CLINICAL PROFILE AND PREDICTORS OF MORTALITY OF PATIENTS ADMITTED WITH RENAL DYSFUNCTION IN THE INTERNAL MEDICINE DEPARTMENT AT MUHIMBILI NATIONAL HOSPITAL-MLOGANZILA, TANZANIA

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Department of Clinical Nursing

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By

Sinaraha Daud Ngonela

A Dissertation Submitted in (Partial) Fulfillment of Requirement for the Degree of Master of Science (Nephrology Nursing) of

Muhimbili University of Health and Allied Sciences
October, 2024

CERTIFICATION

The undersigned certifies that, they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: **''Clinical profile and predictors of mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital-Mloganzila",** in (partial) fulfillment of requirement for the degree of Master of Science (Nephrology Nursing) of Muhimbili University of Health and Allied Sciences.

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Supervisor

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Date

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Mr. Rashidi Heri

Co-Supervisor

_____

Date

DECLARATION AND COPYRIGHT

I, **Sinaraha Daud Ngonela.** declare that this **dissertation** is my original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature…… **Date** ……

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I am also profoundly grateful to my husband (Nicholaus John Fundi) and my children (Mercy and Carline) for their support and conducive environment for studying master's program.

Lastly, I extend my heartfelt thanks to God for granting me the strength and capacity to complete this work

DEDICATION

I dedicated this study to my lovely husband (Nicholaus John Fundi)

ABSTRACT

Background: Renal dysfunction is a major public health problem worldwide, with epidemiological variations from one population to another. It is associated with poor outcomes including high morbidity, high mortality, and long hospital stays especially in low and middle-income countries.

Objectives*:* The study aimed to determine the clinical profile and predictors of mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital –Mloganzila.

Materials and methods*:* This was retrospective cross-sectional study to investigate the clinical profile and predictors of mortality of patients admitted with renal dysfunction in the Internal Medicine Department at Muhimbili National Hospital Mloganzila between January 2023 to June 2023. The Statistical Program for Social Science (SPSS) version 27 package was used for analysis. Continuous variables were summarized by mean, median, standard deviation, and interquartile range while categorical were summarized by using frequency and percentages. Predictors were determined by multiple logistic regression analysis and variables with p value of less than 0.05 was considered significant.

Results: 122 participants of admitted patients had renal dysfunction. The mean age of participants was 50.94±18.46 years. More than half of the study participants were male 66(54.1%). Hypertension was the common comorbidity 76 (62.3%) followed by diabetes mellitus 30 (24.6%) and malignancy 13 (10.7%) of the renal dysfunction patients admitted. 88 (72%) were discharged, while 34 (28%) died. Hemodialysis was performed in 28(23 %) patients. 89 (73%) of patients had anemia, hyponatremia 43 (37.0%), and hyperkalemia 54 (47.8%). Female patients had a reduced risk of mortality (aOR=0.143, 95% CI: 0.040-0.505, P=0.003), no formal education had increased risk of mortality (aOR=4.145, 95% CI: 1.10-17.285, P=0.049). Moreover, patients not on maintenance hemodialysis had an increased risk of mortality compared to those who were on hemodialysis (aOR=6.474, 95% CI: 1.05-42.632, P=0.048).

Conclusion: The study indicated that, 89 (73%) of patients had anemia, hyponatremia 43 (37%), and hyperkalemia 54 (47.8%) and also an older adult, predominantly male, constitute the majority of patients, with hypertension being common comorbidity. The study identified significant predictors of mortality, including sex, education level, length of hospital stay, and maintenance hemodialysis. Further prospective study is needed to assess survival rates and factors associated with survival among patients with renal dysfunction.

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ABBREVIATIONS

AKI-	Acute Kidney Injury
CKD-	Chronic Kidney disease
ESKD-	End stage of kidney disease
NCD-	Non-Communicable disease
HIV-	Human Immunodeficiency Virus
MNH-	Muhimbili National Hospital
GFR-	Glomerular filtration rate
KDIGO-	Kidney Disease Improving Global Outcomes
ART-	Antiretroviral therapy
SPSS-	Statistical Package for the Social Sciences
HPM-	Health Promotion Model
HAART-	Highly Active Antiretroviral therapy
JEEVA-	Hospital Information Management System application (JEEVA)
CKD-EPI-	Chronic kidney disease epidemiology collaboration
MUHAS-	Muhimbili University of Health and Allied Sciences
TZS-	Tanzanian Shillings

DEFINITIONS OF KEY TERMS

Acute kidney injury- defined as an abrupt and rapid deterioration of kidney function as evidenced by raise in serum creatinine of 0.3mg/dl within 24 hours, increased in blood urea nitrogen or decreased urine output by ≤ 0.5ml/kg/hr for six hours that might be potentially reversible (KDIGO, 2023).

Chronic Kidney Disease; is defined as kidney damage identified by a glomerular filtration rate (GFR) of less than 60ml/min per $1.73M^2$ or markers of kidney damage for 3 months or more, regardless of the underlying cause(KDIGO, 2023)

End Stage Kidney Disease (ESKD) is defined as chronic kidney disease (CKD) stage 5 with a glomerular filtration rate (GFR) of less than 15ml/min/$1.73m^2$ or need to start kidney replacement therapy (dialysis or transplantation)(Fakultät, 1980; Odetunde *et al.*, 2014).

Mortality is defined as death of the patient which may be caused by renal dysfunction or other causes (Masina *et al.*, 2022).

Renal dysfunction; is defined as the renal impairment or abnormal functioning that leads to a decline in the glomerular filtration rate, elevated serum creatinine, increased blood urea nitrogen and decreased urine output (KDIGO, 2023).

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Renal dysfunction is a major public health problem worldwide, with epidemiological variations from one population to another. Renal dysfunction is the renal impairment or abnormal functioning that leads to a decline in the glomerular filtration rate(Mwanjala and Urio, 2022). Patients with renal dysfunction includes those with either acute kidney injury (AKI), chronic kidney disease (CKD) or acute on chronic kidney disease (AOCKD) depending on their clinical presentation, duration of illness, laboratory investigations and findings in the imaging studies(Masina *et al.*, 2022).Patients with renal dysfunction usually presents with raised serum creatinine above the normal acceptable ranges for their age or sex and calculated estimated glomerular filtration rate of <60 ml/min/1.73 m^2 (Robert, 2015). In the developed world, renal dysfunction has been reported high compared to that in the developing countries, for example, in Northwest China, the prevalence of renal dysfunction was 8.69% among diabetic and hypertension patients (Lin *et al.*, 2021). In Europe the reported prevalence of renal dysfunction among patients with post Stroke was 27.1%(Chwojnicki *et al.*, 2016). In Africa, the prevalence of 31% of renal dysfunction among the acute heart failure patients with eGfr < 60ml/min/1.73m^2(Sani *et al.*, 2014).

In Tanzania, studies have reported different prevalence of renal dysfunction; in Lake zone, the prevalence of renal dysfunction among hospitalized adult patients was found to be 28% (Kilonzo *et al.*, 2016), another study among patients with HIV who were on medication was 24.7% (Mwemezi *et al.*, 2020) . Higher prevalence of renal dysfunction has been observed in individuals with comorbidities such as hypertension and diabetes mellitus (Id *et al.*, 2022; Masina *et al.*, 2022). The mainstay management of renal dysfunction is treating the underlying cause such as hypertension, diabetes mellitus, and infection, and stopping the use of nephrotoxic drugs. Treatment of severe renal dysfunction involves renal replacement therapy inform of dialysis or kidney transplantation; therapies with major cost implications to healthcare systems(Robert, 2015). Despite the improvement in quality of life in patients on renal replacement therapy, in low and middle-income countries renal dysfunction has been reported to be associated with poor outcomes including high mortality and long hospital

stays (Kilonzo *et al.*, 2016). The objective of this study is to assess the clinical profile and predictors of mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital –Mloganzila.

1.2 Problem statement

Renal dysfunction is an important public health problem due to increase in patients with renal dysfunction as a result of increase in non-communicable diseases such as hypertension and diabetes in Tanzania. Tanzania has high prevalence (28%) of renal dysfunction compared to other countries like China (8.9%)(Kilonzo *et al.*, 2016; Lin *et al.*, 2021). Also, in Tanzania the mortality is high (35.4%) among patients with renal dysfunction (Kilonzo *et al.*, 2016).

The previous studies done in Tanzania focused on renal dysfunction on HIV positive population and on ART medication. associated with renal dysfunction with limited information addressing renal dysfunction caused by other factors such as hypertension and diabetic (Msango *et al.*, 2011; Mwemezi *et al.*, 2020; Mwanjala and Urio, 2022)**.**

Early identification of the renal dysfunction is important key in efforts to prevent further progression of renal injury and progression to ESRD and possibly avert avoidable deaths. There is a scarcity of information on the clinical profile and predictors of mortality of hospitalized patients with renal dysfunction in our settings. In low and middle income countries like Tanzania where the cost of care and advanced therapies of end stage renal disease is mostly not affordable or not accessible to the majority of its individuals it is of utmost importance to recognize renal dysfunction and its factors which may in future be utilized in strategies to reduce, its occurrence or prevent it.

1.3 Conceptual framework

The conceptual framework of this study adapted from Health Promotion Model (HPM). The HPM was developed by Nola Pander. HPM explains that each person has unique characteristic and experiences that affect his/her actions or predict the outcome (Gottwald, 2006). In this study the unique characteristic will be social demographic characteristics, risk factors and clinical profile of renal dysfunction. The outcome in this study will be mortality.

The conceptual framework below will be used to assess the social demographic, risk factors, clinical profile and predictors of mortality of patient with renal dysfunction. Renal dysfunction depends on social demographic characteristics such as age, sex and race. It is more common in advanced age, African race and female (Msango *et al.*, 2011; Kilonzo *et al.*, 2016; Mwemezi *et al.*, 2020; Masina *et al.*, 2022). This study will adapt the risk factors of patients with renal dysfunction in other studies were sepsis, use of nephrotoxic drugs, hypertension, cardiovascular disease, diabetes mellitus and herbal medication (Sani *et al.*, 2014; Masina *et al.*, 2022).

Mortality in this conceptual frame work will be when the patient is died in the hospital.

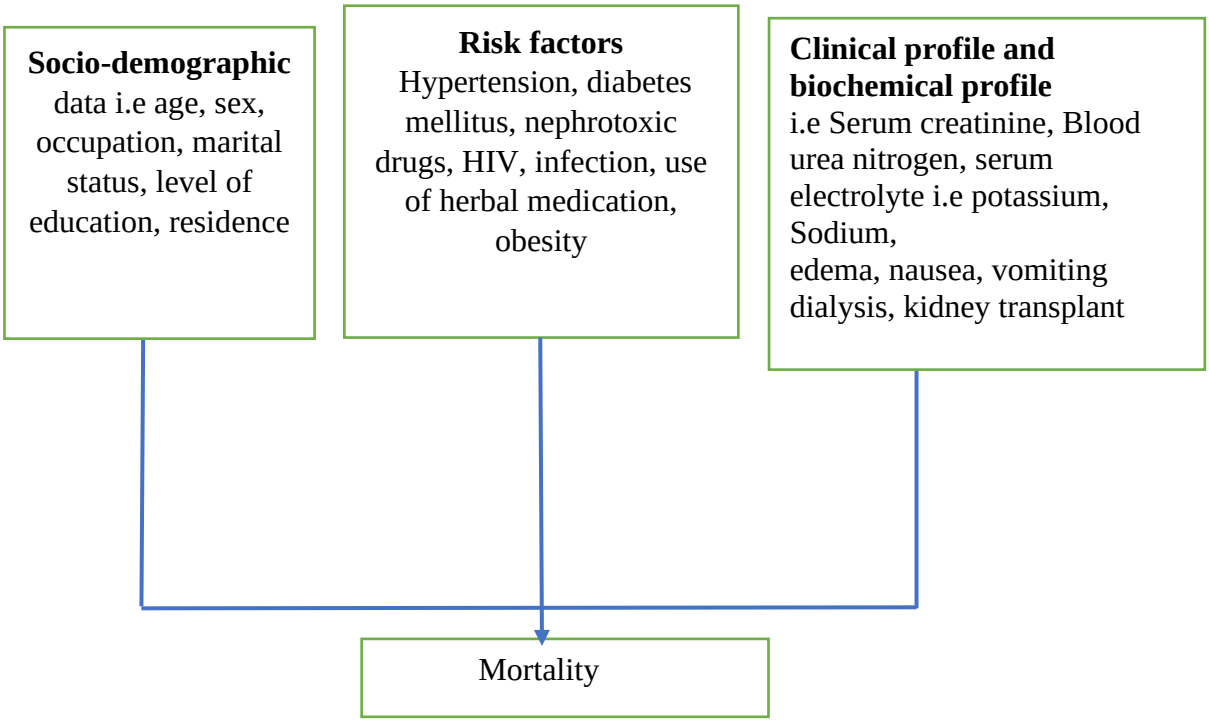


Figure 1: The conceptual framework adapted from HPM(Gottwald, 2006)

1.4 Rationale of the study

Currently, there is limited information on clinical profile and predictors of mortality of patients with renal dysfunction among patients who are admitted in the hospital. The findings of this study may provide health professional at Muhimbili National Hospital areas requiring improvement, strengthening and in need of developing health interventions so as to improve care and decrease mortality of patients with renal dysfunction. Determining the mortality of patients with renal dysfunction, clinical profile and predictors of mortality may assist in determining ways to strengthen the services required in early detection and management of renal dysfunction, in preventing their complications and mortality of the patients with renal dysfunction.

1.5 Research questions

1.5.1 Main research question

What are the clinical profile and predictors of mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital - Mloganzila?

1.5.2 Specific research questions

1. What are the clinical profile of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital- Mlognzila?
2. What is the mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital – Mloganzila?
3. What are the predictors of mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital – Mloganzila?

1.6 Objectives

1.6.1 Broad objectives

To determine the clinical profile and predictors of mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital-Mloganzila.

1.6.2 Specific objectives

1. To determine clinical profile of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital- Mlognzila
2. To determine mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital – Mloganzila.
3. To determine predictors of mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital – Mloganzila.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview of the renal dysfunction

Renal dysfunction is a growing worldwide problem and one of the major public health threats. Renal dysfunction presents as acute or chronic. Acute kidney injury is a kidney disease of less than three months including acute kidney injury while Chronic kidney disease refers to kidney disease with more than three months corresponding to a persistent glomerular filtration rate (GFR) of less than 60 ml/min/1.73m^2 (Kaze *et al.*, 2015). It was reported in South Africa that the presentations of renal dysfunction in hospitalized patients were acute kidney injury (46.5%), chronic kidney disease (27.6%) and acute on chronic kidney disease (25. 5%)(Masina *et al.*, 2022). In the developed world, the prevalence of 8.69% of renal has been reported and mostly was associative hypertension and diabetes mellitus(Lin *et al.*, 2021). In sub-Saharan countries the reported prevalence of renal dysfunction was 42% in Zambia and found mostly among patients who had hypertension, diabetes mellitus, diarrhea, vomiting, and those exposed to the use of nephrotoxic drugs (Banda *et al.*, 2010). In Africa, renal dysfunction is associated with high mortalities (85%) (Sani *et al.*, 2014; Kilonzo *et al.*, 2016). In Tanzania for example, a revealed that 28% of the admitted patients had renal dysfunction, In that study, the identified risk factors associated with renal dysfunction included female sex, age, hypertension, diabetes mellitus, and reduced urine output (Kilonzo *et al.*, 2016).

2.2 Socio - demographic of patients with renal dysfunction

Age, is a risk for developing renal dysfunction, and most studies shows show that as age increases the risk of developing renal dysfunction (Banda *et al.*, 2010; Makori *et al.*, 2015; Mwemezi *et al.*, 2020; Kasongo, Siziya and Banda, 2022; Mwanjala and Urio, 2022). Gender has been linked to the likelihood of developing renal dysfunction, and some studies have shown that especially males have a high risk of developing renal dysfunction while other studies have reported that females gender were more likely to develop renal dysfunction than male (Muntner *et al.*, 2002; Lin *et al.*, 2021). In Africa, the shows that females a higher develop renal dysfunction than males(Banda *et al.*, 2010; Makori *et al.*, 2015; Nyende *et al.*,

2020; Kasongo, Siziya and Banda, 2022) however, others show males have a high prevalence of developing renal dysfunction(Banda *et al.*, 2010; Sani *et al.*, 2014). In Tanzania, the contradicting findings have also been reported, some studies show females have high prevalence renal dysfunction than males (Kilonzo *et al.*, 2016; Mapesi *et al.*, 2016; Peck *et al.*, 2016; Chami *et al.*, 2019; Mwanjala and Urio, 2022) while other studies show male have a high prevalence of developing renal dysfunction(Mwemezi *et al.*, 2020; Nyende *et al.*, 2020; Mwanjala and Urio, 2022)

Socio-demographic characteristics such as area of residency and level of education also have been identified as risks for developing renal dysfunction even in the developed and developing world such as China and Sub-Saharan Africa (Lin *et al.*, 2021). A study done in Tanzania, showed that participants from rural areas and those with low level of education had more renal dysfunction compared to those living in urban areas and with high level of education(Peck *et al.*, 2016). In a study done in Tanzania on decreased renal function and associated factors showed that marital status and income per month showed no association with decreased renal function(Peck *et al.*, 2016).

In a cross sectional study done in Uganda on prevalence of renal dysfunction among HIV patients on Tenofovir drug, showed that the majority (89.9%) were employed while only 10.1% were unemployed. The study also showed that majority(42.8%) of patients were married, while 18.4% were single, 30.6% were separated and 8.3% were widow(Nyende *et al.*, 2020).

2.3 Clinical Profile

2.3.1 Clinical presentation of patients with renal dysfunction

The clinical presentations of renal dysfunction vary from acute kidney injury (46.5%), chronic kidney disease (27.6%), and acute on chronic kidney disease (25. 5%). Symptoms of Nausea, vomiting, diarrhea, oliguria, edema, dyspnea, fatigue, and confusion are frequently reported as the clinical presentations of hospitalized patients developing renal dysfunction(Masina *et al.*, 2022). In Burkina Faso, the researchers found out that lack of appetite, abdominal pain, dyspnea, headache, anuria, dizziness, cough, fever, and chest pain were the common clinical presentations at admissions of patients with renal dysfunction (Sanou *et al.*, 2020).

Laboratory investigations that identifies revealed renal dysfunctions includes at plasma urea, serum creatinine, serum electrolytes, and minerals, urine to look for proteinuria, and full blood picture to look for hemoglobin level, leukocytes, and platelets (Sanou *et al.*, 2020). Sample bedside tests using urine dipsticks have been successfully used in determining patients with features of renal dysfunction such as proteinuria, hematuria, leukocytes, and nitrites.(Luyckx *et al.*, 2009; Panjwani, Munshi and Patel, 2019). Vomiting, diarrhea, abdominal pain, dyspnea, headache, anuria, dizziness, cough, fever , chest pain history of sore throat or skin infection, sepsis, sickle cell disease, and fever are reported as the clinical presentations of patients developing renal dysfunction (Banda *et al.*, 2010; Sanou *et al.*, 2020; Kasongo, Siziya and Banda, 2022).

In northwestern, Tanzania study conducted in two referral hospitals reported hematuria, fever, dysuria, diarrhea, rash, vomiting, pallor, dehydration, edema, and decreased urine output as the clinical presentations of the hospitalized patients of developing renal dysfunction (Chami *et al.*, 2019)

HIV Infection have been associated with increased prevalence (42%) of renal dysfunction compared to uninfected (27%) (Banda *et al.*, 2010). The overall prevalence of renal dysfunction in HIV infection in cohort study among HIV infected patients who used. Highly active antiretroviral therapy, (HAART) in Kenya was 6.3%. Alcohol consumption, age, use of concurrent medications, and duration of therapy were other risk factors renal dysfunction in that cohort; The study suggested that there must be closely monitoring of renal function status during the period of use antiretroviral medications to avoid renal toxicity. (Makori *et al.*, 2015) . In Tanzania, duration of ART use, was also linked to increase in prevalence of renal dysfunction. (Msango *et al.*, 2011; Mwemezi *et al.*, 2020; Mwanjala and Urio, 2022) Infection with schistosomiasis mansoni was a risk for developing renal dysfunction is a study done along the shoreline of lake Victoria , in that study the overall prevalence of renal abnormalities was 22.2% and patients had red blood cells in urine (Kayange *et al.*, 2020). Drugs use have been a risk to developing renal dysfunction, In the cross sectional study on the prevalence of renal dysfunction among hospitalized children showed that herbal medication use was associated with renal dysfunction (Chami *et al.*, 2019) .

2.3.2 Risk factors of patients with renal dysfunction

In a cross sectional study done in Mwanza on renal dysfunction among adult patients showed that diabetes and hypertension were strongly associated with renal dysfunction(Kilonzo *et al.*, 2016; Peck *et al.*, 2016) Authors have documented that renal dysfunction is prevalent in patients with sepsis/septic shock (~25%), diabetic emergencies (20%), hypertensive emergencies (12%), respiratory failure (9%), status epilepticus (9%), severe malaria (8%) and poisoning(5%) (Kasongo, Siziya and Banda, 2022).

2.3.3 Mortality and Predictors of Mortality

There is high mortality that has been reported with disappointing outcome among adults and pediatric patients with renal dysfunction(Chami *et al.*, 2019; Sylvanus *et al.*, 2019). In the developed world, researchers have documented high mortality in China was 40%(Zhang *et al.*, 2023) In sub Saharan Africa for example, a study in Johannesburg reported that 30.7% of patients with renal dysfunction died, while in Zambia 19.1% of patients with renal dysfunction died during admission to the emergence department (Sani *et al.*, 2014; Kasongo, Siziya and Banda, 2022). A study in pediatric patients in Nigeria reported death as the outcomes of 30.8% of hospitalized children. Most children who died in this Nigerian study were < 5 years old (71.4%) and survived (45.0%), children died and survived with cough at the time of hospitalization were 42.9% and 16.7% respectively. Also children who need dialysis died (64.5%) and survived (25%) (Esezobor, Ladapo and Lesi, 2015) .

In Johannesburg, patients with renal dysfunctions reported to have long hospital stay (days) 10.3 (7.08%), with initial hospitalization mortality of 18.8%, re-hospitalization day 60 (14.5%), death day 60 (22.8%), death of readmission day 60 (26.9%) and death day 180 (32.0%). (Sani *et al.*, 2014).. In Mwanza, Tanzania, study reported outcomes of the patient admitted with renal dysfunction, post discharge as readmission rate at 1 and 3months (33.7%, 21.4%), mortality rate was 35.4%, and duration of hospital stay were 3 to 8 days(Kilonzo *et al.*, 2016). Another study in Tanzania described that patient presenting who had renal dysfunction and were managed conservatively, 52% of them died while 48% survived; among those patients with renal dysfunction who received dialysis therapy patients 20% of them died and 80% survived respectively within 30 days. loss to follow up was reported in 2.5% and 3.3% of conservative management patients and dialysis patients respectively. (Sylvanus *et al.*, 2019) .

In Nigeria study reported the outcomes of hospitalized patients, 30.8% of children died during hospitalization and 3.3% discharged against medical advice by their parents.44.7% and 8.3% death rate occurred in children with sepsis and malaria respectively. The reason for death rate of children was sepsis (44.7%) and malaria (8.3%). Most children who died were < 5 years old (71.4%) and survived (45.0%), children died and survived with cough at the time of hospitalization were 42.9% and 16.7% respectively. Also children who need dialysis died (64.5%) and survived (25%) (Esezobor, Ladapo and Lesi, 2015) . A study among children in Dar es salaam reported the overall in hospital mortality was 22.5% due to acute kidney injury and 83% survived (Mwamanenge, Assenga and Furia, 2020)

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Study design

The study design was retrospective cross-sectional study. The study was conducted at Muhimbili National Hospital-Mloganzila in the internal medicine department from May 2024 to June 2024 selecting patients who were admitted with renal dysfunction between January to June 2023.

3.2 Study area

The study was conducted at Muhimbili National Hospital Mloganzila; Muhimbili National Hospital- Mloganzila which is located between latitude $6^0$48’ & 56’ south and longitude 39º3’ & 30’ east. The hospital is in Dar es Salaam region, Ubungo Municipal council, Kibamba ward, Kwembe village and Mloganzila street. Muhimbili National hospital-Mloganzila is a super specialized, teaching and referral hospital in Tanzania. The hospital has 1 nephrologist, 4 urologists, 1 nephrologist nurse, 15 registered nurses, 4 medical attendants, 12 dialysis machine. The hospital offers dialysis services and renal transplant services. There were about 600 patients admitted per month in internal medicine department. Patients were attended using both electronic file (JEEVA System) and physical files.

3.3 Study population

The study involved patients aged 18 years and above who were admitted in the Internal Medicine Department at Muhimbili National Hospital-Mloganzila between January and June 2023.

3.3.1 Inclusion criteria

Adult patients aged ≥18 who were admitted with abnormal renal function in the Internal Medicine department between January 2023 and June 2023.

3.3.2 Exclusion criteria

Patients whose records were unavailable

Pregnant women

3.4 Sample size

The sample size was calculated using sample size formula from Fishers formula (Charan and Biswas, 2013)

$$N = \frac{Z^2 P(100-P)}{E^2}$$

Whereby N= Sample size

Z= value for confidence level 95% (1.96)

P= previous of other study (in another study the prevalence of renal dysfunction was 8.69% (Lin *et al.*, 2021)

E= margin of error e=5

$$N = \frac{1.96^2 \times 8.69(100-8.69)}{5^2}$$

N= 122

3.5 Data collection

Data were all fully anonymized before being collected. The study followed the principles of the Declaration of Helsinki ('World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects', 2014).Data was collected using a checklist. The checklist consisted of two parts. The first part contained socio-demographic characteristics and the second part contained information on clinical profile and discharging status. Pilot study was conducted before initiation of the data collection and the findings were used to improve and modify the design of the data collection tools. Data was collected by taking patients' physical and electronic files with available serum creatinine results within 48 hours of admission and leaving those patients' physical or electronic files without serum creatinine. The confidentiality was maintained by using a code number and the institution provided a password to access the electronic files in the Jeeva system.

The patient information such as sex, age, date of admission, and duration of admission was extracted from the patient files requested from medical records and electronic files (Jeeva systems) was used to extract the results of serum creatinine and other clinical findings of the patients.

Data was collected by the researcher and one research assistant. The research assistant was a health professional and received two days of training on the use of data collection tool. Data that was collected includes socio-demographic data such as age, sex, and residency. Clinical presentations such as vomiting, diarrhea, edema, decreased urine output, laboratory investigations such as serum creatinine, hemoglobin, urine protein, and hematuria. The serum creatinine will get used for calculating the estimated glomerular filtration rate in combination with age, sex and body weight. Information on risk factors such as hypertension, diabetes mellitus, HIV, hepatitis B and C, use of nephrotoxic drugs such as Non steroid anti-inflammatory drugs (ibuprofen)-and outcomes of the patients such as survived and died were also collected.

Estimated glomerular filtration rate calculator (eGFR calculator) using chronic kidney disease – epidemiology (CKD – EPI) equation/ formula in combination with serum creatinine, sex, age and race was used. The eGFR calculator was used to identify renal dysfunction as well as the staging of chronic kidney disease. The cutoff point for eGFR was <60 ml/min/1.73 m^2 (Robert, 2015).

The eGFR calculator (used for individual with age of 18 years and above)

$$eGFR=141\times\min(K_{serum\ creatinine},1)^{\alpha}\times\max(K_{serum\ creatinine},1)^{-1.209}\times 0.993^{age}\times F$$ (NKF, 2022)

Where
For male's k is 0.9 and α is -0.411
For female k is 0.9 and α is -0.329
For black individuals, multiply the results by 1.159
F is 1,0 for nonblack individuals and 1.159 for black individuals

3.6 Sampling procedure

A purposive sampling technique was used in selecting the physical and electronic patient files in the medical records. Physical and electronic files of patients that met inclusion criteria (availability of serum creatinine once results within 48 hours of admission) and leaving those physical files or electronic files without serum creatinine results.

3.7 Study variable

The independent variables were socio-demographic data like age and sex, education, occupation, marital status and risks factors such as hypertension, HIV, nephrotoxic drugs, herbal medication, diabetes mellitus and infection. The dependent variable was serum creatinine.

3.8 Data analysis plan

Data was entered into a Microsoft Excel electronic spreadsheet after data collection. Analysis was performed by using the Statistical Program for Social Science (SPSS) version 27 package. Categorical variables were summarized using frequency and percentages. Continuous variables were summarized using mean and standard deviation for normal distributed data or median and interquartile range for skewed data. Univariate and multivariate analysis were used to determine the predictors of mortality. Variables with p value of less than 0.2 on univariate analysis were subjected to multivariate analysis. Variable with p value of less than 0.05 on multivariate analysis were considered significant.

3.9 Ethical consideration

The ethical approval was provided by the Research Ethical Committee of Muhimbili University of Health and Allied Sciences (MUHAS) with reference number MUHAS-REC05-2024-2236 and permission to collect data was obtained from the Directorate of Research, Training and Consultancy at Muhimbili National Hospital-Mloganzila with reference number, Ref.No: JA.294/428/01B/189. This was a hospital -based retrospective cross-sectional study and waiver consent would be obtained. The study information collected was confidential.

3.10 Study limitations and mitigation

There were possibly some missing data since the study was retrospective in nature. To mitigate this, the information was checked in both physical and electronic files to reduce the missing data. Also, the study was excluding files which misses serum creatinine results.

3.11 Dissemination plan

After completion of the study, a copy of the research findings was presented at MUHAS – School of Nursing. Also, the study results were shared with MNH-Mloganzila hospital management where the study has been conducted. However, the study findings were presented in academic journals, scientific conferences, professional gatherings and symposiums.

CHAPTER FOUR

4.0 RESULTS

4.1 Socio demographic characteristics

A total of 1535 patients were admitted in the internal medicine department from January 20223 to June 2023. Of these, 122 (7.9%) participants had renal dysfunction. The mean age of participants was 50.94±18.46 years. There were high proportion of participants aged >60 (33.7%), with 66(54.1%) participants were male and 56 (45.9%) were females. The study showed 88 (72.1%) were married and 53(43.4%) had primary education. Also the study revealed 85(69.7%), participants were unemployed. The details of the results are shown in table 1.

Table 1: The socio-demographic characteristics

Variable	Category	Frequency	Percent (%)
Age (year)	18-30	22	18.0
	31-45	27	22.1
	46-60	32	26.2
	61 and above	41	33.7
Sex	Male	66	54.1
	Female	56	45.9
Marital status	Single	22	18.0
	Married	88	72.1
	Widow	11	9.0
	Divorced	1	0.9
Level of education	Primary	53	43.4
	Secondary	36	29.5
	College	9	7.4
	No formal education	24	19.7
Occupation	Unemployed	85	69.7
	Employed	15	12.3
	Self employed	22	18.0

4.2 The Clinical Profile

The mean length of hospital stay was 6.75±5.69 days and most participants 111 (91.0%), this was their first admission at Mloganzila hospital, the majority of participants with elevated serum creatinine were 109 (89.3%). The mean serum creatinine was 695.46±545.77 µmol/l, and the mean estimated glomerular filtration rate (eGFR) was 21.52±29.32 ml/min/1.73m².

Hemoglobin levels were low in 89 participants (77.4%). The mean hemoglobin (Hb) level was 10.07±3.10 g/dl. Hemodialysis prescribed to 38 participants (31.1%), of these only 28 (23.0%) underwent hemodialysis. Of patients initiated on hemodialysis 83 (68.0%) had an estimated glomerular filtration rate (eGFR) <15 ml/min/1.73m².

Among participants with renal dysfunction, hypertension was the most common comorbidity, affecting 76 (62.3%) participants, while diabetes was present in 30 (24.6%) participants. HIV was positive in 14(11.5%) participants, negative in 49 (40.2%) participants and undocumented in 59(48.4%). There were no participants had Hepatitis B positive and 70 (57.4%) were undocumented, proteinuria was present in 12 (9.9%). Additionally, blood in urine was present in 17 (13.9%) participants, nitrates was positive in 1 (0.8%), leukocytes in urine present in 3 (2.4%) of participants (Table 2).

Table 2: The clinical profile of patients admitted with renal dysfunction

Variable	Category	Frequency	Percent (%)
Length of stay (days)	≤7	76	62.3
	8-14	35	28.7
	15-21	8	6.6
	≥22	3	2.5
Number of admission	1	111	91.0
	2 or more	11	9.0
Hypertension	Yes	76	62.3
	No	46	37.7
Diabetes	Yes	30	24.6
	No	92	75.4
Malignancy	Yes	13	10.7
	No	109	89.3
HIV status	Positive	14	11.5
	Negative	49	40.2

Variable	Category	Frequency	Percent (%)
	Not documented	59	48.4
Hepatitis B	Positive	0	0
	Negative	52	42.6
	Not documented	70	57.4
Hemodialysis prescribed	Yes	38	31.1
	No	84	68.9
On maintenance hemodialysis	Yes	16	13.1
	No	106	86.9
EGFR (ml/min/1.73m^2)	≥ 90	9	7.4
	60-89	5	4.1
	30-59	9	7.4
	15-29	16	13.1
	<15	83	68.0
Serum Creatinine	Normal	13	10.7
	Elevated	109	89.3
Hemoglobin (g/dl)	Normal	29	23.8
	Mild	19	15.6
	Moderate	36	29.5
	Severe	31	25.4
Protein in urine	Positive	12	9.9
	Negative	110	90.1
Blood in urine	Positive	17	13.9
	Negative	105	86.1
Nitrate in urine	Positive	1	.8
	Negative	121	99.2
Leukocytes in urine	Positive	3	2.4
	Negative	119	97.6
Sodium(mmol/l)	Hyponatremia	43	37.0
	Normal	67	57.8
	Hypernatremia	6	5.2
Potassium (mmol/l)	Hypokalemia	3	2.6
	Normal	56	49.6
	Hyperkalemia	54	47.8

4.3 Mortality of patients admitted with renal dysfunction

The six months (January 2023-June 2023) study period, 122 patients had admitted with renal dysfunction, 34 (28%) died and the confidence interval (95% CI) were 20.5 ± 36.1.

4.4 Predictors of Mortality of patients admitted with Renal dysfunction

The study identified several predictors of mortality in patients admitted with renal dysfunction. Multivariate analysis revealed that male participants had a significantly increased mortality risk compared to females (aOR=0.143, 95% CI: 0.040-0.505, P=0.003). Additionally, participants with no formal education had a significantly higher risk of mortality compared to those with primary education (aOR=4.145, 95% CI: 1.10-17.285, P=0.049). Participants with a short hospital stay of ≤7 days had a high mortality risk compared to those who stayed longer 8-14 days (aOR=0.147, 95% CI: 0.024-0.880, P=0.036).

Moreover, participants who were not on hemodialysis during the study time had a higher risk of mortality than those on hemodialysis (aOR=6.474, 95% CI: 1.05-42.632, P=0.048).

Other variables such as age, marital status, occupation, presence of hypertension, diabetes, malignancy, HIV status, mode of renal replacement therapy, hemoglobin levels, glucose in urine, protein in urine, and blood in urine did not show significant associations with mortality in admitted patients with renal dysfunction. These findings suggest that sex, education level, length of hospital stay, and hemodialysis status are independent predictors of mortality among patients with renal dysfunction.

Table 3: Predictors of mortality of patients admitted with renal dysfunction

Variable	Category	Sub category	Univariate analysis				Multivariate analysis			
			Cor	95% CI		P value	aOR	95% CI		P value
				Lower	Upper			Lower	Upper	
Sex	Male		Ref				Ref			
	Female		.44	.19	1.00	.05	.14	.04	.51	.003
Level of	Primary		Ref				Ref			
educatio	Secondary		1.68	.64	4.44	.29	1.60	.46	5.63	.46
n	College		.48	.05	4.23	.51	.19	.01	3.48	.27
	No formal education		3.23	1.14	9.16	.03	4.15	1.10	17.29	.05
Length	≤7		Ref				Ref			
of stay	8-14		.10	.02	.47	.003	.15	.02	.88	.04
(days)	≥15		.98	.26	3.65	.98	1.12	.16	7.76	.91
Presence	Hypertensi	Yes	Ref				Ref			
of other comorbid ities	on	No	2.03	.91	4.56	.08	2.64	.86	8.12	.09
HIV	Positive		Ref				Ref			
status	Negative		.34	.09	1.21	.09	.19	.03	1.09	.06
	Not documente d		.59	.18	1.93	.38	.35	.07	1.86	.22
	On maintenan	Yes	Ref							
	ce hemodialy sis	No	3.03	.65	14.09	.16	6.47	1.05	42.63	.05
Hemoglo	Low		Ref				Ref			
bin	Normal		1.64	.58	4.63	.35	1.25	.31	5.02	.75
	Elevated		3.05	.57	16.19	.19	2.86	.34	23.88	.33

CHAPTER FIVE

5.0 DISCUSSION

This study aimed to determine the clinical profile and predictors of mortality among participants admitted with renal dysfunction. The findings highlight significant predictors of mortality, emphasizing the importance of certain demographic and clinical factors in the prognosis of patients with renal dysfunction.

We investigated a total of 122 participants admitted at Muhimbili National Hospital-Mloganzila in the internal medicine department. Renal dysfunction defined as elevated serum creatinine was found in 109 (89.3%) of these participants had severe renal impairment. This finding is consistent with other studies reported high prevalence of renal dysfunction defined by high levels of serum creatinine (Sanou *et al.*, 2020; Masina *et al.*, 2022). Elevated levels of these markers are indicative of impaired kidney function and are associated with worse outcomes.

The higher prevalence of renal dysfunction was found among males (54.1%) participants compared to females (45.9%)(Muntner *et al.*, 2002; Sani *et al.*, 2014). This could be due to higher rates of risk factors such as hypertension and diabetes in males, as well as lifestyle factors such as smoking and alcohol consumption, which are more prevalent among men. However, other studies have reported a higher prevalence renal dysfunction among females (48.2%,54.3%,66%,) compared to males (Kilonzo *et al.*, 2016; Mapesi *et al.*, 2016; Peck *et al.*, 2016; Chami *et al.*, 2019). The discrepancies could be due to differences in the populations studied, healthcare access, and cultural factors influencing health-seeking behavior. Additionally, recent studies have shown hypoestrogenemia has indirect causes of renal dysfunction. The effect is through increased risk of cardiovascular diseases which will lead to increased risk of renal dysfunction(Ahmed and Ramesh, 2016). Furthermore, the direct association of sex hormone especially estrogen is still controversial(Conte *et al.*, 2023). Males have low estrogen compared to female hence lead to increased risk of renal dysfunction(Iglesias, Carrero and Díez, 2012).

It has been shown in other studies that renal dysfunction increases with age (Banda *et al.*, 2010; Makori *et al.*, 2015; Mwemezi *et al.*, 2020; Kasongo, Siziya and Banda, 2022).In this study we also observe similar trend of increasing renal dysfunction with increasing age, the difference was not statistically significant. The higher prevalence in older patients can be attributed to age-related decline in renal function and the increased likelihood of comorbid conditions such as hypertension and diabetes, which are significant risk factors for renal dysfunction (Kasongo, Siziya and Banda, 2022).

Most participants were married (72.1%) and (43.4%) had primary education, with (69.7%) being unemployed low educational levels and unemployment being associated with higher risk of developing renal dysfunction (Peck *et al.*, 2016). Education level may influence health literacy, decision to access to healthcare, and adherence to treatment, while unemployment could limit access to health insurance and healthcare services.

Among the comorbidities, hypertension (62.3%) was the most common and diabetes in (24.6%). Non communicable disease have been linked to increased risk of developing renal dysfunction, and being the leading causes of chronic kidney disease and kidney failure worldwide (Kilonzo *et al.*, 2016; Peck *et al.*, 2016). Our study showed 48.4% had undocumented HIV while 11,5% were HIV positive, and all participants being already on ART.

HIV infection is well known risk for renal disease especially in Sub Saharan Africa where its burden is higher than in the other parts of the world and with higher numbers of patients who are not on ART(Masina *et al.*, 2022).

The mean length of hospital stay was 6.75 days. A mortality in this study was 34 (28%). This high mortality in our study is comparable to other studies conducted in sub-Saharan Africa, which have reported mortality rates ranging from 19.1% to 85% among patients with renal dysfunction (Sani *et al.*, 2014; Kasongo, Siziya and Banda, 2022).

In our study female participants had a lower risk of mortality compared to males (aOR=0.143, P=0.003). This finding contrasts with some studies that have reported higher mortality rates among females with renal dysfunction (Makori *et al.*, 2015; Nyende *et al.*, 2020). The lower mortality risk among females in this study could be attributed to biological

differences in disease progression and response to treatment may also play a role(Iglesias, Carrero and Díez, 2012; Ahmed and Ramesh, 2016).

The length of hospital stays also emerged as a significant predictor of mortality. Participants who stayed 8-14 days had a lower risk of mortality compared to those who stayed ≤7 days (aOR=0.147, P=0.036). This finding suggests that early mortality could be associated with more severe symptoms at the initial presentations and the associated complications. In our study during the initial presentation at admission, 89 (73%) of participants had anemia, hyponatremia 43 (37%), and hyperkalemia 54 (47.8%) and hemodialysis was performed in 28(23 %) patients. Mortality risk was higher in participants who did not received hemodialysis (aOR=6.474, P=0.048) and lesser risk of mortality in those with longer duration of hospital stay might indicate successful stabilization and management of their conditions. Studies have shown that longer hospital stays are often associated with better outcomes due to more comprehensive care (Sani *et al.*, 2014).

Patients not on hemodialysis had a higher risk of mortality in sub-Saharan Africa, delays of diagnosis and need for dialysis at the initial presentation is a common , and largely due to poor access to these services owing to lack of awareness, financial constraints and lack of expertise (Masina *et al.*, 2022). Lower levels of education have been associated with higher risk of mortalities in patients with renal dysfunction(Msango *et al.*, 2011). Our also found that participants with no formal education had a higher risk of mortality compared to those with primary education (aOR=4.145, P=0.049). This aligns with research indicating that lower educational levels are associated with poorer health outcomes and higher mortality rates (Peck *et al.*, 2016). Education influences health literacy, which affects patients' understanding of their condition, adherence to treatment, and ability to navigate the healthcare system. Initiation of hemodialysis or lack of access to this treatment could contribute to higher mortality rates. Timely initiation of hemodialysis has been reported to have improved survival among patients with severe renal dysfunction (Sylvanus *et al.*, 2019). Hemodialysis helps in managing the accumulation of toxins and maintaining fluid balance, which are crucial for patient survival.

5.1 Study limitation

The study was retrospective design in which there were some missing data. To mitigate this; participants who missed important information were excluded from the study. Also the other limitation was bias due to the use of purposive sampling.

CHAPTER SIX

6.0 CONCLUSION AND RECCOMENDATION

6.1 Conclusion

This study has highlighted the clinical profile and key predictors of mortality among patients admitted with renal dysfunction at Muhimbili National Hospital-Mloganzila. The findings indicate that older adults, predominantly male, constitute the majority of patients, with hypertension and diabetes being common comorbidities. The study identified significant predictors of mortality, including sex, education level, length of hospital stay, and maintenance hemodialysis. Female patients and those with longer hospital stays exhibited lower mortality, whereas patients with no formal education and those not on maintenance hemodialysis faced higher mortality risks. These insights underscore the urgent need for targeted interventions and tailored patient care to enhance outcomes for individuals with renal dysfunction.

Given the identified predictors of mortality, there is a critical need to implement strategies aimed at early detection and effective management of renal dysfunction, particularly among high-risk groups. Our study suggests that comprehensive patient education, timely initiation of maintenance hemodialysis, and addressing disparities in healthcare access are essential steps towards improving patient survival. By focusing on these areas, healthcare providers and policymakers can make significant strides in reducing mortality and enhancing the quality of life for patients suffering from renal dysfunction.

6.2 Recommendations

Early Identification and Management: Our findings emphasize the need for routine screening for renal dysfunction, especially in high-risk groups such as older adults and patients with hypertension and diabetes. Early detection and timely intervention can improve patient outcomes.

Comprehensive Patient Education: Enhance patient education programs to improve health literacy, particularly for those with lower educational levels, as our study found higher mortality among patients with no formal education. Educated patients are more likely to adhere to treatment and manage their conditions effectively.

Initiation of Maintenance Hemodialysis: Ensure timely initiation of maintenance hemodialysis for patients with severe renal dysfunction. Our findings show higher mortality in patients not on maintenance hemodialysis, indicating the need for improved access to this life-saving treatment.

Government must develop Health Policy on Chronic Disease Management: Develop and implement policies prioritizing the management of chronic diseases like hypertension and diabetes, significant risk factors for renal dysfunction identified in our study. Effective chronic disease management can reduce the incidence of renal dysfunction.

Government must ensure Healthcare Access and Equity to the population: Address disparities in healthcare access, particularly for vulnerable populations such as the unemployed and those with low educational levels, as indicated by our study. Policies should aim to make healthcare services more affordable and accessible to all.

Government may allocate Funding for Renal Health Programs: Allocate sufficient funding for renal health programs, including the provision of hemodialysis facilities and training of healthcare professionals. Our findings suggest that adequate resources are crucial for sustaining effective renal health services and reducing mortality.

Prospective Studies: Conduct prospective studies to further investigate the predictors of mortality in patients with renal dysfunction. Our findings highlight the need for longitudinal data to provide comprehensive insights into the progression and management of the condition.

REFERENCES

Ahmed, B. and Ramesh, S. (2016) 'Sex hormones in women with kidney disease', pp. 15868–15875. Available at: https://doi.org/10.1093/ndt/gfw084.

Banda, J. *et al.* (2010) 'Prevalence and Factors Associated with Renal Dysfunction in HIV Positive and Negative Adults at the University Teaching Hospital, in Lusaka.', *Medical journal of Zambia*, 37(3), pp. 136–142.

Chami, N. *et al.* (2019) 'Prevalence and factors associated with renal dysfunction in children admitted to two hospitals in northwestern Tanzania', *BMC Nephrology*, 20(1), pp. 1–8. Available at: https://doi.org/10.1186/s12882-019-1254-9.

Charan, J. and Biswas, T. (2013) 'How to calculate sample size for different study designs in medical research?', *Indian Journal of Psychological Medicine*, 35(2), pp. 121–126. Available at: https://doi.org/10.4103/0253-7176.116232.

Chwojnicki, K. *et al.* (2016) 'Renal dysfunction in post-stroke patients', *PLoS ONE*, 11(8), pp. 1–12. Available at: https://doi.org/10.1371/journal.pone.0159775.

Conte, C. *et al.* (2023) 'Role of Sex Hormones in Prevalent Kidney Diseases'.

Esezobor, I., Ladapo, T.A. and Lesi, F.E. (2015) 'Clinical Profile and Hospital Outcome of Children with Severe Acute Kidney Injury in a Developing Country', (December 2014), pp. 54–60. Available at: https://doi.org/10.1093/tropej/fmu066.

Fakultät, R.-S. (1980) 'Ernst-Moritz-Arndt-Universität Greifswald The Economics of Dialysis in Tanzania'.

Gottwald, M. (2006) 'Health Promotion Models', *Rehabilitation: The Use of Theories and Models in Practice*, pp. 131–146. Available at: https://doi.org/10.1016/B978-0-443-10024-6.50010-4.

Id, A.M. *et al.* (2022) 'Demographic and clinical profile of black patients with chronic kidney disease attending a tertiary hospital in Johannesburg , South Africa', 61, pp. 1–15. Available at: https://doi.org/10.1371/journal.pone.0266155.

Iglesias, P., Carrero, J.J. and Díez, J.J. (2012) ‘Gonadal dysfunction in men with chronic kidney disease : clinical features , prognostic implications and therapeutic options’, 25(5), pp. 31–42. Available at: https://doi.org/10.5301/JN.2011.8481.

Kasongo, N., Siziya, S. and Banda, J. (2022) ‘African Journal of Emergency Medicine Clinical profile and predictors of renal failure in emergency department patients at a tertiary level hospital , a cross sectional study’, *African Journal of Emergency Medicine*, 12(4), pp. 456–460. Available at: https://doi.org/10.1016/j.afjem.2022.10.010.

Kayange, N.M. *et al.* (2020) ‘Renal abnormalities and its associated factors among school-aged children living in Schistosoma mansoni endemic communities in Northwestern Tanzania’, 6.

Kaze, F.F. *et al.* (2015) ‘General Hospital in Cameroon : a five-year audit’, 8688, pp. 1–5. Available at: https://doi.org/10.11604/pamj.2015.21.205.5945.

KDIGO (2023) ‘Clinical Practice Guideline for Acute Kidney Injury (AKI) and Acute Kidney Disease (AKD) Update 2023’, pp. 1–18.

Kilonzo, S.B. *et al.* (2016) ‘Renal dysfunction among adult patients in Mwanza , Tanzania : prevalence , outcomes and associated factors’, 18(3), pp. 1–8.

Lin, M. *et al.* (2021) ‘Prevalence and Associated Factors of Kidney Dysfunction in Patients with Hypertension and / or Diabetes Mellitus from a Primary Care Population in Northwest China Prevalence and Associated Factors of Kidney Dysfunction in Patients with Hypertension and / ’. Available at: https://doi.org/10.2147/IJGM.S329604.

Luyckx, V.A. *et al.* (2009) ‘Acute Renal Failure Associated with the Use of Traditional Folk Remedies in South Africa Acute Renal Failure Associated with the Use of Traditional Folk Remedies in South Africa’, 6049. Available at: https://doi.org/10.1081/JDI-42872.

Makori, J.O. *et al.* (2015) ‘Incidence and Risk Factors of Renal Dysfunction in Patients on Nevirapine-Based Regimens at a Referral Hospital in Kenya’, *African Journal of Pharmacology and Therapeutics*, 4(2), pp. 48–58.

Mapesi, H. *et al.* (2016) 'Prevalence and Evolution of Renal Impairment in People Living With HIV in Rural Tanzania', (Cdci), pp. 1–8. Available at: https://doi.org/10.1093/ofid/ofy072.

Masina, J. *et al.* (2022) 'Clinical Profile of Adult Patients Presenting With Renal Dysfunction to a Tertiary Hospital Emergency Department', 14(2), pp. 6–13. Available at: https://doi.org/10.7759/cureus.21873.

Msango, L. *et al.* (2011) 'Renal dysfunction among HIV-infected patients starting antiretroviral therapy', *Aids*, 25(11), pp. 1421–1425. Available at: https://doi.org/10.1097/QAD.0b013e328348a4b1.

Muntner, P. *et al.* (2002) 'Renal Insufficiency and Subsequent Death Resulting from Cardiovascular Disease in the United States', pp. 745–753.

Mwamanenge, N.A., Assenga, E. and Furia, F.F. (2020) 'Acute kidney injury among critically ill neonates in a tertiary hospital in Tanzania ; Prevalence , risk factors and outcome', *PLOS ONE*, 25(2), pp. 1–11.

Mwanjala, M.N. and Urio, L.J. (2022) 'Prevalence and predictors of renal dysfunction among people living with HIV on antiretroviral therapy in the Southern Highland of Tanzania : a hospital-based cross-sectional study'.

Mwemezi, O. *et al.* (2020) 'Renal Dysfunction among HIV-Infected Patients on Antiretroviral Therapy in Dar es Salaam , Tanzania : A Cross-Sectional Study', 2020.

NKF (2022) *Frequent asked Question about GFR*.

Nyende, L. *et al.* (2020) 'Prevalence of renal dysfunction among HIV infected patients receiving Tenofovir at Mulago: A cross-sectional study', *BMC Nephrology*, 21(1), pp. 1–6. Available at: https://doi.org/10.1186/s12882-020-01873-y.

Odetunde, O.I. *et al.* (2014) 'Renal Replacement Therapy in Children in the Developing World : Challenges and Outcome in a Tertiary Hospital in Southeast Nigeria', 2014.

Panjwani, S., Munshi, H. and Patel, C. (2019) 'Clinical Profile of Acute Kidney Injury in Hospitalized Patients', *International Journal of Science Research*, 8(2), pp. 15–19.

Peck, R. *et al.* (2016) 'Decreased renal function and associated factors in cities , towns and rural areas of Tanzania : a community-based population survey', *Tropical Medicine and International Health*, 21(3), pp. 393–404. Available at: https://doi.org/10.1111/tmi.12651.

Robert, S. (2015) *Manual of nephrology*. 8th edn.

Sani, M.U. *et al.* (2014) 'Renal dysfunction in African patients with acute heart failure', *European Journal of Heart Failure*, 16(7), pp. 718–728. Available at: https://doi.org/10.1002/ejhf.103.

Sanou, G. *et al.* (2020) 'Clinical , Paraclinical , and Evolutionary Profiles of Kidney Failure in Gold Miners Hospitalized in a Nephrological Service in a Sub-Saharan African Country', 2020.

Sylvanus, E. *et al.* (2019) 'Profile and outcome of patients with emergency complications of renal failure presenting to an urban emergency department of a tertiary hospital in Tanzania', *BMC Emergency Medicine*, 2, pp. 1–8.

'World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects' (2014) *The Journal of the American College of Dentists*, pp. 14–18. Available at: https://doi.org/10.1093/acprof:oso/9780199241323.003.0025.

Zhang, S. *et al.* (2023) 'Global, regional, and national burden of kidney dysfunction from 1990 to 2019: a systematic analysis from the global burden of disease study 2019', *BMC Public Health*, 23(1), pp. 1–15. Available at: https://doi.org/10.1186/s12889-023-16130-8.

APPENDICES

Appendix I: Checklist

PART A; DEMOGRAPHIC INFORMATION

Instructions: Put tick to the correct answer provided

1. Gender of the patient
    a. Male
    b. Female
2. Age of patient ……. (years)
3. Marital status of the patient
    a. Single
    b. Married
    c. Widow
    d. Cohabiting
    e. Divorce
4. Level of education
    a. Primary education
    b. Secondary education
    c. College level and above
    d. No formal education
5. Occupation
    a. Unemployed
    b. Employed
    c. Self employed
6. Date of admission ……...
7. Date of discharge ……
8. Date of death ……
9. Length of hospital stay……. (days)
10. Number of admission in the hospital……...

PART B; CLINICAL PROFILE

11. Was the serum creatinine measured? (within 48 hours of admission)
    a. Yes
    b. No
12. What was the level of serum creatine umol/l……...?
13. What is estimated EGFR ……... (To be calculated by EGFR calculator)
14. Was Blood Urea nitrogen done within 48 hours of admission?
    a. Yes
    b. No
15. What is the level of BUN mmol/l ……?
16. Was serum Potassium done within 48 hours of admission?
    a. Yes
    b. No
17. What is the level of serum potassium……?
18. Was serum sodium measured within 48 hours of admission?
    a. Yes
    b. No
19. What is the level of serum Sodium……?
20. What is the level of calcium……?/
21. What is the level of parathyroid hormone……...?
22. What is the level of serum albumin……...?
23. What is the level of vitamin D …….?
24. What is the level of phosphorous…….?
25. Was the FBP done within 48 hour of admission?
    a. Yes
    b. No
26. What is the Hb level g/dl……...?
27. Was urine test done?
    a. Yes
    b. No
28. Results of urine tests…….

29. Which imaging test have been measured within 48hrs of admission? (Multiple response)
    a. Kidney Ureter Bladder (KUB) ultrasound
    b. Doppler ultrasound
    c. Abdominal pelvic ultrasound
    d. Contrast tomography scan (CT Scan)
    e. Magnetic resonance image (MRI)
    f. If any, specify…….
30. What is the clinical presentations of the patient during admission? (Multiple response)
    a. Fever
    b. Nausea
    c. vomiting
    d. abdominal pain
    e. Loss of appetite
    f. Constipation
    g. Decreased urine output
    h. Diarrhea
    i. Cough
    j. Difficulty in breathing
    k. Pruritus
    l. Body swelling
    m. Seizures
    n. Confusion
    o. Loss of consciousness
    p. Dysuria
    q. Reduced urine output
    r. Bleeding
    s. If any, specify …….

31. What is the other comorbidities? (Multiple response)
    a. Hypertension (yes / no)
    b. Diabetes mellitus yes /no
    c. Malignancy (Yes/No)
    d. Sickle cell anemia (Yes/No)
32. What is HIV status?
    a. positive
    b. negative
    c. not known /not checked
33. What is Hepatitis B status?
    a. positive
    b. negative
    c. not checked
34. History of use of nephrotoxic drugs like non steroid anti-inflammatory drugs (NSAID)
    a. Yes
    b. No
    c. Not document
35. Was the renal management initiated?
    a. Yes
    b. No
36. Mode of renal replacement of the patients admitted with renal dysfunction? (Multiple response)
    a. hemodialysis prescribed yes/no
    b. Dialysis-hemodialysis done- yes/no
37. What is the admission outcome of the patient?
    a. Discharged
    b. Died
38. The currently status of the patient
    a. Alive
    b. Died
    c. Loss follow up

Appendix II: Orodha ya Ukaguzi

SEHEMU A: TAARIFA BINAFSI

Weka tiki kwenye jibu sahihi lililotolewa

1. Jinsia ya mgonjwa
    a. Mwanaume
    b. Mwanamke

2. Umri wa mgonjwa …… (miaka)

3. Hali ya ndoa
    a.Hajaoa
    b. Ameoa/Ameolewa
    c. Mgane/ Mjane
    d. Wanaishi pamoja
    e. Ametalikiana

4. Kiwango cha elimu
    a. Elimu ya msingi
    b. Elimu ya Sekondari
    c. Elimu ya chuo na zaidi
    d. Hakusoma

5. Kazi
    a. Hajaajiriwa
    b. Ameajiriwa
    c. Amejiajiri mwenyewe

6. Tarehe ya kulazwa…….

7. Tarehe ya kuruhusiwa…….

8. Tarehe ya kufariki……...

9. Siku alizokaa hospitalini……...

10. Mara ngapi amelazwa hospitalini……

SEHEMU B: Vipimo na muonekano wa hali ya mgonjwa

11. Je, kreatinini kwenye damu ilipimwa ndani ya masaa 48 ya kulazwa?
    a. Ndiyo
    b. Hapana

12. Kiwango cha kreatinini kwenye damu ummol/l……..

13. Kiasi cha Egfr kinachokadiriwa……..(Kuhesabiwa na kikokotoo cha eGFR)
14. Kipimo cha urea ya damu kilifanyika ndani ya masaa 48 ya kulazwa?
    a. Ndiyo
    b. Hapana

15. Kiwango cha urea kwenye damu mmol/l……..
16. Je, kipimo cha potassiumu kwenye damu kilifanyika ndani ya mss aa 48 ya kulazwa?
    a. Ndiyo
    b. Hapana

17. Kiwango cha potassium kwenye damu mmol/l…….
18. Kiwango cha sodiumu kwenye damu kilipimwa mdani ya masaa 48 ya kulazwa?
    a. Ndiyo
    b. Hapana

19. Kiwango cha sodiumu kwenye damu mmol/l…….

20. Kiwango cha ionized calcium kwenye damu…….

21. Kiwango cha vitamin D kwenye damu…….

22. Kiwango cha parathyroid homoni kwenye damu……

23. Kiwango cha albumini kwenye damu……..

24. Kiwango cha phospheti kwenye damu…….

25. Kipimo kikubwa cha damu (FBP) kilifanyika ndani ya masaa 48 ya kulazwa?

a. Ndiyo

b. Hapana

26. Kiwango cha wingi wa damu (Hb) g/dl…….

27. Kipimo cha mkojo kimefanyika?

a. Ndiyo

b.Hapana

28. Majibu ya kipimo cha mkojo……..

29. Vipimo vinavyotummia mawimbi sauti, miozi and usumaku vilivyofanyika ndani ya masaa 48 ya kulazwa (Jibu zaidi ya moja)

a. Mawimbi sauti ya figo,ureta, kibofu cha mkojo (KUB)

b. Mawimbi sauti ya Mishipa ya damu

c. Mawimbi sauti ya nyonga ya tumbo

d. Mionzi (CT Scan)

e. Usumaku (MRI)

e. Taja kama kuna kipimo kingine …….

30. Ni dalili zipi alizokuwanazo mgonjwa wakati wa kulazwa ndani ya masaa 48? (Jibu zaidi ya moja)

a. Homa

b. Kichefuchefu

c. Kutapika

d. Maumivu ya tumbo

e. Kupoteza hamu ya kula

f. Kupata choo kigumu

g. Kupungua kwa kiasi cha mkojo

h. Kuhara

i. Kikohozi

j. Kupumua kwa shida

k. Kuwashwa

l. Kuvimba mwili

m. Kifafa

n. Kuchanganyikiwa

o. Kupoteza fahamu

p. Maumivu wakati wa kukojoa

r. Kutokwa na damus

s. Taja kama kuna kingine …….

31. Magonjwa mengine yanayosababisha ugonjwa wa fiko (Jibu zaidi ya moja)

a. Shinikizo la damu (ndiyo/hapana)

b. Kisukari (ndiyo/hapana)

c. Ugonjwa wa kansa (ndiyo/hapana)

d. Ugonjwa wa seli mundu (ndiyo/hapana)

32. Hali ya maambukizi ya virusi vya ukimwi

a. Chanya

b. Hasi

c. hajapimwa/ Haijaandikwa

33. Hali ya homa ya ini

a. Chanya

b. Hasi

c. Hajapimwa/haijaandikwa

34. Je, ulishawahi kutumia dawa ambazo ni sumu kwenye figo(NSAID)?

a. Ndiyo

b. Hapana

c. Haijaandikwa

35. Je, matibabu ya figo yalianzishwa?

a. Ndiyo

b. Hapana

36. Je, kuna njia mbadala iliyotumika kuchuja sumu kwenye figo kwa wagonjwa waliolazwa na matatizo ya figo? (Jibu zaidi ya moja)

a. Kuchuja damu kwa kutumia mashine ulitolewa? (ndiyo/hapana)

b. Kuchuja damu kwa kutumia mashine umefanyika? (ndiyo/hapana)

37. Matokeo ya mgonjwa kulazwa
    a. Ameruhusiwa
    b. Amefariki
38. Hali ya mgonjwa kwa sasa
    a. Hai
    b. Amefariki
    c. Amepotea

Appendix III: Informed consent form

INFORMED CONSENT WAIVER REQUEST

Research title: Clinical profile and predictors of mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital – Mloganzila.

Name of the researcher: Sinaraha Daud Ngonela

The purpose of the study: To determine clinical profile and predictors of mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital – Mloganzila.

The proposed research will be examining the medical records of all patients diagnoses with renal dysfunction at Muhimbili National Hospital – Mloganzila between January 2023 and June 2023.

Data collection

Data were all fully anonymized before being accessed. The study followed the principles of the Declaration of Helsinki (World Medical Association, 2013).

Data will be collected using checklist. The checklist will consist two parts. The first part will contain social demographic characteristics and the second part will contain information on clinical profile and discharging status in terms of mortality status either died or alive. Pilot study will be conducted before initiation of the data collection and the findings will be used to improve and modify the design of the data collection tools. Those patients with renal dysfunction from the available results of serum creatinine in jeeva system within 48-hour post admission will be included in the study. The patient information such as sex, age, date of admission, duration of admission will be extracted from the patient files requested from medical records and electronic files (jeeva systems) will be used to extract the results of serum creatinine and other clinical findings of the patients.

Data that will be collected includes socio-demographic data such as age, sex, residency. Also, laboratory investigations such as serum creatinine, hemoglobin, urine protein will be collected. The serum creatinine will help in calculating estimated glomerular filtration rate

in combination with age, sex and body weight. Information on risk factors such as hypertension, diabetes mellitus, HIV, hepatitis B and C, use of nephrotoxic drugs such as Non steroid anti-inflammatory drugs (ibuprofen)-and outcomes of the patients such as survived and died will also be collected.

Estimated glomerular filtration rate calculator (eGFR calculator) using chronic kidney disease – epidemiology (CKD – EPI) equation/ formula in combination with serum creatinine, sex and race will be used. The eGFR calculator will be used in identifying renal dysfunction as well as staging of chronic kidney disease. The cutting point for eGFR will be <60 ml/min/1.73 m^2 (Robert, 2015).

The eGFR calculator (used for individual with age ≥ 18 years and above)

eGFR=141×min (Kserum creatinine,1) α ×max (Kserum creatinine,1) −1.209×0.993age×F (NKF, 2022)

Where
For male's k is 0.9 and α is -0.411
For female k is 0.9 and α is -0.329
For black individuals, multiply the results by 1.159
F is 1,0 for nonblack individuals and 1.159 for black individuals
The current survival status will be inquired for those who were discharged alive through phone call for those for did not attend hospital for more than 3 months. Patients or relatives of the patients who will not pick up call for more than 3 times in different days will be considered as lost follow up. For those who will pick up phone call will be asked about the condition of the patient, if alive or dead. If alive they will be advised for regular follow up clinic and if dead a word of condolences will be given and the exact date of death will be recorded.

Justification for IRB to approve a Waiver of informed consent

- The research involves no more than minimal risk to the participants

The research is low risk because the medical records are being reviewed for limited information. There is a negligible risk of harm to the patients' status, employment or

insurability. The significant risk of a breach of confidentiality is mitigated by restricting the record review to specified data.

- The waiver or alteration will not adversely affect the rights and welfare of the subjects

The rights and welfare of the individual would not be adversely affected because the clinical profile and mortality of the renal dysfunction details were indicated and already completed regardless of the research. None of the research results would affect the clinical decisions about the individuals care after the fact. Participants are not deprived of clinical care to which they would usually be entitled.

- The research will not be possible to be conducted without the waiver or alteration of waiver

Identifying and contacting the hundreds of potential participants, although not impossible, would not be feasible to review their medical records for information that would not change the care they would have already received. It is difficult to conduct individuals directly when there is no existing or continuing relationship between the hospital and them.

- It would be inappropriate to inform these subjects about the research discoveries as the results would not affect the participants

The clinical profile and mortality of renal dysfunction have been completed for these participants. There is no projected advantage to patients that would alter the course of events.

Data analysis plan

Data will be entered into a Microsoft Excel electronic spreadsheet after data collection. Analysis will be performed by using the Statistical Program for Social Science (SPSS) version 23 package. Categorical variables will be summarized using frequency and percentages. Continuous variables will be summarized using mean and standard deviation for normal distributed data or median and interquartile range for skewed data. Kaplan Meir curves will be used to describe the admission discharging status. The log rank test and cox proportional hazard regression analysis will be used to assess the predictors of mortality Predictors of mortality will be determined using univariate and multivariate analysis. P value of less than 0.05 will be considered significant.

Appendix IV: Ethical clearance



UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS

AND INNOVATIONS



Ref. No.DA.282/298/01.C/2236 Date: 08/05/2024

MUHAS-REC-05-2024-2236
SINARAHA DAUD NGONELA
SHOOL OF NURSING
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: CLINICAL PROFILE AND PREDICTORS OF MORTALITY OF PATIENTS ADMITTED WITH RENAL DYSFUNCTION IN THE INTERNAL MEDICINE DEPARTMENT AT MUHIMBILI NATIONAL HOSPITAL-MLOGANZILA

Reference is made to the above heading,

I am pleased to inform you that the Chairperson has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 08/05/2024
EXPIRATION DATE OF APPROVAL: 08/05/2025

STUDY DESCRIPTION:

Purpose:

This study aims to determine the clinical profile and predictors of mortality of patients admitted with renal dysfunction in the internal medicine department at Muhimbili National Hospital –Mloganzila.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2015662.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain Data Transfer Agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain Material Transfer Agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Apply for and obtain permission to publish the results from National Institute for Medical Research. The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.



Dr. Nahya Salim Masoud,
Chairperson, MUHAS Research and Ethics Committee

Appendix V: Introduction letter

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.466/2022

14th May, 2024

The Executive Director,
Muhimbili National Hospital,
P.O. Box 65000,
DAR ES SALAAM.

RE: INTRODUCTION LETTER OF SINARAHA DAUD NGONELA

We would like to inform you that the carrier of this letter is Sinaraha Daud Ngonela with registration number HD/MUH/T.466/2022 a student at Muhimbili University of Health and Allied Science (MUHAS), Pursuing MSc. Nephrology Nursing.

As part of her studies,she will be doing an elective research titled: **"Clinical Profile And Predictors Of Mortality Of Patients Admitted With Renal Dysfunction In The Internal Medicine Department At Muhimbili National Hospital- Mloganzila".** she is being supervised by from Mr.Rashid Heri MUHAS and Asela Josephat from Mloganzila.

The Ethical Clearance for doing the said research has been given by the University.

Kindly request your assistance and cooperation to our student.

Yours Sincerely,

Ms.Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

cc: Sinaraha Daud Ngonela

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix VI: Permission letter

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF HEALTH

MUHIMBILI NATIONAL HOSPITAL
MLOGANZILA

In reply please quote
Ref. No.: JA.294/428/01B/189 **17/05/2024**

Head of Department,
Clinical Nursing
Muhimbili National Hospital-Mloganzila

RE: PERMISSION TO COLLECT DATA AT MNH - MLOGANZILA

Name of Principal Investigator	Sinaraha Daud Ngonela
Title	**"Clinical Profile and Predictors of Mortality of Patients admitted with Renal Dysfunction in the Internal Medicine Department at Muhimbili National Hospital-Mloganzila".**
Institution	Muhimbili University of Health and Allied Sciences
Supervisors	Mr. Rashid Heri Dr. Godfrey Malangwa-Mloganzila
Period	17th May 2024-30th September 2024

Approval has been granted to the above principal investigator to collect data at MNH-Mloganzila. Kindly ensure the named principal investigator abide to the ethical principles and other conditions of the research approval.

HEAD, TEACHING, RESEARCH & CONSULTANCY UNIT
P. O. Box 65000
DAR-ES-SALAAM
MUHIMBILI NATIONAL HOSPITAL-MLOGANZILA

Mbwalila Ng'amilo
Ass. Head Clinical Research, Training and Consultancy Unit

c.c. DNS
cc. Head-Medical Records
cc. Sinaraha Daud Ngonela