

**DETERMINANTS OF DEHYDRATION AMONG CHILDREN UNDER FIVE  
YEARS WITH ACUTE DIARRHEA ATTENDING MBAGATHI HOSPITAL IN  
NAIROBI CITY COUNTY, KENYA**

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### DECLARATION

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

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**DEDICATION**

I dedicate this dissertation to my Mother, children and colleagues for the invaluable support provided throughout the entire period.

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## TABLE OF CONTENTS

<b>DECLARATION.....</b>	<b>ii</b>
<b>DEDICATION.....</b>	<b>iii</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>iv</b>
<b>TABLE OF CONTENTS .....</b>	<b>v</b>
<b>LIST OF TABLES .....</b>	<b>ix</b>
<b>LIST OF FIGURES .....</b>	<b>x</b>
<b>ABBREVIATIONS AND ACRONYMS.....</b>	<b>xi</b>
<b>DEFINITION OF OPERATIONAL TERMS.....</b>	<b>xiii</b>
<b>ABSTRACT.....</b>	<b>xv</b>
<b>CHAPTER ONE: INTRODUCTION.....</b>	<b>1</b>
1.1 Background of Study.....	1
1.2 Problem Statement .....	5
1.3 Justification .....	6
1.4 Research Questions .....	8
1.5 Null Hypothesis.....	8
1.6 Objectives of the Study .....	9
1.6.1 Main Objective .....	9
1.6.2 Specific Objectives .....	9
1.7 Significance of the Study .....	10
1.8 Assumptions of the Study .....	10
1.9 Limitations of the Study .....	10
1.10 Delimitations of the Study.....	11
1.11 Conceptual Framework .....	12
<b>CHAPTER TWO: LITERATURE REVIEW.....</b>	<b>14</b>
2.1 Introduction .....	14
2.2 Dehydration.....	15
2.3 Global Burden of Diarrheal Disease in Children .....	15
2.4 Local Burden of Diarrheal Disease .....	16

2.5 Socio- Demographic Characteristics of Primary Care Givers and Dehydration in Children .....	17
2.6 Social- Cultural Beliefs of Primary Care Givers and Dehydration in Children .....	18
2.7 Primary Care Giver’s Level of Knowledge in Diarrhea Management and Dehydration in Children .....	19
2.8 Prior Actions Taken by Primary Care Givers to Manage Acute Diarrhea and Dehydration in Children .....	21
2.9 Gaps in Existing Literatures .....	22
2.10 Theoretical Model .....	24
<b>CHAPTER THREE: MATERIALS AND METHODS .....</b>	<b>26</b>
3.1 Study Design .....	26
3.2 Study Variables .....	26
3.2.1 Dependent Variable .....	26
3.2.2 Independent Variables .....	26
3.3 Study Site .....	26
3.4 Study Population .....	27
3.5 Sampling Technique.....	28
3.6 Sample Size Determination.....	30
3.7 Research Instruments .....	31
3.7.1 Investigator Administered Questionnaire.....	31
3.7.2 Focus Group Discussion Guide .....	31
3.8 Pre- Testing of the Data Collection Tools.....	31
3.9 Validity.....	32
3.10 Reliability .....	32
3.11 Data Collection Procedure .....	32
3.11.1 Questionnaires .....	33
3.11.2 Focus Group Discussion.....	33
3.12 Data Analysis .....	33
3.12.1 Quantitative Data.....	33
3.12.2 Qualitative Data.....	34

3.13 Logistical and Ethical Considerations.....	34
<b>CHAPTER FOUR: RESULTS .....</b>	<b>36</b>
4.1 Response Rate .....	36
4.2 Socio-Demographic Characteristics of the Primary Caregiver .....	36
4.3 Demographic characteristics of the Child .....	38
4.4 Social-Cultural Beliefs of the PCG .....	39
4.5 Knowledge on Management of Diarrhea .....	40
4.6 Prior Actions Taken to Manage Diarrhea at Home Before Seeking Healthcare.....	42
Services .....	42
4.7: Univariable Analysis of PCGs Social Demographic Characteristics and Dehydration.....	44
4.8: Univariable Analysis of Child’s Demographic Characteristics and Dehydration .	46
4.9: Univariable Analysis of Social-Cultural Beliefs and Dehydration .....	47
4.10 Univariable Analysis of Knowledge in Diarrhea Management and Dehydration	47
4.11 Univariable Analysis of Prior Actions Taken to Manage Diarrhea and Dehydration .....	49
4.12 Multivariate Analysis of Determinants of Dehydration .....	51
<b>CHAPTER FIVE: DISCUSSION, CONCLUSIONS &amp; RECOMMENDATIONS ..</b>	<b>54</b>
5.1 Discussion .....	54
5.1.1 Socio Demographic Characteristics of PCGs Associated with Dehydration ...	54
5.1.2 Demographic Characteristics of Child Associated with Dehydration.....	56
5.1.3 Social-Cultural Beliefs of PCGs Associated with Dehydration .....	57
5.1.4 Association Between PCGs Level of Knowledge in Diarrhea Management and Dehydration. ....	58
5.1.5 Association Between Prior Actions Taken by PCGs to Manage Acute Diarrhea and Dehydration .....	61
5.1.6 Multivariable Analysis of Determinants of Dehydration .....	63
5.2 Conclusions .....	64
5.3 Recommendations .....	64
5.3.1 Recommendations for Policy.....	64

5.3.2 Recommendation for Practice .....	64
5.3.3 Suggestion for Further Research .....	65
<b>REFERENCES.....</b>	<b>65</b>
<b>APPENDICES .....</b>	<b>70</b>
APPENDIX I: INFORMED CONSENT.....	70
APPENDIX II: QUESTIONNAIRE .....	74
APPENDIX III: FOCUSED GROUP DISCUSSION GUIDE .....	93
APPENDIX IV: MAP OF THE STUDY AREA .....	96
APPENDIX V: APPROVAL OF RESEARCH PROPOSAL .....	97
APPENDIX VI: KU-ERC APPROVAL LETTER.....	98
APPENDIX VII: NACOSTI RESEARCH LICENSE.....	99
APPENDIX VIII: RESAERCH AUTHORIZATION LETTER .....	100
APPENDIX IX: RESEARCH AUTHORISATION LETTER .....	101
APPENDIX X: RESEARCH AUTHORIZATION LETTER .....	102

## LIST OF TABLES

Table 4.1: Socio-Demographic Characteristics of the PCGs.....	37
Table 4.2: Demographic Characteristics of the Child.....	38
Table 4.3 Social-Cultural beliefs of the PCGs.....	40
Table 4.4: Knowledge on Management of Diarrhea.....	41
Table 4.5: Prior Actions Taken by PCGs Before Seeking Healthcare Services.....	43
Table 4.6: Univariable Analysis of PCGs Social Demographic Characteristics and Dehydration.....	45
Table 4.7: Univariable Analysis of Child’s Demographic Characteristics and Dehydration.....	46
Table 4.8: Univariable Analysis of Social-Cultural Beliefs and Dehydration.....	47
Table 4.9: Univariable Analysis of Knowledge on Diarrhea Management and Dehydration.....	49
Table 4.10: Univariable Analysis of Prior Actions Taken to Manage Diarrhea and Dehydration.....	50
Table 4.11: Multivariable Analysis of Determinants of Dehydration.....	51

**LIST OF FIGURES**

Figure 1.1: Conceptual Framework ..... 13

Figure 3.1: Classification of Dehydration..... 29

**ABBREVIATIONS AND ACRONYMS**

<b>ARI</b>	Acute Respiratory Infection
<b>CHW/Vs</b>	Community Health Workers/Volunteers
<b>CI</b>	Confidence Intervals
<b>ERC</b>	Ethical Review Committee
<b>FGD</b>	Focused Group Discussion
<b>ICPD</b>	International Conference on Population and Development
<b>iCCM</b>	integrated Community Case Management
<b>IMCI</b>	Integrated Management of Childhood Illness
<b>KDHS</b>	Kenya Demographic Health Survey
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>MCHHB</b>	Maternal and Child Health Handbook
<b>MOH</b>	Ministry of Health
<b>NACOSTI</b>	National Council of Science and Technology
<b>NMS</b>	Nairobi metropolitan Services
<b>OR</b>	Odd Ratio
<b>ORT</b>	Oral Rehydration Therapy
<b>ORS</b>	Oral Rehydration Salt
<b>SDGs</b>	Sustainable Development Goals
<b>SSP</b>	Social Science Package
<b>UNDP</b>	United Nations Development Program
<b>UNICEF</b>	United Nation International Children's Emergency Fund
<b>WHO</b>	World Health Organization



## DEFINITION OF OPERATIONAL TERMS

**Acute diarrhea:** More than three loose stools per day lasting less than 14 days. No blood in stools.

**Cultural practices:** Traditional and customary practices of a particular ethnic or other cultural group.

**Dehydration:** The loss of water and dissolved salts from the body, occurring as a result of diarrhea. Occurs when one loses more fluid than he/she take in.

**Diarrhea:** The passage of three or more loose or liquid stools in a period of 24 hours (or more frequent passage than is normal for the individual) (WHO, 2013).

**Home care practices:** The interventions used to manage a child with acute diarrhea at home.

**Mild dehydration:** Loss of no more than 5% of the body water. Not enough signs to classify as some or severe dehydration

**Moderate dehydration:** Loss of 5- 10% of body water, presence of two or more of the following signs restlessness, irritability, sunken eyes, drinks eagerly, thirsty. May cause organ dysfunction.

**Oral rehydration salts:** Refers to a balanced glucose- electrolyte mixture.

**Oral rehydration therapy:** The administration of fluid therapy by mouth to prevent or correct dehydration.

**Primary care giver:** A person who is responsible of taking care of a child he/she can be the parent or a guardian.

**Rehydration:** The correction of dehydration.

**Severe dehydration:** Excessive loss of body water 10- 15%, at least two of the following signs: lethargy/unconsciousness, sunken eyes, unable to drink or drink poorly, skin pinch goes back very slowly (>2 seconds). It is life- threatening emergency and can cause death.

**Under five children:** Children aged 0- 59 months.

## ABSTRACT

Diarrhea in the developing countries is the second death causing infection among children below five years of age. Millions of these deaths are caused by dehydration which is the most frequent and dangerous complication of diarrhea. Identification of determinants of dehydration among under five years old would help in predicting the children with acute diarrhea who are likely to die due to dehydration. The aim of the study was to establish predictors of dehydration among under five years old seeking treatment for acute diarrhea at Mbagathi County hospital in Nairobi county, Kenya. The specific objectives were to determine the socio- demographic characteristics of primary care givers (PCGs) and child associated with dehydration in under five years old with acute diarrhea attending Mbagathi county hospital, to identify the social- cultural beliefs of PCGs which are associated with dehydration in under five years old with acute diarrhea attending Mbagathi county hospital, to establish whether there was an association between the PCGs level of knowledge in diarrhea management and dehydration in under five years old with acute diarrhea at Mbagathi county hospital and to determine whether there was an association between the prior actions taken by PCGs to manage the acute diarrhea at home and dehydration in children under five years at Mbagathi county hospital. The study applied a hospital based unmatched case- control analytical design with mixed method approach. Purposive sampling was used to select 110 cases and 110 controls who met the inclusion criteria at a ratio of 1:1. The study participants were interviewed using a structured questionnaire. The same sampling method was used to select PCGs to participate in focus group discussions (FGDs). Qualitative data was thematically analyzed by Nvivo software then transcribed and coded into themes. Quantitative data was analyzed using SPSS Version 25. A mixed effect logistic regression model was used to evaluate the association between the predictors of dehydration. The results of the logistics regression analysis are presented in terms of odd ratios (OR) and the corresponding 95% confidence intervals (CIs). The socio demographics characteristics of PCGs in cases and controls were almost similar in terms of proportion in both groups. The characteristics of child demographics were also almost similar in both groups. In univariate analysis the variables that were statistically significant at cut off  $p < 0.2$  were then offered to the multivariable model. Findings from the adjusted multivariate model the variables that were statistically significant were highest level of education at  $p < 0.05$  and initiation of zinc supplement at home immediately diarrhea started  $p < 0.05$ . After adjusting for duration of diarrhea, results of the logistic regression showed that the variables median age of the PCGs at  $p < 0.01$  and initiating zinc supplement at home immediately diarrhea started at  $p < 0.02$  were significant predictors of dehydration among children below five years. In conclusion there is risk of developing diarrhea- associated dehydration among children under five years with acute diarrhea attending Mbagathi hospital mainly in young mothers with low education and also due to delay in initiating zinc supplement when children develop diarrhea. Recommendation was that there is need for more focused health education on diarrhea management in young mothers and health promotion activities at the community level so as to sensitize the community and dispel myths and misconceptions on causes and management of diarrhea.

## CHAPTER ONE: INTRODUCTION

### 1.1 Background of Study

Diarrheal disease in children under the age of five is ranked globally as a cause of death with about 1.7 billion childhood diarrhea cases reported annually. Most incidents of diarrhea are normally mild, however acute diarrhea if not well managed is likely to cause dehydration as a result of the fluid loss. Acute diarrhea, characterized by atypical stool consistency and increased frequency (typically more than three times a day) and lasting for a duration of less than two weeks, often lacks a differential diagnosis in routine medical practice (Zhang et al., 2016). This condition continues to be a significant public health concern in developing nations, particularly posing a substantial threat to the lives of children under the age of five.

Globally dehydration as a result of acute diarrhea accounts for around 525,000 deaths. Most deaths occur in developing countries where Kenya is included. Malnutrition reported among children below five years is also caused by diarrhea (WHO, 2017). Diarrhea is not lethal itself, however the management and prevention process could be misdirected which causes severe dehydration which could result to death. Diarrheal disease is highly preventable yet it's reported that at least one in five children will die of it due to dehydration. Dehydration occurs when water and electrolytes lost through liquid stools are not replaced (WHO, 2017).

Globally, acute diarrhea stands as the primary cause of mortality in children under the age of five (UNICEF, 2018). In certain regions, it results in higher mortality rates than all other causes combined. Children under five years old affected by acute diarrhea

contribute to around 63% of the global burden of diarrheal diseases (Zhang et al., 2016) and represent the second most significant cause of infant mortality in developing countries (Kotloff, 2017).

In Africa, Asia, and South America, diarrhea is responsible for one out of every eight deaths in children under five annually (Kotloff, 2017). In Senegal, the Ministry of Health (MoH) lists diarrhea as the third leading cause of mortality and the second leading because that drives caregivers of children under five to seek medical consultation (Thiam et al., 2017).

In Kenya, much like other regions in sub-Saharan Africa, the burden of diarrheal diseases among children is deeply concerning. Acute diarrhea remains a significant cause of childhood morbidity and mortality, leading to a substantial number of hospital admissions and fatalities within this vulnerable age group (Mbuthia, 2019).

Nairobi County, Kenya's capital city, is no exception when it comes to the widespread occurrence of acute diarrhea among children under five. In this urban setting, Mbagathi Hospital plays a crucial role as a healthcare facility catering to a sizable population, including many underserved and impoverished communities. The hospital serves as a primary point of care for children grappling with acute diarrhea and its associated complications (Segecha, 2013).

Despite the pressing need to address this issue, there is a noticeable gap in understanding the specific factors contributing to dehydration among children under five with acute diarrhea at Mbagathi Hospital and within Nairobi County as a whole. This knowledge gap is a source of significant concern, given that the severity of dehydration in children is

a critical determinant of the outcomes of diarrheal illnesses, including the risk of morbidity and mortality.

While previous studies, both within Kenya and worldwide, have shed light on the challenges in managing acute diarrhea and the shortcomings in home-based care, there remains a lack of comprehensive research focused on the determinants of dehydration within this unique healthcare context. Investigating the factors leading to dehydration in children under five is imperative, as this insight is vital for designing effective interventions and treatment strategies.

The determinants of dehydration in children with acute diarrhea are multifaceted, encompassing various factors, including the quality of care provided at home, the nutritional status of the child, the accessibility of healthcare facilities, the caregivers' knowledge, attitudes, and practices, and the healthcare system's capacity to manage such cases promptly and effectively.

Moreover, Nairobi County's demographic and environmental conditions are constantly evolving. Understanding the contemporary factors contributing to dehydration in children with acute diarrhea is vital. Factors such as changes in urbanization, access to clean water and sanitation, socioeconomic disparities, and healthcare infrastructure are continually shifting, influencing the prevalence and severity of diarrhea among children.

To address this critical knowledge gap and contribute to the enhancement of healthcare services for children with acute diarrhea in Nairobi County, this study aims to investigate and identify the determinants of dehydration in children under five attending Mbagathi Hospital. The research will provide invaluable insights that can inform evidence-based

strategies and policies aimed at reducing the burden of dehydration and its associated complications in this vulnerable population, ultimately leading to improved child health and well-being in the region. Diarrhea represents Kenya's third leading cause of pediatric mortality following malaria and pneumonia (Khan et al., 2022). UNICEF's 2019 data reveals that diarrhea results in an estimated 100 child deaths daily in those under five years of age. Reports have been generated to establish diarrhea as a leading mortality and morbidity cause across the world, among children under five year's old accounting for 9 % of all deaths in this age group globally (UNICEF 2020).

Acute diarrhea management if initiated early and appropriately can reduce morbidity and mortality of under five years old globally. Prevalence of diarrhea is high in communities living in resource constraints as well as under privileged settings hence the stakeholders should ensure treatment is available and accessible to all children and the care givers have the appropriate knowledge on diarrhea management (WHO 2018)

KDHS 2014 reported that there are several areas of concern in diarrhea management that concurred with a study by Kuday et al., which concluded that although diarrhea is seen as an outdated disease, it is still a public health problem, especially in developing countries (Kuday et al.,2018).

KDHS 2022 assumed a pivotal role as it provided a contextual foundation for understanding the prevalence and risk factors of acute diarrhea in this specific demographic. The KDHS report offered a comprehensive overview of the prevalence, incidence rates, and determinants of childhood diarrhea, particularly in the Kenyan context. It highlighted key risk factors, such as access to clean water, sanitation, and

healthcare services, which significantly influenced the likelihood of dehydration in young children with acute diarrhea. Furthermore, the report underscored the importance of timely and effective treatment practices, including the use of Oral Rehydration Solution (ORS), Oral rehydration therapy (ORT), and zinc supplementation, as integral components in preventing dehydration. (KNBS, 2023) The KDHS findings regarding the impact of diarrhea on child health, including morbidity and mortality rates, provided essential insights that underscored the urgency of the study in Nairobi City County. With this valuable information, the study aimed to explore localized determinants and interventions specific to Nairobi City County, ultimately contributing to improved child health outcomes and the reduction of dehydration risks in this vulnerable population

## **1.2 Problem Statement**

Diarrheal disease is a leading cause of death among children under five globally, resulting in about 1.7 billion cases each year. While most cases are mild, acute diarrhea can lead to dehydration, a severe and potentially fatal condition. Dehydration is preventable, but it still causes around 525,000 deaths globally, with significant impact in developing countries like Kenya.

Despite being a preventable condition, dehydration often results from misdirected management and insufficient prevention efforts. Globally, acute diarrhea is the primary cause of child mortality, especially in developing nations. Nairobi County, Kenya, is no exception, and Mbagathi Hospital serves as a vital facility for children with acute diarrhea.

However, there is a critical knowledge gap regarding the specific factors leading to dehydration in children under five within Mbagathi Hospital and Nairobi County. Understanding these factors is essential for designing effective interventions and improving child health outcomes. The determinants of dehydration are multifaceted, including home care quality, child nutrition, healthcare accessibility, caregiver knowledge, and the healthcare system's capacity.

As Nairobi County's conditions continue to evolve, it's crucial to identify contemporary factors affecting dehydration in children with acute diarrhea. To address this gap and enhance healthcare services for this vulnerable population, this study aims to investigate and identify the determinants of dehydration among children under five attending Mbagathi Hospital in Nairobi County, Kenya.

Diarrhea is a major cause of child deaths in Kenya and globally, and its effective management can reduce child morbidity and mortality. However, challenges persist, especially in resource-constrained settings. It is crucial to address the determinants of dehydration to improve care quality and child health outcomes in Nairobi County.

### **1.3 Justification**

Diarrhea is a significant public health concern worldwide, particularly among children under five. Acute diarrhea and its associated dehydration continue to contribute to high morbidity and mortality rates, primarily in developing countries like Kenya. Understanding the determinants of dehydration in this specific population is crucial to

inform evidence-based interventions and public health policies aimed at reducing the burden of this preventable condition.

The high prevalence of diarrhea and its consequences, including severe dehydration, in Nairobi County and Mbagathi Hospital underscores the pressing need for this study. Nairobi County's demographic and environmental conditions are continually evolving, potentially impacting the prevalence and severity of diarrhea in children. Investigating the determinants of dehydration under these changing conditions is vital for effective healthcare planning and intervention.

Identifying and addressing the factors contributing to dehydration can lead to improved management and prevention strategies, ultimately reducing child mortality rates. This can help Kenya in achieving the SDG, target 3.2 which is “To reduce under 5 mortality rate to at least as low as 25 per 1,000 live births by 2030” (Keats et al., 2018).

This study provides valuable insights into the multifaceted determinants of dehydration among children with acute diarrhea. The results can guide on implementation of existing strategies and policies guidelines on management of diarrhea in children under five years.

Given the research gap in understanding the determinants of dehydration in the specific context of Mbagathi county Hospital and Nairobi County, this study will contribute to the existing body of knowledge in the field of pediatric healthcare. The findings can be used as a reference for future research and policy development and implementation.

#### **1.4 Research Questions**

1. What socio demographic characteristics of the PCGs and the children that are associated with dehydration in children under five years with acute diarrhea at Mbagathi county hospital?
2. Which social-cultural beliefs of the primary care givers are associated with dehydration in children under five years with acute diarrhea at Mbagathi county hospital?
3. Is there a relationship between primary care giver's level of knowledge in diarrhea management and dehydration in children less than five years with acute diarrhea at Mbagathi County hospital?
4. Is there an association between the prior actions taken by primary care givers at home to manage acute diarrhea and dehydration in children under five years at Mbagathi county hospital?

#### **1.5 Null Hypothesis**

1. There is no relationship between dehydration and socio-demographic characteristics of the PCGs and of children under five years with acute diarrhea at Mbagathi county hospital
2. There is no association between social cultural beliefs of primary care givers and dehydration in children under five years with acute diarrhea at Mbagathi county hospital
3. There is no association between dehydration and primary care giver's level of knowledge in diarrhea management for children under five years with acute diarrhea at Mbagathi hospital.

4. There is no relationship between dehydration and prior actions taken by the primary care givers to manage acute diarrhea in children under five years before seeking care at Mbagathi county hospital.

## **1.6 Objectives of the Study**

### **1.6.1 Main Objective**

The overall objective of the study was to establish the determinants of dehydration among children under five years who sought treatment for acute diarrhea at Mbagathi county hospital in Nairobi County, Kenya.

### **1.6.2 Specific Objectives**

- i. To determine the socio- demographic characteristics of PCGs and of the children that are associated with dehydration among children under five years with acute diarrhea at Mbagathi county hospital.
- i. To identify the social- cultural beliefs of primary care giver's which are associated with dehydration in children under five years with acute diarrhea at Mbagathi County hospital.
- ii. To establish whether there is an association between the primary care giver's level of knowledge in diarrhea management and dehydration in children under five years with acute diarrhea at Mbagathi county hospital.
- iii. To determine whether there is an association between the prior actions taken by primary care givers to manage acute diarrhea and dehydration in children under five years at Mbagathi County Hospital.

### **1.7 Significance of the Study**

The study is fundamental in addressing poor child health outcomes as a result of diarrhea-associated dehydration. Establishing predictors of dehydration among children under Five Years old with diarrhea would help in predicting the children who are likely to die due to dehydration.

Findings from this study can also be used to health educate and sensitize PCGs and communities on appropriate home- based diarrhea management practices.

### **1.8 Assumptions of the Study**

The assumption in the study were that eligible caregivers would be willing to participate in the study and answer the interview question in honest and understandable manner.

### **1.9 Limitations of the Study**

The study's findings may be influenced by sampling bias, as the research focuses on children under five who have sought treatment at Mbagathi Hospital. Children who do not seek medical care for acute diarrhea or receive treatment elsewhere are excluded from the study, potentially leading to a biased sample. The study employs a cross-sectional design, which captures data at a single point in time. This design may limit the ability to establish causality or understand changes over time, as it does not provide a longitudinal perspective.

Data collection the information was based on self-reports with possible social desirability bias or recall bias. Caregivers might not accurately remember details, leading to inaccurate information about socio-cultural beliefs and prior actions taken. Respondents

may provide answers they perceive as socially desirable, affecting the accuracy of data, especially when addressing sensitive topics like healthcare knowledge and practices.

Findings from the study may not be readily generalizable to populations outside Nairobi County or those who receive treatment in different healthcare facilities. The characteristics and determinants of dehydration may vary in different regions and healthcare contexts. The study's external validity might be limited, as it focuses on a specific geographic area and healthcare facility. Extrapolating the findings to other settings should be done with caution.

#### **1.10 Delimitations of the Study**

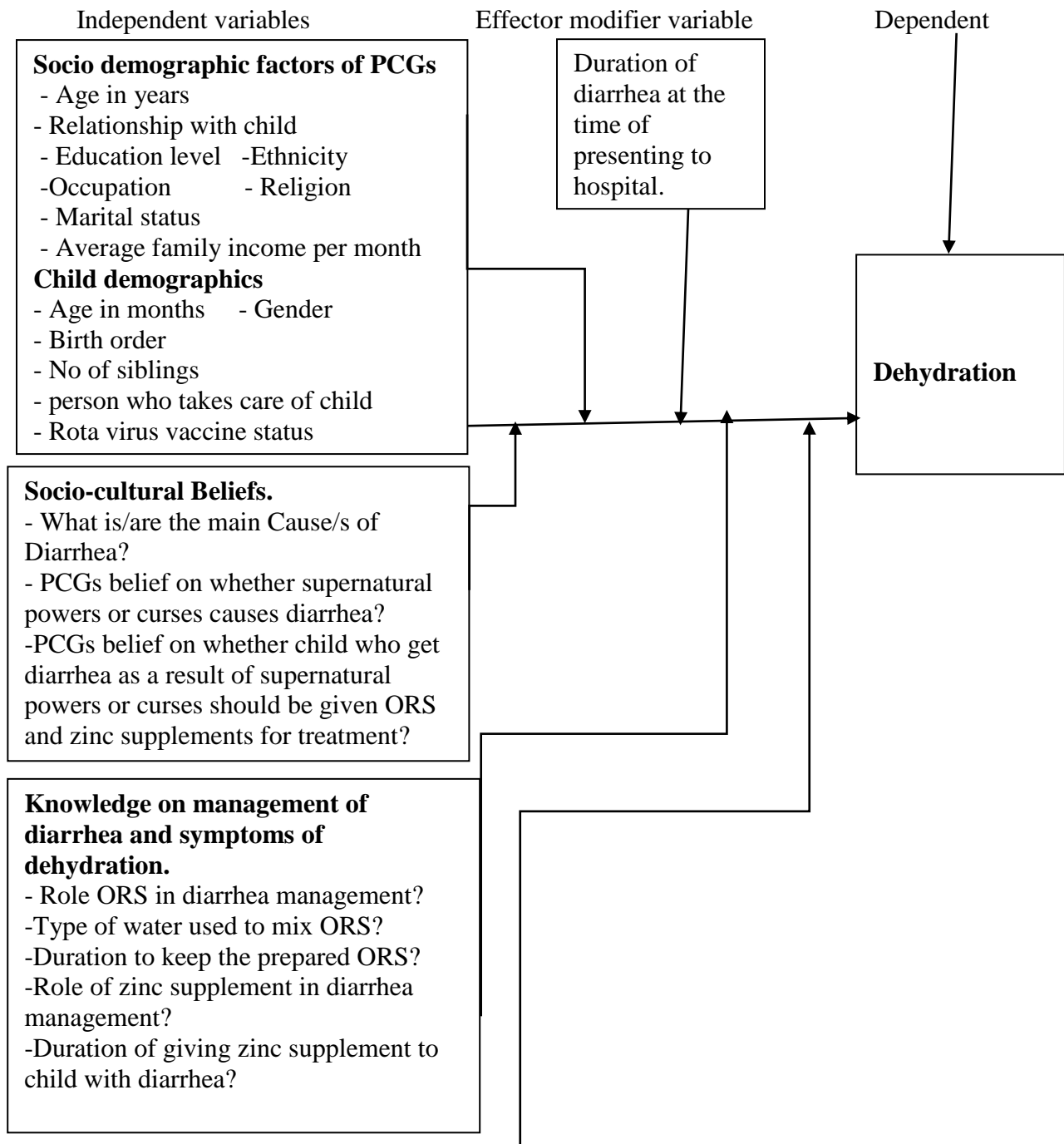
The study specifically concentrates on Mbagathi Hospital, located in Nairobi city county, Kenya. It does not extend to other counties or healthcare facilities. The research is delimited to children under the age of five who have been diagnosed with acute diarrhea. It does not include older children or adults. The study's focus is on healthcare facilities, and it does not encompass PCGs who manage acute diarrhea solely through home-based care without seeking professional medical treatment.

The study acknowledges the role of socio-cultural beliefs but does not delve into broader cultural or sociological aspects beyond what is relevant to the determinants of dehydration. The study is conducted in specific languages, and language barriers may limit the participation of some caregivers and respondents, potentially affecting the diversity of the sample. The study is conducted within a specific timeframe, and conditions and determinants may vary at different times of the year, which is not accounted for in the research.

### **1.11 Conceptual Framework**

The provided conceptual framework (Figure 1.1) serves as a visual representation of the relationships and interactions between different variables in the study. It is adapted and modified from Agrawal (2017) to fit the specific context of this research on dehydration among children with acute diarrhea. The framework illustrates how several independent variables are associated with a dependent variable, dehydration, while also considering the influence of an effector modifier variable. The effector modifier variable serves to moderate or mediate the relationships between the independent variables and the dependent variable. It represents factors that enhance or mitigate the impact of the independent variables on dehydration. For example, the quality and accessibility of healthcare services in the area, the child's overall health status, and other external factors.

This conceptual framework provides a visual representation of how various factors, including socio-demographic characteristics, socio-cultural beliefs, knowledge, and prior actions, are associated with the development of dehydration among children with acute diarrhea. It acknowledges the role of an effector modifier variable, which likely moderates these associations. Understanding these relationships is essential for designing effective interventions to reduce dehydration and improve the health outcomes of this vulnerable population.

**Figure 1.1: Conceptual Framework**

**Prior actions taken before seeking health care services.**

- Amount of fluid/food given
- Received ORS
- Frequency of ORS administration
- Administered zinc supplement
- Amount of home prepared fluid given to child since diarrhea started
- Any Food or drinks withheld to improve diarrhea outcome?

LI **Source: Adopted and modified from (Agrawal, 2017).**

Acute diarrhea is an abrupt onset of 3 or more loose stool with increased water content that lasts less than 14 days. Dehydration as a result of acute diarrhea is put into classes depending to the volume of stool produced: it's named mild if there's less than 5% of the weight of the body, between 5-10% body weight seen as moderate and above 10% it's considered severe and even potentially life-threatening. There is a drop in the blood pressure resulting from the increased loss in the body fluids and consequently the intravascular volume decrease. If the process of restoring lost fluid to the body is not commenced immediately hypotension can progress to circulatory failure, dysfunction of critical organs, and death. Reducing deaths related to dehydration largely depend on early initiation of rehydration, for example, using oral rehydration solutions (ORS) and zinc tablets (WHO 2017).

Diarrhea disease is among the main causes of death among under five years old in low and middle-income countries responsible for approximately 525,000 deaths every year. It is also the major cause of malnutrition in this age group (WHO, 2017).

## **2.2 Dehydration**

The biggest danger from diarrhea is dehydration whereby someone loses more fluids than he or she takes in.

The degree of dehydration is rated on a scale of three; Severe dehydration (that includes some two of these given signs): one drinking poorly or unable to drink, having sunken eyes, lethargy/unconsciousness, a pinch on the skin that goes back slowly i.e. more than 2 second. Some dehydration (consists any two or more of these signs): feeling thirsty, having sunken eyes, being restless, and eagerness in drinking, irritability. Mild dehydration (the signs here are not enough to quantify as some or severe dehydration) mild dehydration. Moderate dehydration may cause organ dysfunction and severe dehydration can cause death (WHO, 2017).

## **2.3 Global Burden of Diarrheal Disease in Children**

Diarrhea remains a high burden disease, in 2019 it accounted for approximately 9 % of all deaths among children under age five worldwide. Despite the existence of simple and effective treatment of this infection, diarrhea deaths are still high of about 13,000 children dying daily which is about 480,000 children dying each year. South Asian and Sub Saharan Africa countries experience most of these diarrhea mortalities and the age group mainly affected are those less than two years of age (Diarrheal disease - UNICEF DATA, 2020 n.d.).

With the correct and proper management of diarrhea, many lives of children could be saved. A good number of children in the high burden region of sub-Saharan Africa do not receive enough care to curb diarrhea. A priority of urgency should therefore be put in

place in order to improve the quality of care in health facilities and at the community to handle childhood diarrhea (Carvajal-Vélez et al., 2016).

#### **2.4 Local Burden of Diarrheal Disease**

According to KDHS 2014, diarrhea causes dehydration which in turn becomes a main cause of illnesses and death seen in young children, and there are still a number of areas of concern in management of diarrhea (KNBS, 2016).

Evidence shows that through integrated community case management (iCCM) strategy where Community health workers/ volunteers (CHW/Vs) are appropriately trained, supervised and supported with uninterrupted supply of medication and equipment can identify and correctly treat most children who have diarrhea, pneumonia and malaria. But according to WHO/UNICEF July 2019, Addis Ababa report on the extent of implementation of iCCM in 18 countries by global fund survey, it showed that Kenya is still far from being at scale in the implementation of the strategy. This is reflected in the iCCM gap analysis which reported that the strategy is yet to attract optimal attention and prioritization in health care financing and budgetary processes from the national and county governments (WHO/UNICEF, 2019)

There have been three studies conducted in different east African countries on 5478 respondents that found that children below the age of five years have a higher occurrence of diarrhea disease which was 27% of the total respondents (OR 2.07) from 2012 to 2017. This meant that there exists a 20.7% prevalence risk of spread in the East Africa region (ELMI & DIOSO, 2017).

## **2.5 Socio- Demographic Characteristics of Primary Care Givers and Dehydration in Children**

The socio-demographic characteristics of primary caregivers play a crucial role in determining the risk and severity of dehydration in children with acute diarrhea.

In a study done in countries reporting high cases of diarrhea in South Asian countries identified education level as the major social demographic characteristics of the primary care givers of under five years old on diarrheal diseases. Whereby those with secondary level and above had good knowledge on prevention and management of diarrhea compared to their counterpart of lower education level. Concluding that education level has a strong association with diarrhea disease incidences. (Hasan & Richardson, 2017).

Kante et al. (2015) carried out a study in Tanzania on the influence of primary caregivers' socio-demographic characteristics on childhood diarrhea and dehydration caregivers' level of education. Research revealed that children in households with lower-educated caregivers were more susceptible to diarrhea, as caregivers with higher education levels were more likely to have the knowledge and resources necessary to prevent and manage diarrheal diseases effectively. Additionally, household characteristics, such as the number of children under five in a household, were associated with an increased risk of diarrhea and dehydration (Kante et al., 2015).

Njeri (2013) investigated the factors that influence the household choice of treatments for children suffering from diarrhea in Kenya using a multinomial logit approach. A sample of 771 under-5 children was drawn from the 2008/2009 Kenya Demographic and Health Survey. It was found that 29.86 percent of the children were not administered with any

sort of treatment for their diarrhea. The study found that prior knowledge/experience of oral rehydration salts, care giver's education level, place of residence, household wealth and birth spacing were key factors determining the use of recommended treatments for childhood diarrhea. The study recommended strengthening awareness on childhood diarrhea and the recommended treatments that can be used to manage it (Njeri, 2013).

## **2.6 Social- Cultural Beliefs of Primary Care Givers and Dehydration in Children**

This literature review explores the influence of social-cultural beliefs held by primary caregivers on the risk and severity of dehydration in children with acute diarrhea.

Gizaw et al. (2017) studied child feeding practices and diarrheal disease among children less than two years of age of the nomadic people in Hadaleala District, Afar Region, and Northeast Ethiopia. A total of 367 children less than two years of age were included using the multistage cluster sampling technique. Data were collected by a structured questionnaire. Multivariable binary logistic regression analysis was used to identify variables associated with diarrheal disease. The study concluded that the prevalence of diarrhea among children less than two years of age in Hadaleala district was high. To prevent diarrhea, the mothers should start breastfeeding early and practice exclusive breastfeeding. Moreover, mothers should improve the hygiene of supplementary foods (Gizaw et al., 2017).

In a study done in Kenya reported that some households still practiced traditional methods in managing and treating diarrhea, recommending further studies to identify social cultural beliefs among primary care givers of under five years old associated with diarrhea prevention and management (Mutama et al., 2019).

A systematic review study showed that harmful practices were commonly employed in management of diarrhea diseases contributing significantly to the high diarrheal disease mortality rates and diarrhea related complications like malnutrition in under five years old (Carte et al., 2015).

## **2.7 Primary Care Giver's Level of Knowledge in Diarrhea Management and Dehydration in Children**

This literature review examines the critical relationship between the level of knowledge among primary caregivers in managing childhood diarrhea and the risk of dehydration in children. Predictors of primary care gives knowledge level on diarrhea disease were identified to be socio demographic characteristics which included education level, age, and marital status and socio economic factors of the family (Wambui et al., 2018).

In a study done to assess mother's knowledge and perception on how to prevent and manage diarrhea at home among under five years old in Ethiopia showed that majority of the mothers had good knowledge, but these did not match with the practice since majority also showed poor practices when it came to what they do at home when their children have diarrhea showing there is a knowledge- do gap among the mothers (Workie et al., 2018).

In another study it concluded that the key role in diarrheal diseases is the mothers who are mainly the primary care givers. Therefore, poor knowledge level of the mothers will directly affect the health care system (Kuday et al., 2018).

In a study done by Carvajal-Vélez et al., reported that health care givers need to bridge the "know- do- gap" among primary care givers of under five years old on management

of diarrhea at home in order to ensure appropriate home management of diarrhea and when to take the child to a health facility to prevent complications or death as a result of diarrhea (Carvajal-Vélez et al., 2016).

According to a study to determine factors that hinders appropriate home management of acute diarrhea by caregivers of children under five years seeking treatment at Mbagathi county hospital showed that the caregivers utilized various home care practices in treatment of diarrhea. However, only 14.4% (n=30) of the caregivers increased fluid intake and administered both ORS and zinc. The choice of treatment was identified to be highly influenced by the perceived cause of the illness. Though majority of the participants were familiar with ORS quite a number of them did not use it at home. Caregivers' knowledge of zinc supplements was found to be low and only a few of the caregivers who knew about it used it. Use of antibiotic in treatment of diarrhea was also prevalent among the caregivers in home management of diarrhea (Njuguna, 2014).

Care givers of children under five years of age participated in a study to find out their knowledge on the preventive behaviors of diarrhea. The study revealed that in as much as the caregivers had good scores on the knowledge area on diarrhea, the preventive behaviors of the same were poor among all the participants in the study. It was seen that the older, wealthier and educated Vietnamese participants practiced better preventive behaviors of diarrhea. This information could be used as a recommendation that future interventions in this remote region may benefit and use as a base to explore the specific preventative behaviors to be promoted (Merali et al., 2018).

KDHS (2022) assumed a pivotal role as it provided a contextual foundation for understanding the prevalence and risk factors of acute diarrhea in this specific demographic. The report offered a comprehensive overview of the prevalence, incidence rates, and determinants of childhood diarrhea, particularly in the Kenyan context. It highlighted key risk factors, such as access to clean water, sanitation, and healthcare services, which significantly influenced the likelihood of dehydration in young children with acute diarrhea. Furthermore, the report underscored the importance of timely and effective treatment practices, including the use of Oral Rehydration Solution (ORS) and zinc supplementation, as integral components in preventing dehydration. The KDHS findings regarding the impact of diarrhea on child health, including morbidity and mortality rates, provided essential insights that underscored the urgency of the study in Nairobi City County.

## **2.8 Prior Actions Taken by Primary Care Givers to Manage Acute Diarrhea and Dehydration in Children**

This literature review explores the various actions taken by primary caregivers in managing acute diarrhea in children and how these actions relate to the risk and severity of dehydration.

Globally, the actions taken by primary caregivers in response to childhood diarrhea are crucial in determining the risk of dehydration. Adequate and prompt care can prevent mild diarrhea from escalating into severe dehydration (Bartlett & Black, 2016). The World Health Organization (WHO) recommends oral rehydration therapy (ORT) and zinc supplementation as effective measures for diarrhea management (WHO, 2017).

However, in resource-constrained settings, caregivers may employ various home care practices that do not always align with these recommendations, potentially increasing the risk of dehydration (Njuguna, 2014).

Regionally, in areas with a high prevalence of diarrheal diseases, the actions taken by caregivers can significantly impact child health outcomes. Studies in Sub-Saharan Africa and South Asia have shown that caregivers may resort to traditional remedies or home treatments, often delaying seeking appropriate medical care. These actions may lead to increased risk and severity of dehydration, especially when traditional treatments prove ineffective (Elhassan et al., 2017).

Within Kenya, research has emphasized the role of caregiver actions in managing childhood diarrhea. The Kenya Demographic and Health Survey KDHS 2014 identified diarrhea as a significant cause of illnesses and death in children under five (KNBS, 2016). Studies have revealed that caregiver actions are influenced by their perceived causes of diarrhea, leading to variations in treatment choices and practices. Caregivers' knowledge and awareness of oral rehydration solutions (ORS) and zinc tablets also play a significant role in their actions (Njuguna, 2014).

## **2.9 Gaps in Existing Literatures**

Research on the determinants of dehydration in children under the age of five with acute diarrhea attending Mbagathi Hospital in Nairobi County, Kenya has highlighted several critical research gaps. While the existing literature provides valuable insights into the broader issue of dehydration in children with diarrhea, it often lacks a localized perspective, with limited information specific to Mbagathi Hospital and Nairobi County.

Thus, there is a need for studies that specifically contextualize the determinants of dehydration in this local setting, considering the unique socio-cultural beliefs, healthcare infrastructure, and demographic characteristics (Mutama et al., 2019).

Furthermore, many studies have addressed isolated aspects of the problem, such as socio-demographic characteristics, knowledge, or social-cultural beliefs, rather than conducting comprehensive local research integrating multiple determinants. Conducting a holistic study that examines all relevant factors together can provide a more accurate picture of the risk of dehydration in children under five with acute diarrhea (Kuday et al., 2018).

An area that requires further exploration is the assessment of the healthcare system's capacity to manage acute diarrhea promptly and effectively in the local context. This includes understanding the resources, capabilities, and challenges faced by Mbagathi Hospital, which is essential for improving healthcare services and preventing severe dehydration cases (Carvajal-Vélez et al., 2016).

In addition, research should focus on community-based interventions aimed at bridging the knowledge-do gap among caregivers. While many studies highlight this gap, there is limited exploration of the effectiveness of educational programs and initiatives designed to improve caregiver knowledge and practices, particularly in the Nairobi County context (Workie et al., 2018).

Finally, understanding how social-cultural beliefs held by primary caregivers affect the risk of dehydration in children is another research gap. Although some studies have touched on this aspect, there's a need for in-depth exploration of these beliefs in the local context and how they impact healthcare-seeking behaviors (Gizaw et al., 2017).

## **2.10 Theoretical Model**

The Social Ecological Model (SEM) provides an appropriate theoretical framework for this study (Onwuegbuzie et al., 2013). This widely used model in public health research offers a holistic perspective for investigating health behaviors and outcomes by considering the influence of multiple levels and recognizing the intricate interplay among these factors. At its core, SEM acknowledges that individuals are situated within larger social, cultural, and environmental contexts that collectively contribute to health outcomes (Stokols, 1996).

In the context of this research, the SEM framework enables the exploration of various determinants and their interactions. SEM comprises interconnected levels of influence, encompassing the individual, interpersonal, community, institutional/organizational, and policy/structural levels. At the individual level, the study can investigate factors like the socio-demographic characteristics of primary caregivers (PCGs), their knowledge regarding diarrhea management, and their caregiving behaviors for children with diarrhea. The interpersonal level considers the impact of family, caregivers, and social networks, examining how the beliefs and practices of PCGs within these networks influence the risk of dehydration. The community level takes into consideration broader community characteristics, including access to clean water, sanitation facilities, and local norms affecting child health. Furthermore, the institutional/organizational level focuses on the healthcare system, assessing how the capacity and practices of Mbagathi Hospital affect the likelihood of dehydration. Finally, the policy/structural level addresses larger structural factors, such as government healthcare policies, socioeconomic disparities, and environmental conditions, and their influence on dehydration cases.

By adopting the SEM as the theoretical model for this study, it enables a systematic and comprehensive exploration of the multifaceted aspects contributing to dehydration among children under five with acute diarrhea. This approach facilitates a thorough analysis of the determinants, their complex interactions, and their contextual relevance within the specific healthcare context of Mbagathi Hospital and Nairobi County. This holistic approach aligns well with the intricate nature of the research and provides valuable insights into the various levels of influence that impact child health outcomes.

## **CHAPTER THREE: MATERIALS AND METHODS**

### **3.1 Study Design**

The study was a hospital based unmatched case- control adopting analytical design with mixed method approach. This design facilitated the collection of quantitative and qualitative data to enable the identification of associations between the dependent variable and independent variables of the study.

### **3.2 Study Variables**

#### **3.2.1 Dependent Variable**

The dependent variable in this study was dehydration in children under five years old having acute diarrhea.

#### **3.2.2 Independent Variables**

The independent variables in this study included the Social demographic characteristics of the primary care giver which are sex, age, marital status, education level and occupation. social cultural beliefs, knowledge of the primary caregivers on management of diarrhea and prior actions taken to manage acute diarrhea by the primary caregivers before seeking health care services at Mbagathi county hospital.

### **3.3 Study Site**

The study was conducted at Mbagathi County hospital, this is a public hospital and falls under Dagoretti constituency. It offers a variety of services both in- patient and out-patient. The reason for selecting Mbagathi County hospital was because from a study conducted by Segecha it revealed that the prevalence of diarrhea was 20% which was

higher than the national one of 16% (Segecha,2013). It also serves clients from informal settlements where prevalence of diarrhea is high, which includes Kibra, Kawangware, Mathare and Mukuru. (Ephantus, 2020; Mutama et al., 2019). Being the county hospital in Nairobi county it receives many referral cases from several health facilities all over Nairobi.

### **3.4 Study Population**

The eligible study participants were primary care givers of under five years old presenting with acute watery diarrhea at Mbagathi county hospital pediatric casualty. A face-to-face interview was conducted after consenting. Consenting was only taken once the child was stabilized; this was to allow the primary care giver to be psychologically stable, in order to yield viable information.

#### **3.4.1 Inclusion Criteria**

**For cases:** They were all primary care givers of under five years old children with some to severe dehydration as a result of acute diarrhea, who agreed to give written informed consent to participate in the study.

**For controls:** All primary care givers of children under five years with acute diarrhea with no dehydration and who agreed to give written informed consent to participate in the study.

#### **3.4.2 Exclusion Criteria**

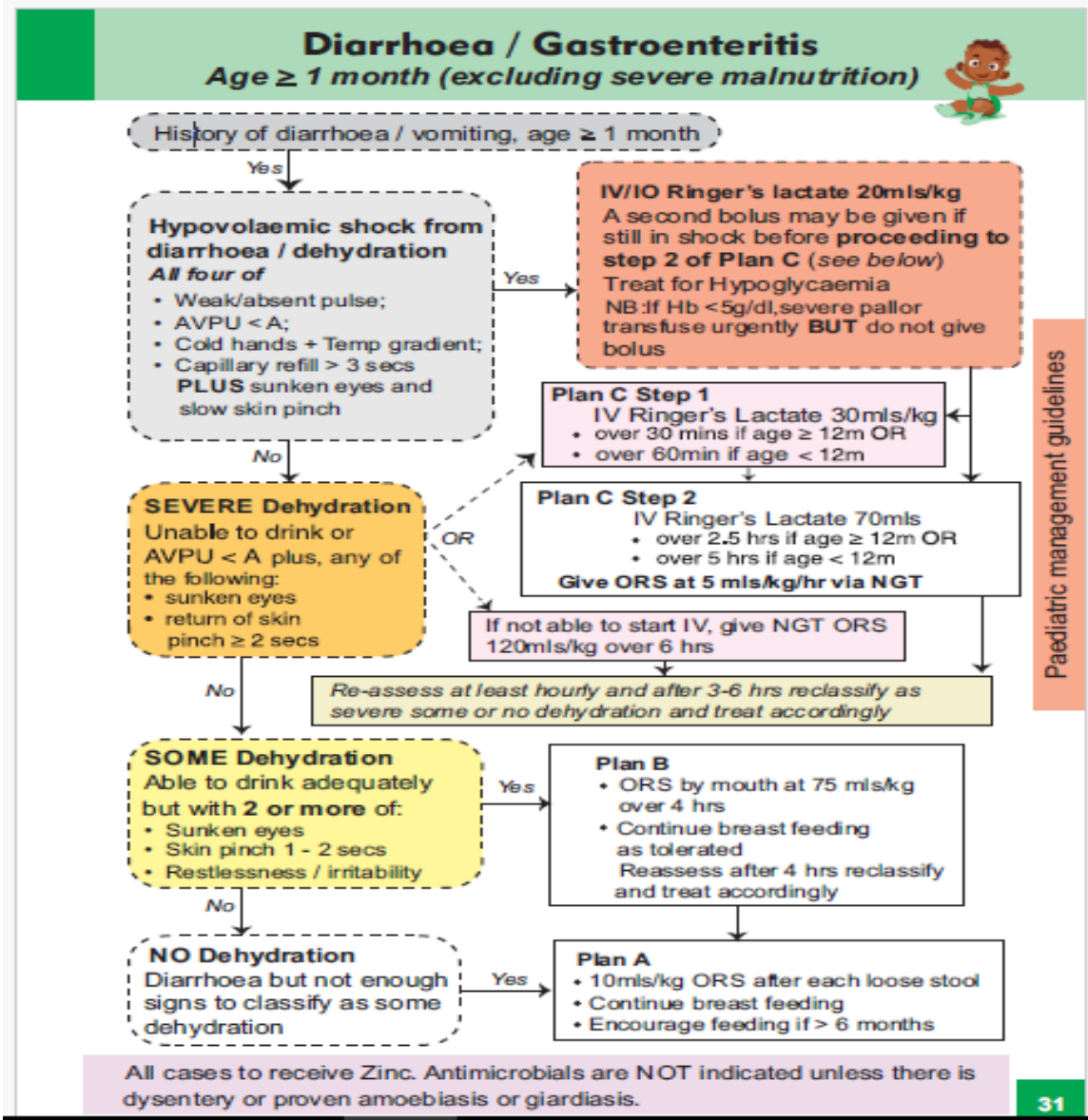
- i. Primary care givers of children under five years who met the inclusion criteria but their primary caregivers were unable or declined to give a written consent.

- ii. Children under five years who meet the inclusion criteria but were not accompanied by a caregiver who was above 18 years old.
- iii. Children under five years who had persistent diarrhea
- iv. Children under five years with acute diarrhea and other comorbidities.
- v. Children under five years with bloody diarrhea.

### **3.5 Sampling Technique**

The participants were purposively selected whereby, available cases and controls meeting the inclusion criteria were recruited simultaneously until the desired sample size was achieved; Selection of cases to control was done in a frequency ratio of 1:1. The classification of the patients depending on the degree of dehydration was done by the clinician attending the child as per the government of Kenya basic pediatric protocol guidelines 5<sup>th</sup> Edition as shown in figure 3.1.

Figure 3.1: Classification of Dehydration



Source : Kenya basic pediatric protocol guidelines 5<sup>th</sup> edition

### 3.6 Sample Size Determination

Sample size was calculated using the case- control formula as proposed by Demidenko (2008).

$$n = \left(\frac{r-1}{r}\right) \frac{(\bar{p})(1-\bar{p})(Z_{\beta} + Z_{\alpha/2})^2}{(p_1 - p_2)^2}$$

Where:

n = minimum sample size

r = 1 Assuming equal number of cases and controls

$\bar{p}$  = Average proportion of cases exposed

$Z_{\beta}$  = 0.84 assuming desired power of 80%

$Z_{\alpha/2}$  = 1.96 assuming level of significance of 0.05

$P_1$  = Proportion exposed in the control group (i.e. they have diarrhea) is taken to be 20%. (Segecha, 2013).

OR = assuming that odd ration to be detected is 2.5.

$P_2$  = Proportion of case group exposed to dehydration.

$$\text{Hence, } p_2 = \frac{OR \times p_1}{p_1(OR-1)+1} = \frac{2.5 \times 0.2}{0.2(2.5-1)+1} = 0.38$$

$$\text{And } \bar{p} = \frac{0.2+0.38}{2} = 0.29$$

$$\text{Therefore, } n = \left(\frac{1+1}{1}\right) \frac{(0.29)(1-0.29)(1.96)^2}{(0.2-0.38)^2} = 100$$

Assuming 10% non-response rate, the final sample is, 110 cases and 110 controls.

### **3.7 Research Instruments**

The study applied both quantitative tools such as questionnaires and qualitative tools such as focus group discussion guides to collect data from the respondents. Construction of the instruments for research was based on the study objectives, literature review and variables of the study.

#### **3.7.1 Investigator Administered Questionnaire**

Structured questionnaire was administered by the researcher and the research assistants to eligible primary caregivers with children under five years who met the inclusion criteria after the child was attended by the clinician at the unit and was in stable condition.

#### **3.7.2 Focus Group Discussion Guide**

Focus group discussions guide was developed based on study objectives. It was used to collect data concerning perceived causes of diarrhea, knowledge on diarrhea management and on how the respondents manage diarrhea at home.

### **3.8 Pre- Testing of the Data Collection Tools**

A Pre- test was done in Mama Lucy hospital this is because the two hospitals share most of their catchment area where they draw the patients hence the participant had similar characteristics. whereby the questionnaire was pretested with a 10% sample of the sample size that is 10 cases and 10 controls. The purpose of the pre-test study was to check for any ambiguities in the data collection tool and training of research assistants.

### **3.9 Validity**

Research assistants were recruited from the nurses working in Mbagathi county hospital pediatric outpatient/casualty who are trained in integrated management of child illness (IMCI).

The research assistants were trained for four days in data collection methods whereby simulation and role-playing methods were used in the office and then pre-tested each research assistant in a situation close to the environment in which they were to collect the data. There was also training on human subjects' protection. Convergence validity was ensured by use of different data collection methods which were structured questionnaires and focus group discussion (FGD).

### **3.10 Reliability**

The questionnaire was pre-tested using a selected sample which was identical to the actual sample of the study and revised and then test retest was done. This was to ensure that the instrument measures what it was supposed to measure in order to enhance data quality.

### **3.11 Data Collection Procedure**

Written informed consent was sought from the primary caregivers of children under five years, after explaining to them the purpose of the study and ethical considerations in place. This took place after the child was attended to by the clinician at the unit and child had been stabilized, this was to allow the primary caregiver to be psychologically stable, so as to yield viable information.

### **3.11.1 Questionnaires**

A structured questionnaire was used by the investigator to interview eligible primary caregivers of children under five-year-old with acute diarrhea. The primary data was derived from the answers respondent gave from the questionnaire prepared by the researcher. Issues of confidentiality were emphasized all throughout data collection by restricted access to information and coding of questionnaires. Questionnaires were cross-checked, stored in locked cabinets and accessed only by authorized persons.

### **3.11.2 Focus Group Discussion**

Three Focus group discussions (FGDs) were conducted in Mbagathi county hospital with caregivers with children below five years who had sought health care services for their five children at the pediatric casualty. Study participants were selected purposively. The researcher moderated the FGDs to avoid creating a bias that would have resulted in some participants dominating the discussions. The discussions went on for 45 - 60 minutes for each FGD. The sessions were recorded after obtaining permission from the respondents. Notes on key issues raised during the discussions were written a by a research assistant (note taker).

## **3.12 Data Analysis**

### **3.12.1 Quantitative Data**

Questionnaires were cross- checked for accuracy and data cleaning done before analysis. Quantitative data was analyzed using Statistical Package for Social Science (SPSS) version 25. Chi-square test and logistic regressions were used to test the association between study variables. Duration of diarrhea was categorized into two groups; 1-2 days

(short duration) and above 2 days (longer duration). Further, five variables were selected to assess knowledge of management of diarrhea among primary care givers. The individual scores were categorized into 3 groups; 0-3 (inadequate knowledge), 4-7 (moderate knowledge) and above 7 (adequate knowledge). A score of zero was assigned to wrong answer (s) and one to correct answer. Total scores were obtained by summing the individual scores. Descriptive results were summarized to frequencies, percentages and median. The results of the logistics regression analysis were presented in terms of odd ratios (OR) and the corresponding 95% confidence intervals (CIs). The statistical level of significance was set at 0.2 in the univariable model and 0.05 in the mixed effect and adjusted models. Stratified analysis on duration of diarrhea was performed to explain effect modification.

### **3.12.2 Qualitative Data**

Qualitative data was thematically analyzed by Nvivo software then transcribed and coded into themes. Then reported as direct quotes or narrations from the respondents.

### **3.13 Logistical and Ethical Considerations**

Kenyatta university graduate school permitted the authority to conduct the study. The proposal was reviewed and approved by Kenyatta University Ethical Review Committee (KU-ERC) (Proposal No. PKU/2183/I1340). Permission to collect data was sought from the following, National commission for science technology and innovation (NACOSTI) (License No: NACOSTI/P/21/9081), Nairobi Metropolitan Services (NMS), Mama Lucy hospital and Mbagathi county hospital.

All the primary caregivers before inclusion of their under five years old and themselves to participate in the study they had to give a written informed consent. Individuals were informed on their right to decline or withdraw their consent at any point for any reason with no negative implications. The data gathered was kept confidential in lockable cabinets and computer with password. The researcher used study numbers instead of names on the questionnaire to maintain anonymity, hence difficult to trace questionnaire to any individual primary caregiver. The interviews were also conducted in a room that provided privacy so as to help maintain confidentiality.

## **CHAPTER FOUR: RESULTS**

### **4.1 Response Rate**

The response rate in this study was 100%.

### **4.2 Socio-Demographic Characteristics of the Primary Caregiver**

Majority of the primary caregivers were biological mothers to child (98.2%) cases versus (97.3%) controls. Thirty-one (28.2%) primary caregivers to cases had completed secondary school education versus forty-five (40.9%) controls. The median family income per month was Ksh. 7000 (IQR 5000, 10,000) cases versus Ksh. 12000 (IQR 7925, 17,000) controls as indicated in Table 4.1.

**Table 4.1: Socio-Demographic Characteristics of the PCGs**

<b>Variables</b>	<b>Value</b>	<b>Case (n =110) %</b>	<b>Control (n=110) %</b>
Relationship with child	Biological mother	108 (98.2)	107 (97.3)
	Other	2 (1.8)	3 (2.7)
Gender	Female	109 (99.1)	110 (100.0)
	Male	1 (0.9)	0 (0)
Marital status	Married	83 (75.5)	89 (80.9)
	Single	19 (17.3)	14 (12.7)
	Others	8 (7.2)	7 (6.3)
Highest level of education	College/University	5 (4.5)	17 (15.5)
	Complete secondary education	31 (28.2)	45 (40.9)
	Incomplete secondary education	45 (40.9)	29 (26.4)
	Complete primary education	16 (14.5)	12 (10.9)
	Incomplete primary education	12 (10.9)	6 (5.5)
	No formal education	1 (0.9)	1 (0.9)
Occupation	Unemployed	45 (40.9)	24 (21.8)
	Self employed	29 (26.4)	31 (28.2)
	Formal employment	10 (9.1)	26 (23.6)
	Casual worker	26 (23.6)	29 (26.4)
Main source of income	Salaried employment	9 (8.2)	26 (23.6)
	Partner	26 (23.6)	17 (15.5)
	Donations	0 (0)	1 (0.9)
	Self-employment	29 (26.4)	30 (27.3)
	Relatives	16 (14.5)	7 (6.4)
	Casual laborer	28 (25.5)	29 (26.4)
	Others-homemaker	1 (0.9)	0 (0)
Religion	Christianity	100 (90.9)	99 (90.0)
	Muslim	8 (7.3)	10 (9.1)
	Other	2 (1.8)	1 (0.9)
Age (median, (IQR))		27 (23, 31) years	29 (26,32) years
Family income per month (median, (IQR))		Ksh. 7000 (5000, 10,000)	Ksh. 12000 (7925, 17,000)

### 4.3 Demographic characteristics of the Child

Table 4.2 shows socio-demographic characteristics of the child. Majority of the children were males; 57.3% cases versus 66.4% controls. Majority of the cases (94.5%) versus (93.6%) controls had received two doses of ROTA virus vaccine.

**Table 4.2: Demographic Characteristics of the Child**

Variables	Value	Case (n=110)	Control (n=110)
		Frequency (%)	Frequency (%)
Gender	Female	46 (41.8)	37 (33.6)
	Male	64 (58.2)	73 (66.4)
Age in months	<6 months	9 (8.2)	6 (5.5)
	6-11	14 (12.7)	7 (6.4)
	12-23	42 (38.2)	32 (29.1)
	24-35	29 (26.4)	29 (26.4)
	36-47	11 (10.0)	23 (20.9)
	48-59	5 (4.5)	13 (11.8)
Number of siblings	No sibling	25 (22.7)	17 (15.5)
	1 sibling	21 (19.1)	16 (14.5)
	2 siblings	35 (31.8)	43 (39.1)
	3 siblings	23 (20.9)	26 (23.6)
	> 3 siblings	6 (5.5)	8 (7.2)
Birth order of the baby in the family	First child	24 (21.8)	16 (14.5)
	Second child	23 (20.9)	18 (16.4)
	Third child	35 (31.8)	44 (40.0)
	Fourth child	22 (20.0)	26 (23.6)
	Fifth child	6 (5.4)	5 (5.4)
Space between child and the previous one		Median 1 (IQR 1, 2) months	Median 1 (IQR 1, 1) month
Person who take care of child most of the time	Primary care giver	72 (65.5)	58 (52.7)
	Daycare	30 (27.3)	27 (24.5)
	Other	8 (7.2)	25 (22.7)
ROTA virus vaccine	Fully vaccinated	104 (94.5)	103 (93.6)

#### **4.4 Social-Cultural Beliefs of the PCG**

Majority of the primary caregivers to the cases (69.1%) versus (59.1%) controls had appropriate information about the main cause of diarrhea. More than a fifth (20.9%) of the primary care givers to the cases versus 16.4% controls indicated that sometimes children get diarrhea because of curse/other spiritual or supernatural curse.

From the focus group discussions, the participants mentioned the following as perceived causes of diarrhea.

*“Others say if the husband steps out of marriage especially if the child is still lactating”.*  
**(D1 R2, D2 R7)**

*“Like now the child is lactating, if I sleep with another man the child will diarrhea”* **(D2 R1).**

*“When you keep the child’s clothes outside to stay until when the sun sets can cause diarrhea”* **(D1 R4, D2 R1, D3 R8).**

*“When it gets to evening there are birds that fly by...Yes, if they pass when the clothes are still outside, they will start to diarrhea.”* **(D3 R4)**

Variables	Value	Case (n=110) %	Control (n=110) %
Main causes of diarrhea	Appropriate information	76 (69.1)	65 (59.1)
	Inappropriate	34 (30.9)	46 (40.9)
Do children get diarrhea as a result of spiritual/ supernatural curses	Yes	23 (20.9)	18 (16.4)
	No	87 (79.1)	92 (83.6)
Should children who get diarrhea due to spiritual/supernatural curse be given ORS, Zinc supplements or homemade fluids to treat diarrhea	Yes	17 (73.9)	15 (83.3)
	No	6 (26.9)	3 (16.7)

**Table 4.3 Social-Cultural beliefs of the PCGs**

#### 4.5 Knowledge on Management of Diarrhea

A small proportion of the primary caregivers to cases (10.0%) versus 13.6% controls gave appropriate response on the use of ORS. More than a quarter (28.2%) of the caregivers in each group gave appropriate response about duration to keep the prepared ORS. Most of the primary caregivers to the cases (91.8%) versus controls (95.5%) gave correct response about type of water used to prepare ORS solution. A small proportion of primary caregivers to cases (4.5%) versus controls (15.5%) gave appropriate response about the use of zinc supplement. Overall, majority of the primary care givers to cases (93.6%) versus controls (79.1%) had inadequate knowledge about diarrhea management.

From the focus group discussion, the parcipants reported various methods of managing diarrhea.

*“I was told if they start to diarrhea you give them wheat and it will stop”. (D2 R1)*

*“You cook rice until it is about to boil when the water becomes thick then you give them the rice water”. (D2 R7)*

*“There is a type of ash you give to the child”. (D3 R7)*

*“I just give plain water without adding salt”. (D3 R9)*

*“They rub the child’s belly with oil and place some ash on the tongue of the child.” (D3 R7)*

**Table 4.4: Knowledge on Management of Diarrhea**

<b>Variables</b>	<b>Value</b>	<b>Case (n=110) %</b>	<b>Control (n=110) %</b>
The role of ORS in diarrhea management.	Appropriate response	11 (10)	15 (13.6)
	Inappropriate responses	99 (90.0)	95 (86.4)
Duration to keep the prepared ORS	Appropriate response	29 (26.4)	31 (28.2)
	Inappropriate responses	81 (73.6)	79 (71.8)
Type of water used to mix ORS solution	Appropriate response	101 (91.8)	105 (95.5)
	Inappropriate responses	9 (8.2)	5 (4.5)
Uses of zinc supplements	Appropriate response	5 (4.5)	17 (15.5)
	Inappropriate responses	105 (95.5)	93 (84.5)
Duration of giving zinc supplement to a child with diarrhea	Appropriate response	9 (8.2)	17 (15.5)
	Inappropriate Responses	101 (91.8)	93 (84.5)
Total knowledge score	Adequate	2 (1.8)	3 (2.7)
	Moderate	5 (4.5)	20 (18.2)
	Inadequate	103 (93.6)	87 (79.1)

#### 4.6 Prior Actions Taken to Manage Diarrhea at Home Before Seeking Healthcare

##### Services

Majority of the children, 88.2% cases versus 64.5% controls had suffered diarrhea for more than 2 days before presenting to hospital. A small proportion of the primary caregivers, 4.5% cases versus 2.7% controls gave child sufficient amount of fluid since diarrhea started. ORS was administered in the correct frequency by 6.3% cases versus 8.6% controls among primary caregivers who initiated ORS administration at home. Almost a half of the caregivers to cases (49.0%) versus controls (70.9%) had given child a zinc product by the time of hospital presentation. A fifth (20%) of the primary caregivers in each group gave child medications other than ORS and zinc to treat diarrhea.

From the FGDs, participants mentioned the following actions;

*“To say the truth I have never used ORS, but when my child had diarrhea what I used is water and I gave him food in plenty. I gave the child fruit juice and regained energy. Mostly I prepared the juice with the fruit the child like e.g. Mangoes, you make your own juice and give the child”. (D1 R6).*

*“He started to diarrhea on Friday. I gave him zinc one per day the diarrhea didn’t stop I didn’t give him ORS because I didn’t have, so on Saturday I saw that he was overwhelmed, yesterday I gave him zinc and brought him to the hospital.” (D1- R8).*

*“So when the diarrhea came it was at night and there was no way I could be helped and he had the fever and vomiting, it manifests like that. The first thing I did because the fever*

*was high I wiped them with a piece of cloth in warm water and gave him as that was the only thing available. When I gave him at least he regained energy a little bit". (D2 R5)*

**Table 4.5: Prior Actions Taken by PCGs Before Seeking Healthcare Services**

<b>Variables</b>	<b>Value</b>	<b>Case (n =110) %</b>	<b>Control (n =110) %</b>
Duration of diarrhea		4 (IQR 3, 5) days	3 (IQR 2, 3) days
Amount of fluid/food given to child during diarrhea	Sufficient amount	5 (4.5)	3 (2.7)
	Insufficient amount	105 (95.5)	107 (97.3)
Received ORS at home	Yes	80 (72.7)	93 (84.5)
	No	30 (27.3)	17 (15.5)
Frequency of ORS administration at home	Administered correctly	5 (6.3)	8 (8.6)
	Administered incorrectly	75 (93.7)	85 (91.4)
Administered zinc tablet/suspension at home	Yes	54 (49.1)	78 (70.9)
	No	56 (50.9)	32 (29.1)
Gave child any of the home-prepared fluids since diarrhea started	Yes	105 (95.5)	107 (97.3)
	No	5 (4.5)	3 (2.7)
Frequency of giving child other fluids during diarrhea	Appropriate response	0 (0)	3 (2.7)
	Inappropriate response	110 (100.0)	107 (97.3)
Amount of food given to child during diarrhea.	Sufficient amount	65 (59.1)	4 (3.6)
	Insufficient amount	45 (40.9)	106 (96.4)
Withheld of any type of fluid/food to improve diarrhea	Yes	6 (5.5)	11 (10.0)
	No	104 (94.5)	99 (90.0)

#### **4.7: Univariable Analysis of PCGs Social Demographic Characteristics and Dehydration**

The univariable analysis results indicated that the variables: age of the PCG in years, highest level of education and occupation of the PCG were significantly associated with dehydration at  $P < 0.20$  (Table 4.6). They were subsequently offered to the multivariable model (Table 4.10).

**Table 4.6: Univariable Analysis of PCGs Social Demographic Characteristics and Dehydration.**

<b>Variables</b>	<b>Values</b>	<b>Case ( n= 110%)</b>	<b>Control ( n= 110%)</b>	<b>(cOR) (95% CIs)</b>	<b>p-value</b>
Relationship with child	Other	2 (1.8)	3 (2.7)	ref	0.65
	Biological mother	108 (98.2)	107 (97.3)	0.66 (0.11-4.03)	
Age in years (median (IQR))		27 (23, 31)	29 (26, 32)	0.92 (0.87-0.97)	0.002
Marital status	Married	83 (75.5)	89 (80.9)	ref	0.33
	Single	19 (17.3)	14 (12.7)	1.46 (0.69-3.09)	
	Others	8 (7.2)	7 (6.3)	1.23 (0.43-3.53)	
Highest level of education	College/University	5 (4.5)	17 (15.5)	ref	0.08
	Complete secondary	32 (29.1)	40 (36.4)	2.72 (0.91-8.17)	
	Incomplete secondary	44 (40.0)	34 (30.9)	6.8 (1.68-27.52)	
	Complete primary	16 (14.5)	12 (10.9)	4.53 (1.30-15.77)	
	Incomplete primary	13 (11.8)	7 (6.4)	4.40 (1.48-13.13)	
Occupation	Formal employment	10 (9.1)	26 (23.6)	ref	0.05
	Self employed	29 (26.4)	31 (28.2)	2.43 (1.00-5.91)	
	Unemployed	45 (40.9)	24 (21.8)	4.88 (2.02-11.77)	
	Casual worker	26 (23.6)	29 (26.4)	2.33 (0.94-5.74)	
Religion	Christianity	100 (90.9)	99 (90.0)	ref	0.82
	Other	10 (9.3)	11 (10.0)	0.90 (0.37-2.21)	
Average family income per month (median, (IQR))		Ksh. 7000 (5000, 10,000)	Ksh. 12000 (7925, 17,000)	1	

#### 4.8: Univariable Analysis of Child's Demographic Characteristics and Dehydration

The univariable analysis results indicated that the variables: age of the child in months, child gender and persons who take care of the child most of the time were significantly associated with dehydration at  $P < 0.20$  (Table 4.7). They were subsequently offered to the multivariable model (Table 4.12).

**Table 4.7: Univariable Analysis of Child's Demographic Characteristics and Dehydration.**

Variables	Values	Case (n =110) %	Control (n=110) %	(cOR) (95% CI)	P- value
Child's age in months	>23-59	45 (40.9)	64 (58.2)	Ref	
	<6	9 (8.2)	5 (4.5)	0.39 (0.11- 1.20)	0.11
	> 6- 12	18 (16.4)	9 (8.2)	0.35 (0.14- 0.83)	0.02
	>12- 23	38 (34.5)	30 (27.3)	0.56 (0.30- 1.02)	0.06
Child's gender	Male	64 (49.0)	73 (66.4)	Ref	
	Female	46 (41.8)	37 (33.6)	1.44 (0.83- 2.49)	0.19
Number of siblings	2	35 (31.8)	43 (39.1)	Ref	
	0	25 (22.7)	17 (15.5)	0.53 (0.25- 1.14)	0.11
	1	21 (19.1)	16 (14.5)	0.60 (0.27- 1.32)	0.21
	3	23 (20.9)	26 (23.6)	0.88 (0.43- 1.83)	0.75
	> 3 siblings	6 (5.5)	8 (7.2)	0.88 (0.31- 2.59)	0.82
Birth order of the child	Third	35 (31.8)	44 (40.0)	ref	
	First	24 (21.8)	16 (14.5)	0.53 (0.24- 1.97)	0.11
	Second	23 (20.9)	18 (16.4)	0.62 (0.29- 1.33)	0.22
	Fourth	22 (20.0)	26 (23.6)	0.94 (0.46- 1.94)	0.87
	Fifth and above	6 (5.4)	5 (5.4)	0.80 (0.23- 2.75)	0.71
Persons who take care of the child most of the time	PCGs	72 (65.5)	58 (52.7)	ref	
	Day care	30 (27.3)	27 (24.5)	1.14 (0.61- 2.13)	0.69
	Others	8 (7.2)	25 (22.7)	5.47 (2.24- 15.51)	<0.001

#### 4.9: Univariable Analysis of Social-Cultural Beliefs and Dehydration

The univariable analysis results indicated that the variable main cause of diarrhea was significantly associated with dehydration at P 0.20 (Table 4.7). This was subsequently offered to the multivariable model (Table 4.10).

Variables		Case (n=110) %	Control (n=110) %	cOR (95% CI)	p-value
Main causes of diarrhea	Appropriate information	76 (69.1)	65 (59.1)	ref	0.12
	Inappropriate information	34 (30.9)	46 (40.9)	1.17(0.37-1.13)	
Do children sometimes get diarrhea due to curse or other spiritual or supernatural powers	No	87 (79.1)	92 (83.6)	ref	0.41
	Yes	23 (20.9)	18 (16.4)	0.79(0.38-1.48)	
Should children who get diarrhea due to spiritual/supernatural powers be given ORS, Zinc supplements or homemade fluids to treat diarrhea	Yes	17 (73.9)	15 (83.3)	ref	0.3
	No	6 (26.9)	3 (16.7)	2.12 (0.52- 8.71)	

**Table 4.8: Univariable Analysis of Social-Cultural Beliefs and Dehydration**

#### 4.10 Univariable Analysis of Knowledge in Diarrhea Management and Dehydration

The univariable analysis results indicated that the variables: type of water used to mix ORS solution, uses of zinc supplement and the duration of giving zinc supplement to a child with diarrhea were significantly associated with dehydration at P< 0.20 (Table 4.8).

These were subsequently offered to the multivariable model (Table 4.10).



**Table 4.9: Univariable Analysis of Knowledge on Diarrhea Management and Dehydration**

Variables		Case (n=110) %	Control (n=110) %	(cOR) (95% Cis)	P- value
The role of ORS in diarrhea management.	Inappropriate response	99 (90.0)	95 (86.4)	ref	
	Appropriate responses	11 (10)	15 (13.6)		0.42
Duration to keep the prepared ORS	Inappropriate response	81 (73.6)	79 (71.8)	Ref	
	Appropriate responses	29 (26.4)	31 (28.2)	1.03(0.76- 1.41)	0.76
Type of water used to mix ORS solution	Appropriate response	101 (91.8)	105 (95.5)	Ref	
	Inappropriate responses	9 (8.2)	5 (4.5)	8.55(1.05- 9.56)	0.05
Uses of zinc supplements	Inappropriate response	105 (95.5)	93 (84.5)	ref	
	Appropriate responses	5 (4.5)	17 (15.5)	3.168(1.20- .37)	0.02
Duration of giving zinc supplement to a child with diarrhea	Inappropriate response	101 (91.8)	93 (84.5)	ref	
	Appropriate Responses	9 (8.2)	17 (15.5)	2.05(0.87- 4.83)	0.1

#### **4.11 Univariable Analysis of Prior Actions Taken to Manage Diarrhea and Dehydration**

Results of the univariable analysis showed that the variables: initiated ORS at home, administered zinc supplement at home when diarrhea and Amount of food given to child during diarrhea episode were significantly associated with dehydration at P 0.20 (Table 4.9). These were subsequently offered to the multivariable model (Table 4.10).

**Table 4.10: Univariable Analysis of Prior Actions Taken to Manage Diarrhea and Dehydration**

Variables	Value	Case (n =110) %	Control (n=110) %	cOR (95%CI)	p-value
Duration of diarrhea		4 (IQR 3,4) days	3 (IQR 2,3) days		
Initiated ORS at home	No	30 (27.3)	17 (15.5)	Ref	0.06
	Yes	80 (72.7)	93 (84.5)	0.92 (0.99- 3.81)	
Frequency of ORS administration at home	Administered incorrectly	75 (93.7)	85 (91.4)	Ref	0.55
	Administered correctly	5 (6.3)	8 (8.6)	1.43 (0.45-4.91)	
Amount of home-prepared fluids given to child since diarrhea started	Insufficient amount	105 (95.5)	107 (97.3)	Ref	0.48
	Sufficient amount	5 (4.5)	3 (2.7)	0.59 (0.12-2.46)	
Initiated zinc supplements at home immediately diarrhea started	No	56 (50.9)	32 (29.1)	Ref	0.002
	Yes	54 (49.1)	78 (70.9)	2.47(1.42-4.36)	
Amount of food given to child during diarrhea episode	Sufficient amount	65 (59.0)	4 (3.6)	ref	< 0.0001
	Insufficient amount	45 (41.0)	106 (96.4)	38.3 (14.72- 131.48)	

#### 4.12 Multivariate Analysis of Determinants of Dehydration

A multivariable analysis was performed to determine significant predictors of dehydration. All the unvariable predictors that had a p- value of 0.2 and below were added to the model. The model identified the PCGS median age, the level of education and initiating zinc supplement at home immediately when diarrhea started as significant predictors of dehydration at a p- value of 0.05 and below ( $p < 0.05$ ) as shown in (Table 4.11).

**Table 4.11: Multivariable Analysis of Determinants of Dehydration**

Variables	Adjusted OR			
	Not controlled for duration of diarrhea OR (95%CI)	p-value	Duration of diarrhea controlled OR (95%CI)	P-value
Median age in years	1.06 (0.87-0.97)	0.14	1.01 (0.93-1.09)	<b>0.01</b>
Highest level of education				
College/University	ref			
Complete secondary	0.41 (0.10-1.48)	0.19	0.26 (0.04-1.17)	0.1
Incomplete secondary	0.33 (0.08-1.26)	0.11	0.25 (0.04-1.22)	0.1
Complete primary	0.23 (0.05-1.04)	0.06	0.29 (0.04-1.80)	0.19
Incomplete primary	0.18 (0.03-0.99)	<b>0.05</b>	0.23 (0.03-1.69)	0.16
Occupation				
Formal employment	ref			
Self employed	0.73 (0.31-1.75)	0.48	0.69 (0.26-1.80)	0.45
Unemployed	0.60 (0.16-2.20)	0.44	0.71 (0.16-3.02)	0.64
Casual worker	0.55 (0.19-1.56)	0.26	0.48 (0.15-1.51)	0.21
Child's age in				

months				
Variables	Adjusted OR Not controlled for duration of diarrhea		Duration of diarrhea controlled	
	OR (95%CI)	p-value	OR (95%CI)	P-value
>23-59	ref			
≤6	0.47 (0.11-1.74)	0.28	0.83 (0.18- 3.73)	0.8
>6-12	0.49 (0.16-1.43)	0.19	0.56 (0.16-1.85)	0.34
>12-23	0.72 (0.34-1.56)	0.41	0.90 (0.39-2.11)	0.8
Child's gender				
Male	ref			
Female	0.75 (0.39-1.44)	0.39	0.95 (0.46-	0.88
Birth order of the child in the family				
Third	ref			
First	0.87 (0.26-3.00)	0.82	0.90 (0.24-3.43)	0.87
Second	0.54 (0.21-1.39)	0.21	0.56 (0.20-1.55)	0.27
Fourth	0.75 (0.32-1.74)	0.5	0.84 (0.32-2.19)	0.72
Fifth and above	0.75 (0.16-3.33)	0.71	1.03 (0.19-5.56)	0.98
Person who takes care of the child most of the time				
Primary care giver	ref			
Daycare	0.49 (0.20-1.16)	0.11	0.49 (0.19-1.25)	0.14
Main cause of diarrhea				
Inappropriate Response	ref			
Appropriate Response	0.60 (0.31- 1.14)	0.12	0.63 (0.31- 1.30)	0.21

Variables	Adjusted OR			
	Not controlled for duration of diarrhea		Duration of diarrhea controlled	
	OR (95%CI)	p-value	OR (95%CI)	p-value
Types of water used to mix ORS solution				
Appropriate response	ref			
Inappropriate	4.37 (0.422- 45.90)	0.22	6.34 (0.55- 73.48)	0.14
Uses of zinc supplement in diarrhea management				
Inappropriate Response	ref			
Appropriate Response	1.85 (0.57- 6.06)	0.31	1.11 (0.31- 4.03)	0.87
Duration of giving zinc supplement to a child with diarrhea				
Inappropriate Response	ref			
Appropriate Response	0.90 (0.34- 2.43)	0.84	0.79 (0.26- 2.40)	0.68
Initiated ORS at home				
No	ref			
Yes	0.71 (0.27-1.87)	0.49	0.67 (0.23-1.93)	0.46
Administered zinc supplements at home immediately diarrhea started				
No	ref			
Yes	2.19 (1.00-4.91)	0.05	2.82 (1.19-6.90)	<b>0.02</b>

## **CHAPTER FIVE: DISCUSSION, CONCLUSIONS & RECOMMENDATIONS**

### **5.1 Discussion**

This was the first study to establish the predictors of dehydration among under-fives seeking treatment for acute diarrhea at Mbagathi county hospital in Nairobi City County, Kenya. This was done by assessing the socio-demographic characteristics of the PCGs as well as the children under five years, socio-cultural beliefs, level of knowledge of the PCGs on management of diarrhea and prior actions taken by PCGs in management of diarrhea for children under five years before seeking health care.

From the descriptive analysis there were no significant difference between the case group and the control group in terms of characteristics. Hence variables that were statistically significant at the multivariate analysis were independent predictors of dehydration among children under five.

#### **5.1.1 Socio Demographic Characteristics of PCGs Associated with Dehydration**

The study found that the majority of primary caregivers were biological mothers, and their median age in both cases and control groups fell within a relatively young age range. This aligns with similar findings from Jamaica, which also reported that most primary caregivers were in their twenties and thirties (Merali et al., 2018). The youthfulness of these caregivers suggests that they are of childbearing age and likely to have young children who are more susceptible to diarrheal illnesses.

An important finding is that a significant proportion of PCGs had attained at least a complete secondary level of education. This observation is consistent with the results of a

study by Kabebe et al., where a considerable percentage of urban participants had reached secondary education (Kebede et al., 2019). This level of education is a crucial determinant of caregivers' knowledge and awareness of diarrhea management. Education equips caregivers with the understanding of the dangers of diarrhea, early signs of diarrhea, and interventions needed to prevent dehydration after the onset of diarrhea.

Further supporting the significance of education, a study in South Asian countries found that caregivers with secondary education and above had better knowledge of diarrhea prevention and management compared to those with lower education levels (Hasan & Richardson, 2017). This underscores the strong association between caregivers' educational levels and the incidence of diarrheal diseases. Caregivers with higher education levels are more likely to have the knowledge and resources necessary for effective diarrhea prevention and management.

The study by Kante et al. in Tanzania also highlighted the influence of caregivers' socio-demographic characteristics, including their education level, on childhood diarrhea and dehydration risk. Caregivers with lower education levels were associated with increased susceptibility to diarrhea, emphasizing the role of education in preventing and managing diarrheal diseases. Additionally, household characteristics, such as the number of children under five in a household, were linked to an increased risk of diarrhea and dehydration (Kante et al., 2015).

In Kenya, Njeri's study identified several factors that influence the choice of treatments for children with diarrhea, including caregivers' education level. The study recommended strengthening awareness about childhood diarrhea and the recommended treatments for

its management, emphasizing the importance of education as a determinant in treatment-seeking behaviors (Njeri, 2013).

The findings of this study and the related literature underscore the importance of primary caregivers' socio-demographic characteristics, especially their level of education, in influencing the risk and severity of dehydration in children with acute diarrhea. Caregivers with higher education levels tend to possess better knowledge and resources for effective diarrhea prevention and management. Promoting educational interventions and raising awareness among caregivers, especially those with lower education levels, can significantly contribute to reducing the burden of diarrheal diseases and the associated risk of dehydration in children.

### **5.1.2 Demographic Characteristics of Child Associated with Dehydration**

Almost all the demographic variables of the child in both groups were similar that is age, gender, number of sibling's birth order Rota virus vaccine status and the person who takes care of the child most of the time. Though some of the variables were significant at univariate analysis as shown in table 4.7 none of the variables was significant at multivariate level. This could confirm that children health is particularly dependent on the PCGs and mostly mothers because she takes care of the child most of the time. Majority of the children in both groups were above one year 75.5% in cases versus 85.5% in controls which differed with other study conducted in the community (Mutuma, 2019; KNBS, 2016) and concurred with the studies which were also hospital based (Riaz, 2019); (Ng'arng'ar, 2020) . These difference may be due the difference in study area where those conducted in the community were able to pick all diarrhea cases even those

who had self-limiting episodes hence did not require to visit a health facility for treatment.

### **5.1.3 Social-Cultural Beliefs of PCGs Associated with Dehydration**

The study findings reveal that a substantial number of PCGs held appropriate information about the main cause of diarrhea. This knowledge is a critical component of effective diarrhea management, as understanding the primary causes of diarrhea can lead to appropriate actions and preventive measures.

Interestingly, a notable percentage of primary caregivers in both cases and controls indicated that diarrhea in children could sometimes be attributed to curses or other spiritual or supernatural factors which was also echoed in the FGDs on perceived causes of diarrhea. Furthermore, some believed that such children should not be treated with ORS, zinc supplements, or homemade fluids. These findings underscore the influence of socio-cultural beliefs on caregivers' decisions regarding diarrhea management. Such beliefs may affect treatment-seeking behaviors and the administration of recommended treatments.

Despite these findings, the multivariable analysis did not identify a significant association between socio-cultural beliefs and dehydration. This suggests that while such beliefs may influence initial treatment decisions, they may not be the primary determinant of whether a child develops dehydration in the long run. Other factors, such as the caregivers' knowledge, practices, and the timing of treatment, may play a more critical role in dehydration risk.

The influence of socio-cultural beliefs on childhood diarrhea management is a complex and multifaceted issue. Caregivers' beliefs are often deeply rooted in their cultural and social contexts, and interventions to address these beliefs must be sensitive and context-specific. In some cases, traditional practices may hinder effective diarrhea management, as reported in a systematic review study that found harmful practices commonly employed in the treatment of diarrhea (Carte et al., 2015).

Addressing these beliefs and practices should be part of a comprehensive approach to diarrhea prevention and management. Health educational interventions should aim to correct misconceptions and emphasize the importance of timely and evidence-based treatment. Moreover, healthcare providers and community health workers can play a vital role in promoting appropriate practices and dispelling harmful beliefs.

The influence of socio-cultural beliefs on diarrhea management is evident in the study, with a notable proportion of caregivers holding beliefs that may affect their treatment decisions. While these beliefs are significant, they may not be the sole determinants of dehydration risk. The findings highlight the need for culturally sensitive interventions that address these beliefs and promote evidence-based practices for effective diarrhea management.

#### **5.1.4 Association Between PCGs Level of Knowledge in Diarrhea Management and Dehydration.**

The study findings reveal a significant relationship between the level of knowledge among PCGs in managing childhood diarrhea and the risk of dehydration in children under five. The level of knowledge among primary caregivers significantly influences

their actions and practices in the management of childhood diarrhea, which, in turn, impacts the risk of dehydration.

The study identified a knowledge gap among primary caregivers regarding essential aspects of diarrhea management. For example, a substantial proportion of primary caregivers did not have appropriate knowledge about the role of ORS in diarrhea management, duration to keep the prepared ORS, uses of zinc supplementation, and the recommended duration for giving a child zinc supplements. These gaps in knowledge can have direct consequences on the effectiveness of diarrhea management and the prevention of dehydration. This agrees with Mumtaz et al; findings which reported that the problem with diarrhea lies with mother's improper knowledge and their misdirected approach towards its management. This leads to a high degree of mismanagement which results in severe dehydration and also Markennen et al study findings, reported that a number of caregivers had inadequate knowledge. This inadequacy in knowledge about diarrhea diseases can be very challenging to PCGs who should be providing care to their children (Mumtaz et al.,2014); (Markennen et al.,2018)

Another study emphasizes the pivotal role of mothers as primary caregivers and their knowledge level in influencing the outcome of diarrheal diseases in children. Poor knowledge levels among mothers directly impact the healthcare system, as they are the first line of care for their children (Kuday et al., 2018); (Rao et al., 2015)

Addressing the "know-do gap" among primary caregivers is crucial, as highlighted by Carvajal- Vélez et al. (2016). This means bridging the divide between what caregivers know about diarrhea management and what they actually do in practice. Appropriate

home management of diarrhea and knowing when to seek medical care are essential to prevent complications and reduce child mortality due to diarrhea.

The findings from the current study are consistent with a previous study conducted at Mbagathi County Hospital, which revealed that caregivers utilized various home care practices in the treatment of diarrhea. However, a significant proportion of caregivers did not initiate the recommended treatment, such as ORS and zinc. The choice of treatment was often influenced by the caregivers' perception of the illness's cause. This observation further emphasizes the critical role of caregiver knowledge in influencing their practices and, consequently, the risk of dehydration in children (Njuguna, 2014).

Responses from the FGDs on knowledge on diarrhea management concurred with a study done in Kawangware, Kenya which showed that some households still believe in inappropriate traditional methods of diarrhea management, this could pose as significant risk factors to child having diarrhea (Mutuma et al., 2019).

The study highlights the critical role of caregiver knowledge in managing childhood diarrhea and preventing dehydration. Bridging the knowledge gap is essential to ensure that caregivers not only possess the necessary knowledge but also apply it effectively. This can be achieved through targeted educational interventions and awareness campaigns, considering the demographic and socioeconomic factors that may influence knowledge and practice.

### **5.1.5 Association Between Prior Actions Taken by PCGs to Manage Acute Diarrhea and Dehydration**

The findings of the study indicate that initiating ORS, initiation of zinc supplementation at home immediately when diarrhea starts and amount of food given to child during diarrhea episode are significant predictor of dehydration among children under five years seeking treatment at Mbagathi Hospital in Nairobi County. This observation aligns with global recommendations from the World Health Organization (WHO, 2019), which emphasizes the importance of zinc supplementation as part of effective diarrhea management. The WHO advocates for the use of oral rehydration therapy (ORT) and zinc supplementation, highlighting their role in preventing and managing dehydration in children with diarrhea. The study findings underscore the significance of this recommendation, particularly in resource-constrained settings like Mbagathi Hospital, where optimal healthcare resources might not always be readily accessible.

These findings also resonate with the broader literature on caregiver actions in managing childhood diarrhea and their implications for the risk of dehydration. Globally, caregiver actions in response to childhood diarrhea are acknowledged as pivotal in determining the likelihood of dehydration. Adequate and timely care can prevent mild cases of diarrhea from progressing to severe dehydration, emphasizing the importance of early interventions (Bartlett & Black, 2016); (Riaz, 2019).

Regionally, particularly in areas with a high prevalence of diarrheal diseases, caregiver actions assume a significant role in shaping child health outcomes. Studies in Sub-Saharan Africa and South Asia have shown that caregivers may resort to traditional or home-based remedies for diarrhea, sometimes delaying the decision to seek appropriate

medical care. This delay in seeking professional healthcare can contribute to an increased risk and severity of dehydration, especially when traditional remedies prove to be ineffective (Elhassan et al., 2017).

Within Kenya, the Kenya Demographic and Health Survey (KDHS) of 2014 and 2022 has identified diarrhea as a major cause of illnesses and death among children under five. The research emphasizes the role of caregiver actions, including their choice of treatments, which are influenced by their perceived causes of diarrhea. Variations in treatment choices and practices are attributed to the caregivers' knowledge and awareness of oral rehydration solutions (ORS) and zinc supplements. Therefore, caregiver knowledge and practices directly influence the outcomes of diarrhea management (Njuguna, 2014).

This study observed two critical findings that shed light on the management of childhood diarrhea. Firstly, the receipt of Oral Rehydration Solution (ORS) and zinc supplements at home emerged as statistically significant factors in the analysis. These results align with the recommendations put forth by the World Health Organization (WHO) in 2019 and were consistent with the findings of a study conducted in Ethiopia by Workie (Workie et al., 2018). This agreement underscores the importance of ensuring that children have access to these life-saving interventions at home, which is particularly crucial in the context of childhood diarrhea, a major cause of morbidity and mortality.

The study also revealed that the majority of PCGs were practicing inappropriate measures in managing diarrhea. This finding resonates with (Ndou, 2020) and (UNICEF, 2020). It emphasizes a concerning gap in knowledge and behavior among caregivers when it

comes to managing diarrhea in children. The study also showed that majority of the PCGs level of knowledge in diarrhea management was inadequate which correlated with poor home- based management of diarrhea the findings differed with a study done in India which reported that the knowledge level of caregivers was good but the practices were inappropriate resulting in a know- do gap among the caregivers (Sumathi et al., 2020). Unlike this study which reported that both the knowledge and practice were poor, a study done in Ethiopia found that more than half of the caregivers (59.2%) had good knowledge but home-based management practices of diarrhea was poor showing also there was a know- do gap (Gemechu et al., 2022).

#### **5.1.6 Multivariable Analysis of Determinants of Dehydration**

The multivariable analysis conducted in this study aimed to identify significant predictors of dehydration in children under five with acute diarrhea at Mbagathi County Hospital. Among the factors analyzed, three key determinants of dehydration emerged as statistically significant. Firstly, the level of education of the PCGs played a crucial role, with children under the care of PCGs with incomplete primary education level being 1.39 times more likely to develop dehydration compared to those whose PCGs had completed primary education and above. This underscores the pivotal role of caregiver education in preventing and managing dehydration in children with diarrhea. Secondly, Increase in age of PCG lowered the odds of developing dehydration among children with acute diarrhea attending Mbagathi county hospital. lastly, the odds of developing dehydration were 2.82 times more among children whose PCGs did not initiate zinc supplement at home immediately when diarrhea started compared to the odds of dehydration in children who had zinc initiated at home immediately when diarrhea started.

## **5.2 Conclusions**

The Following Conclusions Have Been Drawn from the Findings of this Study

1. Socio demographic characteristics of the PCGs that were independent predictors of dehydration among children with acute diarrhea attending Mbagathi county hospital were age of the PCGs and Level of education.
2. PCGs level of knowledge on management of diarrhea was low.
3. The study revealed that PCGs practices in management of diarrhea at home was poor.
4. Delay in initiation of zinc supplement immediately when diarrhea starts is also a predictor of dehydration among children under five years.

## **5.3 Recommendations**

### **5.3.1 Recommendations for Policy**

1. More focus on implementation of integrated community case management (iCCM) policy in Nairobi county especially in informal settlements where resources are limited.

### **5.3.2 Recommendation for Practice**

1. More focused health education on diarrheal management in young mothers

2. Health promotion activities at the community level so as to sensitize the community and dispel myths and misconceptions on causes and management of diarrhea.

### 5.3.3 Suggestion for Further Research

1. More studies on risk factors associated with diarrhea- associated dehydration.

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## APPENDICES

### APPENDIX 1: INFORMED CONSENT

My Name is Mary Wanjeri Muriu, I am MASTER student from Kenyatta University. I am conducting a study on **“Determinants of dehydration among children under five years with acute diarrhea in Nairobi city county, Kenya.”** The information will be used by the Ministry of Medical Services and Ministry of Public Health and Sanitation to improve care of children with acute diarrhea in the community and Mbagathi county hospital as well as in other regions of Kenya.

#### **Procedures to be followed**

Participation in this study will require that I ask you some questions concerning you and your child. I will record the information from you in a questionnaire.

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

Please remember that participation in the study is voluntary. You may ask questions related to the study at any time.

You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you receive from this clinic or any other organizations now or in the future.

### **Discomforts and Risks**

There are no perceived risks to you or your child from this study. However, some question may make you uncomfortable. If this happens, you may refuse to answer these questions if you choose so. You may also stop the interview at any time. The interview may add approximately half an hour of your time in the clinic. and this will happen after your child has been attended to in the clinic and is stable.

### **Benefits**

If you participate in this study you will help us to learn the gaps available in management of acute diarrhea and identify effective health education and care that can improve the outcome of children under five years old with acute diarrhea. Hence reduce the risks of dehydration.

### **Reward**

There is no direct reward since there is no compensation for participating in the study. You will also not be required to pay anything for participation.

### **Confidentiality**

The interviews and examinations will be conducted in a private setting within the clinic. Your name will not be recorded on the questionnaire. The questionnaire will be kept in a locked cabinet for safe keeping Data on computers will be password protected. Everything will be kept private.

**Contact information**

If you have any questions you may contact Dr. Judy Mugo. On 0720671286 or Dr. Redempta Mutisya On 0724563316 or the Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke ,

**Participant’s Statement**

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

Name of participant.....

Signature or thumb print..... Date.....

**Investigator`s Statement**

I, the undersigned, I have explained to the volunteer in a language she/he understands, the procedures to be followed in the study and the risks and benefits involved.

Name of interviewer.....

Interviewer signature..... Date.....

**APPENDIX II: QUESTIONNAIRE**

**QUESTIONNAIRE FOR THE RESEARCH ON DETERMINANTS OF DEHYDRATION AMONG UNDER FIVE YEARS OLD WITH ACUTE DIARRHEA AT MBAGATHI COUNTY HOSPITAL.**

Questionnaire number..... Date of interview.....

Interviewer Name..... Interviewee

residence..... Interviewee home county.....

Interviewee tribe.....

**A. SOCIAL DEMOGRAPHICS**

**SOCIO-DEMOGRAPHIC OF THE PRIMARY CAREGIVER**

**1.0 What is your relationship with the child?**

- a. Mother
- b. Father
- c. Relative
- d. Guardian

**1.1 What is your age (Years).....?**

**1.2 What is your gender?**

- a) Male
- b) Female

**1.3 What is your marital status?**

- a) Single
- b) Married (answer Q 1.9-1.13)

c) Divorced

d) Separated

e) Widowed

**1.4 What is the highest level of schooling you attained?**

a) No formal education

b) Incomplete primary education

c) Completed primary education

d) Incomplete secondary education

e) Completed secondary education

f) College/university

**1.5 Occupation**

a. Unemployed

b. Self-employed

c. Formal employment/Salaried

d. Casual worker

**1.6 What is your main source of income?**

a) Salaried employment

b) Partner

c) Donations

d) Self-employment/ Business (specify).....

e) Relatives

f. Friends

f) Casual labourer

g. Others .....(specify).....

**1.7 What is the average family income per month? (in Kenyan Shillings)**

.....

**1.8 What is your religion?**

a) Christianity

b) Muslim

c) Traditionalist

e) Other (Specify).....

**SOCIO-DEMOGRAPHIC OF PARTNER**

**1.9 Partner's age in years.....?**

**1.10 What is the highest level of education**

- a) No formal education
- b) Incomplete primary education
- c) Completed primary education
- d) Incomplete secondary education
- e) Completed secondary education
- f) College/university

**1.11 Occupation**

- a. Unemployed
- b. Self-employed
- c. Formal employment/Salaried
- d. Casual worker

**1.12 Partner's source of income?**

- a). salaried employment
- b) Donations

c). Self-employment/ business (specify).....

d). Partner

d). Relatives

e. Friends

f. Casual labourer

g. Others(specify).....

**SOCIAL DEMOGRAPHIC OF THE CHILD**

**1.13 Gender of the child**

a) Male

b) Female

**1.14 Date of birth dd/ mon/year.....**

**1.15 Age of child in months.....**

**1.16 Siblings**

c) Number of siblings.....

**1.17 What is the birth order of the baby in the family?**

a) 1<sup>st</sup> child

b) 2<sup>nd</sup> child

- c) 3<sup>rd</sup> child
- d) 4<sup>th</sup> child
- e) 5<sup>th</sup> child
- f) 6<sup>th</sup> child or more (indicate position) .....

**1.18 What is the space between this child and the previous one? (in months)**

- a) .....Months
- b) Not applicable.

**1.19 Who takes care of the child most of the time?**

- a) self
- b) partner
- c) Daycare
- d) House help
- e) Others (Specify).....

**IMMUNIZATION HISTORY**

**1.20 Has the child been given the Rotavirus vaccine?**

- a). Yes
- b). No
- c. Don't know

**1.21 If yes how many doses and at what age (specify)**

a) 1<sup>st</sup> dose.....age.....

b) 2<sup>nd</sup> dose.....age.....

**B. SOCIAL-CULTURAL BELIEFS**

**2.1. When your child is sick who decides whether the child should be given treatment?**

a) Father

b) Mother

c) Other (specify).....

**2.2 What is/are the main causes of diarrhea?**

a) Drinking or eating dirty food or water

b) Teething

c) Witchcraft

d) Evil eyes Others

**2.3. Do some children sometimes get diarrhea because of a curse or other spiritual or supernatural curse?**

a) Yes

b) No

**2.4. Should children who get diarrhea as a result of the above-mentioned causes be given ORS, Zinc supplements or homemade fluids to treat diarrhea?**

a) Yes

b) No

**2.4.1. If no,**

a) Why?.....

b) What should they be given.....

**2.5 Can diarrhea be easily treated?**

a) Yes

b) No

**2.6 If yes by who?**

a) Caregiver

b) Health worker

c) Traditional healer

d) Church minister

c) Witchdoctor

d) Other (Specify) .....

**C. KNOWLEDGE ON MANAGEMENT OF DIARRHEA**

**3.1 When should you take the child who has diarrhea to a health facility immediately**

- a) Drinking poorly
- b) Blood in stool
- c) Develop fever
- d) becomes sicker
- e) Others (specify).....

**3.2 Have you ever heard of oral rehydration salts (ORS) sachet?**

- a) Yes
- b) No (go to Q 3.11)

**3.3 If yes where did you hear about the ORS sachet?**

- a) Radio/Television
- b) Health care provider
- c) Maternal and child health handbook
- c) Friend
- d) Banner/poster

e) Newspaper

f) Others (specify).....

**3.4 What is the ORS solution used for?**

a) Replacement of fluid lost during diarrhea

b) Stopping diarrhea

c) Don't know

d) Other (specify).....

**3.5 Is it easy to get ORS sachets?**

a) Yes

b) No

**3.6 If no why?**

.....  
.....

**3.7 Where can you obtain the ORS sachets from?**

a) Health facility

b) Community health worker

c) Private pharmacy

d) Neighbor/friend/relative

e) Others (specify).....

**3.8 Do you find it easy to remember the steps in making ORS solution?**

a) Yes

b) No

**3.9 If no why?**

.....  
.....

**3.10 How long should you keep the prepared ORS?**

a) Until it is finished

b) Six hours

c) Twelve hours

d) Others (specify) .....

**3.11 What type of water do you use to mix ORS solution?**

a) Previously boiled and cooled water

b) Any available water

c) Boiling water

d) Other (specify) .....

**USE OF ZINC SUPPLEMENTATION**

**3.12 Have you ever heard about zinc tablets/ supplements?**

a) Yes

b) No (go to Q 3.18)

**3.13 If yes where did you hear about zinc supplementation?**

a) Radio/Television

b) Health care provider\friend

c) Maternal and child health handbook

c) Banner/poster

d) Newspaper

e) Other (specify).....

**3.14 What is zinc tablets/ supplements used for?**

a) Replacement of fluid lost during diarrhea

b) Stopping the diarrhea

c) Don't know

d) Other (specify).....

**3.15 Is it easy to get zinc tablets?**

a) Yes

b) No

**3.16 If no why?**

.....  
.....

**3.17 How many days should you give zinc to a child with diarrhea?**

a) Until diarrhea stop

b) 7 days

c) 10-14 days

d) Don't know

e) Other specify.....

**D PRIOR ACTIONS TAKEN BEFORE SEEKING HEALTH CARE SERVICES**

**4.1 How many days has the child had diarrhea?**

.....

**4.2 How much fluid have you been giving the child since diarrhea started?**

a) More than the usual amount

b) Less than the usual amount

**4.3 Have you been giving ORS solution?**

a) Yes

b) No

**4.4 If yes**

**How often have you been giving ORS to the child?**

a) After the passage of each watery stool

b) Every half an hour

c) Whenever the child wants to take

d) Morning, mid-day and night

e) Other (specify) .....

**4.5 How much ORS solution have you given your child in the last 24 hours?**

a) As much as the child can take

b) One cup

c) Other (specify).....

**4.6 If no why?**

.....  
.....

**4.7 Have you given your child a zinc product since diarrhea started?**

a) Yes

b) No

**4.8 If yes where did you obtain the zinc product?**

a) Community health worker

b) Health facility

c) Private clinic/ pharmacy

d) Friend/ relative

e) Other (specify).....

**4.9 Are you still giving your child zinc supplements?**

a) Yes

b) No

**4.10 If no why?**

.....  
.....

**4.11 Have you been giving your child any of the home-prepared fluids since diarrhea started?**

- a) Yes
- b) No

**If yes which ones**

- a) Cereal gruel (Uji)
- b) Fresh and fermented milk
- c) Fresh fruit juices
- d) Soups prepared from meat, fish and chicken
- e) Clean, safe water
- f) Tea with milk
- g) Tea without milk
- h) Rice water
- i) Others (specify).....

**4.12 How many times have you been giving the child home-prepared fluids?**

- a) After the passage of each watery stool
- b) Every half an hour
- c) Whenever the child wants to take

d) Morning, mid-day and night

e) Frequently

f) Other (specify) .....

**4.13 Do you breastfeed your child?**

a) Yes

b) No (go to 4.15)

**4.14 If yes, how have you been breastfeeding the child since the time diarrhea started?**

c) Breastfed about the same amount (Same amount as usual)

a) Breastfed more

b) Breastfed less

d) Other (specify) .....

**4.15 How much food have you been giving the child since the time diarrhea started?**

c) The same amount as usual

a) More food

b) Less amount of food

d) Nothing to eat

**4.16 Have you withheld any type of food or drink from the child since diarrhea started?**

a) Yes

b) No

**4.17 If yes which food or drink and why?**

.....  
.....  
.....

**4.18 Was the child given any medication other than ORS or zinc to treat diarrhea during the illness?**

a) Yes

b) No

**4.19 If yes which one**

- a) Home remedies (specify).....
- b) Herbal treatment
- c) Antidiarrheal (specify).....
- d) Antibiotics (specify).....
- e) Other categories (specify) .....

**THANK YOU FOR YOUR TIME AND COOPERATION**



### **APPENDIX III: FOCUSED GROUP DISCUSSION GUIDE**

Focused group discussion guide for the research on determinants of dehydration among under- five years presenting to Mbagathi County Hospital with acute diarrhea.

#### **1. Introduction**

Welcome and thank you for taking time to participate in this discussion today. My names are Mary Wanjeri Muriu a master's of public health student at Kenyatta University. I am carrying out a research on determinants of moderate to severe dehydration among mothers of children under five years attending Mbagathi District Hospital. With me is (NOTE TAKER NAME) and he/she will be assisting in this session.

#### **2. Ground Rules**

We are interested in all of your opinions and feelings and therefore do not fear while giving your opinions. We need your ideas, so any criticisms you have will not hurt our feelings. We encourage you to provide frank comments that will improve our study. Some of you may agree or disagree with each other, which is perfectly normal, but please do not comment on others views as wrong or right. Do not wait for the moderator to ask for your opinion. Feel free to speak at any time, however, please try to avoid interrupting others while they are talking. Everyone will have a chance to speak and all ideas, concerns, and opinions are of value to us. The session will last for about 50 minutes.

#### **3. Confidentiality**

Everything that is said in this room is confidential and we will not tell anyone that you participated in this discussion. A tape recorder will record the discussion because we do not want to miss any of your comments. No one outside this room will have access to

these tapes and they will be destroyed after the report is written. My assistant will also take some notes that will also help us in report writing. Does anyone have any questions or clarifications?

**Check the appropriate box**

Do you agree to participate in this session? **Yes**  **No**

Do you agree to be tape recorded? **Yes**  **No**

Participant's signature (one person on behalf of all members)

(Initials)..... Date.....

Interviewer signature (initials).....

Date of discussion: .....

Moderator.....

Venue.....

Note-take.....

Time started.....

Time Stopped .....

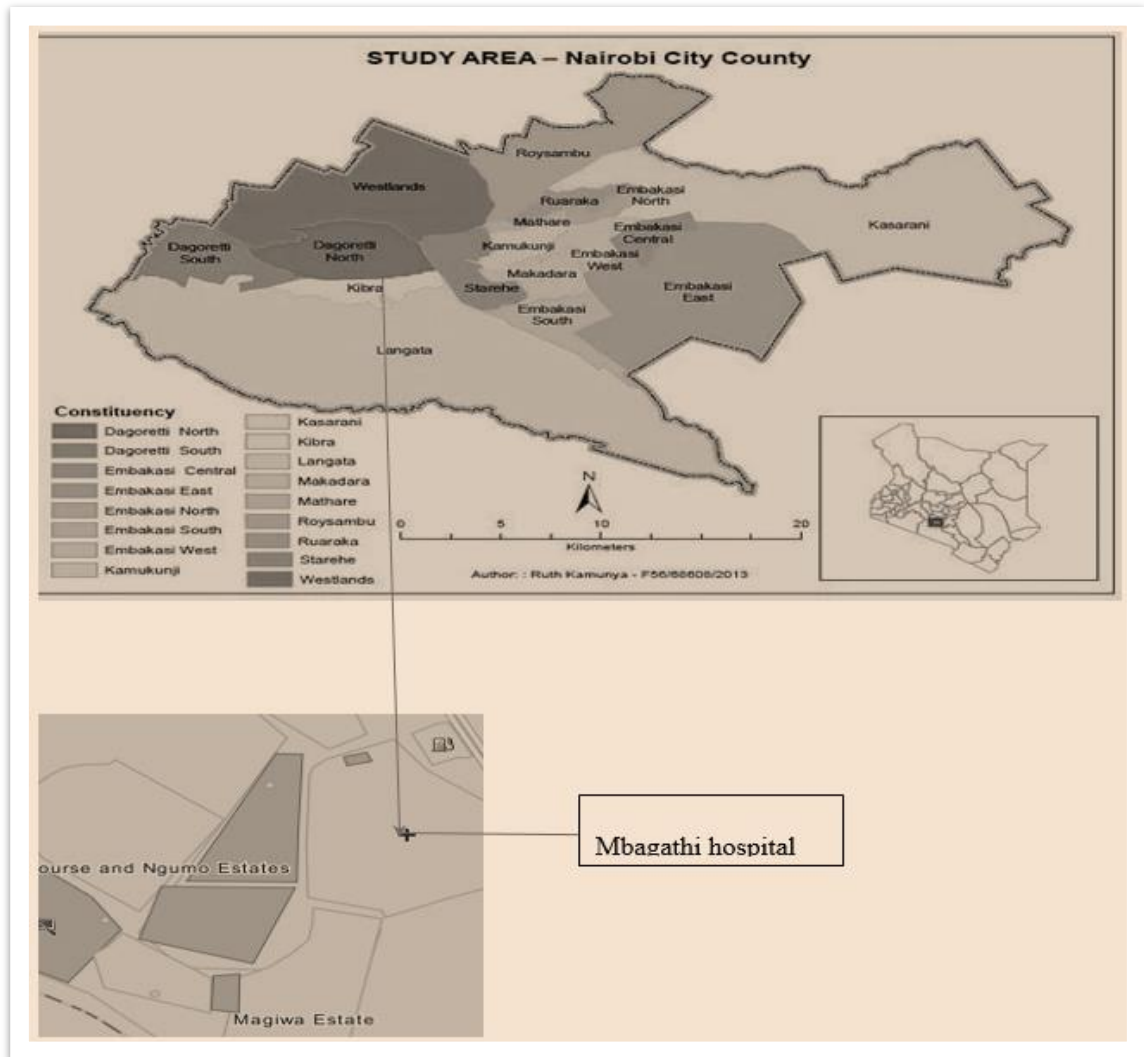
No. of participants at start .....

No of participants at stop: .....

Script code .....

1. Comment on the extent of under five children having dehydration as a result of diarrhea in this community from your experience and knowledge?
2. What are the aspects of a primary care giver that really determine whether a child suffering from diarrhea will complicate or not? Please explain
3. What cultural believes do you think are associated with management of diarrhea among under five children in this community? Please explain
4. Do you think most primary caregivers in this community have adequate and proper knowledge regarding management of diarrhea among the under five children?
5. Before seeking healthcare services, what do you think a primary caregiver can do at home to manage childhood diarrhea?

**APPENDIX IV: MAP OF THE STUDY AREA**



**APPENDIX V: APPROVAL OF RESEARCH PROPOSAL**

**KENYATTA UNIVERSITY  
GRADUATE SCHOOL**

E-mail: [dean-graduate@ku.ac.ke](mailto:dean-graduate@ku.ac.ke)

Website: [www.ku.ac.ke](http://www.ku.ac.ke)

P.O. Box 43844, 00100  
NAIROBI, KENYA  
Tel. 020-8704150

**Internal Memo**

**FROM:** Dean, Graduate School

**DATE:** 3<sup>rd</sup> November, 2020

**TO:** Ms. Mary Wanjeri Muriu  
C/o Department of Population,  
Reproductive Health & Community  
Resource Management

**REF:** Q139/CTY/PT/38742/17

**SUBJECT: APPROVAL OF RESEARCH PROPOSAL**

=====

We acknowledge receipt of your Research Proposal after fulfilling recommendations raised by the Graduate School Board of 11<sup>th</sup> September, 2020.

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation and Ethics Review Committee, Kenyatta University.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The Forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

**JULIA GITU**  
**FOR: DEAN, GRADUATE SCHOOL**



CC. Chairman, Department of Population, Reproductive Health & Community  
Resource Management

**Supervisors:**

1. Dr. Judy Mugo  
C/o Department of Population, Reproductive Health & CRM  
Kenyatta University
2. Dr. Redempta Mutisya  
C/o Department of Population, Reproductive Health & CRM  
Kenyatta University

## APPENDIX VI: KU-ERC APPROVAL LETTER



**KENYATTA UNIVERSITY  
ETHICS REVIEW COMMITTEE**

Fax: 8711242/8711575  
Email: [kuerc.chairman@ku.ac.ke](mailto:kuerc.chairman@ku.ac.ke)

P. O. Box 43844,  
Nairobi, 00100  
Tel: 8710901/12

Website: [www.ku.ac.ke](http://www.ku.ac.ke)

Our Ref: **KU/ERC/ COND. APPROVAL/VOL.1**

Date: 19<sup>th</sup> January, 2021

Mary Muriu  
P.O Box 43844, 00100  
Nairobi.

Dear Ms. Muriu,

**APPLICATION NUMBER: PKU/2183/11340 -DETERMINANTS OF DEHYDRATION AMONG CHILDREN UNDER FIVE YEARS WITH ACUTE DIARRHEA IN NAIROBI CITY COUNTY**

### 1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic “-Determinants of Dehydration among children under five years with acute Diarrhea in Nairobi City County”. Received on December, 2020 and discussed on January, 2021.

### 2. APPLICANT

Mary Muriu

### 3. SITE

Nairobi City County

### 4. DECISION

The committee has considered the research protocol in accordance with the Kenya University Research Policy (section 7.2.1.3) and the Kenya University Ethics Review Committee Guidelines and **APPROVED** that the research may proceed **ON CONDITION** that you incorporate its advice as below

**APPENDIX VII: NACOSTI RESEARCH LICENSE**

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 461446	Date of Issue: 16/February/2021
<b>RESEARCH LICENSE</b>	
	
<b>This is to Certify that Ms.. Mary Wanjeri Muriu of Kenyatta University, has been licensed to conduct research in Nairobi on the topic: DETERMINANTS OF DEHYDRATION AMONG CHILDREN UNDER FIVE YEARS WITH ACUTE DIARRHEA IN NAIROBI CITY COUNTY, KENYA for the period ending : 16/February/2022.</b>	
License No: NACOSTI/P/21/9081	
461446	
Applicant Identification Number	Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
	Verification QR Code
	
<p>NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.</p>	

## APPENDIX VIII: RESEARCH AUTHORIZATION LETTER



**NAIROBI  
METROPOLITAN  
SERVICES**



REF: EOP/NMS/HS/117

DATE: 9<sup>th</sup> March, 2021

MARY WANJERI MURIU  
Kenyatta University  
NAIROBI.

Dear Ms. Muriu,

**RE: RESEARCH AUTHORIZATION**

This is to inform you that the Nairobi Metropolitan Services - Health Directorate's Research Technical Working Group (RTWG) reviewed the documents on the study titled "Determinants of Dehydration Among Children Under 5 years with Acute Diarrhoea in Nairobi City County, Kenya."

I am pleased to inform you that you have been authorized to undertake the study in Nairobi, specifically at Mama Lucy Kibaki and Mbagathi Hospital in Nairobi. The researcher will be required to adhere to the ethical code of conduct for health research in accordance to the Science Technology and Innovation Act, 2013 and the approval procedure and protocol for research for Nairobi.

On completion of the study, you will submit one hard copy and one copy in PDF of the research findings to the RTWG. By copy of this letter, the Medical Superintendents - Mama Lucy Kibaki and Mbagathi Hospital are to accord you the necessary assistance to carry out this research study.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Ouma Oluga'.

**DR. OUMA OLUGA**  
**FOR: DIRECTOR HEALTH SERVICES**

Cc: Medical Superintendents:

- Mama Lucy Kibaki Hospital
- Mbagathi Hospital

**APPENDIX IX: RESEARCH AUTHORISATION LETTER**



**THE PRESIDENCY  
EXECUTIVE OFFICE OF THE PRESIDENT  
NAIROBI METROPOLITAN SERVICES**

Telephone:  
020 - 2297000  
E-mail: [medsupnedh@yahoo.com](mailto:medsupnedh@yahoo.com)  
When replying please quote

**MAMA LUCY KIBAKI HOSPITAL-EMBAKASI  
P.O. Box 1278-00515  
NAIROBI**

Ref: No.- MLKH/ADM/RES/1

Date: 4<sup>th</sup> June,2021

Mary Wanjiku Muriu  
Kenyatta University  
Nairobi

**RE: PERMISSION TO COLLECT DATA**

**TITLE: "DETERMINANTS OF DEHYDRATION AMONG CHILDREN UNDER 5 YEARS WITH ACUTE DIARRHOEA IN NAIROBI CITY COUNTY, KENYA."**

Refer to your application to collect data on the above research in this institution.

This is to inform you that the Hospital has given you permission to allow you collect data subject to the following.

1. You are expected to adhere to the rules and regulations pertaining to the data collection.
2. You are expected to submit a copy of the final findings collected after completion to the research committee.

  
**DR.EMMA MUTISO  
MEDICAL SUPERINTENDENT**



## APPENDIX X: RESEARCH AUTHORIZATION LETTER



**NAIROBI  
METROPOLITAN  
SERVICES**

*Mbagathi Hospital, P.O Box 20725 – 00202  
Email: [mbagathihosp@gmail.com](mailto:mbagathihosp@gmail.com)  
Tel: 0721311808, 2724712, 2725791*



**Date: 21<sup>st</sup> July, 2021**

**Mary Wanjeri Muriu  
Kenyatta University  
Nairobi.**

**RE: RESEARCH AUTHORIZATION.**

This is in reference to your application for authority to carry out a research on ***'Determinants of Dehydration Among Children Under 5 years with Acute Diarrhoea in Nairobi City County, Kenya.'***

I am pleased to inform you that your request to undertake research in the hospital has been granted.

On completion of the research, you are expected to submit one hard copy and one soft copy of the research report/ thesis to this office.

**Dr. David Kimutai  
For: Medical Superintendent  
Mbagathi Hospital.**

