# PERCEIVED BENEFITS AND BARRIERS TO EXERCISE AND PHYSICAL ACTIVITY STATUS AMONG PATIENTS UNDERGOING HEMODIALYSIS AT KENYATTA NATIONAL HOSPITAL IN KENYA

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## DECLARATION

This thesis is my personal work and has not been submitted for examination purposes or award of credit in any other institution.

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## DEDICATION

This thesis is dedicated to my dear family, my supportive husband, Dr. E. Mburu, for believing in me, paying my fees and for taking good care of our children while I have been away from home pursuing this degree.

To my children, Olivia and Austin, for giving me a reason not to give up and to persevere when the going got tough.

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| BMI | Body Mass Index |
| CKD | Chronic Kidney Disease |
| COVID-19 | Coronavirus Disease 2019 |
| CVD | Cardiovascular Disease |
| DOPPS | Dialysis Outcomes and Practice Patterns Study |
| DPEBBS | Dialysis Patient-Perceived Exercise Benefits and Barriers Scale |
| ESKD | End-Stage Kidney Disease |
| GPPAQ | General Practice Physical Activity Questionnaire |
| HCPs | Health Care Providers |
| HPM | Health Promotion Model |
| HRQoL | Health-Related Quality of Life |
| KDIGO | Kidney Disease Improving Global Outcomes |
| KDOQI | Kidney Disease Outcomes Quality Initiative |
| KMTC | Kenya Medical Training College |
| KNH | Kenyatta National Hospital |
| KRT | Kidney Replacement Therapies |
| KT | Kidney Transplant |
| NCDs | Non-Communicable Diseases |
| PD | Peritoneal Dialysis |

| | |
|---|---|
| PI | Physical Inactivity |
| QoL | Quality of Life |
| SPSS | Statistical Package for Social Sciences |
| UK | United Kingdom |
| US | United States |
| WHO | World Health Organization |

## OPERATIONAL DEFINITIONS

**Adult** - Any person aged 18 years and above.

**Chronic kidney disease** - An abnormality of kidney structure of function ,present for more than 3 months with implications for health and requires one of two criteria documented or inferred for >3 months: either GFR<60 ml/min/1.73 m2 or markers of kidney damage, including albuminuria (KDIGO).

**Patients undergoing hemodialysis** - Persons with end-stage kidney disease on hemodialysis as a kidney replacement therapy.

**Physical activity** - Any movement of the body including during leisure time, for transport to get to and from places, or as part of a person's work.

**Exercise** - Any physical activity that is planned, structured, repetitive and intentional.

**Physical activity status** - Is a way of expressing how active or inactive a person is based on their level of engagement in physical activities.

**Perceived exercise benefits** - Refers to the positive beliefs that patients undergoing hemodialysis have regarding exercise outcomes that motivate them to take part in exercise.

**Perceived exercise barriers** - Refers to the negative beliefs that patients undergoing hemodialysis have regarding exercise that discourage them from engaging in exercise.

## ABSTRACT

**Background:** Physical inactivity is a common challenge among patients on hemodialysis. This is despite growing evidence about the benefits of physical activity and exercise in these patients. This may be due to uncertainty and lack of appropriate guidance about physical exercise, or driven by the barriers and benefits of exercise that they perceive. Understanding these perceptions may inform interventions aimed to increase their participation in physical exercise.

**Objective:** To determine perceived benefits and barriers to exercise and physical activity status among patients undergoing hemodialysis at Kenyatta National Hospital in Kenya.

**Methods:** This was a descriptive cross-sectional study. It was conducted among 91 adult patients undergoing hemodialysis at Kenyatta National Hospital's renal unit. The study tools included a self-created questionnaire on respondents' demographic information, the Dialysis Patient-perceived Exercise Benefits and Barriers Scale (DPEBBS) to assess perceived benefits and barriers to exercise and the General Practice Physical Activity Questionnaire (GPPAQ) to assess the respondents' physical activity status, all of which were interviewer-administered. The study data was analyzed through descriptive statistics that included percentages and frequencies as well as means and standard deviation using the Statistical Package for Social Sciences (SPSS, version 25). Association between study variables was evaluated using chi-square test at 95% CI. Results were presented in tables and figures.

**Results:** Patients undergoing hemodialysis at KNH renal unit had low physical activity status as only 20.3% (n = 16) were assessed as being moderately active with the remaining assessed as being moderately inactive or inactive. The perceived exercise benefits identified to be associated with the respondents' physical activity status were prevention of muscular atrophy (Chi square p = .005), achieving a manageable body weight (Chi square p = .005), improved immunity (Chi square p = .015), enhanced self-care abilities (Chi square p = .000) and improved quality of life (Chi square p = .000). The perceived exercise barriers identified to be associated with the respondents' physical activity status were regular tiredness (Chi square p = .000), fear of falls during exercise (Chi square p = <.000), body pain (Chi square p = .003), frequent lower-extremity muscle fatigue (Chi square p = .005); lacking awareness of how they should exercise (Chi square p = .012), fear of thirst (Chi square p = .009), concerns over their medical condition (Chi square p = .039) and having comorbidities (Chi square p = .000).

**Conclusions:** Patients undergoing hemodialysis at KNH renal unit had low physical activity status. Patients undergoing hemodialysis at KNH renal unit had a wide range of perceived benefits and barriers to exercise.

**Recommendations:** There is need for renal unit healthcare team to create awareness among patients undergoing hemodialysis at KNH's renal unit on the significance of physical exercises as a critical component of their treatment and management.

# CHAPTER ONE: INTRODUCTION

## 1.1 Study Background

Chronic kidney disease (CKD) is a major public health problem worldwide. It is marked by progressive loss in kidney function over time and its most advanced stage, the end-stage kidney disease (ESKD) is characterized by uremia, metabolic acidosis, anemia, volume overload, electrolyte imbalances and endocrine disorders (Ortiz, 2019). It is a leading contributor to morbidity and mortality from non-communicable diseases (NCDs) in both developed and developing countries (Cockwell & Fisher, 2020). It is also associated with major adverse implications on person's health-related quality of life (HRQoL), high diagnostic and therapeutic cost and high disease burden on affected individuals, their families and on health systems (Carney, 2020). In 2019, 4.6% of all-cause mortality worldwide was due to CKD and CKD-attributable CVD cases, with most of the burden of CKD concentrated in low-income regions; sub-Saharan Africa included (World Health Organization [WHO], 2020). This necessitates the use of kidney replacement therapy (KRT) to ensure survival.

The need for kidney replacement therapy (KRT) becomes inevitable when CKD advances to end-stage kidney disease stage. Irrespective of the cause of the chronic kidney disease, kidney replacement becomes necessary when the patient displays signs and symptoms of uremia or electrolyte imbalances (Ammirati, 2020). The choice of the KRT is dictated by the availability and the severity of uremia and is aimed at delaying the progression of the chronic kidney disease (Chen et al., 2019). Hemodialysis is the most prevalent type of KRT around the world accounting for 82% of care used (Cockwell & Fisher, 2020). However, while hemodialysis improves the quality of life of the patient, there are certain aspects which are equally important, like exercise, but that are ignored.

Multiple benefits of exercise in patients undergoing hemodialysis have been identified in research. These include improved quality of life (QoL); improved physical performance or functioning and improved muscular strength (Ghafourifard et al., 2021; Filipčič et al., 2021). Other benefits are reduced mortality risk; reduced cardiovascular disease risk; improved blood pressure control; shorter hospital stay

(reduced hospitalization); improved nutritional status; reduced anxiety and depression; better sleep; better control of body weight (Bennett et al., 2019; Huang et al., 2019; Wilkinson et al., 2021). Exercise also leads to improved disease management with lesser complications; improved dialysis efficiency/adequacy; improved balance and coordination; better social interactions; and better/improved independence/self-reliance (Kendrick et al., 2019). This implies that engagement in physical activity and exercise is vital and beneficial to patients on hemodialysis.

However, in spite of the well-documented evidence about the potential benefits of physical activity and exercise among ESKD patients on hemodialysis, physical inactivity is still very prevalent in this patient population. Significantly low physical activity status was reported in patients receiving hemodialysis compared to healthy controls in these studies (Moorman et al., 2019; Wang et al., 2020; Lightfoot et al., 2021; Sutherland et al., 2021). Studies by Bennett et al. (2019), Wilkinson et al. (2021) and Filipčič et al. (2021) also offered evidence of higher prevalence of physical inactivity among patients undergoing hemodialysis compared to their age-matched healthy controls. There is need, therefore, to explore the reasons for the high physical inactivity seen in patients undergoing hemodialysis.

The reasons for the low physical activity status among patients on hemodialysis are varied. Part of the physical inactivity paradigm may be due to the lack of promotion of physical activity and exercise by healthcare providers (HCPs) as an essential component of patients undergoing hemodialysis treatment (Huie, 2017; Kendrick et al., 2019). Other reasons may include a concern for safety and uncertainty about the most appropriate exercise regimen due to a lack of suitable guidance (Hannan & Bronas, 2017). However, it is also acknowledged that a patient's own individual perceptions towards the relative barriers and benefits of physical activity and exercise may also contribute to their non-participation (Clarke et al., 2019). Hence the focus on perceived benefits and barriers to physical exercise among patients on hemodialysis are essential.

Perception of exercise benefits and barriers among patients undergoing hemodialysis is likely to influence their engagement in physical activity. Perceived exercise benefits

are the various beliefs regarding positive outcomes of exercise. Perceived exercise barriers refer to patients' negative beliefs that prevent them from engaging in exercise and physical activities (Lightfoot et al., 2021). Among patients undergoing hemodialysis, it is argued that greater perceived benefits from exercise could lead to greater participation in physical activities, while greater perceived barriers from exercise may lead them to avoid exercise participation (Yamagata et al., 2019; Sutherland et al., 2021). However, there was paucity of local data on patients undergoing hemodialysis' perception of exercise benefits and barriers and their physical activity status. This study, therefore, sought to determine physical activity status and perceived benefits and barriers to exercise among patients undergoing hemodialysis in the local context.

### 1.2 Statement of the Problem

Physical inactivity is a common phenomenon in patients undergoing hemodialysis. This is despite physical exercise having been shown to be safe and to have numerous positive effects in these patients (Weber et al., 2020). This is affirmed by findings of the Dialysis Outcomes and Practice Patterns Study (DOPPS) - an ongoing global initiative on monitoring ESKD management practice and policy, which shows that approximately 45% of patients undergoing hemodialysis do not engage in physical activity or exercise. The evidence for sub-optimal or low physical activity levels among patients undergoing hemodialysis compared to age-matched healthy controls have also been reported in numerous studies (Moorman et al., 2019; Huang et al, 2019; Lightfoot et al., 2021; Wilkinson et al., 2021; Li et al., 2021). This denotes gaps in utilization of physical activity and exercise as a useful intervention in the management of patients on hemodialysis across the globe.

Low physical activity levels among patients undergoing hemodialysis is a greatly worrying pattern or issue. This is given that physical inactivity is associated with poor health-related quality of life, increased symptoms of anxiety and depression, increased risk of cardiovascular events and increased mortality rates (Bohm et al., 2019). This is also unfortunate as physical inactivity is a major modifiable risk factor, implying that even slight increases in exercise levels among patients undergoing hemodialysis

would help reduce the large burden of ESKD associated morbidity and mortality (Bennett et al., 2019). Unfortunately, most of the empirical studies on this study subject has been conducted in developed countries (Kendrick et al., 2019; Sutherland et al., 2021; Wilkinson et al., 2021; Lightfoot et al., 2021), with the status of this research subject locally being largely unclear.

The Health records at Kenyatta National Hospital (KNH) in Kenya indicated that a significant proportion of patients on hemodialysis were physically inactive. Physical inactivity was a recurrent theme on the hospital's renal unit regular audits reports on challenges complicating health care outcomes of this group of patients. The KNH renal unit reports depicted that only few (about 5%) of the patients on hemodialysis engaged in physical exercises. The report therefore noted that the physical activity status of most of the patients undergoing hemodialysis in the hospital was sub-optimal. The physical inactivity was noted as having adverse effects on their care outcomes and quality of life through increasing the risk for other serious comorbidities such as diabetes and CVDs (KNH renal unit reports, 2021). Further, the perceptions of patients undergoing hemodialysis at KNH towards the benefits and barriers to exercise and how they relate to their physical activity status were unclear. The purpose of this study was therefore to determine the physical activity status, perceived benefits and barriers to exercise among patients undergoing hemodialysis in the hospital.

### 1.3 Study Justification

A review of the physical activity status of patients undergoing hemodialysis and their perceptions of the benefits and barriers to physical exercise in the local context is instrumental for various reasons. First, increasing physical activity levels helps reduce the risk of heart disease among patients undergoing hemodialysis. This is crucially important as cardiovascular events account for more than 50% of mortality causes in patients with advanced chronic kidney disease. Secondly, the direct and indirect economic impact, in terms of health care costs of ESKD treatment, on individuals, their families, and the greater community and on health systems is significant and increasing. In most health care settings in both developed and developing countries,

ESKD treatment and management costs account for a significantly disproportionate share of hospital costs considering the number of ESKD patients relative to the rest of the patient population. Greater physical activity levels among patients undergoing hemodialysis could help reduce this huge cost burden. Third, the benefits of physical exercise among patients undergoing hemodialysis are numerous and touch on the physiological, psychological and social domains of patients undergoing hemodialysis' lives and hence exercise forms one of the most efficient and cost-effective interventions that can greatly improve patients undergoing hemodialysis' overall health-related quality of life. Lastly, ESKD is a major contributor to Kenya's growing burden of NCDs. All efforts that could help reduce the huge ESKDburden in the country were therefore important, and increasing the physical activity levels of patients undergoing hemodialysis through physical exercise is one such kind of effort.

## 1.4 Research Questions

1. What is the physical activity status of patients undergoing hemodialysis at KNH renal unit?

2. What are the perceived benefits of physical exercise among patients undergoing hemodialysis at KNH renal unit?

3. What are the perceived barriers to physical exercise among patients undergoing hemodialysis at KNH renal unit?

## 1.5 Study Objectives

### 1.5.1 Broad Objective

To determine physical activity status, perceived benefits and barriers to exercise among patients undergoing hemodialysis at Kenyatta National Hospital in Kenya.

### 1.5.2 Specific Objectives

1. To assess the physical activity status among patients undergoing hemodialysis at KNH renal unit.

2. To determine the perceived benefits of exercise among patients undergoing hemodialysis at KNH renal unit.

3. To determine perceived barriers to exercise among patients undergoing hemodialysis at KNH renal unit.

## 1.6 Research Hypothesis

### 1.6.1 Null Hypothesis

Perceived exercise benefits and barriers had no significant influence on the physical activity status of patients undergoing hemodialysis at Kenyatta National Hospital in Kenya

### 1.6.2 Alternate Hypothesis

Perceived exercise benefits and barriers had a significant effect on the physical activity status of patients undergoing hemodialysis at Kenyatta National Hospital in Kenya

## 1.7 Significance of the Study

The study findings may inform local treatment practices for patients undergoing hemodialysis through greater emphasis on use of physical activities and exercise as a critical intervention for the management of ESKD patients at KNH. The findings may also inform renal nursing education with insights generated from the study acting as a basis for formulation of renal nurses training tools and guides on fostering regular use of exercise among patients undergoing hemodialysis attending KNH. The findings may also inform or influence policy review on the role of physical activity and exercise in the treatment of ESKD patients in the country. Further, the findings from this study may also inform research by acting as a reference point and a basis for further research on the study subject among other scholars and academicians.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

This chapter presents a review of literature as guided by the study objectives. The chapter begins with an overview of physical exercise guidelines for patients with ESKD. It also contains a review of empirical literature on the physical activity status among patients undergoing hemodialysis as well as on perceived benefits and barriers of physical exercise among patients undergoing hemodialysis. The chapter also includes a summary of the reviewed empirical literature and also presents the study's theoretical and conceptual frameworks.

Key words used in search of relevant studies from various academic literature databases such as PubMed, EMBASE, Cochrane Library, CINAHL and Google Scholar included chronic kidney disease, end stage kidney disease, hemodialysis, physical activity status or level, perceived exercise benefits and perceived exercise barriers. Twenty nine (29) studies were reviewed, sixteen (16) were from the developed countries in Europe and North America; 10 were from the developing countries in Asia, Latin America and Middle East and 3 were from the sub-Saharan region, though none had been done in Kenya. The reviewed studies were restricted to a period of not more than 5 years ago. These studies constituted this study's empirical literature review.

## 2.2 Physical Activity Status among Patients undergoing Hemodialysis

Physical activity levels among patients on hemodialysis are significantly lower compared with age-matched healthy control individuals. This was so established in a study that compared the physical activity status between patients undergoing hemodialysis and healthy controls and observed significantly lower physical activity level among the patients undergoing hemodialysis compared to their age-matched controls. This could possibly be explained by the higher incidence of sedentary lifestyle among patients on hemodialysis compared to their healthy counterparts (Kendrick et al., 2019). Likewise, Wilkinson et al. (2021) reported higher prevalence of physical inactivity among patients on hemodialysis relative to healthy controls.

They attributed this to reduced time opportunity for engaging in physical exercises among patients undergoing hemodialysis due to treatment related obligations. The low physical activity level among patients undergoing hemodialysis was also evident in a study by Dashtidehkordi et al. (2019) in which over two-thirds of surveyed patients undergoing hemodialysis exhibited lower physical activity scores compared to age-matched healthy persons. The World Health Organization makes similar observation that persons undergoing hemodialysis tend to be more physically inactive compared to the general population. The high physical inactivity status is a major modifiable risk factor for morbidity and mortality in the ESKD population (WHO, 2021). It is thus evident that the physical activity status of patients undergoing hemodialysis was poorer compared to that of healthy persons.

Physical inactivity appears to be a common phenomenon in patients undergoing hemodialysis. For instance, the prevalence of physical activity among surveyed individuals on hemodialysis was found to be 6% compared to the level of controls at 34%. This could be due to disease related implications on their physical well-being (Wilkinson et al., 2021). Similarly significantly higher levels of physical inactivity were also reported among surveyed patients undergoing hemodialysis relative to healthy subjects in a study conducted in Slovenia. In the study, most of the patients undergoing hemodialysis were unaware of physical activity guidelines for persons undergoing hemodialysis. As such, their high physical inactivity status could be due to their low knowledge regarding physical activity recommendations for patients undergoing hemodialysis (Filipčič et al., 2021). Higher prevalence of physical inactivity was also reported among surveyed Korean patients undergoing hemodialysis at 50% compared to less than 15% in the control group. This could be attributed to their higher rates of inactive lifestyle relative to the controls (Kim et al., 2021). This depicts that patients undergoing hemodialysis tend to be more physically inactive compared to the general population.

The guidelines on physical activity stipulate that patients undergoing hemodialysis should engage in moderate intensity physical activity for at least 30 minutes each day for 5 times per week. However, this is barely the case among many of the patients

undergoing hemodialysis. According to a study undertaken by Segura-Ortí et al. (2018), the proportion of patients undergoing hemodialysis that met the recommended physical exercise level of at least 150 minutes per week was only 6%. This denotes low level of adherence to physical activity level recommendations among this cohort. Similarly, in a study performed by Kendrick et al. (2019), the proportion of patients undergoing hemodialysis that engaged in physical exercise as recommended was less than a third. Similarly, in studies by Lightfoot et al. (2021) and Sutherland et al. (2021), the proportion of patients on hemodialysis meeting the required physical exercise threshold was low. These studies attributed the low physical activity level among these patients to their low awareness of recommended guidelines on physical activity. In their study, Jayaseelan et al. (2018) also noted sub-optimal adherence to issued guidelines on physical exercise among most of the interviewed patients on hemodialysis. In the study, less than 10% of participating patients undergoing hemodialysis was the ones who met the recommended physical exercise threshold of 150 minutes of moderate exercise each week. This depicts that most of the patients undergoing hemodialysis do not meet the set threshold of physical activity level.

Patients on hemodialysis seem to generally agree that their physical activity status is not the same as they were before their kidney disease diagnosis. This was so reported in studies by Araújo Filho et al. (2016) and Wang et al. (2020) with majority of the participating patients undergoing hemodialysis agreeing that their physical activity status was significantly lower compared to their pre-CKD diagnosis. This could be attributed to the lengthy durations these patients spend on dialysis machines, possible adverse effects of treatment on their energy levels and their low appreciation of the importance of physical activity to their general well-being. These two studies noted that most of the surveyed hemodialysis patients indicated they got exhausted quickly. They also had low awareness of the benefits of physical activity to their health status (Araújo Filho et al., 2016; Wang et al., 2020). Likewise, Li et al. (2021) made similar observations with physical activity level of hemodialysis patients found to be lower compared to when they had not been diagnosed with the condition. A study by Sutherland et al. (2021) made similar observations and attributed the change in physical activity level among the interviewed patients undergoing hemodialysis to

treatment related responsibilities coupled with personal work obligations leaving little time for participation in physical activity as is recommended. The next section explores perceived exercise benefits among the patients undergoing hemodialysis.

### 2.3 Perceived Benefits of Exercise among Patients undergoing hemodialysis

This section describes the perceived benefits of physical exercise among patients undergoing hemodialysis. This is as highlighted in the reviewed empirical literature.

#### 2.3.1 Improved Quality of Life

Improved QoL is one of the leading perceived benefits of physical exercise identified by patients undergoing hemodialysis. Engaging in physical activity, regularly, leads to improvements in the physical functioning, mental status and general well-being of patients undergoing hemodialysis (Ghafourifard et al., 2021). A UK study reported that a significant proportion of patients undergoing hemodialysis cited improved quality of life as a major benefit of exercising, and this was common in both younger and older patients undergoing hemodialysis (Lightfoot et al., 2021). Similarly, in empirical studies carried out by Bohm et al. (2019), Huang et al. (2019) and Wilkinson et al. (2021), patients undergoing hemodialysis who engaged in physical exercises had an improved quality of life as evident in their improved physical capacity and general well-being. Similarly, surveyed patients undergoing hemodialysis drawn from a tertiary referral hospital did also point to an improvement of their QoL as one of the reasons they engaged in physical activity as reported by Moorman et al. (2019) and Filipčič et al. (2021). It is thus evident that patients undergoing hemodialysis perceived physical activity as having positive effects on their QoL.

The quality of life domains among patients on hemodialysis that improve with increased physical activity include improved physical function, better mental state, improved independence and better mobility. This was so reported in a study conducted by Kendrick et al. (2019) that noted that patients undergoing hemodialysis that engaged in physical activity exhibited better physical functioning, less reliance on others for help and significantly improved mobility. Zhang and Bennett (2019) also

reported that patients undergoing hemodialysis perceived physical exercise and/or activity as yielding positive benefits to their QoL. This was in areas such as physical functioning, improved mobility and greater independence. Similar views were expressed by Weber et al. (2020) who in a review of factors that motivated patients with ESKD to engage in physical exercise noted gains in QoL domain in areas of physical function and better psychological state. It is thus evident that patients undergoing hemodialysis perceived QoL improvements as one of the benefits of engaging in physical exercise.

### 2.3.2 Better Body Weight Control

Patients undergoing hemodialysis also cite better control of body weight as another perceived benefit of physical exercise. Ina study conducted among patients undergoing hemodialysis evaluating their perceived benefit of physical exercise, they identified improved body weight control as a perceived benefit of exercising. This is particularly in light of their high risk of other serious comorbidities such as diabetes mellitus and CVDs to which high BMI is a significant risk factor (Baker et al., 2022). Similarly, Ghafourifard et al. (2021) in a study of the physical exercise benefits as perceived by patients undergoing hemodialysis did identify better control of body weight as a leading perceived benefit of patients undergoing hemodialysis' involvement in exercises. This depicts that better control of body weight is one of the benefits patients undergoing hemodialysis perceive as resulting from engaging in physical exercise.

Patients on hemodialysis treatment in a Chinese study did also identify being able to maintain a healthy body weight as a leading perceived benefit of engaging in physical activities. According to the study, most of the interviewed patients undergoing hemodialysis shared the view that they perceived physical activity as beneficial owing to its positive effects on their body weight (Huang et al., 2019). Similarly, Moorman et al. (2019) also cited improved body weight control as one of the anticipated benefits of exercising that served as an impetus for patients undergoing hemodialysis to engage in physical activity. Better control of body weight is therefore a benefit that patients undergoing hemodialysis perceived as resulting from physical activity.

### 2.3.3 Improved Mood/Morale

Engagement in physical activities and exercises is also perceived to positively impact the morale or mood of patients undergoing hemodialysis. According to a review performed by Sheshadri et al. (2020), patients undergoing hemodialysis who engaged in moderate physical activities on a regular basis reported improved mood status compared to their counterparts that lived a sedentary lifestyle. Similarly, improved mood was also cited as one of the perceived benefits of exercising among individuals undergoing hemodialysis according to a study conducted by Sutherland et al. (2021).This was also affirmed in the findings of a study performed by Lightfoot et al. (2021) which also identified more positive mood and improved morale as perceived benefits attributed to participation in physical activities by patients under hemodialysis. Similarly, Jayaseelan et al. (2018) in a review of benefits associated with physical exercise among patients undergoing hemodialysis did also find that engagement in physical exercise was associated with improved mood in this cohort evident in reduced stress, anxiety and irritability, sentiments also shared by Ghafourifard et al. (2021). This clearly indicates that a positive change in mood and morale was perceived as one of the benefits of exercising by patients undergoing hemodialysis treatment.

### 2.3.4 Improved Energy Levels and Muscle Strength

Another identified perceived benefit of engaging in physical activities or exercises among patients undergoing hemodialysis is improved energy levels and muscle strength. Reduced energy levels constitute one of the major consequences of ESKD which leads to a decreased QoL. Engaging in physical activity is deemed a pathway of improving the energy levels among patients with ESKD (Jhamb et al., 2016). Ghafourifard et al. (2021) in a study on benefits of exercise as perceived by patients undergoing hemodialysis identified improved energy level as a leading benefit that participating patients undergoing hemodialysis did associate with engagement in physical exercises in this group of patients. Similarly, improved energy levels were also cited by interviewed patients on hemodialysis as a perceived benefit arising from participation in physical exercise according to findings by Jayaseelan et al. (2018).

Similar observations were also made by Kendrick et al. (2019) and Li et al. (2021) who observed better energy levels among patients undergoing hemodialysis who engaged in some degree of physical activity compared to those who did not. This therefore depicts improved energy levels as one of the perceived exercise benefits highlighted by patients undergoing hemodialysis.

Improved muscle strength also constitutes another benefit that patients undergoing hemodialysis perceive as resulting from engaging in physical exercise. This was so reported by Sutherland et al. (2021) whose study identified improved muscle strength as one of the benefits that interviewed patients undergoing hemodialysis did recognize as resulting from their participation in physical activity. In a study exploring benefits of exercise as perceived by patients undergoing hemodialysis, better muscle strength scores were evident among patients undergoing hemodialysis that engaged in regular physical activity or exercises compared to those that barely participated in physical activity and exercise (Ghafourifard et al., 2021). In studies by Jayaseelan et al. (2018) and Li et al. (2021), improved muscle strength emerged strongly as one of the perceived benefits that patients undergoing hemodialysis' associated with their participation in physical exercise. It is thus evident that patients undergoing hemodialysis did perceive improved muscle strength as one of the core benefits emanating from their engagement in physical exercise.

### 2.3.5 Improved Self-Care Abilities

Improvements in self-care abilities is another attribute associated with engagement in physical activity among individuals undergoing hemodialysis treatment. Improved self-care abilities evident in improved autonomy in undertaking one's personal responsibilities and tasks is another of the beneficial attributes that patients undergoing hemodialysis perceive as resulting from their involvement in physical activities (Milam, 2019). In a qualitative study evaluating motivation behind engaging in physical exercise among adult patients undergoing hemodialysis, one of the leading benefits of exercise discerned was improvement in patients undergoing hemodialysis' self-care abilities attributable to exercising (Weber et al., 2020). The improvement in self-care abilities was attributed to improved physical functioning among the patients

undergoing hemodialysis resulting from physical activity engagement. This shows that enhanced self-care ability was one of the benefits that patients undergoing hemodialysis perceived of physical activity.

Improvements in one's self-care abilities constitute an important perceived benefit of physical activity among patients on hemodialysis. Sutherland et al. (2021) queried patients undergoing hemodialysis regarding their perceived benefits of engaging in physical exercise. A significant proportion of the patients undergoing hemodialysis acknowledged that they perceived physical activity associated enhancement of their ability to take care of themselves as a significant perceived benefit of physical activity. Similar views were also reported by Lightfoot et al. (2021) that improved ability to self-care was indeed a significant perceived benefit of physical activity as highlighted by surveyed patients on hemodialysis. Similarly, in a review of published studies on perceptions towards physical activity and exercise among patients with ESKD, Zhang and Bennett (2019) identified improved self-care abilities as one of the perceived benefits that the patients with ESKD associated with participating in physical activity and exercising. This depicted that improved self-care ability was one of the perceived exercise benefits to the patients undergoing hemodialysis.

### 2.3.6 Improved Sleep Quality

The quality of sleep is another domain identified as benefitting patients undergoing hemodialysis that engage in physical activity and exercises. Wilkinson et al. (2021) in a study on the physical activity correlates among patients undergoing hemodialysis in UK identified improved sleep quality as one of the benefits patients undergoing hemodialysis associated with exercising. Similarly, in a review examining the role of exercise in improving care outcomes in patients undergoing hemodialysis, better sleep quality was a common benefit perceived to be resulting from these patients engagement in physical activity (Bohm et al., 2019). Better quality of sleep was also identified as a benefit of exercising physically as perceived by patients undergoing hemodialysis in a study by Huang et al. (2019). Improved sleep quality thus constitutes an important perceived exercise benefit of physical activity as noted by patients on hemodialysis.

Better sleep quality constitutes an important benefit that is associated with physical exercise level among patients on hemodialysis. Jhamb et al. (2016) in a review of perceived benefits associated with physical activity among patients undergoing hemodialysis reported improved sleep quality as one of the physical exercise perceived benefits as cited by surveyed patients undergoing hemodialysis. Similarly, in a review examining the perceived benefits of physical exercise among patients undergoing hemodialysis, better sleep quality was a common theme and most patients undergoing hemodialysis highlighted it as one of the core benefits perceived to result from their engagement in physical exercise (Clarke et al., 2019). Better quality of sleep was also identified as a major perceived benefit of engaging in physical exercise among patients undergoing hemodialysis in a study by Jayaseelan et al. (2018).

### 2.3.7 Prevention of Other Diseases

Physical activity is instrumental, not just for patients undergoing hemodialysis, but also to all other persons in their pursuit of living a healthy life. Consequently, physical activity is known to be a key intervention for health promotion and disease prevention. Various studies have pointed to the role of physical activity and exercising in helping patients undergoing dialysis to prevent escalation of the illness and reducing their risk of contracting other comorbidities (Huie, 2017; Bennett et al., 2019; Yamagata et al., 2019). In a study performed in Denmark, the surveyed patients undergoing hemodialysis did indicate that significant association of physical activity and exercise with lower risk of comorbidities was a leading motivation that made them engage in physical activity and exercising (Wodskou et al., 2021). Similar views were also espoused in reviews by Bohm et al. (2019) and Kendrick et al. (2019).

### 2.3.8 Other Perceived Benefits

Improvement in appetite is also another benefit associated with exercising and physical activity participation among persons under hemodialysis therapy. This was so reported in studies by Ghafourifard et al. (2021) in Iran and Jayaseelan et al. (2018) in Australia. Zhang and Bennett (2019) did also establish improved appetite as a benefit associated with physical activity engagement among patients undergoing

hemodialysis. The positive influence of physical activity on patients undergoing hemodialysis' feeding behaviours were also reported in reviews by Villanego et al. (2020) and Lightfoot et al. (2021).

Another benefit linked to exercising and physical activity among patients undergoing hemodialysis is delayed decline in health status with studies by Moorman et al. (2019) and Wang et al. (2020) showing that deterioration in health status occurred much sooner among patients undergoing hemodialysis that did not exercise compared to the active hemodialysis group. Similar observations were made by Milam (2019) and Segura-Orti et al. (2018) that patients undergoing hemodialysis' engagement in physical activity helped slow the progression of their illness more advanced phase.

## 2.4 Perceived Barriers to Physical Exercise among Patients undergoing Hemodialysis

### 2.4.1 Tiredness

Tiredness or general body fatigue is one of the leading barriers commonly identified as impeding patients undergoing hemodialysis' participation in physical activities and exercises as fatigue is indeed one of the effects of ESKD. In a study conducted by Kim et al. (2021) exploring perceived barriers to physical activity, fatigue was identified as one of the leading reasons behind patients undergoing hemodialysis' reluctance to engage in physical activities and exercises. Similar observation was made in a study undertaken by Ghafourifard et al. (2021) in which patients undergoing hemodialysis cited tiredness as a major perceived barrier to their participation in physical exercises. Similar findings were also reported in a study performed in China with most of the respondents agreeing that tiredness was a major reason they shunned engagement in physical activities. Similarly, a study by Araújo Filho et al. (2016) also reported tiredness as the most common perceived barrier to engagement in physical exercises among surveyed patients undergoing hemodialysis. Tiredness thus constitutes a major perceived barrier to engaging in physical exercise in patients undergoing hemodialysis.

Patients undergoing hemodialysis consistently cite general body fatigue as a reason for their low participation in physical exercise. A cross-sectional study carried out by Araújo Filho et al. (2016) established tiredness as common perceived barrier to engaging in physical activity as reported by surveyed patients on hemodialysis. Bohm et al. (2019) in a review of the role of physical exercise in improving health outcomes among persons on hemodialysis also identified tiredness as a significant barrier to physical exercise participation from the patients undergoing hemodialysis' perception. Studies by Dashtidehkordi et al. (2019) and Hannan and Bronas (2017) also found general body fatigue as a barrier to physical activity among patients on hemodialysis. From this, it's evident that tiredness constitutes one of the perceived barriers to exercise among patients on hemodialysis.

### 2.4.2 Lack of Guidance regarding Exercise

Another commonly identified barrier to engaging in physical activities or exercises among individuals undergoing hemodialysis therapy is their lack of guidance from the healthcare team regarding recommended exercise guidelines. As observed by Baker et al. (2022), a significant proportion of patients undergoing hemodialysis fail to engage in physical exercises due to lack of guidance on the same from competent medical personnel. In a study on barriers to engaging in physical exercises among ESKD patients undergoing hemodialysis treatment, not receiving exercise counseling from their physicians was a leading reason behind the patients' non-engagement in exercising (Jayaseelan et al., 2018). Similarly, Filipčič et al. (2021) did also identify little or lack of guidance on exercising as a leading perceived barrier to surveyed patients undergoing hemodialysis' participation in physical activities. Lack of guidance regarding exercise among patients under hemodialysis treatment is thus a leading perceived barrier to their engagement in physical exercise.

Lacking guidance regarding exercises does contribute to low physical activity engagement among patients on hemodialysis.Huang et al. (2019) observed better physical activity levels among patients undergoing hemodialysis that had been counseled about physical exercise guidelines compared to patients undergoing hemodialysis that had not received this form of counseling. It was concluded that lack

of guidance regarding exercise constituted a major barrier to patients undergoing hemodialysis involvement in physical exercise. This was possibly out of lack of appreciation on the part of the patients undergoing hemodialysis of the value of physical exercises to their health status and general wellbeing. Kim et al. (2021) also noted that a significant proportion of patients on hemodialysis do not engage in physical exercise partly due to lack of guidance on physical exercise from their care providers. Likewise, Wang et al. (2020) also reported not receiving education on physical exercise as a leading reason behind patients undergoing hemodialysis' low or poor engagement in physical exercise. Hence, little or lack of guidance on exercising is a leading perceived barrier to surveyed patients undergoing hemodialysis' engagement in physical exercises.

### 2.4.3 Poor Knowledge of the Benefits of Exercising

Poor knowledge or lack of awareness regarding the benefits of exercising to their general well-being and health care outcomes constitutes another commonly identified barrier to physical activity and exercise participation among patients undergoing hemodialysis. In their study, on impediments to patients undergoing hemodialysis participation in exercising, Hannan and Bronas (2017) established poor knowledge of the benefits of physical exercises as one of the barriers to these patients participation in physical exercises discerned. Similarly, having low awareness as to the value of participating in physical activity was also cited as a perceived barrier to participation in physical activity among surveyed patients undergoing hemodialysis in a study conducted by Segura-Ortí et al. (2018).Weber et al. (2020) noted that the level of awareness about the benefits of exercise among patients undergoing hemodialysis was crucial in the decision as to whether or not to engage in physical activity. Patients undergoing hemodialysis that had average to good knowledge of the benefits of physical exercise had higher odds of engaging in exercise compared to their counterpart with low/poor knowledge of physical exercise benefits. Poor knowledge of the significance of physical activity to their own health thus was a major factor that impeded patients undergoing hemodialysis engagement in physical activities and exercises.

### 2.4.4 Other Comorbidities

Another perceived barrier to engagement in physical activity among patients undergoing hemodialysis is presence of other comorbid conditions. In a study carried out in UK examining correlates of physical activity among patients undergoing hemodialysis, existence of comorbidities such assuch as cardiovascular disease, hypertension, diabetes and muscle wasting among the patients undergoing hemodialysis therapy was cited as a leading barrier to their participation in physical activity and exercise programs (Wilkinson et al., 2021). Similar observations were also made by Sutherland et al. (2021) who in a study of barriers relating to haemodialysis patients' physical activity status did identify other comorbidities affecting patients with ESKD including persistently elevated hypertension, recent heart attack and hyperlipidemia as major impediments to their participation in recommended physical exercise routines. Similarly, developing ESKD-associated complications such as anemia, heart disease, hypertension, high potassium levels, metabolic acidosis and fluid build-up was also perceived as a major factor impeding patients undergoing hemodialysis' participation in physical exercises according to reviews by Moorman et al. (2019) and Lightfoot et al. (2021). Thus presence of other comorbidities also serves as an important perceived barrier to physical activity and exercise among patients undergoing hemodialysis.

### 2.4.5 Fear of Falling

Another commonly perceived barrier to participation in physical activity and exercise among patients undergoing hemodialysis is their fear of falling. Risk of falls, possible due to loss of muscle strength, effects of treatment, postural hypotension, anemia among others, is common among patients with ESKD and falls constitute a leading cause of injury and even deaths especially among elderly ESKD patients (Bohm et al., 2019). In studies by Huang et al. (2019) and Kendrick et al. (2019), fear of falling was identified as a leading perceived barrier to engaging in physical exercise routines among surveyed patients undergoing hemodialysis. Similarly, Ghafourifard et al. (2021) also identified fear of falling as one the barriers to patients undergoing hemodialysis' participation in physical activities, an observation also espoused by

Dashtidehkordi et al. (2019). Hence, fear of falls also impedes patients undergoing hemodialysis engagement in physical activity.

Fear of falls remains an important perceived barrier to physical activity and exercise in patients undergoing hemodialysis. According to a study by Wodskou et al. (2021), participating patients undergoing hemodialysis identified fear of falling as one of the reasons why they did not engage in physical exercise. In studies by Moorman et al. (2019) and Wilkinson et al. (2021), fear of falling emerged as a significant common perceived barrier to physical exercise participation among surveyed patients undergoing hemodialysis. Similarly, Milam (2019) also identified fear of falling as one the barriers to patients undergoing hemodialysis' participation in physical activities, with similar findings also reported by Filipčič et al. (2021) and Li et al. (2021). Hence, it is clear that fear of falling constitutes a significant perceived barrier to engaging in physical exercise among patients undergoing hemodialysis.

### 2.4.6 Inadequate Support from Family and HCPs

Lack of or poor support from family and HCPs is also a common barrier to patients undergoing hemodialysis' engagement in physical activities and exercises. Dashtidehkordi et al. (2019) espoused the view that support from family and the health care team was indeed instrumental in promoting patients undergoing hemodialysis' participation in physical exercises. According to a study by Zhang and Bennett (2019), patients undergoing hemodialysis with close support from their families and the health care team had significantly higher odds of participating in physical exercises compared to their counterparts with no or inadequate support from family or HCPs. Kim et al. (2021) in a study performed in the Korean Republic did also identify lack of or poor support from family and health care providers as a major perceived impediment to engaging in physical exercises among surveyed patients undergoing hemodialysis. Similarly, Wang et al. (2020) in an observational study did also find lack of support from health care providers as one of the perceived barriers to participation in recommended physical exercise levels among the study's respondents. Inadequate support from family and HCPs is thus one of the perceived barriers to exercise among patients undergoing hemodialysis.

### 2.4.7 Muscle Fatigue and Body Pain

Experience of muscle fatigue and body pain constitutes other perceived barriers to engaging in physical activity and exercises in patients undergoing hemodialysis treatment. For instance in a cross-sectional study performed to assess correlates of physical activity among kidney disease patients undergoing hemodialysis treatment, Ghafourifard et al. (2021) established muscle fatigue and body pain as some of the perceived impediments to partaking in physical exercises among surveyed patients undergoing hemodialysis. Likewise, a systematic review by Villanego et al. (2020) did also establish muscle fatigue and body pain as one of the barriers that made patients undergoing hemodialysis reluctant to participate in physical activities and exercises. Wodskou et al. (2021) in a review of the barriers to physical exercise among patients undergoing hemodialysis also reported these patients' experience of muscle fatigue and body pain as a leading perceived barrier to their involvement in physical activities based on the patients undergoing hemodialysis' own perception. Muscle fatigue and body pain were also cited as perceived barriers to patients undergoing hemodialysis participation in physical exercises in a review by Li et al. (2021). Experience of muscle fatigue and body pain thus is one of the perceived barriers to exercise among patients undergoing hemodialysis.

### 2.4.8 Advancing Age

Advancing age or old age is also perceived as a barrier to participating in physical exercises in kidney disease patients undergoing hemodialysis. In their study, Jhamb et al. (2016) observed a higher prevalence of low physical activity levels and reduced functional performance among elderly patients undergoing hemodialysis (those aged 65 years and above) compared to their relatively younger counterparts aged 50 years and below. This could be attributed to their frailty and general low energy levels among the elderly patients undergoing hemodialysis compared to the relatively younger ones. Similarly, patients undergoing hemodialysis aged 60 years and above were found to have significantly lower physical activity level compared to patients undergoing hemodialysis that were aged under 60 years. The study concluded that old age (or being elderly) was a notable perceived barrier to engaging in physical exercise

among patients on hemodialysis. Clarke et al. (2019) in an investigation of barriers to engaging in physical exercises in ESKD patients undergoing hemodialysis treatment did also report advanced age as a barrier to these patients' participation in exercise programs. Increasing age as a barrier to patients undergoing hemodialysis participation in physical activities and/or exercises was also cited in studies by Jayaseelan et al. (2018) and Araújo Filho et al. (2016). This showed that advancing age served as a perceived barrier to physical activity participation among patients undergoing hemodialysis.

### 2.4.9 Lack of Access to Exercise Facilities

Lack of access to exercise facilities is another commonly cited perceived barrier to participation in physical exercises among patients undergoing hemodialysis. In a cross-sectional study conducted in multiple hemodialysis centres to evaluate factors that impeded rehabilitation of patients undergoing hemodialysis through exercises, lack of access to exercise facilities was identified as one of the perceived barriers to engaging in exercise programs among the surveyed patients undergoing hemodialysis (Wang et al., 2020). Similarly, in a study conducted in UK, inaccessibility of exercise facilities was also identified as a leading barrier to physical activity engagement among patients undergoing hemodialysis (Sutherland et al., 2021). In studies by Sheshadri et al. (2020) and Filipčič et al. (2021), lack of access to exercise facilities was also one of the identified perceived barriers to participation in exercises among ESKD patients undergoing hemodialysis therapy. This showed that lack of or poor access to exercise facilities was a perceived barrier to physical exercise among patients undergoing hemodialysis.

### 2.4.10 Other Perceived Barriers

A number of other perceived barriers to engagement in physical activities and exercise among patients undergoing hemodialysis have been cited in various studies. These include lack of motivation and interest among the patients undergoing hemodialysis as reported in studies by Kim et al. (2021) and Villanego et al. (2020). Another perceived barrier identified is schedule constraints where surveyed patients

undergoing hemodialysis cited inability to attend scheduled exercise programs due to work related commitments or other personal commitments that left little room for exercise in their daily schedules. This was so noted in studies undertaken by Kendrick et al. (2019), Sutherland et al. (2021) and Ghafourifard et al. (2021). Worry about thirst is also another cited perceived barrier to patients undergoing hemodialysis' engaging in exercise and this was as reported in studies by Segura-Ortí et al. (2018) and Lightfoot et al. (2021).Unaffordability of exercise programs and/or equipments was cited as a perceived barrier to exercise participation among patients on hemodialysis in reviews by Moorman et al. (2019), Weber et al. (2020) and Li et al. (2021). Hence a wide range of other perceived barriers existed that impeded patients undergoing hemodialysis from engaging into physical exercise as was required.

### 2.5 Summary of Literature Review

Evidence from the reviewed empirical studies indicated that physical inactivity was highly prevalent among patients undergoing hemodialysis across the world with a significantly lower level of physical activity reported among patients undergoing hemodialysis compared to their matched controls in most of the studies. In addition, it was also evident from the reviewed empirical literature that there was a wide range of perceived benefits and barriers to engagement in physical exercise among patients undergoing hemodialysis across diverse settings.

Studies by Jhamb et al. (2016), Jayaseelan et al. (2018), Kendrick et al. (2019), Weber et al. (2020) and Wodskou et al. (2021) did explore perceived benefits and barriers to physical exercise among patients on hemodialysis. These studies were however qualitative in nature while the current study is quantitative in nature. Dashtidehkordi et al. (2019) and Sheshadri et al. (2020) used a clinical trial based methodological approach while studies by Bennett et al. (2019) and Wilkinson et al. (2021) were observational in nature. In contrast, the current study utilizes a cross-sectional descriptive research approach.

Studies by Huang et al. (2019), Zhang and Bennett (2019), Villanego et al. (2020) and Li et al. (2021) were systematic literature review based studies which is in contrast

with the current study which is cross-sectional and descriptive in nature. Studies by Moorman et al. (2019), Lightfoot et al. (2021) and Ghafourifard et al. (2021) used regression and correlational techniques in their data analysis while the current study will use chi-square test statistic at 95% CI to evaluate the association between the study variables. In addition, studies by Wang et al. (2020) and Wilkinson et al. (2021) were multicenter based while the current study is single facility based study.

Further, most of the studies reviewed in the literature were largely done in foreign countries whose healthcare settings and systems differed from that of Kenya. From the empirical literature, it was clear that there was paucity of local empirical studies on perceived exercise benefits and barriers and physical activity status among patients undergoing hemodialysis in the country and hence the need for the current study. Consequently, this study sought to evaluate the perceived benefits and barriers to exercise as well as the physical activity status among patients undergoing hemodialysis at Kenyatta National Hospital.

### 2.6 Theoretical Framework

A theoretical framework's purpose is to make the results of empirical studies both plausible and universally applicable. This study was guided by Pender's Health Promotion Model. Nola J. Pender formulated the health promotion model (HPM) in 1982 and further revised the model in 1996 and 2002. This model defines health as a positive dynamic state rather than simply the absence of disease. It describes the multidimensional nature of persons as they interact within their environment to pursue health and holds that health promotion is directed at increasing a patient's level of well-being (Haugan & Eriksson, 2021).

Pender's HPM focuses on 3 areas namely individual characteristics and experiences (denoting prior related behavior and personal factors); behavior-specific cognitions and affect (denoting perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influences), and behavioral outcomes (denoting adoption of health promoting behavior) (Smith, 2019). The theory notes that each person has unique

personal characteristics and experiences that affect subsequent actions. The set of variables for behavior specific knowledge and affect have important motivational significance and the model argues that these variables can be modified through nursing actions (Rhodes et al., 2019). Health promoting behavior is the desired behavioral outcome, which makes it the end point in the model. These behaviors should result in improved health, enhanced functional ability and better QoL at all stages of development. The final behavioral outcome is also influenced by the immediate competing demands and preferences which can derail intended actions for promoting health (Murdaugh et al., 2018).

The health promotion model has various strengths including it is highly applicable in community health settings; it is simple to understand yet equally robust; provides a set of factors that influence people's adoption of health-promoting behaviors; allows HCPs and patients to work together as a team to promote positive health outcomes and promotes the nursing profession's independent practice as the primary source of health-promoting interventions and education (Fleming, 2020). The model has however been criticized for only focusing on individual health behavior and ignoring other factors that may influence health promotion including environmental, economic, socio-political and interpersonal factors. Further, its applicability to an individual currently experiencing a disease state was not given emphasis (Sharma, 2021).

The model was considered relevant to the current study given its overarching focus on health promotion and given its emphasis on positive behavioral and lifestyle-oriented changes as a pathway to better health outcomes and well-being among individuals. It also offers valuable insights on various person centred variables that could motivate or impede a person's engagement in health-promoting behaviours. It also acknowledges that the role of HCPs goes beyond treatment to health promotion by strengthening resources, potentials, and capabilities for each patient and providing resources and education to promote improved health and a better quality of life. Hence, it provided a useful model for promoting use of physical activity and exercise as an intervention to promote better health outcomes among patients undergoing hemodialysis. The health promotion model was as illustrated in Figure 2.1.

**The Health Promotion Model**

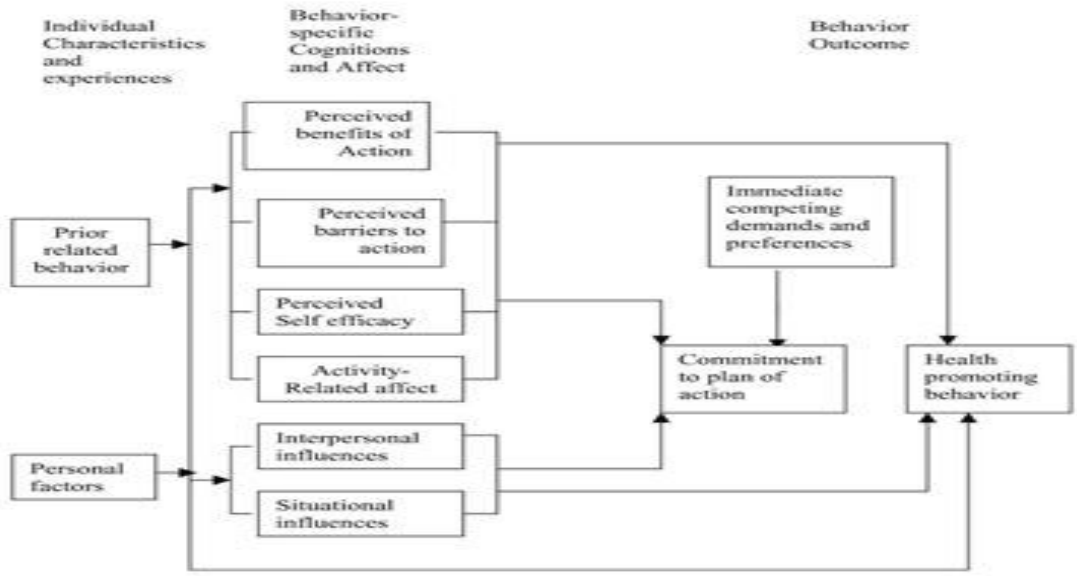


**Figure 2.1 Theoretical framework**

**Source: HPM - Nola J. Pender, 2002**

## 2.7 Conceptual Framework

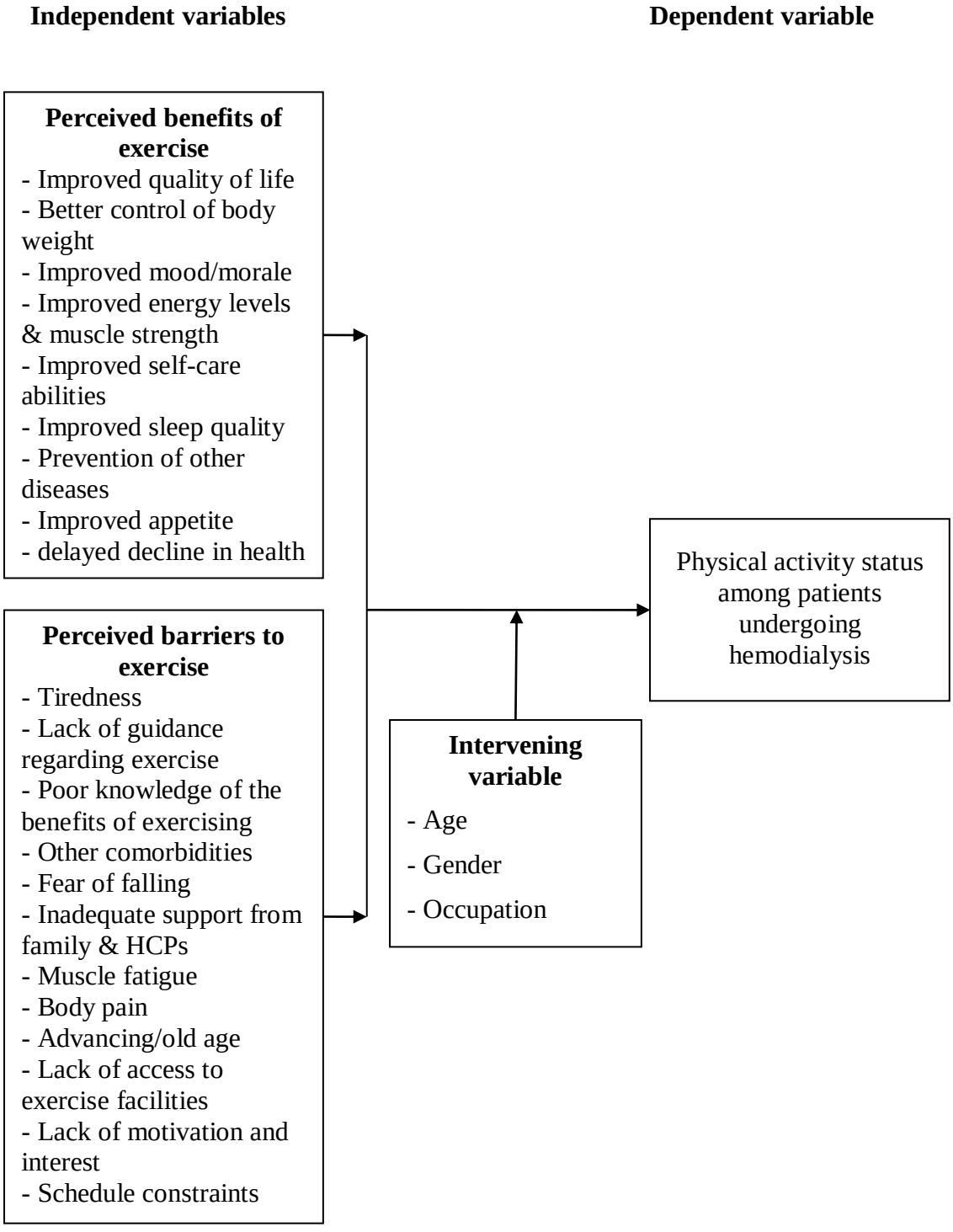


**Figure 2.2 Conceptual framework**

**Source: Researcher, 2022**

# CHAPTER THREE: RESEARCH METHODOLOGY

## 3.1 Introduction

This chapter provides an explanation of the research materials and methods that were used in conducting this research study for purposes of attaining its objectives. The chapter thus describes the study design, study area, study population, the criteria for inclusion and exclusion, sample size and sampling technique, the instruments of data collection, procedures for data collection, pretesting, the research tool validity and reliability, data analysis, dissemination of study findings, ethical considerations and study limitations.

## 3.2 Study Design

This was a descriptive cross-sectional study. This research design presents facts concerning variables being investigated as they exist at the time of study as well as trends that are emerging. The descriptive method was preferred because it ensured complete and accurate description of a situation, ensuring that there was minimum bias in the collection of data (Kothari, 2010).

## 3.3 Study Area

Kenyatta National Hospital (KNH) Renal Unit was the site where this research study was conducted. KNH is the oldest and largest teaching and referral hospital in Kenya. It was founded in 1901 with 40 patients with the hospital having grown over the years to its current bed capacity of about 2,000. It is located about four kilometers from the Nairobi city center, off Ngong road on Hospital Road. The facility offers a wide range of specialized in and out-patient health care services. The specialized health-care services provided at KNH include radiotherapy, heart surgery, neurosurgery, oncology, diabetic, renal dialysis and kidney transplant operations, plastic and reconstructive surgery, orthopedic surgery and burns management among others. The hospital also facilitates medical training and research and participates in national healthcare planning.

KNH's renal unit is the largest in the country and serves patients with different renal issues from all counties in the country. KNH's renal unit has 16 dialysis beds. Most of the patients undergoing hemodialysis attended at the unit have 2 dialysis sessions per week. Approximately 120 patients were being dialyzed in the unit. The services offered in the renal unit included hemodialysis, peritoneal dialysis, management of ESKD patients' pre- and post-kidney transplant care, patient counselling and patient investigations such as kidney biopsy.

Kenyatta National Hospital was an appropriate area of study for this research as it had a wide catchment area from which it drew its clients. The hospital is also a leading centre of care for patients undergoing hemodialysis in the country and beyond. However, the level of physical activity of patients undergoing hemodialysis and their perceived benefits and barriers to engaging in physical exercise at the hospital remained unclear. Hence, KNH's renal unit offered an appropriate setting for exploring the study subject.

### 3.4 Study Population

The study population consisted of adult patients with chronic kidney disease undergoing hemodialysis at the KNH renal unit. Hospital records indicated that, at the time of the study, there were approximately 120 patients undergoing hemodialysis in the renal unit (KNH Renal Unit Records, 2022). This constituted the study population.

### 3.5 Inclusion and Exclusion Criteria

#### 3.5.1 Inclusion Criteria

The study included adult patients with chronic kidney disease on hemodialysis at KNH's renal unit who freely consented to participate in the study.

#### 3.5.2 Exclusion Criteria

The study excluded kidney disease patients on hemodialysis who were unable to provide own consent to participate in the study.

### 3.6 Sample Size

Fishers et al. (1998) formula was utilized for this study's sample size computation as follows;

$n = [z^2pq/d^2]$

Where;

n = desired sample size (if the population was greater than 10,000).

Z = Standard normal deviation at the required confidence interval, 95%, which gave a Z value of 1.96

p = the proportion of the population with desired characteristics set at 0.5 as proposed by Fishers et al. for attributes of a population not yet studied/explored.

q = (1-p) = 1 - 0.5 = 0.5

d = the level of significance, set as 0.05.

Hence, $n = (1.96^2 \times 0.5 \times 0.5) / 0.05^2$

n = 384

The sample size was adjusted for using Yamane's Finite Population Correction formula as shown below;

$n_f = n / [1 + n/N]$

Where $n_f$ = desired sample size when the total population was < 10,000

n = Estimated sample size when the total population (N) was greater or equal to 10,000

N = estimated study population which was 120.

Therefore, 384 / (1 + [384/120]) = 384/4.2 = 91.4, hence approximately 91.

Hence, the study sample comprised of 91 patients undergoing hemodialysis at KNH's renal unit.

### 3.7 Sampling Technique

This study applied simple random sampling technique to identify the 91 study participants. This offered all the members of the study population an equal chance of being selected. 'Yes' and 'No' words were written on pieces of paper where Yes were 91 and No were 29. All the patients undergoing hemodialysis meeting the inclusion criteria, who consented and picked 'Yes' were allowed to participate in the study. Simple random sampling was the best sampling technique for the study because it was impossible to test every single individual in the population. It also saved time, money and effort while conducting the research.

### 3.8 Data Collection Instrument

The study data that were gathered included the respondents' socio-demographic characteristics, perceived exercise benefits and barriers and their physical activity status.

Perceived benefits and barriers to exercise among the respondents were assessed using the 'Dialysis Patient-perceived Exercise Benefits and Barriers Scale' (DPEBBS), which is a 24-item tool that is modified for dialysis patients from the Exercise Benefits and Barriers Scale that is used for the assessment of perceived barriers and benefits of exercise in the general population. It has 12 questions on benefits and 12 questions on barriers. Patients' rated answers on a 4-point Likert scale from '1' ('strongly disagree') to '4' ('strongly agree'). Barrier items were reverse coded. The minimum score was 24and the maximum score was 96. A low score indicated that the participants had a higher perception to barriers and a lower perception to exercise benefits. The reverse was true for higher scores. The tool had been validated in multiple studies (Jayaseelan et al., 2018; Moorman et al., 2019; Lightfoot et al., 2021).

Each barrier and benefit were classified as a binary variable (i.e., present and absent). Patients must have had 'agreed' (3) or 'strongly agreed' (4) for them to be said to have an observed barrier or benefit.

Patients' physical activity status were evaluated using the self-reported 'General Practice Physical Activity Questionnaire' (GPPAQ) from which patients were defined as either 'active', 'moderately active', 'moderately inactive' and 'inactive'.

The 4 levels of physical activity were interpreted as follows;

**Inactive:** Sedentary job and no physical exercise or cycling

**Moderately inactive:** Sedentary job and some but < 1 hour physical exercise and / or cycling per week OR Standing job and no physical exercise or cycling

**Moderately active:** Sedentary job and 1-2.9 hours physical exercise and / or cycling per week OR Standing job and some but < 1 hour physical exercise and / or cycling per week OR Physical job and no physical exercise or cycling

**Active:** Sedentary job and ≥ 3 hours physical exercise and / or cycling per week OR Standing job and 1-2.9 hours physical exercise and / or cycling per week OR Physical job and some but < 1 hour physical exercise and / or cycling per week OR Heavy manual job.

The GPPAQ is a validated standard tool used to evaluate patients' physical activity status and hence did not require validation for the current study. The tool was interviewer-administered to the study participants. The adopted tools used simple English statements, hence were easily understood and could be responded to by participants who possessed basic English language proficiency.

### 3.9 Participants' Recruitment and Consenting Procedures

To recruit the study participants, the researcher targeted the patients undergoing hemodialysis during their weekly hemodialysis clinics at KNH's Renal Unit. The researcher approached them during waiting times where she provided them with brief

information about the study before their individual hemodialysis sessions began. The briefing did not last for more than 5 minutes. During these brief encounters, the researcher offered important points about the study; emphasized on the selection criteria and disclosed where she could be found for further details within the renal unit. Those patients undergoing hemodialysis who met the inclusion criteria were requested to meet the researcher at Renal Unit's Confidential Counselling Office at their convenience for in-depth information and procedure of participation.

As part of the participation procedure, the patients undergoing hemodialysis were required to give their informed consent prior to participation in the study. This entailed signing the study's Informed Consent document. This was however after they were adequately briefed by the researcher about the study. The considerations of the consenting environment included voluntary participation, respect for the dignity and autonomy of the participants, ensuring confidentiality of any information provided and ensuring that the study participants felt at ease during the data collection exercise. Those who declined to participate in the study were allowed to do so without victimization and were still accorded the standard care of treatment.

### 3.10 Data Collection Procedures

The principal investigator was assisted by two trained research assistants to collect the data. The two research assistants, drawn from the higher Nursing Diploma in renal nursing class at KNH, were adequately trained by the principal investigator on the study objectives and on how to administer the study tools to the study participants. The respondents were required to offer their informed consent before responding to the tool.

The study tool was interviewer-administered on the respondents. As such, the respondents were allowed to give their responses to the study tool's questions and the interviewer recorded their responses/answers to the questions asked. The data collection exercise was held in a confidential counselling office located within KNH's renal unit. Thereafter, questionnaires responded to were safely kept prior to its analysis. Further, to help reduce possible spread of COVID-19, Ministry of Health's

offered guidelines on COVID-19 prevention were adhered to during the data collection process. The data collection exercise took about 4 weeks.

### 3.11 Data Management and Analysis

Data cleaning and entry preceded analysis of the study data. The study data were analyzed using the Statistical Package for Social Sciences (SPSS version 25.0)

Descriptive statistics were used for continuous variables and frequency listing for discrete/categorical data. As such the study data were analyzed using measures of central tendencies such as means and medians as well as measures of dispersion including standard deviation and inter-quartile ranges. Further, categorical data were analyzed using frequencies and percentages.

Inferential statistics were applied in testing the study hypothesis. For this purpose, Chi-square test statistic was used to determine the association of perceived barriers and benefits of exercise with the physical activity status of the study participants at 5% significance level. The null hypothesis were accepted if the chi-square test yielded a p-value greater than 0.05 while the study's alternate hypothesis were accepted if the chi-square test yielded p-values of $\leq 0.05$.Results of the study were presented in tables and figures.

### 3.12 Ethical Considerations

Ethical approval for the study was sought by the researcher from the KNH-UoN ERC. The researcher also sought permit to collect data among the targeted respondents from the Head of Department of the Renal Unit of KNH. All participants were required to give written consent before they participated in the study. Confidentiality was maintained throughout the study for all information obtained. Anonymity was observed by coding the questionnaires. No names or any other form of personal identification were written on the questionnaires. Participation in the study was voluntary and the respondents were free to withdraw from the study at any time without victimization. No inducements or rewards were given to the participants to join the study. There was no any intended health risk or any other harm to participants

for participating in this study. However, in the event that the study participants suffered emotional or psychological distress for participating in this study, the researcher referred them to a counselor for appropriate help. Dissemination of the study's findings would only be done as per the University's guidelines and anonymity and confidentiality of the participants would also be ensured during the findings dissemination. All filled questionnaires were kept safely under lock and key prior to data analysis and reporting. Ministry of Health's COVID-19 prevention guidelines were followed during data collection.

### 3.13 Study Limitations

The study findings were limited to Kenyatta National Hospital, and hence may not be generalized to all other hospitals in the country due to differences in sizes, geographical location and institution set up. To allow for comparison and generalization of the study findings, a wider study involving other hospitals in the country has been recommended.

The study findings were limited to patients on hemodialysis as KRT at KNH and hence may not be generalized to all other cadres of patients diagnosed with ESKD on other treatment modalities other than hemodialysis. To counter this limitation, a similar study may be done among patients with ESKD on other treatment modalities such as PD, conservative management and kidney transplantation in the hospital.

### 3.14 Study Findings Dissemination Plan

The study findings shall be disseminated through forwarding a copy of the final research project report to the University of Nairobi's Department of Nursing Sciences, to UoN Library and to the Renal Unit of Kenyatta National Hospital. The final research project report would also be uploaded to UoN's repository. The researcher shall also endeavor to present the findings in appropriate academic and scientific workshops and conferences as well as publishing the work in a relevant peer-reviewed journal.

# CHAPTER FOUR: RESULTS

## 4.1 Introduction

This chapter presents the study results as set out in the research methodology. The results are presented on the perceived benefits and barriers to exercise and physical activity status among patients undergoing hemodialysis at Kenyatta National Hospital in Kenya. The chapter begins with highlighting the response rate and then provides results on the respondents' demographic characteristics before outlining the findings based on the research objectives.

### 4.1.1 Response Rate

The study targeted 91 patients undergoing hemodialysis at KNH's renal unit as respondents. From the interviews conducted, the researcher was able to obtain adequate responses from 79 of the respondents translating into a response rate of 86.8%. The remaining 12 respondents were excluded from the final analysis because they opted out of the study before completion of the data collection exercise. This response rate was, however, considered sufficient and representative and conforms to Mugenda and Mugenda (2003) stipulation that a response rate of at least 80% is sufficient for cross-sectional studies with sample sizes of 100 and below.

## 4.2 Demographic Characteristics of the Respondents

The study sought to establish the demographic profile of the study participants. The demographic attributes considered were gender, age, education level, marital status, occupation, family income, place of residence and duration under hemodialysis therapy. The results on the respondents' demographic characteristics are as shown in Table 4.1.

**Table 4.1 Respondents' demographic characteristics**

| Attribute | | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 46 | 58.2 |
| | Female | 33 | 41.8 |
| | **Total** | **79** | **100.0** |
| Age | 18 - 29 years | 6 | 7.6 |
| | 30 - 39 years | 14 | 17.7 |
| | 40 - 49 years | 18 | 22.8 |
| | 50 years & above | 41 | 51.9 |
| | **Total** | **79** | **100.0** |
| Education level | Primary | 24 | 30.4 |
| | Secondary | 44 | 55.7 |
| | Tertiary | 11 | 13.9 |
| | **Total** | **79** | **100.0** |
| Marital status | Single | 12 | 15.2 |
| | Married | 59 | 74.7 |
| | Separated | 3 | 3.8 |
| | Divorced | 1 | 1.3 |
| | Widowed | 4 | 5.1 |
| | **Total** | **79** | **100.0** |
| Occupation | Unemployed | 19 | 24.1 |
| | Casual labour | 21 | 26.6 |
| | Formally employed | 9 | 11.4 |
| | In business | 18 | 22.8 |
| | Retired | 12 | 15.2 |
| | **Total** | **79** | **100.0** |
| Household income level | No income | 7 | 8.9 |
| | Below Kshs. 10,000 | 23 | 29.1 |
| | Kshs. 10,001 - Kshs. 30,000 | 40 | 50.6 |
| | Above Kshs. 30,000 | 9 | 11.4 |
| | **Total** | **79** | **100.0** |
| Place of residence | Within Nairobi | 58 | 73.4 |
| | Outside Nairobi | 21 | 26.6 |
| | **Total** | **79** | **100.0** |
| Duration under hemodialysis therapy | Less than 1 year | 25 | 31.6 |
| | 1 - 5 years | 51 | 64.6 |
| | 6 - 10 years | 3 | 3.8 |
| | **Total** | **79** | **100.0** |

### 4.3 Physical Activity Status of Patients on Hemodialysis

The first objective of the study sought to determine the physical activity status among the study respondents. This was evaluated using the self-reported 'General Practice Physical Activity Questionnaire' (GPPAQ) from which the respondents were classified as either 'active', 'moderately active', 'moderately inactive' and 'inactive'.

Those whose work did not involve any form of physical effort were considered as being inactive. Those whose work involved low intense physical effort were considered as being moderately inactive. Those whose work involved definite physical activities that required moderately intense physical effort were considered as being moderately active while those whose work involved high intense physical effort (or vigorous physical activity) were considered as being active. Results on the type and amount of physical activity involved in respondents' work are as presented in Table 4.2.

**Table 4.2 Type and amount of physical activity involved in respondents work**

| Respondents' kind of work | Frequency (n) | Percentage (%) |
|---|---|---|
| I am not in employment (e.g. retired, retired for health reasons, unemployed, full time career etc) | 33 | 41.8 |
| I spend most of my time at work sitting (such as in an office) | 16 | 20.3 |
| I spend most of my time at work standing or walking. However, my work does not require much intense physical effort (e.g. shop assistant, hair dresser, security guard, child minder etc) | 25 | 31.6 |
| My work involves definite physical effort including handling of heavy objects and use of tools (e.g. plumber, electrician, carpenter, cleaner, hospital nurse, gardener, postal delivery workers etc) | 5 | 6.3 |
| My work involves vigorous physical activity including handling of very heavy objects (e.g. scaffolder, construction worker, refuse collector etc) | 0 | 0.0 |
| **Total** | **79** | **100.0** |

Further, the respondents were requested to indicate the amount of time they spent on selected physical activities in the last one week. Results in Table 4.3 indicate that most of the respondents had spent very little time in noted physical activities including physical exercises, cycling, house work and gardening in the last one week. Further, though most of the respondents indicated as having engaged in walking, they did not spend much time in it as well.

**Table 4.3 Time spent on various physical activities by the respondents (n = 79)**

| | None | | Some but less than 1 hour | | 1 hour but less than 3 hours | | ≥ 3 hours | |
|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | f | % |
| Physical exercise such as swimming, jogging, aerobics, football, tennis, gym workout | 69 | 87.3 | 7 | 8.9 | 3 | 3.8 | 0 | 0.0 |
| Cycling, including cycling to work and during leisure time | 65 | 82.3 | 10 | 12.7 | 4 | 5.1 | 0 | 0.0 |
| Walking, including walking to work, shopping, for pleasure | 0 | 0.0 | 63 | 79.7 | 16 | 20.3 | 0 | 0.0 |
| Housework/childcare | 17 | 21.5 | 56 | 70.9 | 6 | 7.6 | 0 | 0.0 |
| Gardening/do it yourself tasks | 62 | 78.5 | 12 | 15.2 | 5 | 6.3 | 0 | 0.0 |

Further, the study categorized the respondents into ‘active’, ‘moderately active’, ‘moderately inactive’ and ‘inactive’ based on the respondents’ nature of job and time they spent in physical exercises.

Those considered ‘active’ were those involved in heavy manual jobs or those that performed physical jobs and engaged in some physical exercises or those involved in sedentary jobs but who participated in 3 hours or more of physical exercises per week.

Those considered ‘moderately active’ were those that performed physical jobs but did not engage in physical exercises including cycling or those with sedentary jobs but who engaged in moderately intense physical exercises such as cycling and walking (marked as 1 - 2.9 hours of any form of physical exercise per week)

Those considered ‘moderately inactive’ were those involved in sedentary jobs but engaged in some form of physical exercises including cycling and walking for short time periods (< 1 hour).

Those considered ‘inactive’ were those involved in sedentary jobs and did not engage in any form of physical exercises. Results are as shown in Figure 4.1.

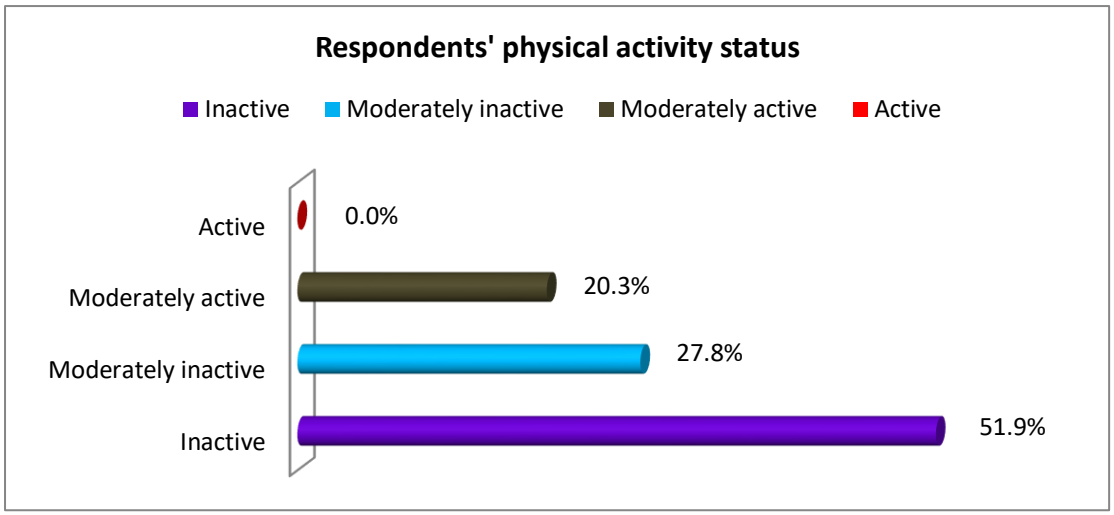


**Figure 4.1 Physical activity status of the respondents**

### 4.4 Perceived Exercise Benefits and Barriers among Patients on Hemodialysis

The second and third objectives of the study sought to determine the perceived benefits of and perceived barriers to exercise among patients undergoing hemodialysis at KNH renal unit. The two objectives were assessed together as the study tool applied evaluates them as one.

To achieve these two study objectives, the respondents were requested to indicate their level of agreement with a set of listed perceived benefits of and perceived barriers to exercise as contained in the Dialysis Patient-Perceived Exercise Benefits

and Barriers Scale (DPEBBS) tool. The responses on the perceived benefits of exercise were evaluated using a scale of 1-4where 1 - strongly disagree; 2 - disagree; 3- agree and 4 - strongly agree, while the responses on the perceived barriers to exercise were scored reversely, that is, 1 - strongly agree; 2 - agree; 3 - disagree and 4 - strongly disagree.

Responses of 'agreed' or 'strongly agreed' denoted that the respondents had a positive (or greater) perception of the perceived benefit or barrier while responses of 'disagreed' or 'strongly disagreed' denoted that the respondents had a negative(or lower)perception of the perceived benefit or barrier.

The total score for the responses on perceived exercise benefits and barriers ranged from 24 to 96. On aggregate, scores of 24 to 48denoted lower perception of the perceived exercise benefits and higher perception of the perceived exercise barriers while scores above 48 denoted higher perception of the perceived exercise benefits and lower perception of the perceived exercise barriers.

Results showed that most (69.6%, n = 55) of the respondents had total scores of 48 and below denoting that they had a higher perception of perceived barriers to exercise and a lower perception of the perceived exercise benefits. The remaining 30.4% (n = 24) had scores of above 48 denoting that they had a higher perception of the perceived benefits of exercise and lower perception of the perceived exercise barriers. Results are summarized in Table4.4, Table 4.5 and Table 4.6.

**Table 4.4 Aggregate scores on perceived exercise benefits and barriers among the respondents**

| | | **Frequency** | **Percentage** |
|---|---|---|---|
| Respondents' aggregate scores on the DPEBBS tool | 24 - 36 | 37 | 46.8 |
| | 37- 48 | 18 | 22.8 |
| | 49- 72 | 17 | 21.5 |
| | 73- 96 | 7 | 8.9 |
| | **Total** | **79** | **100.0** |
| Aggregated summary | 24 - 48 | 55 | 69.6 |
| | 49 - 96 | 24 | 30.4 |

**Table 4.5 Perceived benefits of exercise among the respondents**

| Perceived benefits | Negative perception | | | | Positive perception | | | |
|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | | Disagree | | Agree | | Strongly agree | |
| | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| Exercise helps reduce my total medical costs | 32 | 40.5 | 41 | 51.9 | 5 | 6.3 | 1 | 1.3 |
| Exercise helps reduce my body pain | 16 | 20.3 | 54 | 68.4 | 7 | 8.9 | 2 | 2.5 |
| Exercise can postpone a decline in body function | 13 | 16.5 | 41 | 51.9 | 18 | 22.8 | 7 | 8.9 |
| Exercise helps prevent muscular atrophy | 3 | 3.8 | 9 | 11.4 | 48 | 60.8 | 19 | 24.1 |
| Exercise improves my mood | 0 | 0.0 | 6 | 7.6 | 56 | 70.9 | 17 | 21.5 |
| Exercise improves bone diseases | 50 | 63.3 | 17 | 21.5 | 7 | 8.9 | 5 | 6.3 |
| Exercise improves my appetite | 4 | 5.1 | 9 | 11.4 | 26 | 32.9 | 40 | 50.6 |
| Exercise helps me lead an optimistic and active life | 2 | 2.5 | 11 | 13.9 | 20 | 25.3 | 46 | 58.2 |
| Exercise can keep my body weight at a steady level | 0 | 0.0 | 4 | 5.1 | 21 | 26.6 | 54 | 68.4 |
| Exercise improves my quality of life | 7 | 8.9 | 7 | 8.9 | 35 | 44.3 | 30 | 38.0 |
| Exercise helps enhance my self-care abilities | 3 | 3.8 | 6 | 7.6 | 36 | 45.6 | 34 | 43.0 |
| Exercise will keep me from having other diseases (e.g. cold) | 5 | 6.3 | 12 | 15.2 | 39 | 49.4 | 23 | 29.1 |

**Table 4.6 Perceived barriers to exercise among the respondents**

| Perceived barriers | Negative perception | | | | Positive perception | | | |
|---|---|---|---|---|---|---|---|---|
| | Strongly disagree | | Disagree | | Agree | | Strongly agree | |
| | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| Frequent tiredness impedes my exercise participation | 0 | 0.0 | 7 | 8.9 | 45 | 57.0 | 27 | 34.2 |
| Exercise is adverse to health of dialysis patients | 22 | 27.8 | 33 | 41.8 | 15 | 19.0 | 9 | 11.4 |
| I worry about a fall during exercise | 2 | 2.5 | 5 | 6.3 | 40 | 50.6 | 32 | 40.5 |
| Frequent lower-extremity muscle fatigue impedes my exercise participation | 6 | 7.6 | 6 | 7.6 | 36 | 45.6 | 31 | 39.2 |
| I lack an understanding of the benefits of exercise | 27 | 34.2 | 39 | 49.4 | 8 | 10.1 | 5 | 6.3 |
| Exercise is not suitable for me since I have comorbidities | 0 | 0.0 | 11 | 13.9 | 54 | 68.4 | 14 | 17.7 |
| Body pain impedes my exercise participation | 0 | 0.0 | 6 | 7.6 | 60 | 75.9 | 13 | 16.5 |
| I lack an understanding of the knowledge of how to carry out exercise | 2 | 2.5 | 8 | 10.1 | 48 | 60.8 | 21 | 26.6 |
| I worry that exercise may make me thirsty | 5 | 6.3 | 11 | 13.9 | 23 | 29.1 | 40 | 50.6 |
| Exercise is not suitable for me since I have kidney disease | 7 | 8.9 | 12 | 15.2 | 24 | 30.4 | 36 | 45.6 |
| I worry that exercise may affect arteriovenous fistula | 3 | 3.8 | 14 | 17.7 | 18 | 22.8 | 44 | 55.7 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Outdoor exercise adds burden to my family since I need their company while I am out | 6 | 7.6 | 10 | 12.7 | 26 | 32.9 | 37 | 46.8 |

### 4.5 Association of Perceived Exercise Benefits and Barriers with Physical Activity Status among Patients undergoing Hemodialysis

An association of the perceived exercise benefits and barriers with physical activity status among the respondents was evaluated. The study utilized Chi square statistic at 95% confidence level with Chi square p values of $< 0.05$ denoting a significant association between the study variables.

The respondents' physical activity status was classified into 2 categories - inactive and active. Respondents assessed as inactive and moderately inactive were categorized as 'inactive' while respondents assessed as active and moderately active were categorized as 'active'. Similarly, perceived exercise benefits and barriers were also classified into 2 categories based on respondents' aggregate scores on the DPEBBS tool. The 2 categories were scores of 24 - 48 which denoted higher perception of perceived exercise barriers and lower perception of perceived exercise benefits and scores of 49 - 96 which denoted higher perception of perceived exercise benefits and lower perception of perceived exercise barriers.

From the findings, a statistically significant association was established between the respondents' higher perception of perceived barriers to exercise and lower perception of perceived exercise benefits with a low physical activity status as denoted by a chi-square p value of 0.000.

Based on the results, the null hypothesis that perceived exercise benefits and barriers had no significant influence on the physical activity status of patients undergoing hemodialysis at Kenyatta National Hospital in Kenya was rejected. Consequently, its alternate hypothesis that perceived exercise benefits and barriers had a significant effect on the physical activity status of patients undergoing hemodialysis at Kenyatta National Hospital in Kenya was accepted. The results are as shown in Table 4.7.

**Table 4.7 Association of perceived exercise benefits and barriers with physical activity status among the respondents**

| Perceived exercise benefits & barriers | | Physical activity status | | Total | Chi-square | |
|---|---|---|---|---|---|---|
| | | Active [n = 16] | Inactive [n = 63] | | Statistic ($X^2$) | Sig. (p) |
| Aggregate scores on the DPEBBS tool | 24 - 48 | 4 | 51 | 55 | | |
| | 49 - 96 | 12 | 12 | 24 | 18.89 | .000* |

* Statistically significant at 0.05 significance level

# CHAPTER FIVE: DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

This chapter presents discussion of findings, conclusions and recommendations of the study in line with the study objectives. The study evaluated the physical activity status, perceived benefits and barriers to exercise among patients undergoing hemodialysis at Kenyatta National Hospital in Kenya.

## 5.2 Discussion of Findings

### 5.2.1 Demographic Characteristics of the Respondents

The study respondents were male and female patients on hemodialysis at the renal unit of KNH mostly aged 40 years and above, with basic education background, were mostly married, were of diverse occupations, were largely from low income households, were mostly urban residents and had been under hemodialysis therapy for 5 or less years. Similar demographic attributes were observed among respondents of studies by Jayaseelan et al. (2018) and Wodskou et al. (2021) in which patients on hemodialysis from both genders who represented diverse occupations and were from low income households took part. Similarly, in studies by Ghafourifard et al. (2021) and Sutherland et al. (2021), the respondents were largely married, had basic education level, were from diverse occupations and had been under dialysis mostly for 1-5 years. Similar demographics for study participants as reported in the current study were also evident in studies by Araújo Filho et al. (2016) and Filipčič et al. (2021).

### 5.2.2 Physical Activity Status of Patients on Hemodialysis

This study established that majority of the respondents had low physical activity status. This was given that only a few of the respondents were assessed as being moderately active with the remaining assessed as being moderately inactive or inactive. From the findings, none of the respondents indicated that their work

involved vigorous physical activity. Only a few of the respondents indicated that their work involved definite physical effort including handling of heavy objects and use of tools. Most of the respondents concurred that their work involved no or much less intense physical effort. Further, most of the respondents indicated that they had not engaged on any physical activities such as swimming, jogging, aerobics, football, tennis, gym workout, cycling, house work and gardening in the last one week prior to the study. Most of the respondents had also engaged in walking though for less than 1 hour during the last one week. Thus, it was evident that there was high prevalence of low physical activity status among most of the patients undergoing hemodialysis at KNH.

Low physical activity level among patients undergoing hemodialysis was also reported in studies by Kendrick et al. (2019) and Dashtidehkordi et al. (2019) in which over two-thirds of surveyed patients undergoing hemodialysis exhibited poorer physical activity scores compared to age-matched healthy persons. This depicted that patients undergoing hemodialysis tended to be more physically inactive compared to the general population. These two studies attributed the low physical activity status among patients undergoing hemodialysis largely to their sedentary lifestyle and being involved in livelihood earning activities that did not involve intense physical effort. The current study shares these sentiments and attributes the reported low physical activity status among the surveyed patients undergoing hemodialysis at KNH's renal unit to their largely sedentary lifestyle, low participation in physical exercises and being engaged in jobs requiring no or very little physical effort.

Similarly, Wilkinson et al. (2021) in an observational multicentre study exploring the prevalence and correlates of physical activity among patients on hemodialysis did also report higher prevalence of physical inactivity among patients on hemodialysis relative to healthy controls. They attributed this largely to their inactive lifestyle, an observation also made in the current study where most of the surveyed participants did not engage in any form of physical exercises. Studies by World Health Organization (WHO, 2021), Filipčič et al. (2021) and Kim et al. (2021) also observed significantly higher levels of physical inactivity among surveyed patients undergoing

hemodialysis relative to age-matched healthy subjects with low physical activity status among patients on hemodialysis also reported in studies by Jayaseelan et al. (2018), Li et al. (2021) and Sutherland et al. (2021). In all these studies, the low physical activity status among patients undergoing hemodialysis was attributed to their low engagement in physical exercises. And this according to the studies was due to their positive or higher perception of various perceived barriers to exercise. The current study shares similar view that the reported low physical activity status among patients undergoing hemodialysis at KNH's renal unit could be as a result of their higher perception of perceived barriers to exercise which in turn impeded their participation in physical exercises.

### 5.2.3 Perceived Benefits of Exercise among Patients on Hemodialysis

Perceived benefits of exercise according to most of the respondents included prevention of muscular atrophy, ability to lead an optimistic and active life and a manageable body weight. Others included improved immunity as well as improvements in their mood, appetite, self-care abilities and quality of life. This showed that the patients on hemodialysis at KNH did acknowledge various benefits associated with participation in exercises. Similarly, in a review of motivations for engaging in exercises among patients undergoing hemodialysis, Wodskou et al. (2021) identified improved quality of life, enhanced self-care abilities, enhanced immunity and better weight management as potential leading motivations for these patients participation in physical exercises. Wang et al. (2020) and Moorman et al. (2019) shared similar findings as they identified strengthening of lower extremities muscles, improved mood and appetite, better weight management and improved quality of life and immunity as some of the benefits accruing to these patients when they engaged in physical exercises.

Ghafourifard et al. (2021) and Lightfoot et al. (2021) shared similar sentiments that patients undergoing hemodialysis could benefit from improvements in mood, appetite, body weight and quality of life if they regularly engaged in physical exercises. Studies by Zhang and Bennett (2019), Kendrick et al. (2019) and Weber et al. (2020) also agreed that improved quality of life, immunity, muscle strength and improvements in

mood and feeding were some of the perceived benefits attributable to participation in physical exercises among hemodialysis patients. Similarly, according to Araújo Filho et al. (2016), Bohm et al. (2019) and Clarke et al. (2019) patients on hemodialysis that engaged in physical exercises as is recommended derived various benefits. These included increased muscle strength; improved personal mood; improved appetite; improved quality of life; enhanced self-care abilities and better immunity from other diseases such as flu and cold. Based on the findings of these studies and those of the current study, it is evident that engaging in exercises conferred a wide range of benefits to patients undergoing hemodialysis. It is possible therefore that the physical activity status of patients undergoing hemodialysis could be enhanced through placing greater emphasis on perceived benefits of exercise to these patients.

### 5.2.4 Perceived Barriers to Exercise among Patients on Hemodialysis

The study established that most of the respondents had a higher perception of perceived exercise barriers. This study therefore attributes the low physical activity status reported among the respondents to their higher perception of perceived barriers to exercise. The perceived barriers to exercise reported by most of the respondents included regular tiredness, fear of falls during exercise, frequent fatigue of leg muscles, body pain, lacking awareness of how they should exercise, fear of thirst, fear of arteriovenous fistula being affected by the exercises, concerns over their medical condition and having comorbidities. The findings agreed with those of Ghafourifard et al. (2021) who in a cross-sectional study evaluating correlates of physical exercises among kidney disease patients undergoing hemodialysis treatment established muscle fatigue, body pain and fear of falls during exercise as some of the perceived impediments to partaking in physical exercises among surveyed patients undergoing hemodialysis. Similarly, in studies undertaken by Kendrick et al. (2019), Sutherland et al. (2021) and Lightfoot et al. (2021), worries about thirst, worries over falls during exercise, personal lack of motivation and interest in exercises, body pain and lack of awareness as to how they should exercise were major barriers that impeded involvement in exercises among kidney disease patients on hemodialysis treatment.

The current study argues that the high perception of perceived barriers to exercise was a leading reason behind the low physical activity status observed in surveyed patients undergoing hemodialysis treatment at KNH. Indeed, the study found that a statistically significant association existed between higher perception of perceived exercise barriers (which corresponded with lower perception of perceived exercise benefits) and low physical activity status among the study respondents. This implied that perceived barriers to exercise had a significant adverse effect on hemodialysis patients' engagement in exercises in turn contributing to their low physical activity status. Similarly, in studies by Kim et al. (2021) and Villanego et al. (2020), low physical status among patients on hemodialysis were attributed to various perceived exercise barriers. These included regular tiredness, fear of falls during exercise, frequent fatigue of leg muscles, body pain, fear of thirst and poor awareness of how they should exercise.

Sheshadri et al. (2020), Weber et al. (2020) and Filipčič et al. (2021) shared similar sentiments that various perceived barriers to exercise could explain the low physical activity levels reported among patients undergoing hemodialysis. They cited these perceived exercise barriers as including frequent tiredness; worries about falls during exercise; frequent lower-extremity muscle fatigue, body pain and lack of proper knowledge of how to carry out exercises as significant barriers to exercise prevalent. Other studies that reported similar findings on regular tiredness, fear of falls during exercise, frequent fatigue of leg muscles, having comorbidities, not knowing how they should exercise, fear of thirst, body pain, fear of arteriovenous fistula being affected by the exercises and concerns over their medical condition being perceived exercise barriers were those by Milam (2019), Huang et al. (2019), Kendrick et al. (2019) and Wilkinson et al. (2021).

### 5.3 Conclusion

Based on the findings of the study, the researcher drew the following conclusion:

Patients undergoing hemodialysis at KNH renal unit had low physical activity status as they were assessed to be largely physically inactive. The low physical activity

status among these patients was attributed to their largely sedentary lifestyle and to their higher perception of perceived barriers to exercise and lower perception of perceived exercise benefits. The leading perceived barriers to exercise among the respondents included regular tiredness, fear of falls during exercise, frequent fatigue of leg muscles and body pain. Other perceived barriers to exercise included lacking awareness of how they should exercise, fear of thirst, and fear of arteriovenous fistula being affected by the exercises. Concerns over their medical condition and having comorbidities were also other perceived barriers to exercise among the respondents. Few of the patients undergoing hemodialysis at KNH were assessed to be moderately active. This was attributed to their higher perception of perceived exercise benefits. Such included improved immunity, self-care abilities and quality of life. Others included improvements in their mood and appetite, increased muscle strength, ability to lead an optimistic and active life and better body weight management.

## 5.4 Recommendations

### 5.4.1 Recommendations for Practice

Patients undergoing hemodialysis at Kenyatta National Hospital require guidance on how to conduct physical exercises in a safe and effective way. Efforts are needed to allay any fears and concerns over participation in physical exercises among patients on hemodialysis at KNH's renal unit. This should also include addressing any misconceptions that the patients have regarding engaging in physical exercises.

### 5.4.2 Recommendations for Policy

Efforts towards enhancing the physical activity status of patients undergoing hemodialysis at Kenyatta National Hospital in form of developing appropriate policies and interventions aimed at addressing identified perceived barriers to exercise among these patients are needed.

### 5.4.3 Recommendations for Research

This was a single hospital study evaluating the physical activity status, perceived benefits and barriers to exercise among patients undergoing hemodialysis at Kenyatta National Hospital, Kenya. Therefore to facilitate a broader comparison and generalization of the study findings, a wider study involving other hospitals in the country is hereby recommended. Further, an investigation of the reasons for physical inactivity among patients on hemodialysis at KNH would equally be illuminating.

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# APPENDICES

## Appendix 1: Participant Information Form

**Title of Study:** Perceived benefits and barriers to exercise and physical activity status among patients undergoing hemodialysis at Kenyatta National Hospital in Kenya

**Principal Investigator\and institutional affiliation:** Alice Wangui Ng'ang'a, University of Nairobi

**Supervisors:** Dr. Dorcas Maina & Dr. Irene Mageto, University of Nairobi

### Introduction

My name is Alice Wangui Ng'ang'astudent at the University of Nairobi pursuing a Masters of Science Degree in Renal Nursing. I am carrying out a research study on: perceived benefits and barriers to exercise and physical activity status among patients undergoing hemodialysis at Kenyatta National Hospital in Kenya.

### Purpose of the study

The purpose of this study is to determine perceived benefits and barriers to exercise and physical activity status among patients undergoing hemodialysis at Kenyatta National Hospital in Kenya.

### Description of the research

I'm requesting your participation in this study by giving your views and opinions about the research subject through the study tool. If you consent to participate, the researcher will request you to respond to a series of questions based on the research objectives.

### Confidentiality

All information provided will be handled and processed with utmost confidentiality. All information given herein will only be used for purposes of the research study.

Your name or anything else that may identify you will not appear anywhere in the study.

**Voluntary participation**

Your participation in this study is voluntary i.e., on your own free will and without any coercion.

**Right of withemodialysisrawal**

Should you feel/wish to terminate your participation in this study, you have the right to do so at any time without facing any consequences/penalties.

**Benefit**

This research work is for academic purposes only and if you agree to participate, the information that you will provide will be of great importance in informing development of necessary interventions to improve utilization of physical exercise as a key intervention of disease management among patients undergoing hemodialysis at KNH in Kenya. The findings may also be used to inform development of awareness creation programs aimed at educating patients undergoing hemodialysis about the value of exercise to their physical activity status and general well-being. However, there will be no monetary gains or any other form of payment for participating.

**Risks**

There is no any intended health risk or any other harm to your child for participating in this study. However, in the event that he/she suffers emotional or psychological distress for participating in this study, the researcher will refer him/her to a counselor for appropriate help.

**Contacts**

For any queries regarding this research study, kindly contact;

| **Principal researcher** | | **Lead supervisor** | | **Secretary** |
|---|---|---|---|---|
| Alice Wangui Ng'ang'a | | Dr. Dorcas Maina | | KNH-UoN ERC |
| Cell: 0724738873 | O | Cell: 0724440843 | O | Telephone: 020-2726300 |
| Email: kuicelia@gmail.com | R | Email: mainad@uonbi.ac.ke | R | Email: uonknh_erc@uonbi.ac.ke |
| P.O Box 412-00100 Nairobi | | | | P.O. Box 19676 – 00202 Nairobi |

**Appendix 2: Consent Form**

**Respondent's Declaration**

I have been fully informed about the nature of the study, I know the benefits, and understand that there are no risks involved. I hereby give my consent to participate in this study.

Signature …….. Date …….

**Researcher's Declaration**

I have fully disclosed all the relevant information concerning this study to the study respondent.

Signature of researcher ……. Date ……

**Appendix 3: Questionnaire**

**Study title:** Perceived benefits and barriers to exercise and physical activity status among patients undergoing hemodialysis at Kenyatta National Hospital in Kenya

**Code** ……. **Date** …….…….

**Instructions;**

- Do not write your name or any personal identification on the questionnaire.
- Answer all the questions by putting a tick (√) in the preferred box.
- Information obtained will be handled and processed in strict confidence.

**Section A: Demographic information of the respondents**

1. What is your gender? Male ( ) Female ( )

2. What is your age (in completed years)? ….……

3. What is your education level?

No formal education ( ) Primary education ( )

Secondary education ( ) Tertiary education ( )

4. What is your marital status?

Single ( ) Married ( ) Separated ( )

Divorced ( ) Widowed ( )

5. What do you do for livelihood? ……..……..……

6. What is the approximate monthly income of your family? …….

7. Where do you live? ……

8. For how long have been under hemodialysis therapy? …..……..

**Section B: Dialysis Patient-Perceived Exercise Benefits and Barriers Scale (DPEBBS)**

| **Statements** | | **Tick Only One Response That Matches Statement Accordingly** | | | |
|---|---|---|---|---|---|
| | | **Strongly disagree** | **Disagree** | **Agree** | **Strongly agree** |
| 1 | Exercise helps reduce my total medical costs. | | | | |
| 2 | Exercise helps reduce my body pain | | | | |
| 3 | Exercise can postpone a decline in body function | | | | |
| 4 | Exercise helps prevent muscular atrophy | | | | |
| 5 | Frequent tiredness impedes my exercise participation | | | | |
| 6 | Exercise improves my mood | | | | |
| 7 | Exercise improves bone diseases | | | | |
| 8 | Exercise is adverse to health of dialysis patients | | | | |
| 9 | I worry about a fall during exercise | | | | |
| 10 | Exercise improves my appetite | | | | |
| 11 | Frequent lower-extremity muscle fatigue impedes my exercise participation | | | | |
| 12 | I lack an understanding of the benefits of exercise | | | | |
| 13 | Exercise helps me lead an optimistic | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | and active life | | | | |
| 14 | Exercise is not suitable for me since I have comorbidities | | | | |
| 15 | Body pain impedes my exercise participation | | | | |
| 16 | Exercise improves my quality of life | | | | |
| 17 | I lack an understanding of the knowledge how to carry out exercise | | | | |
| 18 | I worry that exercise may make me thirsty | | | | |
| 19 | Exercise is not suitable for me since I have kidney disease | | | | |
| 20 | Exercise can keep my body weight at a steady level | | | | |
| 21 | I worry that exercise may affect arteriovenous fistula | | | | |
| 22 | Exercise helps enhance my self-care abilities | | | | |
| 23 | Exercise will keep me from having other diseases (e.g., cold) | | | | |
| 24 | Outdoor exercise adds burden to my family since I need their company while I am out | | | | |

**Source: Adopted from Lightfoot et al. (2021)**

## Section C: General Practice Physical Activity Questionnaire

General Practice Physical Activity Questionnaire

Date.....

Name.....

1. Please tell us the type and amount of physical activity involved in your work.

| | | Please mark one box only |
|---|---|---|
| a | I am not in employment (e.g. retired, retired for health reasons, unemployed, full-time carer etc.) | |
| b | I spend most of my time at work sitting (such as in an office) | |
| c | I spend most of my time at work standing or walking. However, my work does not require much intense physical effort (e.g. shop assistant, hairdresser, security guard, childminder, etc.) | |
| d | My work involves definite physical effort including handling of heavy objects and use of tools (e.g. plumber, electrician, carpenter, cleaner, hospital nurse, gardener, postal delivery workers etc.) | |
| e | My work involves vigorous physical activity including handling of very heavy objects (e.g. scaffolder, construction worker, refuse collector, etc.) | |

2. During the *last week*, how many hours did you spend on each of the following activities? *Please answer whether you are in employment or not*

Please mark one box only on each row

| | | None | Some but less than 1 hour | 1 hour but less than 3 hours | 3 hours or more |
|---|---|---|---|---|---|
| a | Physical exercise such as swimming, jogging, aerobics, football, tennis, gym workout etc. | | | | |
| b | Cycling, including cycling to work and during leisure time | | | | |
| c | Walking, including walking to work, shopping, for pleasure etc. | | | | |
| d | Housework/Childcare | | | | |
| e | Gardening/DIY | | | | |

3. How would you describe your usual walking pace? Please mark one box only.

| | | | |
|---|---|---|---|
| Slow pace (i.e. less than 3 mph) | | Steady average pace | |
| Brisk pace | | Fast pace (i.e. over 4mph) | |

**Appendix 4: Letter to KNH-UoN Ethics and Research Committee**

Alice Wangui Ng'ang'a,

Reg. No.: H56/38011/2020,

Department of Nursing Sciences,

Faculty of Health Sciences,

University of Nairobi.

The Secretary,

KNH/UoN - Ethics and Research Committee,

P.O. Box 20723-00202,

Nairobi.

Dear Sir/Madam,

**RE: <u>Approval to Conduct a Research Study</u>**

My name is Alice Wangui Ng'ang'aa student at the University of Nairobi's Department of Nursing Sciences undertaking a Masters of Science Degree in Renal Nursing. I am hereby requesting for your approval to carry out a research study on "Perceived benefits and barriers to exercise and physical activity status among patients undergoing hemodialysis at Kenyatta National Hospital in Kenya", as a requirement in partial fulfillment for the award of the said degree.

Thank you in advance.

Yours faithfully,

Alice Wangui Ng'ang'a

**Appendix 5: Letter to the Head of Department - Renal Unit of KNH**

Alice Wangui Ng'ang'a,

Reg. No.: H56/38011/2020,

Department of Nursing Sciences,

Faculty of Health Sciences,

University of Nairobi.

The Head of Department,

Renal Unit - KNH,

Nairobi.

Dear Sir/Madam,

**RE: <u>Authority to Carry out A Research Study at KNH Renal Unit</u>**

My name is Alice Wangui Ng'ang'aa student at the University of Nairobi's Department of Nursing Sciences undertaking a Masters of Science Degree in Renal Nursing. I am undertaking a research study on "perceived exercise benefits and barriers and physical activity status among patients undergoing hemodialysis at Kenyatta National Hospital in Kenya", as a requirement in partial fulfillment for the award of the said degree.

I am therefore hereby requesting for your authorization to conduct data collection among patients undergoing hemodialysis at the Renal Unit of KNH.

Yours faithfully,

Alice Wangui Ng'ang'a

## Appendix 6: Approval Letter from KNH-UoN Ethics and Research Committee

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

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

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

Ref: KNH-ERC/A/300

4th August, 2022

Alice Wangui Ng'ang'a
Reg. No H56/38011/2020
Dept. of Nursing Sciences
Faculty of Health Sciences
University of Nairobi

Dear Alice,

**RESEARCH PROPOSAL: PERCEIVED BENEFITS AND BARRIERS TO EXERCISE AND PHYSICAL ACTIVITY STATUS AMONG PATIENTS UNDERGOING HEMODIALYSIS AT KENYATTA NATIONAL HOSPITAL (P349/04/2022)**

This is to inform you that KNH-UoN ERC has reviewed and approved your above research proposal. Your application approval number is **P349/04/2022.** The approval period is 4th August 2022 – 3rd August 2023.

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by KNH-UoN ERC.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KNH-UoN ERC 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH-UoN ERC within 72 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to KNH-UoN ERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

**DR. BEATRICE K.M. AMUGUNE**
**SECRETARY, KNH-UoN ERC**

c.c. The Dean, Faculty of Health Sciences, UoN
The Senior Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information Dept., KNH
The Chair, Dept. of Nursing Sciences, UoN
Supervisors: Dr .Dorcas Maina, Dept of Nursing Sciences, UoN
Dr. Irene G Mageto, Dept of Nursing Sciences, UoN

## Appendix 7: Approval for Data Collection from Kenyatta National Hospital

KNH/R&P/FORM/01

KENYATTA NATIONAL HOSPITAL
P.O. Box 20723-00202 Nairobi

Tel.: 2726300/2726450/2726565
Research & Programs: Ext. 44705
Fax: 2725272
Email: knhresearch@gmail.com

### Study Registration Certificate

1. Name of the Principal Investigator/Researcher
   ALICE WANGUI NG'ANG'A
2. Email address: kuiceliae@gmail.com Tel No. 0724738873
3. Contact person (if different from PI).....
4. Email address: ..... Tel No. .....
5. Study Title
   PERCEIVED BENEFITS AND BARRIERS TO EXERCISE AND PHYSICAL ACTIVITY STATUS AMONG PATIENTS UNDERGOING HEMODIALYSIS AT KENYATTA NATIONAL HOSPITAL (P349/04/2022)
6. Department where the study will be conducted KNH - RENAL UNIT
   *(Please attach copy of Abstract)*
7. Endorsed by KNH Head of Department where study will be conducted.
   Name: DR. P. MBUGUA Signature ..... Date 25/8/22
8. KNH UoN Ethics Research Committee approved study number P349/04/2022
   *(Please attach copy of ERC approval)*
9. I ALICE WANGUI NG'ANG'A commit to submit a report of my study findings to the Department where the study will be conducted and to the Department of Medical Research.
   Signature..... Date 23/08/2022
10. Study Registration number (Dept/Number/Year) Renal/193/2022
    (To be completed by Medical Research Department)
11. Research and Program Stamp

KENYATTA NATIONAL HOSPITAL * Research Centre * 25 AUG 2022 P.O. Box 20723-00202 Nairobi

All studies conducted at Kenyatta National Hospital must be registered with the Department of Medical Research and investigators must commit to share results with the hospital.

**Appendix 8: Work Plan**

| Activity | 2022 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** |
| Development of the concept | | | | | | | | | | |
| Proposal writing and presentation | | | | | | | | | | |
| Submitting the proposal to ERC | | | | | | | | | | |
| Pretesting the study tool | | | | | | | | | | |
| Collecting the study data | | | | | | | | | | |
| Data analysis, report writing and corrections | | | | | | | | | | |
| Defense of the project | | | | | | | | | | |

**Appendix 9: Budget**

| Component | Description | Item | Quantity | Unit Cost (Ksh) | Total (Ksh) |
|---|---|---|---|---|---|
| Literature Review | Literature search | Airtime<br>Internet | 6 Months<br>6 Months | 1,000/Month<br>4,999/Month | 6,000<br>29,994 |
| | Stationery | Laptop | 1 | 60,000 | 60,000 |
| | | External Hard Disc | 1 | 7,000 | 7,000 |
| | | Pens, Pencils, Eraser, Folders | 10 | @ 100 | 1,000 |
| Proposal | Related costs | Plain paper<br>Printing<br>Photocopying<br>Binding | 2 reams<br>1 Draft<br>2 Drafts<br>3 Drafts | @650<br>@750<br>@250<br>@100 | 1,300<br>750<br>500<br>300 |
| Approval | KNH Data<br>ERC | | 1<br>1 | @500<br>@ 2,000 | 500<br>2,000 |
| Research Phase | Pretesting of questionnaire | Printing | 10 | @ 50 | 500 |
| | Consent Form and Questionnaire | Printing, photocopy | 97 | @60 | 5,820 |
| | Data collection | Research Assistants | 2 | @ 10,000 | 20,000 |
| | Data Processing and analysis | Statistician | 1 | @ 35,000 | 35,000 |
| Report Phase | Final Report | Printing<br>Photocopying<br>Binding | 1 copy<br>4 copies<br>5 copies | @ 500<br>@ 500<br>@ 100 | 500<br>2,000<br>500 |
| Publishing | | | | | 30,000 |
| **Sub Total** | | | | | **203,664** |
| Contingencies | 10% of sub-totals | | | | **20,366.4** |
| **Grand Total** | | | | | **224,030.4** |

**Source of funding - Self**