% of the main sample. The study minimum participants were 67 therefore the pretest was conducted on seven ESKD patients. Patients were selected randomly and given the questionnaire. Additional and current factors influencing HD compliance described by respondents in the initial survey were integrated into the subsequent survey.

The pre-test gave feedback to researcher as to whether the entire area essential to the study has been captured well. It was also detected whether the respondents understand the questions correctly or not. Kirinyaga county referral hospital renal unit was used for the pre-test of the study tool since it provides equally the same services as Nyeri County. It has population with the same characteristics as Nyeri county population hence minimal errors.

3.7.3 Data Collection Process

The principal investigator and two study assistants were engaged. The study assistants were Bachelor of Science in nursing holders and not working in the renal units.

3.7.3.1 Selection and orientation of research assistants

The main researcher involved two research assistants. The Bachelor of Science in nursing holders were used as they have basic knowledge in renal nursing and well

conversant with the study topic. The two assistants were trained on how to collect the data by use of the questionnaire before pre-testing was done. Training of research assistants ensure accuracy in data collection and reduce any error that may arise.

3.7.3.2 Data collection process

The researcher and the assistants travelled to the study area and through the census method sampled the respondents, explained the purpose of the study and requested their participation. Those who met inclusive criteria were selected. All relevant information in relation to the study were given and informed consent was obtained from those who wished to be involved in the study. Thereafter those recruited were issued with questionnaires. Patient's proxies were also used for the illiterate patients and those who could not understand English but wanted to be involved in the research. Covid 19 Ministry of health guidelines were adhered to during the whole process of data collection.

3.7.4 Data Management

Data collected was coded and then entered into a computer using the statistical package for social science (SPSS) version 25. In this study, data cleaning was done through visual inspection of filled questionnaires before entering it into the computer. The obtained data was coded and entered in statistical package for social science (SPSS) computer software.

3.7.5 Data Analysis

This was done using software of statistical package for social science (SPSS) version 25. The findings were presented using tables and pie charts. Descriptive and inferential analysis methods were used. Descriptive statistics was used to analyze

demographic data such as age, marital status, and gender. This was done with an aim of consolidating the information that was given by the respondents for easy presentation.

Inferential analysis using Chi-square test and was done on categorical data to establish presence of any relationship between independent variables and the level of compliance to HD among ESRD patients. Multiple Regression Analysis was done on variables which were found to have association with compliance in order to measure the strength between variables and their relationship.

3.8 Ethical Considerations

The study approval was sought from Kenyatta University Graduate School. Ethical clearance was obtained from Kenyatta University Ethical Review Committee and National Commission for Science, Technology and Innovation (NACOSTI). Authorization to conduct the study was obtained from the Director of Health Services, Nyeri County.

Participation in the study was voluntary and no coercion or reward was used. Informed consent was sought from the participants before administering the questionnaire. The vulnerable groups which included; children below 18 years of age, physically challenged, consent was obtained from their parents or legal guardians.

To ensure anonymity, participants were not required to provide their names in the questionnaire. The participants were assured of confidentiality of the information obtained from them. No physical harm was expected from the study. Any questions from the respondents on the research were promptly answered. The data was coded, entered and stored in a password protected computer and backed up in a flash disc only accessible to the researcher and her supervisors.

Covid 19 Ministry of health guidelines were adhered to during pretesting of the study tool and also during the data collection period.

3.9 Study limitation and delimitation

One of the limitations of this study was respondents were not willing to take part in this research. This was addressed by the main researcher by informing them the significance of the study to them.

The study was carried out in Nyeri County. The respondents being ESKD patients who have been on HD for the last three months thus may not give the true picture of the whole country. These is because different counties within the Republic of Kenya have different perception on chronic illnesses where cultural and religion beliefs may have some influence on HD compliance.

Strength of this study was that it was multicenter study. This enabled patients from different social economic background to be included in the study where many factors were evaluated for their association to hemodialysis compliance.

CHAPTER FOUR: STUDY FINDING

4.1 Introduction

The study sought to investigate the level of compliance to hemodialysis treatment and related factors among ESKD patients in Nyeri County. The specific objectives were to determine level of compliance with hemodialysis among patients, to establish patient factors, therapy related factors and institutional factors that are associated with compliance to hemodialysis among end stage kidney disease patients in Nyeri County. The study sample was 80 patients however, 73 patients successfully filled the questionnaire and were included in the analysis representing a 91.3% response rate.

4.2.1. Patients characteristics

The results showed that among the respondents, 68.5% (n =50) were male, the average age was 59±15 years, 49.3% (n =36) had secondary level education 64.4% (n =47) were self-employed while 31.5% (n =23) did not have an income as shown in Table 4.1

Table 4.1: Patient characteristics

Patient factors	Mean ±SD	Frequency (n)	Percentage (%)
Gender			
Male		50	68.5
Female		23	31.5
Age	59.04±15		
Education			
Primary		19	15.1
Secondary		36	49.3
College		18	24.7
Marital status			
Single		10	13.7
Married		58	79.5
Divorced		5	6.8
Religion			
Christian		71	97.3
Muslim		2	2.8
Residence			
Rural		47	64.4
Urban		27	37.0
Occupation			
Self employed		47	64.4
Public servant		4	5.5
Unemployed		22	30.1
Income			
None		23	31.5
Less than 10,000		16	21.9
10,000 - 20,000		18	24.7
20,000 - 50,000		14	19.2
Above 50000		2	2.7

4.2.2 Patient related factors among hemodialysis patients

The findings showed that, 98.6% (n =72) of the respondents were paying for HD using NHIF, 56.2% (n =41) were paying for NHIF on their own. Chronic illness was assessed where, 75.3% (n =55) had hypertension, 56.2% (n =41) had diabetes. Further, 39.7% (n =29) were admitted 1 or 2 times. Further, 23% (n =17) of the respondents asserted that they have missed their HD session as shown in Table 4.2

Table 4.2: Patient related factors among respondents

HD characteristics	Frequency (n)	Percentage (%)
Payment for HD		
NHIF	72	98.6
Harambee	1	1.4
Financier of NHIF		
Self	41	56.2
Family member	29	39.7
Government	3	3.1
Chronic illness		
Hypertension	55	75.3
Diabetes	41	56.2
Cancer	4	5.5
Number of hospital admissions		
None	28	38.4
1 - 2 times	29	39.7
3 - 4 times	10	13.7
5 times or more	6	8.2
Reason for admission		
Hypertension	25	34.2
Body weakness	12	16.4
Body swelling	17	23.3
Missed HD session		
Yes	17	23.3
No	56	76.7
Accompany to facility		
Family	46	63
Friend	2	2.7
None	25	34.2
Belong to a health support group		
Yes	1	1.4
No	72	98.6

4.2.3 Therapy related factors among hemodialysis patients

Therapy related factors were descriptively analyzed where the results found that, the average duration of hemodialysis was 23.38±15 months, 56.2% (n =41) had not missed any of their hemodialysis sessions. The reasons for missing HD included time and malfunctioning dialysis machines, 42.5% (n =31) shortened their dialysis time while 87.7% (n =64) had the required four hours of hemodialysis treatment hours as shown in Table 4.3

Table 4.3: Therapy related factors

Therapy related factors	Mean± SD	Frequency	Percent
Duration of HD (months)	23.38±14.97		
Missed HD			
None		41	56.2
One		14	19.2
Two		18	24.7
Reasons for missing HD			
Time		10	13.7
HD Machine malfunction		10	13.7
Arranged for missed HD			
Always		3	4.1
At times		9	12.3
No		16	21.9
Shortened HD session			
Yes		31	42.5
No		42	57.5
Reasons for shortening HD			
NA		35	47.9
Clamping		11	15.1
Chest pain		3	4.1
Restlessness		5	6.8
Low BP		7	9.6
Clotting		5	6.8
HD treatment hours			
Less or equal to 2 hours		1	1.4
3 hours		6	8.2
4 Hours		64	87.7
Equal or greater than 4 hours		1	1.4

4.2.4 Institutional related factors among hemodialysis patients

The results revealed that 50.7% (n =37) of the respondents lived between 1 to 15 km from the health facility, 64.4% (n =47) had average waiting time of less than one hour. All patients had their dialysis during the day. All of the respondents asserted that the healthcare providers share health information with them, 53.4% (n =39) highlighting that they are given health information every HD session as shown in Table 4.4.

Table 4.4: Institutional related factors

Institutional related factors	Frequency (n)	Percentage (%)
Distance to facility		
1 - 15 km	37	50.7
16 - 30 km	25	34.2
31 - 45 km	9	12.3
Over 45km	2	2.7
Missed Dialysis due to distance		
Yes	13	17.8
No	60	82.2
HD waiting time		
≤1 hour	47	64.4
2 - 4 hours	26	35.6
Reasons for waiting time		
Nurse shortage	23	31.5
Inadequate machine	35	47.9
Machine breakage	18	24.7
Time of HD		
Day time	73	100
Time of HD Convenience		
Yes	72	98.6
No	1	1.4
Share health information		
Yes	73	100
Frequency of sharing health information		
Every session	39	53.4
Weekly	8	11.0
Monthly	3	4.1
Random	23	31.5

4.3. The level of compliance with hemodialysis treatment among ESKD patients

In order to determine the compliance with hemodialysis patients were requested to indicate the number of HD sessions per week and the time taken for each session. The findings from the study revealed that, 53.4% (n =39) were compliant with hemodialysis treatment as shown in Figure 4.1.

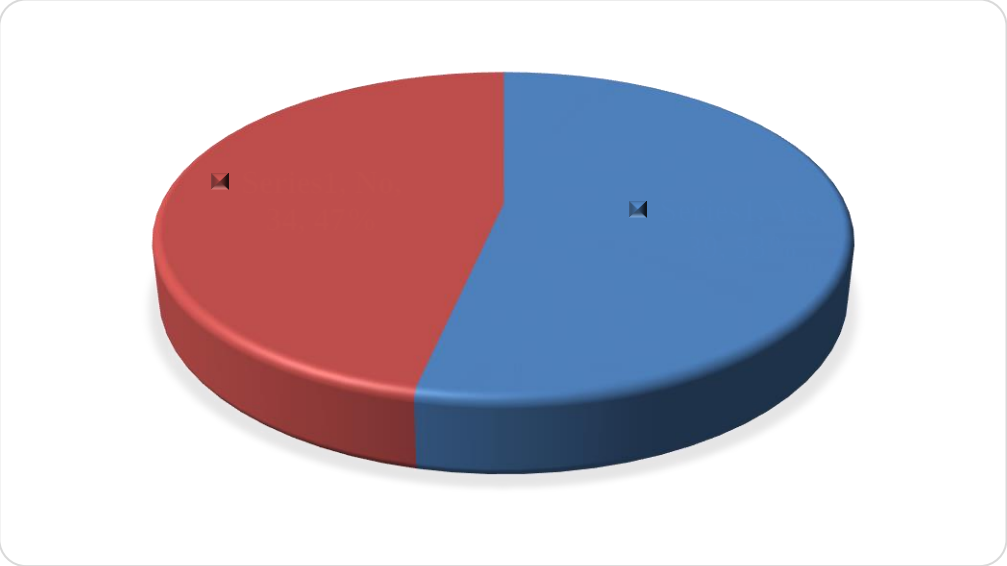

Figure 4.1: Level of compliance with hemodialysis treatment

4.4 Patient factors associated with compliance to hemodialysis among end stage Kidney disease patients in Nyeri County.

A chi square test for association was conducted to investigate patient factors associated with compliance to hemodialysis among end stage kidney disease patients as shown in Table 4.5. The findings revealed that, marital status, x^2 (2) = 5.151, p =0.029, income, x^2 (4) = 11.322, p =0.045, and number of hospital admissions, x^2 (3) = 38.069, p =0.0001 were significantly associated with compliance to hemodialysis.

Table 4.5: Association between patient factors and compliance to hemodialysis

	Compliance				
	Yes	**No**	**Chi square**	**Df**	**P-value**
Gender					
Male	26(52)	24(48)	0.129	1	0.458
Female	13(56.5)	10(43.5)			
Age					
Less or equal 50 years	8(44.4)	10(55.6)			
51 - 60 years	11(55)	9(45)	0.798	2	0.671
Above 60 years	20(57.1)	15(42.9)			
Education					
Primary	10(55.6)	8(44.4)			
Secondary	20(55.6)	16(44.4)	1.33	2	0.722
College	10(52.6)	9(47.4)			
Marital status					
Single	4(40)	6(60)			
Married	30(51.7)	28(48.3)	5.151	2	0.029
Divorced	5(100)	0			
Residence					
Rural	27(58.7)	19(41.3)	1.79	1	0.137
Urban	11(42.3)	15(57.7)			
Income					
None	8(34.8)	15(65.2)			
Less than 10,000	9(56.3)	7(43.8)			
10,000 - 20,000	12(66.7)	6(33.3)	11.322	4	0.045
20,000 - 50,000	12(84.6)	2(15.4)			
Above 50000	1(50)	1(50)			
Hypertension					
Yes	26(47.3)	29(52.7)	2.833	1	0.0793
No	12(70.6)	5(29.4)			
Diabetes					
Yes	18(43.9)	23(56.1)	3.408	1	0.053
No	21(65.6)	11(34.4)			
Number of hospital admission					
None	27(96.4)	1(3.6)			
1 - 2 times	11(37.9)	18(62.1)			
3 - 4 times	1(10)	9(90)	38.069	3	0.0001
5 times or more	0	6(100)			
Depression level					
No relevance	6(42.9)	8(57.1)			
Borderline depression	19(57.6)	14(42.4)	0.859	2	0.608
Depression symptoms	14(53.8)	12(46.2)			

4.5 Therapy factors that influence compliance to hemodialysis among end stage kidney disease patients in Nyeri County

The findings showed that, shortened hemodialysis was closely related with compliance to hemodialysis, x^2 (1) = 10.086, p =0.002 as shown in Table 4.6.

Table 4.6: Association between therapy related factors and compliance to hemodialysis.

	Compliance				
	Yes	No	Chi square	Df	P-value
Missed Dialysis session					
Yes	10(58.8)	7(41.2)	0.26	1	0.41
No	29(51.8)	27(48.2)			
Shortened Hemodialysis					
Yes	6(26.1)	17(73.9)	10.086	1	0.002
No	33(66)	17(34.0)			
Treatment hours					
Less or equal to 2 hours	0	1(100)			
3 hours	3(50)	3(50)	2.423	3	0.489
4 Hours	36(55.4)	29(44.6)			
Equal or greater than 4 hours	0	1(100)			

4.6 Institutional factors associated with compliance to hemodialysis among end stage kidney disease patients in Nyeri County.

The results investigating institutional factors that influence compliance to hemodialysis found that, waiting time for HD was significantly associated with compliance to hemodialysis, x^2 (1) = 3.263, p =0.006 as shown in Table 4.7.

Table 4.7: Chi square test for association between institutional factors and compliance to hemodialysis

	Compliance				
	Yes	**No**	**Chi-square**	**Df**	**P-value**
Distance to facility					
1 - 15 km	16(43.2)	21(56.8)			
16 - 30 km	15(60)	10(40)			0.226
			4.354	3	
31 - 45 km	6(66.7)	3(33.3)			
Over 45km	2(100)	0			
Missed due to distance					
Yes	4(30.8)	9(69.2)			0.081
			2.312	1	
No	35(58.3)	25(41.7)			
Waiting time for HD					
Less or equal 1 hour	26(55.3)	21(44.7)			0.006
			3.263	1	
2 - 4 hours	12(46.2)	14(53.8)			
Nurse Shortage					
Yes	10(43.5)	13(56.5)			0.183
			1.335	1	
No	29(58)	21(42)			
Inadequate machine					
Yes	18(51.4)	17(48.6)			0.138
			0.05	1	
No	20(54.1)	17(45.9			
Machine breakage					
Yes	12(66.7)	6(33.3)			0.138
			1.858	1	
No	26(48.1)	28(51.9)			
Frequency given health information					
Every session	19(48.7)	20(51.3)			
Weekly	5(62.5)	3(37.5)			0.823
			0.912	3	
Monthly	2(66.7)	1(33.3)			
Random	13(56.5)	10(43.5)			

4.7 Predictors of compliance among end stage kidney disease patients

The findings from the multivariate analysis found that shortened hemodialysis and waiting time (2 to 4 hours) were independently associated with non-compliance to hemodialysis treatment. Respondents who shortened their hemodialysis were 5.5 times more likely to be non-compliant with hemodialysis treatment, (aOR = 5.5, 95%*CI* (1.832, 16.512), p = 0.002). Respondents who waited for 2-4 hours prior to start their hemodialysis session were 4 times more likely to be non-compliant with hemodialysis treatment, (aOR = 4.112, 95%*CI* (1.54, 10.98), p = 0.005) as shown in Table 4.8.

Table 4.8: Predictors of compliance among end stage kidney disease patients

						95% C.I.foraOR	
	B	S.E.	Df	p-value	aOR	Lower	Upper
Marital status							
Single					Ref		
Married	21.608	3.571	1	0.651	0.121	0.118	0.851
Divorced	21.134	1.151	1	0.241	0.189	0.001	0.131
Income							
None					Ref		
Less than 10,000	-0.629	1.480	1	0.671	0.533	0.029	9.708
10,000 - 20,000	-0.118	1.495	1	0.937	0.889	0.047	16.661
20,000 - 50,000	-0.693	1.500	1	0.644	0.500	0.026	9.457
Above 50000	1.705	1.610	1	0.290	5.500	0.235	128.968
None					Ref		
1 - 2 times	-24.4	11.762	1	0.812	0.573	0.212	0.649
3 - 4 times	-20.7	16.98	1	0.641	0.891	0.000	0.901

5 times or more	-19.01	14.702	1	0.117	0.512	0.000	0.451
Shortened dialysis					Ref		
Yes	1.705	0.561	1	**0.002**	5.500	1.832	16.512
No							
Waiting times							
Less or equal 1 hour					Ref		
2 - 4 hours	1.414	0.501	1	**0.005**	4.112	1.540	10.981

CHAPTER FIVE: DISCUSSION

5.1 DISCUSSION

5.1.1 Socio demographic characteristics

The present study investigated the level of compliance to hemodialysis treatment as well as associated related factors. Majority of the hemodialysis patients in this study were male who comprised 50(69%) of the total number of respondents. These findings are consistent with earlier studies which found that majority of hemodialysis patients are male (Nakoa et al., 2016; Alikari et al., 2018; Mukakarangwa et al., 2018). These is so because most women give their health more priority than men by attending routine screening services hence predisposing risk factors are identified as early as possible and the required interventions are put in place in time unlike men who only report to health facilities when complications have already occurred. However, these findings are in contrast to a study conducted in Egypt by Ibrahim et al. (2015) which reported that majority of the respondents, 62% were female.

This study also found that the average age of patients with ESKD was 59 years. Kereu et al. (2017) and Alikari et al. (2018) also found similar results in studies conducted in Kenya and Greece, where the average age of patients on hemodialysis was 58 years and 59 years respectively. These findings indicate that prevalence of life style diseases is high among this age group and some of them complicate to ESKD. Similarly, in a peer review conducted by Kistler et al., (2021) found out that the prevalence of chronic kidney disease is common among older persons. This is as a result of increased co-morbidity such as high blood pressure, diabetes, prolonged use of over the counter drugs as well as kidney stones which are common in this age group.

The finding of this study showed that almost half of the respondents had secondary level education, 36(49%). This finding is comparable to another study which showed secondary level as highest level of education among ESKD patients in a study done in Rwanda (Mukakarangwa et al., 2018). The level of education is comparable to compliance level as respondents with higher education level may effortlessly comprehend the importance of the therapy and therefore may be able to follow instructions and guidelines of the therapy well unlike respondents with less education level.

5.1.2 Level of compliance with hemodialysis treatment among end stage kidney disease patients

The finding of this study showed that more than half of the respondents, 53% were compliant to hemodialysis treatment. The finding are comparable with other studies conducted in Palestine and Rwanda which confirmed moderate compliance with hemodialysis treatment (Naalweh et al., 2017; Mukakarangwa et al., 2018). However, the finding of this study is inconsistent with other studies done in Egypt and Athens, which found higher levels of compliance to hemodialysis treatment respectively (Ibrahim et al., 2015; Alikari et al., 2018). This difference could be as a result of improved quality of hemodialysis care in these settings. Advanced settings have quality healthcare systems which consider chronic conditions such as ESKD, thus improving patient care and wellbeing (Hashemi et al., 2018).

5.1.3 Patient factors associated with compliance to hemodialysis among ESKD patients

The finding of this research revealed that marital status was significantly associated with compliance to hemodialysis treatment ($p<0.05$). The findings showed that patients who were married had a higher compliance level. These findings are consistent with prior studies by (Alashker et al., 2015; Alikari et al., 2018) which

found that married HD patients enjoy social support from family members and spouse not like unmarried patients. Alexopoulou et al., (2016) in a study done in Greece revealed that, Patients living with chronic illness need social and family support in order to cope and adapt. Individuals who have family support have a high compliance level to treatment regimes compared to those with no family support at all.

Our findings also revealed that, monthly income was associated with compliance to hemodialysis. Respondents who earned an average monthly income of more than Ksh.50,000 were highly compliant. These findings are comparable to previous studies (Kustimah et al.,2019 ; Chironda & Bhengu, 2019). Income plays an important role in improving patient ability to follow the predetermined prescription to dietary intake, fluid restriction as well as medication and attendance of hemodialysis sessions. Inability to pay for all the hemodialysis sessions was a major obstacle to compliance. Those who have higher monthly income are able to afford to pay for health insurance covers which increase the level of compliance. In this study all respondents had NHIF cover because they had been in HD for more than three months. The findings point out that despite NHIF covering all HD sessions, patients with low income may not afford HD sessions when need arise for them to pay cash for a session resulting to non-compliance.

On the other hand 60% of hemodialysis patients are not able to keep up with their sources of income after being started on hemodialysis sessions, leading to reduced opportunities of ensuring adequate source of income. Those who have higher monthly income are able to afford to pay for health insurance covers which increase the level of compliance. The findings point out that despite NHIF covering all HD sessions, patients with low income may not afford to pay for NHIF monthly premiums thus

significant others and their families assist in making this payment Gerogiann et al. (2016) .

Number of hospital admissions among respondents was also associated with HD compliance. Most of patients who had more than two hospital admissions were non-compliant. These findings are consistent with Kilonzo et al. (2021) in a study done in Kenya which showed that higher hospital admission of hemodialysis patients is an indication of non-compliance to HD among ESKD patients. A multi-center study conducted in Turkey found that hospital admissions were linked to failure of patients to follow the prescribed treatment guideline. The most common consequence of non-compliance to hemodialysis sessions was hospital admissions (Ozen et al., 2019). This result from fluid overload and accumulation of biochemical molecules in the body systems leading to high blood pressure, anemia, infections, uremic; gastritis and encephalopathy. In our study 62% (45 out of 73 patients) had been admitted to the hospital.

5.1.4 Therapy factors that influence compliance to hemodialysis among end stage kidney disease patients

The study findings demonstrated that 42.5% (n=31) of respondents shortened their hemodialysis sessions. This result agrees with a previous study by AKF. (2018) which found that 45% of patients leave dialysis sessions early or miss sessions altogether. A study done in USA on investigating management of non-compliance among ESKD patients demonstrated that completing all hemodialysis sessions was a crucial factor in improving the level of compliance and quality of life among ESKD patients (Cohen & Kimmel, 2018). Similarly, in another study conducted by Mastardo et al. (2016) in United States found that skipping or shortening hemodialysis sessions increases the level of non-compliance and higher risk of hospitalization. The main observation from

this study shows that shortening hemodialysis sessions is more prevalent among the patients who encounter hemodialysis adverse effects which included; muscle clamping, chest pains, low inter-dialytic hypotension.

5.1.5 Institutional factors associated with compliance to hemodialysis among end stage kidney disease patients

Waiting time for hemodialysis session in our study was found to be significantly associated with compliance. Respondents who waited for a time period of between two and four hours were four times more likely to be noncompliant with hemodialysis treatment. Longer waiting times means that the patients are likely to have their sessions shortened considering the high number of patients. These finding are consistent with a study by AKF. (2018) which found that, barriers to HD treatment compliance included shortening and missing sessions. Longer waiting time could be related to high machine patient ratio in dialysis center (Nobahar & Tamadon et al., 2016). Patients who wait longer are highly likely to reschedule their hemodialysis sessions which in turn influence their compliance levels.

5.1.6 The predictors of compliance to HD among end stage kidney disease patients in Nyeri County

The findings from our present study revealed that shortening of hemodialysis was associated with increased likelihood of non-compliance. Patients who shorten or skip their treatments are reducing their time on dialysis, and, by definition, the amount of dialysis they receive. There is no question that shortening and skipping poses a significant problem. These findings are consistent with a study done by AKF. (2018) which found that shortening and missing hemodialysis session occur commonly and are related to inadequate dialysis and high mortality rate. These behaviors are also frequently equated with patient non-compliance.

Further, waiting time was also found to be an important predictor of compliance. Patients who waited for two to four hours were found to be significantly non-compliant with treatment. Mugi et al. (2021) maintained that service delivery is affected by frequent breakdown and an insufficient number of HD machines which causes unnecessary delay while waiting for a session to begin. This might be as a result of gaps in the quality of hemodialysis services within these institutions. Longer waiting times is necessitated by large number of patients and few functional dialysis machines (Som et al., 2017).

5.2 Conclusion

The researcher concluded that:

I. The level of compliance with hemodialysis treatment among end stage kidney disease patients was found to be moderate.

II. Economic status is a patient factor that is associated with non-compliance. Their main complain focused on economic problems that most of the patients faced due to inability to work in order to support their families economically and also contribute towards NHIF monthly premiums.

III. The significant therapy related factor identified to influence compliance with hemodialysis was shortening of hemodialysis sessions associated with adverse effects of the therapy. The consequences of shortening hemodialysis sessions are serious complications and frequent hospitalization following hemodialysis inadequacy.

IV. On the institution factors the study identified waiting time for hemodialysis session to begin as a significant factor in non-compliance. The long waiting time was associated with high nurse patient ratio and broken down machine due to poor maintenance.

5.3 Recommendations

The researcher recommends that;

I. The hospitals providing dialysis services should develop attainable and cost-effective strategies to improve compliance. The patients and their families should be equipped with adequate information concerning the nature of the disease and the support systems required through counselling programmes. These would create awareness, thus promoting more support and enhancing compliancy.

II. The patients should be encouraged to continue with their income generating activities even when they are on hemodialysis treatment in order to have sufficient income to support their families economically and pay for their treatments.

III. Regarding shortening of hemodialysis session due to adverse effects of the therapy, patients should be educated by their renal professionals on inter-dialytic weight gain management which is the epicenter of almost all adverse effects of hemodialysis treatments. Also the institutions providing hemodialysis services

should ensure that hemodialysis sessions are not interrupted through periodic maintenance of machines to avoid premature disconnections.

IV. The hospitals providing dialysis services should increase the number of machines in order to reduce machine patient ratio and also increase the number of trained renal nurses. Mechanisms should also be put in place where all patients who skip or shorten their sessions are closely monitored and followed up in order to curb hospitalisation rate.

5.4 Areas of further studies

I. The study recommends replication of the same study by using a longitudinal study design. This is because compliance levels keep changing with time.

II. The study did not evaluate compliance to diet and fluid due to resources constrains. Therefore, it recommends further study to investigate on dietary and fluid compliance to the ESKD patients on maintenance hemodialysis.

III. The study has found compliance to be sub- optimal and therefore a study **on "strategies to improve compliance are recommended".**

5.5 Dissemination of the study finding

I. The finding of the study will be shared with hospital management of; Nyeri county Referral hospital, Outspan hospital and Tumutumu hospital.

II. The finding will also be disseminated to Nyeri county Hospital Research Committee, KU ERC and NACOSTI who provided Ethical approval for the study.

III. Finally, the study will be shared through conferences and publications in the local and international journals.

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APPENDICES

APPENDIX I: PATIENT'S CONSENT FORM

Informed consent

My name is JACINTA W. CHEGE, MScN student from Kenyatta University. I am conducting a study on compliance with hemodialysis among end stage kidney disease patients in Nyeri County. The information will be used by the Ministry of Health; Kenya, county Government of Nyeri and other stakeholders to improve compliance to hemodialysis with the aim of prolonging and improving the quality of life among end stage kidney disease patients.

Procedure to be followed

Participation in this study will require that I administer a questionnaire to you to fill or I ask you some questions if you are not able to read and write. I will record the information from you in a questionnaire.

You have the right to refuse participation in this study. You will get the same care and health services whether you agree to join the study or not and your decision will not change the care you will receive from the renal unit today or any other health services at any other time.

Please remember that participation in this study is voluntary you may ask questions related to the study at any time you may refuse to respond to any question and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you receive from the renal unit now or in the future.

Discomforts and risks

There are no physical risks involved. However, the filling of the questionnaire will take fifteen minutes before you receive your routine services.

Benefits

If you participate in this study you will help us to learn the factors that lead to non-compliance to hemodialysis among end stage kidney disease. If you are found to be non-compliant you will be advised on how to improve compliance.

Reward

The study will have no monetary benefits but the information you will give will inform on the compliance to patterns. Any sub optimal compliance will be noted and corrective measures taken.

Confidentiality

The interview will be conducted in a private setting within the renal unit. Your name will not be recorded on the questionnaire. The questionnaire will be kept in a locked cabinet for safe keeping. Everything will be kept private.

Contact information

If you have any questions you may contact Dr. Grace Githemo on 0722787862 or Dr. Lister Onsongo on 0700002488 or Kenyatta University Ethical Review Committee on Telephone number8710901/12 or Kenyatta University Ethical Review Committee, Email to chairman.kuerc@ku.ac.keor secretarykuerc@ku.ac.ke.

Participant's statement

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that I will get the same care and health services whether I decide to leave the study or not. My decision will not change the health services I will receive from the renal unit today or any other subsequent visit at any given time.

Code of participant……

……. …….

Signature or thumb print Date

Investigator's statement

APPENDIX II: RESEARCH AUTHORIZATION

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: R50/CE/39758/16

Date: 27th October, 2020

Director General, National Commission for Science,
Technology & Innovation,
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MS. CHEGE J. WANJIKU REG. NO. R50/CE/39758/16

I write to introduce Ms. Chege who is a Postgraduate Student of this University. She is registered for M.Sc. degree programme in the **Department of Medical Surgical Nursing & Pre-Clinical Science in the School of Nursing Sciences.**

Ms. Chege intends to conduct research for M.Sc. Degree thesis entitled **"Compliance with Hemodialysis Treatment among end Stage Kidney Disease Patients in Nyeri County, Kenya".**

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

JG/cao

APPENDIX III: RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **171943**

• Date of Issue: **22/March/2021**

RESEARCH LICENSE

This is to Certify that Miss.. JACINTA WANJIKU CHEGE of Kenyatta University, has been licensed to conduct research in Nyeri on the topic: COMPLIANCE WITH HEMODIALYSIS TREATMENT AMONG END STAGE KIDNEY DISEASE PATIENTS IN NYERI COUNTY. KENYA for the period ending : 22/March/2022.

License No: **NACOSTI/P/21/9555**

171943

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

APPENDIX IV: ETHICAL APPROVAL

REPUBLIC OF KENYA

COUNTY GOVERNMENT OF NYERI
DEPARTMENT OF HEALTH SERVICES
OFFICE OF THE DIRECTOR

Email: nyericountyhealth@yahoo.com

COUNTY COMMISSIONER'S HQ
BLOCK 'A'
P.O. Box 110 - 10100

REF: CGN/HEALTH/HRM/5/VOL.II **Date: 30th March 2021**

The Hospital Administrator
- Outspan hospital
- Tumutumu Hospital

The Medical Superintendent
- Nyeri County Referral Hospital

RE: AUTHORITY TO COLLECT DATA

The bearer of this letter, **Jacinta Wanjiku Chege** is a student at Kenyatta University undertaking Masters in Nursing.

She is hence introduced to undertake a data collection exercise for purposes of her learning.

Kindly accord her the necessary assistance.

COUNTY DIRECTOR OF HEALTH

Dr. Nelson Muriu
Director of Health Services
NYERI COUNTY

APPENDIX V: PATIENT'S QUESTIONNAIRE

Study instrument

Questionnaire No. ……

Instructions:

Kindly indicate your response by ticking along the space provided as accurately as possible.

Where response / choice is not provided please write the response in the space provided.

DO NOT indicate your name

Section A: Patient's Social demographic Factors

1. Indicate your gender.

- □ Male
- □ Female

2. Age in years……..

3. What is your level of education?

- □ No schooling
- □ Primary
- □ Secondary
- □ College
- □ University

4. Indicate your marital status.

- □ Single
- □ Married

- □ Divorced
- □ Others (below 18 years)

5. Indicate your religion.

- □ Christian
- □ Muslim
- □ None
- □ Others

6. Where is your place of residence.

- □ Rural
- □ Urban (Town)

7. Indicate your occupation.

- □ Self Employed / business
- □ Public Servant
- □ Un-employed
- □ Employed (private)

8. On average, what is your monthly income.

- □ Less than Ksh 10,000
- □ Ksh 10,000 – Ksh 20,000
- □ Ksh 20,000 – Ksh 50,000
- □ Above Ksh 50,000

9. How do you pay for hemodialysis sessions?

- □ Salary
- □ Personal business
- □ Family contribution
- □ Harambee (fundraising)

□ NHIF Insurance

10. (a) Any presence of chronic illness ?

□ Yes

□ No

(b) If yes specify

□ Hypertension

□ Diabetes

□ Cancer

□ HIV/AIDS

□ Others (Specify)….....

11. (a)Indicate the number of hospital admissions since you started hemodialysis sessions

□ Not applicable (Have never been admitted)

□ 1-2 times

□ 3-4 times

□ More than 5 times

(b) What was the reason for the admission(s)?

□ High blood pressure

□ Generalized body weakness

□ Generalized body swelling

□ Missed previous hemodialysis session

□ Others specify……..

12. During the hemodialysis treatments, who accompanies you to the dialysis center?

□ Family member

□ Friends

□ None

13. (a)Do you belong to any of health support group?

□ Yes

□ No

(b)If yes indicate the benefit(s) of that support group

……

……

……

……

……

14. Checklist for patient biochemical parameters.

	Reference Range	**3 months Average**
Urea levels	1.7-8.3mmol/L	
Creatinine Level	99-110 mmol/L	
Sodium Levels	130-150 mmol/L	
Chloride Levels	**90-110 mmol/L**	
Potassium Levels	3.5-5.5 mmol/L	
Phosphorus levels	2.5- 4.5mmol/L	

15. Average blood pressure for 3 months ……mmHg

16. Average weight for 3 months;

(a) Dry weight……

(b) Pre-dialytic weight……

17. In your opinion rate the following?

3= Strongly disagree

2= Disagree

1 = Agree

0= Strongly agree

Items	0	1	2	3
I enjoy the things I used to enjoy				
I feel cheerful				
I care on how l feel about my self				
I can enjoy a good book or radio o TV program				
I like to talk about the problem I go through and share them with others				
I talk to my friends and family whenever I feel low and need encouragement				
I feel hopeful about the future				

Section B. Therapy related factors that influence hemodialysis compliance

1.How many years have you been on hemodialysis?.....

2.(a)During the last one month how many hemodialysis session(s)have you missed completely.

- □ Non
- □ one
- □ Two
- □ All sessions

(b) What was the main reason(s) for the missed hemodialysis session

- □ Not applicable (I have never missed any hemodialysis session)
- □ Time constrains
- □ Distance to hospital
- □ Lack of money to pay for hemodialysis sessions
- □ Breakdown of the hemodialysis machines
- □ Others (specify) …….

- □ Any arrangement made to undergo the missed hemodialysis session(s)? Always
- □ Sometimes
- □ No

3. (a)Have you ever shortened your hemodialysis sessions?

- □ Yes
- □ No

(b) If yes what was the main reason(s).

- □ Not applicable (I have never shortened my hemodialysis treatment)
- □ Muscle Cramping
- □ Chest pains
- □ Restlessness
- □ Low blood pressure
- □ Clotting
- □ Others (specify)……

4.How many hours are you treated for each hemodialysis session

- □ Less than 2 hours
- □ 3 hours
- □ 4 hours
- □ More than 4 hours

Section C. Institutional related factors influencing hemodialysis compliance

1. How far (in kilometers) did you travel to get here?

- □ 1 – 15 kms
- □ 16 – 30 kms
- □ 31 – 45 kms
- □ Over 46 kms

2. Have you ever missed any hemodialysis session due to long distance to hemodialysis center?

- □ Yes

□ No

3. (a)How long do you wait for hemodialysis treatment to start.

□ Less than 1 hour

□ 2-4 hours

□ 4-6 hours

□ More than 6 hours

(b) What was the main reason that kept you waiting for hemodialysis treatment to start

□ Shortage of Nurses

□ Inadequate dialysis machines

□ Broken down dialysis machines

□ Others (Specify)

4. **(a)** When are you scheduled forhemodialysis sessions.

□ Day

□ Night

(b) Is your hemodialysis schedule convenient for you?

□ Yes

□ No

(c) If no specify……

5. (a) Are you given health information before hemodialysis sessions?

□ Yes

□ No

(b) If yes how often

□ Every session

□ Weekly

□ Monthly

6. In your own opinion how best can hemodialysis be improved

……

APPENDIX VI: NYERI COUNTY MAP

Source: Google Maps